



# ELECTRIC AGE.

DEVOTED TO ELECTRIC LIGHTING, ELECTRIC POWER, TELEGRAPHY, TELEPHONY, AND ALL PHASES OF ELECTRIC DEVELOPMENT.

VOL. VII—No. 19.

NEW YORK, MARCH 1, 1890

PRICE 10 CENTS.

## J. H. BUNNELL & CO.

76 CORTLANDT STREET,

New York.

### Telegraph

### Instruments,

### BATTERIES, BELLS AND ELECTRICAL SUPPLIES.

The Largest Stock and best variety of main line and short line instruments in any American establishment.



#### New "No. 2" Improved Mechanical Telegraph Instrument. (For Practice.)

Combined Key and Giant Sounder (without magnets—no battery required.) Works exactly like the very best Sounder and Key Combination Set, giving loud, clear sound, with slightest force on movement of Key. All made in first-class instrument composition. Brass, same pattern as best Giant Sounders. Price sent by mail, prepaid, with alphabet cards, etc., \$1.50. Complete Illustrated Telegraph Instruction Book sent free to any address.

SEND FOR OUR

### LATEST ILLUSTRATED PRICE LIST AND CATALOGUE.

#### No. 10 OF MARCH, 1889.

containing over four hundred cuts of Telegraph Instruments, Batteries and Electrical Appliances, FREE; also Manual of Telegraphy FREE to any Address.

## J. H. BUNNELL & CO.,

76 Cortlandt St., New York.

## THE E. S. GREELEY & CO.,

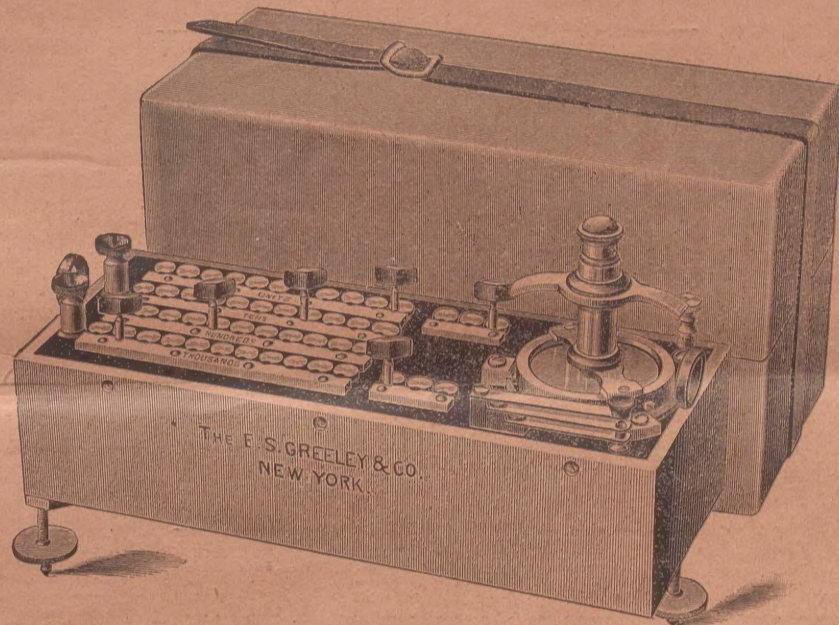
5 and 7 DEY STREET,

NEW YORK.

MANUFACTURERS AND IMPORTERS OF, DEALERS IN AND HEADQUARTERS FOR

Telegraph, Telephone, Electric Light, District, Burglar Alarm, ELECTRIC BELL, EXPERIMENTAL and GENERAL ELECTRICAL SUPPLIES.

SOLE MANUFACTURERS OF THE VICTOR TELEGRAPH INSTRUMENTS.



### NEW WHEATSTONE BRIDGE SET,

With Fibre Suspended Needle and Revolving Galvanometer mounted in a finely Polished Portable Case.

PRICE.....\$120.00.

The fibre suspension of the needle in this instrument secures extreme delicacy of action, the needle being strongly deflected through 1.1 megohms with five cells of Leclanché Battery. The act of closing the case releases the fibre from all tension, thus avoiding much of the risk of rupture in transportation.

The features of a revolving galvanometer and a variable and removable damping and directing magnet, conduces to rapid work and ease of manipulation. Measures accurately from  $\frac{1}{100}$  of an ohm to 1,111,000 ohms.

A full line of first-class Electrical Measurement Apparatus always in stock.

Sole Agents for the Celebrated Standard Electrical Measurement Instruments of the Electrical Manufacturing Co. of Troy.

We have always in stock every variety of Telegraph Instruments known to the craft, as well as Telegraph Supplies of every description.

## THE E. S. GREELEY & CO.,

5 and 7 DEY STREET.

NEW YORK.

## "C. & C." ELECTRIC MOTOR COMPANY,

402 & 404 GREENWICH STREET, NEW YORK.

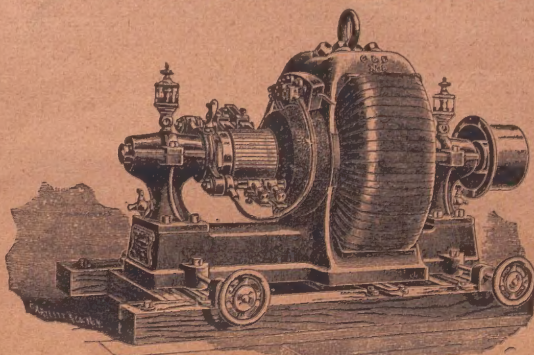
ALL STANDAND SIZES

—OF—

### Electric Motors

—FROM—

1-8 H. P. TO 40 H. P.



OVER 6,000 NOW IN USE

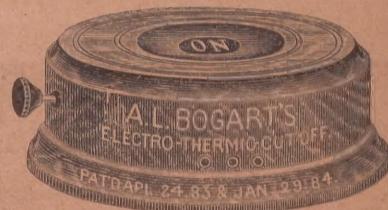
IN THE

UNITED STATES,

Running Sewing Machines, Elevators, Printing Presses, Ventilating Fans, Blowers, Coffee Mills, Polishing and Grinding Tools, etc.

New England Office, 148 High St., Boston.  
Philadelphia Office, 301 Arch Street.

Chicago Office, Phoenix Building.  
Cincinnati Office, 165 Walnut Street.



#### The Attention of Electric Fitters

Is directed to the merits of the above instrument for preserving from polarization batteries used in any class of open circuit work, whether gas-lighting, bells, clocks or watchmen's detectors. It is not only the simplest and most desirable, but the lowest priced instrument offered to the trade. Can be set for any length of time, from 1 to 60 seconds.

A. L. Bogart, 22 Union Square, N. Y. City.

—FOR—

## HIGH SPEED!!

PERFORATED

### Electric Leather Belting.

#### Chas. A. Schieren & Co.,

MANUFACTURERS.

New York. Chicago. Boston. Philadelphia.

## NOYES BROS.,

MANUFACTURERS OF

### Electric Light & Combination Fixtures.

We make a specialty of furnishing Supply and Construction Companies with ELECTRIC BRACKETS, made from our own or special designs.

Dealers will find it to their advantage to have our Descriptive Circulars and Price List before placing orders.

Correspondence solicited.

OFFICE AND WORKS, 83-87 FIFTH AVE., CHICAGO, ILL.

LEONARD PAGET. CHARLES J. KINTNER

PAGET & KINTNER,

Chemical & Electrical Experts & Electrical Engineers.

DOMESTIC AND FOREIGN PATENTS.

No. 45 Broadway,

New York.

### Electrical Test

INSTRUMENTS.

AMMETERS

AND

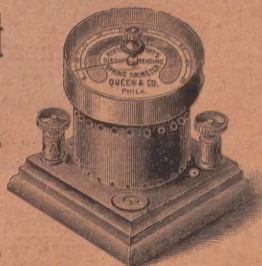
VOLTMETERS,

For Direct and Alternating Currents.

Queen's New Standard Resistance Boxes. Queen's New Portable Testing Sets. Complete Outfits for Insulation Tests.

### Queen & Co.,

SEND FOR CATALOGUES, PHILADELPHIA.





THE ELECTRIC AGE.

# THE BUTLER HARD RUBBER CO.,

33 Mercer Street, New York.

—MANUFACTURERS OF—

## Hard Rubber Goods of Every Description,

INCLUDING THE CELEBRATED HARD RUBBER BATTERY CELLS Manufactured under Kiel's Patents.

FOR PRIMARY AND STORAGE BATTERIES.

THE CHEAPEST AND BEST CELLS IN THE MARKET

Also, SHEET, ROD AND TUBING (Kiel's Patent) for Electrical Purposes, at Reduced Prices.

Standard Quality Sheet, Rod, Tubing, Insulator Hooks, Key Knobs, Switch Handles, Telephone Receivers and Battery Syringes constantly on hand. Hard Rubber specialties of all kinds made to order.

SEND FOR PRICES AND ESTIMATES. FOR SALE BY

**CENTRAL ELECTRIC CO., Chicago, Ill.**

## THE ONLY AWARD

—GIVEN FOR—

# Electric Railways

AT THE PARIS EXPOSITION OF 1889

WAS A **GOLD MEDAL** PRESENTED TO THE

## SPRAGUE ELECTRIC RAILWAY and MOTOR CO.

—FOR THE—

Most Perfect System of Electric Railway Equipment.

E. H. JOHNSON, PRESIDENT.

F. J. SPRAGUE, VICE-PRESIDENT.

A. S. BEVES, SECRETARY & TREASURER.

## SPRAGUE ELECTRIC RAILWAY AND MOTOR CO.,

16 AND 18 BROAD STREET, NEW YORK.

ESTABLISHED 1831.

## JOHN STEPHENSON COMPANY, Limited.

TRAM CAR BUILDERS,

47 East 27th St., New York.

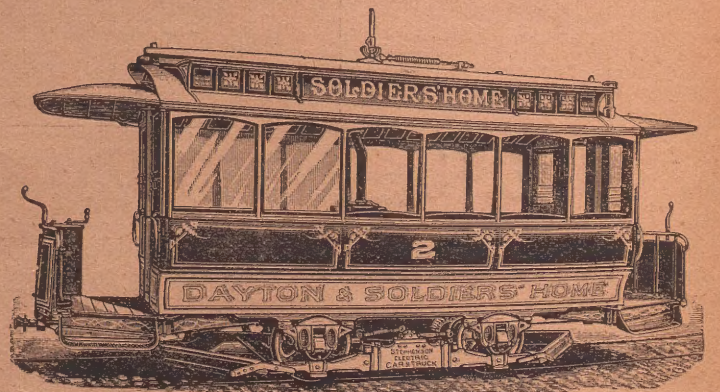
INVITE THE ATTENTION OF

PROMOTERS OF ELECTRIC RAILWAY ENTERPRISES

TO THEIR SUPERIOR FACILITIES FOR THE CONSTRUCTION OF

**TRAMWAY CARS**

AND FOR THEIR ADAPTATION TO THE VARIOUS SCHEMES OF ELECTRIC PROPULSION.



## ELECTRICAL BOOKS.

SEND FOR CATALOGUE.

**D. VAN NOSTRAND CO.,**  
23 MURRAY ST., 27 WARREN ST., NEW YORK.



## THE ELECTRIC AGE.

TELEGRAPH EDITION.

Published on the 1st and 16th of Every Month.

BY THE ELECTRIC AGE PUBLISHING CO.

J. B. TALTAVALL, President.

G. E. HOLBROOK, Secretary.

T. R. TALTAVALL, Treasurer.

ENTERED AS SECOND-CLASS MAIL MATTER.

Registered Cable Address, "Electage," New York.

## TERMS OF SUBSCRIPTION:

One Copy, one year, - - - - \$1.50  
Great Britain and other Countries, - 2.00

Subscribers should promptly notify us of any change in their addresses, giving the old as well as the new one, that they may receive all the papers they pay for.

## ADVERTISING RATES: \$2.00 PER INCH.

Four Line Notices, 50 cents.

T. R. TALTAVALL, Editor.

J. B. TALTAVALL, Business Manager.

R. J. GRAY, Manager, Advertising Department.

Address all communications to the Electric Age Pub.  
Co., No. 5 Dey Street, New York.

NEW YORK, MARCH 1, 1890.

## AUTHORIZED AGENTS FOR THIS PAPER.

Augusta, Ga.—C. E. Watson.  
Allentown, Pa.—D. E. Lerch.  
Baltimore, Md.—H. C. Wooden.  
Boston, Mass.—W. Hazelboom.  
Buffalo, N. Y.—J. M. Stambach.  
Bridgeport, Conn.—P. A. Moriarty.  
Cincinnati.—L. E. Moores.  
Cleveland.—J. J. Corrigan.  
Chicago.—C. S. Loewenthal.  
Columbus, O.—F. C. Rubrecht.  
Campbellton, N. B.—J. Vautier.  
Detroit, Mich.—F. B. Beach.  
Dayton, O.—W. C. Weinman.  
Dallas, Tex.—F. L. Saunders.  
Duluth, Minn.—E. D. Williams.  
Deming, N. Mex.—Mrs. M. E. Kaine.  
Erie, Pa.—Geo. J. Goiding.  
Evansville, Ind.—O. D. Richardson.  
Ft. Wayne, Ind.—J. H. Scherzgen.  
Hamilton, Ont.—J. J. Seitz.  
Helena, Mont.—B. F. Hartz.  
Jacksonville, Fla.—E. B. King.  
Kansas City, Mo.—B. C. Elder.  
Louisville, Ky.—F. Farrell.  
London, Ont.—D. Adams.  
Milwaukee.—A. P. Velle and A. Wilson.  
Minneapolis.—B. W. Parrott.  
Memphis.—W. B. Harvey.  
New Orleans.—S. M. English.  
New Brunswick, N. J.—W. C. Wineland.  
North Sydney, C. B.—L. W. Hoyt.  
Newburg, N. Y.—John Mitchell.  
Newark, N. J.—E. A. Coney.  
New York.—H. I. Jolley, 195 Broadway.  
Pittsburgh.—W. E. Burns.  
Portland, Me.—K. W. Starbird.  
Philadelphia.—L. Miller and J. E. Janney.  
Petersburg, Va.—S. D. DeShazor.  
Plattsburg, N. Y.—G. W. Hickey.  
Port Arthur, Ont.—C. L. Hallett.  
Raleigh, N. C.—P. H. Hughes.  
Rochester, N. Y.—D. B. Hendricks.  
Reno, Nev.—E. A. Kilbourne.  
San Francisco, Cal.—H. M. Graham.  
Sioux City, Ia.—J. P. Slack.  
Savannah, Ga.—G. W. Spaid.  
St. Louis.—C. D. Lee.  
Syracuse, N. Y.—S. H. Eiker.  
St. Paul, Minn.—B. F. Wright.  
Toronto.—W. J. Anderson.  
Victoria, B. C.—Wm. Christie.  
Washington.—H. D. Robinson.  
Winnipeg, Man.—  
Wheeling, W. Va.—J. W. Wells.  
Watertown, N. Y.—E. B. Holcomb.

## THE POSTAL TELEGRAPH SCHEME.

At a meeting of the House Committee on post-offices and post-roads, held at Washington on February 18th, Postmaster-General Wanamaker and President A. B. Chandler, of the Postal Telegraph Company, were questioned concerning the bill prepared by the Postmaster-General for the establishment of a government telegraph system.

Mr. Wanamaker introduced the subject by saying that he never had any personal difficulty with the Western Union Telegraph Company. His first hope, he said, had been to persuade the Western Union Company to look at the matter of telegraph rates as he saw them. But he had failed in that. He said he wanted it distinctly understood that there was no personal feeling in his coming before the Committee, and he had offered the present bill simply as a study for the Com-

mittee. He said it would be agreeable to him to have Section 7 of his bill—that fixing rates—amended so as to vest the Postmaster-General with the power of fixing the rates and allowing him to change them from time to time. He also said he thought the Civil Service Commission should control the proposed new service, and he would also recommend that the bill be amended so as to prevent the use of the wires for political purposes by employes and others.

In response to questions, Mr. Wanamaker said that the difficulty of getting a contract flexible in its character, so that the Government might take the advantages of new inventions occurring during the ten years of the contract, was not so troublesome as it might seem. He then reiterated his statement that he wanted it clearly understood that there never had been and could not be any feeling between himself and the Western Union. He was not making any reflection on the telegraph companies on account of their rates, as that was purely a business matter. The day was coming when there would be a uniform postal system reaching over the entire country, and the initiative must proceed in the line now proposed. The present machinery of the Post-Office Department should be used. He would start the system with the free-delivery offices, believing that before Congress adjourned it would greatly increase that service.

His whole aim in using the employes now engaged was to obviate the objections which had been raised that a postal telegraph would take a great deal of money from the Treasury and would bring in a new army of employes. He knew the telegraph people thought his scheme visionary. He insisted that it was not a new thing for capitalists to organize telegraph companies. The present instance would offer a great inducement for capitalists, as it would not require so much money as starting new telegraph companies did in olden times. The offices were already provided, and a large amount of business was already assured. If the Government should fail to get a satisfactory contract, he contended, nothing would be lost by the experiment.

Mr. Chandler said he was very much in sympathy with the Postmaster-General in his desire to serve the public interests, but not to the same extent that he was, because the Postmaster-General was a public officer and he (Chandler) was not. "We want," he said "to serve the interests of the Government in every proper way, but we do not want to see a Government telegraph established or the beginning of a Government telegraph that will destroy seven or eight million dollars which we have invested in this property and make it valueless. We do not think the Government has a right to do that, and if it has that right, we think it would be unjust and very unreasonable to exercise it."

THE NEW YORK TELEGRAPHERS' AID SOCIETY.—The annual meeting of this society will be held on Wednesday, March 12th, at 6 P. M., in room 55, Western Union Building. The election of officers and standing committees for the ensuing year will take place and other important business will be transacted. Some changes in the Constitution and By-laws will be considered and acted upon. Among these is an amendment to Article 5, Section 2, of the Constitution providing that \$8 per week shall be paid in case of sickness or disability of any member in good standing, provided, however, that such sickness or disability is not the result of intemperate use of alcoholic stimulants or narcotics.

REPORTED PURCHASE OF THE EMPIRE AND BAY STATE TELEGRAPH CO.—It has been reported from Boston, on very good authority, that the lines of the Empire and Bay State Telegraph Co. have been sold to the Western Union.

LATER.—The above report has been confirmed, and the Western Union Telegraph Company are now in virtual possession of the Empire and Bay State Company's property.

## THE FAST SENDING TOURNAMENT.

Interest in the Fast Sending Tournament is increasing, and there is no question that it will be an event of great importance.

The time and place have been settled upon. The contest will take place on Thursday, April 10th next, in Hardman Hall, 5th avenue and 19th st. There will be afternoon and evening sessions.

The conditions governing the tournament are as follows:

1. Number of words to be transmitted.—From 250 to 500, according to number of entries.
2. Qualifications.—Speed combined with excellence.

The instruments to be used will be furnished by the leading electrical manufacturers who have contributed money for prizes.

Classification.—Class A: Open for all.

Class B: Open for all; barring those who have a record of better than 11 minutes on the 500 words used in the last contest.

Ladies Class: Free for all.

Old Timers Class: Open for those who were in the service prior to 1865.

Entrance fee \$2, except in the ladies class.

The transmission by each operator will be recorded with a Caligraph in the hands of an expert operator, thereby demonstrating the value of the writing machine worked in conjunction with the telegraph.

Under date of Feb. 17th, C. W. Summers, manager of the Western Union office at Schriever, La., addresses the manager of the Western Union Telegraph Co., New York, as follows: "I will challenge the winner of the first prize in the coming contest to be held in your city in April next, to determine the shortest time a given number of words can be telegraphed, in a like contest of 100 words for \$500 a side; same to take place at any given place and time. Please inform committee."

Mr. T. A. Edison sends a liberal contribution with his best wishes. It is not unlikely that Mr. Edison will be present if he is in town. An effort will be made by his friends to have him in the hall.

The entries will close on March 18th, and we understand that there is a good deal of quiet work being done by intending contestants, in their efforts to attain a speed in private that will insure an entrance as a contestant.

Any person desiring a copy of the matter transmitted in the contests of 1884-85 with records then made, bearing names of contestants, judges, time, etc., can procure the same by sending a stamped and addressed envelope to Mr. Fred Catlin, 195 Broadway, New York.

ENTERPRISE APPRECIATED.—During the recent floods, snowslides, etc., in Oregon, the Pacific postal officials at Portland showed great enterprise in maintaining telegraphic communication with the East, while at the same time the Western Union Company were disabled. That these efforts were fully appreciated by the management of the Postal company may be seen by the following copy of a telegram sent to Manager J. W. Hayes, of the Portland office:

"SAN FRANCISCO, Feb. 8.

"J. W. Hayes and staff, Portland, Ore: I have seen your message of last night, and wish to say to yourself and staff that your efforts to restore and keep up communication are fully appreciated.

"JOHN W. MACKAY."

A messenger boy having heard the operators speaking about a duplex, but not understanding what it was, suddenly grew wise in the following manner. One of the operators was receiving a "duplicate" message. The messenger in question happened to be looking over the operator's shoulder and spied the word "duplicate." He suddenly exclaimed as the idea struck him: "Oh, I know what de duplex is for now; it's for receiving duplicates on."



## A RIVAL OF THE PHONOGRAPH.

A despatch from Berlin conveys the intelligence that the phonograph has been beaten in competition in that city by a grammophone.

Berliner patented his grammophone several years ago, and it was exhibited in this city, Washington, Boston and elsewhere, but was not considered a serious rival of the phonograph, owing to its being more complicated and cumbersome.

Jesse H. Lippincott, President of the North American Phonograph Company, and licensee of the American Graphophone Company, says Berliner's machine is impracticable mechanically. It will do very well to use in a hall to record musical sounds, but is too unwieldy for ordinary commercial use.

The Edison people say that the fact that Professor Siemens was present at the trial does not carry much weight, as the result is not given as his verdict.

It is also stated that the Edison phonograph used at the trial was one of those exhibited at the Paris Exhibition, while since his return from Europe the inventor has made several important improvements to his instrument.

**WATER POWER.**—The London *Electrical Review* says: "The successful working of the Central Station at Keswick by means of water power should bring a considerable amount of attention to this method of obtaining power. There can be no question but that there are many places which do not require a very large amount of light, and where coal is expensive, which would very readily be supplied by means of water power close at hand. The economy of working is great, and the ease of regulation is known, and the only danger to be feared is the scarcity of supply from exceptional drought. This has been met with at Keswick by the addition of steam power as an alternative. Electric lighting by means of waterpower is well known, but this is, we believe, the very first application of it to the purposes of a central station in this country. The first instance of a private installation was, we believe, at Sir Wm. Armstrong's house, where water was used. But perhaps the best known was that at Hatfield, where a varied amount of work is done on the Marquis of Salisbury's estate."

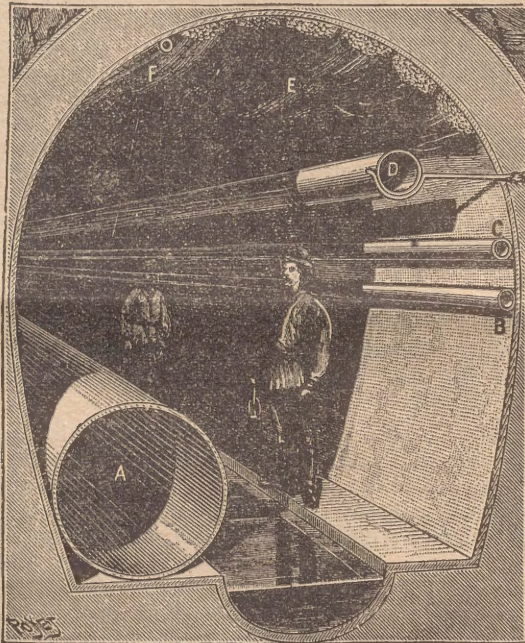
The Tucker Electrical Construction Company of this city report a large increase of business. This company has completed some of the largest contracts in the United States. Among them are mentioned the Plaza Hotel, Plaza Club, Amberg Theatre, New York Turn Verein Club, Consolidated Stock Exchange, Rouss Building (of which favorable mention was made in our issue of Feb. 8) and numerous other large buildings. The company employs the best talent, and the highest grade materials and all their work has given complete satisfaction. The President Chas. A. Tucker, through his genial qualities, has built a large and increasing business.

**THE EDISON-LALANDE BATTERY.**—The Edison-Lalande battery is attracting a good deal of attention among electricians. As a telegraph battery it seems to have taken the lead of all other makes. This is not to be wondered at when its valuable features are considered. The Philadelphia and Reading Railroad are about to instal a battery of 232 cells of the Edison-Lalande type, from which it is proposed to run eight wires. The total cost of labor in maintaining this battery will be \$14.60 per year. The Pennsylvania Railroad Company are also going to introduce this battery in its Philadelphia office, and run 14 wires therefrom. It is possible to supply 30 wires with current from one of these batteries. The resistance of 100 cells is only  $2\frac{1}{2}$  ohms, which renders this battery particularly adapted to supplying several wires from one source.

## ELECTRIC WIRES, ETC., IN THE PARIS SEWERS.

In Paris the city station Bergere has aërial cables, and these are used by the Faubourg St. Martin station. But the new companies that have just received grants will be able to establish subways only. The sewers have been reserved for the cables of the municipal service. If we consider that the cables, although protected by mouldings or otherwise, are at the mercy of the force of workmen who traverse the sewer, and are exposed to humidity and several other causes of damage, this is perhaps not an advantage. It must, moreover, be remarked that the sewers are greatly encumbered by telephone and telegraph cables, and by pipes for distributing compressed air.

In the illustration we show a section of a sewer in Opera avenue. At *A* there is a water main,  $3\frac{1}{4}$  feet in diameter; at *B* and *C*, two 4 inch water pipes; at *D*, an 8 inch pipe for the distribution of compressed air; at *E*, several large bundles of telegraph and telephone wires; and at *F*, a pipe for the passage of compressed air for setting pneumatic clocks. To these still should be added the pipes that serve for the pneumatic post of Paris. The large



PARIS SEWERS.

number of conductors already established will be especially remarked. Under such conditions for the placing of wires, especially for alternating currents, it is indispensable to take precautions against the phenomena of induction. It might seem as if the most advantageous means for this purpose would consist in the adoption of concentric cables. Now, such cables, which are already employed in several distributions, present great inconveniences, both as regards making connections and the security of the service, and, despite experiments, the use of them has not as yet entered thoroughly into practice. It is probable that the sewers will not be used for this purpose. The various electric lighting companies are taxing their wits to find models of subways for the laying of their cables as advantageously as possible.

We shall not fail, when the occasion occurs, to describe the principal methods employed, and which will finally settle us as to the practical establishment of subways—a question which is certainly the most important one in distributions.—*La Nature*.

The East Cleveland Railroad Company, of Cleveland, Ohio, have just put in three 250 horse power engines, and increased their rolling stock by the addition of 18 motor cars.

## HONORS TO GEN. O. E. MADDEN.

The friends of Gen. O. E. Madden, who sailed for Europe on Wednesday, February 12th gave a dinner in his honor at the Electric Club on the evening of the 7th, which was one of the most enjoyable affairs of the many that have taken place since the opening of the club house.

The tables were laid in the large lecture-room of the club, and were beautifully decorated with "fairy lamps" placed among cut flowers and smilax. The centre-piece was a large floral steamship, bearing the name of the steamer *Lahn*, on which General Madden is to sail, and the words "*Bon voyage to O. E. M.*"

Mr. Henry L. Storke presided, and among the gentlemen present were his honor, Mayor Hart, of Boston; Allen V. Garratt, F. W. Toppan, W. L. Candee, A. H. Patterson, C. O. Baker, Jr., H. B. Thayer, W. D. Sargent, E. A. Leslie, Henry D. Stanley, A. F. Stanley, Paul T. Brady, B. Coggeshall, J. C. Chamberlain, F. Z. Maguire, J. J. Carty, C. F. Willard, Robert J. Steen, D. Frank Lloyd, Schuyler S. Wheeler, E. T. Gilliland, Charles W. Price, J. H. Guest, A. B. Uline, T. E. Gardner, Charles P. Bruch, P. H. Alexander, George Worthington, and others prominent in electrical circles to the number of forty.

An elegant dinner was served, after which addresses were made by Mayor Hart, Mr. Patterson, Mr. Wheeler, Mr. Gilliland, Mr. Sargent, Mr. Candee, and many others, and songs were sung by Lieut. Toppan, Mr. Patterson and Mr. Maguire.

Gen. Madden had the best wishes of all for a pleasant and safe journey, and received many compliments and congratulations upon the excellent condition and continued success of the club under his management as its president.

He expects to remain abroad about eight weeks, combining business with pleasure, in England and on the continent.

**A NEW DYNAMO.**—A new invention is an alternating current apparatus that is an automatic continuous current machine, designed to operate without the intervention of external regulating apparatus. By making the armature winding of high resistance, a practically constant current is maintained under wide limits of load. The essential feature of the construction lies in the nature of the windings on the armature poles. These coils consist of many convolutions, so that a slight variation in the quantity of current flowing through the coils produces considerable variation in the ampère turns. In the operation of the machine, according to the inventor, the strong field magnets tend to develop a large number of lines of force, and the alternate currents generated tend to set up in the armature core lines of force which oppose or stem back a portion of the lines of force of the field magnet pole, toward which it is moving, thus permitting only a comparatively few to be effective in generating an electro-motive force in the armature coils. These two tendencies to establish lines of force may be considered as the magnetic potentials of the field and armature. The excess of the magnetic potential of the field above that of the armature at the time when the field poles are effective in sending lines of force through the armature-core is that which is effective in producing electro-motive force in the armature coils. The number of lines of force resulting from this difference of magnetic potentials, and which are thus effective in developing currents on the armature coils, will remain approximately constant so long as the resistance offered to the flow of the current on the work circuit remains constant; but as the resistance increases, the tendency of the armature current to be diminished will allow a greater number of lines of force to cut the armature coils, thus increasing the electro-motive force sufficiently to hold the current approximately at a predetermined value.



ELECTRICITY IN THERAPEUTICS.

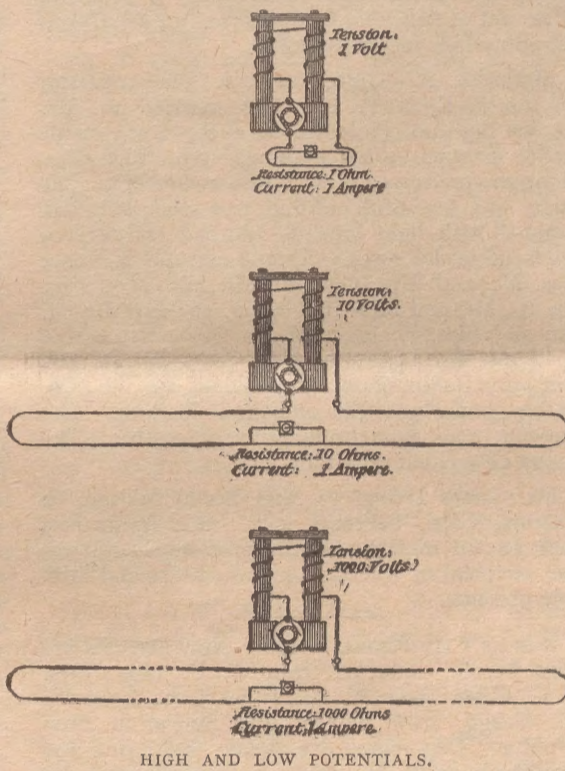
The costliness, the care and the special knowledge required to keep an electrical outfit in good working order and to properly apply it are the reasons for the diversity of opinions among medical men as to the value of electricity as a therapeutic agent. It seems most difficult of belief that scientists should reckon the value of a thing of this nature by the dollars and cents of its cost and the amount of special knowledge required; but such is the fact. You will hear a physician sneer when electricity is mentioned, and say something about imagining that it is an elixir of life and that sort of thing, all because he cannot afford to keep an apparatus himself, or will not, or is too lazy to acquire the learning necessary to practice with it. There are also some who are really prejudiced against it for what they believe to be good reasons. Any one, however, who has seen the mechanism of an asphyxiated new-born babe set in operation by the aid of a little pocket faradization machine will scarcely be in a mood to listen to the croak of the pessimists who call up cases where electrification of the heart has ensued from the blundering of an unskillful or careless physician. And his feelings of patience toward the aforesaid pessimist would scarcely mellow when he has seen the same little machine stop a *post-partum* hemorrhage that had proved rebellious to all other safe measures known; if he has seen galvanism, followed by faradization, not only bring back the lost plumpness of paralyzed muscles, but also—even if he cannot say how—lead the patient along the only road that ends in regeneration of the diseased spinal cord; if he has seen the cautery wire bury itself bloodlessly in parts that he would not have dared attack with a knife; or even if he had seen faradization give comfort in a few moments to a person suffering with muscular rheumatism. There ought to be no doubt entertained of the great therapeutic value of electricity; what is wanted is more precise knowledge as to when and how to use it. That knowledge must be obtained by experimental work, guided by correct knowledge of physiology and pathology. —*New York Medical Journal.*

A NEW STORAGE BATTERY ELECTRIC MOTOR—E. Dederick, a Milwaukee inventor, has invented a storage battery electric motor, which he thinks solves the problem of electric rapid transit. At each end of the car are two closets which contain the storage battery cells, of which twenty-five are placed in each closet. The cells are all connected and unite with armature of the motor. The latter sets in motion two small leather-covered wheels, which press closely against the large wheels. At the center of the shaft, connecting the large wheels, is a third small wheel that in turn presses closely against another large wheel. In this case, however, a lever in the hands of the operator enables him to raise or lower one of the wheels, and by applying the brake stop the car. The motor continues to run, and the momentum gained thereby starts the car much quicker than if the motor had to be stopped every time. A pitman at each side of the last-mentioned wheels connects with the apparatus which sets the track wheels in motion, and this is the point on which Dederick claims the success of his invention hinges. The pitman rods set in motion two grippers, which are attached to the axle of the rear car wheels, the action being alternating. At the instant one gripper lets go the other connects, and a constant motion is thus given to the car. Two small levers are attached to the gripping apparatus, and by changing the position of these the action of the grippers and the motion of the car are reversed. When the battery has been fully charged, which takes from four to five hours, it is said that the car can run for eighteen hours.

A project is on foot to connect Richmond and Petersburg, Va., by an electric railway.

HIGH AND LOW TENSION ELECTRIC CIRCUITS.

An error in scientific nomenclature does not always imply ignorance. The chemist invariably calls carbonous oxide carbonic oxide, and calls the higher oxide of carbon either carbonic acid or carbonic acid gas. Several such inaccuracies have become so engrafted upon the science that they are accepted and used universally. Electricity has been defined as the science of measurements. It might with more propriety have been termed the science of nomenclature and definition. Any tendency to error in its terminology is to be avoided. Every day an inaccuracy is perpetrated by electricians as well as by the laity which should be stopped, especially as no end is served by its continuance. It is the use of the term high and low tension current or high and low potential current. Neither tension nor potential can be attributes of an electric current. The use of such an expression may conduce to convenience; but if for the word "current" either "system" or "circuit" be substituted, an improvement at least is effected. The worst of the matter is that this application of the term tension has given a false conception of the true nature of a current.



HIGH AND LOW POTENTIALS.

A current passing through a circuit is urged by electromotive force, or by difference of potential, which, in a certain sense, forces the current through the wire. The term tension is correct if used to denote the difference of potential; but it no more expresses an attribute of the current than the elevation of Lake Glazier expresses an attribute of the flow of the Mississippi. It influences its flow, but is not a function of it.

The error is worse when a current of so many volts is spoken of. A current is rated by amperes, not by volts. A wire carries current at the rate of so many amperes, a current cannot be measured in or be designated by volts.

Some diagrams are given to show when a current is produced how a high and low potential difference may produce absolutely identical currents. For convenience simple numbers will be used throughout the description.

Three dynamos with their circuits are shown. The first dynamo is supposed to maintain a difference of potential of one volt at its terminals. The terminals are supposed to be connected with a wire ten feet long of one ohm resistance. A current of one ampere will pass through the wire.

The second dynamo is supposed to maintain a difference of potential of ten volts, and to have its terminals connected by one hundred feet of the same wire. This will give a current of one ampere

just as before. Finally the third dynamo is supposed to give a difference of potential of one thousand volts, its current passing through ten thousand feet of the same wire. As before, the current will be of one ampere intensity. Under the popular terminology, the first two cases would be called low tension currents and the last a high tension current. Yet the currents in the three cases are absolutely identical.

To illustrate this still further, equal lengths of the different circuits can be compared. Suppose a section of five feet is taken and its electrical data determined. It will in all three cases be found to be passing a current of one ampere intensity. The difference of potential from end to end of the section will in all three cases be one-half a volt. Thus if equal portions are compared, the three currents, high and low tension "currents" so-called, are found to be identical. In like manner if ten foot sections of the different wires be compared, the same current of one ampere, with a difference of potential of one volt, will be found in all three. The popular term indicates the original difference of potential, but is very incorrectly used. It would be far better to consider the whole circuit with its generator and apply the adjective to it—speaking of a high or low tension circuit or of a 1,000 volt circuit, alluding in all cases to the maximum difference of potential that is maintained in the circuit when in operation.—*Scientific American.*

FAVORABLE TO ELECTRIC POWER:—Experts have for some time been experimenting and estimating upon the comparative cost of running a line of street cars by electricity and by horse-power. After careful inquiry and investigation they have reported that taking a line of fifty cars the average cost of operating per day with horses is \$303.75, while with electricity the cost is but \$68.50. This leaves a handsome balance of \$231.25 a day, or nearly \$5 a day on each car in favor of the electric plant. These facts being verified street car companies should not be slow in adopting the new motive power, as a line running fifty cars would save enough in a single year to go a great way towards equipping their cars with electric appliances for propelling them.

TESTS OF SAFETY APPLIANCES.—At the present time Boston is foremost in the investigation and solution of electric light problems. The conflagration of last Thanksgiving Day was a costly experience, and, as the fire is generally supposed to have been caused by an electric current, the insurance people are taking the matter up themselves and making investigations as to means of removing the dangers in the use of electric light currents. The Fire Underwriters' Union are about to undertake a series of the most searching and crucial tests of every known device for protection against the dangers of heavy currents. Inventors and manufacturers are invited to submit their appliances for tests, and it is said that the electrical people are in perfect harmony with the movement, and are co-operating with considerable zeal.

ELECTRIC LIGHTING IN LONDON.—A cable message from London, England, for Westinghouse alternating current apparatus for 30,000 incandescent lights was received at the office of the company a few days since. The order came from the Metropolitan Electric Supply Company of London. The same organization has already several plants in the English metropolis, which are all fitted out with machinery from Pittsburg. The cable states that the shipment of the machinery must be made immediately. The entire outfit for this plant, consisting of Westinghouse engines, dynamos, excitors and other electrical appliances, will be got ready for shipment at once.

ELECTRIC RAILWAYS.—The Sioux City (Iowa) Rapid Transit Company have let a contract to equip 1 1/8 miles of their road electrically.



A REMINISCENCE OF THE EARLY DAYS  
OF THE TELEPHONE AND PHONOGRAPH.

BY THOMAS R. TALTAVALL.

One evening during the summer of 1877 or 1878 business on the usually very active Washington wire of the Associated Press was very dull, and for the time being the sounder had ceased its clicking. All was quiet along the line and I sat at my desk in the New York office, reading. The soft notes of Trinity's chimes had hardly died away after striking the hour of nine, when the silence on the wire was broken. The sounder clicked spasmodically for a few moments, and my discriminating ear told me at once that there was a stranger on the wire. First a few dots were made, then there was a pause as if the stranger was trying to make up his mind what to say or do. Presently he began to call "N Y", as if to get his bearings, for he evidently did not know what wire he was on. I broke in and informed him he could not get "N Y on this wire," adding that he was on the Associated Press wire. Up to this time I had had no clue as to the identity of my unseen correspondent, so I asked him who he was. Distinctly and promptly came back the reply, "Edison, Menlo Park."

Edison, at that time, was located at Menlo Park, and through his inventions in connection with the telephone and phonograph—both of which were still in their swaddling clothes, and only read of—his name was a household word. Everybody was talking about Edison and his wonderful inventions, and Menlo Park. Hence, on the occasion mentioned, it was with considerable interest that I exchanged compliments with the man whose fame had already spread to the widest limits of Christendom.

"Would you like to hear some music?" he asked.

Replying that I would be pleased to be so entertained, I was puzzled to know how he would accomplish his object.

"Screw the armature of your relay up tight," he said, "and move the magnets up as close as possible, without touching; then listen."

I did as he directed, and in a few moments the notes of a cornet, as soft and sweet as the summer breezes, broke the silence. They had a far-away sound, which made them all the sweeter, but they were quite audible to those in the office, notwithstanding the crude apparatus on which they were translated. Every one turned with open ears to locate the direction of the sounds, and in a few moments my desk was the centre of attraction.

After a tune on the cornet the entertainment was varied, and some vocal music was given, then some whistling, all of which was well reproduced considering the character of the receiving apparatus.

The instruments were then restored to their normal condition, and Mr. Edison inquired how it reached us. After informing him, and assuring him of the extreme pleasure his novel entertainment had afforded us all, he bade me "Good Night," and disappeared, leaving us with the notes of the charming music still ringing in our delighted ears.

**COURTING BY WIRE.**—When business is dull many a pleasant hour is spent by telegraph operators in talking over the wire. A certain telegraph operator in Maine first became acquainted with the young lady who is now his wife over the wire. They used to chat every evening after business hours. One day this young man thought he would take a trip down the line and see the young lady with whom he had done so much talking. It was a case of love at first sight, and the couple were soon married.

**THE AMERICAN RAPID ABSORBED.**—The American Rapid Telegraph lines are soon to be transferred to the Postal system.

**MARRIED.**—A quiet but notable home wedding was that of Miss Grace Aldrich, daughter of Mrs. John H. Aldrich, and Hector de Castro, the Vice-President of the Commercial Cable Company, solemnized on the 12th February at the residence of the bride's sister, Mrs. J. G. Moore, at 11 East Sixty-fifth street. But few guests were present at the ceremony on account of the illness of Mrs. Moore, and there were no ushers or bridesmaids. The service was read by the Rev. Dr. Heber Newton. The bride wore a gown of white silk and Mecheln lace, and a lace veil held by a diamond bow knot, her mother's gift. She was attended by her niece, Miss Ruth Moore, who wore a Felix frock of gray crêpe and white satin, and carried a bunch of lilacs and mignonette. The best man was Pierre Lorillard Ronalds, Jr. The bride's presents were numerous and very costly, and included an old English tea service of silver and a silver dessert service from Mr. and Mrs. Mackay, a full dinner service of silver from Mr. and Mrs. Moore, and a silver centrepiece from Edward Tuck. One of the most admired presents was that given by the superintendents and heads of the several departments of the Commercial Cable Company; it consisted of a handsome leather case containing a beautiful silver set of fish knives and forks, an asparagus scoop and an ice-cream knife.

Margaret A. Guin, at one time operator for the P. R. & P. Co., was married to Mr. George Bollin of Philadelphia, at the home of the bride's parents, a few evenings ago. The ceremony was performed by Rev. Robert Graham. The bride was beautifully attired in a steel faille silk trimmed with light brocade and had corsage bouquets of bridal roses. Among the guests were: Rev. Mr. and Mrs. Graham, Mr. and Mrs. Wm. Guinn, Mr. and Mrs. Bollin, Mr. and Mrs. Leach, Mr. and Mrs. Eckings, Mr. La Moore and Miss Richards, Mr. Gale and Miss Scott, Misses Ella and Jerda Bollin, Master John Guinn, Mr. and Mrs. Barbay, and Misses Ella and Lizzie McNutt. The presents were numerous and very costly. The happy couple left on a tour.

Mr. James Irving, to Miss Bertha Wilson, at Ventura, Cal., February 26th. Mr. Irving is a well known member of the profession, and was the recipient of sincere congratulations and valuable presents.

**KANSAS CITY POSTAL NOTES.**—New arrivals are Miss Bessie Godecke, from W. U., city; Mrs. B. C. Elder, from W. U.; J. S. Scott, from W. U., Gregg, from Texas, and Schramm from Omaha. Departures are Baker, Belmaine and Craddock, to W. U., city. J. Breman puts the quotations on the blackboard at Board of Trade rooms office, which has lately been opened, with night chief Shell as manager. Business has been very brisk since its opening. Harry Meredith, from the W. U., at Wichita, is operator at 12th and Main streets office. Several new branch offices have been opened lately and all are doing a brisk business. Our Western lines have reached Emporia, Kansas, and will be extended rapidly. A new cable has been lately strung to accommodate the new city loops. A branch office has been opened in Wyandotte, Kansas, across the river from this city, and H. Mooney appointed manager. Mrs. Fite, the pleasant lady manager of the Postal at Marysville, Kansas, paid us a visit a few days ago. Manager Holtzinger has been looking over his territory for several days past. His control extends to all offices north to Omaha, and west to Topeka and Emporia.

**THE GRIPPE A SOURCE OF PROFIT.**—It is asserted that the free use of the wires of the Western Union during the influenza epidemic in sending messages of condolence and congratulation has increased the earnings of the company enormously. This is another instance in which it is proven that it is an ill wind that does not blow some one some good.

**WASHINGTON D. C. NOTES.**—The grippe question has been the subject of much discussion the past month. Quite a large percentage of the force have been prostrated with it. Among its victims were the following gentlemen; W. H. Young, night manager, J. M. Field, night traffic chief, J. W. Collins, Western wire chief, L. M. Smith, assistant night traffic chief, Barton Van Denburg, C. L. Brennan, J. R. Brown, P. E. Brown, C. F. Burlingame, M. E. Cahill, D. W. Daly, S. L. Dickson, J. F. Hahn, W. F. A. Hasson, R. C. Haywood, Frank Jones, Frank Kane, day traffic chief; R. E. Layton, R. W. Bender, day chief; Jos. Little, W. A. Porterfield, W. E. Peirce, H. W. Robinson, W. S. Royer. One of the last to succumb to the grippe was Denny Brown. When the Russian farmer began wielding his scythe, hewing down his victims, Denny, with tragic strides, and sepulchral tones, vowed he was perfectly serene. No Russian grippe could down him. He was an Irishman bold and brave. But alas for the frailty of humanity, Denny was vanquished, and for three days, among the victims, was enrolled the name of Dennis. In connection with the great speech, delivered by Senator Ingalls in the Senate on January 23d last, meritorious work was done by four of the *St. Louis Globe Democrat* operators, Messrs. Powell, McDonald, Burroughs and Magill. These four gentlemen handled the entire speech containing 10,028 words without a break or error and with perfect punctuation. The average made on the four circuits was 39 and a fraction words per minute. The boys for the past ten days have been on the hustle. The fight in the House increased the special work far beyond the figures of any previous session. But it was left for the Tracy fire to cap the climax. On that day, within half an hour after the news of the fire, 15 wires were working with New York. Every table in the office was occupied. Thousands of words for every section of the country were being fired in upon us. But with all the excitement and rush, not a hitch occurred, not an error was made. On the night of the fire, 20 wires to New York, 11 to Chicago and 3 to St. Louis, were necessary to handle the large volume of press filed. Jerry Collins, the Western chief, and Mr. Eugene Cadmus, the Eastern chief, were kept humping, but they got there in great shape. Circuits were made up in a twinkling. Two hundred and seventy-one thousand words of special was the result of the night's roast. It overshadowed Garfield's assassination. Under the supervision of Mr. W. H. Young, night manager, assisted by Mr. J. M. Field, special chief, Geo. L. Diven, all night chief and L. M. Smith traffic chief, this large pile of matter was handled without an error. Everything moved like clockwork. It is with profound sorrow that I announce the death of Mr. J. H. McEvay's, father. About six months ago he lost his mother, and the demise of his father following so closely, has completely prostrated his sister, who is now in a critical condition. We hope she may speedily recover. Among the recent arrivals are, Mr. J. Mooney, W. J. Costello, S. I. Williams, J. H. Burrus and Mr. McLaughlin of Boston.

SALUDA.

**A FRIENDLY CALL BY THE WAY.**—Mr. Edward Reilly, recently of Aldershot, England, has been recently paying his New York friends a visit. He is the guest of Mr. James A. O'Keefe. Mr. Reilly has left for St. John's, N. F., where he will be employed by the Anglo-American Cable Company.

**PERSONAL.**—Superintendent S. S. Dickinson, of the Commercial Cable Company, Canso, N. S., paid Toronto, Ont., a visit last week.

Mr. George Cumming, formerly of 195 Broadway, is now in the printing business at Kirksville, Missouri.

The manufacturers of keys are jubilant over the coming fast telegraphing tournament. Keys are in great demand for home practice.



SERIAL BUILDING, LOAN AND SAVINGS INSTITUTION OF NEW YORK.

At the annual election of officers of this association, which took place at the last meeting, the following were elected: J. Merrihew, president; E. F. Cummings, vice-president; A. R. Brewer, treasurer; E. F. Howell, secretary; A. A. Rich and J. B. Sabine, attorneys. Directors: D. B. Mitchell, D. C. Sullivan, W. B. Waycott, J. J. Barry, W. J. Morrison, John Brant, T. E. Fleming, T. G. Singleton, M. W. Cummings, and F. B. Merrihew.

STATEMENT SHOWING THE CONDITION OF THE ABOVE NAMED INSTITUTION THE FIRST DAY OF JANUARY, 1890.

ASSETS.	
Cash in treasury, - - - -	\$7,802.67
Bond and mortgage and stock loans, - - - -	150,600.00
Unpaid dues, - - - -	1,080.08
Property commission expense, &c., - - - -	98.79
Safe, - - - -	80.50
<b>Total assets, - - - -</b>	<b>\$159,662.04</b>
LIABILITIES.	
Reserved on bond and mortgage, - - - -	\$6,450.00
Advance dues, - - - -	47.60
Due on withdrawn stock, - - - -	155.87
Capital stock 3,880 shares, - - - -	153,008.57
<b>Total liabilities, - - - -</b>	<b>\$159,662.04</b>

Witness our hand this 17th day of January, 1890:  
 [Signed] JAMES MERRIHEW, President.  
 WILLIAM B. MARSH, Secretary.

State of New York, }  
 City and County of New York, } ss.

James Merrihew and William B. Marsh, being duly sworn, severally depose and say that James Merrihew is president and William B. Marsh is secretary of the above named Serial Building, Loan and Savings Institution, and that the foregoing statement is true to the best of their knowledge, information and belief.

[Signed] JAMES MERRIHEW,  
 WILLIAM B. MARSH.

Sworn to before me this 17th day of January, 1890.  
 [Signed] J. B. SABINE,  
 Notary Public, Kings County.  
 With certificate filed in New York Co.

**TELEGRAPHERS' GRIEVANCES.**—A meeting, the first of a series of similar gatherings intended to be convened in all the chief centres throughout England, was held at Plymouth last Saturday week on the subject of Post-office and telegraph clerks' grievances. It was stated that it was intended to agitate for the abolition of classification, the right of probationers to have their appointments confirmed on passing a fixed qualifying examination of proficiency, payment for Sunday duty as overtime, compulsory retirement at the age of 60, a limitation of a day's labor to seven hours, making a working week of 42 hours, payment for overtime at the rate of time and a quarter, the adoption of a graduated scale of salaries, commencing at 12s. a week on entry as probationers, and increasing by small annual increments until a maximum of £200 a year was reached, and an immediate increase of all second class clerks who entered the service prior to the application of the Fawcett revision. The London clerks, it was explained, received exactly double the ordinary pay for Sunday duty. A resolution in support of these views was unanimously carried by the meeting. Stoppage of promotion and transfer, including supersession, was the punishment recently awarded to eight telegraphists of Cardiff, suspected of having written a letter concerning their grievances to a local paper and of being unwilling or unable to prove their innocence when called upon to do so. The affair is said to have created a painful sensation throughout the service.

THE WEEKLY EDITION OF THE ELECTRIC AGE.

We desire to call the attention of operators to a feature of the Electrical edition (weekly) of THE ELECTRIC AGE. We devote a portion of the space in each issue to the discussion of elementary electrical subjects. There is also a department of inquiries and answers, which in itself is a very valuable feature in any paper. We frequently receive inquiries from students, etc., concerning matters that are difficult to them of solution or explanation, and in accordance with our announced intention to devote some space toward making easy and plain the difficulties that beset the average student, we will publish these questions with our answers, so that others may be benefited thereby. Any question that may be asked, and its explanation or answer are always sure to be of value to some one else, and our columns are open to those who wish to be enlightened. We will be glad at any time to afford what help is in our power to make the way easy for any worthy person endeavoring to master the mysteries of the electrical science. Outside of these departments there is always a vast fund of valuable information in each weekly issue. We have received many letters from beginners in the study of electrical science testifying to their appreciation of our willingness to help them along in their studies and investigations, and stating that a paper such as the weekly ELECTRIC AGE is what the rising generation of electricians have been hoping for for a long time.

Electrical industries in every branch, particularly in electric lighting and electric railways, are making such enormous advances in their development that we know of no better field in which an ambitious young man can enter with so much promise of future success. The development of these industries creates a demand for more help and expert knowledge, and these persons require training and instruction before they can hope to be successful. To these THE ELECTRIC AGE hopes to be a benefit. Any subscriber to the telegraph Edition can subscribe for the Electrical (weekly) paper for \$1.50 additional, making the two papers for one year at \$3.00.

**AROUND THE WORLD IN 60 DAYS.**—The Canadian Pacific Railway officials are getting up schedules of railroad and steamers showing how the trip around the world can be accomplished in 60 days. The Canadian railroads make this rapid progress possible, and this fact is used as a strong argument in favor of the establishment of a line of fast steamers westward from Vancouver, B. C., and eastward from the eastern terminus of the Canadian Pacific Railway. This railroad is an enterprising one, and a road that can show such a great saving in time has good reason to make a great effort to get its share of trans-continental traffic. To be sure travelling around the world in as short a time as possible is something that is not frequently attempted, but the fact that by using this new route and its proposed connections, a person can get around the world in 60 days is proof that any portion of the entire distance can be covered in a correspondingly less time. Time is valuable to a business man.

Mr. George E. Holbrook, all night traffic chief of the 195 Broadway office, has accepted a position with the New York World as editor of the Labor Department. Mr. Holbrook, being one of the most popular members of the profession of this city, is receiving the congratulations of his numerous friends. It is needless to say the World has made a valuable acquisition to its staff of expert writers. It is with regret that the profession parts with its loyal and consistent friend.

Frank W. Kinne, a well-known telegrapher, has branched out as a mining broker. He has sailed for Europe to try to interest foreign capitalists in his mines.

THE TELEGRAPHERS' CLUB.

NOMINATIONS MADE FOR OFFICERS FOR THE ENSUING YEAR.

George E. Holbrook, who for the past year has been the president of the Telegraph Club of this city, has declined a re-election. Several prominent telegraphers are mentioned in connection with the office, among whom are M. J. Fitzpatrick, H. A. Du Souchet, E. E. Brannin and J. I. Buxton. At a meeting held in the club-rooms Feb. 22 these gentlemen were placed in nomination and the following nominations for first vice-president were made: Richard Kane, William Foley and Lant. S. Jones; for second vice-president, Clarence Cross, William L. Ives and W. B. Richardson. Dr. P. J. Byrnes, Edward Morrison and George F. Jones were nominated for third vice-president. For the position of recording secretary Charles J. Power and Martin Erwin are named. R. J. Marrin, Perry Chamberlain and John Stacom were placed in nomination for the position of financial secretary. John Brant as treasurer seemed to be the unanimous selection of the meeting.

**CINCINNATI NOTES.**—Cincinnati newspapers have been devoting considerable space to the prominent mention and biography of leading local lights in the profession, the *Enquirer* of a recent date containing good pictures and a short history of the following well-known telegraphers: Andy Otto of the Postal, E. W. H. Cogley, Charley Christie and Guss Rose of the Associated Press; George Ducey and "the only" McCaffery of the United Press, and John Daly and W. F. Hart, of the *Enquirer* W. U. staff. The *Commercial Gazette*, a few weeks since, also gave the Cincinnati boys quite a send-off in a column and a half item. George Ashley, after a year's sojourn in New York, is again with us on the sub-list. George says Cincinnati "is the place" after all. Harry Jones has resigned his position with the Western Union here and goes to Memphis for the Associated Press. C. B. Lamb, after several weeks of severe illness, is again on duty, and the "Kentucky delegation," consisting of Scoville, Randolph, Lamb, Miller, Higdon and Cook, is again complete. It is rumored they intend to take up a collection and purchase a small cannon for mutual protection on the long weary tramp. *The Telegrapher*, the latest venture in telegraph literature, has made its appearance, and is ably represented by Chris Popp, who says the West should have a paper of its own. Chris is a hustler and no mistake. Why does John Pierce smile? Because there is another daughter at his house. There have been a number of changes made in the location of quads and duplexes in the Western Union office, and the old familiar corner, for so many years occupied by the first New York quad, is now occupied by Atlanta, New York taking its place near the centre of the room, and Pittsburg local and second. New York comes down near the board, while Cleveland quad takes its place near the south end of the room. Memphis and New Orleans have dissolved partnership on the quad and are now duplexes, the latter made up via Montgomery.

**PORTLAND, ME., W. U. OFFICE.**—P. A. Foley, formerly of the W. U. at Providence, R. I., is subbing for G. H. Mayberry. Mr. Mayberry is at present acting ticket agent and operator at Old Orchard, Me. T. A. Donahue is sick at his residence. It is hoped he will speedily recover and return to his desk. J. H. Cusick, for a number of years past, ticket agent and operator at Gardiner, Me., died at his father's residence in that city recently, of chronic pneumonia. Mr. Cusick was an expert telegrapher and much liked by his friends and associates.

**CABLE BRANCH OFFICES.**—The Anglo-American Cable Co. has opened branch offices at 446 Broome street and 16 Beaver street.



## LONG'S ELECTRIC SEMAPHORE SIGNAL.

In the operation of railroads it is frequently necessary to have signals placed at considerable distances from the person operating the signals, and to successfully operate such distant signals with certainty has been found exceedingly difficult; especially if they were semaphore arm signals, now justly regarded as the only proper sort of fixed signal for railroad purposes, as its meaning or language is understood from its position and not from a difference in form. It seems at first a very simple affair to fix a light cable or wire connection from a semaphore signal to a hand lever, and arrange to pull the semaphore to one position, using a weight to return the signal to another position, or using two wires, but it is found that wires shorten by cold and lengthen by heat, also by stretching, requiring compensating, adjusting and other devices to be employed, even for moderate distances, and that breakage of the wire is quite frequent.

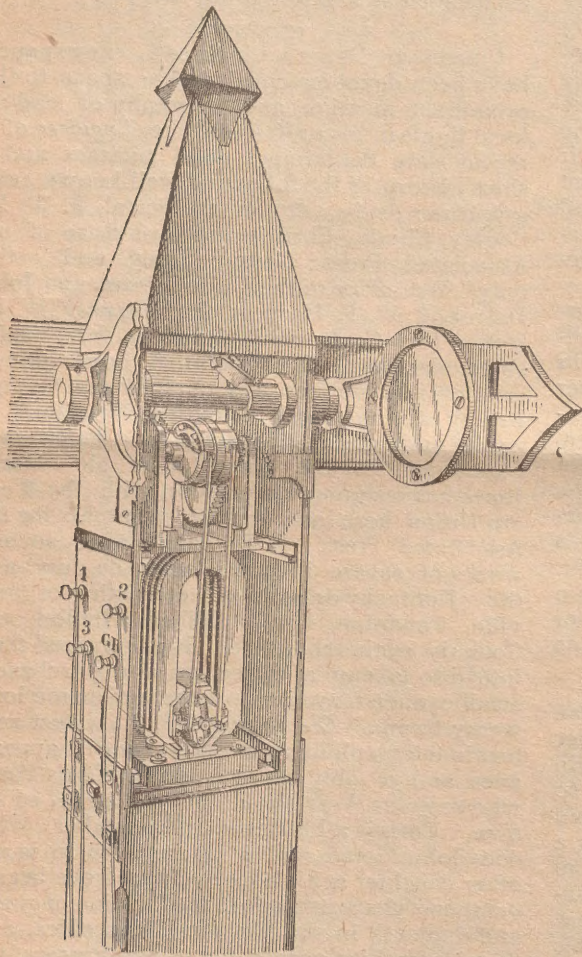


FIG. 1.

The difficulties multiply greatly when it is attempted to operate semaphores at considerable distances, or around curves, and it is often found necessary to fix a signal to be worked this way, far short of the place where it should be fixed for the proper government of trains, thus compelling the persons in charge of the trains to read the signal while at such distances from it that with adverse conditions, such as storms, fogs, etc., it becomes impossible to distinguish the "language" of the signal at the proper time.

Prior to the production of Long's patent electric semaphore signal it became necessary for the proper handling of trains to operate a semaphore signal at a distance of even three-quarters of a mile, which involved simply another telegraph office with its quota of expense, to be added to the operating expense of the railroad.

With Long's patent electric semaphore, by a new application of electricity, it becomes practicable to operate semaphore signals with certainty and precision, and with full knowledge

as to their positions, at any distance required in the operation of a railroad, and in any situation that can be reached by wire circuits.

This improvement consists of an electric motor, geared to a semaphore arm (Fig. 1) to move it positively to its different signaling positions, and provided with an automatic electric switch which stops the action of the motor when the semaphore arm has reached the desired position; these parts being connected by wire circuits, (leading to the controlling station), to a manual magneto-electric generator (Fig. 4), a suitable manual electric switch (Fig. 3) to change the course of the electric currents according to the position into which the semaphore is to be moved, and to indicators, visual or audible, which automatically indicate the position which the semaphore has actually assumed.

That part of the actual labor of moving the semaphore arm required to be performed by one vibration of the electro-magnet is so very small,

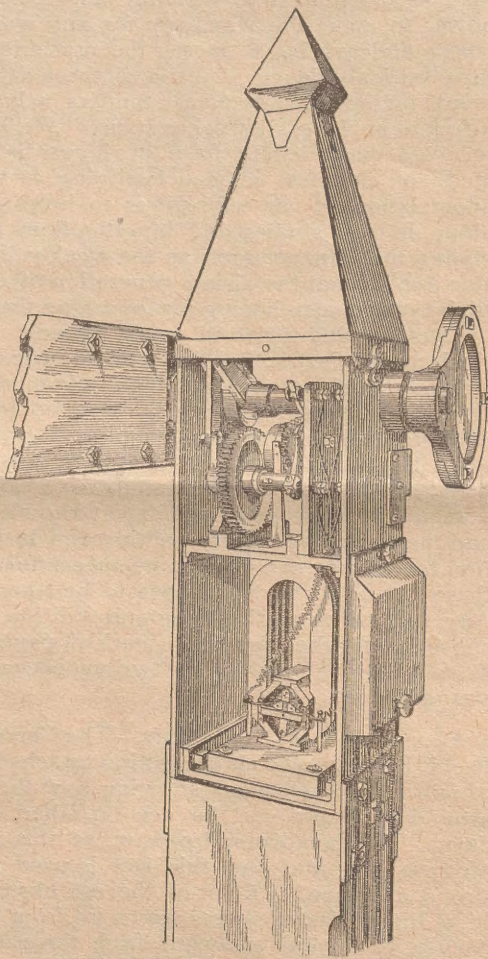


FIG. 2.

owing to the number of vibrations taken for a movement of the semaphore, that there is no probability of any conditions sufficiently adverse to prevent the movement of the semaphore so long as the circuits are in act; and the operator cannot in any event be deceived as to the position of the semaphore.

The circuits between the semaphores and the electric generator, electric switch and indicators, in the office, consist of three wires (ordinary telegraph circuits) carried on telegraph poles, with one ground wire at each semaphore, and one at the office.

The number of electric semaphore signals which can be operated from one office, with one electric generator, is only limited by the form of manual electric switch. These are supplied for almost any required number.

The semaphore shaft is provided (as seen in Fig. 1) with a crank arm, vibrating vertically, and connected by a link to a revolving driving crank, on the shaft of a gear wheel, which is driven by a small pinion, always in one direction only. When the revolving crank is on the "upper dead centre" the semaphore is rigidly

held in the "Danger" position, and the semaphore is held in the "Safety" position when the crank is on the "lower dead centre."

In either of its two positions, the semaphore is locked against being moved except by working the motor apparatus.

The pinion that drives the gear wheel and revolving crank is rotated, always in the same direction, by an electric motor, until the semaphore has been brought to the desired position, when a rotating electric switch, moved by the gear wheel shaft, automatically opens the circuit by which electricity reached the electric motor, so that the semaphore arm will not be carried beyond the desired position, until the electric motor is reached by electricity over another circuit.

The electric motor consists of a vibrating electro magnet, working between the pole-

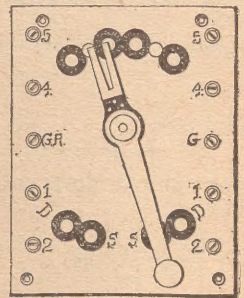


FIG. 3.

pieces of permanent steel magnets with which a limited vibration brings them into magnetic contact. As the electro-magnet is vitalized by currents of alternate polarity, its poles become alternately attractive and repellant to the pole-pieces of the permanent magnets, resulting in rapid and powerful vibrations of the electro-magnet, each vibration being similar to the action of a polarized relay. On the axis of the vibrating electro-magnet, a cross arm is connected by light rods to the outer cases or shells of a pair of silent clutches (or ball ratchets) on the same shaft with the driving pinion of the motor apparatus. The hubs of the clutches, which are fixed on the shaft, have inclined recesses for the rollers or balls (see broken out part in Fig. 2) so that when the shells, which are loose on the shaft, are moved by the upward movement of the rods the rollers move inward without moving the hub, but when the rods move downward, the rollers move outward and

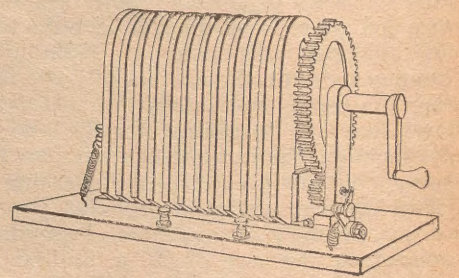


FIG. 4.

cause motion to be imparted to the hubs and the driving pinion.

Thus the vibrations of the electro magnet effect movement of the crank by which the semaphore arm is handled, and when the motor has given the crank a half revolution, say to the upper center, as in Fig. 2, the semaphore will be locked securely in the "Danger" position, and the next half revolution of the crank to the lower center will return the semaphore to the "Safety" position.

Interlocking of semaphores, to prevent conflicting signals, may be effected by attachments to indicators, whereby their action will open or close circuits to semaphores, and compel the several semaphores of a system to be worked in the proper order.

For outdoor use, generators are mounted in substantial iron cases which may be secured to

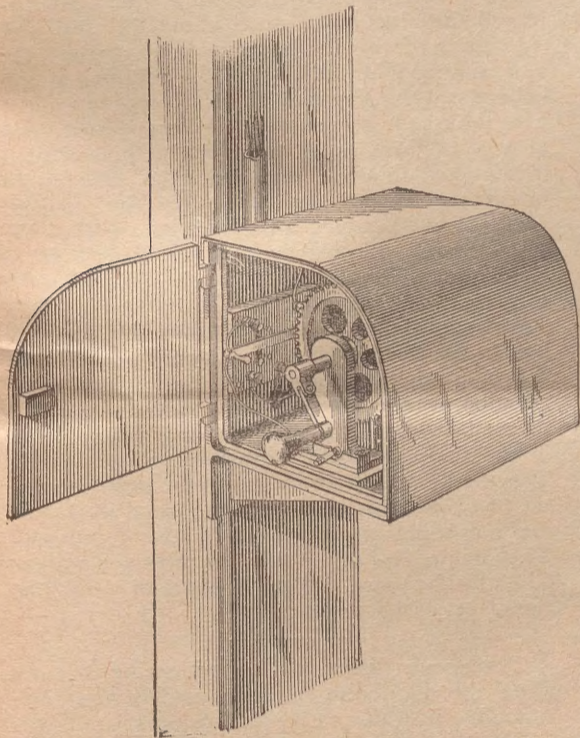


the outside of a building or on a post. When not in use handle will be folded inwards and case securely locked.

In this arrangement the indicator will be a bell, combined with a manual electric switch, all inside the case, the circuits being so connected that while the semaphore is being worked the bell will sound, and cease only upon the semaphore having taken the desired position, the indicator being for two semaphores or one, as may be required.

*Distant Signals for Stations.*—For this service the electric semaphore signal is of great value; having the semaphores placed at a distance of one-half mile to one mile from the station, or such a distance that after any train has passed the signal, approaching the station, there will be sufficient time for the train to be brought under control and stopped as circumstances may require to avoid accident.

At junction stations, etc., it is sometimes desirable to have a number of signals operated from one office, in order to control the movement of trains on the several tracks. With electric semaphores, at distances from the station that the circumstances require, the persons



LONG'S ELECTRIC SEMAPHORE SIGNAL.—FIG. 5.

on the trains may be accurately informed whether a train perhaps already late may run to the station at good speed, or should approach with caution. By the interlocking devices, which can be provided for such cases, conflict of signals will be avoided, and trains moving in accordance with signals will avoid danger of colliding.

The connections between the semaphore signal and magneto-electric generator, etc., in the controlling office, being simply ordinary telegraph wire circuits attached to binding screws duly numbered and lettered, linemen unacquainted with the working of the signal can readily place the apparatus and make it ready to be operated by telegraph operators, station agents, despatchers and others from their offices. By use of the electric semaphore signal the disfigurement of buildings, tearing up of platforms, etc., often necessary to arrange the cable or wire connections to mechanically operated station or distant signals can be avoided, also the liability of such connections being obstructed in their out-of-the-way locations.

*CITY TELEPHONES TO BE REPLACED.*—The Chicago City Council has adopted a resolution instructing the mayor and controller to direct the Chicago Telephone company to replace the instruments removed from the police stations and public offices a short time ago.

#### GOOD CAR RECORDS.

When electric railways were first introduced, it used to be commonly said among street railway men that the motors were not built sufficiently durable and strong for the necessities of street car service. Such charges might have been true at that time, but they are certainly not applicable at the present day. The durability of the electric street railway motor, as exemplified by the productions of the leading supply companies of to-day, is probably as high if not higher than that of any other machine exposed to the same kind of service.

We are in receipt of some quite interesting statistics from Erie, Pa., in regard to the operation of electric cars upon the line of the Erie Electric Motor Company in that city, which illustrates this in a striking manner. One motor car on this line has run 19,300 miles without requiring any repairs of any kind. A second car, equipped with only a single motor, has run 15,000 miles without repairs being required, and other cars have records very nearly as large. When the arduous work required of these street railway motors is taken into consideration, this is truly a remarkable record, and one which is most gratifying to all interested in electric traction. The Erie Electric Railway has been in operation for a number of months, on the Sprague Electric System, and is said to be giving great satisfaction to the managers of the road, and to the general public. The equipment of the road is complete in every respect. At the station the power plant includes two 150 H. P. Ball engines, each engine being belted directly to two 50,000 Watt railway dynamos which furnish the current to the line.

The motor car equipment consists of fifteen electric cars, equipped with the Sprague improved motors and all the largest attachments and devices used by the Sprague Company upon its cars.

When the installation of this electric line was proposed, there was considerable opposition from property owners along the route who were not acquainted with electric railway systems, and objected to the installation of an unusual power. The road has become very popular, however, on account of the rapid transit facilities afforded, and has carried large numbers of passengers since it has been in operation.

#### AN ELECTRIC MOTOR IN A THEATRE.

An interesting and novel application of electric power has recently been made in New York City by the local agent of the Sprague Electric Ry. & Motor Company. In one of the theatres a spectacular play is being presented in which one of the features consist of a horse race on the stage. In order to keep the horses constantly in view of the audience, the platform upon which the horses race is endless, and kept constantly moving over a pair of rollers at each end of the stage. When the question of motor power for this movable stage was suggested, a Sprague Electric Stationary Motor was selected for the work. This is belted to a system of counter shafting which reduces the speed to that required by the rollers over which the movable platform revolves.

This is rather a novel application of electric power, but it is simply an example of the extensive and varied use to which Sprague electric motors are now being applied. When the manufacturers of this motor made the statement a year or so ago that their motors were used in more than one hundred and thirty industries, the statement seemed almost incredible, but the convenience of the electric motor and its wide range of adaptability to all classes of work, have made it almost a necessity in places where no other motor could be used.

We have no doubt but that the number of different industries to which Sprague motors have been applied, is now very largely in excess, probably double, what was claimed a year ago.

Cohoes and Waterford, N. Y., are connected by an electric road.

#### PUBLICATIONS RECEIVED.

A copy of the last issue of the *Revista Telegrafica de Mexico* has reached us. This is an electrical paper published in the City of Mexico, by F. A. Soni, who is editor and publisher. It is the only electrical paper in Mexico and has a large circulation in Central and South America. The existence of such a paper in Mexico is ample evidence of the growth of interest in electrical matters in that country. The Mexicans are quite progressive in this matter, and want the best of everything in the electrical line. This paper affords an excellent opportunity for American manufacturers and dealers to advertise in that progressive country.

We are in receipt of a pamphlet just issued by Partrick & Carter, of Philadelphia, giving many testimonials as to the excellence of their new covered cell of the Disque Leclanche type. Every one speaks highly of the performance of these cells.

*ELECTRIC LIGHTING IN MASSACHUSETTS.*—The fifth annual report of the Board of Gas and Electric Light Commissioners of Massachusetts shows that there are in the State 75 gas companies, of which 26 have the right to supply both gas and electricity, and no fewer than 100 electric light and power companies. The number of public gas lamps continues to diminish, electric lights taking their places. The coal gas companies lost 999 lights. The year was an active one for those engaged in the electric lighting business. There were 44 new electric light and power companies and 4 new companies for the manufacture of gas and electric light incorporated.

*EXTENDING THE EDISON LIGHT TERRITORY.*—The Edison Illuminating Company of New York have decided to begin without delay the construction of a new 100,000 light station, somewhere in the neighborhood of the City Hall, to supply the entire down-town district, and to push at once the construction of the Fifty-third street Station for 50,000 lights.

*ELECTRO DEPOSITION OF IRON.*—Messrs. Barthe and Möller, of Hamburg, give the following recipe for the electro deposition of iron: Six hundred grams of ferrous sulphate ( $\text{FeSO}_4$ ) are dissolved in five litres of water; to this is added a solution of 2,400 grams of carbonate of soda ( $\text{Na}_2\text{CO}_3$ ) in five litres of water. The resulting precipitate of ferrous carbonate,  $\text{FeCO}_3$ , is then re-dissolved by the addition in small quantities of strong sulphuric acid, until the precipitate is just dissolved, when the fluid will show a green color; it is then diluted to twenty litres by adding water. The solution must be faintly acid, turning blue litmus paper deep claret color, but not red. An iron anode is used.

*TESTING THE POWER OF AN ELECTRIC MOTOR.*—A test of strength of the electric motors in use on the West End electric car line in Boston was recently made. Three ordinary passenger cars were coupled to a motor, two of them being loaded heavily with a miscellaneous lot of articles of a weighty nature. The weight of each car was about 10,000 pounds. After the tracks were well sanded, the train was started, and the motor ascended the heavy grades on the line with great ease. The trial was a complete success.

*ELECTRIC TRAMWAY IN FRANCE.*—An electric tramway has just been opened between Clermont Ferrand and Royat, two well-known holiday resorts, about seven kilometres apart. The installation consists of Farcot steam engine of 150 horse-power and a six-pole Thury dynamo of 300 volts and 350 ampères. A small 24 horse-power steam engine and dynamo is used to excite the larger dynamo and to supply the station with electric light. The current is supplied to the motors on the cars by means of an overhead wire, and the return current passes along the rail. The speed of the cars is twelve kilometres per hour.



## PRIZE STORIES.

AT THE NEW YORK TELEGRAPH CLUB.

(No. 9.)

Enter the New York Telegraph Club's cosy, home-like, little reception-room, with its pictured walls, comfortable arm-chairs, melodious pianos, and well-filled book-case, and glancing around at the occupants who are apparently enjoying the comforts of pleasant surroundings and congenial companionship, notice particularly the young man who has just taken a book from the case and placed a chair in his favorite nook, with an idea for solid comfort.

Scarcely had he become absorbed in his book when a welcome voice from the adjoining smoking-room summoned him thither. To his delight he found his old friend Jack Wallis leaning back comfortably in his chair, sending forth blue circlets of smoke from the bowl of a finely colored meerschaum pipe. Cheery greetings were exchanged, but the invitation "Have a cigar?" Ned Davendale declined, pleading "literary mood—no desire to smoke this evening."

Jack noticed the book, and asked "What book have you there. Ned? Let's see. What! 'Reveries of a Bachelor.' Well, bless my stars! Now, Ned, what do you want to know about reveries of a bachelor, surely sorrow hasn't crossed the life-line of your palm? Oh, come on, let's have a smoke; don't waste this lovely evening on such sentimental bosh."

"Yes, that's you, Jack; whenever a fellow approaches you on anything pertaining to *affaires du cœur* you ward them off beautifully with your favorite couplet,

'Woman, woman, lean or fat,  
In face an angel, in soul a cat.'

Now, see here, Jack, if you really want me to sit here and enjoy this smoky atmosphere, suppose you 'sub' for Ike Marvel and tell me for once why *you* are a bachelor" was Ned's retort.

What memory is it which causes Jack's face to assume a shade of sadness as he says, "Oh the pages are all turned down, Ned, and 'the tender grace of days that are dead' will never come back to me?"

Ned regretted the change he had unwittingly caused in his old friend's cheery mood, and to make amends quickly changed the subject by asking if he knew there was a letter in the box addressed Care of Secretary New York Telegraph Club. Jack said that was the first he had heard of it. Accordingly Ned got the letter, excused himself to Jack, and left him to enjoy its perusal.

Jack's eyesight was keen enough to recognize the handwriting, and yet, no—impossible—preposterous! he sighed as he adjusted his spectacles, realizing age was advancing. As he reads, he ponders, soliloquizing "'Old man,' Poetry and Age go not hand-in-hand. Love lingers not over gray hairs and furrowed brows, nor does it fancy such abiding places; has the wrong letter gotten in the wrong envelope and I, perchance, the recipient of something intended for another scion of Adam? Yet no; as I follow the chords sending forth their melody in poetry and love—plucking here and there reminiscences and incidents from the past which clearly stamps the letter for me and me alone. I know 'tis no mistake—'old man,' who says you're old? surely I am not, or why this burst of melody?" At last the explanation has come, and now I could tell Ned why I am a bachelor.—LARBIE.

SIoux CITY, IA., NOTES.—Mr. H. M. Waters is now a member of the day operating force. Mr. J. P. O'Donnell day traffic chief, is now night chief. Mr. M. O. Heron takes Mr. O'Donnell's place. The appointments are excellent ones. Mr. Frank Pugh has returned from Dakota, where he was sent to help out during the rush caused by the opening of the Sioux-Indian Reservation.

NEW YORK WESTERN UNION NOTES.—What might have been a very sad accident on Wednesday last was prevented by the timely gallantry of Senator Ives, who at the peril of his life grabbed the reins of a runaway horse, attached to an express wagon madly dashing down Dey St., just as Miss Hall, assistant city line chief, was crossing over. Miss Louise Rose, who has been dangerously ill and absent for nearly four months, is slowly mending and out of danger. Miss A. Lehman is relieving in a broker's office. Miss Hattie Watson who was to have been married to Mr. Walter Brant on the 19th inst. has been dangerously ill with pneumonia and the wedding was postponed. Miss Crissie Hawhe has also been ill for the past week. Mrs. Harry Dobson has resigned, and Miss Kerrin assigned to her wire. Misses King and Duane have been transferred to the P. G. & S. Exchange. Miss Omeara has accepted a position with Henry Clews & Co., in Brooklyn. Miss McLean is relieving at 9 New St. Miss Florence Miller and Nellie Reeves are going to take part in a dramatic entertainment to be given under the management of the genial Mr. Dixon. With the assistance of these talented young ladies the performance should be well attended. The following gentlemen have been transferred from the 8 A.M. to the 11.30 A.M. force. Messrs. Atkins, Falkenberg, Kranshaar, Minturn, J. H. Henry and E. G. Wood, and the following are added to the regular 8 A.M. force. T. Kenney, J. J. Kelly, W. H. Newman, Geo. Blanks, W. F. Lewis Kuttner and E. A. Jackson, J. Morressey 7.30 to 5. Aleck Cutair, Lon Bartholomew and James Bergin have been transferred to Jacksonville, Fla., for the balance of the season. H. W. Sauer, J. S. Eves, P. F. Sullivan, Chas. Kilfoyle, H. R. Swivel and Sam. H. Jolly are on the waiting list. Lizzie Malone returned to duty after an absence of six months on account of sickness. R. D. Riley is absent on the sick list. Vincent Burns of the Race Bureau aspires to be a Greenpoint policeman. The bulletin board in the coat room is now put to the use of advertising furnished rooms, etc. We are sorry to learn that the popular J. M. Winder is at home very ill with heart trouble. Joe. Lee, O'Connor, Dowling, Hannigan, McGowan, Hughes and Mulligan, have returned to work at the different pool rooms. Clampitt, Riddic, McWha and Pittmann are added to the 11.30 force, and Mr. and Mrs. Zelfiff to the 7 A.M. Lively interest is being felt in the coming election of the New York Aid Society. Mr. Omalley through an unfortunate injury sustained by being hit with a stone has been conveyed to the hospital. Mr. Wingate is laid up with the rheumatism. Miss Lucie McKenna has resigned to enter a convent. The popular Chief George E. Holbrook has the sympathy of the entire force in the loss of his brother at Marquette, Mich. Miss Lizzie Boyle has been assigned to the 7.30 instead of the 8 to 5.30 trick.

NEW YORK, LAKE ERIE AND WESTERN RAILWAY NOTES.—M. E. Smith, formerly on first trick at Rutherford Junction, was appointed Signal Inspector on February 10th, superseding J. A. Ashhurst. He has charge of the block signal system from Turners to Jersey City. J. Hamil succeeds him at Rutherford Junction. John Winter takes Mr. Hamil's place at Passaic Bridge. E. Horton, third trick man at Ridgewood Junction, is off on a six months leave-of-absence on account of general ill health. He proposes putting in the time on the road as the Horton and Lewis Comedy Company. Geo. Eisenhauer takes the place made vacant by Mr. Horton. Chas. Shoudy takes Mr. Eisenhauer's place at Hohokus. Mr. Hollenbeck is manager at Passaic, and not Mr. Connelly, as was erroneously stated in former notes. J. W. Quackenbush, of Allendale, leaves the telegraph department to enter upon a new field of duty on March 1st, that of assistant advertising agent for the Erie road at New York. Garry Remsen has been subbing at "Jy" despatchers office and at "Hu." By the way, "Hu" is of sufficient importance to give a passing glance. Situated in the Jersey City yard with engines whistling and blowing off steam and yard men howling, the operators serenely copy reports a yard long. The force consists of F.

Mitchell, manager, and F. Keefe and B. Carbon, operators. This is the testing office for the Eastern Division and branches, and also a transfer office, and is one of the busiest places on the Erie. Mr. Garvey, of Paterson, has been on the sick list but is again on duty. Mr. Welsh from Chester filled his place. The Erie proposes putting in operation the block signal system from Turners, the present terminus, to Lackawaxen, Pa., in the early spring. They are pushing the work of construction, and will probably have it completed in a month. This will make 120 miles of main line and 60 miles of branches in operation under the protection of the interlocking safety block system. Jas. Keegan, manager at Suffern, stands a very good chance of being appointed a railroad commissioner for the State of New York. He has held several responsible positions in his native town and is a worthy and ambitious young man. Success to you, Mr. Keegan.

PITTSBURGH NOTES.—The boys at Oil City office enjoyed a hearty laugh one day last week all owing to the actions of one of Oberlin, Ohio, college graduates. He applied to Superintendent Ellis, of the Cleveland line, for a position as operator, and informed Mr. Ellis that he was a good operator and had his diploma with him. He displayed the document which bore the seal and signatures of the Professors of the college. He also informed Mr. Ellis that he was told at the college that the National Transit Company wanted five thousand operators. He was tested and proved a failure, as all other productions of such institutions do. He departed in a very angry mood and swore vengeance on the college. James Heally is taking a vacation for a week. W. H. Hartman of Nedskey has been transferred to Kennedy. The oil country in the vicinity of Oil City is overcrowded with operators, and those having positions are not getting wealthy very rapidly on their salaries. It would be wise for operators to remain away from this section of the country, as the old time oil region days are a thing of the past. Salaries are lower than in some of the cities and living expenses are very high. There will be quite an exodus in the spring among the first-class men who have done good work, and are not being treated fairly by the companies. They helped to build up the business and worked faithfully for years. Forty dollar men are taking the places of those at \$90.

TELEPHONE RATES.—The following figures show the telephone rates charged in the cities named. In Kansas City the business rate is \$72 a year, and the residence rate \$60 a year. This \$72 a year means for any point within a radius of three-quarters of a mile of the telephone exchange. For each quarter of a mile beyond this limit an additional charge of \$6 a year is made. In New York there are three rates given—legal and express, business and residence. The legal and express rate is \$210 a year; business, \$150 to \$180; residence \$75 to \$100. In Boston, the bank and express \$200; business, \$96 to \$120. Pittsburg's business rate is from \$84 to \$100 a year. Cincinnati's \$72 to \$100, and Louisville \$72 to \$96. Chicago charges from \$100 to \$125 a year for business, and St. Louis \$100 even. New Orleans asks \$96, and Denver \$80. San Francisco has a peculiar system of rates. The company charges \$60 a year for the privilege or using the Bell telephone, and each subscriber has to pay the local company five cents for every connection made, whether it proves satisfactory or not.

DIED.—Geo. M. Taylor, an old time telegrapher, died at his home in Annapolis, Md., February 20th. Mr. Taylor was well known in Western Union circles in Baltimore, where for a great many years he was employed. His old associates express the utmost sympathy in his death.

A 1500 light Westinghouse plant has been ordered for Allentown, Pa.



## NEW PUBLICATIONS.

Mr. Edward Trevert, of Lynn, Mass., has just issued "Everybody's Hand-book of Electricity," which is published to supply the demand there is for a brief outline of the various systems of electric lighting, etc. This book will just fill this want. It not only describes the special features of the various systems of lighting, but also describes electric lamps, electric motors, electric railways and the process of electric welding. In addition to these subjects there is much other information of value. The book will be found very convenient for reference, particularly by the layman, because he will not have to search through a great volume of matter to get the information he wants. This book tells him plainly and briefly. The glossary of electrical terms at the back of the book will be valuable to beginners, and will materially aid in the study of the science. The price of this valuable little book is but 25 cents, and it is published by the Bubier Publishing Company, of Lynn, Mass. The same author has also issued a little work on "How to make Electric Batteries at Home." Plain directions are given, and any one with ordinary mechanical ingenuity can make any one of the various batteries treated of.

This latter book is printed by the same company, and the price is the same as that of the first named. Both books are well illustrated, and their low price brings them within the reach of all.

**SAD DEATH.**—Operator John Coghlan, of Cascade, Cal., whose condition was reported in recent issue has since died. "And what an awful lonely death it must have been," says Mr. Jennings of the *New York World*, who was snow bound in that neighborhood for several days. He added: "When the rotary passed Cascade, at which station Coghlan was assigned, the operator was down with pneumonia, dying, the men said. The statement came flippantly, as a jest from their lips. I asked for particulars and learned that Cascade was located in a break in the snow-sheds about a mile and a half long, where the sheds had burned during the summer, and that while they were speaking there was eighteen to twenty feet of snow surrounding Cascade. The story of this young man dying alone in his snow prison went straight to my heart, and, after obtaining the *World's* authority for so doing, I sent a message to Division Supt. J. B. Wright, at Sacramento, stating that the *World* would pay the expense of carrying a doctor to Cascade on a plough train to the relief of Coghlan. Mr. Wright thanked the *World* and immediately ordered a man to Cascade on showshoes, who took mustard and medicines and food to Coghlan. But the poor fellow kept on getting worse, and I see by Friday's despatches he is dead."

**THE CANADIAN TELEGRAPH SUIT DISMISSED.**—At Montreal, on January 31st, Judge Wurtele dismissed the great telegraph suit on the ground that the Canadian Pacific Railway should have been first sued for trespass, and that the Montreal Telegraph Company might have been called upon to protect the great Northwestern Company in that proceeding. Each company pays its own costs. The judge did not express an opinion as to the merits of the case, whether the agreement was a lease or not, or whether the Great Northwestern Company was entitled to two or three per cent. reduction. Large stock transactions have occurred pending the decision, which really settles nothing. The case will be appealed by the Great Northwestern Company, which, in view of the judgment, will cease paying rental until the question is decided on appeal.

**A BLIND OPERATOR.**—J. H. Moore, agent at Ellerslie, Ga., is totally blind, yet performs all the duties of agent and telegrapher to the satisfaction of the company, receives and sends his own messages, sells tickets, checks way freight, and makes his own reports.

**PHILADELPHIA NOTES.**—Mrs. Pauline M. Dickel of the Postal has gone elsewhere.

The A. D. T. promotions, changes, etc., as follows: W. S. Logan, formerly day sergeant at the 3rd, has been appointed manager of the new 6th district office. John Kane, sergeant at the 9th district, has been appointed night operator at the 8th; *vice* John Sheahan, transferred to 5th district nights, *vice* Wallace Corson, transferred to 4th, nights. Messrs. J. H. Smith and W. J. Dougherty, night manager and night operator of the 4th, have been transferred to the 9th for day duty. J. H. Snyder, day manager at the 9th, transferred to the 4th. Mr. I. F. Taylor, for many years clerk in the Executive Department, has resigned to go with the Beneficial Saving Fund. Mr. W. L. Fry is now filling Mr. Taylor's position.

**C. P. R. EASTERN DIVISION NOTES.**—C. F. McGowan, promoted Cartier to Agent Chapeau. L. Cormack, transferred Nemegosenda to Cartier. P. J. Murray, promoted Amyot nights to agent Nemegosenda. E. Whiteside, transferred Ridout nights to Amyot nights. W. F. Link, working nights at Missanable.

**C. P. R. WESTERN DIVISION NOTES.**—J. H. Longworth, Port Arthur, has returned from a most enjoyable trip to Prince Edward Island. As intimated in our last notes, Mr. Longworth has been "wise" and brought with him a better half. Congratulations are heartily extended. The "boys" presented the happy pair with an address and a handsome set of pictures to adorn their new home. A. A. Marlatt, of "X" office, has the sympathy of his many friends in his death of his mother, in eastern Ontario a few days ago. Mr. Marlatt, owing to the pressure of business and the long distance, was unable to attend the last sad rites. A. Allen, telegraph inspector, Port Arthur, has returned from New Brunswick and Nova Scotia, where he has been for the past few months on construction work. "Alex" is looking happy and jovial as usual. According to all accounts, he will remember his visit with much pleasure, his services having been appreciated in the most satisfactory manner.

**THE PACIFIC POSTAL COMPANY'S ENTERPRISE.**—The *Portland Oregonian* of February 6th highly compliments the Pacific Postal Telegraph Company for its enterprise during the recent floods, snow blockades and land slides, during which time that section of the country was almost entirely isolated, telegraphically and otherwise, from the East. The Western Union Company was practically disabled, and the Postal lines furnished the only outlet for news and telegrams. The latter company patrolled the streets with a wagon on which was displayed the announcement "Pacific Postal Telegraph delivery, wires O. K. East and North," delivering and collecting telegrams. All of the operators worked like Trojans, although the office was knee-deep in water. The Postal branch office at First street was the only accessible telegraph office in the city, except by means of small boats.

**THE WESTERN UNION SUED.**—The Western Union Telegraph Company was sued recently by R. W. Crawford, of Houston, Tex., for \$10,000 actual damages, and \$20,000 exemplary damages, and a jury awarded \$350 for plaintiff. The cause of action was the non-delivery of a telegram announcing the death of plaintiff's sister, and the fact that the body had been sent to plaintiff's house for burial. The first intimation the plaintiff received of his sister's death was when the body was brought to his house.

**BORN.**—To Mr. and Mrs. R. J. Horwood, Cleburne, Texas, February 7th, a daughter.

**A COSTLY TELEGRAM.**—The Italian papers state that the telegram sent to Rio de Janeiro by the King of Italy to the son of the Duke d'Aosta, announcing the duke's decease, contained 1,200 words, and cost \$110.60.

## \$10.00 AND \$5.00 FOR ORIGINAL STORIES FROM LADY SUBSCRIBERS.

The ELECTRIC AGE will give \$10.00 to the lady telegrapher who composes and sends us for publication the best original telegraph story. A second prize of \$5.00 will also be given to the lady telegrapher sending the second best story.

The conditions are: 1st. The lady must be a subscriber to the paper; 2d. The story must not exceed 500 words in length, and *one* side of the paper only should be written on.

A *nom de plume* may be used if preferred.

Two stories from the same author will not be admitted in the same contest. The prizes will be awarded when not less than ten stories have been printed, and at least two of the stories will appear in each issue until that number has been reached.

Mr. George E. Holbrook, President of the New York Telegraph Club, has kindly consented to act as referee. Mr. Holbrook possesses well-known literary ability, and any decision he might render is certain to give general satisfaction. Now, let the ladies contribute.

**THE ADVANTAGE OF A TELEGRAPH COLLEGE EDUCATION.**—A certain telegraph college, the pupils of which are almost exclusively of the female sex, guarantees a situation at the completion of the course. Some of the Western Union officials are understood to be interested in the venture, and through them the scheme is worked. Recently a young lady finished a term at the college and applied for the promised position. She was given an office in the West End and was to receive a commission on the receipts. The first month she took in \$4 and received for her month's work 40 cents. Then she threw up the job in disgust.—*Cincinnati Enquirer*.

**LATEST EDITION.**—The new sixth edition of the Modern Service of Commercial and Railway Telegraphy, Railway Station and Express Service. Complete volume of 427 pages.

Owing to the almost Encyclopædic nature of the volume, it is difficult to do it justice or show its innumerable features in the space of this circular. However, among the valuable features added to this new edition may be mentioned:

The official code of uniform general train rules, the official code of uniform telegraphic orders, recently adopted by the convention of General Managers and Superintendents, the study of which we commend to all operative railway employes and those contemplating entering the service, as the Code will in time, no doubt, be ratified and adopted by all the roads in the country. Another valuable feature added is the full and complete description of induction telegraphy to and from moving trains, also the additional valuable information regarding the station service and commercial telegraphy. Price, post-paid, \$2.00.

Remittances should be made by P. O. Money Order, Postal Note, Express Money Order or Registered letter, which will insure safe delivery. Address:

THE ELECTRIC AGE,  
5 Dey St. New York.

One of the neatest, cosiest and best conducted restaurants in the immediate vicinity of THE AGE office is the Little Magnet Coffee and Lunch Room located at 27 Church Street, between Dey and Cortlandt. The proprietors, Messrs. Martin Dunne and J. H. Regan, are not unknown to the fraternity, having for several years past been employed in the Western Union Lunch Room. A representative of this paper who is a frequent diner at the place speaks of it in terms of highest praise. The gentlemen named are deserving of patronage and we hope the boys will see to it that they are not disappointed.

We cannot publish anonymous communications. One from Memphis, one from Grand Rapids and one from Vicksburg are therefore consigned to the paper basket.



## IMPROVED TELEPHONE.

James Lowth of Chicago, Ill., has patented the "stetho" telephone, an invention which he believes will far surpass the present telephone system, without infringing upon its patents. The new invention has been thoroughly tested in several conversations between Chicago and Milwaukee, over a common telegraph wire, with six other wires on the same poles, which were being operated by means of very heavy batteries. The absence of a diaphragm is one reason for its success on long lines. The operator places the receiver to the ear and the transmitting button against the side of the throat. Briefly described, the Lowth "stetho" telephone is a combined receiver and transmitter. It takes its name from the manner of using it. The instrument is said to have all the capabilities of the ordinary stethoscope, with the addition that it is able to transmit all voice sounds to a distance. The combined transmitter and receiver is  $4\frac{1}{2}$  inches long from the centre of the transmitting button to the centre of the earpiece. The transmitting button projects about two inches from the side of the instrument, and is in a convenient position to be placed against the side of the throat, when the earpiece is placed in its proper position against the ear. Holding the instrument with its transmitting button pressed lightly against the throat, the actual movements taking place in and about the larynx are conveyed by the button to the electrical parts of the instrument, and through them sent over the line to the distant receiver, in which the most perfectly formed words are reproduced. Mr. Lowth distinguishes his system from those in which a transmitter diaphragm is used, by calling it "the solid medium system the agency through which the instrument is operated being positive and mechanical, and not atmospheric."

**ELECTRICAL MONOPOLIES IN ENGLAND.**—Our esteemed contemporary, the London *Electrical Review*, in a leading article, appeals to the English electrical trade to take vigorous action with reference to monopolies in the English electrical industries. It says: "We groan under the great monopolies of the lamp and the telephone," and the time has come for definite action when an endeavor must be made to show where the monopoly is harmful. "We have great confidence in British enterprise," the article concludes, "but at the present day it must start level with its competitors, and when the goal is reached we shall not be far in the rear." The article characterizes the English policy with regard to lamps as short sighted. The price of the Edison lamp in England is 3s. 6d., while in America and on the Continent the same lamp costs from 1s. 8d. to 2s. The same policy is pursued with reference to fittings. The telephone monopoly begun about 8 years ago; previous to that there were numerous telephone factories established in England, but these were crushed out of existence by the United Company.

**A LARGE CONTRACT.**—A large order has been awarded to the Thomson-Houston Company. It is for the complete equipment of 100 motor cars and 60 electric locomotives, for the St. Paul and Minneapolis street railway lines. Regular train work between the two cities will be established.

## COMPARATIVE COST OF ELECTRIC LIGHTING IN MUNICIPALITIES.

The rates charged by electric light companies for municipal lighting throughout the country have a great range, as will be seen by the following figures. Boston and Denver, Colorado, pay the highest prices, a fraction over 65 cents per light per night, and the lowest charge is 19 cents per night.

New Orleans has 934 arc lights of 2,000 candle-light power, 634 of which cost \$125 per year; 262 suburban at \$146, and 38 across the Mississippi at \$205: the price per night in the city proper being about 34 cents. At Cleveland, Ohio, the lighting is done with 100 lights, eight of which, suspended from high masts, are of 4,000 candle power, and cost \$394.80; the 92 others are of 2,000-candle power and cost \$139.12 per year; the cost of the 2,000-candle power light being about 38 cents. Fort Wayne, Ind., is lit by 2,000-candle power lights at \$135 per year, or about 36 cents each per night. Memphis has 100 arc lights of 2,000-candle power. They cost \$187.50 per year, or about 51 cents per lamp per night. Denver, Col., has 1,100 twenty-candle power incandescent lights at a cost of \$26 a year. For its 2,000-candle power lights it pays \$240, or about 65 cents each per night. St. Paul uses 54 arc lights at 35 cents a night; the lamps running until midnight only. Omaha for 100 arc lights pays \$175 per year, or about 47 cents per light per night. Detroit uses 600 2,000-candle power lights at \$140 a year, or about 38 cents each per night. Buffalo, with its 1,223 lights, pays the electric companies \$155.61 $\frac{1}{2}$  a year, or about 42 cents each per night. In Milwaukee 270 arc lights of 2,000-candle power are used, for cost of which it pays \$150 a year, or about 41 cents per night. Quincy, Ill., pays \$100 a year for 181 lamps of 2,000-candle power, the rate per lamp per night being about 27 cents. In St. Joseph there are 210 arc lights at \$70 a year, or 19 cents per night. Pittsburgh employs 1,000 of 25-candle power incandescent at a cost of \$16 per year, and 300 of 2,000 candle power, costing \$105 per year, or about 28 cents each. Kansas City, Kan., uses 96 arc lights of 2,000 candle power and pays \$144 for them, or about 39 cents each. St. Louis uses 1,600 2,000-candle power arc lights at \$78 a year, or about 21 cents each per night, and 1,600 incandescent lights of 30-candle power, for 800 of which it pays \$17.50, and for the remaining 800 \$20.

**AN ELECTRIC FIRE KINDLER.**—Every day electricity is put to a new use. It is gradually being made our most submissive servant in every department of life. It gives us light, power and heat. The latest use to which it has been put is in the capacity of a fire kindler. An electric connection from the bedroom lights the fire in the stove or range, so that the room may be warmed and the breakfast got under way without being obliged to leave the bed, and spoil the morning nap. Thus the most precious half hour of the whole day is saved.

**ELECTRIC TRAMWAYS IN LIVERPOOL.**—Arrangements are being made for experiments with the view of the introduction of electric cars on the tramcar system in Liverpool. A member of the company said that the time was not far distant when the company would be in possession of an electric engine, which would be tried on its merits.

**PHILADELPHIA TO HAVE AN ELECTRIC CLUB.**—Philadelphia's reputation as a slow-going place is again emphasized by the growing sentiment in favor of the establishment of an electric club in that city. Electrical interests have awakened to an appreciation of the fact that such an organization might be of benefit to the trade, and now it looks as if an electric club might be the outcome. Philadelphia is rather late. Many of the principal cities have an electric club, and much benefit is derived by their members at the meetings.

**ELECTRIC RAILROAD TO WASHINGTON'S HOME.**—An electric railway from Washington to Mount Vernon—Washington's burial place, has been chartered by the Virginia Legislature. It will be 20 miles in length. The line will pass through Arlington and Alexandria.

## NOW IN THE 5th EDITION.

Endorsed by THOS. A. EDISON. 1 volume, limp cloth, fully illustrated; price, 50 cents.

**A. B. C. of Electricity,**

By WM. H. MEADOWCROFT.

Extracts from a few of the Press Notices:

"A clear and comprehensive little treatise."—*N. Y. Sun.*

"A large number of readers will, no doubt, receive their first book-knowledge of electricity through this medium, and others further advanced, may obtain many useful hints."—*Electrical Review.*

"In simple language, the author lays bare the secrets of electrical science, and application. . . . The arrangement is systematical, the cuts are good, the typography and binding in cloth are excellent, and altogether the work is one we can heartily commend."—*Electrical World.*

"The need of such a book has undoubtedly been felt by many, young and old. . . . This work supplies the foundation for a more thorough knowledge of this interesting subject. Its illustrations and comparisons are drawn from objects and simple facts familiar to all, and its language is perfectly plain. Taken altogether, the book is deserving of success, and we predict for it a splendid sale."—*The Age of Steel.*

"A book like this, should be largely read. Mr. Meadowcroft's volume is short, simple and well illustrated. . . . It also explains electrical terms more clearly than most of the dictionaries."—*N. Y. Herald.*

"It is a capital book, and contains within a hundred pages, and in simple and intelligible terms, a vast amount of useful information, nowhere else accessible in such a form, concerning the telegraph, the telephone and various other electrical appliances, which, although of every-day use, the great majority of people know little about."—*Washington Post.*

"An instructive little book, whose purpose is simply described by its title, and is endorsed by no less an authority than Mr. Edison. It explains simply and concisely the uses to which electricity is put by modern science, and describes the various methods by which it is produced and rendered available. The author has succeeded admirably in adapting his work to the object for which it was intended."—*Gazette, Boston.*

108 Pages, Illustrated, Limp Cloth. Will be mailed by us for 50 Cents.

**FRANK F. LOVELL & CO.,**  
PUBLISHERS,

142 & 144 Worth Street, NEW YORK.

**SEND FOR IT NOW.**

**THE CLARK SYSTEM OF ARC LIGHTING,**

The Safest, the Most Economical, Durable and Perfectly Regulated System in the United States.

Manufactured by the **CLARK ELECTRIC CO.,** 192 Broadway, New York.



# ELECTRIC LIGHTING AND PUBLIC SAFETY.

Electricians and Mechanics interested and experimenting in the subject of Electricity can take time by the forelock and prevent the waste of money in useless experiment by acquiring the information covered in the article of Sir WILLIAM THOMSON, the greatest European authority, on **ELECTRIC LIGHTING and PUBLIC SAFETY**, in the February number of

## The North American Review.

OTHER FEATURES OF THIS NUMBER ARE:

**THE GLADSTONE-BLAINE CONTROVERSY** is continued by Hon. Roger Q. Mills. STATE RIGHTS. By Jefferson Davis. NEWSPAPERS HERE AND ABROAD. By E. L. Godkin. BRITISH CAPITAL AND AMERICAN INDUSTRIES. By Erastus Wiman. ITALY AND THE POPE. By Gail Hamilton. A NEW VIEW OF SHELLEY. Ouida. THE AMERICAN BISHOP OF TO-DAY. By Rev. J. H. Ward. THE PREVAILING EPIDEMIC. By Cyrus Edson, M. D., Chief Inspector N. Y. Board of Health. FINAL WORDS ON DIVORCE. Margaret Lee, the Rev. Philip S. Moxom.

FOR SALE BY ALL NEWSDEALERS. FIFTY CENTS A COPY. \$5.00 A YEAR.

**NORTH AMERICAN REVIEW, NEW YORK.**

### —THE— SHAVER MULTIPLEX TELEPHONE.

Capacity for private lines 2 miles.

TRUNK LINES comprising a number of Telephones upon one circuit, and EXCHANGES for short lines switching direct one station with another. The only mechanical phone which works during rain and wind storms.

AGENTS WANTED.

THE SHAVER CORPORATION,  
78 CORTLANDT ST. NEW YORK.

### STYLUS

AGATE, STEEL, BONE, PORCELAIN and GUITA PERCHA  
—MOUNTED ON—  
EBONY, PEARL AND CEDAR HANDLES.  
—A GREAT VARIETY.—

SEND TO THE MANUFACTURERS FOR PRICE LIST.  
Rogers Manifold and Carbon Paper Co., 75 Maiden Lane, N.Y.  
HEADQUARTERS FOR  
Manifold Books, Carbon Paper, T. W. Ribbons, &c  
SEE OUT OF STYLUSES PAGE 18, AUGUST 1, 1889.

**WANTED**—Manufacturers to know that we will give free site, with right to purchase lands adjoining, to responsible manufacturers who will locate with us. The land is situate along the main line of Penna. Railroad, in Westmoreland County, Pa., 28 miles from Pittsburgh (all shipping rates same as Pgh.) in the heart of the Great Natural Gas Belt, adjacent to gas and water mains; is all underlaid with coal. Address  
ENTERPRISE LAND COMPANY, GREENSBURG, PA.

### FOR SALE.

A first-class Electric Light Plant in a growing town of 8,000 population. Best equipped plant in Wisconsin; well established; pay better than twelve per cent. Good reasons for selling. Cash only will buy it.

For particulars apply to

W. A. KNAPP,  
62 South Canal Street, Chicago, Ill.

### For Sale.

The controlling interest in an electric light company, in city of 15,000 inhabitants. Desirable contract with city for street lighting. Demand for private lights greater than present capacity of plant. Everything in first-class condition and on a paying basis.

For particulars address,

J. H. HICKMAN, Pres., Electric Light Co.,  
OWENSBORO, KY.

## The Telegraphers' Mutual Benefit Association.

A FRATERNAL LIFE INSURANCE SOCIETY.

—INSURANCE, \$1,000.—

TWENTY-THIRD YEAR.

For Particulars, Address THOMAS E. FLEMING, Secretary  
BOX 3175, NEW YORK.

## GOLD AND STOCK LIFE INSURANCE ASSOCIATION.

THIRTEENTH YEAR.

For Telegraphers and Others in Electrical Service.

INITIATION FEE, \$1.00. DUES, 50c per Month. INSURANCE, \$600.00.

In Payments of \$50.00 per Month for One Year.

WM. J. DEALY, Secretary,

(Room 58.) 195 Broadway, New York.

## FOUNTAIN AND STYLO PENS. Fountain Pens, \$1.50 and upwards

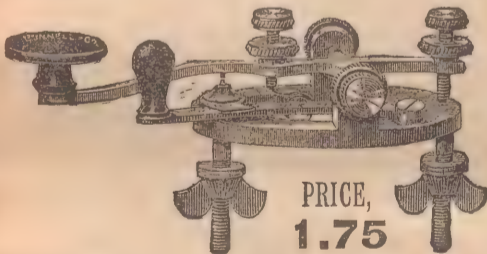


The FOUNTAIN PEN consists of a highly finished hard rubber holder, fitted with superior 14-kt. GOLD PEN to suit any writer. SIMPLEST AND CHEAPEST. "INDEPENDENT" STYLOGRAPHIC PEN. PRICE, \$1.00 AND UPWARD. EVERY PEN WARRANTED. Writes as smoothly as a Lead Pencil and is ALWAYS READY FOR USE.

J. UELRICH & CO., 106 and 108 Liberty St., New York.

## J. H. BUNNELL & CO'S

### STEEL LEVER SOLID TRUNNION KEYS.

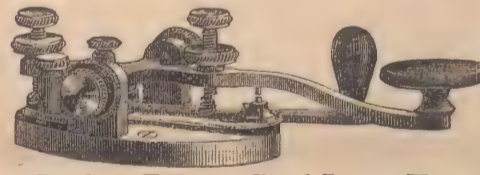


Over 73,000 now in use.

THE ONLY PERFECT KEY.

PRICE,  
1.75

J. H. BUNNELL'S PATENT,  
Feb. 15th, 1881.



Legless Pattern Steel Lever Key.

A Beautiful and Perfect Key suitable for use on fine desks, or wherever a Legless Key is preferable. PRICE, carefully boxed, and sent, prepaid by mail, to any part of the United States, \$2.25.

This form is especially convenient for operators who wish to possess their own private key, as it can be readily placed anywhere or removed without boring holes.

Telegraphers cannot fail to have noticed that upon the introduction of the BUNNELL STEEL LEVER KEY over eight years since, it at once achieved a vast popularity, such as never before attached to any specialty in Telegraph Instruments, and that this popularity has continually increased, and is still increasing.

It will also be noticed by Telegraphers, that since the STEEL LEVER KEY was introduced, a brood of "improved" keys has been hatched and put forward from various sources from time to time each one made to look as much like the STEEL LEVER KEY as possible, or made with some kind of a "steel lever," or "patent lever," and in every case claiming all the merits possible and impossible that language could describe. Most of these "improved keys" have become exterminated by the force of their own worthlessness. Years of practical test in the use of THOUSANDS of BUNNELL STEEL LEVER KEYS throughout America demonstrates their perfection and popularity. BE NOT DECEIVED BY THE ABSURD IMITATIONS.

THE BUNNELL STEEL LEVER KEY is more durable, and in every respect better than any other for rapid and perfect sending for the following reasons:

The Lever is only one-half the weight of the ordinary brass lever as generally made.

The entire Lever and Trunnions together being made of but one piece of fine wrought steel, the common defect of loose trunnions is avoided, the strength of a heavy brass lever is obtained with much less weight of metal, and, by the perfect bearing which the solid trunnion gives, together with the use of hardened platina points, sticking is absolutely prevented.

The size and proportions are such as to make it the most perfect operating key possible to obtain, either for the hand of the skilled and rapid expert, or the beginner.

Price, \$1.75. Finely Finished, and Lever Nickel Plated.

Steel Lever Keys sent by mail, post-paid to any part of the United States or Canada on receipt of price, by Registered Letter or Money Order.

SEND FOR OUR NEW CATALOGUE No. 10 OF MARCH, 1889.

J. H. BUNNELL & CO., 76 Cortlandt Street, NEW YORK.

## BOOKS.

Bottomo—Elec. Instrument Making.....\$1 20  
Du Moncel—Electro-magnets, trans. by Wharton..... 75  
Fahie—History of Elec. Telegraphy..... 3 00  
Hedges—Elec. Light Productions..... 1 00  
Himes—Electric Lighting..... 1 00  
Hospitalier—Domestic Electricity..... 3 00  
Munro and Jamieson Pocket-book..... 2 50  
Solomons, Sir D.—Accumulators..... 1 25  
Stephens—Electric Lighting..... 1 00  
Walker—Dynamo Building..... 80  
Catalogue and circulars free on application.

E. & F. N. SPON,  
12 Cortlandt St., NEW YORK.

## Telegraph Poles

I am prepared to furnish any number on short notice, both cedar and cypress. Parties wishing to buy will save money by giving me a chance to bid before they do so.

A. BUSHNELL,  
S. E. Cor. 9th and Broadway,  
KANSAS CITY, MO.

J. B. SABINE,  
COUNSELOR AT LAW.

## Electrical Patents.

181 BROADWAY,  
New York.

Specialty Electrical Patents.

## Headquarters for Type Writer Supplies.

RIBBONS, CARBON AND MANIFOLD PAPERS.  
Full line of papers specially selected for use on all writing machines. Pads for Yost writing machine. Sample books and price lists furnished on application.  
THE S. T. SMITH CO., 14 Park Place, N. Y.



### \$175.00 IN PRIZES.

\$100 first; \$50 second, and \$25 third. Prizes to be awarded to the three persons sending us the most business from February 16th to Nov. 16th, 1890.

ONE HUNDRED DOLLARS will be given to the person who sends us the most business during the ten months named.

FIFTY DOLLARS will be given to the person sending us the second-largest amount of business.

TWENTY FIVE DOLLARS will be given to the person sending us the third-largest amount of business.

These prizes are given exclusive of the usual commissions allowed; therefore those who work hard for one of these prizes will also be liberally compensated for the trouble with increased commissions. The first prize amounts to \$10 per month—a handsome sum of money for so small an effort.

Any person, except a regular employé of the paper, is qualified. This, of course, includes all agents and correspondents.

All remittances will be acknowledged in each issue of the paper.

A pretty lively skirmish is already on foot for these prizes. During the past fortnight we have sent out a great deal of literature to induce members of the craft to respond. Of course we are prepared to furnish our friends with anything they may desire to push their individual interests in the securing of business.

Up to the present time the list of those interested stands:

B. C. Elder, Kansas City, Mo.	\$8 70
W. E. Burns, Pittsburgh, Pa.	27 40
E. A. Coney, Newark, N. J.	1 50
L. E. Moores, Cincinnati, O.	4 65
B. F. Hartz, Helena, Montana	8 40
A. M. Butler, Omaha, Neb.	10 00
C. D. Lee, St. Louis, Mo.	10 00
C. J. App, Knoxville, Tenn.	4 80
F. B. Holcomb, Watertown, N. Y.	2 00
C. S. Loewenthal, Chicago, Ill.	11 54
H. I. Jolley, 195 B'way, N. Y.	8 00
L. Miller, Philadelphia, Pa.	4 00

Remittances only are acknowledged in this contest.

CHICAGO NOTES.—With the return of the birds from Southern climes comes a small advance guard of the traveling telegrapher. Some half a dozen have already made their appearance, while about as many have again flown to parts unknown. The reason for the short lingering was that they were entirely too early, and those who were successful were so on account of a few vacancies caused by men leaving. Among those who left were Wm. E. Ryan and Otho Godman, and among the arrivals, Mr. Cotton, from Vicksburg, Miss. Mr. Geo. Allen, on his return from his home in Hamilton, Ont., to Helena, Mont., stopped off and paid us a visit. Walter Omeliah has entered the Conservatory in this city to perfect his studies for the stage. He has chosen the Shakspearean school, and from what has been seen of his talent in amateur entertainments, he has certainly left a very favorable impression among all and no doubts as to his making his efforts a matter of success. Meanwhile Mr. Omeliah is working a special trick in this office. The new wire from New Orleans is a grand success. The old wire has been at times almost unworkable, but the new one is an almost straight copper wire, being run in at Memphis, and it cannot be denied that it is aught but a pleasure to work it. Messrs. McLaurin and Lee Hutson have exchanged places. Mr. McLaurin has recently fallen heir to a snug little sum which causes Mac to feel a little more comfortable and, as a matter of fact, takes life slightly easier. Mr. J. Savey has been appointed assistant chief in the Eastern Division, days, and we are all happy, his ap-

pointment being well received in the office. He is a thorough electrician and gentleman and well liked by everybody. During the great Saengerfest at New Orleans, recently, an enormous amount of German special matter was received here. Mr. Duenwald was detailed for the work, he copying the entire specials in German penmanship, and that it was highly appreciated by the German journals here was testified by a complimentary editorial in the *Staats-Zeitung*, and a box of elegant Havanas, which were brought to Mr. Duenwald by the editor of *Die Freie Presse*. Such work has seldom, if ever, been equaled in this country. We are sorry to record the death of the mother of our assistant chief operator, J. F. Stevely, which occurred Friday, Feb. 21.

BALTIMORE NOTES.—The Baltimore Division No. 17, Order of Railroad Telegraphers, held a reunion and banquet at Lechler Hall on the 19th of February, it being their 4th anniversary. The order was organized at Cedar Rapids, Ia., in August, 1886, with a membership of 25. It now has a membership of over twenty thousand, with one hundred and sixty divisions. The officers of the Baltimore Division are: Jas. B. Finnan, president; Geo. A. Kirby, vice-president; W. O. Hiltabidle, secretary and treasurer; Wm. Nolan, senior telegrapher; J. H. Roberts, junior telegrapher; H. Webb, inside sentinel; H. H. Tille, outside sentinel, and John T. Considine, past chief telegrapher. An excellent repast was served. Speeches were made by a number of the older members. Among those present were visitors from Philadelphia, Washington and York, Pa. J. Farley, of the Postal Company, has resigned to accept a position with the Automatic Fire Alarm Company as electrician.

TRANSFERS.—Miss Fannie Hoffmann, W. U., to Postal office, San Francisco, Cal.; John M. Scott, Louisville, Ky., to Kansas City, Mo.; John O. Shunk, Helena to Chicago; Kittie B. Lynott, Kansas City, Mo., to Colorado Springs, Col.; W. A. Brown, Grand Rapids, Mich., to N. P. R. R., St. Paul, Minn.; C. Howard, Kansas City, Mo., to Chelsea, Vt.; W. E. Lockhart, Oil City, Pa., to Lima, Ohio; W. T. Budds, W. U., to Postal, Augusta, Ga.; J. M. Scott, Kansas City, Mo., to Jacksonville, Ill.

CAN'T STOP THEM FROM CHEWING GUM.—A few days ago an order was issued in the office of the Postal Telegraph Company this city prohibiting the gentlemen from smoking and the ladies from crocheting or reading daily papers or other periodicals while on duty. The morning after the order had been bulletined 25 of the lady operators (they comprised the entire force of females so employed) filed in, took their places and began the business of the day—by chewing gum. Mr. George H. Usher, Manager of the office put in an appearance less than 10 minutes thereafter. He was convulsed with laughter. "But," he remarked, "the order still stands good." And from present indications it does.

WHAT'S THE MATTER WITH DELIVERY SERVICE?—About two weeks ago a Kansas City Post-office official sent a telegram addressed "care P. O. D." New York City. (Post-Office Department) Twenty four hours afterwards they asked a "G. B. A." on it and inquired if it was intended for "P. O. Box D" or "Station D." Next will they ask what C. O. D. and F. O. B. stands for.

SUBSCRIBER.

The following little anecdote will show what bright lights there are in the profession now-a-days. All way offices on a through wire between two large cities were instructed to cut out and use the local wire. One day one of the local offices cut in on the through wire and when told to go on the local wire replied: "Well, this is a through message and I'm going to send it on the through wire," and he fought circuit till he did.

MUST NOT JOIN THE UNION.—An agent of the Order of Railway Telegraphers has spent a week or more travelling from station to station on the Long Island Railroad enrolling the telegraph operators as members of the order. Superintendent Barton heard of it and was not pleased. He thought he foresaw an opportunity for a combination to force up wages or close the keys, thereby tying up for a time, at least, many of the company's trains and complicating the service. George Canning, of the Jamaica station, one of the most expert operators on the road, was made chief of the Long Island division, and Miss Raynor, of the Morris Park station, was made secretary. On February 20th Mr. Canning and Miss Raynor were dismissed from the company's service. During the day Superintendent Barton addressed a circular letter to all operators warning them not to join the order, and notifying all members to withdraw before March 1 or they will be discharged. It is not known how many of the operators have joined the order.

The order referred to above, which was sent to all operators on the line by Superintendent of Telegraph, Wm. E. Lewis, is as follows:

If you are a member of the Order of Railway Telegraphers and as such agreed to perform or not to perform certain duties, which as employees representing this Company you had no right to agree, I beg to inform you that you must either sever your connection with said Order of Telegraphers before March 1, or you will be dismissed from the service of this Company. Return this letter to me by first express with your decision noted thereon.

"I would like to ask," said one of the operators, "why it is that members of the Order of Railway Conductors and of the Brotherhood of Locomotive Engineers are allowed to stand by their colors while members of the Railway Telegrapher's order are expected to haul down theirs."

The headquarters of the Telegrapher's order are at Vinton, Ia. The organization numbers about nineteen thousand. On some roads no applicant for a position will be accepted unless he can show by his travelling card that he is in good standing in the order. It is opposed to strikes, and any member using his influence to create one will be expelled. The principal objection Mr. Lewis has to the organization, it is said, is a clause in the constitution prohibiting members from teaching the art of telegraphy to any one without the consent of the Grand Chief Telegrapher, attested by the Grand Secretary. He does not purpose, he says, to consult the wishes of an entire stranger a thousand miles away whether he can or cannot place in any office over which he has control a boy or girl to learn the business.

"The organization on the road is stronger than some people think," said Mr. Blackmond, District Organizer for Pennsylvania, New Jersey, Delaware, Maryland and New England States. "We intend in the event of trouble to simply allow our men to come to us to be placed elsewhere, leaving it for the Company and the travelling public to contend with the 'scrub oak' element. If they are content to put up with cheap labor and possibly a few fatal accidents and 'bulled' business generally we are satisfied to let them. If competent men are required they can be had from among the members in good standing of our organization. If men would occupy their spare time in practising and becoming adepts of their work in place of teaching students for the paltry sum received for such services and recommending them for duty before they can copy an order correctly or know how to operate a semaphore, many of the wrecks that have occurred would have been averted. It seems to me that the sooner an order is recognized by the railway officials of this country and none but its members hold positions on their lines the quicker accidents will cease."

Three large New York firms are already located in Montreal, and two Boston firms are negotiating for wire facilities.



## THE BOSTON BALL.

The fifth annual ball of the Telegraphers' Aid Association of Boston took place at Odd Fellows Hall February 14th. The affair was a most brilliant success, financially and otherwise. The committee which had the arrangements in charge was made up of some of the most active members of the association, and the notable success achieved is due to their unceasing labors to eclipse all previous efforts.

The committee of arrangements was as follows: F. B. Gray, H. W. Gillespie, W. A. Hazelboom, R. E. Tobin, G. H. Winston, J. A. Kenna, D. Carter, T. F. Clark, S. F. Shirley, J. M. Sullivan, W. S. Hutchinson, J. A. McGlinchy, D. J. Donovan, T. C. Devine, M. F. O'Donnell, J. B. Gatins, E. J. O'Connor, T. F. McAuliffe, J. D. Mulloney, G. J. McCarthy, J. C. O'Leary, F. T. Viles, H. B. Potter, S. Crowe, A. D. Brewer.

The reception committee was made up as follows: Matthew C. Harrington, H. B. Potter, J. P. Pendergast, A. W. Austin, H. N. Barrett, J. C. O'Leary, F. B. Gray, J. B. Gatins, C. A. Hart, T. F. McAuliffe, G. J. McCarthy, J. D. Mulloney, G. B. Kirkpatrick, J. R. Martin, S. F. Shirley.

Floor Director Daniel Carter led the march. Then came Assistant Director Thomas F. Clark and, accompanied by their ladies, the following aids: T. C. Devine, J. M. Sullivan, T. R. Melville, F. T. Viles, P. T. Cronin, M. F. O'Donnell, A. S. Patterson, J. J. Riley, William A. Hazelboom, G. H. Mooney, J. L. Culliney, J. B. Clancey, H. L. Flynn, W. S. Hutchinson, A. H. Donovan, W. A. Kenna, W. Dow, J. C. Kilday, P. T. Haggerty.

Besides those named above, the following telegraphers were present:

Misses Mollie Bumpus, Fannie Goode, M. E. Sullivan, Kittie Barnes, Mollie Behnke, Abbie Goode, Mollie Dunn, and K. E. Clifford.

Messrs. E. B. Pillsbury, W. P. Foley, J. J. Hasty, J. H. Connors, Harvey C. Wheeler, N. F. Clifford, M. J. Connors, D. J. McCarthy, J. T. Hart, J. E. Shorey, H. F. Evans, Wm. McFarland, G. H. Williams, P. G. Henderson, David Connell, Edward Burke, J. H. Morris, T. R. Melville, D. J. Thomas, J. H. Ready, M. F. McGlinchy, P. H. Ferriter and S. C. Carr.

ST. LOUIS WESTERN UNION NOTES.—A brief statement of the magnitude to which the special news service has attained in the St. Louis office will perhaps prove interesting to the telegraphic world as well as to those connected with this office. That few telegraph officials outside of St. Louis realize the importance and volume of this business is evident from the doubts expressed when St. Louis people have endeavored to enlighten them upon the subject. The key to the situation is found in the strategic position of St. Louis, in reference to the vast area of territory stretching west, northwest, and southwest, not to mention the east, which acts as a natural feeder of news as well as of commerce. St. Louis daily journals have extensive circulation throughout all this territory. They are naturally held responsible for the collection and prompt dissemination of the current news. How they meet this responsibility can best be judged from the amount of press service handled by the St. Louis office. This special service does not infringe upon the regular and complete service of the various press associations, but generally comprises news not received by them. To perform this service in a prompt and reliable manner, a system has been evolved in this office which has proved eminently trustworthy and efficient. The *Globe-Democrat* office is equipped with fourteen loops and sets of instruments; the *Post-Dispatch* with eight, and the *Republican* with five. On Saturday nights these loops are taxed to their fullest capacity to handle the incoming specials from all parts of the country. Thirteen New York wires have been employed in this service at one time. The *Globe-Democrat* has worked

with all the principal cities from Ogden, Utah, to Portland, Maine, on the same night. The amount of matter handled by the office the year round averages from 75,000 to 100,000 words daily. As high as 140,000 words have been handled on a single night. So perfect is the system employed that there is scarcely any time lost in making loop connections, or supplying the various offices with the necessary operators. The loop-chiefs can tell at a glance the exact status of their department. The quality of this service is a matter of personal pride to the entire office, and is a source of large revenue to the company. The *Globe-Democrat* recently made the statement that its bills for specials averaged from fifteen to twenty-five hundred dollars weekly. The special service has grown to its present proportions under the administration of chief-operator Topliff, to whom, with night-chief Spencer, who has personal supervision of the system, is due the credit for the excellent manner in which this important service is performed. Among the "new departures" we have to note is an inauguration of an "Academy of the Telegraph," under the tutorship of Mr. Charles Edward Turner, a recent graduate of this office. Among the special features of the institution as conducted by Mr. Turner will be the rounding out and development of first-class operators. As this college instructs only in the higher (?) branches, and is worked solely by the "main line system," a new and advanced school of operators will be "turned out." The college, by working day and night will be able to supply both day and night operators, a great advantage over the ordinary school. By the attachment of a reading-room a "long felt want" is supplied, as this equipment insures that graduates will know how to read. This last innovation emphasized the fitness of Mr. Turner as an instructor of the highest order. It is unnecessary to say that this institution is a member of the inter-collegiate association, and that under the management of Charles Edward Turner, T.B., it will be an "unqualified" success—the accent on the "unqualified." Operator E. J. Linden has been confined to his room for three weeks with acute rheumatism. He is now recovering. F. S. Mitchell has returned from Zanesville, Ohio, where he had been called to attend the funeral of his sister. Mr. Jack Magill was unexpectedly summoned to Kansas City by a telegram announcing the severe illness of his mother. Miss Jessie Sinclair has recently been transferred from the Wheatstone to the operating department. Miss Thomas has been transferred from Morse to Wheatstone. Dame rumor has it that Miss Jennie Sinclair, lately resigned from the Wheatstone department, will soon be married. Miss Sinclair has many friends in the office who anxiously await the development of this rumor. Arrivals: F. T. Dolson, from Detroit; Thomas F. Hanley from St. L. & K. C. R. R.; Mr. Hugh O'Rourke, combination Wheatstone and Morse operator, and Mr. J. C. Kelly, Wheatstone puncher from New York. Departures: Chas. Griener, Wheatstone, to enter mercantile business. On Feb. 10th, Mr. J. B. Taltavall, formerly editor, but now business manager of the *Age*, paid this office a very pleasant visit. Mr. Taltavall was on his way West to attend the National Electrical Convention held in Kansas City.

AN OLD TIMER.—Mr. James L. Lillis, of the Postal Telegraph Company, San Francisco, on the 10th day of February completed the 44th year of his telegraph service. He is a veritable "Old Timer." In a communication he asks if we know of any one now in the service who can beat his record. He mentions his association with Mr. Edmund Clasback in the Magnetic Co.'s office in Jersey City in 1846. This was practically New York's telegraph office at that time. As there was no known method of laying wires across rivers at this period, there was no telegraph office in New York City. Messrs. Joseph L. Edwards, Edward

Clasback and M. B. Lillis, were also associated with Mr. Lillis during the babyhood days of the telegraph, and they are all still in the service. Mr. Edwards is one of the "printers" at 195 Broadway, and looks so young that anyone not knowing the fact would never suspect that he witnessed the birth of the telegraph and has been identified with it ever since. Mr. Clasback is employed in the Tariff Bureau of the Western Union Company, at 195 Broadway, and bears his years well. Although time has whitened his hair and beard, his step is as elastic and firm as that of a youth. Mr. M. B. Lillis, a brother of James L., is a member of the night force at 195 Broadway. The reminiscences of the early days of the telegraph of these four pioneers no doubt would make a very interesting story.

## NOTICE.

A grand performance and reception (Testimonial), with the co-operation of the New York Telegraph Operators, will be rendered to Martin J. Dixon, at the new Central Opera House, 209 to 215 East 67th street, on Wednesday evening, April 16. The beautiful society play of "East Lynne" will be produced with Miss Florence Miller, of 195 Broadway, in the title role. Miss Susie Stephenson has kindly volunteered to sing between the acts, and Mr. Thomas Ballantyne will mimicize.

Prices: Boxes, holding seven persons, - \$3.00  
Tickets, admitting Gentlemen and Ladies, 50

On sale at all principal telegraph offices in New York and Brooklyn.

RAILWAY TELEGRAPHERS' BALL.—The New York City Division, No. 129, Order of Railway Telegraphers, gave their first annual ball, Friday evening, February 28th, at Lyric Hall, 723 Sixth avenue. As this issue was on the press at the time, details of the entertainment could not be prepared in season. We hope to give a full account in our next.

REPORTING THE MARYLAND LEGISLATURE.—Mr. James Doyle, manager of The United Press at Baltimore is, with two assistants, reporting the proceedings of the Maryland Legislature, at Annapolis, for all of the Baltimore morning papers.

## CATARRH,

## CATARRHAL DEAFNESS—HAY FEVER.

## A NEW HOME TREATMENT.

Sufferers are not generally aware that these diseases are contagious, or that they are due to the presence of living parasites in the lining membrane of the nose and eustachian tubes. Microscopic research, however, has proved this to be a fact, and the result of this discovery is that a simple remedy has been formulated whereby catarrh, catarrhal deafness and hay fever are permanently cured in from one to three simple applications made at home by the patient once in two weeks.

N. B.—This treatment is not a snuff or an ointment; both have been discarded by reputable physicians as injurious. A pamphlet explaining this new treatment is sent free on receipt of stamp to pay postage, by A. H. Dixon & Son, 337 and 339 West King St., Toronto, Canada.—*Christian Advocate*.

Sufferers from Catarrhal troubles should carefully read the above.

J. S. TOWNSEND,

1554 Wabash Ave.,

Chicago, Ills.

Will ship you any article in the way of Diamonds, Watches, Jewelry, Emblems, etc., etc., C. O. D. approval, and guarantees all goods as first-class, and prices spot cash, wholesale rates. We sell immense quantities of goods and can afford to give our customers the benefit of very great inducements. Write for Catalogue and our Co-operative Watch Club system. Manufacturing and Repairing. Designs furnished free of charge.

References: Editor of this journal and First National Bank, Chicago, Ills.

J. S. TOWNSEND,

1554 WABASH AVENUE,

CHICAGO, ILLS.



# TELEGRAPH OPERATORS!

IMPROVE YOUR LEISURE TIME AND  
ADD TO YOUR INCOMES.

There is a large and constantly increasing demand for Electric Bells, Burglar Alarms, etc., in the smaller cities throughout the country, where there are no regular Electrical Construction houses.

Telegraph operators possess the requisite knowledge and skill for Electrical housework, and can utilize their spare time in obtaining orders for and doing this class of work, which is both pleasant and profitable and requires little or no capital.

This Company makes a specialty of Housework Supplies and is prepared to furnish them to Telegraphers, who desire to engage in this business, in quantities as desired, and upon the most favorable terms.

Send Ten Cent Stamp for Terms, Complete Illustrated Catalogue and Diagrams of Housework.

**THE EMPIRE CITY ELECTRIC CO.,**  
15 Dey Street, New York.

FRANKLIN S. CARTER, CHARLES M. WILKINS, E. IWARD WILKINS.

TRADING AS

**PARTRICK & CARTER,**

Manufacturers and Dealers

**ELECTRICAL SUPPLIES**

Sole Proprietors of the Patent Needle Annunciator.

114 SOUTH SECOND ST.,

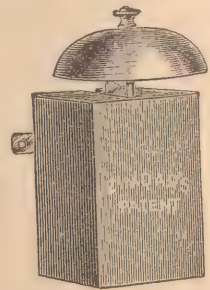
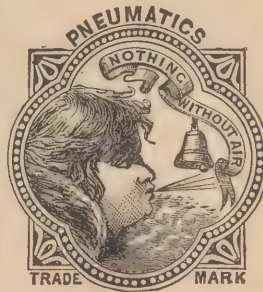
PHILADELPHIA.

ESTABLISHED 1867.

Patent Needle Annunciators, Burglar Alarms, Electric Bells, Bronze, Nickel and Wood Pushes, Door and Window Springs, Electric Matting, Automatic, Ratchet, and Hand Light Burners, Spark Coils, Keys (Wood and Nickel), Compound Pushes, etc., Door Pulls and Attachments, Automatic Drops, Magneto Bells, Buzzers, Batteries (all Kinds), Foot Pushes, Pear Pushes, Desk Pushes, and all Supplies for Electric Bell Work, Telegraph Instruments, Registers, Relays, Keys, Sounders, Learners' Outfits, Medical Batteries and Appliances, Induction Coils, Motors, Storage Batteries, Hydrometers, Bluestone, Salammonic, Zinc, Copper, Climbers, Pliers, Screw Drivers, Bits, Augers, Vices, Tool Belts, Tool Bags, Splicing Irons, Clamps, Electro-Plating Outfits, Electric Light Supplies, Wires of all kinds, Tape Insulators, Cross Arms, Brackets, Pole Steps, etc., etc.

Send Business Card for Catalogue and Discount Sheet.

FOR DWELLINGS, HOTELS, APARTMENT  
HOUSES, YACHTS, &c.



PNEUMATIC  
BELLS AND ANNUNCIATORS.

NO WIRES NO BATTERY REQUIRED.

ZIMDARS & HUNT,

PATENTEES AND MANUFACTURERS,

237 MERCER STREET, NEW YORK.

**FRAUD! FRAUD!**

Recognizing the Popularity of the

**SAWYER-MAN  
LAMPS,**

Unscrupulous persons manufacture  
lamps in bases stamped

**"SAWYER-MAN PATENTS"**

These manufacturers being financially  
irresponsible,

**THE SAWYER-MAN ELECTRIC CO.**

Hereby gives notice that it will enforce  
**THE STRINGENT LAWS**

Regarding Fraudulent Patent Marks,  
Against the USERS of such lamps.

**Sawyer-Man Electric Co.,**

510-534 West 23d Street,  
NEW YORK.



# BERGMANN & CO.,

All Appliances for the Edison Electric Light,

—AND—

## ELECTRIC LIGHT, COMBINATION *and* GAS FIXTURES.

*Fixtures Adapted to any System of Incandescent Lighting.*

**CATALOGUES, SPECIAL DESIGNS AND ESTIMATES FURNISHED ON APPLICATION.**

ARCHITECTS' DESIGNS FAITHFULLY CARRIED OUT.

CORRESPONDENCE SOLICITED.

Office and Works:  
292-298 Ave. B. }

NEW YORK.

Show Rooms:  
65 Fifth Avenue. }

*T. W. Wilmarth & Co., 225 State Street, Chicago, Ills.*

AGENTS FOR OUR FIXTURES IN THE NORTHWEST.

# CHAS. A. SCHIEREN & CO.,

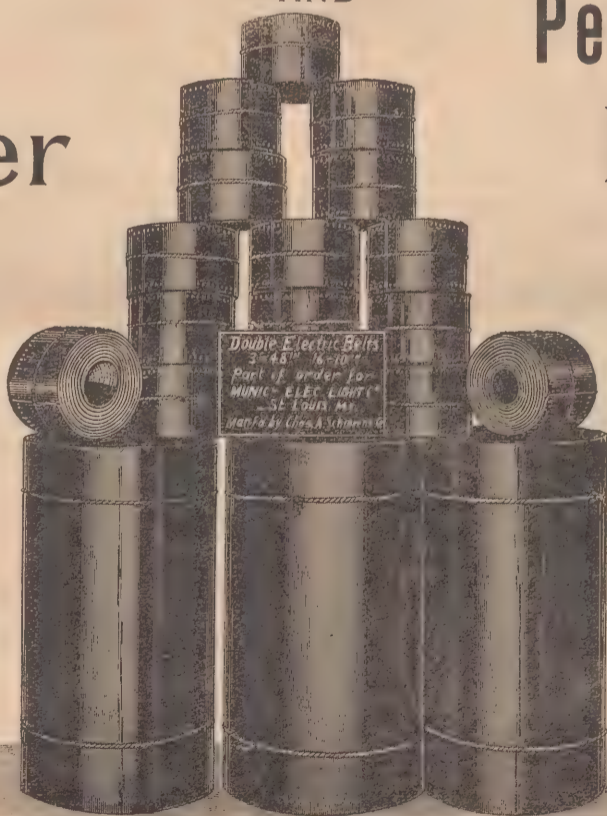
—MANUFACTURERS OF—

Electric  
Leather

—AND—

Perforated Electric  
Belting  
Dynamamos.

*for use on*



Used by all the

Largest Electric Light Companies

in the

UNITED STATES.

FACTORY AND MAIN OFFICE:

45-51 Ferry Street, NEW YORK.

CHICAGO: 46 S. Canal St.

PHILA.: 226 N. Third Street.

BOSTON: 119 High Street.

TANNERIES:

Brooklyn, N. Y.

Adamsburg, Pa.

Mount Union, Pa.

Louisville, Ky.

FRAUD! FRAUD!



# EDISON LALANDE BATTERY

FOR

## TELEGRAPH MAINS AND LOCALS.

MANUFACTURED BY

**EDISON MANUFACTURING CO., - ORANGE, N. J.**

*Estimates showing investment, maintenance, etc., and diagram of proposed arrangement of battery on main lines will be cheerfully furnished to anyone who will*

### **ANSWER THE FOLLOWING QUESTIONS.**

**CUT THEM OUT AND MAIL TO US.**

Name of Company: .....

Address: .....

(1) How many wires do you wish to operate from one battery?

(2) From what point do they start?

(3) What is the mileage of each wire?

(4) Please state the number of relays included in each circuit?

(5) If possible, please state total resistance of each line including relays?

(6) Do two or more of these wires terminate at the same point? If so, please indicate which.

(7) Please state number and kind of cells at present in use on each line?

### **THESE CELLS**

Are equally efficient in all kinds of weather, owing to their exceedingly low internal resistance, viz.: .025 ohm. For the same reason, low internal resistance, practically any number of wires can be operated from a single battery of these cells.

The running expense of Telegraph Departments can be materially reduced by

### **CONCENTRATING MAIN LINE BATTERIES.**

For further particulars and information apply to

**EDISON MANUFACTURING CO., ORANGE, N. J.**



Awarded the Grand Prize.

At late Paris Exposition.

### The Double Cylinder Law Battery

THE STANDARD FOR ALL OPEN CIRCUIT WORK.

ITS NINTH YEAR.

The Negative Element has 147 square inches of surface, which is more than double the surface found in any other! The Cell contains 2 1/2 pints of solution, which is nearly double that in any other cell!



- No Running over or Creeping of Salts.
- No Evaporation.
- No Corrosion.
- No Renewal of Negative Element.
- Requiring no Care.
- Costing nothing for Renewals except for Zinc and Solution (a trifle) in from two to four years.
- White Flint Glass Jar.
- Black Rubberoid Cover
- Lock Seal Top.
- Pure Zinc.
- Pure Sal Ammoniac.
- Fewest Parts.

4 1/2 ins. square, 7 1/2 ins. high.

The Law Battery is kept in stock and for sale by all reliable supply houses.

AGENTS: { GEO. L. HENZEL, San Francisco, Cal.; for Pacific Coast.  
CHAS. A. STREILINGER & CO., Detroit, Mich., for Detroit.

THE LAW TELEPHONE CO., Sole Makers,  
85 JOHN STREET. NEW YORK.

HIGHEST AWARD!

FOR ELECTRIC

PARIS,



ONLY GOLD MEDAL BATTERIES.

1889.

Exposition.

# GONDA AND AXO

OF THE WORLD.



THE STANDARD BATTERIES

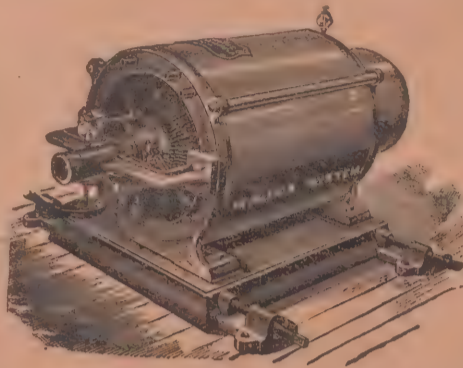
THE LECLANCHE BATTERY CO., 149 W. 18th Street, N. Y.

72 Page Illustrated Catalogue of  
**RUBBER STAMPS**  
Steel Stamps, Stencils, Seals, &c.  
Sent Free on Application by Postal to  
**S. W. REESE & CO,**  
29 CHURCH ST., NEW YORK

**ELECTRIC LIGHT AT HOME**  
WITHOUT MACHINERY,  
Send for Illustrated Catalogue.  
**JAMES H. MASON**  
Manufacturing Electrician,  
120 Park Ave., Brooklyn, N. Y.

Awarded the Highest Distinction, a Gold Medal, by the International Jury at the Universal Exposition, Paris, 1889.

### THE HEISLER PATENT LONG DISTANCE INCANDESCENT ELECTRIC LIGHT SYSTEM.



Unequaled for Distribution over wide Areas.

SPECIALLY ADAPTED FOR STREET, COMMERCIAL AND DOMESTIC ILLUMINATION FROM CENTRAL STATIONS.

SAFETY, RELIABILITY AND FINANCIAL SUCCESS FULLY DEMONSTRATED.

Plan of Wiring the Simplest, Cheapest and Most Efficient.

— STRICTLY SERIES. —

Noted for the Brilliance and Beauty of the Light. Lamps, 10 to 100 Candle Power. Long Life without Blackening.

Greatest Production of Candle Power per Horse Power. Dynamo Self-Contained and Perfectly Automatic.

Plant may be located where Power can be secured Cheapest, even if Miles Distant from the Lighting.

SEND FOR CIRCULARS. - CORRESPONDENCE SOLICITED.

HEISLER ELECTRIC LIGHT CO., 809-817 South 7th St., ST. LOUIS, MO.

LIBERAL DISCOUNT TO DEALERS, SEND FOR REDUCED PRICE LIST.



No. 2 O. K. OUTFIT,  
WITH SOUNDER AND KEY

On same base, or separate, as ordered.

Complete Outfit, - - - \$3.75

Sounder, - - - - - 2.25

Key, - - - - - 1.00

Sounder and Key on one

Base, - - - - - 3.25

The above Outfit consists of a beautiful Sounder wound to 20 ohms, and one of my unrivaled Nickel Plated, Legless, Steel Lever Keys; One Cell 5x7 Battery (or 6x8 Battery, 10c. extra); 15 ft. Insulated Office Wire, 1 lb. Vitriol, 1 Instruction Book, all safely packed and will be shipped on receipt of price, or sent C. O. D., subject to inspection, if you send me \$1.00 with order. State whether you wish Key and Sounder on same Base or separate. Write your address plain and full, also state by what Express Co. wish goods shipped. Address,  
**A. B. LYMAN, 34 and 36 South Water Street, CLEVELAND, OHIO.**

## CALIGRAPH Remington

GREATEST SPEED ON RECORD!!

T. W. Osborne wrote 179 words in one single minute on the CALIGRAPH, the Champion Machine of the World.

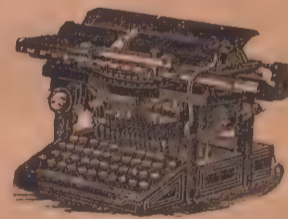
100,000 Daily Users.



G. A. McBride wrote 129 words in a single minute, *Blindfolded*, thus in each case proving the falsity of many of the statements of our competitors.

For full and correct account of above test, address  
**THE AMERICAN WRITING MACHINE CO., HARTFORD, CONN.**

BRANCH OFFICES:—237 Broadway, N. Y.; 14 W. 4th Street, Cincinnati, O.; 1003 Arch Street, Philadelphia.



Standard Typewriter

HAS BEEN FOR

**FIFTEEN YEARS**

THE STANDARD,

AND

Embraces the Latest and Highest Achievements of Inventive Skill.

WYCKOFF, SEAMANS & BENEDICT,  
327 BROADWAY, NEW YORK.

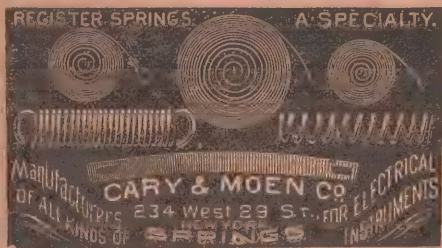


**A GOLD MEDAL**  
the PARIS EXPOSITION for



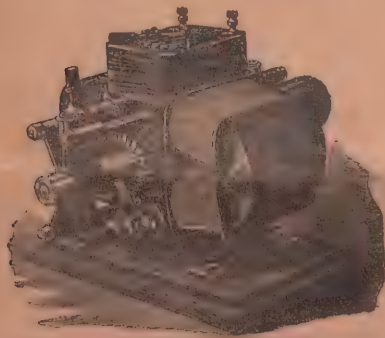
**WIRES & CABLES**  
For Telegraph, Telephone and Electrical Uses.

**THE OKONITE CO.,**  
No. 13 Park Row, NEW YORK.



W. D. SARGENT, Pres. JNO. A. BARRETT, Vice-Pres. & Cons. Elec. E. H. CUTLER, Treas. & Man. FRANK A. PERRET, Electrician.

**THE ELEKTRON M'F'G CO.,** 79-81 WASHINGTON ST. BROOKLYN, N. Y.



MANUFACTURERS OF THE  
**PERRET ELECTRIC MOTORS and DYNAMOS.**

Automatically Regulated, Unexcelled in Simplicity and Durability.

THE ONLY MACHINES HAVING

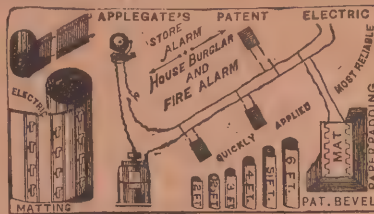
**Laminated Field Magnets of Softest Charcoal Iron,**

BY MEANS OF WHICH

Higher Efficiency, Closer Regulation and Slower Speed are obtained than is possible otherwise.

CAREFUL INVESTIGATION INVITED.

**Standard Underground Cable Co.**  
**ELECTRIC CABLES,**  
**LINE and HOUSE WIRE.**  
General Offices, 708 Penn. Ave., Pittsburgh, Pa.  
Branch Offices:  
N. Y., 18 Cortlandt St. Chicago, Room 542, The Rookery.



**Applegate's Electric Floor Mat Manufacturing Co.**

OFFICE AND FACTORY:

No. 37 Market Street, Camden, N. J.

**THE GREATEST HOME PROTECTION YET INVENTED.**

**SIMPLE! DURABLE! CHEAP! VALUABLE!**

For sale by all Electrical Supply Houses.

**DAY'S**  
**KERITE WIRES AND CABLES**  
For Aerial, Underground and Submarine use.  
**EDWARD B. McCLEES,**  
General Agent.  
**16 DEY ST., NEW YORK**

**Moss Engraving Co.** 535 PEARL ST. NEW YORK.  
COR. Elm St.  
ENGRAVINGS FOR BOOKS, NEWSPAPERS and CIRCULARS  
SEND GREEN STAMP FOR CIRCULAR—SEND PHOTOGRAPH, DRAWING or PRINT for ESTIMATE.  
When writing please mention "The Electric Age."



**India Rubber Insulation.**

NEXT to GUTTA-PERCHA, the best known insulator is INDIA RUBBER, but it is very refractory unless vulcanized, and the sulphur necessary for vulcanizing is a deadly enemy to copper (as may be observed in samples of all wires insulated with rubber compounds where the vulcanized coat is placed directly on the wire).

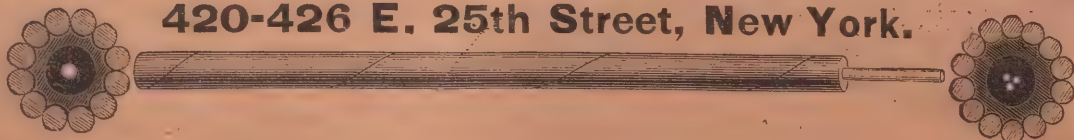
In order to overcome these difficulties, we first coat the copper wire with TIN; then with a Rubber Cement; then with a Rubber Compound WITHOUT SULPHUR; then for protection use the vulcanizing coat, and rubber tape or braid.

It is then vulcanized with great care so as not to be liable to crack.

These wires are the best made for AERIAL OR UNDERGROUND WORK.

**BISHOP GUTTA-PERCHA COMPANY,**

420-426 E. 25th Street, New York.



**The United Press.**

International in scope, representing leading Journals throughout the United States, Canada, and Europe, and operating a complete system of leased wires to the principal American cities.

**BOARD OF DIRECTORS.**

JAMES W. SCOTT, Chicago Herald.	ROBERT S. DAVIS, Philadelphia Call.
CHAS. H. TAYLOR, Boston Globe.	JAMES E. SCRIPPS, Detroit Evening News.
WILLIAM M. LAFFAN, N. Y. Evening Sun.	SAMUEL D. LEE, Rochester Herald.
WILLIAM L. BROWN, New York Daily News.	E. H. BUTLER, Buffalo Evening News.
ARTHUR JENKINS, Syracuse Herald.	C. R. BALDWIN, Waterbury American.
JOHN H. FARRELL, Albany Press and Knickerbocker.	W. C. BRYANT, Brooklyn Times.
	WALTER P. PHILLIPS, New York.

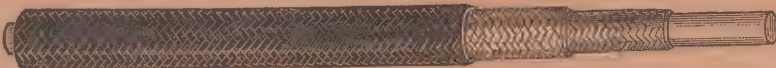
**EXECUTIVE OFFICERS.**

JAMES W. SCOTT, President. C. R. BALDWIN, Treasurer.  
A. L. SUEBMAN, General Western Manager, Chicago. WALTER P. PHILLIPS, General Manager, New York.

**ANSONIA BRASS & COPPER CO.**

SOLE MANUFACTURERS OF

Cowles' Patented Fire-Proof and Weather-Proof Line Wire.



SAMPLES FURNISHED UPON APPLICATION.

Pure Electric Copper Wire, bare and covered, of every description.

Warerooms: 19 and 21 Cliff Street, New York; 133 & 135 Wabash Ave., Chicago, Ill. Factories: Ansonia, Conn.

**Electrical Business Directory.**

**ANSONIA BRASS & COPPER CO.,** Wires, New York and Chicago.

**BOGART, ABM. L.,** MANUFACTURER of Electric Gas Lighting Supplies. 22 Union Square, N. Y.

**BROOKFIELD, W.,** MANUFACTURER of Screw Glass Insulators and Battery Jars. 53 Fulton St., N. Y.

**BUNNELL, J. H. & CO.,** ELECTRICAL Supplies. 76 Cortlandt St., N. Y.

**CAND C. ELECTRIC MOTOR COMPANY,** Electric Motors. 402-4 Greenwich Street, New York.

**CARY AND MOEN CO.,** SPRINGS, 234 W 29 St., N. Y.

**COLBURN, I. W. & CO.,** DYNAMOS. 130 Main St., Fitchburg, Mass.

**DAY'S KERITE, WIRES AND CABLES.** 16 Dey St., N. Y.

**EDISON MACHINE WORKS, WIRES &c.** 19 Dey St., N. Y.

**ELEKTRON MANUFACTURING CO.,** Perret Electric Motors and Dynamos, 79-81 Washington St., Brooklyn, N. Y.

**GREELEY THE E. S. AND CO.,** ELECTRICAL Supplies. 5 & 7 Dey Street, N. Y.

**D. R. GASSNER'S DRY BATTERY.** THE best open circuit battery in the market. A. Schoverling, Sole Agent and Manufacturer, No. 111 Chambers St., N. Y.

**HEISLER ELECTRIC CO.,** ELECTRIC Lighting. 809 to 817 So. 7th St., St. Louis, Mo.

**LAMARCHE'S SONS, H.,** 83 JOHN ST., New York. Zincs. Finest quality Zinc, Annunciator, Office, Magnet and Electric Wire of all kinds.

**L. ECLANCHE BATTERY CO.,** BATTERIES. 149 W. 18th St., N. Y.

**LYMAN, A. B. KEYS AND SOUNDERS.** 34 and 36 So. Water St., Cleveland, O.

**LAW TELEPHONE CO.,** BATTERIES. 85 John St., N. Y.

**MANHATTAN ELECTRICAL SUPPLY CO.,** Electrical Supplies, 26 Church Street, N. Y.

**MARSHALL, WM.,** MANUFACTURER, ELECTRIC CONDENSERS, Standards a Specialty, Room 2 & 4, University B'g. N. Y.

**OKONITE CO.,** WIRES AND CABLES. 13 Park Row, N. Y.

**PARTRICK AND CARTER,** ELECTRICAL Supplies. 114 So. 2nd St., Philadelphia.

**STANDARD UNDERGROUND CABLE CO.,** Cables, Pittsburg, Chicago and New York.

**SABINE, J. B.,** ELECTRICAL PATENTS. 181 B'way, New York.

**SPON, E. and F. N.,** ELECTRICAL Books. 12 Cortlandt St., N. Y.

**SHAVER CORPORATION** ACOUSTIC Telephones. 78 Cortlandt St., N. Y.

**VAN NOSTRAND, D. CO.,** ELECTRICAL Books. 23 Murray St. & 27 Warren St., N. Y.

**J. W. COLBURN & CO.**  
130 MAIN ST. FITCHBURG MASS.  
FIRST-CLASS WORK  
MACHINES FOR ARC AND INCANDESCENT ELECTRIC LIGHTING, ELECTRO-PLATING, AND FOR EXPERIMENTAL USE. ALSO MOTORS.  
LOWEST PRICES



# THE ELECTRIC AGE

## TELEGRAPH EDITION.

VOL. VII—No. 20.

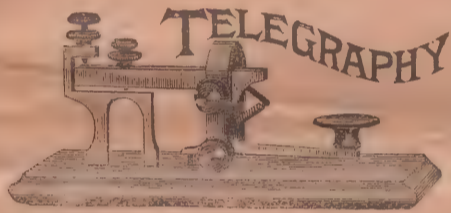
NEW YORK, MARCH 16, 1890

PRICE 10 CENTS.

**J. H. BUNNELL & CO.**  
76 CORTLANDT STREET,  
—New York.—

Telegraph  
Instruments,  
BATTERIES, BELLS  
AND ELECTRICAL  
SUPPLIES.

The Largest Stock and best variety  
of main line and short line instruments  
in any American establishment.



New "No. 2" Improved Mechanical Telegraph  
Instrument. (For Practice.)

Combined Key and Giant Sounder (without magnets—no battery required.) Works exactly like the very best Sounder and Key Combination Set, giving loud, clear sound, with slightest force on movement of Key. All made in first-class instrument composition. Brass, same pattern as best Giant Sounders. Price sent by mail, prepaid, with alphabet cards, etc., \$1.50. Complete Illustrated Telegraph Instruction Book sent free to any address.

SEND FOR OUR  
Latest Illustrated Price List and Catalogue,  
No. 10 of March, 1889.

Containing over four hundred cuts of Telegraph Instruments, Batteries and Electrical Appliances,  
FREE; also Manual of Telegraphy  
FREE to any address.

**J. H. BUNNELL & CO.**  
76 Cortlandt St., N. Y.

### ON TO THE TOURNAMENT!

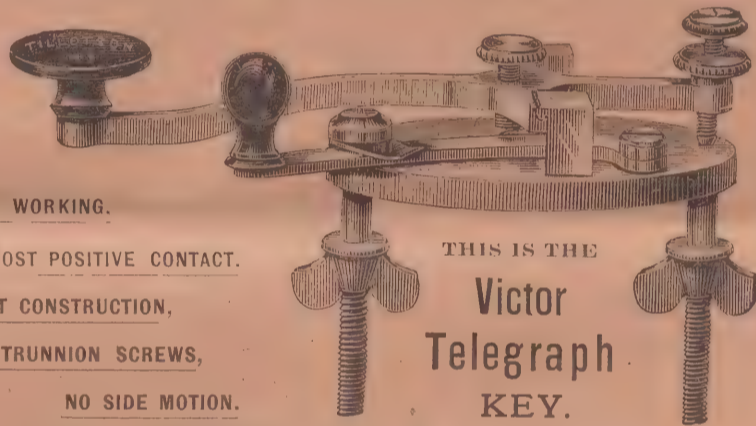
*A Keen Eye, A Steady Nerve, A Nimble Hand and a*

### VICTOR KEY,

ARE ALL FACTORS IN THE PROBLEM OF SUCCESS IN  
The National Fast Sending Tournament of  
—1890.—

And What's the Matter with the "CATLIN GRIP?"

Oh! That's All Right! Add that to the list  
of the Factors too.



EASIEST WORKING.

MOST POSITIVE CONTACT.

PERFECT CONSTRUCTION,

NO TRUNNION SCREWS,

NO SIDE MOTION.

THIS IS THE  
Victor  
Telegraph  
KEY.

#### SPECIAL TOURNAMENT PRICES TO THE FRATERNITY.

The Following Telegraph Instruments sent postpaid by mail on receipt of price on orders placed with us before the date of the National Tournament of 1890. The Victor Instruments are cheapest even at double the price of the old style Trunnion Screw Instruments.

VICTOR INSTRUMENTS.		TRUNNION SCREW INSTRUMENTS.	
Keys,	\$2.00	Steel Lever Key,	\$1.50
Legless Key,	2.25	Local Giant Sounder,	2.25
Local Sounders,	2.75	20 Ohm	2.75
20 Ohm	3.25	150 " W. U. Relays	4.75
150 Ohm Relays,	5.50	Local Combination Sets,	4.00
Local Combination Sets,	4.75	20 Ohm	4.50
20 Ohm	5.25		

### THE E. S. GREELEY & CO.,

Manufacturers and Importers of, Dealers in and Headquarters for Telegraph, Telephone, Electric Light, District Burglar Alarm, Electric Bell, Experimental and General Electrical Supplies. Sole Manufacturers of the Victor Telegraph Instruments.

5 AND 7 DEY STREET, NEW YORK.

R. E. GALLAHER, SECRETARY.

J. W. GODFREY, GENERAL MANAGER.

W. B. DOWSE, SUPERINTENDENT.

## New York Insulated Wire Co.,

—SOLE MANUFACTURERS OF—

WHITE CORE WIRES, B. D. WIRES, COMPETITION LINE WIRES, GRIMSHAW TAPES, GRIMSHAW SPLICING COMPOUND.

SELLING AGENTS.—Knapp Electrical Works, Chicago, Ill.; St. Louis Electrical Co., St. Louis, Mo.; Southwestern Electric Supply and Construction Co., Kansas City, Mo.; The Central Thomson-Houston Co., Cincinnati, O.; Kendall & Slade, Boston, Mass.; Fisher Electric Co., Detroit, Mich.

649 & 651 BROADWAY, N. Y.



## "C. & C." ELECTRIC MOTOR COMPANY,

402 & 404 GREENWICH STREET, NEW YORK.

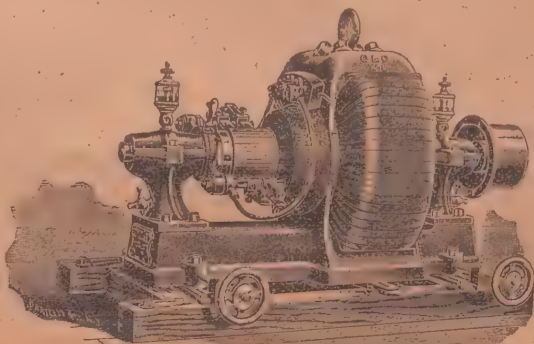
ALL STANDAND SIZES

—OF—

Electric Motors

—FROM—

1-8 H. P. TO 40 H. P.



Chicago Office, Phoenix Building.  
Cincinnati Office, 165 Walnut Street.

OVER 6,000 NOW IN USE

IN THE

UNITED STATES,

Running Sewing Machines, Elevators, Printing Presses, Ventilating Fans, Blowers, Coffee Mills, Polishing and Grinding Tools, etc.

New England Office, 148 High St., Boston.  
Philadelphia Office, 301 Arch Street.

Electrical Test

INSTRUMENTS.

AMMETERS

AND

VOLTMETERS,

For Direct and Alternating Currents.

Queen's New Standard Resistance Boxes.  
Queen's New Portable Testing Sets.  
Complete Outfits for Insulation Tests.

**Queen & Co.,**

SEND FOR CATALOGUES. PHILADELPHIA.



The Attention of Electric Fitters

Is directed to the merits of the above instrument for preserving from polarization batteries used in any class of open circuit work, whether gas-lighting, bells, clocks or watchmen's detectors. It is not only the simplest and most desirable, but the lowest priced instrument offered to the trade. Can be set for any length of time, from 1 to 60 seconds.

A. L. Bogart, 22 Union Square, N. Y. City.

—FOR—

## HIGH SPEED!!

PERFORATED

### Electric Leather Belting.

Chas. A. Schieren & Co.,

MANUFACTURERS.

New York. Chicago. Boston. Philadelphia.

## NOYES BROS.,

MANUFACTURERS OF

### Electric Light & Combination Fixtures.

We make a specialty of furnishing Supply and Construction Companies with ELECTRIC BRACKETS, made from our own or special designs.

Dealers will find it to their advantage to have our Descriptive Circulars and Price List before placing orders.

Correspondence solicited.

OFFICE AND WORKS, 83-87 FIFTH AVE., CHICAGO, ILL.



# THE BUTLER HARD RUBBER CO.,

33 Mercer Street, New York.

—MANUFACTURERS OF—

## Hard Rubber Goods of Every Description,

INCLUDING THE CELEBRATED HARD RUBBER BATTERY CELLS Manufactured under Kiel's Patents.

FOR PRIMARY AND STORAGE BATTERIES.

### THE CHEAPEST AND BEST CELLS IN THE MARKET

Also, SHEET, ROD AND TUBING (Kiel's Patent) for Electrical Purposes, at Reduced Prices.

Standard Quality Sheet, Rod, Tubing, Insulator Hooks, Key Knobs, Switch Handles, Telephone Receivers and Battery Syringes constantly on hand. Hard Rubber specialties of all kinds made to order.

SEND FOR PRICES AND ESTIMATES. FOR SALE BY

**CENTRAL ELECTRIC CO., Chicago, Ill.**

# St. Paul St. Louis Minneapolis

## THREE MORE LARGE CITIES FALL INTO LINE.

All the street railways in Minneapolis and St. Paul, and between those two cities, comprising 200 miles of track, are to be equipped on the *Sprague Electric System*.

(Statement of Mr. Thos. Lowry, President of the Minneapolis Street Railway.)

*New York, February 19th, 1890.*

*"I have this day closed contract with Sprague Electric Railway and Motor Company for the electrical equipment of the street railways in Minneapolis, St. Paul and between these two cities.*

(SIGNED) THOMAS LOWRY, President.

St. Louis follows with an order for 68 Car Equipments for the Lindell St. Railway in that City.

**TOTAL NUMBER OF STREET RAILWAY MOTORS CONTRACTED FOR SINCE JAN. 1, 1890, 810.**

**SPRAGUE ELECTRIC RAILWAY & MOTOR CO., 16 & 18 Broad St., New York.**

Rialto Building, Chicago, and all Commercial Centers.

ESTABLISHED 1831.

## JOHN STEPHENSON COMPANY, Limited.

### TRAM CAR BUILDERS,

47 East 27th St., New York.

INVITE THE ATTENTION OF

PROMOTERS OF ELECTRIC RAILWAY ENTERPRISES

TO THEIR SUPERIOR FACILITIES FOR THE CONSTRUCTION OF

**TRAMWAY CAR**

AND FOR THEIR ADAPTATION TO THE VARIOUS SCHEMES OF ELECTRIC PROPULSION.



## ELECTRICAL BOOKS.

SEND FOR CATALOGUE.

**D. VAN NOSTRAND CO.,**  
23 MURRAY ST., 27 WARREN ST., NEW YORK.



THE ELECTRIC AGE.

TELEGRAPH EDITION.

Published on the 1st and 16th of Every Month.

BY THE ELECTRIC AGE PUBLISHING CO.

J. B. TALTAVALL, *President.*  
G. E. HOLBROOK, *Secretary.*  
T. R. TALTAVALL, *Treasurer.*

ENTERED AS SECOND-CLASS MAIL MATTER.

Registered Cable Address, "Electage," New York.

TERMS OF SUBSCRIPTION:

One Copy, one year, - - - \$1.50  
Great Britain and other Countries, - 2.00

Subscribers should promptly notify us of any change in their addresses, giving the old as well as the new one, that they may receive all the papers they pay for.

ADVERTISING RATES: \$2.00 PER INCH.  
Four Line Notices, 50 cents.

T. R. TALTAVALL, *Editor.*  
J. B. TALTAVALL, *Business Manager.*  
R. J. GRAY, *Manager, Advertising Department.*

Address all communications to the Electric Age Pub. Co., No. 5 Dey Street, New York.

NEW YORK, MARCH 16, 1890.

AUTHORIZED AGENTS FOR THIS PAPER.

- Augusta, Ga.—O. E. Watson.
- Allentown, Pa.—D. E. Lerch.
- Baltimore, Md.—H. C. Wooden.
- Boston, Mass.—W. Hazelboom.
- Buffalo, N. Y.—J. M. Stambach.
- Bridgeport, Conn.—P. A. Moriarty.
- Cincinnati.—L. E. Moores.
- Cleveland.—J. J. Corrigan.
- Chicago.—C. S. Loewenthal.
- Columbus, O.—F. C. Rubrecht.
- Campbellton, N. B.—J. Vautier.
- Detroit, Mich.—F. B. Beach.
- Dayton, O.—W. C. Weinman.
- Dallas, Tex.—F. L. Saunders.
- Duluth, Minn.—E. D. Williams.
- Deming, N. Mex.—Mrs. M. E. Kaine.
- Erie, Pa.—Geo. J. Goadling.
- Evansville, Ind.—O. D. Richardson.
- Ft. Wayne, Ind.—J. H. Scherzgen.
- Hamilton, Ont.—J. J. Seitz.
- Helena, Mont.—B. T. Hartz.
- Jacksonville, Fla.—E. B. King.
- Kansas City, Mo.—B. C. Elder.
- Louisville, Ky.—F. Farrell.
- London, Ont.—D. Adams.
- Milwaukee.—A. P. Velle and A. Wilson.
- Minneapolis.—B. W. Parrott.
- Memphis.—W. B. Harvey.
- New Orleans.—S. M. English.
- New Brunswick, N. J.—W. C. Wineland.
- North Sydney, O. B.—L. W. Hoyt.
- Newburg, N. Y.—John Mitchell.
- Newark, N. J.—E. A. Coney.
- New York.—H. I. Jolley, 195 Broadway.
- Pittsburgh.—W. E. Burns.
- Portland, Me.—K. W. Starbird.
- Philadelphia.—L. Miller and J. E. Janney.
- Petersburg, Va.—S. D. DeShazor.
- Plattsburg, N. Y.—G. W. Hickey.
- Port Arthur, Ont.—C. L. Hallett.
- Raleigh, N. C.—P. H. Hughes.
- Rochester, N. Y.—D. E. Hendricks.
- Reno, Nev.—E. A. Kilbourne.
- San Francisco, Cal.—H. M. Graham.
- Sioux City, Ia.—J. F. Slack.
- Savannah, Ga.—G. W. Spaid.
- St. Louis.—C. D. Lee.
- Syracuse, N. Y.—S. H. Riker.
- St. Paul, Minn.—B. F. Wright.
- Toronto.—W. J. Anderson.
- Victoria, B. C.—Wm. Christie.
- Washington.—H. D. Robinson.
- Winnipeg, Man.—
- Wheeling, W. Va.—J. W. Wells.
- Watertown, N. Y.—F. B. Holcomb.

ANOTHER POSTAL TELEGRAPH BILL.

A BILL PROVIDING THAT THE POSTAL GOVERNMENT SHALL BUILD OR PURCHASE THE LINES REQUIRED.

Representative Taylor, of Illinois, introduced in the House on March 6th, a bill to provide for the establishment of a system of government telegraphs for the use of the government and people, and to be operated as a part of the postal system. It provides that a Board, consisting of the Secretary of State, Secretary of War, and the Postmaster-General, shall cause to be built, or shall buy lines of telegraph where, in its opinion, such are needful. It shall be the purpose of the government that these government telegraphs shall yield no earnings beyond the cost of operating the same, and at all times to keep the outgo and income as nearly equal as may be. To this end, as soon as may be, the

Postmaster-General shall name such rates at which messages may be sent as shall keep the total earnings and expenses as nearly equal as may be, or shall make the lines self-sustaining, and the Postmaster-General shall from time to time so change the rates that they shall conform to this requirement.

It is provided further that until it shall be known what rates must be charged in order to carry out the above requirement, the rates shall be as follows: All government telegrams or private telegrams sent over a single circuit or unbroken line of telegraph without relay, and requiring but one operator at either end, without regard to distance, one cent for each word, counting the address and signature, but not the date; but no telegram so sent shall cost less than 15 cents. For each additional circuit or relay requiring an additional dispatcher and an additional receiver, an additional charge equal to the charge for sending the same message over one circuit without relay shall be made.

Assemblyman Duffy, of New York, labors under the impression that the telegraph companies will flounder in wealth in a ten cent rate for day messages of ten words each, and twenty words for a night message, and a cent and half cent extra word rate respectively. Mr. Duffy is not a stockholder in any of the existing telegraph companies, it is needless to say. Legislator Duffy desires the State to legalize his opinions and has introduced the necessary bill.

VANDALS IN A TELEGRAPH OFFICE.—When the Lehigh Valley operator at the junction of that road and the Baltimore and Ohio line at Roselle, N. J., came to his office on the morning of Feb. 17th, he found the building partly wrecked, all the instruments stolen, all the batteries broken, and the signal target in pieces. A detective is making an investigation.

The direct United States Cable Company has opened an office at 40 Hope street, Glasgows Scotland, which is greatly appreciated by the produce merchants in its vicinity, who are now enabled to hold telegraphic communications with the exchanges in America within a few minutes of time.

Mr. W. J. Tonkin, of the N. Y., L. E. & W. R. R., Rutherford, N. J., is out with a paper, the name of which we have not yet learned. It is devoted, we understand, to literature of a high order. Mr. Tonkin is a good writer and an excellent gentleman. We wish him and his enterprise much success.

HE WAS A POOR OPERATOR ONCE.—When Ezra Cornell opened his first telegraph office in New York he was so poor, it is said, that he could afford but one meal a day.

MAGNETIC CLUB.—The Magnetic Club will give its next dinner on April 21, 22, or 23, at Martenelli's. The matter has been placed in the hands of the entertainment committee to be decided.

Miss Georgia Southworth, formerly of the Postal, Bridgeport, Conn., is now located at Deep River, Conn., for the same company.

A New York operator was arrested in Albany, N. Y., March 4th for attempting to tap a pool room wire.

Does the short or the long end of a quadruplex battery work easiest? Respectfully referred.

Mr. W. H. Stanton, an old timer, formerly of Port Huron, is now with the W. U., Muskegon, Mich.

Mr. W. E. Peirce, of Washington, was in town this week visiting friends.

TWO VALUABLE BOOKS.

Every operator should thoroughly understand the instruments he works with and be able to locate faults on the wires. It is needless to say that such operators are of more value to a telegraph company than those who know nothing about such matters. Many operators are willing to study up on electrical matters and fit themselves for more desirable positions, but hardly know how and where to begin. The quadruplex is a familiar instrument these days, but how many operators understand it? Very few! Every operator ought to understand it, and there is no better instructor than Maver and Davis' "Quadruplex." This book has had a deservedly large sale. The language used is as plain as it was possible to state it, and very little more mathematical knowledge than addition, subtraction, multiplication, and division is necessary to understand the few problems set forth. These are purposely made simple and clear, in order to avoid any confusion or discouragement in the minds of those who are not versed in the higher mathematics. Any person can read the book through and understand every word of it. Its contents are the "Development of the Quadruplex," "Introduction and Explanatory," "The Transmitter, Rheostat and Condenser," "Stearns' Duplex," "Instruments of the Polar Duplex," "The Quadruplex," "The Dynamo-Electric Machine in Relation to the Quadruplex," "The Practical Working of the Quadruplex," "Telegraph Repeaters," and "The Wheatstone Automatic."

The other book is "Pope's Modern Practice of the Electric Telegraph." Its title is a very appropriate and comprehensive one, and indicates clearly the character of the book. Its contents by chapters are, "Origin of the Electric Current," "Galvanic Batteries," "Electro-Magnetism," "Telegraphic Circuits," "The Morse or American Telegraph System" (including description of all the principal repeaters), "Insulation," "Testing Telegraph Lines," "Notes on Telegraphic Construction," "Hints to Learners," "Recent Improvements in Telegraphic Practice," and "Appendix and Notes." It will be seen that the scope of the work is large, and every word in it is interesting as well as valuable. The two books named form a complete electrical library, and every operator who has any ambition at all to acquaint himself in an easy way with the wonderful force he manipulates every day, should possess a copy of both books if he has no others.

The price of each is \$1.50, and \$3 for these two books is money well invested.

Send for our catalogue of books.

ELECTRIC AGE PUBLISHING Co.,  
5 Dey street, New York.

THE ASSOCIATED PRESS QUADRUPLEX.—The Associated Press has recently discontinued the use of the quadruplex on its wire between New York and Washington, and substituted therefor two single wires. The idea of this change originated with Mr. Thomas R. Taltavall, then superintendent of telegraph of the Associated Press, and now editor of this paper. The change would have been carried into effect long ago had it been possible to arrange the terms with the Western Union Telegraph Company, from whom the quadruplex wire was leased. The matter, however, was again taken up recently, with the result as stated. The change was made in entire accordance with Mr. Taltavall's original plan, and the results which he predicted have been verified in every particular. More work is done on the two single wires than was accomplished on three sides of the quadruplex, and in every way the service is more satisfactory.

The sympathy of all old timers is extended to Mr. E. M. Tomlinson who has recently lost, by death, his mother and a daughter.



THE THEORY OF ARMATURE REACTIONS IN DYNAMOS AND MOTORS.

BY JAMES SWINBURNE.

It seems to be generally supposed that electrical engineers are in full possession of means for calculating out and designing a dynamo or motor. This is no doubt the case as regards very small machines, and as regards large machines when considered with reference to no load. The effect of the armature current is mentioned in the classical paper of Drs. J. and E. Hopkinson, the excitation necessary at full load being given in terms of the armature current turns and the lead of the brushes; but as the lead of the brushes is determined after the machine is made, that paper gives the first step towards a solution of the armature reaction, but does not go farther. As not only the excitation necessary at full load, but also the best dimensions of the magnets and the proper shape of the pole-pieces, depend on the armature reactions, and as the armature reactions are of immense importance in large machines, such machines cannot be designed with accuracy unless the armature reactions and position of the brushes at full load can be foretold. The

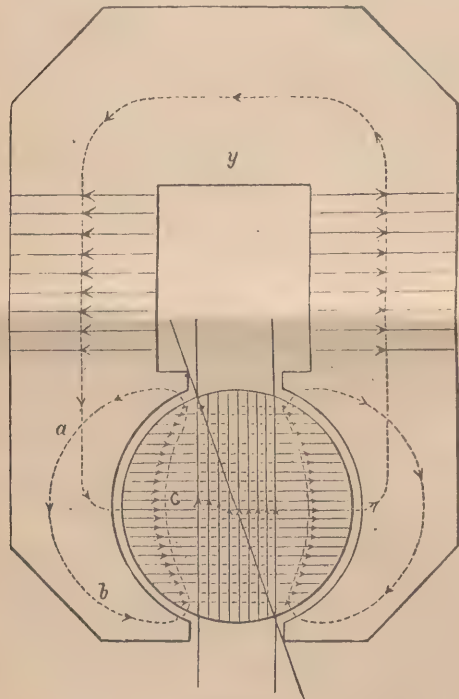


FIG. 1.

armature reactions are often regarded as obscure and unimportant phenomena, but, except in very small dynamos, the error due to neglecting them would be much greater than that due to neglecting the waste field, which has, of late, received so much more attention.

As most engineers are now in the habit of using C. G. S. measure, the C. G. S. system will be used in this paper. The only new importation into dynamo work will be the idea of magnetic potential, as it is exceedingly convenient for explanation. The magnetic potential is, of course, the line integral of the magnetic force, and is  $4\pi$  times the current turns. As it is cyclic, we must take the line integral once round a circuit interlinked with the exciting circuit. Any point of the circuit may be assumed as of zero magnetic potential, but generally difference of potential is alone considered. The magnetic potential may be thought of as ampere-turns, or might be measured in ampere-turns; but as such a method is unusual, it will be taken in C. G. S. measure, being denoted by the symbol  $\Omega$ ; and for want of a unit of its own, it may be measured in ergs. An ampere-turn thus gives a magnetic potential of  $4\pi/10$  ergs, or 1.26 ergs.

MAGNETS AND WINDING.

As single-magnet machines are very largely used now, and a type can be taken which is ap-

proximately that used by most of the large representative makers, such a machine may be taken as an example. A formula which gives the size of iron, and the excitation needed, will then be worked on.

The vertical line through the centre may be taken as at zero magnetic potential at no load. Assuming the length of the core to be the same as that of the pole-pieces, and calling the external radius of the core  $r$ , and the radial depth of the discs  $b$ , and the length of core  $a$ , and the armature induction  $B_a$ , the surface integral of the induction, or what may be for shortness called the total armature induction, is  $2abB_a$ . The desired armature induction is here assumed. In practice different makers prefer different inductions, and to discuss the various considerations would take too much room, and would be outside the subject of this paper. The distance,  $l_a$ , which represents the length of iron that has

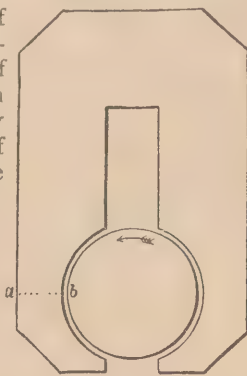


FIG. 2.

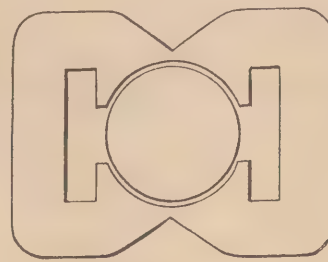


FIG. 3.

to be magnetized to the induction  $B_a$ , depends on the arc of embrace of the pole-pieces; but a large error in the estimate of this length causes a very small error in the design of the machine, as very little of the excitation is spent on this part of the magnetic circuit. The fall of magnetic potential over  $\frac{1}{2}l_a$  is  $\frac{1}{2}l_a B_a/\mu$ , and may be written  $\frac{1}{2}\Omega_a$ . The induction in the air gap depends on the armature induction, the radial depth of the discs, and the pole-face angle. It will be written  $B_g$ . The line integral of the induction across the gap is  $\frac{1}{2}gB_g$ , where  $g$  is the distance across the gaps.  $\frac{1}{2}gB_g$  may be written  $\frac{1}{2}\Omega_g$ . The fall of potential from the middle of the yoke to the pole-piece depends on the length of the circuit and the induction. It may be written  $\frac{1}{2}l_m B_m/\mu$ , or  $\frac{1}{2}\Omega_m$ . The induction that can best be used in the field magnets depends, again, on many things that can-

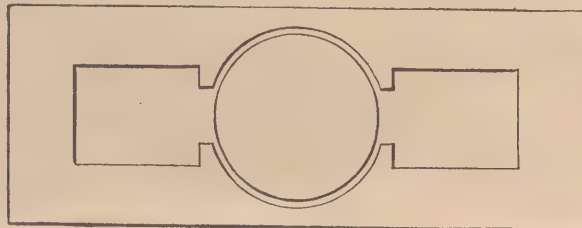


FIG. 4.

not be discussed shortly. As it is generally best to use a lower induction in the yoke, that must, of course, be taken into account. As the other half of the magnetic circuit is similar at no load, the line integral of the magnetic force needed in the shunt is  $\Omega_s = \Omega_a + \Omega_g + \Omega_m$ . As to the length of the field magnets, it depends on the total excitation needed. Different makers allow different lengths per thousand ampere-turns on the fields.

At full load the armature induction has to be increased to allow for the resistance of the armature and series coils, and sometimes for the leads also. A higher value is therefore taken for  $B_a$ , and therefore for  $\Omega_a$ . The effect of the armature current itself may be divided into two components; and in the case of a drum armature, which may be taken for the sake of simplicity, the electrical effect is the same as if the external conductors were connected across

the ends as shown in Fig. 1. There is thus a belt of current-turns, opposing the field excitation, and another belt acting at right-angles to it. These may be called the back and the cross-ampere-turns, and the induction produced by them, the back and the cross induction respectively. The breadth of these belts or the number of turns in each, depends on the lead of the brushes. For the present the lead of the brushes may be assumed. The extra difference of magnetic potential between the pole-pieces due to the back current-turns is  $\pi C n_b/10$ , where  $C$  is the armature current in amperes, and  $n_b$  the number of external armature conductors in the belt of back turns,  $n_a$  being the number of external armature conductors. This may be written,

$$\Omega_b = \pi C n_b/10 \dots \dots \dots (1)$$

The difference of potential of the pole-pieces at full load is thus  $\Omega_a + \Omega_b + \Omega_g$ ; and  $\Omega_a$  and  $\Omega_g$  are greater than at no load, because the armature and gap induction are higher. The difference of potential between the pole-pieces may be shortly written,  $\Omega_p$ . In a given type of dynamo the percentage of waste field varies directly as the difference of potential of the pole-pieces, provided the field magnets are not strongly magnetized, and is independent of the linear dimensions, or as the diameter of the armature. If the armature cross-sectional area is  $2ab$ , and the armature induction is  $B_a$ , and if the field induction desired is  $B_m$ , the cross-section of the field-magnets must be

$$A_m = 2ab \frac{B_a}{B_m} + \frac{r\Omega_p}{M B_m} \dots \dots \dots (2)$$

where  $M$  is a coefficient depending on the type of the machine. This coefficient can be readily determined from another machine of the same type but of different size, and an error in its estimation makes comparatively little difference in the dynamo.

In ordinary single-magnet machines  $M$  is generally about .08 to .085; in double-magnet machines it is less. Of course a great deal depends on the mounting of the dynamo. A machine let into a bed-plate, as is often necessary in the case of direct-coupled engines has more leakage.

An equation for the shunt and series excitation is now to be found. From (1) the field induction is found—

$$B_m = \frac{2abB_a}{A_m} + \frac{r\Omega_p}{MA_m} \dots \dots (3)$$

Giving the value of  $B_a$  and  $\Omega_p$  at no load, the value of  $B_m$  at no load is obtained. The shunt excitation is thus

$$\Omega_s = l_a B_a/\mu + gB_g + l_m B_m/\mu \dots \dots (4)$$

in ergs, or this number divided by 1.26 in ampere-turns. By giving the full-load values of  $B_a$  and  $\Omega_p$  the total excitation,

$$\Omega_s + \Omega_b = l_a B_a/\mu + \pi C n_b/10 + gB_g + l_m B_m/\mu (5)$$

is obtained, and, of course the difference gives the series excitation. Of course the full-load field induction has already been assumed in finding the size of the magnets.

It must not be forgotten that all this time it has been assumed that the lead of the brushes, and therefore  $\Omega_b$ , is known.

Returning to Fig. 1, a closed line,  $abc$ , may be drawn which is interlinked with all the armature conductors under the pole-piece. The magnetic potential round this circuit is

$$\Omega_c = \theta n C/10 \dots \dots \dots (6)$$

when  $n$  is the number of armature conductors, and  $C$  is the armature current as before, and  $\theta$  is the angle of embrace of the pole-piece. As the permeability of the iron, both in the part of the armature and of the pole-piece through which this line passes, is great, the whole difference of potential may be taken as being between the core and pole-piece. The induction under the leading corner, due to cross current-turns only, is then  $\frac{n C \theta}{2g \times 10}$ , and under the trailing



ing corner it is  $\frac{n C \theta}{2 g \times 10}$ . The field is thus weak-

ened under one corner, and, provided the permeability of the iron is practically infinite, equally strengthened under the other, being at its normal value half way down. The cross induction has in this case no direct effect in increasing or lessening the E. M. F. of the machine. If a dynamo were enlarged to scale, the field excitation would increase as the linear dimensions, but the armature current-turns, assuming the same current-density, would increase as the square of the linear dimensions. If the electromotive force of the machine were kept the same, they would increase faster, as the insulation would take proportionately less room. It is thus evident that a size would soon be reached when the cross induction under the leading corner would be equal to the normal induction due to the field excitation, and there would be no field to reverse the current in the section being commuted. The size at which this takes place varies according to the practice of makers, and is generally above the size in common use, as the output of a given armature is generally much smaller than might be taken from it. Machines with single magnets, and fairly large outputs for the size of their armatures, become difficult to design when they have armature above 35 to 40 cm. diameter. The fault can to some extent be corrected in single-magnet machines by making the polar angle—that is, the area of the pole-face—small. There are then fewer cross current-turns, and the induction in the gap is greater, so there is less chance of reversal of induction under the leading corners. This demands more field excitation and larger field magnets, as the difference of magnetic potential between the poles is greater, and so the waste field is greater. If the pole-pieces are made small, so as just to carry the induction due to the field coils without saturation, one side will be to some extent saturated by the additional induction due to the cross current-turns. In Fig. 2 the pole-piece is small across  $a-b$ , and the iron may need some magnetic force there, so the whole of the magnetic force of the cross-current turns will not be spent on the gaps, and the cross induction will thus be less. On the other side, of course, the cross induction is not lessened, as the iron is less magnetized. The resulting field will not be symmetrical. If the armature is Gramme-wound, the lower brush will need more lead than the upper. Sparking at the lower brush in single-magnet Gramme machines has been frequently noticed by dynamo makers. Of course, it may be partly due to the poles being too small in section, so as to throttle the main induction of the field-magnets, but it is much more often caused by the cross induction. If the armature is drum-wound, throttling the cross induction on one side will do some good in lessening the cross induction; but it is difficult to throttle the cross induction without also throttling the field induction proper and wasting field exciting power.

Fig. 2 may be taken as a diagram of a 30 cm. or 12 in. armature machine of about the usual type, with the magnets rather close.

If there were no cross induction the pole-pieces would not be strongly magnetized anywhere, but when the cross induction is superimposed, the neck reaches a high magnetization, the induction in this case amounting to about  $B = 15,800$  there, and to about  $B = 17,200$  a little higher up. If it were not that the cross induction is lessened by the saturation of the iron, the neck would rise to  $B = 17,500$ , and in the region 5 cm. or so above the centre line to  $B = 18,600$ . The difference of magnetic potential between a point a little below the middle and the top of the pole-piece comes to about 1,880 ergs. The effect of this is that more than 1,000 extra ampère-turns are required on the field-magnets. In a Gramme machine the effect is very easily observed by the use of a pilot brush. A resistance of, say, 100 ohms is con-

nected between the terminals of the machine. The pilot brush is connected to one terminal of a detector, and the other terminal is connected successively to points in the resistance corresponding, say, to 95, 90, 85 ohms, and so on. The positions of the brush for the zero readings are noted. This avoids errors due to slight variations of speed, which give trouble in the first instance, and errors due to bad contacts. With a drum this method does not give the distribution of the field, as each convolution is on both sides of the armature; but if one pole-piece is highly magnetized by the cross induction, the half of the armature under the upper left and lower right-hand halves of the pole-pieces (in Fig. 2) gives a lower electromotive force than the other. This effect is sometimes very marked in machines with cast-iron pole-pieces.

A double magnet two pole machine can be made up to a larger size than a single by shaping the pole-pieces so as to throttle the cross induction. Two common types of machine are shown in Figs. 3 and 4 with the pole pieces so cut. If it be assumed for the moment that the armature-section current can be reversed with no appreciable field, the largest pole-angle that can be used is when the gap induction due to the field excitation is equal and opposite to the cross induction under the leading corner—that is, when

$$\theta = 2 \sqrt{\frac{b g B_n \times 10}{n C (r + \frac{1}{2} g)}} \quad (7)$$

As the armature sections need a sensible field to reverse them, the pole-angle must be less than this.

#### A BIG ROAD GOES IN FOR ELECTRICITY.

The week before last, Mr. Thos. Lowry, president of one of the largest street railway combinations in the world, showed his confidence in the electric system of street railway propulsion by deciding to equip all the lines of St. Paul and Minneapolis by electricity. The electric company to whom this contract was awarded is the Sprague Electric Railway and Motor Company, and the investment called for from the Street Railway Company is said to be in the neighborhood of \$2,000,000.

Before deciding upon any system to be used upon these roads, the president of the company, together with the directors, made a careful inspection of all the different methods of operating street cars in large cities, and investigated the merits of each. As a result of this investigation the contracts for the partial equipments of the road, by cable, were cancelled, and negotiations were entered into with the Sprague Company for the entire electrical equipment.

By the terms of the contract the Sprague Company is to fully equip and put into working order the entire mileage owned by the railway company, the work to be completed by June 1st, and the first delivery of electric railway apparatus, which will include 400 Sprague improved motors for the equipment of the rolling stock, will be made shortly.

This is probably the largest order which has ever been given for electric railway motors, and evinces the confidence which prominent street railway managers feel in the electric system.

PROPOSED ELECTRIC RAILWAY BETWEEN ST. PETERSBURG AND ARCHANGEL.—*La Lumière Electrique* reports that a scheme is on foot in Russia for connecting Archangel and St. Petersburg by an electric railway. The estimate cost of the proposed line, including rolling stock, is \$20,000 per mile, or 30 per cent. less than that of an ordinary railway. As the distance between Archangel and St. Petersburg is considerably over 500 miles as the crow flies, the Archangel merchants, who are said to have originated this project, must possess a remarkable degree of enterprise.

#### HOW EDISON INVENTS.

Mr. George Parsons Lathrop, in his article recently published in *Harper's Magazine*, recites a talk he had with Thomas A. Edison as to the manner in which the great inventor developed his ideas. The following is interesting, inasmuch as he makes emphatic the difference between discovery and invention:

"Discovery is not invention, and I dislike to see the two words confounded. A discovery is more or less in the nature of an accident. In my own case but few, and those the least important, of my inventions owed anything to accident. Most of them have been hammered out after long and patient labor, and are the result of countless experiments, all directed toward attaining some well defined object."

The electric light gave him more difficulty than any of his other inventions. He spent years over it, and is still experimenting. He says of the light:

"I was never myself discouraged or inclined to be hopeless of success. And yet, through all those years of experimenting and research, I never once made a discovery. All my work was deductive, and the results I achieved were those of invention pure and simple. I would construct a theory and work on its lines until I found it was untenable. Then it would be discarded at once, and another theory evolved. This was the only possible way for me to work out the problem, for the conditions under which the incandescent light exists are peculiar and unsatisfactory for close investigation. Just consider this: we have an almost infinitesimal filament heated to a degree which it is difficult for us to comprehend, and it is in a vacuum, under conditions of which we are wholly ignorant."

"You cannot use your eyes to help you in the investigation, and you really know nothing of what is going on in that tiny bulb. I speak without exaggeration when I say that I have constructed 3,000 different theories in connection with the electric light, each one of them reasonable and apparently likely to be true. Yet only in two cases did my experiments prove the truth of my theory. My chief difficulty, as perhaps you know, was in constructing the carbon filament, the incandescence of which is the source of the light. Every quarter of the globe was ransacked by my agents, and all sorts of the queerest of materials were used until finally the shred of bamboo now utilized by us was settled upon."

Edison's strongest mental characteristic is an intense desire to find out the causes and nature of things.

#### THE SPERRY ELECTRIC COMPANY'S NEW QUARTERS.

—The Sperry Electric Company of Chicago has just moved into their new quarters, 203 South Canal street. Their rapidly increasing trade necessitated more commodious quarters, and their new manufacturing plant is one of the most complete and efficient that can be found anywhere. They occupy the 6th and 7th floors of the building, each floor being in dimensions 75x175 feet. The dynamos are manufactured on the sixth floor, and the present capacity of this department is four plants per week. The arc lamps are manufactured on the seventh floor, and 100 of these are turned out per week. The Sperry dynamo is such an excellent and well-known machine that it is hardly necessary to enumerate its special points. It may be said, however, that this dynamo is one of the most efficient made, and most economical to operate and maintain. The regulator is a very valuable feature of the Sperry system, and is the only regulator that will maintain a steady light through all changes, from one light to a full load, without the necessity of maintaining a resistance coil. The Sperry lamps are simple and efficient, and entirely automatic in operation. The complete system is one that produces excellent results, and one in which the company justly feel proud.



## THE FAST SENDING TOURNAMENT.

Mr. Fred. Catlin, of 195 Broadway, New York, manager National Tournament for 1890, is prepared to furnish copies of the matter which was transmitted in previous contests, upon application accompanied by a two cent postage stamp and an addressed envelope.

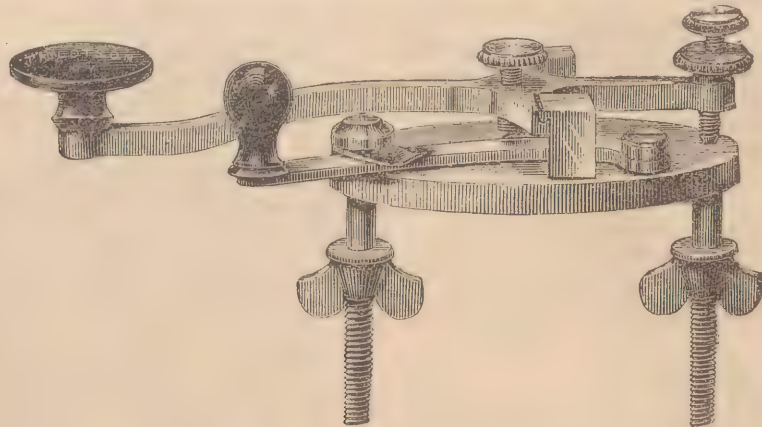
The keys which are to be used in the coming contest are the makes of The E. S. Greeley & Co., and J. H. Bunnell & Co. and the Western Electric Co. These establishments propose to place their keys in such a position and in such numbers as to suit the taste or fancy of every contestant.

most interesting event to witness both of these gentlemen once more grasping the key.

Among the operators who will take part in sending are: J. W. Roloson, Postal, New York; W. L. Waugh, the United Press, New York; W. M. Gibson, the United Press, New York; D. Wark, Western Union, New York; Frank L. Catlin, Broker Office, New York; A. J. Swan and two others, Philadelphia; C. W. White, Richmond, Va.; Geo. M. Eitemiller, Pittsburgh, Pa.

## ALLOTTMENT OF PRIZES.

Class A,	1st Prize, \$100.	2d Prize, \$75.
Class B,	" \$85.	" \$65.
Ladies' Class,	" \$50.	" \$40.
Old Timers,	" \$50.	" \$40.



THE "VICTOR" KEY.—THE E. S. GREELEY &amp; CO., N. Y.

It is well known that every sender has a required position for the key and a peculiar adjustment; and to compel him to forego these privileges practically debar him from rendering efficient work.

The E. S. Greeley & Co., have placed their well-known "Victor" key before the contestants for those who prefer to use it in the transmission of the matter.

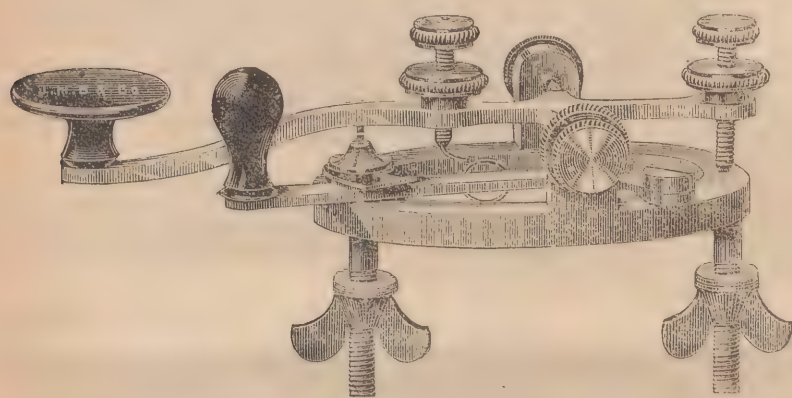
The well-known "Steel Lever" key, over 73,000 of which are said now to be in use in the United States, has been placed before the contestants by J. H. Bunnell & Co., of this city.

The Western Electric Company have also furnished a desirable key, an illustration of which also appears with this article.

Among the ladies who will contest for the prize in the ladies' class are Misses Kittie B. Stephenson, Belle M. Dennis, E. R. Vanselow and Jennie Schlesinger, of the main office, New York.

Mr. J. H. Bunnell, the well-known instrument maker and old timer, when asked if he would take hold of a key once more, and endeavor to make the sending tournament a success, said he would be glad to do so if the first prize was made a 25 lb. ham, the second prize a 15 lb. ham, and the third prize a "cold" shoulder of bacon for old timers who had not touched a key in a quarter of a century.

It is not unlikely that several old timers, who are now prosperous in other lines of business,



"STEEL LEVER" KEY.—J. H. BUNNELL &amp; CO., N. Y.

It is quite possible that several "old timers," long left the business, may find it convenient to take part in this sending contest. They never tire relating their achievements at the key in the days when the present generation of operators was in its swaddling clothes and the electric telegraph itself in its babyhood days.

These old timers will be given an opportunity to display their ability as senders and they will be given a hearty reception by all those fortunate enough to be present. It is something less than twenty-five years ago that Thomas A. Edison, then at the Boston end of the New York wire and Fred. Catlin at the New York end of the same wire, made a record which shows the good work accomplished by these gentlemen in those days. It will be a

will accept an invitation to be present and participate in the "old timers" class. Mr. A. S. Brown, superintendent of the Western Union, is booked for the old timers class.

The following letter explains itself:

"The sending tournament is quite attractive, and while I have not touched a key professionally since 1854, the old habit is like swimming, something that one cannot forget, and if some of the genuine old timers are going to try their hands, I would like to join them, just for the fun of the thing. Please let me know some more about it, when and where the contest is to occur.

Yours respectfully,  
C. C. HINE."

Postal Telegraph Cable Co.,  
Washington Bldg. No. 1 B'way,  
New York, March 5th, 1890.

Fred Catlin, Esq.,

Manager, Nat. Fast Telegraphing Tournament,  
195 B'way, N. Y.

*My Dear Sir:* Attention to your recent communication has been delayed by my repeated absence from the city and extreme occupation when here.

I am much interested in all that tends to improve the work of the operating department of the telegraph, and have no doubt that the trial of skill which you inform me is to take place in this city next month will stimulate the efforts of all operators to excel in their profession. I enclose herewith our company's check for \$50 in furtherance of that object. I do not find any reference, either in your letters or the printed notices on this subject, to any other feature of skillful work than that of fast sending. Desirable as it is to attain high speed in transmission, it is still more desirable that the work should be strictly accurate, and the copy of the receiving operators clean and in right form. I have no doubt that this is well recognized by all operators who are sufficiently expert to take part in such a test as is proposed to be made; but, for the benefit of the younger operators, and of the telegraph service, I take the liberty of suggesting that, in dealing with this subject, its promoters shall make it plain that a firm touch and absolutely correct work, and clean copy, are to be sought for, as well as swift sending.

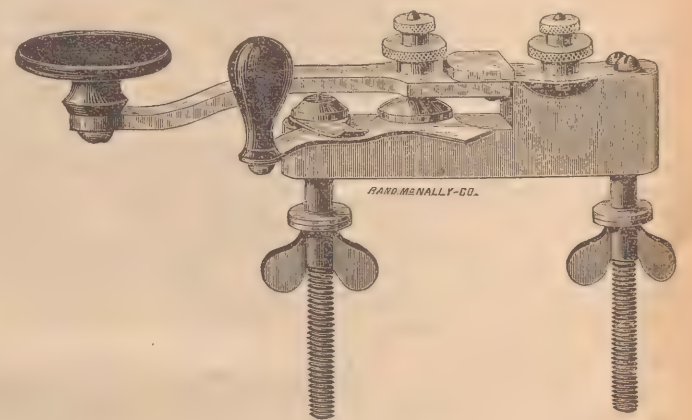
I will give a prize of ten dollars (\$10) to the operator who in this trial shall be adjudged to be the clearest and best sender regardless of speed; and another prize of ten dollars (\$10) to the receiving operator who shall make the clearest and best "pen and ink" copy, including all the "earmarks" required for the identification and record of messages. Very truly yours,

A. B. CHANDLER, Pres't.

New York, March 7th, 1890.

MR. A. B. CHANDLER, Pres't.

*Dear Sir:* In acknowledging receipt of your note March 5th, enclosing check for tournament, and expressing sentiments of kindly interest in the affair, I desire to thank you for the fraternity at large, by whom they will be received with much satisfaction.



KEY OF WESTERN ELECTRIC CO., NEW YORK.

Noting your reference to the subject of having the matter transmitted, recorded with pen and ink, I would state that the matter has been thoroughly canvassed, and the opinion expressed by a large number with whom I have consulted, that it is only in rare cases where an operator on trial, under the critical inspection of hundreds of experts, has sufficient control of his nerves to make a creditable showing. Some of our very best operators, under the severe trial would fail, while in a less conspicuous position they could copy these rapid transmissions with ease. It is largely a question of nerve. Arrangements have been made to have the transmissions received by an expert typo-telegrapher, and recorded on the caligraph.

However, should any operators desire to compete



for this prize, and the honor attached, the opportunity is offered them.

I also note your offer of a prize to the operator who makes the best transmission regardless of speed, and will place it before the contestants.

I am striving hard to make the contest a grand success, and fully appreciate the value of your hearty co-operation.

Yours very truly,  
FRED CATLIN, Manager Fourney.

March 8th, 1890.

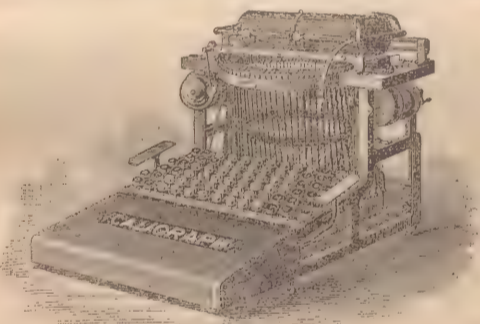
Dear Mr. Catlin: In reply to your note of yesterday, just received, let me say that I appreciate the fact that the making of a clear and complete copy by receiving operators at a high rate of speed, especially when under observation and criticism, requires not only good penmanship and careful work, but strong nerves. It is true, however, that nearly all our business must, for some time to come, be received by "pen and ink," and to excel as a receiver and copyist, in accuracy and legibility, is, in my opinion, more difficult, and requires a higher order of skill and intelligence than to be a fast and true sender. I shall therefore feel somewhat disappointed if some of our operator "artists" do not compete for this prize.

Yours very truly,  
A. B. CHANDLER, President.

Mr. Chauncey M. Depew will write the matter to be transmitted, copies of which will be furnished to contestants as soon as prepared for use.

Mr. G. W. Sawyer, of the National Transit Company, this city, writes:

We all know that the man who sits down to a test of this kind is inclined to be unnerved by the ordeal through which he is about to pass. The effort is great, and the strain is sufficient to overtax the strongest and best trained arm. Therefore it is necessary, in order that a con-



NO. 2 CALIGRAPH.

testant's mind may be free from all harrassing and embarrassing doubt, that some plan be adopted by which the judges would be entirely ignorant as to the identity of the operator, upon whose work they were passing judgment. Of course it is presumed the contestants will not be visible during the sending. It will be seen that by this method the judges will be utterly ignorant of the person against whom they are placing marks of merit or demerit.

Mr. W. B. Upperman, of the Associated Press, will receive the matter transmitted on a caligraph.

There was always a controversy between operators on the Continent of Europe, England and the United States, as to the relative speed of the Continental alphabet, used on the Continent and in England, and the American Morse system. In 1867 Professor Morse was in Paris attending the exposition of that year, and it was then proposed to settle, by a series of speed trials, the question of superiority. The struggle began, and after France had vanquished all rivals on the Continent, she came out second best in a contest with England. It was then decided to make it a world's contest, the question of supremacy to be decided by a committee composed of the officials of the Paris Exposition and Professor Morse.

It now became America's turn to compete,

and after a number of unofficial contests had been made throughout the United States, it was found that the most proficient telegraphers were employed between Boston and Washington. At this stage of the game an official order was issued by the Western Union Telegraph Company directing that an authentic test be made. In five tests, the fastest time made for one hour was on the report received by the late N. J. Snyder, as is shown by a sworn statement contained in the report made by General T. T. Eckert to President Orton, "that on February 20, 1868, Nicholas J. Snyder, operator at Philadelphia, received from Edward Stuart, of the Western Union Telegraph Company's Washington office, a portion of press report, containing 2,540 words; time occupied one hour." The report was a speech delivered by M. Thiers in the French legislative body, January 20. Mr. Snyder received a gold medal from Professor Morse. The record for a half hour's fast work also falls to Mr. Snyder, he having copied 1,500 words in thirty minutes, which is at the rate of fifty words per minute.

N. J. Snyder was for a number of years in the employ of the Western Union Telegraph Company, and afterward was engaged by the banking firm of Drexel & Co., in whose service he remained up till the time of his death.

Walter P. Phillips, mentioned by Professor Morse as having recorded 2,731 words in one hour, did not take part in any of the official tests. There are a great many telegraphers who are capable of great speed in transmission, but comparatively few who can record it—that is, put it down with pen and ink correctly and in readable shape. Mr. Phillips in his more youthful days was one of the few. The thoroughly first-class operator should be able to receive fast writing as well as to transmit it.

The work of the Associated Press telegraphers, for instance, would be hard to improve upon. The receiving operators use typewriters to record what is sent to them; and when it is understood that the sending operator uses a system of abbreviations which bring their speed close to fifty words per minute for hours at a time—without a break from the receiver—it will be conceded that this is very speedy work. It must also be understood that the receiving operator "writes out" in full, punctuates, etc., what he is putting down, so that when it leaves his machine it is in perfect shape for the printer. Many thousands of words are handled by the Associated Press operators daily, and it is remarkable how few errors are made.

GOVERNMENT TELEGRAPHS. — The present drift of public opinion appears to be in the direction of postal telegraphy. Many of the officials of the various companies believe that the present administration proposes to push the subject to a final issue. It is quite evident that the majority in Congress will favor whatever measure is agreed upon by the Committee on Post-Offices and Post-Roads. This move on the part of the government is not very encouraging to the fraternity for the reason that 10 and 15 cent rates will be established instead of a 25 cent rate. It is a question whether the lower rate would not result in largely increasing the facilities of machine telegraphy, while a 25 cent rate would ensure a large increase in business and good salaries to the employees.

A NEW PAPER. — A new paper has made its appearance in this city. It is called the *Mes-sage*. We extend it a hearty welcome and hope it will live long and prosper. It is bright and crispy and Mr J. F. Howell, of 195 Broadway, is the editor.

Saucy chief operator to inferior operator, on working a hard wire: "What's the resistance of your line?" — Inferior operator not to be outdone. "Didn't know a clothes line had any resistance."

\$175.00 IN PRIZES.

\$100 first; \$50 second, and \$25 third. Prizes to be awarded to the three persons sending us the most business from February 16th to Nov. 16th, 1890.

ONE HUNDRED DOLLARS will be given to the person who sends us the most business during the ten months named.

FIFTY DOLLARS will be given to the person sending us the second largest amount of business.

TWENTY FIVE DOLLARS will be given to the person sending us the third largest amount of business.

These prizes are given exclusive of the usual commissions allowed; therefore those who work hard for one of these prizes will also be liberally compensated for the trouble with increased commissions. The first prize amounts to \$10 per month—a handsome sum of money for so small an effort.

Any person, except a regular employé of the paper, is qualified. This, of course, includes all agents and correspondents.

All remittances will be acknowledged in each issue of the paper.

A pretty lively skirmish is already on foot for these prizes. During the past month we have sent out a great deal of literature to induce members of the craft to respond. Of course we are prepared to furnish our friends with anything they may desire to push their individual interests in the securing of business.

Remittances only are acknowledged in this contest.

Up to the present time the list of those interested stands:

B. C. Elder, Kansas City, Mo.	\$8 70
W. E. Burns, Pittsburgh, Pa.	27 40
E. A. Coney, Newark, N. J.	1 50
L. E. Moores, Cincinnati, O.	4 65
B. F. Hartz, Helena, Montana.	8 40
A. M. Butler, Omaha, Neb.	10 00
C. D. Lee, St. Louis, Mo.	10 00
C. J. App, Knoxville, Tenn.	4 80
F. B. Holcomb, Watertown, N. Y.	2 00
C. S. Loewenthal, Chicago, Ill.	15 91
H. I. Jolley, 195 Broadway, N. Y.	15 25
L. Miller, Philadelphia, Pa.	11 20
A. L. Hallett, Port Arthur, Ont.	12 50
S. H. Riker, Syracuse, N. Y.	3 00
H. C. Worden, Baltimore, Md.	1 80
B. J. Meising, Oil City, Pa.	5 00
J. F. Slack, Sioux City, Iowa.	3 70
K. W. Starbird, Portland, Me.	1 20
J. W. Thompson, Nashville, Tenn.	7 25

Mr. M. J. Fitzpatrick, who recently returned to the main office, is one of the best looking, best natured and best operators in the office. He has a good record from his birth down to the present day and everybody is his friend. He has been with a pool room up town for a number of years.

There used to be a tramp operator in Texas who was a notorious "scrapper" over the wires. He very rarely ever remained in the same office two pay days. He would either get drunk or have a fight with some operator; call him all the vile names he could think of, and, worst of all, it was his delight not to allow the man at the other end to say a word back, if he had to fight all day. He was completely annihilated though during the strike, while working in Dallas, Texas. It was his first time on a duplex, and, as usual, he got into a row with the man at Galveston. When he found that he could not stop the "back talk" of the Galveston man his spirit was broken. He opened his key but in vain. He got up and went out to seek a position in some office where the duplex was unknown.

Machine telegraphy — An operator using a typewriter.



## THE DEADLY WIRE.

Under the above caption the *Pittsburgh Leader* in its issue of Feb. 23d, sounds a loud and timely note of warning on the dangers of fire and accidents arising from the careless workmanship and poor quality of wire being used in the wiring of public buildings and private residences. It protests vehemently against the employment of other than first-class electricians—men who are entitled to that name from having undergone a thorough course of training in this profession—where wiring is to be done, and shows strikingly the eminent danger invited by using a poorly insulated wire. This, it asserts, is what is generally done by plumbers and other so called electricians, because of its cheapness. It states that in a number of buildings so wired in Pittsburgh, it has been found necessary to warn the owners not to have the current turned on for fear of an accident that might result in the loss of life. This is a most deplorable state of affairs truly, when it is remembered that there is a safe wire available. The *Leader* prints a lengthy interview with Mr. George O. Morse, of the Morse Supply and Construction Company, Pittsburgh, from which we quote the following remarks: "Time alone will develop the fraud that has been practiced in this city by so-called electricians. Men who were well aware of the dangers of the deadly current have, for the sake of a few dollars, placed in jeopardy thousands of lives. The public knows nothing whatever of electricity and it has been imposed upon by such men as I have spoken of. \* \* \* Poor workmanship is exceedingly dangerous, especially in electrical appliances and methods. But far worse is the material that is being put into the houses. One might as safely put a red hot coal in a pile of shavings and expect it to be safe, as the wire that is used in one out of every three houses that have been wired in this city. The basis of proper house wiring is the insulation of the wire. A wire that electricians have found to be absolutely safe and lasting is the "Okonite." The so-called weather and fire-proof wire which has been pronounced safe by the Board of Underwriters is nothing but bare copper wire wrapped with cotton, then covered with a poor braid, and finally soaked in coal tar. It is far from being fire-proof, for it will burn almost as readily as a match, even when it is new. When it is dried out it is as ignitable as a tinder box. This is the quality of wire that is used by a number of the construction companies and has been put in two-thirds of the buildings that use electricity in this city. \* \* \*

It costs only about one-third as much as 'Okonite' and the profits from wiring a house with such material if fully twice as large, so one can readily understand why it is used so extensively. It is made of a poor grade of copper and the insulation is so poor that the covering pulls off easily leaving the wire bare. This is how so many houses have grounded wires. The moment the wires come in contact with each other, or with a gas pipe, they ignite and the fire flies. The covering on the wire takes fire readily, and if close to inflammable material there is bound to be a conflagration. \* \* \* There is another cheap wire that is used almost as extensively as the underwriters wire. It is such a good imitation of 'Okonite,' that it takes an expert at the time it is put in to tell the difference. But after the current has been turned on for a few months the insulation peels off and leaves the wire exposed. The composition that forms the insulation is not rubber as represented, it has no elasticity whatever, and when the insulation lets go an accident is bound to occur.

The people themselves, however, are largely to blame, for they will not pay the price for good work. A customer asks for an estimate for wiring a house in first-class style. Basing the figures on genuine 'Okonite,' a price is furnished. It is expensive because the wire costs from three to eight cents a foot. They will tell you that they can get the work done for one-half from another electrician. The result is that no electrician can remain in the business in this city and do first-class

work. I have seen bids for wiring houses that called for 'Okonite' wire, that the price was not sufficient to pay for the bare wire. \* \* \*

Not only are the dangers increased from using cheap wire, but the light obtained is of a very poor quality. I can wire a house with 'Okonite' and another with the so-called fire-proof wire, and the difference in the quality of light will be as great as between 10 and 25 candle power light. The cause of this is that when the insulation is poor the wire sort of sweats and part of the force of the current escapes. With 'Okonite' the wire is first insulated with tin, then a heavy coating of pure rubber, and on the outside of this, not as an insulator, but as a protection to the insulator, a heavy and closely woven covering of braided cotton. This is not fire-proof nor is any wire such. If exposed wires come in contact with each other you can depend upon it fire will result. Thus you see that the protection lies altogether in the insulation. \* \* \*

I have until the last month refused to wire any building except with 'Okonite,' but I had to fall in line with the others or give up the business. I could not begin to compete with those who used an inferior quality or an imitation of 'Okonite.' For over six months I have been carrying as dead stock several hundred dollars worth of 'Okonite.' The people would not pay the price, and I could not use it. I now use the 'underwriters,' but before beginning the contract I inform the owner of the building that I will not guarantee the work in any particular. If they are satisfied to take the risk, all right; if not some one else gets the job."

Just as long as the people allow the difference in cost between a cheap and a good wire to influence their selection, when wiring is to be done, just so long will we continue to hear of "The Deadly Wire." A good article at a fair price is far cheaper than a poor article at any price.

**LIGHTING THE NATIONAL CAPITOL.**—The question is now being considered of lighting the Capitol and grounds at Washington by electricity. Under instructions from a Senate committee, the architect of the Capitol has inquired into the matter, and has handed in an extended report. Any low voltage system of lighting now in use is deemed suitable. It is estimated that 7,000 lamps of 16-candle power will be required, the estimated cost of the necessary plant being placed at \$169,470. The running expenses are placed at \$7,200 per annum for employes, \$12,190.50 for fuel and waste, and \$12,000 for renewal of lamps and repairs. This is for the Capitol and terrace alone. The grounds he thinks could be more conveniently lighted by a local lighting company. The cost of running wires and subways for the grounds is placed at \$40,000, with an additional  $\frac{3}{4}$  of a cent per lamp per hour for lighting. The aggregate cost would be considerably more than is now paid for gas, but of course the service would be more than as much better in comparison with the present system.

**BROWNING AND THE PHONOGRAPH.**—Browning was at dinner at the house of a friend last summer, when he saw the phonograph for the first time. He was greatly interested in it, and started to repeat to it "The Ride from Ghent to Aix." When half through he stopped suddenly and exclaimed, "I've forgotten the rest!" The phonograph dutifully repeated all he had said, including the exclamation at the end, and the film upon which the poet's language was impressed is now preserved as a precious relic.

**CONSOLIDATION.**—The National Gas, Electric Lighting & Gas Light & Coke Companies, of Indianapolis, have been consolidated by an eastern syndicate at a capital of \$4,000,000.

**THE EDISON ORE SEPARATOR.**—It is said that Mr. Edison has taken offices in Charlotte, N. C., for the year, his object being to put to a practical test his ore separator.

## SAFETY AND SAFETY DEVICES ON ELECTRICAL INSTALLATIONS.

EXTRACT FROM A PAPER READ BY PROF. ELIHU THOMPSON AT THE ELECTRIC LIGHT CONVENTION.

"Outside of these factors just mentioned, safety in such circuits rests in insulation and maintenance, avoidance of leaks, or crosses, proper placing of wires and lamps, avoidance of partial contacts or partial ruptures of the circuit at joints, binding posts or switches. In series circuits the main object is to avoid a concentration of, or establishment of, large differences of potential at points in the line where the currents find or can find a path; in low potential, multiple arc systems as used in direct incandescent work, the object is to avoid concentration of current at points where such currents cannot find a sufficiently low resistance path. Hence there are required cut-offs for an excessive current in any part of the system. Short circuits of accidental character must be provided against. If the safeguards are not ample, a more potent fire producer than a short-circuited section of an extended multiple arc system is hard to find. Take out your fuse wires and replace them with copper wires, a practice, instances of which were not difficult to find in times past, and a short circuit may quickly heat a long line of wire in a building, so as to set fire to the insulation of the wire and surrounding woodwork. Another risk in such systems is that of creeping of current from main to main over moist surfaces, or partial conductors, in amount insufficient to blow a fuse, but sufficient to convert enough energy into heat to set a fire. Good waterproof insulation of wires avoids this risk if the insulation remains intact. I consider the plan of running the *two branch wires*, excepting the larger ones of the system, *near together or close together*, as excellent in avoiding this risk, provided the wires are encased in insulation and covered in or run in a *tube*. In case of a leak from main to main, the more quickly the fuses blow the better, and the proximity of the wires assists this speedy action, while between the wires there is not at any time enough combustible matter to set afire by the short circuit. *Enclosure in a tube effectually shuts off possibility of flame reaching combustible matter before the fuse blows.* This does not apply to the heavier mains, capable of carrying thousands of ampères, so well as it does to the smaller branches. I am glad to note here that the tube or conduit system appears to be well worked out for inside wiring by the INTERIOR ELECTRICAL CONDUIT COMPANY.

**AN ELECTRICAL ROMANCE.**—Earl Russell is a partner in the electrical works at Teddington, England, near where Lady Scott lives, and is an enthusiastic worker in the business, which he constantly supervises. Lady Scott ordered some electrical fittings from the Earl's works, and clad in a mechanic's suit, the Lord went to superintend the work. His bearing impressed Lady Scott's daughter, and, by her intercession, he was invited to lunch in the parlor, while his men lunched with the servants. The result was that the couple fell in love. Lady Scott learned of the affair and was furious. She went to the electrical works to annihilate the presumptuous mechanic. In making inquiries she learned that the gentlemanly foreman was Earl Russell, and her anger cooled. Then the couple that loved in secret were betrothed openly, with Lady Scott's assent, and a wedding soon followed.

**ELECTROMOTIVE FORCE.**—If the zinc in a Daniell's cell is substituted by any of the following metals the electromotive force of the cell will be of the values represented:

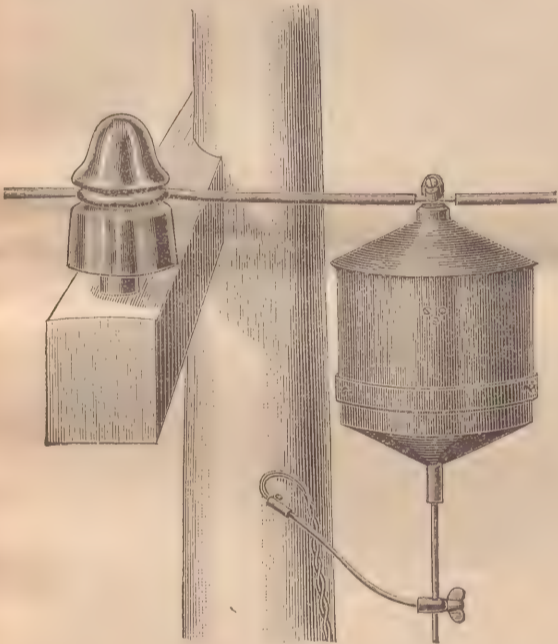
Zinc, 1.08 volts; Cadmium, .79; Aluminum, .65; Iron, .64; Cobalt, .40; Nickel, .1; Lead, .58; Copper, .07; Silver—.02; Antimony, .09; Bismuth, .17.



AUTOMATIC POLE LIGHTNING AR-  
RESTER.

The accumulation of static electricity on electric light wires during a thunderstorm very frequently does serious damage to the circuits by rupturing lamp filaments or subjecting them to such a strain that they are very materially weakened and soon collapse. Not only are incandescent lamps exposed to divers dangers, but the arc lamp too. A heavy charge of static electricity is liable to burn out the shunt coils or otherwise destroy the usefulness of the lamp. Several attempts have been made to devise some effectual means of avoiding these dangers, but with very poor or indifferent success. The Electric Supply Company, of Chicago, however, has at last solved the problem, and has produced an invention which will dispel one charge after another from arc or incandescent wires effectually and very simply. The principle employed is an entirely new one.

As will be seen in the cut the case, which is moisture proof, is attached to a line which is freed from insulation at this point for such purpose; at the bottom of the case is an insulated rod and a flexible conductor running to a ground wire which passes down the side of the



pole to a gas or water main or other suitable ground connection near the base of the pole. The ground connection is very important and great care should be exercised when putting the apparatus into position. Two strands of No. 8 galvanized iron wire are sufficient to carry the current to the ground; three strands may be employed for the smaller incandescent circuits. The apparatus being near the cross arm, it is easily gotten at for inspection.

Each arrester will protect from one-half to three-fourths of a mile of line wire, depending upon the extent of the net work; one arrester is necessary for each wire, positive or negative. Should the lightning strike the line, it will run to the nearest lightning arrester and be grounded automatically without interference in any way with the operation of the lamps and without grounding the line. The dynamo current, following the static discharge, severs all ground connection and at the same time places in position new discharge plates, which operation is repeated for successive discharges.

The advantages of this ingenious device are apparent; as the static electricity comes on the line exterior to the station, it is instantly taken off therefrom at a point near to the point struck, but very little damage can be incurred in the more delicate portions of the lamps, motors or other translating devices upon the circuit, and but a small percentage of them can

be influenced at all. It is adapted for use with both arc and incandescent circuits of any length; its use upon an incandescent circuit does away entirely with the wink and constant strain upon the filaments of the lamps during thunder storms.

This arrester has the following advantages over the ordinary station lightning arrester.

1. It is self-acting and there is an entire absence of any element of self-induction (magnets, solenoids or coils), which element has recently been shown to be so destructive to the rapid conduction of the discharge current.
2. There being no catch, ratchet or similar device in the mechanism of the arrester, the parts will not become displaced by the action of the wind, or any other ordinary jar.
3. It requires no constant consumption of energy to keep it in operation. There is no circuit through it and no energy enters it excepting at the instant that the static discharge is passing.

**BUSINESS NOTICE.**—Mr. J. H. Mason, 120 Park Avenue, Brooklyn, N. Y., who has recently placed upon the market a primary battery to furnish electric lights for home lighting, is in receipt of the following unsolicited testimonial:

"Allow me to extend to you my heartiest appreciation of the success with which your new primary battery and solution has been attended. I have had eleven of your No. 9 cells in constant use for over two months, and eighteen in use about a month, and must candidly admit that I am more than pleased with the results obtained from them, they doing far more than you claim; also one of the principal features most especially noticed, since I have been using your cells, was the absence of fumes, low resistance and the very constant depolarizing qualities. Of all the primary batteries I have ever used heretofore, I do not know of one that would hold a candle light alongside of your improved cell. One of the trials I gave your battery, was in the electrical exhibit I placed and operated in Lee Avenue Congregational Church Fair, held during the evenings of February 11th, 12th and 13th. I had in operation eleven of your No. 9 cells, nine of which were used in lighting 36 incandescent electric lights varying from 1/2 to 6 c. p. and working alternately from one to five at one time. The other two cells I used in operating the motor, which turned the tree and worked the music box in connection with same, the average working of the lighting and motor was six hours each night or an aggregate of eighteen hours total for the three nights, and must mention here that the throng of people who witnessed the exhibit were under the impression that the whole was operated from a current taken from the street main, [until otherwise informed] on account of the number and brilliancy of the lights and the perfect working of the motor, &c. I wish to also add that with this same charge of solution used in the above exhibit I operated in my own laboratory a 4 c. p. lamp eleven hours, and a standard 16 c. p. lamp, 18 volts, three hours, from ten cells. This you will no doubt find to be far in excess of what you ever claimed for your No. 9 cells. In closing, will mention again that I am more than pleased with your battery and at an early date will replace your No. 9 cells with your large No. 11, as I am confident I can work your large cells for domestic electric lighting about as cheap as gas, and for country homes I think it is the cheapest light yet produced. Wishing you abundant success with your battery, which you so richly deserve, I remain,  
Sincerely yours,  
WM. T. KNOX,  
Electrician.

**ELECTRIC LIGHT IN WINDSOR CASTLE.**—The grand corridor at Windsor Castle has been lighted electrically, and with such good results that the illuminant will probably be extended to the dining-room and the drawing-rooms.

FOR POSTAL TELEGRAPHY.

MR. BATES PRESENTS ARGUMENTS IN FAVOR OF IT.

D. H. Bates, of New York, representing, he said, a party of gentlemen interested in postal telegraphy, addressed the House Committee on Post-Offices and Post-Roads on March 4th. He analyzed some of the statistics presented by President Green, of the Western Union Telegraph Company, with the result of establishing, he asserted, that the average rate on Western Union messages for distances over 500 miles was 49 cents. He said that the Baltimore & Ohio Telegraph Company was the only opposition company that ever paid expenses. It had been the pioneer in cheap rates. Owing to the fact that it was confined to the great commercial and populous centres, it had handled one-sixth as much business as was handled by the Western Union, notwithstanding the fact that the proportion of miles of wire is very much less. The natural result of the low rates was longer messages. The Baltimore & Ohio Company was very popular with the public, as they sympathized with the under dog and desired to foster competition. Now the people wanted the government to step in and compete to a certain extent. The Postmaster-General's bill would do this. It did not propose to put the government under any expense, nor would it require additional employes.

Chairman Bingham remarked that the bill would require the contracting companies to maintain the lines, but the government was to furnish the operative, delivery and collection services.

Mr. Bates said that the bill by implication only provided for a government staff. At the proper time gentlemen would undertake to contract for the service—probably at 13 cents on a 15-cent message. Of course the business would probably not at first be of large volume, and could be made remunerative only by using as an adjunct a "fast-speed" system which would encourage the public patronage. A uniform rate for the entire country would be desirable, but was impracticable. The rate he would suggest on the basis of the telegraph company doing all of the service except collection and delivery, and including operators (no other basis would be possible) would be: under 500 miles, 15 cents; above 500 miles and east of the Mississippi, 25 cents or 30 cents; between 85th and 105th parallels, 25 cents or 30 cents with 50 cents as a maximum. So large a contract could not be undertaken for a shorter period than ten years. No guarantee of a paying volume of business would be required from the government. In fairness, however, the government should be required at the expiration of the lease to renew it or buy the lines from the company.

Chairman Bingham inquired what inducement there was for a new company to undertake this contract at lower rates than those of the Western Union.

Mr. Bates replied that the Western Union had made \$100,000,000 in twenty years; the new company would have facilities in post-offices; it would have a good standing commercially, and it would use improved means of telegraphy.

At the conclusion of Mr. Bates's statement, the chairman read a letter from Dr. Green, in which he thanked the committee, and expressed his confidence in its fairness and impartiality.

**ELECTRIC ORE SEPARATOR.**—The electrical process has been successfully adopted in South Australia for the recovery of the minute gold dust that has hitherto been lost in the work of separating the metal from the ore. The economical value of the process has been abundantly proved, and the returns are sufficiently good to compensate for the somewhat high expense of the process.



### TYPEWRITERS FOR RECEIVING SHORT DESPATCHES.

A device for feeding telegraph blanks into either Remington typewriters or Caligraphs has been invented by Mr. W. J. Barron, of this city, and is now in practical operation. We examined the arrangement a few days ago and found it was all that Mr. Barron claimed for it. A bundle of one, two, three or four hundred blanks can be adjusted at one time and when the end of one blank is reached, the following blank is adjusted ready for use automatically and without failure. A great feature of this invention is that the ordinary typewriter platen or roller is dispensed with, thereby doing away with the noise, the pad of paper or blanks itself taking the place of the rubber roller. Three years ago Mr. Barron called our attention to this device which we noticed in these columns at the time, and he has given the matter more or less of his spare moments ever since, in its perfection. It will be remembered that Mr. Barron was prominently identified with the development of the Remington typewriter, through his inventions, and introduced that machine first in 1871, in the offices of the Automatic Telegraph Co., 64 Broadway, New York, of which office he subsequently became manager. He also furnished the basis or principal inventions of the Caligraph, and was inspector at their factory, and general agent from 1882 to 1885. Mr. Barron's handiwork is apparent on all machines on the market to-day. He also was the first gentleman to use a typewriter in connection with press service in the New York bureau of the Associated Press and in the commercial agencies of this city, Mr. Erastus Wiman giving him an order for 250 machines, on its first exhibition at the American Institute Fair, in 1873, and the first machines manufactured by E. Remington & Sons, delivered in this city were for Dun, Wiman & Co. and Bradstreet's, commercial agencies. Mr. Barron is, therefore, quite familiar with the requirements of the telegraph fraternity in receiving short dispatches direct from the sounder with a typewriter. He is now sanguine that he has solved the problem and will be ready to supply machines within a short period for any use the profession may put them to.

**BROOKLYN, N. Y.**—The following changes have taken place in Brooklyn in the past few months: Mr. Jos. Slavenzck, formerly night operator, at 353 Flatbush Ave. office, has been appointed Manager of the Western Union and District telegraph office at 448 Myrtle Ave., Fred. Bauman and Mr. Pippett are his operators. W. G. Price, former manager of 520 Fifth Ave. office, has resigned, and received an appointment as letter carrier, W. H. Brake, former night operator at 4 Court St. taking his place. Mr. Ackerman is night operator. Mr. Hayden has been appointed manager of the Eastern Dist. Messenger and Western Union office at 115 Broadway in place of Geo. Fisher, resigned. The operators are B. F. Benson and Mr. Webster. J. J. Madden and E. J. Tosmey, both operators, are at 353 Flatbush Ave., where they are giving good service. The clerks are Andrew J. Leslie and E. Everett, Jr. The present force at 4 Court St., is, days—P. F. Doyle, Jno. Holbrook, Miss Florence J. Deane; nights—H. E. Dobson and J. J. Shaughnessy.

At the meeting of the "Electric Club," held at their club rooms, Johnston Building, Friday, March 7th, the following nominations were made for officers for the following year:

W. H. Pearson, (renominate) President; F. G. Payne, Vice-President; Miss S. McElhaine and Miss M. Connelly, Recording Secretaries; P. F. Doyle, (renominate), Financial Secretary; M. J. Phelan, (renominate), Treasurer.

This organization is now in its second year with a large membership and it is expected

that during the coming year they will not only repeat their many successful entertainments but go beyond them.

Mr. C. Anny has been appointed night operator for the W. U., at 726 Fulton St. office.

**ST. LOUIS W. U. NOTES.**—The following is the personnel of the entire day operating force of this office, including split-trick, Wheatstone, C. N. D. and substitute list, with J. H. Topliff in charge as chief operator; A. R. Pippitt, assistant chief; C. V. Safford, chief 1st division and race department; W. N. Manley and John A. Carberry, chiefs 2d and 3d divisions respectively; C. L. Gross, force chief; James H. Gallagher, way chief; C. W. Cray, city line chief; A. E. Van Tyne, wire chief; M. D. Crain, assistant wire chief; Miss Fannie Topliff and Miss Letitia Stevenson, chief operator's clerks; Louis Schofield, chief check. Day operators: Brown, Baker, Cutliff, Cooper, Cotton, Danforth, Dunn, T. M. and Harry Eckert, Grandy, Garrene, Geo. Goodwin, Harris, Irwin, J. B. Morgan, Murphy, Markley, Metzgar, McClure, McIlvaine, O'Laughlin, O'Rourke, Parmelee, Rooke, Remington, Slaughter, Schifflin, Schreiner, Tully, Troll, Van Landingham, W. T. Wright, and E. J. Wright, Mesdames Catlin and Douglass, Misses Bertha and Fanny Bernstein, Brown, Connor, Crotty, Croake, Colden, Casey, Claus, Floerke, Geraghty, Hall, Hunt, Higgins, Kron, Kleekamp, Langenbach, Marcer, Meyer, cordt, Meyer, McSwinnny, O'Fallon, Pauli, Ryan, Sommers, Shields, Straat, Smith, Sinclair, Tobias, Wise and Walther. Split-trick: Messrs. Ashby, Brophie, Brooks, Crain, Deverell, T. B. Goodwin, McNeill, McLeod, Palmer, Parkinson, Roberts, Roche, Rall, Spencer, Smit, Tremaine. Mr. C. P. Higgins is manager on change, with T. F. Dunn and Marc Gautier as regular operators. A detail of fifteen men from the main office work on change during board hours. Wheatstone: Melville A. Hawley, chief in charge; C. E. Cummings, assistant; Misses Bachle, Craven and Thomas, key clerks. Punchers: Messrs. S. A. Hawley, Horstman, Kelley and Misses Flaherty, Gleeson, Murray and Neslage. Type-writers: Misses Doyle, Ehlich, Gindra, Lynn, Schaefer, Mullaney, Sachs, Tremper, Tynan and Wendling; Miss Romie Hull, number clerk. In the C. N. D. Mr. Sol. Ure is in charge; Miss N. C. Mitchell sends stocks and Miss M. E. Mitchell cotton on ticker; Miss Mamie Thornhauer makes up C. N. D.'s and Mr. Wm. Geary has charge of the grain ticker. The substitute list comprises the following names: Misses Brooks, Price, Giblin, Kron and Hollo (Wheatstone), Mrs. Flora Potter, Mrs. Lizza Pratt, Messrs. Harris, De Witt, Carmody, Sheldon, Payne, Hanlon, Baer, Martin, McArdle, Kennedy, Linden, Tracey and Pippett. Night wire chief S. B. Fairchild will hereafter give his entire attention to the switch in the multiplex department and Mr. H. C. Smith, night chief on city wires, will manipulate the single wire board. Mr. Ollie Covington has been detailed to aid Mr. Smith as assistant chief on city wires. By this change the chiefs on the fourth floor will be relieved from board duty which was severely taxing their time. The coming fast-sending tournament, to be held in New York, is the subject of considerable interest in this office. A local contest will be held shortly to determine the advisability of sending a representative to participate in the contest, and it is hoped that we will be able to furnish a man who will make a creditable showing for St. Louis, to do which he must bring back the prize. Mr. G. H. Netherland, Superintendent Baker's secretary, has resigned to enter the electric light business at Louisville, Ky. "Ned" has a large circle of friends in the profession who wish him abundant success in his new field which he is in every way qualified to enter. Mr. L. M. Sickles is another departure from this office. He goes into the insurance business in this city. In consequence of an investigation of the telegraph colleges, so called, in St. Louis, by Mr. Lee Merriweather, of the State Board of Labor Commissions, a small-sized sensation has been developed. By exposing the fraudulent methods and practices of these institutions, which

are very numerous here, Mr. Merriweather is performing a very meritorious service not only to the public at large, which has been constantly imposed upon by these schools, but to those whose interests are identical with the proper conduct of the telegraph business. From the stringent measures the Labor Commissioners propose to adopt in dealing with these fraudulent institutions, they will no doubt succeed in squelching all such pseudo-telegraph colleges which have heretofore been allowed full sway in this city.

**NEW YORK WESTERN UNION NOTES.**—The following ladies have been placed on the 9 to 6.30 trick: Misses Humphreys, Reeves, McPherson, A. Miller, Wiggins, Troschette, Barry, O'Brien, Houser, Halloran, K. Boyle, Gavan, K. V. Brown; Mr. E. L. Kinney, 11.30 to 9. J. McParlan, of marine department, is back again home for ten days with rheumatism. Hugh Moody made a flying trip to Brentwood, L. I., where he has some property. Miss Hogan, one of our expert operators, died of pneumonia on Saturday morning. She had been suffering for past three or four years with Bright's disease. Manager Dealy kindly had her remains transferred to Rochester, N. Y. Miss Kate Donovan, city wire chief, and some of the deceased's friends from the office, attended the funeral on Tuesday. Miss Kircher, who has been ill for the past three or four months, has returned, looking better, but still not strong. Miss Fitch has returned from three weeks vacation, looking greatly improved. George J. Withey has been placed on the waiting list. Resigned: Misses Duane and King to go with a broker; Miss Kramer to go to Hoboken; Mr. F. P. Newman, T. Gregg, A. J. Heldman, A. Minturn, P. Cray and Clarence Cross to pool rooms; Miss F. Miller, Mrs. Zeliff, and Miss A. C. Murphy to Jersey City for the N. J. C. R. R. The lady members of Aid Society ask why the Aid Society don't open polls at three in the afternoon, so all can vote. A prominent lady remarked to your correspondent that the New York Telegraph Club voted twelve hours. The Aid Society could surely spare three hours to allow us to vote and not lose our dinner.

**MARRIED.**—Joseph Holden, of the Postal office, 91 Leonard street, to Edith Bernard, of Brooklyn, N. Y., March 10. The happy couple were the recipients of many costly presents, among them a handsome silver service from Manager Cole. Mr. and Mrs. Holden will enjoy a southern trip before making Brooklyn their permanent home.

**\$10.00 AND \$5.00 FOR ORIGINAL STORIES FROM LADY SUBSCRIBERS.**

THE ELECTRIC AGE will give \$10.00 to the lady telegrapher who composes and sends us for publication the best original telegraph story. A second prize of \$5.00 will also be given to the lady telegrapher sending the second best story.

The conditions are: 1st. The lady must be a subscriber to the paper; 2d. The story must not exceed 500 words in length, and one side of the paper only should be written on.

A *nom de plume* may be used if preferred.

Two stories from the same author will not be admitted in the same contest. The prizes will be awarded when not less than ten stories have been printed, and at least two of the stories will appear in each issue until that number has been reached.

Mr. George E. Holbrook, President of the New York Telegraph Club, has kindly consented to act as referee. Mr. Holbrook possesses well-known literary ability, and any decision he might render is certain to give general satisfaction. Now, let the ladies contribute.

BORN to Mr. and Mrs. Edward A. Coney, of Newark, a daughter, Feb. 20, 1890.



## TELEGRAPH CLUB ELECTION.

The Australian system of balloting was observed in the annual election of officers by the New York Telegraph Club on March 4. It imparted a quiet dignity to the proceedings which gave general satisfaction. The club started Feb. 15, 1889, with fourteen members and has increased to 300. The prime movers in this first organization of the kind in America were George W. Hann, Thomas W. Greene, Robert W. Martin, F. R. Blanchard, J. C. Watts, E. V. Wedin, Dr. B. B. Palmer, J. R. Powers, J. I. Buxton, J. E. Tomkins, William Gibson, N. F. Beow, C. F. McCrum and George E. Holbrook.

The last-named gentleman was elected president. Other officers elected were Geo. W. Hann, first vice-president; R. W. Martin, second vice-president; Thomas W. Greene, third vice-president; J. C. Watts, secretary, and J. I. Buxton, treasurer. The name of the club at a subsequent meeting was changed from that of the Electro-Gastronomic to the New York Telegraph Club. At that meeting E. W. Morrison was elected clerk of the Governing Committee; E. Dean, financial secretary; John R. Powers, librarian, and Conrad Meyer, second vice-president, to succeed R. W. Martin.

Twice during the past year the rooms have been gutted by fire of incendiary origin.

Notwithstanding this, the club's affairs, free of debt, were turned over with a handsome surplus in the treasury to the following officers elected for the ensuing year: President, E. E. Brannin; first vice-president, Richard Kane; second vice-president, W. B. Richardson; third vice-president, Dr. P. J. Byrne; secretary, Chas. J. Powers; financial secretary, Robt. J. Marrin; treasurer, John Brant; librarian, M. C. Sink; board of audit, Paul Sheehan, N. D. Webster and Geo. E. Holbrook.

Remarks of a felicitous nature were made by J. H. Dwight, Richard Kane, Geo. E. Holbrook, W. L. Ives, R. C. Edwards, T. E. Fleming, J. B. Taltavall, J. C. Watts, J. I. Buxton, W. C. Cherry, E. M. Tomlinson, H. A. Du Souchet and others.

President Brannin received several rounds of cheers when assuming his seat as the presiding officer of the club for the ensuing year.

A motion was adopted ordering engrossed resolutions to be presented to the retiring officers and a committee consisting of Richard Kane, W. C. Cherry and J. B. Taltavall was appointed to procure the same.

President Brannin appointed as Governors for the ensuing year Messrs. H. A. Du Souchet, C. A. Meyer, J. C. Watts, J. I. Buxton, Clarence Cross, T. E. Fleming, C. F. McCrum, R. C. McDonald, Martin Erwin, T. J. Dunn, E. M. Anson, J. B. Taltavall, Robt. Morton, J. E. Tomkins, J. W. Callahan and the eight officers, making a total of 25 members.

## THE NEW PRESIDENT.

Mr. Edward E. Brannin, the newly elected president, was born in New York City, March 15, 1854. He learned telegraphy while clerking in a clothing store in Matawan, N. J., in 1870-71. He was employed at various points on the Central Railroad of New Jersey from 1873 to 1880; in the New York main office from September, 1880 to March, 1881. He then accepted a position in the despatchers office of the C. R. R. of N. J., Jersey City, from 1881 to 1884. On September 1, 1883, he accepted a night trick in the New York main office. He resigned his railroad position June 1, 1884. He was appointed chief operator March, 1888. He resides in Jersey City, has a wife and three children, the eldest a boy 12 years of age, and two girls, aged 4 and 6 years respectively.

It is therefore safe to assume that under his able and popular administration the affairs of the club are in good hands. The fact that he appointed his competitor for the presidency, Mr. H. A. Du Souchet, to head the list of governors, is sufficient evidence of his "hustling qualities."

President Brannin proposes to at once look up larger and more suitable quarters.

NEW YORK POSTAL NOTES.—The force is gradually being increased to meet the rapidly growing business. Upwards of 25,000 messages are now handled daily. Manager Usher and assistant Shirley, together with the efficient corps of chiefs manage to keep this vast volume of business moving without the slightest delay. Night manager Roloson and his aides contribute their share of efficient work to the prosperity and good name of the company. Since our last report the following appointments have been made to the force: Miss Halsey; C. Brenesholtz; C. E. Davis; W. C. Christian; W. C. Cherry; J. O'Hare; W. V. Conkling; M. B. Knerr; J. J. McCoy; C. Higgins; W. E. Todd; Joe Hurley; S. J. Wilson. Mr. G. B. Ashley is absent on sick leave. Departures: F. E. Keene; G. F. Graff; J. J. Brady; Mrs. Fones; J. Masterson; W. E. Applegate; F. N. Andrews; E. Frary; E. P. Heyl. Arrivals: J. S. Brennan; E. L. Haughey; J. Dempsey; R. M. Williams; C. H. Cooke; C. F. Peckham; D. C. Lawrence; J. Coughlin; G. B. Gale; D. Grogan; H. A. Cameron; A. E. Hughes; P. J. Faulkner; J. H. Ward; C. W. Pierson; E. A. Randall; E. E. Todd.

WESTERN POSTAL NOTES.—At St. Joseph, Mo., we find the Postal doing a large business, under the careful management of Mr. W. G. Brinson, assisted by Jno. Dryer, chief. W. O. Kennedy uses a machine on U. P., nights. Frank Brinson is cashier, while John Crowley looks after the condition of the city lines. At Atchison, Kas., we find Mrs. Davy as manager, who is building up a fine business. Mr. M. H. Peck, one of "old timers" is manager at Leavenworth, Kansas, and manages to convince the "opposition" that he is in the "Burg." At Seneca, Kansas, we find G. B. Seeley as manager. At Hiawatha, Kas., we find the charming little lady, Lola Spears, manager, while William Kilain looks after the broker's office. At Beatrice, Neb., we see H. H. Craig, manager, with C. E. Grant at a broker's office. Mr. Craig has built up a very satisfactory business for the Postal at this point. At Lincoln, Neb., Mr. Harry Smith is manager, and is doing a good business. Will give more of the personnel of the Kansas City, Omaha lines later.

THE WESTERN UNION ROBBED.—William Blood, formerly manager of the Western Union Telegraph office in Aberdeen, S. D., who was arrested in November last, on a charge of embezzlement, but discharged for lack of evidence, was arrested at Council Bluffs on the 4th inst., on an indictment found upon a similar charge at the last term of the County Circuit Court. His former examination, it is said, tended to prove the existence of a wide-spread conspiracy among operators to "knock down" business by the old false check system. Later investigation and the admissions of several of those implicated are alleged to have shown that Blood was the organizer and chief of the combine. It is charged that he worked to induce several operators to join the plot, and his stealings are said to have exceeded \$800 during the few months he was in charge of the local office.

POSTAL NOTES, KANSAS CITY.—ST. LOUIS LINES.—At Warrensburg, Mo., we find Chas. H. Achenback as manager, with Luther Labban as operator; Independence, Mo., E. Peterson, manager, Alfred Peterson, operator; Knobnoster, Mo., R. H. Carr, manager and operator; Sedalia, Mo., W. S. Logan, manager; Tipton, Mo., L. W. Lutz, manager and operator; Jefferson City, Mo., H. A. Macauley, manager; Lynn, Mo., F. J. Tainton, manager; Drake, Mo., Lewis Boeger, manager; Union, Mo., Chas. W. Leiser, manager; Manchester, Mo., G. B. Lidener.

KANSAS CITY POSTAL NOTES.—Arrivals since last issue are M. Andrews, from the W. U.,

Omaha; Miss Dale, from the W. U., City, and U. S. Alvord, from Des Moines. Departures are Gregg, to Des Moines; Brennan, from the Board Trade, to the W. U., City; J. M. Scott, to Jacksonville, Ills. Night Chief Schell is manager at Board Trade during Change hours, and is assisted by E. S. Schram, who chalks up the quotations, and Mrs. Bray, who works the city wire loops. Business is heavy and more force will soon be required. Miss Dale has been assigned to the St. Joe and Atchison wire, and sends the afternoon report to Atchison and Wyandotte. Miss Godecke works the Topeka duplex and handles C. N. D's and "sugar" quotations, also sends reports to Topeka. Mrs. Elder works the St. Louis and Jefferson City wire, handling C. N. D's from the St. Louis Exchange for our northern points. Our business is rapidly increasing and more wires are in course of erection. Our western terminus is now Hutchinson, Kansas, and Wichita, Kansas, will soon be opened; two wires are already up and the third is to be soon strung, to accommodate the flattering support the people accord the "new" company. The AGE is winning favor rapidly on the "Postal" lines, and numerous inquiries are being made after the weekly electrical paper. Mr. Lesem, of "D" office, City, is able to be around again, after a severe illness. Our genial chief operator, Mr. A. B. Richards, is to be married on March, 19th, to a most estimable young lady, of Bowling Green, Mo. The entire force join in wishing the happy couple a long and prosperous married life.

SAN ANTONIO, TEXAS, NOTES.—This is one of the liveliest places in the southwest. The force is not as large as in some other southern cities, but a great amount of business is handled here, mostly the California overland, which comes this way all the time on account of Northern routes being interrupted or overcrowded. The present operating force is as follows: J. L. Newton, manager; F. L. Saunders, day chief, vice J. F. Marshall, who is off on leave of absence; operators, C. E. Michaels, J. B. Abbott, and Johnson; nights, T. J. Bolleter, chief; operators, Sennett and Barnes; split, Claude Banks. Manager Newton is very efficient and well liked by all. Success to THE AGE.

ST. LOUIS POSTAL NOTES.—A new "quad." was recently added to our equipment. A new wire is being strung between Chicago and St. Louis and will soon be ready for use. Business continues to increase, and is fast exceeding our facilities.

B. F. Kyle, late of Omaha, is with Mo. Pac. R. R. Co., this city. Walter Anderson, Venice, Ill., has been added to the day force this office. Jas. J. McGrath, Halifax, N. S., succeeds him at Venice.

Jan. 1st the Postal Co. secured the exclusive right for an office in the Lindell Hotel. Miss Ada Sampson was appointed manager, and Miss Maggie Miles, ex-manager, appointed to a position on the day force, main office.

Miss Sarah Craden now sends United Press west. She is a very skillful operator.

Wm. A. Redfield, late of old Mexico, passed through here few days ago on way to Chicago.

Geo. J. Hugh is one of the prominent athletes of the West.

TELEGRAPH COLLEGES.—We find the following in a Philadelphia daily:

STUDENTS WANTED.—TELEGRAPHY  
S in all its branches thoroughly taught at Humphrey's Institute, 1305 Arch street. Graduates assisted to positions when competent.

A student writes us that this concern failed to assist him. We did not suppose fraudulent colleges had any further use for a student after he had paid his tuition fee. We would advise our Philadelphia friends to expose this concern.



ELECTRICAL PATENTS ISSUED MARCH  
4TH.

- 422,419. Armature. Charles D. Jenny, Indianapolis, Ind.
- 422,438. Automatic Switch for Regulating the Power of Electric Batteries. Geo. B. Pennock, Brooklyn, N. Y.
- 422,445. Supporting Frame for Electric Railway Motors. Edward D. Priest, Lynn, Mass.
- 422,446. Arc Lamp. George C. Pyle, Indianapolis, Ind., assignor to the National Electric Head-Light Company, same place.
- 422,456. Carbon for Electric Lamps. Walter F. Smith, Philadelphia, Pa., assignor to the United Electric Improvement Company, Gloucester City, N. J.
- 422,457. Treatment of Storage Battery Plates. Charles Sorley, New York, N. Y., assignor to the Anglo-American Electric Light Manufacturing Company of West Virginia. Original application filed November 12, 1889. Divided and this application filed December 19, 1889.
- 422,504. Secondary Battery. Stanley C. C. Currie, Philadelphia, Pa., assignor to the United Gas Improvement Company, same place.
- 422,505. Secondary Battery. Stanley C. C. Currie, Philadelphia, Pa., assignor to the United Gas Improvement Company, same place.
- 422,511. Dynamo Electric Machine. Rudolf Eickemeyer, Yonkers, N. Y.
- 422,512. Electro Magnet. Rudolf Eickemeyer, Yonkers, N. Y.
- 422,524. Automatic Circuit Breaker. Marion C. Happoldt, Providence, R. I.
- 422,533. Secondary Battery Plate. Wm. P. Kookogey, Brooklyn, N. Y., assignor to the Kookogey Electric Company.
- 422,550. Compound Insulating Layer for Electric Coils. Elihu Thomson, Lynn, Mass.
- 422,556. Electric Motor. Henry E. Walter, Schenectady, N. Y.
- 422,577. Apparatus for Speaking Telephones. Thomas A. Edison, Menlo Park, N. J., and Ezra T. Gilliland, Boston, Mass.
- 422,578. Telephone Repeater. Thomas A. Edison, Menlo Park, N. J.
- 422,579. Telephone Repeater. Thomas A. Edison, Menlo Park, N. J.
- 422,591. Suspension Device for Incandescent Lamps. Hiram W. Hayden and Charles S. Dikeman, Waterbury, Conn., assignors to the Holmes, Booth & Haydens, New York, N. Y.
- 422,592. Reflector for Incandescent Lamps. Frank Holman, Brooklyn, N. Y.
- 422,604. Printing Telegraph Receiver. Henry Mahnken, New York, N. Y., assignor to the Commercial Telegram Company, same place.
- 422,645. Electric Railway. Sidney H. Short, Cleveland, Ohio.
- 422,654. Electric Time Alarm and Annunciator. Nathan H. Suren, Fort Worth, Tex.
- 422,672. Galvanometer. John Waring, Manchester, Conn.
- 422,681. Armature for Electric Machines. John C. Wray, Peoria, Ill.
- 422,705. Switch. Adolph Berrenberg, Somerville, and Jacob Umbehend, Cambridge, Mass.
- 422,722. Automatic Telephone Call. Henry L. Carpenter, Minneapolis, Minn.
- 422,730. Method of Electric Welding. Chas. L. Coffin, Detroit, Mich.
- 422,732. Magnetic Separator. Gurdon Conkling, Glens Falls, N. Y.
- 422,746. Electrical Induction Apparatus or Transformer. Michael Von Dolivo-Dobrowsky, Berlin, Germany, assignor to the Allgemeine Elektrizitäts-Gesellschaft, same place.
- 422,755. Electromotor Engine. Sebastian Z. de Ferranti, Hampstead, County of Middlesex, England. Patented in England, September 13, 1887, No. 12,418; in France, August 2, 1888, No. 192,192, and in Belgium, August 3, 1888, No. 82,780.
- 422,765. Telephone Switch System. Claude C. Gould, Batavia, assignor to the Eastern

Electrical Manufacturing Company, Wheatfield, N. Y.

- 422,773. Electro Magnetic Annunciator. Cornelius J. Hamilton, Philadelphia, Pa., assignor to the Novelty Electric Company, same place.
- 422,811. Lighting Fixture. Paul C. J. Le-maire, New York, N. Y., assignor to Bergmann & Company, of New York.
- 422,855. Pulsating Electric Generator. Chas. J. Van Depoele, Lynn, Mass.
- 422,857. Alternate Current Pulsating System. Charles J. Van Depoele, Lynn, Mass. Original application filed March 23, 1889. Divided and this application filed October 4, 1889.
- 422,858. Converting Continuous into Pulsating Electric Currents. Charles J. Van Depoele, Lynn, Mass. Original application filed March 23, 1889. Divided and this application filed October 4, 1889.
- 422,859. Pulsating Current System. Charles J. Van Depoele, Lynn, Mass. Original application filed March 23, 1889. Divided and this application filed October 4, 1889.
- 422,860. Multiple Current Pulsating Generator. Charles J. Van Depoele, Lynn, Mass.
- 422,862. Regulating Electric Motors. Geo. A. Washburn, Cleveland, Ohio, assignor to Ford & Washburn, same place.
- 422,863. Armature for Dynamos, etc. Geo. A. Washburn, Cleveland, Ohio, assignor to Ford & Washburn, same place.
- 422,895. Manufacture of Carbons for Electric Lamps. Walter F. Smith, Philadelphia, Pa., assignor of the United Electric Improvement Company, Gloucester City, N. J.

**THE VOLTAIC ARC.**—If two pointed pieces of carbon are joined by wires to a generator of electric currents, and are brought into contact for a moment and then drawn apart to a short distance an electric arc is produced between the points of carbon, and a brilliant light is emitted by the white hot points of the carbon electrodes. This phenomenon was discovered in 1809 by Sir Humphrey Davy, and its explanation seems to be that before contact the difference of potential between the points is not sufficient to produce a spark across an air space of over one-ten-thousandth of an inch, but when the carbons are brought into contact a current is established. On the separation of the carbons the momentary extra-current due to self-induction of the circuit, which possesses a high electromotive-force, leaps across the space and in so doing volatilizes a small quantity of carbon between the points. Carbon vapor being a fair conductor, permits the continuance of the flow of the current across the gap, if it is not too great; but as the carbon vapor has a very high resistance it becomes intensely heated by the passage of the current, and the carbon points also grow hot. Since, however, solid matter is a better radiator than gaseous matter, the carbon points emit a light of much greater intensity than the arc itself, though they are not so hot. The most refractory substances, such as flint, diamond, etc. melt, and gold and platinum are actually vaporized by the intense heat of the arc. When the arc is produced in the air the carbons are slowly consumed by oxidization. It is observed, also, that particles of the positive carbon are torn away and some of these are deposited on the negative carbon. By this process the positive carbon becomes shorter, and convex at the arc end, while the negative carbon by the constant accretion is added to in length. The resistance of the arc may vary, according to circumstances, from 0.5 ohm to 100 ohms. To produce a satisfactory light a minimum electro-motive-force of 40 to 50 volts is necessary, and the current must be at least from 5 to 10 or more ampères. Arc lights of an illuminating power of less than 100 candles cannot be maintained steady in practice and are uneconomical.

**CITY ELECTRICIAN.**—The Omaha City Council has recently created the office of electrician for that city.

## ELECTRIC MOTORS.

VARIOUS PLEAS ABOUT THEM EXPRESSED IN LETTERS AND LECTURE BEFORE THE BUFFALO ELECTRICAL SOCIETY—A PAPER ON THE SPRAGUE SYSTEM BEFORE THE ELECTRICAL SOCIETY—ANSLEY D. WHITE HAS MORE TO SAY ABOUT STORAGE BATTERIES.

Mr. E. E. Higgins delivered an interesting talk March 3, before the Buffalo Electric Society on a subject which is at present attracting much attention, namely: "The Sprague Electric Street Car Motor."

After describing the manner in which the car is propelled by electricity, he defined the heaviness of a current necessary to produce death. The danger line was 750 volts; below that it was impossible to kill a human being unless special artificial means were taken to increase the effectiveness.

Mr. Higgins then went back to the time when electric cars originated, and traced their improvement to the present time. The first was a storage battery, then came the central station motor with three rails, the current being conducted along one rail and returned on the others. The trolley came next, but difficulties were experienced in continuing connection with the overhead wires, as two were used at first. This was overcome later when the underwire connection was invented. The modern road dated from the time the Richmond road was put in operation, in February, 1888. Improvements were gradually made in placing the motors and many other particulars. The Sprague feeder system maintained an even pressure along the line by inoculating strength at intervals. The chief points of difference between the Sprague and the Thompson-Houston system were the manner of stopping the car, and the feeding process, which was not practiced by the latter company as a rule.

There are 194 overhead wire lines now in existence in 134 cities, Mr. Higgins said. In speaking of the storage battery, he said everyone hoped that would soon be perfected. At present it was unreliable, although it gave excellent service at times. The Beverly & Danvers road, which so much has been said of, was the property of the Union Car Company, and was used by it for experimental purposes, and it must be remembered that reports of its success comes from the Union Car Company. The Sprague Company was working as hard as anyone to make a success of the storage battery, but it must be confessed that at present it was impracticable.

The discussion which followed, more concerned the strength of the electric current than the serviceability of the system. To Mr. Higgins was given a vote of thanks for his entertaining talk.

**DISAPPEARANCE.**—Mr. Frank McGowan, who was connected with the Edison laboratory in Orange, N. J., suddenly disappeared from his home in that place and has not been heard from since January 15th last. Mr. McGowan is the person whom Mr. Edison sent to South America some years ago to find a certain plant, the fibre of which was to be used in making the filament for the Edison incandescent lamps. McGowan, after severe hardships, finally found the object of his mission, although he contracted a fever during his search in the unhealthy climate. He was very ill for a time, and was cared for by a wealthy Spaniard. During his illness he was nursed by the Spaniard's daughter who was reported to be a very beautiful woman. Their acquaintance developed into a love affair, and Mr. McGowan's friends suspect that he has gone back to South America, and will return with the young lady as his bride.

**PERSONAL.**—Mr. W. H. Markland, the electrician of the Pennsylvania Railroad, is the proudest man in his State. The boy was born on the morning of Feby. 27.



NEW BOOKS.

"How to Preserve Health" is the title of a book just issued by the Exchange Printing Company, of New York. The object of the book, according to the introduction, is to instruct its readers what to do that they may preserve and enjoy health and avoid sickness, in so far as human foresight can accomplish these ends.

Dr. Louis Barkan, the author, has ably covered a great deal of ground, and the volume is full of information on this important subject—the one that concerns the human race more than any other. "It is easier to prevent disease than to cure it" is the key-note to the work, and anyone following the advice contained in its pages cannot fail to enjoy the greatest of all blessings to the human race—good health. Dr. Barkan is an advocate of the electric light on account of its being better for the eye than any other light, and from a hygienic point of view. It is well known that the electric light is the healthiest of all. The volume also gives directions for treatment in case of lightning striking a person, and states that recoveries are on record after an hour of supposed death from lightning.

Mr. George C. Hale, Chief of the Fire Department at Kansas City, Mo., makes the statement that no fire there has ever been able to extend beyond the four walls. His system of reporting fires is a unique one. He relies entirely upon private and public telephones to convey the alarm to station houses. He claims that by these methods of communication more prompt results are obtained than by having an organized system with boxes separated several blocks apart.

**INDUCTION TELEMETER.**—An arrangement called an induction telemeter, comprising induction coils and a telephone, is used in Germany for registering the indications of a distant thermometer. It is so arranged that when there is silence in the telephone the indications of the recording instruments are identical.

**LIVERPOOL DOCK RAILWAY.**—It is expected that the Liverpool Docks (Overhead) Railway will be entirely completed by July, 1891. Electricity will be the motive power; but no definite system will be adopted until the last possible moment, in order that the best may be obtained.

**SPRAGUE ELECTRIC RAILWAY AND MOTOR DIRECTORS.**—The following named gentlemen were, on the 4th inst., elected directors of the Sprague Electric Railway & Motor Company: H. Villard, J. H. Herrick, E. H. Johnson, F. J. Sprague, Samuel Insull, J. S. Wise, C. H. Coster, C. A. Spoffard, A. Marcus.

**THE CANADIAN ATLANTIC CABLE.**—The act to incorporate the Canadian Cable Company, says the Montreal Herald, has passed the committee on railways and canals, etc., and that journal adds, little time will probably be lost "in supplying that much-felt want, an independent Canadian cable." The promoters are stated to be "good and substantial men," and it is added that the money needed will be forthcoming without much urging. The cable is to be laid from Clew Bay, Ireland, to a point not yet decided upon, on the north shore of the St. Lawrence, and will there be connected with other lines over the American continent. It is only a wholly independent, non-amalgamative, non-leasable and non-purchasable line which would have any influence in reducing cable rates.

**ELECTRICITY ON THE ALPS.**—The proposed railway up the Jungfrau, which is to be almost entirely underground, will, when completed, be lighted by electricity.

The Youngstown, Ohio, council has decided not to establish a municipal lighting plant.

Telephone Companies, Supply Houses, Bell Hangers, Physicians, and all users of Open Circuit Batteries, are requested to write the

**LAW TELEPHONE CO.,**  
85 JOHN ST., NEW YORK,  
We have something to interest you.

**BATTERIES.**

Outfits to run INCANDESCENT LAMPS from 25 to 300 hours.

Send for Illustrated Catalogue and Testimonials.

**JAS. H. MASON,**

Manufacturing Electrician,

120 PARK AVENUE, BROOKLYN, N. Y.

—THE—

**SHAVER MULTIPLEX TELEPHONE.**

Capacity for private lines 2 miles.

TRUNK LINES comprising a number of Telephones upon one circuit, and EXCHANGES for short lines switching direct one station with another. The only mechanical phone which works during rain and wind storms.

AGENTS WANTED.

**THE SHAVER CORPORATION,**  
78 CORTLANDT ST. NEW YORK.

LEONARD PAGET. CHARLES J. KINTNER

**PAGET & KINTNER,**  
Chemical & Electrical Experts & Electrical Engineers

DOMESTIC AND FOREIGN PATENTS.  
No. 45 Broadway. New York.

**WANTED**—Manufacturers to know that we will give free site, with right to purchase lands adjoining, to responsible manufacturers who will locate with us. The land is situate along the main line of Penna. Railroad, in Westmoreland County, Pa., 28 miles from Pittsburgh (all shipping rates same as Pgh.) in the heart of the Great Natural Gas Belt, adjacent to gas and water mains; is all underlaid with coal. Address  
ENTERPRISE LAND COMPANY, GREENSBURG, PA.

**FOR SALE.**

A first-class Electric Light Plant in a growing town of 8,000 population. Best equipped plant in Wisconsin; well established; pay better than twelve per cent. Good reasons for selling. Cash only will buy it. For particulars apply to  
W. A. KNAPP,  
62 South Canal Street, Chicago, Ill.

**For Sale.**

The controlling interest in an electric light company, in city of 15,000 inhabitants. Desirable contract with city for street lighting. Demand for private lights greater than present capacity of plant. Everything in first-class condition and on a paying basis. For particulars address,  
J. H. HICKMAN, Pres., Electric Light Co., OWENSBORO, KY.

**The Telegraphers' Mutual Benefit Association.**  
A FRATERNAL LIFE INSURANCE SOCIETY.  
— INSURANCE, \$1,000.—  
TWENTY-THIRD YEAR.  
For Particulars, Address THOMAS E. FLEMING, Secretary  
BOX 3175, NEW YORK.

**GOLD AND STOCK LIFE INSURANCE ASSOCIATION.**  
THIRTEENTH YEAR.  
For Telegraphers and Others in Electrical Service.  
INITIATION FEE, \$1.00. DUES, 50c per Month. INSURANCE, \$600.00.  
In Payments of \$50.00 per Month for One Year.  
**WM. J. DEALY, Secretary,**  
(Room 58.) 195 Broadway, New York.

**New York Electric Supply Co.,**  
MANUFACTURERS, IMPORTERS AND DEALERS IN

**ELECTRIC SUPPLIES**  
OF EVERY DESCRIPTION,  
Electric Light, Telephone and Telegraph Apparatus,  
**DYNAMOS, ELECTRIC MOTORS,**  
Primary and Storage Batteries, &c.,  
94 LIBERTY STREET, NEW YORK.

PERFECTLY RELIABLE. NO DANGEROUS CURRENTS

**THE ALUMINUM BATTERY**  
ELECTRIC LIGHT & POWER Co.  
94 LIBERTY ST. NEW YORK

ARC & INCANDESCENT ELECTRIC LIGHTING  
THE MOST ECONOMICAL SYSTEM FOR LIGHT PLANTS  
POWER & LIGHT FURNISHED AT VERY LOW PRICES

**THE CLARK SYSTEM OF ARC LIGHTING,**  
The Safest, the Most Economical, Durable and Perfectly Regulated System in the United States.  
Manufactured by the **CLARK ELECTRIC CO.,** 192 Broadway, New York.



## CABLE CLIPPINGS.

On the morning of January 23d, the new and handsome office of the Anglo-American Cable Company at No. 8 Broad street was first opened to the public. Mr. W. B. Waycott was appointed manager, with the following staff, culled principally from 16 Broad street:

Messrs. F. H. Waycott, D. Mackenzie, C. J. Abbott, A. H. Rogers, George Blood and J. C. Van Cura comprise the day force. Vibert Salter is on deck in the evening as night manager, ably seconded by Mr. Ferris, while M. W. Cummings presides, with becoming dignity, from midnight until 8 A. M. F. H. Nichols acts as cashier, with J. H. Bellows as receiver; William Moore is delivery clerk during the day, and Robert Montgomery accelerates the movements of the messenger boys at night.

At the Central Cable office at 16 Broad street, Mr. C. H. Robinson has been appointed manager, with D. B. Case as chief operator, Messrs. R. A. Griffin, E. F. Kirby, C. B. Rittenhouse, N. J. Crean and J. K. Badcock have been transferred from 195 to fill the vacancies left by those who went with the Anglo. Messrs. Price, Getty, Chase, Thompson, Gaynor and Coldbeck complete the day force; Mr. P. J. Tierney is night manager, with Messrs. Kelliher, Keene and "extras" to help him out.

Normon Sears fills the position of receiving clerk vacated by F. H. Nicholls, and is ably seconded by George B. Cashow; C. W. Kay presides over the number sheet and Joe. Byrnes at the delivery window; J. F. Timmins is service clerk with Messrs. Scott and Logan as his assistants; A. J. Locke is all-night chief with George Reed to assist him.

The "recorder" staff is made up as follows:—W. H. Glover in charge, D. Lynch, J. Wiseman, J. N. Webb, L. H. Delano and J. Glover, operators.

PHONOGRAPHIC DOLLS.—At the Edison Laboratory, Orange, N. J., an additional building has been erected for the manufacture of phonographic dolls. The bodies of these dolls are manufactured in Germany, and they are sent to Orange to receive their "inards." These consist of a small phonograph, on the wax cylinder of which a verse of some nursery rhyme is embossed by trained lady elocutionists. A representative of THE ELECTRIC AGE visited the laboratory a few days ago and was astonished on learning of the magnitude of the doll business. The contract between the company controlling the doll trade and the Edison Company calls for 500 dolls per day. There are now on hand at the factory 100,000 of these dolls, and the supply is being continually augmented. These toys have not yet been put on the market, but when they are the child who is fortunate enough to possess one will find infinite delight in making its doll tell the story of Mary's Little Lamb.

ARRESTED FOR SWINDLING TELEGRAPHERS.—Bailey Roeth, proprietor of the Union Telegraph Company, of St. Louis, which promises to make a skilled telegraph operator of a student in three months upon payment of \$40, was arrested recently for fraud. Roeth has obtained about \$10,000 in the past six months from gullible students at \$40 a head. He further stipulated that all graduates would receive situations worth \$100 a month. When graduates demanded situations Roeth would smile and say he had a nice place in South America, Mexico, or Siberia which a man or woman about the size of the graduate could fill.

Mr. R. L. De Akers, while on his way up Fulton street to the United Press Office, where he is employed, in this city, on March 5th, was struck on the head by a piece of iron fire escape which cut his head very badly, necessitating eighteen stitches being taken. The injury is a serious one.

BOSTON W. U. NOTES.—Our hours, Washington's Birthday, were as usual, notwithstanding the holiday and Saturday, combined. The expressions of disappointment were many as business was extremely dull, and the regular holiday programme, on a lengthened lunch hour, would have worked admirably. But the message from New York authorizing "such reductions of force as circumstances permit" did not put in an appearance, so we worked nine hours. As years go by, holiday privileges in this office seem to diminish very perceptibly. A number of excellent young operators have resigned within the past few weeks to accept positions with the Postal. Better pay, and we presume better hours, have been the inducements offered by the opposition in each case. The vacancies have been filled from the extra list. Manager Pillsbury of the Postal is to be congratulated on having secured valuable additions to his already efficient staff. The proposed fast sending tournament in New York is attracting much attention here and developments will be watched with interest. As yet we are unable to say whether there will be a representative from Boston or not. If not, we hope that something of the kind will take place here before April 10th so that the results of same may be compared with those of the New York contest. It has long been a mooted question as to who Boston's very fastest senders are, and a glance at the long list of eligible ones indicates that such a contest would be an interesting one. Copies of the matter used at the New York contests are in the hands of a number of the operators and many trials of speed take place every day during the "let ups." Some of the records claimed are excellent. Who will take the initiative in arranging a tournament for Boston? Or better still, who will journey to New York and bring back with him the first prize? We would receive him with a brass band at the station and give him a reception that would make him proud. Mr. T. F. McAuliffe, of the Milk street office, recently paid a visit to Lewiston, Me., in the interests of the T. M. B. Association. Mr. Arthur Pratt, formerly of this office, has gone to the Postal office, Taunton, Mass., as manager. Miss Ella Brigham, of the Postal, has been seriously ill at her home in Marlboro, for some weeks past. Mr. Charles S. McCoy, who died out west a few weeks ago, was a well-known member of the force here ten years ago. The wires of the Empire and Bay State Tel. Co., acquired by the recent purchase of that system by the W. U., were run into the W. U. switch, March 6th. The battery, switches and instruments are to be immediately transferred to the Western Union office.

AN EXPLANATION.—Brother Davenport, of the *Telegrapher*, of Chicago, takes this paper to task for appropriating, without credit, one of its many good things mentioned in its issue of February 15. We acknowledge our error and promise never to do so again. It happened in this wise: One of our writers who had read the item and had a short space to fill up in one of his pages endeavored to rewrite the item from memory in the composing room. He gave the *Telegrapher* credit for the item but the last paragraph at the end of which the credit was acknowledged could not be crowded into the page. It would have been an easy matter to place the credit to the part that was used, but it was entirely overlooked. We owe brother Davenport one, and will "pay up" when we visit Chicago during the World's Fair, in the success of which we hope he will have both hands and feet.

At the adjourned annual meeting of the Kansas City branch of the United States Military Telegraph corps, held a few days ago, Day K. Smith was elected president, J. D. Cruise, vice-president, and D. A. Williams, secretary and treasurer. This is the old staff of officers, except the vice-president, J. D. Cruise succeeds W. H. Wooding.

Mr. Geo. F. Allman, late of New York, is with a broker at Rochester, N. Y.

## PRIZE STORIES.

No. 10.

## OVER THE WIRE.

Early one lovely September evening, two young men stood on the platform of a railroad terminus idly talking—A bright-faced, happy-looking girl passed them, with a bow of recognition and boarded the train. A few moments later a hasty good-bye was exchanged, the young men parted, one went to the train despatcher's office; the other joined the young lady, who accompanied by an older sister was returning to her country home, after a shopping expedition in town. The usual conventional courtesies were exchanged then *sotto voce*. "Say, Rita, did you notice my friend on the platform?" "Yes—no—why?" Well, because, as you approached, he called my attention, saying, "here comes a good-natured looking girl, I'd like to know her," before I had time to reply, you bowed and boarded the train. He looked at me for an explanation, I told him you were his evil genius that "plug" at "Rustic by the Bridge." Well, you are just too smart, Mr. Louis, you should quit selling tickets and be an advertising agent, retorted the indignant Rita. "Now, sweetness, don't get so excited, just wait a minute." "Who is he?" "Oh, nobody that you care anything about, only the train despatcher at X who signs 'Q. K.'"—Rita's eyes opened wide, and her heart beat faster than she would have cared to acknowledge, as she asked, "What did he say about me?" "That he'd like to know you, and you should have seen his face when I disclosed your identity—but you needn't look so startled 'cause I told him about the farmer, fresh 'from the meadow, rich with corn,' who talks to you through the ticket window, while waiting for the train, about the prospect of crops." Oh, that's enough, you monster,—you didn't,—but say, Louis, he is simply horrid over the wire, and the way he rushes me—actually makes me weep—Oh, dear, he's good-looking, wonder why he's so hateful to me?" "Never mind, Rita, I fancy those 'Rustic' train reports will have a new interest for him, but here's my station—say, let me know if he cuts the the farmer out—Good night." "Well, having broken my heart over the wire, he's welcome to come and take the fragments—Good night, cousin Louis, I'll keep you posted."—While to herself she hoped he would not tell him. But Louis was a man, and couldn't keep secrets, as Miss Rita soon found out, by the great change in 'Q. K.'s telegraphic demeanor, and in numerous notes, which came with flowers, all signed 'Q. K.' Wondrous indeed the subtle fascination of wired love when hearts are young. Wired chats, became like personal interviews, and when at our last heavy snow-storm 'Q. K.' drove up to her door with a sleigh, his coming seemed like the arrival of a dear old friend, and in that drive in the moonlight over the snow, she realized the full extent of Louis' treachery, for "Q. K." asked her if he might claim "those fragments." Rita, though happy, was not rash, but just inclined to retaliate. She reminded him of his propensities to "rush," and made the terms of capitulation, that he should break the record—win the prize in the coming sending tournament—and then they would take the prize money and start housekeeping and like people in story books—love each other till they died.

"Qui."

This is about one of the funniest reasons ever given for standing an office off. A railway station was recently calling Brownville, Me., despatcher's office, when "Os" stopped him with the following request: "Please wait a minute; I'm shaving." There's nothing common about that "stand off."



## NOTICE.

A grand performance and reception (Testimonial), with the co-operation of the New York Telegraph Operators, will be tendered to Martin J. Dixon, at the new Central Opera House, 209 to 215 East 67th street, on Wednesday evening, April 16. The beautiful society play of "East Lynne," will be produced with Miss Florence Miller, of 195 Broadway, in the title role. Miss Susie Stephenson has kindly volunteered to sing between the acts, and Mr. Thomas Ballantyne will mimicize.

Prices: Boxes, holding seven persons, - \$3.00  
Tickets, admitting Gentlemen and Ladies, .50

On sale at all principal telegraph offices in New York and Brooklyn.

KANSAS CITY W. U. NOTES.—Changes in this office since our last letter are as follows: Departures—R. E. Norman, formerly on Deming duplex, to New Orleans for the W. U.; Henry B. Cervaney, from "C" office, to Hubbell, Neb.; Miss Dale, to the Postal, this city; Miss Godecke, from St. Joe quad, to the Postal, this city; Geo. I. Knapp has gone East; Frank Meyers, of the night force, has gone to Hutchinson, Kas., for the W. U.; Miss Mattie Van Ausdall is now at Topeka for the W. U. Several other important changes should have been noted earlier. Arrivals—W. H. Belmaine, Robert Baker, W. H. Craddock and Wm. Brennan, from the Postal, this city; Frank Boyden, J. McIntosh. Mrs. Manter, who formerly worked in this office, before her marriage a year ago, has now returned and works from 10 A. M. to 3 P. M.; Chas. Alexander is also another arrival. Business is booming and plenty of "extra" causes a very large smile to overspread the countenances of the "Wolves" who are always on the alert to "scoop." Messrs. Hannon, Evers, Moore and Craddock were sent to Deming, New Mexico, a few days to help out on the rush of overland business, occasioned by the wires on northern routes going down. They will remain a couple of weeks, or until the northern routes are clear. The Deming office has twice this season been reinforced from this office. The Wheatstone department is being enlarged to make room for the Los Angeles wire, to be shortly manned in this office. This will increase business of the Wheatstone wonderfully at this point. Miss Alva Walley, of this office, was quietly married to Mr. Walter Arnold, of Butler, Mo., on Feb. 27. It is to be regretted we have been unable to get a "write-up" oftener. Hereafter Mr. John Ferris will have the charge of the AGE interests in this office. Any items of interest given to him for publication will be appreciated. Lets have an item every issue.

PITTSBURGH NOTES.—J. W. Clark, Charles O. Rowe, Thomas D. Williams, and J. S. Lucock have formed a company, and applied for a charter, and will manufacture their celebrated railway signal. The corporation name will be the Western Pennsylvania Electric Railway Signal Company. Geo. M. Eitemiller announces himself as a candidate for honors in the class of 1865—Catlin contest. J. F. Reilly has accepted the night managership of the Western & Atlantic pipe line office in this city. W. H. Smith, of the C. N. D., is drilling for oil on his farm at Nimick Station. G. V. Watterson, of the Western Union, has resigned his position here to engage in the paint business. Edward N. Forse carries an eight by ten smile. It is a ten-pound boy. The entire force has the picture craze, and the walls of the operating department will shortly be decorated with photos of "Some of the Finest." J. Wilson Hartley has resigned his position with the Western Union, and accepted the managership of the Postal Company, Allegheny City office.

PRIZE STORIES.—Owing to the great press of important matter we have been compelled to hold two prize stories over for the next issue.

## AMERICAN RAPID AT AUCTION.

The property of the American Rapid Telegraph Company, operated by the Western Union under agreement with the receiver, will be sold in the near future at the Real Estate Exchange. The sale is to be made in pursuance to an order of Judge Lacombe in the suit of the Boston Safe & Deposit Company to foreclose a mortgage for \$3,000,000 made to secure bonds for that amount.

The mortgage was foreclosed in 1885, but there arose considerable litigation, which was finally determined in another suit against the Bankers' and Merchants' Telegraph Company in 1889. Since that time the foreclosure suit has been brought to trial, and recently Judge Lacombe granted an order to sell the property.

Among the students of Bellevue Hospital who had the degree of M. D. conferred upon them, on Monday, the 10th instant, at the Carnegie Laboratory, East 26th street, was Mr. Thomas Manning, an operator in the Commercial Cable Company, 1 Broad street. Dr. Manning was formerly with the Anglo-American Telegraph Company at Valentia, Ireland, and came to this country some six years ago. After working with the Mutual Union Company for a short time he joined the Commercial, when that company opened its cables to the public. On Dr. Manning taking up the study of medicine he was much encouraged by General Manager Ward and Superintendent Clapperton, and he deserves great credit for his perseverance in carrying out his three years' studies while performing his regular duties at the office. Dr. Manning ranked eighth in the class of 144 men. We heartily congratulate the young M. D. and wish him every success in his new profession. He does the fraternity honor.

PHILADELPHIA NOTES.—Mr. J. J. Brady, from 187 Broadway, N. Y., is the latest arrival at the Postal Office. Mr. S. A. Duff, of the P. R. R., at Downingtown, has been appointed Manager at 131 South 2d street, vice Harry E. Bailey, now at the Commercial Exchange. Mr. A. C. Crawford, late split-trick man, has gone to the Western Union. Mr. E. O. Shock, Manager at Reading, paid us a short visit recently. The Fast Sending Tournament is the all-prevailing topic of conversation. The boys are doing their prettiest to make a good record, and there is a likelihood that this company may send a representative from Philadelphia.

TRANSFERS.—J. F. Akin, Newhall to Union City, Pa.; C. J. Seefred, Detroit to Toledo, O., for the Commercial; Mr. J. Annand, W. U. to Postal, Portland, Ore.; L. Lemon, Glendive, Mont., to Paterson, Pa.; Miss Terry, Minneapolis to Helena, Mont.; C. Wallace, Toledo to Chicago; E. A. Clark, St. Louis to Chicago.

Mr. J. F. McClain, for many years city manager of Wyckoff, Seamans & Benedict, well known to the electrical profession, has resigned to accept a position with the Hammond Type-writer people in this city. No doubt he will be heard from frequently in telegraph quarters where he proposes to push his machine.

MISSING.—John McArdle, Detroit, is missing since Feb. 17, any information concerning him please communicate to A. McArdle, W. U. office, St. Louis.

YANKEE INGENUITY.—An American girl in France who wanted to save cable tolls telegraphed to her father: "Marseilles, Tuesday."

The wealthiest men in the telegraphic profession are said to be the railroad operators. They always have a depot-sit to their account.

Mr. W. W. Carr, formerly of Topeka, Kansas, is now receiving report for the *World-Herald*, Omaha, Neb.

## THE NEW YORK TELEGRAPHERS' AID SOCIETY.

The annual meeting of the New York Telegraphers' Aid Society occurred March 12.

The membership in 1889 was 534 and in 1890, 590—468 men and 122 women.

At the last meeting there was a balance in the treasury of \$2,015.19, and in 1890, \$2,103.49. Amount paid out for benefits during the year, \$3,371.86, and since the organization of the society, ten years ago, over \$12,000. There was no increase in the working expenses of the society during the year notwithstanding the great increase in the work.

There has been collected outside of the above from various sources, for distribution in relieving distress of worthy telegraphers or their families, \$411.60, of which amount \$371.60 was paid out, leaving a balance of \$40.00 on hand.

The gathering was the largest in the history of the society, 227 members voting.

The following were selected as officers for the ensuing year: President, E. F. Cummings; Vice-President, R. C. McDonald; Secretary, W. J. Quinn; Treasurer, F. W. Baldwin. Executive Committee: Miss K. E. Cummings, Mrs. S. G. Graus, W. H. Jackson, John Brant, C. A. Meyer, W. C. Burton and H. I. Jolley and the officers. Auditing Committee: G. W. Logan, W. A. Van Orden and Gardner Irving.

IN THE INTEREST OF THE NEW YORK TELEGRAPH CLUB.—If every telegrapher and his friends in New York and Brooklyn would save their *Evening World* coupons and vote to give the New York Telegraph Club the piano, that worthy organization would have a walk-over in the race. Why not make the effort? Success is certain if the boys do their duty. Love for the cosy rooms and the enthusiasm and enterprise of the members, and the good management of President Brannin, should speedily tell the tale. Mr. Tom O'Reilly is sending hundreds of votes over from Philadelphia for the N. Y. T. C. Let the New Yorkers do their duty.

Telegraphy is one of the studies at the New York State Reformatory, Elmira, N. Y.

## CATARRH,

## CATARRHAL DEAFNESS—HAY FEVER.

## A NEW HOME TREATMENT.

Sufferers are not generally aware that these diseases are contagious, or that they are due to the presence of living parasites in the lining membrane of the nose and eustachian tubes. Microscopic research, however, has proved this to be a fact, and the result of this discovery is that a simple remedy has been formulated whereby catarrh, catarrhal deafness and hay fever are permanently cured in from one to three simple applications made at home by the patient once in two weeks.

N. B.—This treatment is not a snuff or an ointment; both have been discarded by reputable physicians as injurious. A pamphlet explaining this new treatment is sent free on receipt of stamp to pay postage, by A. H. Dixon & Son, 337 and 339 West King St., Toronto, Canada.—*Christian Advocate*.

Sufferers from Catarrhal troubles should carefully read the above.

## J. S. TOWNSEND,

1554 Wabash Ave., Chicago, Ills.

Will ship you any article in the way of Diamonds, Watches, Jewelry, Emblems, etc., etc., C. O. D. approval and guarantees all goods as first-class and prices spot cash, wholesale rates. We sell immense quantities of goods and can afford to give our customers the benefit of very great inducements. Write for Catalogue and our Co-operative Watch Club system. Manufacturing and repairing. Designs furnished free of charge.

References: Editor of this Journal and First National Bank, Chicago, Ills.

Special Agents for the celebrated Howard Watches. For twenty-five cents will send our 250-page, elegant catalogue, this amount to be deducted from first order.

## J. S. TOWNSEND,

1554 WABASH AVENUE, CHICAGO, ILLS.



— THE —

**EDISON LALANDE**

**BATTERY.**

~~~~~

Manufactured by the

**Edison Manufacturing Co.,**

**ORANGE, N. J.**



THE BEGINNING OF THE END.

Edison Company Sustained. Westinghouse Company Defeated.

Sawyer-Man Patent Decided by the Court to be a Fraud and Absolutely Valueless. Extracts from the Decision of Justice Bradley, Oct. 5, 1889.

Circuit Court of the United States for the Western District of Pennsylvania.

THE CONSOLIDATED ELECTRIC LIGHT COMPANY (WESTINGHOUSE COMPANY) versus MCKEESPORT LIGHT COMPANY (EDISON COMPANY).

No. 5, May Term 1888. On Bill and Final Hearing.

EXTRACTS FROM OPINION OF THE COURT.

"The great question in this suit is whether the patent sued on is valid, so far as involves a general claim for the use in electric lamps of incandescing carbon conductors made of fibrous or textile substances. If it is, the complainant must prevail. If it is not, the bill must be dismissed"

"Is the patent valid for such a broad claim? The defendants contend that it is not; first, because no such invention was set forth in the original application, but was introduced more than four years after it was filed, and after the same material had been used by Edison, and claimed by him in application for a patent; secondly, because Edison, and not Sawyer-Man, was really the original and first inventor of an incandescing conductor made of fibrous or textile material for an electric lamp."

"It is very clear to us that in the original application for the patent sued on the applicants had no such object in view as that of claiming all carbon made from fibrous and textile substances as a conductor for an incandescing electric lamp. Nothing on which to base any such claim is disclosed in the original application. We have carefully compared it with the amended application, on which the patent was issued, and are fully satisfied that after Edison's inventions on this subject had been published to the world there was an entire change of base on the part of Sawyer & Man, and that the application was amended to give it an entirely different direction and purpose from what it had in its original form."

"By an adroit amendment made in 1885, they say: 'Our improvement relates more especially to the incandescing conductor, its substance, its form and its combination with the other elements composing the lamp.' The purpose of this amendment is obvious, and needs no comment."

"The fact is that Sawyer & Man were unconscious that the art was not new, and supposed that they could get a patent for it; but, as their eyes were opened, they changed about and amended their application, and made the material of the conductor the great object—carbon made from fibrous or textile material. Compare the original with the amended application, as first stated in this opinion, and this purpose most obviously appears."

"The fact that the whole object of the application was changed is evinced by the correspondence of the parties."

"This testimony of Mr. Broadnax, which is undoubtedly to be relied on, in connection with the letter just quoted, shows that the idea of claiming carbons made from fibrous and textile materials was an afterthought, and was no part of the purpose of the original application. The amendments relating to this new and broad claim were made afterward, in February and March, 1885."

"We are of the opinion that the changes made in the application in this regard were not justifiable, and that the claim in question cannot be sustained."

"We are not at all satisfied that Sawyer and Man ever made and reduced to practical operation any such invention as is set forth and claimed in the patent in suit. Their principal experiments were made in 1878, and perhaps the beginning of 1879. The evidence as to what they accomplished in the construction of electric lamps is so contradictory and suspicious that we can with difficulty give credence to the conclusions sought to be drawn from it. We are not satisfied that they ever produced an electric lamp with a burner of carbon made from fibrous material, or any other material, which was a success."

"The application for the patent in suit was not made until January, 1880, nearly or quite a year after all their experiments had ceased, and after the inventions of Edison had been published to the world."

"The explanations made by the complainants for the delay in applying for the patent in suit fail to satisfy our minds that Sawyer & Man, or their assignees for them, have not sought to obtain a patent to which they were not legitimately entitled."

"But, suppose it to be true, as the supposed inventors and some of the other witnesses testify, that they did in 1878 construct some lamps with burners of carbon made of fibrous material, and of an arched shape, which continued to give light for days or weeks or months; still, were they a successful invention? Would any one purchase or touch them now? Did they not lack an essential ingredient which was necessary to their adoption and use? Did they go any farther in principle, if they did in degree, than did other lamps which had been constructed before? It seems to us that they were following a wrong principle—the principle of small resistance in an incandescing conductor, and a strong current of electricity—and that the great discovery in the art was that of adopting high resistance in the conductor with a small illuminating surface, and a corresponding diminution in the strength of the current. This was accomplished by Edison in his filamental thread-like conductors, rendered practicable by the perfection of the vacuum in the globe of the lamp. He abandoned the old method of making the globe in separate pieces, cemented together, and adopted a globe of one entire piece of glass, into which he introduced small platinum conductors, fastened by fusion of the glass around them, thus being able to procure and maintain perhaps the most perfect vacuum known in the arts. In such a vacuum the slender filaments of carbon, attenuated to the last degree of fineness, may be maintained in a state of incandescence without deterioration for an indefinite time, and with a small expenditure of electric force. This was really the grand discovery in the art of electric lighting, without which it could not have become a practical art for the purposes of general use in houses and cities."

"The principle and great thing described is the attenuated filament and its enclosure in a perfect vacuum." "We think we are not mistaken in saying that but for this discovery electric lighting would never have become a fact. We have supposed it to be the discovery of Edison because he has a patent for it. This may not be the case. It may be the discovery of some other person; but, whoever discovered it, it is undoubtedly the great discovery in the art of practical lighting by electricity."

"THE BILL MUST BE DISMISSED."

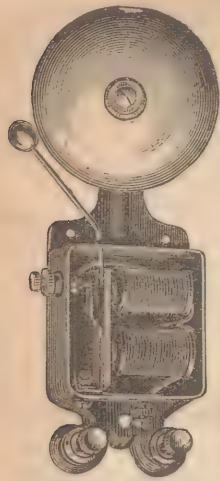
PRICE OF LAMPS MUCH REDUCED.

SEND FOR OUR NEW PRICE-LIST OF LAMPS.

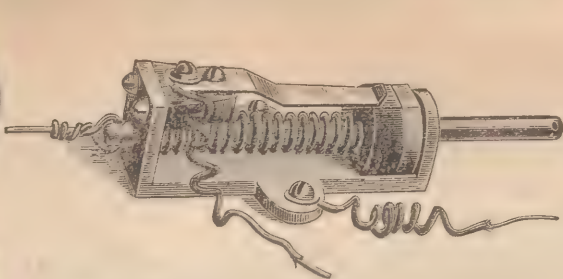
UNITED EDISON MANUFACTURING COMPANY,

65 Fifth Avenue, New York.

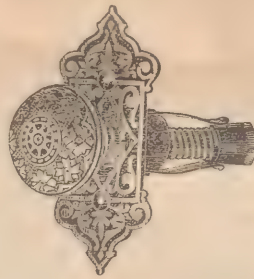




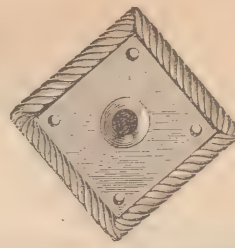
IRON BOX BELL  
(WITH COVER REMOVED).  
NICKEL PLATED GONG AND  
TRIMMINGS.



CIRCUIT CLOSER FOR MECHANICAL DOOR PULL



BELL PULL CONNECTOR.



BRONZE PUSH BUTTONS.



PEAR SHAPED  
PUSH BUTTON FOR  
DROP CORD.

# The Empire City Electric Co.,

15 DEY STREET, NEW YORK.

## ELECTRICAL SUPPLIES

For House-Work, Telegraph, Telephone, Electric Light, Etc.

EVERYTHING IN THE ELECTRICAL LINE.

SEND FOR CATALOGUE AND QUOTATIONS.

FRANKLIN S. CARTER, CHARLES M. WILKINS, E. I. WARD WILKINS

TRADING AS

### PARTRICK & CARTER,

Manufacturers and Dealers

## ELECTRICAL SUPPLIES

Sole Proprietors of the Patent Needle Annunciator.

114 SOUTH SECOND ST.,

PHILADELPHIA.

ESTABLISHED 1887.

Patent Needle Annunciators, Burglar Alarms, Electric Bells, Bronze, Nickel and Wood Pushes, Door and Window Springs, Electric Matting, Automatic, Ratchet, and Hand Light Burners, Spark Coils, Keys (Wood and Nickel), Compound Pushes, etc., Door Pulls and Attachments, Automatic Drops, Magneto Bells, Buzzers, Batteries (all Kinds), Foot Pushes, Pear Pushes, Desk Pushes, and all Supplies for Electric Bell Work, Telegraph Instruments, Registers, Relays, Keys, Sounders, Learners' Outfits, Medical Batteries and Appliances, Induction Coils, Motors, Storage Batteries, Hydrometers, Bluestone, Salammonic, Zinc, Copper, Climbers, Pliers, Screw Drivers, Bits, Augers, Vices, Tool Belts, Tool Bags, Splicing Irons, Clamps, Electro-Plating Outfits, Electric Light Supplies, Wires of all kinds, Tape Insulators, Cross Arms, Brackets, Pole Steps, etc., etc.

Send Business Card for Catalogue and Discount Sheet.



THE "PARAGON"

## ELECTRIC BELL

— IS DUST PROOF. —

PLATINUM CONTACTS. THOROUGHLY RELIABLE.

THE

"PARAGON"

## ELECTRIC ANNUNCIATOR

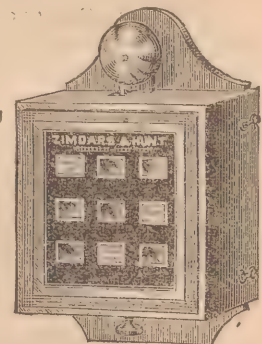
Is constructed on an entirely new principle.

ZIMDARS & HUNT,

MANUFACTURERS,

237 MERCER STREET,

NEW YORK.



# SAWYER-MAN ELECTRIC CO.,

Incandescent Lamps and General Electrical Supplies.

"The lamps of the Sawyer-Man Pattern, in use on board S. S. (Omaha) in many instances have shown a remarkably long life, several having a record of from 5,000 to 7,000 hours each."—Extract from report of Commander R. B. Bradford, Inspector of Electric Lighting, to the Chief of the Bureau of Navigation, Navy Department, for 1889, page 27.

GENERAL OFFICES:

510-534 West 23d Street,

NEW YORK.



Awarded the Grand Prize.

At late Paris Exposition.

### The Double Cylinder Law Battery

THE STANDARD FOR ALL OPEN CIRCUIT WORK.

ITS NINTH YEAR.

The Negative Element has 147 square inches of surface, which is more than double the surface found in any other! The Cell contains 2 1/2 pints of solution, which is nearly double that in any other cell!



- No Running over or Creeping of Salts.
- No Evaporation.
- No Corrosion.
- No Renewal of Negative Element.
- Requiring no Care.
- Costing nothing for Renewals except for Zinc and Solution (a trifle) in from two to four years.
- White Flint Glass Jar.
- Black Rubberoid Cover.
- Lock Seal Top.
- Pure Zinc.
- Pure Sal Ammoniac.
- Fewest Parts.

4 1/2 ins. square, 7 1/4 ins. high.

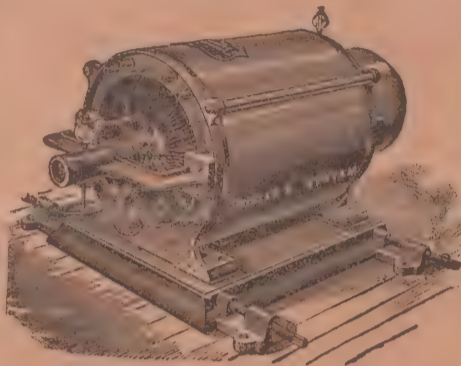
The Law Battery is kept in stock and for sale by all reliable supply houses.

AGENTS: { GEO. L. HENZEL, San Francisco, Cal., for Pacific Coast.  
CHAS. A. STRELINGER & CO., Detroit, Mich., for Detroit.

THE LAW TELEPHONE CO., Sole Makers,  
85 JOHN STREET. NEW YORK.

Awarded the Highest Distinction, a Gold Medal, by the International Jury at the Universal Exposition, Paris, 1889.

### THE HEISLER PATENT LONG DISTANCE INCANDESCENT ELECTRIC LIGHT SYSTEM.

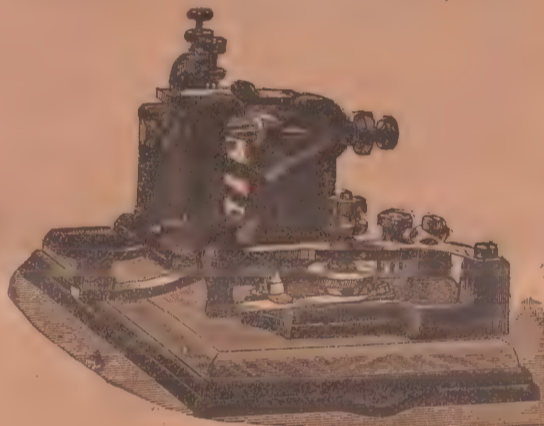


Unequalled for Distribution over wide Areas. SPECIALLY ADAPTED FOR STREET, COMMERCIAL AND DOMESTIC ILLUMINATION FROM CENTRAL STATIONS. SAFETY, RELIABILITY AND FINANCIAL SUCCESS FULLY DEMONSTRATED. Plan of Wiring the Simplest, Cheapest and Most Efficient. — STRICTLY SERIES. — Noted for the Brilliancy and Beauty of the Light Lamps, 10 to 100 Candle Power. Long Life without Blackening. Greatest Production of Candle Power per Horse Power. Dynamo Self-Contained and Perfectly Automatic. Plant may be located where Power can be secured Cheapest, even if Miles Distant from the Lighting.

SEND FOR CIRCULARS. CORRESPONDENCE SOLICITED.

HEISLER ELECTRIC LIGHT CO., 809-817 South 7th St., ST. LOUIS, MO.

LIBERAL DISCOUNT TO DEALERS, SEND FOR REDUCED PRICE LIST.



No. 2 O. K. OUTFIT,  
WITH SOUNDER AND KEY  
On same base, or separate, as ordered.  
Complete Outfit, - - - \$3.75  
Sounder, - - - - - 2.25  
Key, - - - - - 1.00  
Sounder and Key on one  
Base, - - - - - 3.25

The above Outfit consists of a beautiful Sounder wound to 20 ohms, and one of my unrivaled Nickel Plated, Legless, Steel Lever Keys; One Cell 5x7 Battery (or 6x8 Battery, 10c. extra); 15 ft. Insulated Office Wire, 1 lb. Vitriol, 1 Instruction Book, all safely packed and will be shipped on receipt of price, or sent C. O. D., subject to inspection, if you send me \$1.00 with order. State whether you wish Key and Sounder on same Base or separate. Write your address plain and full, also state by what Express Co. wish goods shipped. Address, A. B. LYMAN. 34 and 36 South Water Street, CLEVELAND, OHIO.

HIGHEST AWARD!  
FOR ELECTRIC

ONLY GOLD MEDAL  
BATTERIES.



PARIS, 1889.  
Exposition.  
**GONDA**  
AND  
**AXO**



THE STANDARD BATTERIES OF THE WORLD.

THE LECLANCHE BATTERY CO., 149 W. 18th Street, N. Y.

72 Page Illustrated Catalogue of  
**RUBBER STAMPS**  
Steel Stamps, Stencils, Seals, &c.  
Sent Free on Application by Postal to  
**S. W. REESE & CO.,**  
29 CHURCH ST., NEW YORK

**ELECTRIC LIGHT AT HOME**  
WITHOUT MACHINERY,  
Send for Illustrated Catalogue.  
**JAMES H. MASON**  
Manufacturing Electrician,  
120 Park Ave., Brooklyn, N. Y.

## CALIGRAPH Remington

GREATEST SPEED ON RECORD!!

T. W. Osborne wrote 179 words in one single minute on the CALIGRAPH, the Champion Machine of the World.

100,000  
Daily  
Users.



G. A. McBride wrote 129 words in a single minute, Blindfolded, thus in each case proving the falsity of many of the statements of our competitors.

For full and correct account of above test, address  
**THE AMERICAN WRITING MACHINE CO.,**  
HARTFORD, CONN.

BRANCH OFFICES:—237 Broadway, N. Y.;  
14 W. 4th Street, Cincinnati, O.; 1003 Arch  
Street, Philadelphia.



Standard • Typewriter

HAS BEEN FOR

**FIFTEEN YEARS**

THE STANDARD,

AND

Embraces the Latest and Highest Achievements of Inventive Skill.

**WYCKOFF, SEAMANS & BENEDICT,**  
327 BROADWAY, NEW YORK.



**A GOLD MEDAL**  
at the PARIS EXPOSITION for



TRADE MARK.

**WIRES & CABLES**

For Telegraph, Phone and Electrical Uses.

**THE OKONITE CO.,**  
No. 13 Park Row, NEW YORK.



W. D. SARGENT, Pres.

JNO. A. BARRETT, Vice-Pres. & Cons. Elec.

E. H. CUTLER, Treas. & Man.

FRANK A. PERRET, Electrician.

**THE ELEKTRON M'F'G CO.,** 79-81 WASHINGTON ST.  
BROOKLYN, N. Y.

MANUFACTURERS OF THE

**PERRET ELECTRIC MOTORS and DYNAMOS.**

Automatically Regulated, Unexcelled in Simplicity and Durability.

THE ONLY MACHINES HAVING

**Laminated Field Magnets of Softest Charcoal Iron,**

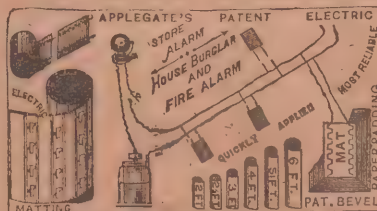
BY MEANS OF WHICH

*Higher Efficiency, Closer Regulation and Slower Speed are obtained than is possible otherwise.*

CAREFUL INVESTIGATION INVITED.

**Standard Underground Cable Co.**  
**ELECTRIC CABLES,**  
**LINE and HOUSE WIRE.**

General Offices, 708 Penn. Ave., Pittsburgh, Pa.  
Branch Offices:  
N. Y., 18 Cortlandt St. Chicago, Room 542, The Rookery.



**Applegate's Electric Floor Mat Manufacturing Co.**

OFFICE AND FACTORY:

No. 37 Market Street, Camden, N. J.

**THE GREATEST HOME PROTECTION YET INVENTED.**

**SIMPLE! DURABLE! CHEAP! VALUABLE!**

For sale by all Electrical Supply Houses.



**ENGRAVINGS for BOOKS, NEWSPAPERS and CIRCULARS**  
SEND GREEN STAMP for CIRCULAR—SEND PHOTOGRAPH, DRAWING or PRINT for ESTIMATE  
When writing please mention "The Electric Age."

**Stevens Institute of Technology,**

Hoboken, N. J., February 12, 1889.

**BISHOP GUTTA PERCHA CO.**

Gentlemen:—I have made an extensive series of tests of your **WHITE CORE INDIA RUBBER INSULATION**, under various conditions of temperature and times of immersion in water, with the following results:

INSULATION RESISTANCE IN MEGOHMS PER MILE.

|               |        |        |         |          |          |                 |         |         |         |         |
|---------------|--------|--------|---------|----------|----------|-----------------|---------|---------|---------|---------|
| Time.....     | 5 min. | 1 hour | 24 hrs. | 10 days. | 24 days. | Time.....       | 30 min. | 30 min. | 30 min. | 30 min. |
| Temperature   | 60° F. | 60° F. | 60° F.  | 60° F.   | 60° F.   | Temperature..   | 40 F.   | 115° F. | 167° F. | 200° F. |
| Resistance... | 3,200  | 3,300  | 3,300   | 3,300    | 3,300    | Resistance..... | 3,900   | 162     | 12      | 5.2     |

The times given in the left hand table are those between the immersion of the wire in water and the making of the test. The times of right hand table indicate the time between that at which the tank reached the indicated temperature and that at which the test was made. The cable had been immersed in water for a month before the first temperature test was made. It will be observed that the temperature being at 60° F, the resistance remained constant at its highest point for 24 days, and then raised greatly on lowering the temperature. The lowering of resistance by a rise in the temperature is a common characteristic of all such insulations and indicates no defect. Most insulations are much more affected by this cause than was this one. This wire also showed no deterioration from exposure to moist air, fresh plaster, damp earth, etc., after several month's exposure. Its insulating power also was unaffected by a like exposure to illuminating gas.

Very truly yours,

(Signed) **HENRY MORTON.**

**BISHOP GUTTA PERCHA COMPANY,**  
420-426 E. 25th Street, New York.

**THE ELECTRICAL NOVELTY CO.**  
MANUFACTURERS OF  
**TELEGRAPH INSTRUMENTS,**  
DEALERS IN  
**ELECTRICAL SUPPLIES**

**ALL KINDS OF ELECTRICAL WORK.**

Patents bought and Inventions marketed on commission.

Correspondence invited. Address,

**R. S. HOWLAND, Pres.**  
**F. N. BASSETT, Sec. & Gen. Mgr.** **ELECTRICAL NOVELTY CO.,** Montclair, N. J.

**ANSONIA BRASS & COPPER CO.**

SOLE MANUFACTURERS OF

Cowles' Patented Fire-Proof and Weather-Proof Line Wire.



SAMPLES FURNISHED UPON APPLICATION.

Pure Electric Copper Wire, bare and covered, of every description.

Warerooms: 19 and 21 Cliff Street, New York; 133 & 135 Wabash Ave., Chicago, Ill. Factories: Ansonia, Conn.

**DRACHTSMAN'S SENSITIVE PAPER**  
FOR COPYING DRAWINGS &c. IN  
WHITE LINES ON BLUE GROUND  
BY LIGHT. AN EXTREMELY CHEAP & SIMPLE METHOD.  
**AMATEUR PHOTOGRAPHIC OUTFITS**  
SEND FOR THOMAS M. COLLIER'S 635 ARCH ST.  
PRICE LIST PHILADELPHIA PA.

**Electrical Business Directory.**

**ANSONIA BRASS & COPPER CO.,**  
Wires, New York and Chicago.

**BOGART, ABM. L., MANUFACTURER**  
of Electric Gas Lighting Supplies.  
22 Union Square, N. Y.

**BROOKFIELD, W., MANUFACTURER**  
of Screw Glass Insulators and Battery  
Jars.  
53 Fulton St., N. Y.

**BUNNELL, J. H. & CO., ELECTRICAL**  
Supplies. 76 Cortlandt St., N. Y.

**CAND C. ELECTRIC MOTOR COMPANY,**  
Electric Motors.  
402-4 Greenwich Street, New York.

**COLBURN, I. W. & CO., DYNAMOS.**  
130 Main St., Fitchburg, Mass.

**DAY'S KERITE, WIRES AND CABLES.**  
16 Dey St., N. Y.

**EDISON MACHINE WORKS, WIRES**  
&c.  
19 Dey St., N. Y.

**ELEKTRON MANUFACTURING CO.,**  
Perret Electric Motors and Dynamos,  
79-81 Washington St., Brooklyn, N. Y.

**GREELEY THE E. S. AND CO. ELEC-**  
trical Supplies. 5 & 7 Dey Street, N. Y.

**DR. GASSNER'S DRY BATTERY.** THE  
best open circuit battery in the mar-  
ket. A. Schoverling. Sole Agent and Man-  
ufacturer, No. 111 Chambers St., N. Y.

**LAMARCHE'S SONS, H., 83 JOHN ST.,**  
New York. Zincs. Finest quality Zinc.  
Annunciator, Office, Magnet and  
Wire of all kinds.

**LECLANCHE BATTERY CO., BATTER-**  
ies. 149 W. 18th St., N. Y.

**LYMAN, A. B. KEYS AND SOUNDERS.**  
34 and 36 So., Water St., Cleveland, O.

**LAW TELEPHONE CO., BATTERIES,**  
85 John St., N. Y.

**MARSHALL, WM., MANUFACTURER,**  
ELECTRIC CONDENSERS,  
Standards a Specialty,  
Room 2 & 4, University B'g, N. Y.

**OKONITE CO., WIRES AND CABLES.**  
13 Park Row, N. Y.

**PARTRICK AND CARTER, ELECTRICAL**  
Supplies.  
114 So. 2nd St., Philadelphia.

**STANDARD UNDERGROUND CABLE**  
CO., Cables, Pittsburg, Chicago and  
New York.

**SABINE, J. B., ELECTRICAL PA-**  
tents. 181 B'way, New York.

**SPON, E. and F. N. ELECTRICAL**  
Books. 12 Cortlandt St., N. Y.

**SHAVER CORPORATION ACOUSTIC**  
Telephones. 78 Cortlandt St., N. Y.





# THE ELECTRIC AGE

## TELEGRAPH EDITION.

VOL. VII—No. 21.

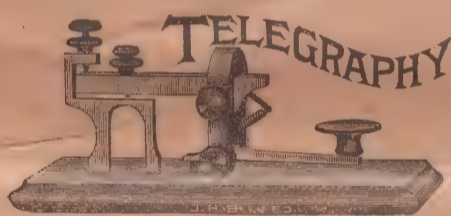
NEW YORK, APRIL 1, 1890

PRICE 10 CENTS.

**J. H. BUNNELL & CO.**  
76 CORTLANDT STREET,  
New York.

**Telegraph Instruments,**  
BATTERIES, BELLS  
AND ELECTRICAL  
SUPPLIES.

The Largest Stock and best variety  
of main line and short line instruments  
in any American establishment.



New "No. 2" Improved Mechanical Telegraph  
Instrument. (For Practice.)

Combined Key and Giant Sounder (without magnets—no battery required.) Works exactly like the very best Sounder and Key Combination Set, giving loud, clear sound, with slightest force on movement of Key. All made in first-class instrument composition. Brass, same pattern as best Giant Sounders. Price sent by mail, prepaid, with alphabet cards, etc., \$1.50. Complete Illustrated Telegraph Instructor Book sent free to any address.

SEND FOR OUR  
Latest Illustrated Price List and Catalogue,  
No. 10 of March, 1889.

Containing over four hundred cuts of Telegraph Instruments, Batteries and Electrical Appliances,  
FREE; also Manual of Telegraphy  
FREE to any address.

**J. H. BUNNELL & CO.**  
76 Cortlandt St., N. Y.

## ON TO THE TOURNAMENT!

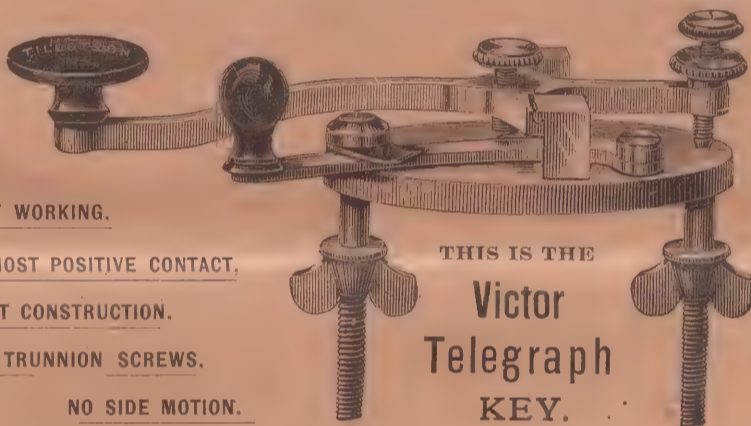
A Keen Eye, A Steady Nerve, A Nimble Hand and a

### VICTOR KEY,

ARE ALL FACTORS IN THE PROBLEM OF SUCCESS IN  
The National Fast Sending Tournament of  
1890.

And What's the Matter with the "CATLIN GRIP?"

Oh! That's All Right! Add that to the list  
of the Factors too.



EASIEST WORKING.

MOST POSITIVE CONTACT.

PERFECT CONSTRUCTION.

NO TRUNNION SCREWS.

NO SIDE MOTION.

THIS IS THE  
Victor  
Telegraph  
KEY.

### SPECIAL TOURNAMENT PRICES TO THE FRATERNITY.

The Following Telegraph Instruments sent postpaid by mail on receipt of price on orders placed with us before the date of the National Tournament of 1890. The Victor Instruments are cheapest even at double the price of the old style Trunnion Screw Instruments.

| VICTOR INSTRUMENTS.               |        | TRUNNION SCREW INSTRUMENTS.       |        |
|-----------------------------------|--------|-----------------------------------|--------|
| Keys, Legless Key, - - - - -      | \$2.00 | Steel Lever Key, - - - - -        | \$1.50 |
| Local Sounders, - - - - -         | 2.25   | Local Giant Sounder, - - - - -    | 2.25   |
| 20 Ohm " - - - - -                | 2.75   | 20 Ohm " " - - - - -              | 2.75   |
| 150 Ohm Relays, - - - - -         | 3.25   | 150 " W. U. Relays - - - - -      | 4.75   |
| Local Combination Sets, - - - - - | 5.50   | Local Combination Sets, - - - - - | 4.00   |
| 20 Ohm " " - - - - -              | 4.75   | 20 Ohm " " - - - - -              | 4.50   |
|                                   | 5.25   |                                   |        |

### THE E. S. GREELEY & CO.

Manufacturers and Importers of, Dealers in and Headquarters for Telegraph, Telephone, Electric Light, District Burglar Alarm, Electric Bell, Experimental and General Electrical Supplies. Sole Manufacturers of the Victor Telegraph Instruments.

5 AND 7 DEY STREET, NEW YORK.



The Attention of Electric Fitters

Is directed to the merits of the above instrument for preserving from polarization batteries used in any class of open circuit work, whether gas-lighting, bells, clocks or watchmen's detectors. It is not only the simplest and most desirable, but the lowest priced instrument offered to the trade. Can be set for any length of time, from 1 to 60 seconds.

A. L. Bogart, 22 Union Square, N. Y. City.

## HIGH SPEED!!

PERFORATED  
Electric Leather  
Belting.

Chas. A. Schieren & Co.,  
MANUFACTURERS,  
New York. Chicago. Boston. Philadelphia.

**NOYES BROS.,**  
MANUFACTURERS OF  
Electric Light & Combination Fixtures.

We make a specialty of furnishing Supply and Construction Companies with ELECTRIC BRACKETS, made from our own or special designs.

Dealers will find it to their advantage to have our Descriptive Circulars and Price List before placing orders.

Correspondence solicited.  
OFFICE AND WORKS, 83-87 FIFTH AVE., CHICAGO, ILL.

R. E. GALLAHER, SECRETARY.

J. W. GODFREY, GENERAL MANAGER.

W. B. DOWSE, SUPERINTENDENT.

## New York Insulated Wire Co.,

SOLE MANUFACTURERS OF—

WHITE CORE WIRES, B. D. WIRES, COMPETITION LINE WIRES, GRIMSHAW TAPES, GRIMSHAW SPLICING COMPOUND.

SELLING AGENTS.—Knapp Electrical Works, Chicago, Ill.; St. Louis Electrical Co., St. Louis, Mo.; Southwestern Electric Supply and Construction Co., Kansas City, Mo.; The Central Thomson-Houston Co., Cincinnati, O.; Kendall & Slade, Boston, Mass.; Fisher Electric Co., Detroit, Mich.

649 & 651 BROADWAY, N. Y.

## "C. & C." ELECTRIC MOTOR COMPANY,

402 & 404 GREENWICH STREET, NEW YORK.

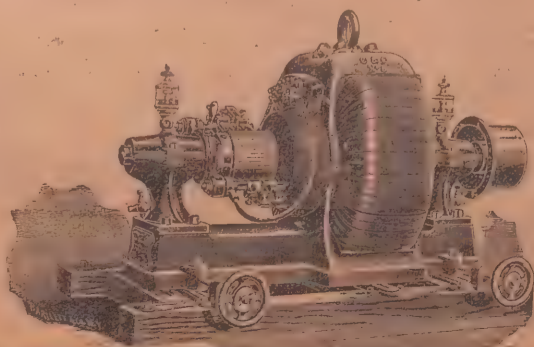
ALL STANDAND SIZES

—OF—

Electric Motors

—FROM—

1-8 H. P. TO 40 H. P.



OVER 6,000 NOW IN USE

IN THE

UNITED STATES,

Running Sewing Machines, Elevators, Printing Presses, Ventilating Pans, Blowers, Coffee Mills, Polishing and Grinding Tools, etc.

Electrical Test  
INSTRUMENTS.

AMMETERS  
AND  
VOLTMETERS,

For Direct and  
Alternating Currents.

Queen's New Standard Resistance Boxes.  
Queen's New Portable Testing Sets.  
Complete Outfits for Insulation Tests.

**Queen & Co.,**

SEND FOR CATALOGUES. PHILADELPHIA.



Chicago Office, Phoenix Building.  
Cincinnati Office, Smith Building.

New England Office, 148 High St., Boston.  
Philadelphia Office, 301 Arch Street.



# THE BUTLER HARD RUBBER CO.,

33 Mercer Street, New York.

—MANUFACTURERS OF—

## Hard Rubber Goods of Every Description,

INCLUDING THE CELEBRATED HARD RUBBER BATTERY CELLS Manufactured under Kiel's Patents.

FOR PRIMARY AND STORAGE BATTERIES.

THE CHEAPEST AND BEST CELLS IN THE MARKET

Also, SHEET, ROD AND TUBING (Kiel's Patent) for Electrical Purposes, at Reduced Prices.

Standard Quality Sheet, Rod, Tubing, Insulator Hooks, Key Knobs, Switch Handles, Telephone Receivers and Battery Syringes constantly on hand. Hard Rubber specialties of all kinds made to order.

SEND FOR PRICES AND ESTIMATES. FOR SALE BY

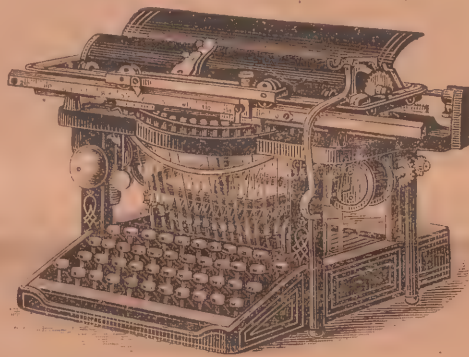
**CENTRAL ELECTRIC CO., Chicago, Ill.**

# TYPEWRITING AND TELEGRAPHY.

### BRANCH OFFICES.

—[o]—

BALTIMORE, 15 North Charles Street.  
BIRMINGHAM, 88 Colmore Row.  
BOSTON, 15 School Street.  
BUFFALO, 58 Pearl Street.  
CHICAGO, 196 La Salle Street.  
CINCINNATI, 177 West 4th Street.  
CLEVELAND, 188 Superior Street.  
DENVER, 1633 Champa Street.  
INDIANAPOLIS, 34 East Market Street.  
KANSAS CITY, 606 & 608 Wyandotte St.



### BRANCH OFFICES.

—[o]—

LIVERPOOL, Central Bldgs., N. John St.  
LONDON, 100 Gracechurch Street.  
MANCHESTER, 8 Moult Street.  
PARIS, 18 rue de la Banque.  
MINNEAPOLIS, 12 Third Street, South.  
PHILADELPHIA, 834 Chestnut Street.  
ROCHESTER, 13 East Main Street.  
ST. LOUIS, 308 N. 6th Street.  
ST. PAUL, 94 East 4th Street.  
SYRACUSE, 202 Warren Street.  
WASHINGTON, Le Droit Building.

### READ WHAT SOME OF THE FOREMOST TELEGRAPHERS IN NEW YORK SAY OF THE REMINGTON STANDARD TYPEWRITER:

"WORLD" OFFICE, NEW YORK, September 14, 1887.  
Gentlemen—We have used the REMINGTON TYPEWRITER for some time, and are highly pleased with the rapidity and ease with which matter can be copied from the wires. Operators who are expert with the typewriter find no difficulty in copying the fastest sending. Its work is entirely satisfactory to the compositors and copy readers of the *World*, and we find it a great improvement over the pen. Yours truly,  
W. A. McALLISTER and A. J. BOOTH, Telegraph Staff.

"SUN" OFFICE, NEW YORK, September 19, 1887.  
Gentlemen—About two months ago I received a No. 2 REMINGTON machine to practice on. It wasn't in the office more than half an hour before all hands, from the editors down to the office devil, had written their names, and at the next meeting of the *Evening Sun* Association the "REMINGTON" was unanimously voted a "dandy" and a valuable acquisition to the office. I am now able to write from forty to forty-five words per minute and would rather miss my Sunday dinner than be without it. Yours,  
O. S. KENNEDY, Operator, *Evening Sun*.

The REMINGTON TYPEWRITER is, without a doubt, the best machine of its kind extant. A thorough test has convinced us of this fact, and it is only a matter of time when it will be used exclusively in connection with the telegraph. The "REMINGTON" is in use in the New York office of The United Press, as well as in other offices throughout the United States.

R. D. BLUMENFELD, C. H. H. COTTRELL, M. H. CRANE,  
J. G. McCLOSKEY, R. SPILLANE, F. J. KIHM,  
JOSEPH T. HEENAN, CHAS. H. DAVIS, J. P. GARDNER.

The REMINGTON TYPEWRITER is used exclusively in this office. Its usefulness in connection with telegraphy cannot be too highly praised. It is of much benefit to an operator, rendering "receiving" an easy task when the machine is once mastered.

GEORGE H. SICKLES, New York Associated Press.  
P. T. BRADY, New York Associated Press.  
F. P. BLANKS, Western Associated Press.  
EDW. L. BOOLE, Western Associated Press.

SEND FOR PAMPHLET.

## WYCKOFF, SEAMANS & BENEDICT, 327 Broadway, N. Y.

ESTABLISHED 1831.

## JOHN STEPHENSON COMPANY, Limited.

### TRAM CAR BUILDERS,

47 East 27th St., New York.

INVITE THE ATTENTION OF

PROMOTERS OF ELECTRIC RAILWAY ENTERPRISES

TO THEIR SUPERIOR FACILITIES FOR THE CONSTRUCTION OF

### TRAMWAY CAR

AND FOR THEIR ADAPTATION TO THE VARIOUS SCHEMES OF ELECTRIC PROPULSION.



## ELECTRICAL BOOKS.

SEND FOR CATALOGUE.

D. VAN NOSTRAND CO.,  
23 MURRAY ST., 27 WARREN ST., NEW YORK.



THE ELECTRIC AGE.  
TELEGRAPH EDITION.

Published on the 1st and 16th of Every Month.

BY THE ELECTRIC AGE PUBLISHING CO.

J. B. TALTAVALL, *President.*  
G. E. HOLBROOK, *Secretary.*  
T. R. TALTAVALL, *Treasurer.*

ENTERED AS SECOND-CLASS MAIL MATTER.

Registered Cable Address, "Electage," New York.

TERMS OF SUBSCRIPTION:

One Copy, one year, - - - - - \$1.50  
Great Britain and other Countries, - 2.00

Subscribers should promptly notify us of any change in their addresses, giving the old as well as the new one, that they may receive all the papers they pay for.

ADVERTISING RATES: \$2.00 PER INCH.  
Four Line Notices, 50 cents.

T. R. TALTAVALL, *Editor.*  
J. B. TALTAVALL, *Business Manager.*  
R. J. GRAY, *Manager, Advertising Department.*

Address all communications to the Electric Age Pub. Co., No. 5 Dey Street, New York.

NEW YORK, APRIL 1, 1890.

AUTHORIZED AGENTS FOR THIS PAPER.

- Augusta, Ga.—C. E. Watson.
- Allentown, Pa.—D. E. Lerch.
- Baltimore, Md.—H. C. Wooden.
- Boston, Mass.—W. Hazelboom.
- Buffalo, N. Y.—J. M. Stambach.
- Bridgeport, Conn.—P. A. Moriarty.
- Cincinnati.—L. E. Moores.
- Cleveland.—J. J. Corrigan.
- Chicago.—C. S. Loewenthal.
- Columbus, O.—F. O. Rubrecht.
- Campbellton, N. B.—J. Vautier.
- Detroit, Mich.—F. B. Beach.
- Dayton, O.—W. C. Weinman.
- Dallas, Tex.—F. L. Saunders.
- Duluth, Minn.—E. D. Williams.
- Deming, N. Mex.—Mrs. M. E. Kaine.
- Erie, Pa.—Geo. J. Gouling.
- Evansville, Ind.—O. D. Richardson.
- Ft. Wayne, Ind.—J. H. Schwerzgen.
- Hamilton, Ont.—J. J. Seitz.
- Helena, Mont.—B. F. Hartz.
- Jacksonville, Fla.—E. B. King.
- Kansas City, Mo.—B. C. Elder.
- Louisville, Ky.—F. Farrell.
- London, Ont.—D. Adams.
- Milwaukee.—A. P. Velle and A. Wilson.
- Minneapolis.—B. W. Parrott.
- Memphis.—W. B. Harvey.
- New Orleans.—S. M. English.
- New Brunswick, N. J.—W. C. Wineland.
- North Sydney, O. B.—L. W. Hoyt.
- Newburg, N. Y.—John Mitchell.
- Newark, N. J.—E. A. Coney.
- New York.—H. I. Jolley, 195 Broadway.
- Pittsburgh.—W. E. Burns.
- Portland, Me.—K. W. Starbird.
- Philadelphia.—L. Miller and J. E. Janney.
- Petersburg, Va.—S. D. DeShazor.
- Plattsburg, N. Y.—G. W. Hickey.
- Port Arthur, Ont.—C. L. Hallett.
- Raleigh, N. C.—P. H. Hughes.
- Rochester, N. Y.—D. R. Hendricks.
- Reno, Nev.—E. A. Kilbourne.
- San Francisco, Cal.—H. M. Graham.
- Sioux City, Ia.—J. F. Slack.
- Savannah, Ga.—G. W. Spaid.
- St. Louis.—C. D. Lee.
- Syracuse, N. Y.—S. H. Riker.
- St. Paul, Minn.—B. F. Wright.
- Toronto.—W. J. Anderson.
- Victoria, B. C.—Wm. Christie.
- Washington.—H. D. Robinson.
- Winnipeg, Man.—
- Wheeling, W. Va.—J. W. Wells.
- Watertown, N. Y.—F. B. Holcomb.

LATEST TELEGRAPH SCHEME.

Mr. J. M. Seymour, a member of the New York Exchange, and representing a number of capitalists, appeared before the House Committee on Post Offices and Post Roads in Washington, Friday, March 14th, and said they were prepared to establish a postal telegraph at the terms and rates proposed in the bill prepared by the postmaster general, or a uniform rate of twenty-five cents per message. The means by which the gentlemen represented by himself hoped to make the undertaking a success was by what is known as the Patten Multiplex Telegraph System, which, he said, has been in successful operation in New York and Philadelphia for the past six months. The syndicate proposed to build and maintain the lines needed, to furnish operators, power and stationery, and to have the right to build and be protected in

constructing lines over all postal roads. They asked to be exempt from Federal and State taxation. In cities where the post offices were cramped for want of room, the syndicate proposed to furnish its own offices. It was desired to make a contract with the Government for fifteen years, with the privilege of renewal unless the Government would take the lines at the end of that time at a value to be appraised by experts.

Mr. Seymour said that he would rather not give the names of his associates in the scheme, but he assured the committee that they were all well-known throughout the commercial world. They were willing to give a bond of \$100,000 as a guarantee that they would carry out any contract with the Government. The syndicate expected, he said, to be allowed to do a private business outside of the government work. Mr. Seymour claimed that had the Western Union used the Patten system last year its expenses would have been \$6,000,000 instead of \$16,000,000.

F. Jarvis Patten, of New York, inventor of the system referred to by Mr. Seymour, described it to the committee. By it, the carrying capacity of one wire was equal to eight or even twelve wires under the present Morse system. To maintain the lines under the Patten system would cost about seventy-five per cent. less than under the present system.

Mr. Seymour stated that it was proposed to lease wires to newspapers at almost nominal rates and to reduce press rates about thirty-three per cent. To establish the system under the provisions of the postmaster general's bill would cost, he believed, about \$7,000,000. A complete system covering the entire country would cost about \$25,000,000.

PHILADELPHIA NOTES.—Mr. G. W. Hiney has resigned his position with the Postal Company, and is now in the service of an up-town firm as crayon artist. Mr. William Shone, recently connected with the B. & O. R. R., in Virginia and West Virginia, is the latest acquisition to force in the Sugar District. Mr. W. Desmond, night operator for the A. D. T. Co. at the 14th district, has been transferred to day duty at the 12th vice S. Mlotowski, resigned to go elsewhere. Mr. J. Kane, of the 8th, is now at the 14th, in Mr. Desmond's place. Mr. M. Mecke has been taken from the sergeant's desk at the 2d, and promoted to the position of night operator at the 8th. Mr. E. O. Tomlinson, of the 3d, is now the proud and happy father of a 12 pound daughter, who "reported for duty" on the 17th inst. Congratulations.

THE NEW YORK TELEGRAPH CLUB.—Since March 1st, applications for membership to the number of seventy-five have been acted upon by the Government Committee. The outlook for the club is unusually bright. Rooms at No. 32 Cortlandt street have been secured, and the additional space amounts to three or four times the room now occupied. They will be fitted up in an elaborate manner with a complete gymnasium.

The Postal has almost entirely done away with its battery in this city where it has an admirable system of dynamos on the Jones principle. Mr. Charles A. Richter, who formerly was located in the battery-room at 187 Broadway, now looks after the local and call circuit batteries of the entire down-town district, which extends from the Battery to Leonard street. Miss Jones, of 187 office, is now at the 25 Broad street office. Mr. Neill has been transferred to 91 Wall street as statement clerk.

Dr. Manning, of the Commercial Cable Co., whom we mentioned in our issue of March 16, has just been appointed assistant house surgeon at the German Hospital, (St. Francis), in Fifth street. The position was obtained by competitive examination, Dr. Manning being the first out of six applicants. He enters upon his duties 1st of April.

ILLUSTRATIONS AND DESCRIPTIONS OF TELEGRAPHIC APPARATUS.—The second edition of Terry and Finn's book giving illustrations and descriptions of telegraphic apparatus is meeting with a large sale. The second edition is limited in number of copies, and it will soon be exhausted. The scope of the work is best described in the preface, which reads as follows: "In publishing this work the authors have sought to bring within the reach of all telegraphers a book illustrative and descriptive of the principal telegraph apparatus in practical use upon the lines of the different telegraph companies at the present day. \* \* \* \* \* An additional, and it is hoped valuable feature of the book will be found in the article explanatory of the elementary principles of ordinary circuit testing and of Wheatstone Bridge measurements." The section devoted to the various methods of testing lines, etc., is a very valuable feature of the book, and any operator with a little mechanical ingenuity might construct apparatus to enable him to master the science with great facility. The special features of the second edition are the descriptions and illustrations of the methods of F. W. Jones, Gerritt Smith and Moffatt and Blakeney of increasing the efficiency of the quadruplex. The price of the book, which is very tastefully gotten up, is \$1.50. For sale by THE ELECTRIC AGE PUBLISHING CO., 5 Dey street, New York.

Mr. James B. Finnan, one of the officers of the Order of Railway Telegraphers, of Baltimore, Md., was in town last week in the interest of his organization. Mr. Finnan, by his dignified and gentlemanly bearing makes friends for the Order, of all with whom he comes in contact. Any organization may be proud of such men. Mr. Finnan visited the Telegraph Club headquarters and was favorably impressed with what he saw in those comfortable rooms.

Little three-year old James Dennis, son of Capt. James R. Dennis, the well-known telegrapher of this city, had a narrow escape from being burned to death last Thursday morning. The little fellow had set fire to the window curtains which ignited his clothes. Mrs. Dennis was also burned in her endeavors to extinguish the burning garments. Both, however, are doing well.

Col. R. C. Clowry, V.P., and general superintendent; L. C. Baker, of St. Louis; J. J. Dickey, of Omaha; M. C. Bristol, of Chicago; T. P. Cook, of Dallas, Texas, all prominent Western Union officials, are in Texas on a general tour of inspection, visiting all the principal cities in the State. They are travelling in a very beautiful private car labelled "Electric."

The result of the Oxford-Cambridge boat race left London on the cables of the Western Union Company at 5.07 1/2 Greenwich time, and was delivered to the New York office of the Associated Press at 5.08. Only one half of a minute of time was consumed in flashing the result of this interesting event 3,000 miles.

The staff of operators at Spencer, Trask & Co.'s New York office consists of Archie G. Chisholm, who works Albany and Saratoga; Geo. H. Ackerman, on Boston and Providence, and Arthur E. Harris on Philadelphia.

An operator recently wrote President Harrison for a third-class post-office, with this postscript as positive influence: "If I am not successful I will have to return to pounding brass." Poor fellow, licking stamps failed.

Dr. Norvin Green and his wife expect to celebrate their golden wedding on April 1st, at Louisville, Ky., when eighty-five lineal descendants will participate in the South-Western Union.

T. M. B. ASSOCIATION.—Assessment 239 has been levied to meet the claims arising from the deaths of A. W. Pearkes, J. L. Williams, H. H. Scobell and A. Donhauser.



## THE CALIGRAPH IN TELEGRAPHY.\*

That time saved is money saved is a self-evident truth. No one appreciates the truth of this maxim more than the active business man, who is often heard to express the wish that the business day was twice as long as it is so that he could complete the work that each day brings. If one day's work is to be done before the next begins it must be done hurriedly, and often in an unsatisfactory manner. Hence anything that saves the time and labor of a business man is valuable to him, and is equivalent to so many dollars and cents, according to the facility and expedition with which he can carry on his business. In this line, one of the greatest time and labor-saving devices that was ever invented is the type-writing machine, and it is wonderful what an enormous volume of correspondence may be disposed of in a very short time by the use of such a machine. In fact it would be an utter impossibility for some firms

them is proved by the fact of the large sales and great demand for this particular machine. The demand is a natural one, too, on account of the inherent merits of the machine. There might be a demand for an inferior machine in case a good machine were too expensive, or for some other reason. But in this case the demand is based entirely on the merit of the machine itself—because it is the best machine made. When it is considered that the Caligraph embodies all of the essential improvements made in writing machines up to the time of its introduction, with many improvements on these in the direction of simplicity, any reasonable being can not but admit that the Caligraph ought to be as nearly a perfect machine as it is possible for human hands to make it. On comparing the Caligraph with other similar machines, the simplicity of the former is its most striking feature. The question of durability naturally presents itself to mind. This will be fully discussed later on. The fact is, the Caligraph

than a week or two that many of the ambitious operators were trying their skill as type-writer receivers. It is on record of a case of one of the Associated Press operators discarding his stylus altogether and substituting the type-writer after only *two* weeks practice. This was a remarkable case; but there are many other records that are not far behind, and taking the history of the introduction of the type writing machine on the Associated Press wires some very interesting facts are revealed. As soon as the operators discovered for themselves that the use of the machine was going to save them a vast amount of hard work, they became very assiduous in their preliminary practice, and when they put their heart and soul into it, the road to success was easy, and it was with a good deal of pride that each announced that he had copied his first despatch on the type-writer, or that he had a "stylus to sell."

Let us consider for a moment what the type-writing machine does for these operators. We

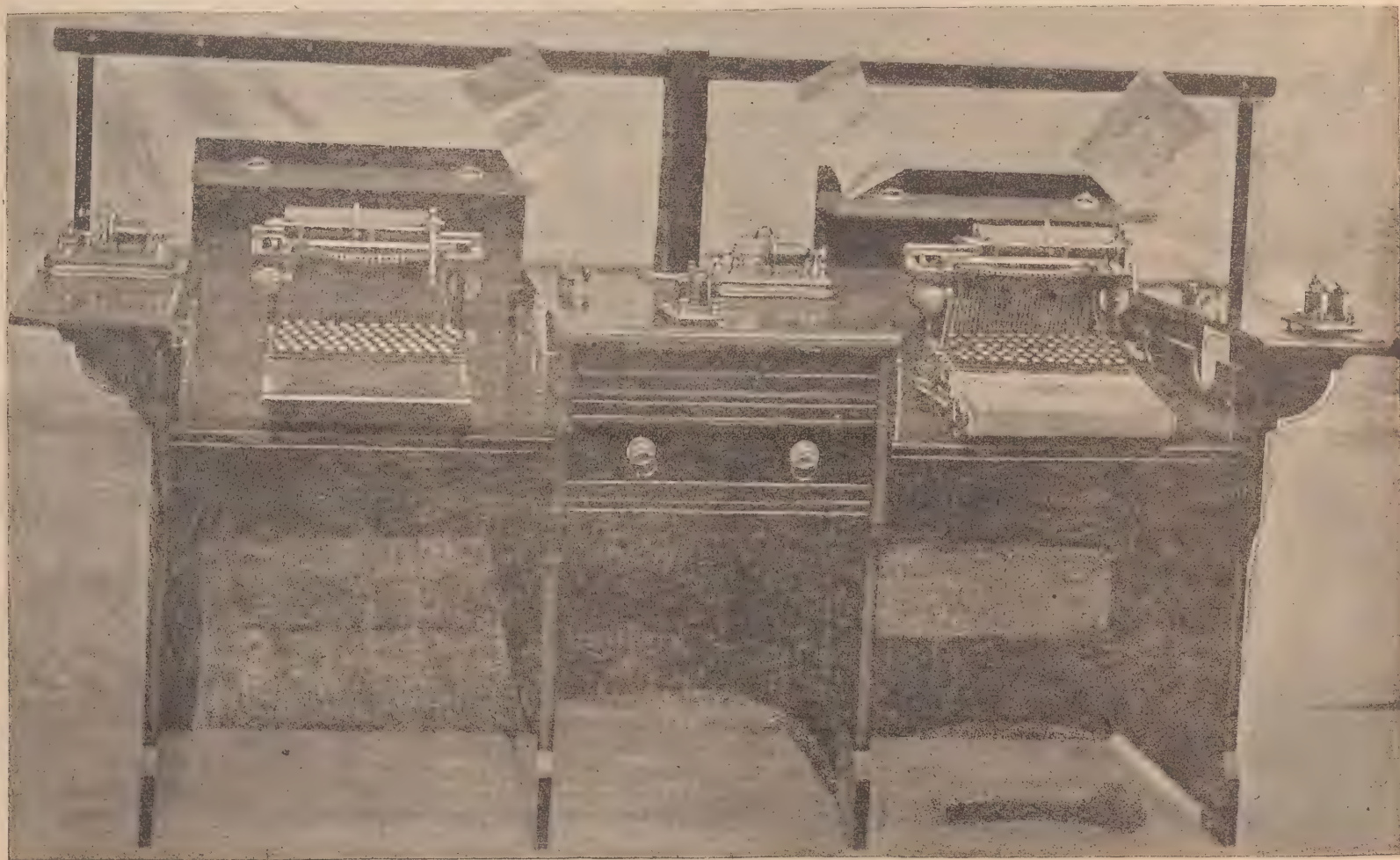


FIG. 1.—THE CALIGRAPH IN THE POSTAL OFFICE, SAN FRANCISCO.—DROP CABINET.

to properly attend to their correspondence these days were it not for the type-writing machine. The great demand for such machines in late years has been the mother of many inventions in this line. All such machines of course are not alike as respects their ability to perform efficient work. An efficient machine must possess several prominent qualities—it must be simple so that it will not easily get out of order and thus consume time; it must be durable, so that it will not wear out before a reasonable length of time; and it must be inexpensive. It has been the aim of inventors for many years to produce a machine that would meet every requirement demanded. Next to the mechanism of a watch, probably there is not another piece of machinery in use in any line of business that is subjected to so much strain and hard usage as a type-writing machine. Consequently it has also been necessary for inventors to produce a machine that would stand great wear and tear, and at the same time make it as light as possible to facilitate handling. The Caligraph is the only type-writing machine that has ever been gotten up that combines all of these essential qualities, and that it does possess

may be termed the essence of all good machines. Having all the experience of typewriter inventors, anterior to its own time to draw from it can readily be understood why the Caligraph should be superior to all other machines of its class.

Having so far spoken in a general way about this machine, we will now contemplate it in some specific applications. Four or five years ago the Associated Press introduced type-writing machines in all offices on its leased wires for the purpose of copying thereon directly from the receiving instruments all press despatches. At first the innovation did not meet with any great encouragement on the part of some of the operators, who evidently thought that it was in the direction of lowering salaries, etc., but it was not very long, as they became more familiar with the machine and knew it better, before expressions of satisfaction with the new idea were heard from those who at first looked upon it unkindly. Of course, before using the machine for transcribing despatches each man would practice on his typewriter during his spare moments, and as the work of familiarization went on it was not more

will take the New York office of the Associated Press to begin with. There is no harder work done in any newspaper press office than in this one. On account of the large number of papers to be served with the news, it is necessary to take thirty copies of each despatch. Before the introduction of the type-writing machines two receiving operators were necessary on one wire, each making fifteen or sixteen copies of manifold *by hand*. Complaints are frequently heard of operators in smaller offices experiencing difficulty in making 4 or 5 copies. But what would they do if required to make 15 copies? Taking fifteen copies of manifold by hand, at high rates of speed, and for hours continuously, was very severe work, and it was only a question of time when each man would break down. Something had to be done, and the type-writing machine solved the problem. As an indication of how the machine was appreciated by these operators after they had become familiar with it, the expression used in a letter written by one of them referring to machine work represents the sentiment of them all. In the letter he said: "After working for nine hours almost without interruption, and when I



am relieved at 6 o'clock, by the night man, I feel about as fresh as I did when I sat down at my desk at 9 A. M."

Within two or three months after the introduction of the machine all despatches on the Associated Press wires were copied thereon. It then became evident that a greater speed of transmission was possible. This led to the adoption of a code of abbreviations, by the use of which fifty words or more per minute are transmitted over the wires and copied *in full* on the type-writing machine. At this high rate of speed it is astonishing how easily each operator can transcribe the matter in full. Sixty words per minute on the machine is a moderate speed, and any operator can write at that rate with a moderate amount of practice. Aside from the labor-saving feature of the machine, it pays for itself in a year or less in the saving of paper. Besides this, one of the greatest and valuable points in favor of the machine is the legibility of the copy. It makes no difference

tion of these machines in other branches of the telegraph service.

In all large general telegraph offices caligraphs may be seen in plenty. In the New York main office very many of them are in use, and are giving the best of satisfaction. Profiting by experience of the New York office other offices naturally demand Caligraphs when ordering type-writing machines. This accounts for the fact that more Caligraphs are seen in telegraph offices than machines of other makes, and it is a very noticeable fact that when other machines are worn out or exchanged, Caligraphs take their place.

It is not an uncommon thing these days to meet with operators owning their own typewriters. It did not take them long to perceive the great advantage in copying messages in this manner, and many operators are now in the telegraph service who take messages right along on the machine without any trouble. There is no doubt that it is a question of a very short

chines used in all large offices of the Postal Telegraph Company. He deserves much credit for his enterprise in this matter and the business community will not be slow to appreciate his efforts to give satisfactory telegraph service. Nothing is so pleasing to a business man as to receive a telegram printed in type, as legible as print, and nothing is so exasperating as a telegram badly written. Time is money to him, and he appreciates anything that saves him time. Mr. Mackay had the interests of the business men at heart when he took this new departure. At the same time he practically elevates the tone and standard of the art of telegraphy and, as has already come to pass, typewriting operators will be employed in preference to those who are not. The use of a typewriting machine is very advantageous to operators in many ways, besides the saving of labor. It makes him take great pride in the manner in which he turns out his copy, the tendency being, of course, toward perfection,



FIG. 2.—SHOWING THE OPERATION OF THE DROP CABINET.

whether an operator is a poor penman or not—a poor penman can turn out as good copy on the machine as the finest Spencerian writer. It may be stated at this point that the first machines used by the Associated Press were not caligraphs, and were continually breaking down, owing to some inherent weak points in the machine. A better machine was looked for, and Caligraphs were finally substituted for the original machines. Notwithstanding the very heavy and severe work demanded of the machines in the large offices, the Caligraph has made the record of being by far the best machine in every respect. The weak points in the first machines are strong points in the Caligraph; the fact is there are no weak points in the latter. The result of this is that the machines are worked incessantly, month in and month out without any break down. No other machine can show such a record.

The success attending the use of Caligraphs on the Associated Press wires has given a remarkable and merited stimulus to the introduc-

tion of these machines in other branches of the telegraph service; indeed it is now frequently one of the first questions asked an applicant for a position, if he is a typewriter.

No better proof of the favor and encouragement that this new departure receives at the hands of telegraph managers can be given than the two illustrations presented herewith. Fig. 1 represents one of the desks in the San Francisco office of the Postal Telegraph-Cable Company. Caligraphs are seen all ready for the reception of despatches, and the sounders are placed on the desk at the side. The desks are of the "drop" pattern. Fig. 2 shows the manner of dropping the Caligraphs out of sight and covering them up by a desk top. This is a very valuable feature of the arrangement, and when it is desired to use the desk room for hand work the machine can be put out of the way in a moment. This elegant desk was fitted up on the order of President John W. Mackay, of the Postal Telegraph Company and of the Commercial (Mackay-Bennett) Cable Company. Mr. Mackay would like to have type-writing ma-

as regards spelling, punctuation, etc. The Caligraph is a great boon to operators, and he who does not fall into line now will ere long be left behind in the onward march of progress.

Referring to the use of the Caligraph in the San Francisco office, it may be stated that specimens of the work have been sent to the principal telegraph offices as proof of what can be done by the use of this machine. The "copy" is universally admired, and the perfect manner in which the work is done speaks more for the machine than words can.

There is a general feeling among telegraph managers that all despatches will be received on the typewriting machine directly from the wire in the early future, and the business community will hail with delight the day when telegrams are printed on the machine. The movement in this direction is a vigorous and persistent one, and it will not be very long before typewriting machines will be considered as much a part of the equipment of every commercial office as the telegraph instruments.



## THE FAST SENDING TOURNAMENT.

The circumstances of Mr. T. A. Edison's subscription to the prize fund are interesting and worthy of particular mention. Mr. Catlin addressed a letter to Mr. Edison in reference to the proposed tournament. In it he told Mr. Edison not to think that the letter was a hint for a subscription; that none was expected nor requested, but that a few words from him (Edison) for publication would be a great help to the enterprise. Mr. Catlin, in his letter, addressed Mr. Edison as "Friend Edison," and remarked that twenty-five years ago he would have addressed him as "Dear Tom." Circumstances, however, had dealt differently with them both; but the fact that they occupied different stations in life did not, he hoped, affect the old-time friendship that existed between them. In concluding his letter Mr. Catlin apologized for his familiarity.

Mr. Edison's generous nature asserted itself in the following characteristic reply, which was made as promptly as though it pertained to a transaction involving a million of dollars:

"FRIEND CATLIN:—I hope I haven't changed a particle. I would rather have the small pox than a swelled head. Put me down for twenty-five.  
Yours,  
T. A. EDISON."

From present indications a large delegation of telegraphers from distant points will be present as spectators, if not actual participants, in the contest.

Lady operators, upon application to Mr. Catlin after April 5th, on which date the printing will be ready, can obtain free admission tickets for the afternoon session of the Sending Tournament, at which time the Ladies' Trial will take place.

Mr. E. M. Barton, President of the Western Electric Co., of Chicago, writes:

"Yours of March 6th, proposing that I take a hand among the old-timers in the Sending Tournament, is received. I have worked with Mr. A. S. Brown too long to be willing now, at my present time of life, to enter into competition with him on sending Morse."

Mr. L. C. Weir, of Cincinnati, one of the old-time brilliant telegraphers, writes to Mr. Bunnell that he expects to be in New York, April the 10th, and witness the tournament.

The following is a complete list of the entries to date:

## CLASS "A."

John W. Roloson, New York, Postal Tel.-Cable Co.; W. Davis, New York, Postal Tel., 187 Broadway; James P. Bradt, New York, United Press; W. M. Gibson, New York, United Press; Frank J. Kihm, New York, United Press; W. L. Waugh, New York, United Press; Frank L. Catlin, New York, Henry Clews & Co.; George W. Simmonds, New York, Fifth Avenue Hotel; B. R. Pollock, Jr., Hartford, Ct., N. Y. and N. E. Railroad; H. S. Wright, Washington, D. C., United Press; H. Peters, New York, Postal Tel.-Cable Co., 187 Broadway; H. T. Paulhamus, Philadelphia, Postal Tel.-Cable Co.; Andrew J. Swan, Philadelphia, Western Union Tel. Co.; M. H. Toomey, New York, Stock Exchange.

## OLD TIMERS.

A. S. Ayers, New York, United Press; Charles H. Gogel, Annapolis, Md., Postal Tel.-Cable Co.; Geo. M. Eitemiller, Pittsburgh, Pa., Western Union Tel. Co.; John H. Dwight, New York, Western Union Tel. Co.; Fred. Catlin, New York, Western Union Tel. Co.

## CLASS "B."

W. L. Waugh, New York, United Press; Jas. P. Bradt, New York, United Press; J. G. McCloskey, New York, United Press; E. A. Sprong, New York, United Press; H. S. Wright, Washington, United Press; Frank L. Catlin, New York, Henry Clews & Co.; David Wark, New York, Western Union, 195 Broadway; C. G. Millard, New York, Western Union, 195 Broadway; M. H. Toomey, New York, Stock Ex-

change; O. Hart, New York, Charles Head & Co.; Frank English, New York, Charles Head & Co., Mills Building; W. Davis, New York, Postal, 187 Broadway; M. J. Doran, New York, Johnson & Boardman; W. A. Jones, National Transit Co., 26 Broadway; J. D. Hinnant, New York National Transit Co., 26 Broadway; F. F. Norton, Postal, 187 Broadway; C. W. White, Richmond, Va., Western Union Tel. Co., 1300 E. Main; H. T. Paulhamus, Philadelphia, Postal; Andrew J. Swan, Philadelphia, Western Union Tel. Co.; Robert C. Mecredy, Philadelphia, Western Union Tel. Co., Commercial Exchange; A. S. Patterson, Providence, R. I., Western Union Tel. Co.; Ed. Bishop, Pittsburgh, Pa., Western Union Tel. Co.; W. D. Chandler, New York, Associated Press; W. B. Upperman, New York, Associated Press.

## LADIES' CLASS.

Miss Belle M. Dennis, New York, 1227 Broadway; Miss E. R. Vanselow, New York, 195 Broadway; Miss Jennie Schlesinger, New York, 195 Broadway; Miss Tillie V. Froschel, New York, 195 Broadway; Miss Kittie B. Stephenson, New York, 195 Broadway; Miss Adele Erhelding, New York, 195 Broadway; Miss Millie Moss, New York, 195 Broadway; Miss Mamie Smith, New York, Caldwell & Bunker, Brokers, Wall street; Miss M. A. Daley, New York, 457 E. 10th street, Western Union; Miss L. Wagner, 8th avenue and 23d street, Western Union; Miss Annie M. Schaffer, New York, Postal, 187 Broadway; Miss Emma V. Garthwaite, New York, 195 Broadway; Miss Minnie White, New York, 821 6th avenue, Western Union; Miss S. C. Barry, New York, 821 6th avenue, Western Union; Miss Anna E. Findley, New York, Postal, 91 Wall street; Mrs. M. E. Randolph, 195 Broadway.

## RECEIVERS.

E. A. Sprong, New York, United Press; John Turnan, New York, Postal, 187 Broadway; A. J. Lafaye, New York, Western Union, 195 Broadway.

A meeting of contestants was held at the residence of Mr. Catlin on Saturday evening, March 22d, to draw for position. A heavy rain storm prevented a large number from being present, but the following were recorded: J. D. Hinnant, W. A. Jones, W. M. Gibson, J. P. Brady, W. L. Waugh, Frank English, C. G. Millard, H. Peters, David Wark, Frank L. Catlin, M. H. Toomey, F. J. Kihm, G. W. Simmonds, Fred Catlin and J. B. Taltavall, by invitation to report the meeting. Mr. Catlin stated that he would issue the following to contestants: Owing to the very large number of entries, it will be necessary to limit the trials to a five minute schedule in order to finish the contest before midnight. Contestants will be allowed two minutes for adjusting instruments. Every man should be ready to take his position at the key as soon as vacated by the preceding sender to prevent loss of time. The ladies' contest will begin at 1.30 P.M. sharp, to be followed by the old timers, and contestants in Class A who are also entered in Class B. Contestants in Class A should be on hand at 7.30 P.M., as it is probable the evening session will begin at that time.

The names of all the contestants in the different classes were then placed in a box and Master George Catlin drew one out at a time and handed the same to Mr. Taltavall, who made the announcement. The following is the official order of procedure:

LADIES' CLASS.—1, Millie Moss; 2, Mamie Smith; 3, T. V. Froschel; 4, Belle M. Dennis; 5, Kittie B. Stephenson; 6, Annie M. Shaffer; 7, Jennie Schlesinger; 8, Emma V. N. Garthwaite; 9, Mamie C. White; 10, L. Wagner; 11, Annie E. Findley; 12, Adele Erhelding; 13, M. A. Daley; 14, E. R. Vanselow; 15, S. C. Barry; 16, Mrs. M. E. Randolph.

OLD TIMERS.—1, J. H. Dwight; 2, Charles H. Gogel; 3, Fred. Catlin; 4, A. S. Ayres; 5, George M. Eitemiller.

CLASS A.—1, J. W. Roloson; 2, B. R. Pollock, Jr.; 3, Andrew J. Swan; 4, W. M. Gibson; 5, Frank L. Catlin; 6, H. Peters; 7, H. S. Wright; 8, H. D. Paulhamus; 9, W. L. Waugh; 10, F. J. Kihm; 11, J. P. Bradt; 12, W. Davis; 13, Geo. W. Simmonds; 14, M. H. Toomey.

CLASS B.—1, W. B. Upperman; 2, W. L. Waugh; 3, Ed. Bishop; 4, W. D. Chandler; 5, J. G. McCloskey; 6, A. J. Swan; 7, Frank English; 8, H. S. Wright; 9, D. Wark; 10, H. D. Paulhamus; 11, C. G. Millard; 12, M. J. Doran; 13, M. H. Toomey; 14, Frank L. Catlin; 15, Robert C. Mecredy; 16, W. A. Jones; 17, O. Hart; 18, J. P. Bradt; 19, C. W. White; 20, A. S. Patterson; 21, J. D. Hinnant; 22, F. F. Norton; 23, E. A. Sprong; 24, W. Davis.

After refreshments had been served, every one had an opportunity to display his ability as a sender, and some remarkable time and excellent Morse were exhibited. The matter sent in the previous tournament was used, and the speed averaged from forty-four to fifty words per minute. If this exhibition is any criterion, the contest will be a memorable one from the standpoint of speed and accuracy.

Mr. Catlin stated that since the entries closed he had received applications, and he undoubtedly would receive many others during the coming ten days. After a thorough discussion, the contestants unanimously decided not to reopen the entries.

Contestants who fail to respond to their calls for trial, forfeit all privileges in the class under trial.

Changes of position may be arranged between contestants, but notice of such changes must be sent to Mr. Catlin on or before the first of April.

The same matter that was used in the 1885 contest will be sent in the April 10 tournament.

The number of entries is far in excess of what was expected when allotment of prizes was made, and the management has decided to devote Mr. Andrew Carnegie's contribution of \$100 to third prizes in classes A, B, and ladies' class, and to add \$10 each to the prizes offered for clearest sending and best pen and ink copy.

## ALLOTMENT OF PRIZES.

|                | 1st Prize. | 2d Prize. | 3d Prize. |
|----------------|------------|-----------|-----------|
| Class A,       | \$100.00   | \$70.00   | \$30.00   |
| Class B,       | 85.00      | 65.00     | 30.00     |
| Ladies' Class, | 50.00      | 40.00     | 20.00     |
| Old Timers,    | 50.00      | 40.00     | —         |

Best pen and ink copy \$10, by A. B. Chandler, with \$10 added by the management—total \$20.

Best sending \$10, by A. B. Chandler, with \$10 added by the management—total \$20.

The following is from an old-timer, who was one of the brilliant operators of his time:

Editor ELECTRIC AGE:—The approaching contest of telegraphic speed will doubtless be confined to a new and later generation than that which crossed swords nearly twenty-five years ago. It is true that "he who fights and runs away, may live to fight another day," but frequently it happens that the skeddaddler doesn't want to do any more fighting, and that is the case with some of us old stagers, who may have drifted into slower, and may it not be hoped, more remunerative lines of business as the years roll by.

In 1868, after Mr. Snyder's record of 2,540 words of press news received in an hour was made, I copied 2,631 words of press report in an hour, received over a long and rickety circuit in the northwest. A copy of the manuscript with affidavit attached was sent to Prof. Morse, not to obtain a medal nor a laurel wreath, but as a matter of courtesy. He wrote his protege and friend, O. S. Wood, that this was the best one hour record of business matter transmitted that he had yet heard from, and that we had beaten Europe out of her boots, though that isn't the way he expressed it. I obtained and still have Morse's letter. These facts may be of interest at this time. Our sender, E. M. Shape, of Milwaukee, is such a modest fellow that I have to blow the horn for both of us. He it was, who, while putting on extra steam one



evening getting off accumulated business, was stopped by the girl up at Red Wing, who drawled out, "say! who is running this sewing machine anyway?" S. stopped a few minutes, whether to catch his breath or to step outside and see a man, in the emergency, I never knew, possibly both, and who could blame him?

We older material have, since leaving the business been outstripped in several directions. The use of the typewriter in receiving what is sent over the wires is one of the great improvements of late inventive years. Editors who formerly pored over the copy furnished them by the tired night man or his sub, which was generally worse, must feel as Thackeray did about children of the present day and their handsome books, as compared with the dismal pictures and literature doled out to children when he was a child. "Why," asked he dolefully, "should our children be so much better off than we old fellows were when we were young?" The telegraphers' life and labors have never been burdened with honors, and anything that makes his life easier and pleasanter, be it phonograph, typewriter, either of feminine or neuter gender, or extra pay for long service, or a pension when worn out in service, (which, by the way, ought some day to be brought about), is not begrudged him by old-timers, and for my part I shall watch the coming contests with the improved appliances and new blood with much interest.

EDWARD CURRY.

[Mr. Curry is now Treasurer of the Staten Island Rapid Transit Railway Company, New York.]

Mr. W. B. Upperman, of the Associated Press, states that the Associated Press system of coding enables very fast time to be made when typewriters are used, and any speed he or Mr. Chandler might make would indicate a speed so many per cent. greater when the code was used.

Since arranging the above the following letter came to hand:

FRED. CATLIN, Esq.—*My Dear Sir*: It having been decided by the judges in the forthcoming fast sending tournament that the decisions shall be on the basis of the fastest time made, provided the sending is readable, I have concluded to offer four supplemental prizes to the amount of \$100 00, and write to say that I will pay \$25.00 to the contestant, in each class, who is adjudged to have done the most finished and accurate sending in the quickest time. I thoroughly understand that it has been your aim to lower the record and that this is a fast telegraphing tournament and not one in which the most musical or most finished sender is to carry off the honors unless his time is also faster than that of others. But for these fast sending trials, which have occurred at intervals since 1867, there would be no phenomenal senders in the business now, and the purpose they serve is therefore admirable. At the same time the work of a Messonnier is as much entitled to recognition as that of his brother artist who paints on broader lines and on a more extended canvas, and I am persuaded that by putting a premium upon accuracy and rhythm in telegraphic manipulation, we may incidentally encourage the school of beautiful senders in a tournament for the benefit of that small class of gentlemen whose nerves of steel have enabled them to make time calling for an average of nineteen movements of the hand per second—an achievement which places the piano gymnastics of Thalberg, De Meyer, Von Bulow, Rubenstein, Essipoff and D'Albert, decidedly in the shade.

Fraternally yours,

WALTER P. PHILLIPS.

The New York *World* will contribute a beautiful and valuable medal to be awarded to the person who makes the best record in Class B, and who has never won a prize in previous contests. The *World* will also contribute a handsome diamond lace pin to the lady making the best record in the Ladies class.

WANTED.—Substitutes are desired in all telegraph offices in New York, Brooklyn, Jersey City and Hoboken, on April the 10th, to allow the regular force to attend the Fast Sending Tournament.

Fred. Catlin was born at Great Bend, Pa., March 26, 1848. He comes of revolutionary stock and the genealogy of the family dates back to 1000 Mr. Catlin learned to telegraph on the Erie railway and worked at various points along the road. He came to New York city a quarter of a century ago and for the past eighteen years has been with the Western Union—for twelve years a chief operator. He has acted as chief in all the divisions in the office.

Mr. Catlin had charge of the Sending Tournament of 1884 and 1885 and has taken a great interest in these matters.

The present undertaking involved an immense amount of labor in the preparations, interviews and correspondence, but up to this writing not one hitch has occurred or the slightest discouragement



MR. FRED. CATLIN.

been met with. His strict impartiality has won praise on every hand, and the manner in which he has planned and handled the entire affair in all its details shows that he possesses those natural qualities that are so essential in the successful management of a large undertaking.

As a rapid sender Mr. Catlin has great renown. He is well-known throughout the land, through the "Catlin Grip," which is accepted as the correct method of taking hold of a key so that the best results can be obtained with the least fatigue to the operator.

NEW YORK WESTERN UNION NOTES.—Almost the sole topic of conversation now carried on here is the fast sending tournament. Aspirants for the first honor are turning up daily. It is no unusual thing to witness in various parts of the room during a lull in the routine business of the day or night a number of men working with might and main to send a sufficient number of words in a given period to entitle them to enter the contest as a competitor for one of the many prizes to be awarded. Indeed in this respect the ladies are not to be overlooked. It is hoped their becoming modesty will not keep them from entering the field against some of the sterner sex. It is a fact long since established that were they to do so, in the coming contest the chagrin of some of the men would be so complete that the chances are about 8 to 1 they would ask for a transfer to some out of town office.

John B. Sabine, one of the most respected

Chiefs in the office has resigned his position for the purpose of devoting his entire time to his rapidly increasing law practice. It is gratifying to his many friends to know that he is doing so well. His successor has not yet been appointed.

"Yeoman Turner," for Iceman Turner is about the best thing your correspondent has seen in a Congressional report this season. The mistake occurred twice in less than 100 words of manuscript.

J. P. McNeill, J. Cahill and W. H. Richardson have been added to the 7:30 o'clock force. J. Mahoney, J. J. Murray and J. Stephenson have been assigned to pool rooms. On the night of March 5, 21,273 words were received at the office of the New York *World* by Messrs. McAllister, Booth, Frank Boyle and Swivel. The matter was started at 7:30 and was all in by 1 o'clock. Mr. Swivel did not come on until 9 o'clock. The same night between the hours of 9 and 2 W. H. Richardson transmitted from the same office 8,727 words to Philadelphia.

L. J. Howell, W. E. Giffin, E. Perkins, F. W. Barlow, J. W. Smith and L. Kirschbaum have been added to the day force.

H. W. Roberts, J. S. Wood, J. J. Carroll, W. T. Healey and H. W. Sauer have been appointed on the split trick.

John Filkins has accepted a place on the regular night force.

Recent addition to the Waiting List are: R. W. Perrin, J. H. Gibbons, Walker Christian, C. F. Leonard and John P. Moors. J. A. Henneberry, W. H. Young and Chas. E. Dennis.

One of the happiest looking young men in the office is Ed. Dean, of the C. N. D. Why? It's a boy.

BOSTON NOTES.—Though the dullness of the winter season is still upon us, additions to the extra list seem to be frequent, and more than enough talent is laying round to fill the vacancies which have lately occurred. The personnel of the split trick is almost entirely changed on account of the recent resignations, and a number of promotions and advancements are announced. Messrs. De Cossett, Gray, Bogue, Donovan, Daley, Whipple, Hackett, Hutchinson, Coughlin, Shannon and Tom McLean have had their hours and wires changed. Mr. T. W. Gough, of the Washington quad, will hereafter work the first New York nights, having changed places permanently with Mr. Roorbach. Mr. John Connors has taken advantage of an opportunity afforded, to go with a broker in Lynn, Mass; Mr. F. B. Gay relieves him on the St. John quad. Mr. G. B. Kirkpatrick has also cast his fortunes with a broker. Mr. Kirkpatrick's neat work on the typewriter, nights, will be missed. Messrs. Arthur Donovan and Tommy Clark are now with the Postal. Mr. J. H. Miller, of the Bangor wire, nights, has resigned to accept a position with a broker out of town. Mr. Harry Flynn, lately with the Postal, is now on the W. U. extra list, as also are Messrs. E. W. Giblin and Fred. Corliss. Mr. T. J. Clifford is still on the sick list though he is said to be improving.

The receiving portion of the New York fast sending tournament adds a new and important phase to that event. In the opinion of a well-known W. U. Chief, that receiving contests are unheard of on account of their impracticability is to be regretted. It is earnestly hoped that the New York experiment will be successful, and that the entries will be numerous. But how about our Boston delegates to participate in this great event which is evoking such widespread interest all over the country? At the W. U. office alone, there are several gentlemen who are capable not only of entering a sending or receiving contest, but of managing one as well. The fraternity of Boston should not let this opportune season go by without making some effort to perpetuate records made in the past.



PRACTICAL FORMULAE FOR BATTERIES  
USED IN INCANDESCENT LIGHTING.

Let  $i'$  be the intensity of current required in each lamp to keep it white hot; let  $e'$  be the difference of potential and  $r'$  the resistance between the binding screws of each lamp, while in use. The resistance, when hot may be roughly considered as one-half that found when cold. If we have  $n'$  lamps connected in multiple arc, the current necessary to supply them will be:

$$I = n' i' \quad (1)$$

Let  $n$  be the number of elements of battery or accumulator required, each having an electro-motive force  $e$ , and an internal resistance  $r$ ; the greatest possible intensity of current to be obtained from each will be, from Ohm's law,

$$i = \frac{e}{r} \quad (2)$$

that is, when short circuited, but no useful work is done. The maximum of useful work is obtained when the external resistance is equal to the internal, or when

$$i = \frac{e}{2r} \quad (3)$$

In practice, however, it is found more economical to make the external resistance four or five times that of the battery, to decrease the effects of polarization, and increase the efficiency, or proportion between the useful work and the energy expended. The practical value of  $i$  must therefore be determined by the nature of the element, its size, the length of time it is required to work, etc.

As each element or series of elements should only be traversed by a current  $i q$ , the number of series should be such, that

$$q i = I \quad (4)$$

$$\text{from which } q = \frac{I}{i} \quad (5)$$

If  $t$  be the number of elements in each series, the value of  $I$ , according to Ohm's law, is

$$I = \frac{t e}{\frac{t r}{q} + r' + n'} \quad (6)$$

$$\text{from which } t = \frac{q e'}{q e - r I} \quad (7)$$

If the resistance  $R$  of the connecting wires is large enough to be taken into account and all the lamps are in one group, formula (6) becomes

$$I = n' i' = \frac{t e}{\frac{t r}{q} + r' + R} \quad (8)$$

The value of  $q$  is the same, but  $t$  becomes larger. When the lamps are in groups, the formula is a little more complicated.

For example, let there be 50 lamps, whose constants are  $i' = 1.5$  ampères,  $e' = 48$  volts  $r' = 32$  ohms. How many Faure accumulators will be required to supply them? The constants of each element are, for a current  $i$  of 16 ampères,  $r = .01$  ohm,  $e = 2$  volts. The resistance of the connecting wires is supposed to be zero.

From (1),  $I = n' i' = 50 \times 1.5 = 75$  ampères.

From (5),  $q = \frac{I}{i} = \frac{75}{16} = 4.68$ ; as  $q$  must be a whole number,  $q = 5$ .

From (7),  $t = \frac{q e'}{q e - r I} = \frac{5 \times 48}{(5 \times 2) - (.01 \times 75)} = 25.8$ ;  $t = 26$ .

Therefore, 5 series of 26 elements each, or a battery of 130 elements, will be required.

We have given  $i$  a value of 15 ampères only, in order that the polarization may not bring the electro-motive force below 2 volts. Let us suppose that the cells can be worked to their full capacity, that is, make

$$i = \frac{e}{2r} = \frac{2}{2 \times .01} = 100 \text{ ampères.}$$

As the lamps require only 75,  $q = 1$ , and becomes

$$\frac{q e'}{q e - r I} = \frac{1 \times 48}{2 - (.01 \times 75)} = 38.4$$

39 elements arranged in 1 series will suffice.

A voltaic cell or accumulator may be regarded as a reservoir containing a certain quantity of electricity, but the amount available for useful work is much less than this. If we represent by  $Q$  (expressed in coulombs), the quantity thus available, the number of seconds  $S$ , during which normal working will continue, will be

$$S = \frac{Q}{i} \quad (9)$$

since a current of  $i$  ampères equals  $i$  coulombs per second. It has been found that a Faure accumulator weighing 10 lbs. will furnish 500,000 coulombs. Applying formula (9) to the first solution of the example, where  $i = 15$

$$S = \frac{Q}{i} = \frac{500,000}{15} = 33,330 \text{ seconds} = 9 \text{ hours } 15 \text{ minutes.}$$

In the second solution, provided each accumulator could furnish 500,000 coulombs before  $e$  falls below 2 volts.

$$S = \frac{500,000}{75} = 6,660 \text{ seconds} = 1 \text{ hour } 51 \text{ minutes.}$$

A comparison of the length of normal work in each case with the number of accumulators, shows a decided advantage in favor of the smaller value of  $i$ , although the total energy given out by each cell is the same in both cases. The resistance of the 50 lamps is .64 ohm; of the 130 cells, .05 ohm; of the 39 cells, .39 ohm. In the first case work has to be done against .69 ohm resistance; in the second, against 1.03 ohms. Therefore, to give the current a strength of 75 ampères, an electro-motive force of 52 volts will suffice for the smaller resistance, while 78 volts are necessary for the larger.

**IMPROVED STORAGE BATTERY.**—It is said an improved storage battery has been invented by Professor Main that seems to have been remarkably successful. It consists of zinc plates, horizontal and riveted to copper support plates, and of lead plates perforated so as to present a large surface area, prepared by the Plante process. The power of this battery per pound of lead used, expressed in ampère power is 7.42 against 3.62, 4.10 and 1.77 for three styles of batteries of the Faure type. The battery will bear rough usage. It has not yet been placed upon the market.

**A NEW TELEGRAPH SYSTEM.**—A new multiplex system of telegraphy was tested a few evenings ago between this city and Philadelphia over a Western Union wire, and proved a success. Eight circuits were maintained over a single wire, each acting independent of all the others, and when breaking was done no other circuit was disturbed. The test took place before General Eckert and other well-known telegraph officials, all of whom expressed the belief that a useful and economical system had been discovered. It is said to be something entirely different from the synchronous system.

**BUSINESS NOTICE.**—Messrs. Flack & Son, electrical engineers, of Buffalo, N. Y., after a seven weeks' test of the James H. Mason Primary Battery, have taken the sole agency for these goods in that city. These gentlemen are well-known electricians and know a good thing when they see it.

**THE SPRAGUE OVERHEAD SYSTEM.**—After an unsuccessful experience with the Bentley-Knight underground system in Allegheny City, Pa., the conduit has been abandoned, and the Sprague Electric Railway & Motor Co's overhead system has been adopted in its place.

**THE ELECTRIC LIGHT IN SACCARRAPPA.**—Saccarrappa is not a very euphonious name for a town, but that town, in Maine, is going to have its streets lighted by electricity just the same.

**MR. A. R. FOOTE ON SOCIALISM.**—In a communication to a Baltimore daily paper, Mr. Allen R. Foote very severely criticizes the statements made by Professor Ely, of Johns Hopkins University, Baltimore, in a recent lecture in Buffalo. The lecture was on "Socialism and Political Economy," and Mr. Foote very ably proves the fallacy of Prof. Ely's theories.

Prof. Ely, in his lecture, made the statement that Dunkirk, N. Y. was the best electrically lighted city in the country, as far as he had seen, and the lights cost only ten cents per lamp, while Buffalo was paying forty cents. This low price was due, according to the Professor's theory, to the fact that Dunkirk owned its own plant. The object of this argument was to show the advantages of having everything, including electric lighting, dominated by public spirit. This was the essence of socialism. Mr. Foote, however, upsets this argument by throwing some light on the subject from the opposite standpoint. He told the story of a thrifty housewife, who entertained a company of ladies. A cake she had served, was much praised for its excellence, and, finally, one of the guests asked the hostess how much the cake cost. "Ten cents," replied the hostess. All present expressed surprise at the small cost. Finally, the lady explained that she bought a bottle of flavoring extract for ten cents, and the other things she had in the house. "It is so with Dunkirk," continued Mr. Foote. "The city has some things in the house, or buys them, and covers the expense in other accounts; then it buys carbons or lamp globes, and charges them to lighting account. The small expense of the lighting thus shown is the flavoring of the accounts exhibited, to make the plant popular and cause the people to demand plenty of lamps because they are cheap."

Mr. Foote concluded by referring to the Professor as one of the dreamers of the world who cannot do enough good to counterbalance the harm they do by their misleading theories. The good done in this world, said he, is accomplished by practical men, who know the value of ideas, and at the same time recognize the laws of common sense and veracity.

**BANK ROBBER NICELY CAUGHT.**—Through the coolness and prompt action of a telegraph operator, under most trying circumstances, a bank robber was captured in Meriden, Kansas, on March 1st, and the robber in resisting arrest later was shot dead by the officers. Telegraph operator Taylor, at the railway station at Meriden, had just finished receiving a message to the sheriff describing the bank robber and requesting him (the sheriff) to look out, when his attention was attracted by a stranger at the ticket window. Taylor nearly lost his breath when he saw standing before him the man described in the dispatch. He did not reveal the fact of the recognition, however. The stranger inquired the time of the next train for Atchison, and asked where he could put up for the night. The operator directed him to a hotel, where the man took a room without registering, requesting that he be called at five o'clock in the morning, in time for the Atchison train. Officers were summoned and went to the hotel where the robber was aroused. In coming down stairs he was confronted by the officers and showed fight. The officers, however, were compelled to shoot, and the robber fell dead. Had it not been for the prompt action of operator Taylor, the robber would likely have escaped.

**A NEW TELEGRAPH COMPANY.**—The Inter-Ocean Telegraph Company has received a charter from Judge Norton, at Alexandria, Va. The capital is \$100,000, and the officers are D. H. Bates, of New York; H. W. Garnett, Robt. Andrews and J. F. Hood, of Washington, and W. H. Smith, of Virginia.

**ELECTRIC LIGHTS IN HORSE CARS.**—The Berlin horse car companies have decided to illuminate their cars by electricity.



## COMBINATION SPRAGUE STATIONARY MOTOR AND FAN.

With the approach of summer the question of the best method of ventilating naturally suggests itself, and for that purpose the use of electricity as an agent for transmitting power from a central station to the point of use, holds an unrivalled position.

On this page we show a new combination of electric motor and fan which has recently been brought out by the Sprague Electric Railway and Motor Company, and which promises to meet a widespread demand for a simple and reliable fan, which can be operated directly from a constant potential circuit. As shown in the view, the motor and fan are both on the same stand, the motor being belted directly to the fan. The motor, on account of its winding, can be set in operation by the simple movement of a switch, and stopped as easily; there is no necessity of using a rheostat in connection with the motor.

When all the advantages of electric power are taken into consideration, the absence of fire,

## ANSWERS TO INQUIRIES.

"A Beginner," Wenham, Mass.—The article you refer to is quite correct, and its object is to correct the misapprehensions that you and very many others labor under. If you will read carefully you will see that the author says: *A current is rated by ampères, not by volts.* A wire carries current at the rate of so many ampères; a current cannot be measured or designated by volts." A volt is the unit of measurement of difference of potential, and does not express any attribute of the current. The article does not say the ampère is the measure of intensity. The volt is the measure of intensity. The ampère is the measure of the current. The power to overcome resistance is measured by volts.

The second question cannot be answered unless the size of the battery is known.—Ed. ELECTRIC AGE.

In answer to an inquiry from a correspondent at St. Williams, Ont., as to whether anything has been invented to take the place of a transmitting key, we would say that several methods

duction coil used in connection with the transmitter of the telephone, and the resistance of the wire used on the earphone?

Milwaukee.

S. W. G.

Answer.—The resistance of the primary coil is about two-tenths or three-tenths of an ohm; of the secondary coil the average is about 150 ohms, and of the earphone about 75 ohms.—Ed. ELECTRIC AGE.

Editor of the ELECTRIC AGE.—What is basis of the unit of illuminating power of electric lights. This power is measured by so many candles. What kind of candles does that mean?

Houston, Texas.

J. W. H.

Answer.—The term candle-power is very indefinite. One candle may have greater or less illuminating power than another. The material used in the candle affects the light given out. Thus, tallow, sperm, paraffine, etc., have unequal illuminating power as compared with each other. In practice, only an approximate idea can be had of the value of a candle-power light. There is, however, a standard unit of candle-power, which is the light given by a sperm candle consuming approximately one hundred and twenty grains of spermaceti per hour. This is the American and English standard. The French standard is the "carcel" lamp, which consumes six hundred and forty grains per hour, while in Germany, another standard is adopted. None of the standard units are absolute, and, as will be seen, are not based on anything very definite. Many suggestions have been made in the direction of a uniform and practical standard, but nothing tangible has yet been evolved.

ENGINES FOR ELECTRIC LIGHTING.—Engine and boiler makers say there is a sharp demand for all descriptions of steam-plants just now, especially the types favored by the electrical lighting and motor people. Indeed the outlook for this manufacture is most encouraging, the only thing to be dreaded, the appearance of that class of new manufacturers that may be attracted to enter the field because of its favoring conditions. Engine and boiler building, however, is quite different from most other trades. Steam users rarely purchase plants because they are cheap. They must be of a reliable and favorably known manufacture. The really far-sighted steam-user will pay more for a good type of engine and boiler, because its maker's name is at stake and hence it is to his interest to see that it is properly constructed.

FOG AND ATMOSPHERIC ELECTRICITY.—In a letter to *Industries*, Mr. W. H. Daniels asks the question which, he says, has been mooted in maritime circles, whether fog does or does not affect the mariner's compass. His own opinion is that it does for the following, to him, conclusive reasons: "Magnetism is a form of electricity and so is lightning; lightning is in the clouds, and a fog is a cloud. Moreover, in the normal course of things, a cloud should rise in the air, whereas a fog descends." The late Captain Saxby used to mention that on one occasion a convoy of thirty sail found themselves steering a wrong course through fog.

ELECTRIC POWER.—A general inclination is being evinced by electric lighting companies to provide power as well as light to their customers. This requires a modification as well as an extension of plant but, if properly managed, is pretty sure to prove profitable. The customers of such a plant are, for the most part, small power users, some used to getting their power by auxiliary belting from an adjoining mill or workshop, while others have operated a small steam plant of their own.

ITS NAME IS ITS BUSINESS.—The Electrica. Reminder Company is the name of a concern recently incorporated in Chicago to sell electrical goods and supplies.



COMBINATION SPRAGUE STATIONARY MOTOR AND FAN.

smoke, ashes, engineer or expert attention, it is not surprising that so many electric motors have been adopted for the general distribution of power, and each new application, like the one illustrated, tends to popularize the use of electric power.

ELECTRICITY ON BELGIAN RAILWAYS.—Tenders were recently invited by the Belgian Minister of railways, posts, and telegraphs, for the erection of an electric light installation at the Namur railway stations. The regulations contained in the specification were very stringent, and, as yet, the contract has not been decided.

TELEPHONIC COMMUNICATION WITH SHIPS AT ANCHOR.—The Havre Chamber of Commerce is about to carry out some experiments with a view of testing the feasibility of a system of telephonic communication between ships at anchor in the Roads and the local Exchange.

WANTS ELECTRICITY FOR EVERYTHING.—Kenton, Ohio, is going to have its streets lighted by electricity, and wants an electric street car line.

have been devised for transmitting automatically. An automatic system of transmitting usually includes a slip of paper on which is punched or embossed the matter to be transmitted, and the slips thus prepared are passed through the transmitting instrument. This method renders it possible to increase or decrease the speed at will to any limit. An instrument of this class is used in the Wheatstone system. Siemens Bros., of London, manufacture an instrument, which in appearance resembles a typewriter. By manipulating the keys certain mechanism is operated which performs the functions of an ordinary transmitting key. This instrument, while it transmits automatically, obviates the use of prepared slips by transmitting directly. It is fully described in Prescott's book on the Electric Telegraph. Instruments of this class are necessarily expensive on account of their intricate mechanism. There is nothing that we know of besides these two types of instruments that are of any practical value.—Ed. ELECTRIC AGE.

Editor ELECTRIC AGE.—What is the resistance of the primary and secondary coils of the in-



## PRIZE STORY.

No. 11.

## A TELEGRAPH GIRL.

Entering the dingy little telegraph office, Maurice Randall was surprised to find it occupied by a vision of youth and beauty, a slight, graceful girl with fair complexion, pink tinted cheeks, and pale golden hair, worn banged in front, and confined at the back in a large shining coil; one little foot peeped out beneath her dark blue dress; there was a decided pucker on the smooth white forehead, while her delicate hands twisted a refractory screw; turning her head when she saw the shadow across the floor he saw a pair of the loveliest pansy-blue eyes he had ever beheld.

"Perhaps I can assist you," he said, coming forward, hat in hand; and his strong brown hand soon loosened the screw.

"O, thank you! you see I wanted to take this piece of tin out, the instrument is loud enough without it, and the noise gives me the headache. The former operator must have been deaf if he could not hear Noah without that tin!"

"Noah?" asked Maurice, with an amused smile.

"That's what we call this relay, its so very large; Mr. Jones, the night operator, says he always believed Morse to be the inventor of the telegraph until he saw this instrument. It must have been in existence ages before Morse, and so we christened it Noah's ark!"

"Well, it is rather ancient-looking, these spools resemble miniature steam boilers."

"I don't suppose they were ever used for that purpose. Steam wasn't invented in those days, was it?" and they both laugh and chat, until the young man is reminded by the telegram in his hand of his purpose in coming there, and that he is needed at his office.

Tom Jones, the black-eyed, merry fellow who "ran" the office nights, made his appearance fully five minutes before 7.30 o'clock, a fact that would have surprised Kitty's predecessor, but it would not do to keep her in the office over time, thought good-natured Tom.

Looking through the messages which had been sent that day he remarked, "Randall was in to-day, I see."

"Randall! who's he?"

"Brought the telegram from the Acme Iron Co., a big fellow with a brown moustache."

"Yes, his name is Randall?"

"Maurice Randall, he used to be a clerk in the Acme office, but he made quite a sum by a lucky speculation, and has since entered the firm; not a bit stuck up, either, he's a tip-top fellow."

"He is married, of course?"

"Why of course?"

"Because all the tip-top men are either dead or married," said Kitty, her bright eyes gleaming mischievously.

"Miss Wallace, how can you be so cruel!" cried Tom in mock reproach, and then, "You see Randall and I are shining examples of the untruth of that remark."

And Miss Kitty, going homeward, acknowledged to herself that she was just a little bit pleased to know that the courteous, handsome man, whose gray eyes looked so kindly into hers, was not married.

After that afternoon time flew on golden wings in the little office, especially that portion of time when Mr. Randall came in with his telegrams; he came quite often, indeed, and generally carried a bouquet or a box of sweets to the little operator, and lingered near her as long as possible.

But one day a certain young lady, Miss Millie Benson, who had suddenly become quite interested in Kitty made the latter a friendly call, and contrived to turn the conversation to Mr. Randall.

"Isn't it strange he don't like blondes at all, he is dark himself, too, and says fair haired

women are deceitful; I suppose its because Susie Banks is so very *brune*," she said, lightly, her sharp eyes noting poor Kitty's embarrassment.

"Indeed! is he engaged to Miss Banks?"

"Didn't you know it? Well, I'll have to go; you look dreadfully worn, dear, I'm afraid you work too hard. Bye, bye," and, with a very friendly kiss Miss Benson is gone.

When Maurice that afternoon invited Kitty for a drive by the River road, she, in her efforts to appear very cool, declined rather ungraciously, and he left her feeling very much hurt, and Noah must have supposed there was another flood when two bright tears fell upon him, while the young girl was sending some messages.

The day following, and for several days, the Acme telegrams were brought by a small boy, but before long Maurice, who longed for a glimpse of the "little sunbeam," as he called her to himself, ventured on going himself, only to find that, though she was as pretty and bright as possible, there was a certain air of restraint in her manner toward himself. Pondering on this on his way back he determined to ask her the cause when next they met.

Kitty's friend came in shortly after the departure of Maurice and soon became confidential.

"I met Mr. Randall just now, don't you think he is handsome?"

"Yes, very," returned Kitty.

"But then he has such queer ideas; he looks down on a girl who works for her living; I detest that kind of a man, don't you?"

"Yes, indeed," said Kitty, fervently, "but I did not think Mr. Randall was that kind of a person."

"But he is; thinks he is condescending when he speaks to a poor person," and when Millie leaves, Kitty wishes she would not be so very frank. "But it's only her way though it does leave a sting," thought unconscious Kate.

Millie soon found an opportunity to talk to Maurice.

"What have you been doing to my friend, Miss Wallace?" she asked, with a gay laugh.

He is surprised.

"Why do you ask?"

"She says she perfectly detests you," still laughingly.

"That is rather strong language. Did she give a reason?" he asks.

"No; I suppose it's because you are such a contrast to Mr. Thomas Jones; it's too bad Tom has to work nights; he gets no chance to take his lady love around," and Millie chats on in her gay, hearty manner.

Maurice went no more to the little office. "A flirt" was what he called poor Kitty now. "Who would have thought so from her pretty, truthful-seeming eyes!"

A month passed by and they had met but once, when she had gone by him as he stood in the vestibule of the little church talking to dark-eyed Susie Banks, the banker's daughter. She gave him a simple little nod and his wistful eyes followed her graceful form as she glided up the aisle, a picture of girlish innocence in her plain white robes.

Soon after Kitty learned from her friend, Miss Millie, that he had decided to leave Riverton, and open a branch of the Acme works in a neighboring city.

"I suppose he will soon come back for his bride. I never could understand what he saw in Susie Banks, but then her father is rich you know," concluded Millie with a wise nod.

At noon, a few days later, Kitty, who was late in leaving the office, found a large train of cars attached to a shifting engine, coming down the track over which she had to cross.

"Dear me, the horrid thing will detain me a half hour, and I must get back to work on time to-day," she thought, in vexation; the train was coming nearer but Kitty was not timid, she was in very much of a hurry, and a moment later she was running across the ties. Her foot

slipped on a cinder and she fell to the ground. She attempted to rise, but a noise as of thunder was in her ears, the steaming, hissing iron monster was almost upon her; it paralyzed her senses. "Great heaven! save me!" she murmured hoarsely, and then, her last thought being a horrible wonder as to how much the awful engine weighed, she became unconscious.

When she opened her eyes she found herself in Maurice Randall's arms. He was kissing her forehead, her eyes, her lips. "My darling, my little sunbeam," he murmured.

"Maurice, dear, dear Maurice," she sighed, and eyes of gray and those of blue met in a long glance of mutual love.

Fortunately, the little scene had no observers, the place being a very deserted one, and hid from the men on the train by a high fence; and, when the train had been stopped, and the men hurried up to congratulate Kitty on her narrow escape, and compliment Maurice on his gallant act, one in which he had risked his life, they found a very different scene.

Kitty trembled so much that, of course, Maurice accompanied her to her boarding-house, and they came to a clear understanding.

"And to think, dear, that for one horrible moment it came into my mind that I was saving you for Tom Jones, but, thank God, I did not hesitate."

"Tom is as good as engaged to a lady operator in Vineburg; and Susie Banks?"

"Is nothing to me but an acquaintance. I wonder how you could have heard such an absurd rumor!"

"And you don't look down on us working women?"

"What a cad you must have thought me! I respect them as I do the memory of my mother, who worked for me until I was able to support her. She died a year ago."

His voice took a softer tone, and then Kitty told him of her mother who lived in the city with her two little ones and supported herself by sewing, assisted by what Kitty could spare from her wages.

Soon a quiet wedding took place at Kitty's home, and Millie Benson was *chagrined* to find that all her efforts to part Kitty and the man she had schemed to win for herself, were fruitless.

Tom Jones sent the happy pair his best wishes, saying that he had decorated "Noah" with flowers in honor of their wedding day.

UNITED PRESS NOTES.—Mr. C. R. Mounce, of the United Press, Louisville, Ky., has resigned on account of ill health. The place has been filled by Mr. W. W. Adkins, from St. Paul, Minn. The St. Paul position has been filled by Mr. F. A. Olds. Mr. Carl P. Swain has accepted a position at Logansport, Ind., and H. S. Smith, at Detroit, Mich.

SILENT COMMUNICATIONS.—Telegraphers have ways of communicating to each other unknown to common folks. Said one of them, a bright young woman: "If I am sitting next to an associate in an audience-room I never speak. I simply tap out my message on the hand of my friend." Playwrights might work this idea into a melodrama.

Mr. R. B. Gemmell, Superintendent of Telegraph of the A. T. & S. F., and C. W. Hammond, of the Missouri Pacific are taking quite an interest in the T. M. B. Association. They have sent out 1,500 circulars each along their lines, the effect of which has caused quite a boom in the membership.

A few days since thirty-four words per minute for deep sea cable work was recorded by the Western Union Cables. This is considered very fast cable work.

Edward Blakeney, at one time chief operator at 195 Broadway, late of Leadville, Colo., has gone to San Francisco.

Mr. J. Masterson of the *Herald* bureau, expects to leave the city shortly.



THREE NEW TYPE-WRITERS.

Mr. W. J. Barron, the inventor of the automatic paper-adjusting type-writer carriage, mention of which was recently made in these columns, has invented three new type-writers, which are now being manufactured and will soon be ready for the market. Dr. Emmet Densmore and Mr. Amos Densmore, of this city, who, with Mr. Barron, were former owners of patents under which the Remington type-writer and the Caligraph are manufactured, are associated with him in bringing out two of his machines, one of which "parallels" the Caligraph, and the other the Remington. The type-bars in these new machines are ingeniously constructed so as to prevent the letters from getting out of line. The large experience of these gentlemen in the type-writer business eminently qualifies them to avoid the defects common to machines in the past, and they are fully alive to the requirements necessary to overcome them. The Caligraph style of machine, which requires but one type on each type-bar, will be presented to the public under the name of "The Barron Type Writer," and the Remington style, which requires two type on each bar, will be known as "The Densmore Type-Writer." The Barron type-writer will be fitted with the paper adjusting carriage, for the use of operators in receiving short despatches.

Mr. Barron's third machine is something unique in the way of type-writers. It weighs but six pounds, and there is not a delicate piece of mechanism in it. After short practice anyone can write on an average twenty-five words a minute, and the machine is capable of a speed of sixty words a minute. The writing is in plain view of the operator at all times, and there is a scale and pointer which enables one to make interlineations and corrections without mental calculation or loss of time. No ribbon is used; each type being inked singly before it is printed, thus giving a uniform appearance to a page of manuscript. The ink can be changed from one color to another, or from record ink to copying ink in 5 seconds. The alignment of the letters is perfect and permanent. The machine will manifold better than any type-writer now before the public. It prints seventy-eight characters, and can instantly be adjusted to write all capital letters, which makes it practical for receiving messages direct from the sounder. The carriage can be moved in either direction at any time without the use of a release-key.

Mr. Barron has attached his paper adjusting carriage, holding from 1 to 500 telegraph blanks, to this machine, which will enable any telegraph operator, after short practice, to take down commercial dispatches direct from the wire. It will be known as "The Universal Type-Writer," and will be sold for \$25. The Universal is now being made by the Pope Manufacturing Company, of Boston, and will soon be ready for the market.

**MURDERED.**—Arthur Henry, the telegraph operator at Hartsburg, on the Nickel Plate Road, was murdered March 18th. The office is in a store, and Henry slept there. A burglar gained an entrance to the store; and, on Henry's refusal to open the safe, he shot him.

The Postal Company is denied the use of the telephone at Wilmington, Del., and has asked for a mandamus on the Telephone Company to show cause why its application should not be acted upon favorably.

**MISSING.**—Since February 20th, John McArdle, late assistant night chief, W. U., Detroit, Mich. Any information concerning him, address A. McArdle, 72 Wight street, Detroit, Mich.

Miserly says if the telegraph companies charge their wires as they do their customers he doesn't wonder that it gives a man a shock to touch one.

**DETROIT POSTAL NOTES.**—On account of the rapidly increasing business this company has been obliged to move its operating-room into more spacious quarters. We now have fifteen wires, giving Detroit direct connections with all the principal cities. Mr. George Farnsworth, general manager of the Michigan Telegraph Postal Co., and manager of the Postal Telegraph-Cable Co.'s office here, is Michigan's oldest telegrapher. He has kept pace with the times, and, it is needless to say, the Postal company's interests are well looked after by him. The Postal's Detroit staff is as follows: Wm. C. Black, chief operator; John Z. Hayes, assistant chief; H. W. Beach, night manager. Operators: Mollie F. Corbett, Anna A. M. McGee, Mrs. H. H. Hall, Frank C. Schanz, F. W. Buchanan, B. L. Lafferty, C. T. Duffie, W. R. Newkirk, E. P. Hern, A. Crittenden, W. J. Errengy and H. H. Hall. The Michigan Postal Co., represented at Bay City, Mich., by R. Y. Cadmus, manager, A. W. Samis, operator; at East Saginaw, Mich., by W. J. Bodman, manager, J. F. Cooper, Bert Globensky; at Mount Morris, Mich., J. H. Hughes, manager; at Flint, Mich., Lottie F. Bruce; at Pontiac, Mich., Leah Botsford; at Muskegon, Mich., W. D. Thorne, manager, Daniel Keller; at Spring Lake, Mich., P. A. Dewitt; at Grand Rapids, Mich., S. S. Palmer, manager, Frank Gould; at Portland, Mich., May Bon; at Eagle, Mich., W. Partlow; at Lansing, Mich., Maud Ellis; at Jackson, Mich., H. W. Kennedy, manager, Ed. Tyrrell; at Ann Arbor, Mich., C. L. Hoffman; at Ypsilanti, Alice Shire; at Port Huron, D. J. Stephenson, Lem. Shortridge; at Mt. Clemens, Mich., Geo. Shotwell—all of whom are genuine hustlers, ever alert to get business and handle it promptly, thus making the Michigan Postal the best "feeder" the Postal Telegraph-Cable Co. has and the most popular telegraph company in the State of Michigan.

The Second Annual Ball of the Forest City Division, Order of Railway Telegraphers, will take place April 7th, at Cleveland, Ohio. Division No. 62 is a very successful one, and no doubt an enjoyable time will be had. Direct telegraphic communication will be had with the hall over diverging roads. The tickets of admission are printed on celluloid and are unique in appearance.

**DIED.**—C. F. Ester, died of apoplexy at Newark, N. J., February 3. He was an old time telegrapher, having for many years been Secretary of the I. O. Tel. Co. Of late years he has held political positions in New Jersey.

**T. M. B. ASSOCIATION.**—The heavy mortality which has affected all the insurance associations has not been sparing with this one, but the officers hope to pull through the year without an extra assessment.

**TRANSFERS.**—E. C. Lyon, Dallas to El Paso, for W. U.; Walter Moore, San Antonio to Deming, N. M.; Geo. Barnes, El Paso to San Antonio; J. D. Johnson, Sanderson, Tex., to San Antonio; W. H. Vaughn, Houston to Laredo, Texas.

Mr. H. W. Orr, of the Associated Press, Pittsburgh, was in town a few days ago. Mr. Orr has an excellent and valuable cipher for reporting in a condensed form base ball scores.

The Long Island Railroad Co. has operators in its employ who are compelled to work thirty-six hours on a stretch, every two weeks, for which they do not receive extra pay.

"I would sooner have the small pox than a swelled head."—Thos. A. Edison, in a letter to Fred Catlin, manager of the Sending Tournament.

Mr. W. A. Bellis, formerly of Portland, Pa., has gone to Bangor, Pa. Mr. D. R. Brister is now with W. J. Doran & Co., 53 New St., this city.

Mr. William Wall, formerly of the C. P. R., Sault St. Marie, Mich., is now located at Ottawa, Ont., for the same company.

\$175.00 IN PRIZES.

Our enterprising Pittsburgh agent, Mr. W. E. Burns, leads the list with a comfortable margin. Mr. H. I. Jolley, of New York, is second with C. D. Lee, of St. Louis, third. A number of others are preparing to make a raid on the community in which they reside for business; so that one of the dark horses, so to speak, may carry off unlooked for honors.

\$100 first; \$50 second, and \$25 third. Prizes to be awarded to the three persons sending us the most business from February 16th to Nov. 16th, 1890.

ONE HUNDRED DOLLARS will be given to the person who sends us the most business during the ten months named.

FIFTY DOLLARS will be given to the person sending us the second largest amount of business.

TWENTY FIVE DOLLARS will be given to the person sending us the third largest amount of business.

These prizes are given exclusive of the usual commissions allowed; therefore those who work for one of these prizes will also be liberally compensated for the trouble with increased commissions. The first prize amounts to \$10 per month—a handsome sum of money for so small an effort.

Any person, except a regular employé of the paper, is qualified. This, of course, includes all agents and correspondents.

All remittances will be acknowledged in each issue of the paper.

Remittances only are acknowledged in this contest.

Up to the present time the list of those interested stands:

|                                   |        |
|-----------------------------------|--------|
| B. C. Elder, Kansas City, Mo.     | \$8 70 |
| W. E. Burns, Pittsburgh, Pa.      | 49 00  |
| E. A. Coney, Newark, N. J.        | 3 00   |
| L. E. Moores, Cincinnati, O.      | 4 65   |
| B. F. Hartz, Helena, Montana.     | 8 40   |
| A. M. Butler, Omaha, Neb.         | 10 00  |
| C. D. Lee, St. Louis, Mo.         | 21 00  |
| C. J. App, Knoxville, Tenn.       | 4 80   |
| F. B. Holcomb, Watertown, N. Y.   | 2 00   |
| C. S. Loewenthal, Chicago, Ill.   | 18 51  |
| H. I. Jolley, 195 Broadway, N. Y. | 24 00  |
| L. Miller, Philadelphia, Pa.      | 13 00  |
| S. H. Riker, Syracuse, N. Y.      | 9 44   |
| H. C. Wooden, Baltimore, Md.      | 1 80   |
| B. J. Meising, Oil City, Pa.      | 5 00   |
| J. F. Slack, Sioux City, Iowa.    | 3 70   |
| K. W. Starbird, Portland, Me.     | 1 20   |
| J. W. Thompson, Nashville, Tenn.  | 7 25   |
| G. W. Spaid, Savannah, Ga.        | 6 00   |
| W. Hazelboom, Boston, Mass.       | 10 00  |
| John J. Seitz, Hamilton, Ont.     | 15 00  |
| W. J. Anderson, Toronto, Ont.     | 1 20   |
| F. L. Saunders, Dallas, Tex.      | 8 00   |

**SENDING MACHINE.**—A test of a newly invented sending machine was made in Chicago on the 22d inst. The operator was in Superintendent Clowry's office and sent to John Walker, who copied with a pen, and F. S. Kent, who used a typewriter, over a circuit of 200 miles which was arranged for the test. The result was not altogether satisfactory, only a moderate rate of speed being reached, above which the sending did not go through clear. The idea seems to be a practical one, however, and will doubtless be improved and perfected at an early day. We were unable to learn the inventor's name, or what the new machine is like, except that it is operated with a key-board similar to a typewriter and sends Morse characters in line.—*Telegrapher.*

**TELEGRAPH LINES IN THE ENGLISH COLONIES.**—In 1888 there were in operation in India 31,894 miles of telegraph lines; 38,846 in Australasia; 4,339 at the Cape of Good Hope, and 715 in Ceylon.

**NOTICE.**—"J. N." Everything arranged. Send your address. Will write.—"R. D."



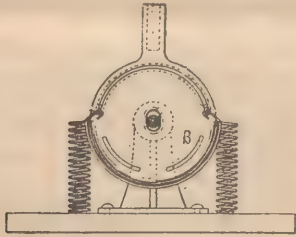
## THE ELECTRIC AGE'S ILLUSTRATED ELECTRICAL PATENT RECORD.

ELECTRICAL PATENTS ISSUED  
MARCH 18TH.

423,361. Coin-Operated Electric Apparatus. John S. Wallace, Belfast, Ireland. Filed Aug. 29, 1889.

423,391. Trolley for Overhead Electric Railways. Frank B. Rae, Detroit, Mich. Filed Nov. 14, 1889.

This is an improvement in trolley arm bearings, and permits of forward and backward motion.



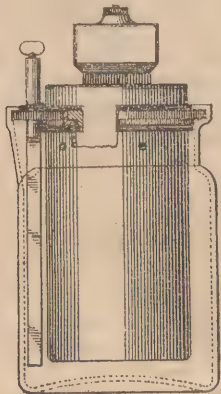
NO. 423,391. TROLLEY.

423,400. Electric-Motor Car. Detlef C. Voss, Medford, assignor of one-half to Edward A. Clark, Boston, Mass.

This invention provides for an electric motor car, having motors at opposite ends, with the circuits so arranged that either or both may be placed in or out of circuit, and an electrically operated device between the motors and contacts to open and close the circuit.

423,421. Apparatus for Producing Steam, Heat and Light by Electricity. Theophilus D. Farrall, Michigan City, Ind. Filed Oct. 5, 1889. This apparatus consists of a source of electricity and an electric transformer, storage battery or accumulator in combination with an electric heating cartridge, steam generator and electric lighting apparatus. This system is adapted to heating and lighting railway trains.

423,449. Electric-Wire Molding. John A. Seely, Brooklyn, N. Y. Filed Oct. 30, 1889. This invention consists of a flexible and non-elastic molding in which are embedded one or more electric wires.



NO. 423,594. GALVANIC BATTERY.

423,487. Fire or Police Telegraph. George C. McCullough, Richmond, Ind., assignor of one-third to John B. Dougan, same place. Filed Feb. 5, 1889. This is a combination of independent outlying main circuits with a central station at which there is a repeater, so that a signal from one circuit may be repeated to each of the other circuits.

423,488. Electric Switch. Thomas S. McEvoy, Waterbury, Conn. Filed Nov. 25, 1889. This switch is opened and closed by means of a scroll cam.

423,495. Crossing for Electric Conductors. Henry A. Seymour, Washington, D. C., assignor to the Short Electric Railway Company, Cleveland, Ohio. Filed Jan. 31, 1890. This

invention, by the use of insulated plates to which electric railway conductors are attached, makes it possible for two or more conductors to cross one another in such a manner that there will be no interference of conductors, and without in any manner disturbing the usual operation of the cars.

423,527. Electrical Conductor. George E. Miller, Lynn, Mass. Filed, Jan. 27, 1890. This invention consists of a method of shunting an electric railway conductor around a railway gate, so that the lowering and raising of the gate will not interfere with the electric operation of the system.

423,549. Electro-Therapeutic Appliance. Charles E. Brunning, Stockton, Kans. Filed Nov. 16, 1889.

423,575. Individual Telephone-Call. Joseph Sack, Dusseldorf, Germany. Filed May 1, 1889.

423,594. Galvanic Battery. Martin M. Clark, Chicago, Ill., assignor to the Western Electric Company, same place. Filed Dec. 9, 1889. This is an improvement in the method of supporting and hanging the elements.

423,600. Ampere Meter. Gustav A. Frei, Boston, Mass., assignor to the Bernstein Electric Company, Portland, Me. Filed Dec. 3, 1889. This meter consists of two stationary coils connected in series and placed side by side, and offset, combined with a movable coil within them and in shunt with the stationary coils.

423,616. Galvanic Apparatus for Dental Surgery. Charles Wm. Manker, Nebraska City, Nebr., and George F. Manker, Bedford, Iowa, assignors of one-third to Henry E. Manker, Elliott, Iowa. Filed Aug. 23, 1889.

423,632. Electric Wire Supporter. William F. Rothenberg, Denver, Colo., assignor of one-half to Joseph Turre, same place. Filed Nov. 20, 1889. This is a method of supporting electric wires above the streets by means of arched supports between the sidewalks.

423,637. Carbon-Rod for Arc Lamps. Charles E. Scribner, Chicago, Ill., assignor to the Western Electric Company, same place. Filed July 3, 1888. This carbon rod is tubular and a wire inserted within is bent in wave-line form to secure good conductivity.

423,638. Cut-Out for Electric Arc Lamps. Charles E. Scribner, Chicago, Ill., assignor to the Western Electric Company, same place. Filed Oct. 26, 1889. Differentially-wound lifting magnets of an arc regulator are combined with the carbons, and a shunt circuit around the carbons containing a switch so arranged that its closure directs the whole current back through the second of the windings of the magnet to neutralize the same.

423,697. Bell. Louis M. Piolet, New York, N. Y. Filed July 15, 1889.

423,707. Electric Bell. Arthur F. Stanley, New York, N. Y. Filed Jan. 20, 1890.

423,708. Static Electrical Machine. Hugo Tirmann, Cleveland, Ohio, assignor to the United States Mine Supplies Company. Filed June 18, 1888. This is a combination of two compound electrics, each consisting of an interior body of hard rubber or of glass and an excitant envelope formed of a special preparation,

423,732. Method of Welding Metals by Electricity. Charles L. Coffin, Detroit, Mich. Filed Nov. 12, 1889.

423,733. Method of and Apparatus for Electric Welding. Charles L. Coffin, Detroit, Mich. Filed Nov. 19, 1889.

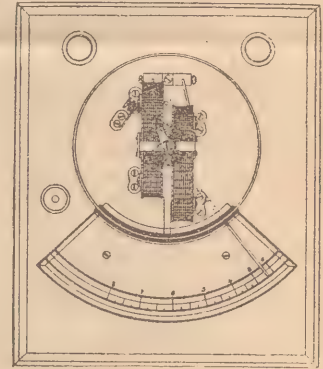
423,734. Method of Welding Metals by Electricity. Charles L. Coffin, Detroit, Mich. Filed Nov. 19, 1889.

423,735. Method of Welding Metals by Electricity. Charles L. Coffin, Detroit, Mich. Filed Dec. 6, 1889.

423,736. Method of Welding Metals Electrically. Charles L. Coffin, Detroit, Mich. Filed Dec. 12, 1889.

423,753. Electric Burglar and Fire Alarm. William Gee, New York, N. Y. Filed Nov. 19, 1889.

423,788. Lightning-Arrester. George S. Maxwell, Louisville, Ky. Filed Dec. 4, 1889. This is a combination of an instrument to be protected with a magnet connected with the same, a circuit breaker located between the



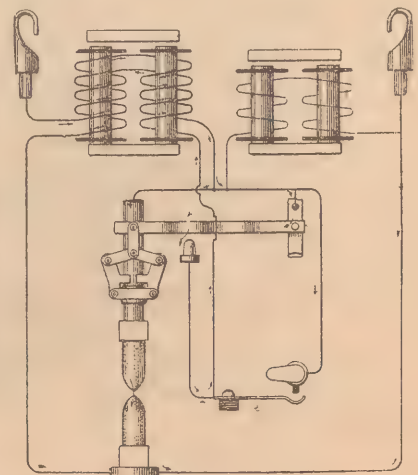
NO. 423,600. AMPERE METER.

magnet and the outside circuit and a ground connection therefor.

423,807. Arc Lamp. Henri Pieper, Fils Liege, Belgium. Filed Sept. 21, 1889. Patented in Belgium Mar. 15, 1889, and in France Mar. 23, 1889. In the lamp a carbon rod is used in conjunction with two or more electrodes in contact with arc end of said rod, one or more of the electrodes being movable.

423,842. Thermostat. Joseph Wach, Höchst-on-the-Main, Prussia, Germany. Filed Sept. 30, 1889. Patented in Germany, Oct. 27, 1888.

423,873. Elevating and Lowering Electric Lights, Robert Kinney and John P. Hebedahl, Weatherly, Pa. Filed Nov. 6, 1889.



NO. 423,638. CUT-OUT FOR ELECTRIC LAMPS.

423,874. Means for Supplying Electricity to tram-cars. Alexander L. Lineff, Chiswick, County of Middlesex, England. Filed Aug. 27, 1889. Patented in England July 11, 1888. This provides means for conveying electricity to tram-cars, consisting of an electric main, a continuous flexible magnetic main, a surface-contact piece or pieces, and a magnet and current-collector situated on the car.

423,886. Electric Railway Gate. Morton Toulmin, Baltimore, Md. Filed July 29, 1889.

423,891. Switch for Electric Apparatus. Samuel L. Barriett, New Orleans, La., assignor to the Southern Electrical Manufacturing and Supply Company (Limited), same place. Filed Mar. 2, 1889.



**MORE ELECTRICAL APPARATUS FOR THE TRANSVAAL.**

We gave a description some time ago of a large installation for the electric transmission of power which was being manufactured by the Sprague Electric Railway and Motor Company for the Forbes Reef Gold Mining Company of the Transvaal, South Africa.

This plant will transmit power from a waterfall, where are situated a number of Pelton wheels, to the mine premises, more than three miles away. The wires connecting the power-house at the water wheels with the electric motors at the mine will be carried upon poles right across country in a direct line. The amount of power transmitted will be one hundred and forty horse-power.

The Forbes Reef Company are now so thoroughly satisfied that electricity is the most convenient and economical agent for transmitting power long distances, and applying it at its point of use, that the managers of that company have ordered additional apparatus, including dynamos and motors with wires for the transmission of 75 more horse-power. This will make a total of 215 horse-power to be transmitted from the water power, which will be used on the mine premises. The efficiency of the whole electric system will be about seventy per cent.; that is, out of every ten units of power delivered from the turbine to the dynamo, seven units will be delivered from the motor pulleys for work, and only three lost in the transmission in both machines. When the long distance which the power is transmitted is taken into account, this is, indeed, a remarkable record. Part of the apparatus has already been shipped to the Transvaal, and the rest will follow soon. The construction and installation of this plant will be under the direction and supervision of Mr. Wm. Rydler of the Sprague Electric Railway and Motor Company. When this is finished it will be one of the largest if not the largest and most extensive electric mining transmission plant in the world. While it is to be regretted that the managers of mines in this country have as yet not availed themselves to any great extent of the advantages in the transmission of power by electricity, it will probably not be long before many of the water powers which now run to waste in many mining localities will be utilized with advantage.

**CURIOUS EFFECT OF ATMOSPHERIC ELECTRICITY ON AN UNDERGROUND TELEGRAPH WIRE.**—In a recent number of *La Lumière Electrique*, M. P. Marcillac, in commenting on some earth phenomena recently observed by Signor Palmieri, relates the following interesting incident connected with subterranean telegraph wires: In 1883, while fault finding, M. Marcillac found himself in a wood between Marseilles and Toulon. The weather was fine and he was in telephonic communication with Marseilles by means of some excellent Siemens apparatus. The telephone was interposed in a circuit formed by two underground wires, and there was, strictly speaking, no earth and no overhead section. The weather suddenly clouded over, and a violent crackling was heard in the telephone. Rain soon fell, and obliged the party to seek refuge in their tents. At about three kilometres distance M. Marcillac noticed a gray-colored cloud, shaped like an inverted cone, oscillating in a most extraordinary manner. Each oscillation of the cloud corresponded to a violent crackling in the telephone. The noise of the thunder prevented conversation, and a field Morse apparatus was rapidly installed to maintain communication with Marseilles. The effect of the oscillating cloud continued and caused the tongue of the Morse apparatus to be attracted with such force that in order not to sacrifice his apparatus M. Marcillac had to put the line to earth. The rain fell in torrents for a few minutes, after which the phenomena ceased. M. Marcillac points out that this was not a question of earth currents, but of induction experienced in a carefully insulated subterranean line.

**RAILWAY COMPANIES AND THE TELEPHONE.**—In several towns in Germany and Austria the railway companies have placed their goods yards in connection with the local exchange. By this means consignees are informed of the arrival of their goods, and merchants and shopkeepers are able to obtain any information they may require from the railway company without delay. This extension of the telephone system has proved very popular.

**ELECTRIC ROAD.**—It is proposed to connect Urbana and Champaign, Illinois, by electric railway.

**DISCHARGE OF A CONDENSER.**—When a condenser is discharged a sound is often heard. This was noticed by Sir W. Thomson in the case of air condensers; and Varley even constructed a telephone in which the rapid charge and discharge of a condenser gave rise to distinct tones.

**A MICRO-FARAD.**—The unit of capacity is a Farad. The practical unit, however, is a microfarad (one millionth of a farad) which is equal to the capacity of about three miles of an Atlantic cable. A condenser of one micro-farad capacity contains about 3,600 square inches of tinfoil.

**ELECTRIC LIGHTING IN GREECE.**—The light has recently been making great strides, notably at Athens. By a recent law overhead lines are prohibited.

**BATTERIES.**

Outfits to run INCANDESCENT LAMPS from 25 to 300 hours.

Send for Illustrated Catalogue and Testimonials.

**JAS. H. MASON,**

Manufacturing Electrician,

120 PARK AVENUE, BROOKLYN, N. Y.

Telephone Companies, Supply Houses, Bell Hangers, Physicians, and all users of Open Circuit Batteries, are requested to write the

**LAW TELEPHONE CO.,**

85 JOHN ST., NEW YORK,

We have something to interest you.

INDISPENSABLE TO EVERY BUSINESS MAN.



Combines the Simplicity of the Hektograph without its great disadvantages, viz: waste, washing, etc.

**THE SIMPLEX DUPLICATOR,**

The Simplest and Cheapest Reliable Duplicator Extant. 150 Copies from one original writing—original written with any ordinary pen.

50 Copies from type-written original. No washing, no inking roller, no stencil, no dotted lines. The only really satisfactory process for duplicating examination papers, lessons, music, shorthand, etc. **SPECIAL SIZES: Note, \$4.50; Letter, \$6.50; Cap, \$7.50, cash with order.** Headquarters for manifold devices of every description.

BEST SUPPLIES ON HAND FOR EVERY STENCIL AND OTHER PROCESS AT LOWEST RATE.

**C. BENSINGER COMPANY,**  
5 Dey Street, NEW YORK.

**BOOKS.**

- Bottom—Elec. Instrument Making.....\$1 20
- Du Moucel—Electro-magnets, trans. by Wharton..... 75
- Fabie—History of Elec Telegraphy..... 3 00
- Hedges—Elec. Light Precautions..... 1 00
- Holmes—Electric Lighting..... 1 00
- Hospitalier—Domestic Electricity..... 3 00
- Munro and Jamieson Pocket-book..... 2 50
- Solomons, Sir D.—Accumulators..... 1 25
- Stephens—Electric Lighting..... 1 00
- Walker—Dynamo Building..... 80

Catalogue and circulars free on application.

**E. & F. N. SPON,**

12 Cortlandt St., NEW YORK.

—THE—

**SHAYER MOLECULAR TELEPHONE.**

Capacity for private lines 2 miles.

TRUNK LINES comprising a number of Telephones upon one circuit, and EXCHANGES for short lines switching direct one station with another. The only mechanical phone which works during rain and wind storms.

AGENTS WANTED.

**THE SHAYER CORPORATION,**

207 BROADWAY, COR. FULTON ST., N. Y.

**For Sale.**

The controlling interest in an electric light company, in city of 15,000 inhabitants. Desirable contract with city for street lighting. Demand for private lights greater than present capacity of plant. Everything in first-class condition and on a paying basis. For particulars address, **J. H. HICKMAN, Pres., Electric Light Co., OWENSBORO, KY.**

**FOR SALE.**

A first-class Electric Light Plant in a growing town of 8,000 population. Best equipped plant in Wisconsin; well established; pay better than twelve per cent. Good reasons for selling. Cash only will buy it. For particulars apply to

**W. A. KNAPP,**

62 South Canal Street, Chicago, Ill

**New York Electric Supply Co.,**

MANUFACTURERS, IMPORTERS AND DEALERS IN

**ELECTRIC SUPPLIES**

OF EVERY DESCRIPTION,

Electric Light, Telephone and Telegraph Apparatus,

**DYNAMOS, ELECTRIC MOTORS,**

Primary and Storage Batteries, &c.,

94 LIBERTY STREET, NEW YORK.

PERFECTLY RELIABLE NO DANGEROUS CURRENTS

**THE ALUMINUM BATTERY**  
—ELECTRIC LIGHT & POWER Co.  
94 LIBERTY ST  
NEW YORK

ARC & INCANDESCENT ELECTRIC LIGHTING  
THE MOST ECONOMICAL SYSTEM FOR LIGHT & POWER PLANTS

PRIMARY BATTERY

INSTALLLED & LIGHT & POWER FURNISHED AT VERY LOW PRICES



## MY OLD PEN.

BY W. E. LOCKHART.

It was nearly morning when I cleared "NY" of his stack of "reds," and, as the last one left my hand, I threw my pen wearily from me and leaned back in my chair, when I was startled by a strange shrill voice, coming apparently from the pen I had just thrown down, addressing me with: "Billy, old man, ain't you using an old friend rather roughly?" Too dumbfounded to speak I stared at the pen in silence, when the voice continued, "You were only a messenger boy when you chose me from the stray pens in the office and placed me behind your ear. Let your thoughts for a moment wander back to the old days. You received your first message with me. Did I ever tell how rattled you were?"

"Think of the days, months and years I have nestled next to your heart, close as the photograph of a sweetheart.

"Do you recall (after you had been trusted with a wire to work) you had aped some 'old timer' by cutting the end off of me, and wrapping neatly with twine the part where your fingers and thumb gripped me?" I could only nod my head in answer as the strange piping voice ran on. "Think of the years I have obeyed your will, writing down, with never a murmur, the characters that through long association have become as familiar as printed letters—countless numbers of pen points have you worn out, taking messages of joy and sorrow, life and death, hum-drum business, and the doings of a whole world. Time and again through carelessness you have lost me. But I always found my way back to you; time and again you have thrown me down in a manner that showed you never gave a thought to one that has been as true as steel and faithful as a dog to you. I didn't use to mind it, Billy, but lately when you throw me down like that I—

\* \* \* \* \*

I awoke with a start as the janitor came in to sweep out, and as I went off duty I picked the old pen up caressingly and placed it carefully and thoughtfully in the pocket it had occupied, when off duty, for so many years.

AMONG THE CABLE STAFF.—W. H. Mountford, the new superintendent of the Anglo-American Cable Co., since his arrival in this city from London, Eng., has made many friends for his Company. Mr. Fred. H. Waycott is one of the chief operators and Mr. W. G. Roberts and Fred. Vogel are assistant accountants. J. B. Hendrickson, W. Cull, L. Lagay, E. Dumas, E. Hughes and H. Tschentscher, clerks. Branch offices have been opened at 446 Broome and 16 Beaver streets, with A. T. Sullivan and C. W. Kay respectively in charge. The above-named gentlemen were overlooked in our last issue.

C. P. R. WESTERN DIVISION NOTES.—A. W. Hodgson, despatcher, Port Arthur, Ont., has resigned his position at that point and has gone to eastern provinces to recuperate, his health not being the best. On his return, in a couple of months, he will take a trick in Winnipeg.

Mr. R. Peard, from Winnipeg, has been appointed to Port Arthur, to relieve Mr. Hodgson.

The large bucket-shop firms are leasing wires pretty extensively from the Great North-Western in Canada.

One firm has established offices in Cornwall, Morrisbury, Brockville, Toronto and Hamilton, and a Pittsburg firm is about to lease a wire to Sarnia, covering intervening points. The pay averages about \$75 per month for these places. We call the attention of our friends to these facts.

Mr. F. C. Gilbert is now located at Butler, Montana, for the Northern Pacific.

NEW YORK POSTAL NOTES.—There has been quite an exodus of operators from the Postal to the Western Union across the street during the past two weeks. It is remarkable too, because it takes away some of the very best men in the Postal's ranks. It will be difficult to fill the places of such men as Chris. Heyl, Johnny Young, and John Henneberry. In all, eight men have "gone over to the enemy." The exodus can only be accounted for on the supposition that they will enjoy many privileges in the Western Union which must perforce be denied to operators in this office. The entire management of this office is deservedly popular with all, from Mr. Usher down to "Larry the time-keeper," but from economic purposes the force is kept down to the veriest workable margin. As business at present is very heavy, the men feel the strain at times. On several occasions the usual dinner relief has been suspended for two and three hours at a time. Of course this has caused considerable grumbling, and it is doubtful if business was handled with any degree of rapidity, as it is well known that men cannot or will not exert themselves while "hunger is gnawing at their vitals." Again, it is almost impossible to obtain a relief of a few minutes during the business hours of the day, as there is not a spare man in the room. Only on this hypothesis can the desertion of some of our brightest and best men be explained. Increased salaries is not the cause, as the Western Union standard is not any higher than the Postal. *Apropos* of salaries, the best men of the day force have individually petitioned the management for an increase. They say, and justly too, that the cost of living is much greater in New York than elsewhere. They fail to see why such cities as Chicago and Pittsburg can afford to pay at the rate of \$80 and as high as \$90 per month, and here, where the volume of business is proportionally larger, the men are compelled to struggle for existence on a pittance of \$75. The coming season promises to be a very busy one, and as good men, as a matter of fact, will be in demand; they cannot be blamed if they place themselves in more remunerative positions. The exodus has not yet ceased. Departures: Messrs. Leonard, Christian, Gibbons, Heyl, Ahearn, Moore, Young and John Henneberry—all to the Western Union. Houghey, for Chicago. New arrivals: Milliken, Augusta; Bokelman, Boston; Williams, West Shore railway; Cameron, Chicago; Hawley, New York.

DIED.—Geo. W. Campbell, of the Postal, Los Angeles, Cal., died on March 13th of heart disease. He had been in bad health for several years past, but he kept up in the face of his infirmity until a day or two previous to his death. Campbell was 32 years of age at the time of his death. He was a native of California, and formerly lived in San Francisco. Besides his widow, he leaves one child. He was as fine an operator as there was on the Pacific coast, a genial good fellow and a great favorite among the boys.

The plant and franchise of the Sandy Hook, Quarantine and City Island Telegraph Company were sold March 24th to the Western Union Company. The first-named company was organized by several of the members of the Maritime Exchange for the purpose of getting information concerning incoming vessels, but it has been operated by the Western Union. The sale was agreed to by 90 per cent. of the stockholders of the company. The terms of sale were not made public.

Timothy Flood, the Western Union lineman who fell from a telegraph pole in Syracuse, N. Y., on April 8th, 1889, died from his injuries March 24th. He was entirely helpless from the time of the accident until death relieved him of his suffering. A widow and three small children survive him.

AN OPERATOR INJURED.—A freight train jumped the track at Richland, N. Y., on the night of March 20, and wrecked the station. The telegraph operator was severely injured.

ERIE RAILWAY NOTES.—W. F. Casey, despatcher at Jersey City, has been very low with pneumonia. He is slowly improving and there is hope of his ultimate recovery. We extend our sympathy to despatcher M. J. Maloney, whose father died recently. Frank Kelly, of Ridgewood Junct., who has been on the sick list, is again at his post. J. E. Dunn transferred to Southfields, in place of Mr. Robinson, who takes the place made vacant by Mr. Dunn, at Clifton Junct. Geo. Eisenhauer goes to Ridgewood Junct., in place of E. Horton, who has a three months' leave of absence to recoup his failing health. F. A. Cramer, from Paterson, takes Mr. Eisenhauer's place at Hohokus, and Garry Remsen takes Mr. Cramer's place at Paterson. J. W. Quackenbush has left the telegraph department, and G. U. Hamilton, of P. R. R. takes his place at Allendale. The block signals were extended to the end of the Eastern Division on Sunday, March 23, from Newburgh Junct. to Port Jervis.

The following additions were made to the telegraph force:

Foley and Kane at "O. W.," east of Guymard; J. P. Tighe and Nolan at "O. B.," east of Port Jervis yard; Regan and Marcinkoskie "F. G.," west of Otisville; Wakeman and F. Crane "O. Q.," west of Hampton; J. M. Morgan and England "Q. N.," Howells, Downs and Hill at the interlocking tower at Goshen; Baldwin and Welch "T. C.," west of Chester; M. S. Allen and Crane "X. A.," east of Goshen; Buckhout and Driscoll at Oxford; and Fitzgerald and Van Keuren at Monroe. The blocks are run by same bell code with no "cabinets." F. A. Cramer has, it is said, gone with the Central R. of N. J., John Winters takes his place at Hohokus. J. Feeney, one of the operators on the new block system, while going to work for the first time, on March 23, in attempting to board a freight train at the tower near Guymard was struck by the caboose of the train and thrown under the pusher engine and killed. Mr. Feeney was a promising young man and his untimely end is much regretted by his many friends on the Erie.

WASHINGTON NOTES.—Mr. W. J. Slater, late of the Postal, is now working at the Government Printing Office. Mr. Slater a short time ago joined the Benedicts. Mr. George W. Hann, who has been with the Postal since the convening of Congress last December, has been appointed to a position in the census office, and has decided to settle here. Mr. L. K. Miller, of the Postal, can be seen daily flying with lightning speed upon his bicycle. Quite a number of the Postal men have been living in the suburbs for the past year or two, and others are preparing to follow suit. President Chandler paid the boys a visit a short time ago. He found business booming, and Chief Andrews up to his neck in it. Mr. James Brick is making a fine record as manager of the Postal Commercial Office at the Capital. "Dirty Station, Texas," is the way a Virginia artist rendered it. It was sent to "Derby Station." As sent from the West: "Bury body there," as delivered in the South: "Bring body here." Result: Dead man on his hands and the fire not hot. There will be held in this city on March 30th, a speed contest among some of the bright lights, to determine who is worthy to represent Washington in the tournament to be held in New York on April 10th. A large number will participate. The personnel of the Western Union and Postal will receive my attention in your next issue.

Mr. S. B. Lambdin spends much of his leisure in writing blank versé poems. They treat of the exploits of the gods, and are pronounced superb by all who have read them.

Mr. George H. Ackerman has just returned from a two weeks' vacation, spent in the vicinity of Niagara Falls. He was relieved by Mr. Wm. Watts.



## NOTICE.

A grand performance and reception (Testimonial), with the co-operation of the New York Telegraph Operators, will be tendered to Martin J. Dixon, at the new Central Opera House, 209 to 215 East 67th street, on Wednesday evening, April 16. The beautiful society play of "East Lynne," will be produced with Miss Florence Miller, of 195 Broadway, in the title role. Miss Susie Stephenson has kindly volunteered to sing between the acts, and Mr. Thomas Ballantyne will mimicize.

Prices: Boxes, holding seven persons, - \$3.00  
Tickets, admitting Gentleman and Ladies, .50  
On sale at all principal telegraph offices in New York and Brooklyn.

ST. LOUIS WESTERN UNION NOTES.—The graceful compliment paid by *Saluda*, the Washington correspondent of the AGE to the St. Louis quartette, who received at the *Globe Democrat* the speech of Senator Ingalls, on January 23rd, was appreciated in this office. The excellent work performed by these gentlemen (Powell, McDonald, Burroughs and Magill) on the occasion named is a just criterion of the work which is constantly going on at the newspaper offices in St. Louis, and when occasion demands, this office can supplement many times the above-named "quartette" with other combinations equally as good. Mr. C. B. Schuler, the gentlemanly proprietor of the lunch room is endeavoring, under unpropitious circumstances, to give satisfaction to the office in the serving of edibles to the force while on duty, his quarters being cramped and inconveniently located, owing to the lack of room on the top floor. It is hoped that when his new quarters are secured, sufficient space and conveniences will be devoted to this purpose to admit of a first-class Western Union restaurant, such as the office would seem to demand. "The wind pulls at the threatening calamity," is the way one correspondent's copy reached this office. Whether the operator's "mind palls" at the perpetration of this bull is undetermined. "Keokuk" for Kokomo is not very bad. The equipment of this office comprises 160 wires, all terminal, 21 quads., 9 duplexes and 2 sets of Wheatstone. A Wheatstone line to Chicago will be added to this equipment before long. The average number of messages handled per day is from twenty to thirty thousand. Of this number fifteen hundred to two thousand are exchanged with Kansas City. There are at present two hundred operators on the main office roll, with twenty on the waiting list. Mr. C. H. Pratt, of this office has been installed as manager of the Hot Springs Western Union office. Mr. Pratt has been an operator in "A" office for a number of years and is in every way fitted for managerial duties. The AGE subscription list at this point is constantly growing, or to paraphrase a scripture passage: "there are added to the list daily such as should be saved." We hope for a still better support for *our paper* and have faith to believe that the future of the operators representative is a bright one. The next St. Louis letter will contain a complete list of the night operating force of this office.

ST. LOUIS UNITED PRESS NOTES.—Mr. O. J. MacAuley, manager of the United Press at this point, was formerly an eastern man and well known among telegraphers. In him the U. P. has a thoroughly capable and efficient representative. Mr. M. D. Shaw, for many years with the United Press and for five years manager of this office, has resigned to accept a position in the municipal service as chief inspector of telephones. The position is a good one and Mr. Shaw is to be congratulated in securing deserved recognition from municipal quarters. The Scripps League early morning service to the *Chronicle* has been discontinued. Mr. W. O. Tremaine, who received this report, is now with the Western Union here.

The Postal office at 91 Leonard street has been removed to 94, where elegant and spacious quarters have been secured. This is one of the banner offices in this city, or in fact any other city, judging it from a financial standpoint. The receipts are over \$2,000 weekly. The manager, Mr. L. P. Cole is constantly among the dry goods fraternity making new friends for the Postal. His efficient staff consists of: Operators—Joseph Holden, M. Lane, E. J. Curran, John Quinn, Edward Reynolds, T. McIntee; assistant manager and cashier, Robert Yates, Jr.; receiver, L. Smith; clerks, Thomas McGowan, Charles W. Wedele, Jeremiah O'Sullivan; Electrician, William B. Halsey, and a force of 24 messengers.

Those desiring to receive all the electrical news published should not fail to subscribe for the electrical edition of this journal, which is now considered the foremost electrical paper published. We do not propose to publish extensive electrical articles in the telegraph edition, now that we have induced most of the operators interested in the development of electricity to subscribe for the electrical edition. We are not now under obligations to any of our advertisers to reproduce their matter in our telegraph edition. This is a freedom we have long desired and which is not enjoyed by any other paper published and catering to the telegraph people.

We call the attention of our readers to the advertisement of the Simplex Duplicator, which is controlled by C. Benzinger & Company, 5 Dey Street, New York. It is without doubt the best Duplicator on the market to-day, and fully 200 copies can be made from one writing. Our own experience with the device is of an entirely satisfactory nature. Its work is an exact fac-simile of ordinary writing or typewriting; it produces the finest work in any color or several colors simultaneously; it prints in solid continuous SHADED lines, size unlimited. The original is written on any ordinary paper with any ordinary pen or typewriter, and the copies can be taken on any ordinary paper, cardboard, wood, china, etc., etc.

The *Tribune*, of Rome, Ga., says: "Talking about quick time," said Mr. T. F. Howell yesterday, "the Postal Telegraph and Cable Company is entitled to the palm. I sent a cable message to Liverpool by that route to-day and received an answer in 55 minutes. Heretofore I have never been able to get an answer in less than 12 hours, and I assure you that 55 minutes was a surprise to me. I think it beats the fastest record ever made in the transmission of telegraphic and cable messages."

BORN.—To Mr. W. F. Archibald, manager of the C. P. R. Tel. Co., Victoria, B. C., on March 9th, a son, first edition. Mr. Archibald has the congratulations of his friends.

Mr. L. J. Beauvalt, of Pearl River, N. Y., says of the AGE: "I hope you may have good success with your paper, as it proves to be a valuable one to me in many ways."

Mr. F. L. Saunders, of Dallas, Texas, who has been acting manager of the Western Union at San Antonio, Texas for some time past, will return to his former position in Dallas, April 1st.

Mr. C. S. Goodwin, formerly of Helena, Montana, is now in St. Paul, Minn.

A COPY OF NELLIE HARLAND FREE.—We will send to each new subscriber for THE ELECTRIC AGE, postage prepaid, one copy of "Nellie Harland." This book is well known, and is a romance of rail and wire. It is one of the most interesting telegraph stories ever written. This is an extraordinary offer, and all persons not now subscribers should at once send in their name and address with \$1.50, and we will send them each a copy of THE ELECTRIC AGE for one year, and a copy of "Nellie Harland."

THE ELECTRIC AGE PUB. CO.  
5 Dey street, New York.

KANSAS CITY POSTAL NOTES.—Arrivals since last letter are, Mrs. Belle Maine, from the W. U., in this city; C. G. Keeler, from the U. P. Ry., and Laughlin, from the city. Departures are, E. S. Schram, to the W. U., at Jacksonville, Fla. and Kennedy, to the W. U., at St. Louis. Following changes and appointments took effect March 15th. Mr. C. H. Schell, former night chief operator, transferred to Board of Trade office as manager; A. D. Faire, former assistant chief operator, promoted to night chief operator; B. C. Elder, former traffic chief, now is assistant chief operator; Mr. Ben Rommell, who worked on Chicago quad., was appointed traffic chief; Mr. Chas. Falk was appointed assistant night chief, a new departure, necessitated by the increase of business. The "specials" handled at night are simply enormous. Business is increasing rapidly and more force will be soon needed to handle it. Branch offices are all doing good business. Mrs. Bray has been placed in charge of the new office lately opened in the New York Life Building. Chief Operator Richards was over to Topeka, Kan., for a few days, to assist in running a cable. Mr. McMicken chalks up the quotations at the Board Trade during "change" hours, since Schram has left. Mr. Shell reports a very flattering business already, and now that he can devote all his time he expects satisfactory results. Mr. C. M. Baker, Superintendent of Construction, has been in the city several times lately, while on his way to the Western terminus.

Louie Lesem, Manager at "D" office, city, was presented with a fine silk hat, on the anniversary of his fifty-second birthday, by some of his friends. Manager Holtzinger has lately made several trips to various points in Kansas, in the interests of extension of lines. H. Harry Smith, Manager at Lincoln, Neb., for this company, drew \$500 in the last drawing of the Louisiana Lottery. He says the first thing will be to subscribe for THE AGE.

Mr. James O. McCurdy, of Savannah, Ga., has been transferred to Nashville, Tenn., for the W. U.

Mr. J. M. Scott, from Jacksonville, Ill., is now with the W. U. in Chicago.

## CATARRH,

CATARRHAL DEAFNESS—HAY FEVER.

A NEW HOME TREATMENT.

Sufferers are not generally aware that these diseases are contagious, or that they are due to the presence of living parasites in the lining membrane of the nose and eustachian tubes. Microscopic research, however, has proved this to be a fact, and the result of this discovery is that a simple remedy has been formulated whereby catarrh, catarrhal deafness and hay fever are permanently cured in from one to three simple applications made at home by the patient once in two weeks.

N. B.—This treatment is not a snuff or an ointment; both have been discarded by reputable physicians as injurious. A pamphlet explaining this new treatment is sent free on receipt of stamp to pay postage, by A. H. Dixon & Son, 337 and 339 West King St., Toronto, Canada.—*Christian Advocate*.

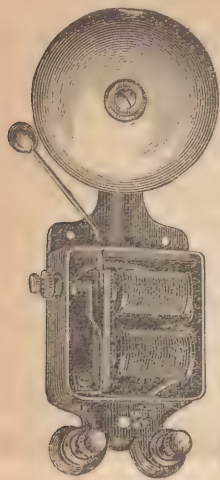
Sufferers from Catarrhal troubles should carefully read the above.

## AN OPPORTUNITY

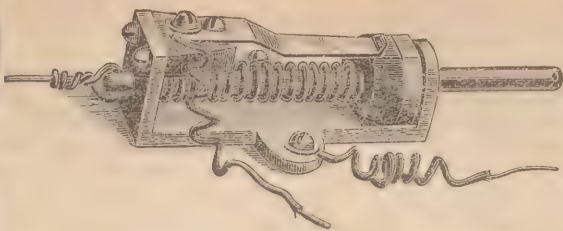
For Some Railroad Man to get a HOWARD WATCH Free of Cost to him.

I propose to furnish one of the well-known **Howard Movements**, of their best quality Gilt, fully adjusted to Heat, Cold and Position, and cased in a specially made Filled Case, Open Face, or Hunting, as may be desired, to **some railroad man** who will send me his full name, giving his address and classification of employment. Each letter received will be assigned a number, and that number will be registered against the name of the writer, and the lucky number gets the **Howard Watch**, which is universally acknowledged to be the best Railroad Watch manufactured. A 2-cent stamp, enclosed with the letter, will insure the return of a certificate bearing the registered number of the name, and for 25c. will include our 230-page catalogue, illustrating movement and case to be given. My object in making this extraordinary offer, is to get the correct name and address of all Railroad Men. The number drawing the watch, and the name of the party holding the same, will be published in this journal. Drawing to take place Sept. 1, 1890, and to be under the supervision of responsible parties. Send your full name and address to J. S. TOWNSEND, 1554 Wabash Avenue, Chicago, Ills.

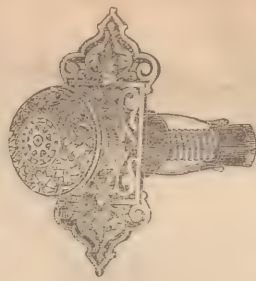




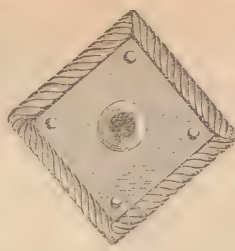
IRON BOX BELL (WITH COVER REMOVED). NICKEL PLATED GONG AND TRIMMINGS.



CIRCUIT CLOSER FOR MECHANICAL DOOR PULL



BELL PULL CONNECTOR.



BRONZE PUSH BUTTONS.



PEAR SHAPED PUSH BUTTON FOR DROP CORD.

# The Empire City Electric Co.,

15 DEY STREET, NEW YORK.

## ELECTRICAL SUPPLIES

For House-Work, Telegraph, Telephone, Electric Light, Etc.

EVERYTHING IN THE ELECTRICAL LINE.

SEND FOR CATALOGUE AND QUOTATIONS

FRANKLIN S. CARTER, CHARLES M. WILKINS, E. WARD WILKIN

TRADING AS

### PARTRICK & CARTER,

Manufacturers and Dealers

## ELECTRICAL SUPPLIES

Sole Proprietors of the Patent Needle Annunciator.

114 SOUTH SECOND ST.,

PHILADELPHIA.

ESTABLISHED 1867.

Patent Needle Annunciators, Burglar Alarms, Electric Bells, Bronze, Nickel and Wood Pushes, Door and Window Springs, Electric Matting, Automatic, Ratchet, and Hand Light Burners, Spark Coils, Keys (Wood and Nickel), Compound Pushes, etc., Door Pulls and Attachments, Automatic Drops, Magneto Bells, Buzzers, Batteries (all Kinds), Foot Pushes, Pear Pushes, Desk Pushes, and all Supplies for Electric Bell Work, Telegraph Instruments, Registers, Relays, Keys, Sounders, Learners' Outfits, Medical Batteries and Appliances, Induction Coils, Motors, Storage Batteries, Hydrometers, Bluestone, Salammonic, Zinc, Copper, Climbers, Pliers, Screw Drivers, Bits, Augers, Vices, Tool Belts, Tool Bags, Splicing Irons, Clamps, Electro-Plating Outfits, Electric Light Supplies, Wires of all kinds, Tape Insulators, Cross Arms, Brackets, Pole Steps, etc., etc.

Send Business Card for Catalogue and Discount Sheet.



### "PARAGON"

## ELECTRIC BELL

— IS DUST PROOF. —

PLATINUM CONTACTS. THOROUGHLY RELIABLE.

THE

### "PARAGON"

## ELECTRIC ANNUNCIATOR

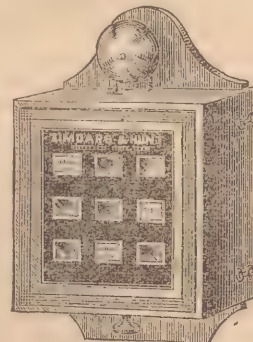
Is constructed on an entirely new principle.

ZIMDARS & HUNT,

MANUFACTURERS,

237 MERCER STREET,

NEW YORK.



# SAWYER-MAN ELECTRIC CO.,

## Incandescent Lamps and General Electrical Supplies.

"The lamps of the Sawyer-Man Pattern, in use on board S. S. (Omaha) in many instances have shown a remarkably long life, several having a record of from 5,000 to 7,000 hours each."—Extract from report of Commander R. B. Bradford, Inspector of Electric Lighting, to the Chief of the Bureau of Navigation, Navy Department, for 1889, page 27.

GENERAL OFFICES:

510-534 West 23d Street,

NEW YORK.



— THE —  
**Hartsfeld Furnace & Refining Co.**

THE OLDEST MANUFACTURERS OF PURE ALUMINUM IN AMERICA.

**PRICES BELOW COMPETITION.**

In Operation in this Country Since 1885.

Office and Works, NEWPORT, KY.

Agents wanted for Aluminum, the new metal, which will no doubt take the place of gold and silver, and perhaps replace our future coin. Its lightness, brilliancy, non-tarnishing lustre and durability is admitted by more than fifty million people, especially for Jewelry, Ornamental and Household Utilities; its demand is now enormous.

We have, with great care and expense, succeeded in placing before the public some entirely new and useful articles as souvenirs, made out of pure Aluminum Metal by skillful artists and new mechanism. Solid Finger Rings without a weld, Earrings, Eardrops, Watch Charms containing the Lord's Prayer—smallest ever coined—and many other novel and useful articles for which the demand called. We have reduced the price below competition—within the reach of all. For each souvenir by mail, prepaid, 50 cents, or \$4.00 per dozen.

**A NEW HARVEST FOR AGENTS TO SUPPLY THE DEMAND.** \$10.00 to \$15.00 per day is easily cleared.

The demand is great and the profit fair. Will you start to work, or induce someone who will?

"Let this be the means of our introduction."—Wanamaker.

CHAS. L. HARTSFELD,  
 President and Gen'l Manager.

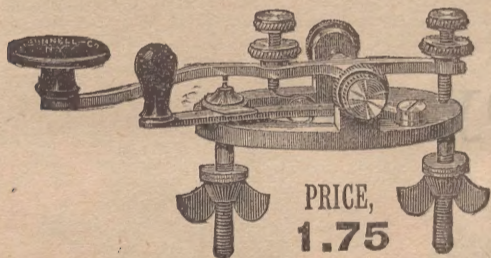
The Hartsfeld Furnace and Refining Co.  
 NEWPORT, KY.

**THE CLARK SYSTEM OF ARC LIGHTING,**

The Safest, the Most Economical, Durable and Perfectly Regulated System in the United States.

Manufactured by the CLARK ELECTRIC CO., 192 Broadway, New York.

**J. H. BUNNELL & CO'S**  
**STEEL LEVER SOLID TRUNNION KEYS.**

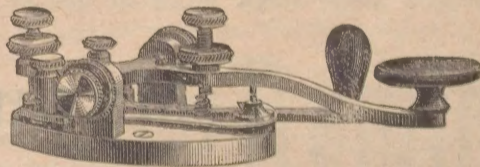


PRICE,  
**1.75**

Over 73,000 now in use.

THE ONLY PERFECT KEY.

J. H. BUNNELL'S PATENT,  
 Feb. 15th, 1881.



Legless Pattern Steel Lever Key.

A Beautiful and Perfect Key suitable for use on fine desks, or wherever a Legless Key is preferable. PRICE, carefully boxed, and sent, prepaid by mail, to any part of the United States, \$2.25.

This form is especially convenient for operators who wish to possess their own private key, as it can be readily placed anywhere or removed without boring holes.

Telegraphers cannot fail to have noticed that upon the introduction of the BUNNELL STEEL LEVER KEY over eight years since, it at once achieved a vast popularity, such as never before attached to any specialty in Telegraph Instruments, and that this popularity has continually increased, and is still increasing.

It will also be noticed by Telegraphers, that since the STEEL LEVER KEY was introduced, a brood of "improved" keys has been hatched and put forward from various sources from time to time each one made to look as much like the STEEL LEVER KEY as possible, or made with some kind of a "steel lever," or "patent lever," and in every case claiming all the merits possible and impossible that language could describe. Most of these "improved keys" have become exterminated by the force of their own worthlessness. Years of practical test in the use of THOUSANDS of BUNNELL STEEL LEVER KEYS throughout America demonstrates their perfection and popularity. BE NOT DECEIVED BY THE ABSURD IMITATIONS.

THE BUNNELL STEEL LEVER KEY is more durable, and in every respect better than any other for rapid and perfect sending for the following reasons:

The Lever is only one-half the weight of the ordinary brass lever as generally made. The entire Lever and Trunnions together being made of but one piece of fine wrought steel, the common defect of loose trunnions is avoided, the strength of a heavy brass lever is obtained with much less weight of metal, and, by the perfect bearing which the solid trunnion gives, together with the use of hardened platina points, sticking is absolutely prevented.

The size and proportions are such as to make it the most perfect operating key possible to obtain, either for the hand of the skilled and rapid expert, or the beginner.

**Price, \$1.75. Finely Finished, and Lever Nickel Plated.**

Steel Lever Keys sent by mail, post-paid to any part of the United States or Canada on receipt of price, by Registered Letter or Money Order.

SEND FOR OUR NEW CATALOGUE No. 10 OF MARCH, 1889.

J. H. BUNNELL & CO.,

76 Cortlandt Street,

NEW YORK.



THE  
EDISON LALANDE  
BATTERY.

Manufactured by the

Edison Manufacturing Co.,

ORANGE, N. J.

THE  
30  
For Pa  
GOLD A  
For Te  
INITIAT  
(Room \$)  
Telegr  
I am prepar  
ber on short  
express. Par  
save money b  
bid before the  
A. B.  
S. W. R.  
HIGHEST  
FO  
THE LEGAL  
73 Page Illu  
RUBBER  
Steel Stamp  
Sect Tree Co. A  
S. W. R.  
29 CHURCH



Awarded the Grand Prize.

SEND FOR THIS BOOK FREE ON APPLICATION.

**THE BABCOCK & WILCOX CO. WATER TUBE**

107 HOPE ST. ST. N.Y.  
30 CORTLANDT ST. N.Y.  
107 HOPE ST. GLASGOW, SCOTLAND.

BRANCH OFFICES:  
BOSTON, MASS. 80 WATER ST.  
PHILADELPHIA, PA. 32 N. 5TH ST.  
CHICAGO, ILL. 155 ARDEN ST.  
INDIANAPOLIS, IND. 17 BRIMLEY ST.  
LONDON, ENGL. 14 MARK LANE ST.  
MANCHESTER, ENGL. 23 CROSS ST.  
PARIS, FRANCE. 20 RUE DE LA HARPE.  
MELBOURNE, AUSTRIA. 111 CROSS ST.

**STEAM BOILERS**

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.

At late Paris Exposition.

The Telegraphers' Mutual Benefit Association.  
A FRATERNAL LIFE INSURANCE SOCIETY.

— INSURANCE, \$1,000. —  
— TWENTY-THIRD YEAR. —

For Particulars, Address THOMAS E. FLEMING, Secretary  
BOX 3175, NEW YORK.

GOLD AND STOCK LIFE INSURANCE ASSOCIATION.

THIRTEENTH YEAR.

For Telegraphers and Others in Electrical Service.

INITIATION FEE, \$1.00. DUES, 50c per Month. INSURANCE, \$600.00.  
In Payments of \$50.00 per Month for One Year.

WM. J. DEALY, Secretary,

(Room 58.) 195 Broadway, New York.

## Telegraph Poles

I am prepared to furnish any number on short notice, both cedar and cypress. Parties wishing to buy will save money by giving me a chance to bid before they do so.

**A. BUSHNELL,**

S. E. Cor. 9th and Broadway,  
KANSAS CITY, MO.

**J. B. SABINE,**  
COUNSELOR AT LAW.

Electrical Patents.

181 BROADWAY,  
New York.

Specialty Electrical Patents.

LEONARD PAGET. CHARLES J. KINTNER  
**PAGET & KINTNER,**  
Chemical & Electrical Experts & Electrical Engineers  
DOMESTIC AND FOREIGN PATENTS.  
No. 45 Broadway, New York.

HIGHEST AWARD!

FOR ELECTRIC

PARIS,



ONLY GOLD MEDAL  
BATTERIES.

1889.

Exposition.

**GONDA**

AND

**AXO**

THE STANDARD BATTERIES OF THE WORLD.

THE LECLANCHE BATTERY CO., 149 W. 18th Street, N. Y.

72 Page Illustrated Catalogue of  
**RUBBER STAMPS**

Steel Stamps, Stencils, Seals, &c.

Sent Free on Application by Postal to

**S. W. REESE & CO,**

29 CHURCH ST., NEW YORK

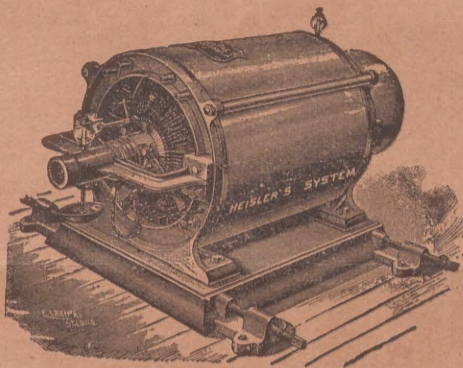
Headquarters for Type Writer Supplies.

RIBBONS, CARBON AND MANIFOLD PAPERS.

Full line of papers specially selected for use on all writing machines. Pads for Yost writing machine. Sample books and price lists furnished on application.  
**THE S. T. SMITH CO., 14 Park Place, N. Y.**

Awarded the Highest Distinction, a Gold Medal, by the International Jury at the Universal Exposition, Paris, 1889.

## THE HEISLER PATENT LONG DISTANCE INCANDESCENT ELECTRIC LIGHT SYSTEM.



Unequaled for Distribution over wide Areas.

SPECIALLY ADAPTED FOR  
STREET, COMMERCIAL AND DOMESTIC ILLU-  
MINATION FROM CENTRAL STATIONS.  
SAFETY, RELIABILITY AND FINANCIAL SUCCESS  
FULLY DEMONSTRATED.

Plan of Wiring the Simplest, Cheapest and Most Efficient.

— STRICTLY SERIES. —

Noted for the Brilliance and Beauty of the Light  
Lamps, 10 to 100 Candle Power. Long Life  
without Blackening.

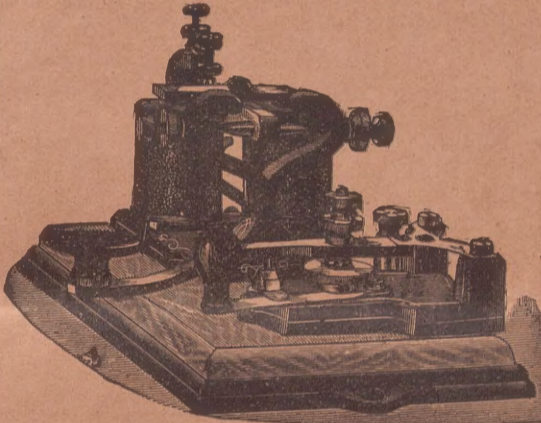
Greatest Production of Candle Power per Horse Power.  
Dynamo Self-Contained and Perfectly Automatic.

Plant may be located where Power can be secured  
Cheapest, even if Miles Distant from the Lighting.

SEND FOR CIRCULARS. - CORRESPONDENCE SOLICITED.

HEISLER ELECTRIC LIGHT CO., 809-817 South 7th St., ST. LOUIS, MO.

LIBERAL DISCOUNT TO DEALERS, SEND FOR REDUCED PRICE LIST.



No. 2 O. K. OUTFIT,

WITH SOUNDER AND KEY

On same base, or separate, as ordered.

Complete Outfit, - - - \$3.75

Sounder, - - - - - 2.25

Key, - - - - - 1.00

Sounder and Key on one

Base, - - - - - 3.25

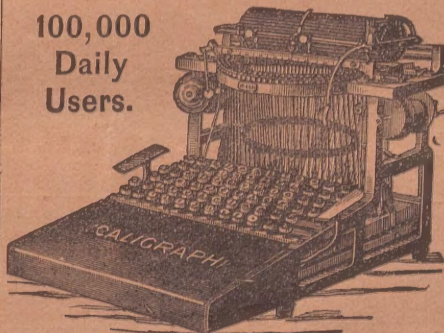
The above Outfit consists of a beautiful Sounder wound to 20 ohms, and one of my unrivaled Nickel Plated, Legless, Steel Lever Keys; One Cell 5x7 Battery (or 6x8 Battery, 10c. extra); 15 ft. Insulated Office Wire, 1 lb. Vitriol, 1 Instruction Book, all safely packed and will be shipped on receipt of price, or sent C. O. D., subject to inspection, if you send me \$1.00 with order. State whether you wish Key and Sounder on same Base or separate. Write your address plain and full, also state by what Express Co. wish goods shipped. Address,  
**A. B. LYMAN. 34 and 36 South Water Street, CLEVELAND, OHIO.**

## CALIGRAPH Remington

GREATEST SPEED ON RECORD!!

T. W. Osborne wrote 179 words in one single minute on the CALIGRAPH, the Champion Machine of the World.

100,000  
Daily  
Users.

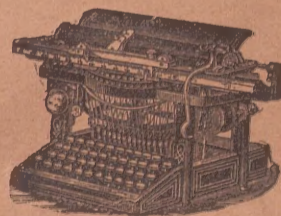


G. A. McBride wrote 129 words in a single minute, Blindfolded, thus in each case proving the falsity of many of the statements of our competitors.

For full and correct account of above test, address

**THE AMERICAN WRITING MACHINE CO.,  
HARTFORD, CONN.**

BRANCH OFFICES:—237 Broadway, N. Y.;  
14 W. 4th Street, Cincinnati, O.; 1003 Arch  
Street, Philadelphia.



Standard • Typewriter

HAS BEEN FOR

**FIFTEEN YEARS**

**THE STANDARD,**

AND

Embraces the Latest and Highest Achievements of Inventive Skill.

**WYCKOFF, SEAMANS & BENEDICT,  
327 BROADWAY, NEW YORK.**



**A GOLD MEDAL**  
at the **PARIS EXPOSITION** for

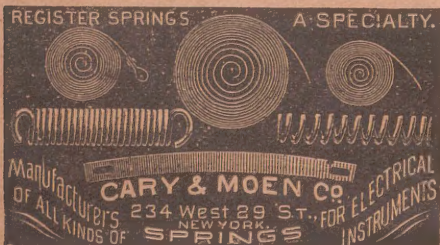


TRADE MARK.

**WIRES & CABLES**

For Telegraph, Telephone and Electrical Uses.

**THE OKONITE CO.,**  
No. 13 Park Row, NEW YORK.



**THE ELECTRICAL NOVELTY CO.**

MANUFACTURERS OF

**TELEGRAPH INSTRUMENTS,**

DEALERS IN

**ELECTRICAL SUPPLIES**

AND CONTRACTORS FOR

**ALL KINDS OF ELECTRICAL WORK.**

Patents bought and Inventions marketed on commission.

Correspondence invited. Address,

**R. S. HOWLAND, Pres.**  
**F. N. BASSETT, Sec. & Gen. Mgr.** **ELECTRICAL NOVELTY CO.,** Montclair, N. J.

**ANSONIA BRASS & COPPER CO.**

SOLE MANUFACTURERS OF

Cowles' Patented Fire-Proof and Weather-Proof Line Wire.



SAMPLES FURNISHED UPON APPLICATION.

Pure Electric Copper Wire, bare and covered, of every description.

Warerooms: 19 and 21 Cliff Street, New York; 133 & 135 Wabash Ave., Chicago, Ill. Factories: Ansonia, Conn.

**THE ELEKTRON MANUFACTURING CO.,**

79 & 81 WASHINGTON ST., BROOKLYN, N. Y.

MANUFACTURERS OF THE

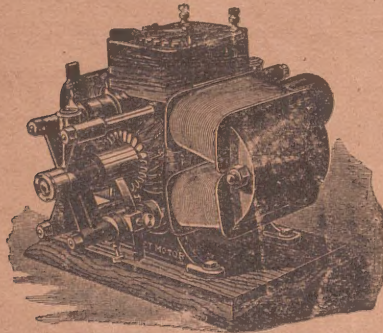
**Perret Electric Motors and Dynamos.**

AUTOMATICALLY REGULATED, UNEXCELLED IN SIMPLICITY AND DURABILITY.

THE ONLY MACHINES HAVING

Laminated Field Magnets of Softest Charcoal Iron,

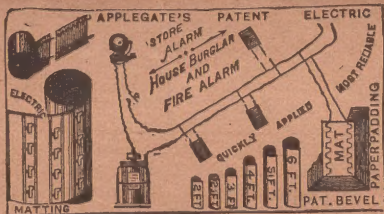
By means of which Higher Efficiency, Closer Regulation and Slower Speed are obtained than is possible otherwise. Careful investigation invited.



**Standard Underground Cable Co.**

**ELECTRIC CABLES, LINE and HOUSE WIRE.**

General Offices, 708 Penn Ave., Pittsburgh, Pa.  
Branch Offices:  
N. Y., 18 Cortlandt St. Chicago, Room 542, The Rookery.



**Applegate's Electric Floor Mat Manufacturing Co.**

OFFICE AND FACTORY:

No. 37 Market Street, Camden, N. J.

**THE GREATEST HOME PROTECTION YET INVENTED.**

**SIMPLE! DURABLE! CHEAP! VALUABLE!**

For sale by all Electrical Supply Houses.

**DAY'S KERITE WIRES AND CABLES,**

For Aerial, Underground and Submarine use.

**EDWARD B. McCLEES,**  
General Agent.

16 DEY ST., NEW YORK



**ENGRAVINGS for BOOKS, NEWSPAPERS and CIRCULARS**

SEND GREEN STAMP for CIRCULAR—SEND PHOTOGRAPH, DRAWING or PRINT for ESTIMATE.  
When writing please mention "The Electric Age."

**Stevens Institute of Technology,**

Hoboken, N. J., February 12, 1889.

**BISHOP GUTTA PERCHA CO.**

Gentlemen:—I have made an extensive series of tests of your **WHITE CORE INDIA RUBBER INSULATION**, under various conditions of temperature and times of immersion in water, with the following results:

INSULATION RESISTANCE IN MEGOHMS PER MILE.

| Time.....     | 5 min. | 1 hour | 24 hrs. | 10 days. | 24 days. | Time.....       | 30 min. | 30 min. | 30 min. | 30 min. |
|---------------|--------|--------|---------|----------|----------|-----------------|---------|---------|---------|---------|
| Temperature   | 60° F. | 60° F. | 60° F.  | 60° F.   | 60° F.   | Temperature..   | 40 F.   | 115° F. | 167° F. | 200° F. |
| Resistance... | 3,200  | 3,300  | 3,300   | 3,300    | 3,300    | Resistance..... | 3,900   | 162     | 12      | 5.2     |

The times given in the left hand table are those between the immersion of the wire in water and the making of the test.  
The times of right hand table indicate the time between that at which the tank reached the indicated temperature and that at which the test was made.  
The cable had been immersed in water for a month before the first temperature test was made.  
It will be observed that the temperature being at 60° F, the resistance remained constant at its highest point for 24 days, and then raised greatly on lowering the temperature.  
The lowering of resistance by a rise in the temperature is a common characteristic of all such insulations and indicates no defect. Most insulations are much more affected by this cause than was this one.  
This wire also showed no deterioration from exposure to moist air, fresh plaster, damp earth, etc., after several month's exposure. Its insulating power also was unaffected by a like exposure to illuminating gas.

Very truly yours,

(Signed) **HENRY MORTON.**

**BISHOP GUTTA PERCHA COMPANY,**

420-426 E. 25th Street, New York.

**DRAUGHTSMEN'S SENSITIVE PAPER**  
FOR COPYING DRAWINGS &C. IN  
**WHITE LINES ON BLUE GROUND**  
**BY LIGHT** AN EXCEEDINGLY CHEAP & SIMPLE METHOD  
**AMATEUR PHOTOGRAPHIC OUTFITS**  
SEND FOR THOS H MC COLLIN 635 ARCH ST.  
PRICE LIST PHILADELPHIA PA.

LEONARD PAGET. CHARLES J. KINTNER,  
Late Prin. Electrical Examiner,  
U. S. Patent Office.

**PAGET & KINTNER,**  
Chemical and Electrical Experts,  
AND ELECTRICAL ENGINEERS.  
DOMESTIC AND FOREIGN ELECTRICAL PATENTS.  
45 Broadway, New York.

**Electrical Business Directory.**

**ANSONIA BRASS & COPPER CO.**  
Wires, New York and Chicago.

**BOGART, ABM. L.,** MANUFACTURER  
of Electric Gas Lighting Supplies.  
22 Union Square, N. Y.

**BROOKFIELD, W.,** MANUFACTURER  
of Screw Glass Insulators and Battery  
Jars. 53 Fulton St., N. Y.

**DAY'S KERITE, WIRES AND CABLES.**  
16 Dey St., N. Y.

**EDISON MACHINE WORKS, WIRES**  
&c. 19 Dey St., N. Y.

**ELEKTRON MANUFACTURING CO.**  
Perret Electric Motors and Dynamos  
79-81 Washington St., Brooklyn, N. Y.

**GREELEY THE E. S. AND CO. ELEC**  
trical Supplies. 5 & 7 Dey Street, N. Y.

**DR. GASSNER'S DRY BATTERY.** THE  
best open circuit battery in the mar-  
ket. A. Schoverling, Sole Agent and Man-  
ufacturer, No. 111 Chambers St., N. Y.

**LAMARCHE'S SONS, H.,** 83 JOHN ST.  
New York. Zincs. Finest quality Zinc  
Annunciator, Office, Magnet and Electric  
Wire of all kinds.

**LÉCLANCHE BATTERY CO. BATTÉ**  
ries. 149 W. 18th St., N. Y.

**LYMAN, A. B. KEYS AND SOUNDERS**  
34 and 36 So. Water St., Cleveland, O.

**LAW TELEPHONE CO., BATTERIES.**  
85 John St., N. Y.

**MARSHALL, WM.,** MANUFACTURER  
ELECTRIC CONDENSERS,  
Standards a Specialty,  
Room 2 & 4, University B'lg, N. Y.

**OKONITE CO., WIRES AND CABLES.**  
13 Park Row, N. Y.

**PARTRICK AND CARTER, ELECTRIC**  
cal Supplies.  
114 So. 2nd St., Philadelphia.

**STANDARD UNDERGROUND CABLE**  
CO., Cables, Pittsburg, Chicago and  
New York.

**SABINE, J. B.,** ELECTRICAL PA-  
tents. 181 B'way, New York.

**SPON, E. and F. N. ELECTRICAL**  
Books. 12 Cortlandt St., N. Y.

**SHAVER CORPORATION** ACUSTIC  
S Telephones. 78 Cortlandt St., N. Y.

**J. W. COLBURN & CO.**  
130 MAIN ST. FITCHBURG MASS.  
FIRST CLASS WORK  
**MACHINES FOR**  
ARC AND INCANDESCENT ELECTRIC  
LIGHTING, ELECTRO-PLATING, AND  
FOR EXPERIMENTAL USE. ALSO MOTORS.