

VOL. XIII.—No. 18.

NEW YORK, SEPTEMBER 15, 1882.

{ ONE DOLLAR A YEAR,
6 CENTS PER COPY.

Fourth Meeting of the National Telephone Association.

The fourth convention of the National Telephone Association of the United States met at the Hotel Vendome, Boston, on Tuesday, Sept. 5. The attendance was large, and great interest was manifested by the delegates in the proceedings. The weather during the two days' session of the convention and the two following days, which were devoted to recreation, was all that could be desired. The American Bell Telephone Company, of Boston, had made every provision for the comfort and entertainment of delegates. Messrs. R. S. Boyd, J. M. Brown, T. B. Doolittle, C. A. Truex, and F. B. Knight, special agents of the company for the Western, Southern, New England, and Middle & Pacific Coast States, respectively, had a suite of rooms—No. 204—in the hotel, and were charged with looking after the welfare of the delegates and seeing that they were all made as comfortable as possible. Mr. Sabin, superintendent of the Pacific Bell Telephone Company, was by these gentlemen elected an honorary member of the "204" club. The best of good-feeling prevailed. Hon. Marshall Jewell, ex-Governor of Connecticut, was chosen president of the association, and accepted the honor in a brief speech, complimenting the members upon the fine attendance at the convention, and upon the progress of the telephone business. A number of applicants were admitted to membership in the association. The reports of the various committees were listened to attentively, and were followed by interesting discussions of various telephonic problems. The exhibition of telephonic apparatus was not so large as at some of the other conventions, the reason probably being that there was comparatively little new to exhibit. This feature, however, was by no means neglected. We shall refer to the exhibits at length next issue. The convention adjourned on Wednesday, September 6, to meet at Cincinnati on the third Tuesday in October, 1883.

On Thursday, September 7, the delegates, by invitation of the American Bell Telephone Company, proceeded in a body, in the steamer Nantasket, to Nantasket Beach, where an elaborate dinner was served. The season at the Hotel Nantasket had closed, but the house was kept open especially for the occasion. The dinner reflected the highest credit alike upon the hotel that served it and the good taste and liberality of the American Bell Telephone Company, that supplied it. Nothing was wanting that thought-

fulness, experience and money could do to make the banquet a success, and that it was a brilliant success, all who were present bear unanimous testimony. The menu having been disposed of, President Forbes, of the American Bell Company, expressed, in a brief address, the kindly feeling of the parent company toward the various exchanges throughout the country. Gov. Jewell responded for the association, paying handsome and deserved compliments to President Forbes and General Manager Vaile.

Mr. Gardiner G. Hubbard, of the original Bell Telephone Company, and who is the father-in-law of Prof. Graham Bell, the inventor of the telephone, followed in an address, reviewing the history of the development of the telephone. He divided the history of the telephone into epochs. The first was eight years ago, when Professor Bell, rising from a piano where he was seated, declared himself convinced that the sound of the human voice could be carried in tone waves upon electrical wires. Another epoch was later, when one day the professor entered his room and handed him a piece of iron attached to a wire. Placing it to his ear he was amused at hearing articulate sounds. The next was when he stood, among others, with the emperor of Brazil, at the Centennial Exhibition, in Philadelphia. The telephone had been mounted, and was on exhibition. The emperor, placing the instrument to his ear, started back, exclaiming, "My God! It speaks!" Another epoch was the establishment of the first telephone exchange. Still later and marked periods were when the present management of the American Bell Telephone Company took the control of affairs, and when the Western Union Telegraph Company became identified with its interest.

An expression of the appreciation felt by the association toward their hosts having been rendered, the party made the return trip, arriving in Boston early in the evening. On the way up there were several pleasant little speeches in the cabin of the Nantasket, in which Mr. Tyler and others, speaking on behalf of the licensees of the American Bell Company, thanked the parent company for the attentions that had been shown the delegates during their stay in Boston. Mr. Tyler said that he was beginning to see into the policy of the American Bell Company, and that he found it to be a living policy for licensees as well as for the parent company.

On the following day the members of the association proceeded to Providence, to accept the invitation of Mr. Eugene F. Phillips, of that city,

to attend his fourth annual clam-bake to telephone, telegraph and electric light men. The festivities took place at the grounds of the Bondholders' Club, Pawtuxet. On the arrival at the grounds the guests, 118 in number, were welcomed by ex-Governor Howard in a neat speech, after which luncheon was served. Then followed a season of sports, varied by story-telling, singing and social enjoyment.

At three o'clock dinner was served, to which ample justice was done. After dinner, the guests indulged in pleasant reminiscence and general fraternization, when order was called and Mr. Ralph W. Pope, of New York, in neat and appropriate phrase, presented Mr. Phillips, on behalf of the electrical fraternity of the country, with an elegant water set, tea set and wine cooler. Mr. Phillips feelingly responded, thanking his guests for this token of their regard and esteem, and said he hoped to meet those present at many more of these annual gatherings. The water pitcher bears the following inscription: "Presented to Eugene F. Phillips, by the Electrical Fraternity of the United States, Sept. 8, 1882." About 6 o'clock the merry party returned to Providence.

This terminated the programme of the convention, and the members dispersed to return to their homes.

The meeting was a very enjoyable and gratifying one in every respect, and reflects much credit upon the enterprising and progressive gentlemen who have charge of the telephone interests of our country.

A detailed account of the proceedings will be found below.

The convention was called to order on Sept. 5, at 11:20 A.M., by President Phillips. The roll of members having been read, applications for membership were taken up, and the following were admitted as members of the association:

The Louisiana Telephone Company, of New Orleans.

Messrs. Loomis & McDaniel, Joplin, Mo.

The St. Johnsbury Telephone Company, of St. Johnsbury, Vt.

The American District Telegraph Company, of Utica, N. Y.

The New Jersey Telephone Company, of Jersey City, N. J.

The Easton Telephone Company, of Easton, Pa.

The Long Island Telephone Company, of Brooklyn, N. Y.

The Northwestern Telephone Association.

The Winnipiscogee Telephone Company, of New Hampshire.

The Missouri and Kansas Telephone Company, of Kansas City, Mo.

The following were elected honorary members:

The Utica Fire Alarm Telegraph Company.
The Bridgeport Brass Company, Bridgeport, Conn.

The reports of the secretary and treasurer were read, the latter showing a balance on hand at the last meeting of \$781.40; receipts from initiations and annual dues, \$1,422.23; and to the credit of the association at the present time (after deducting amounts paid out during the year), cash deposited, \$818.41; in hand, \$70.75.

The president announced that at a meeting of the executive committee, held that morning, the accounts of the secretary and treasury had been examined and found correct. The executive committee also recommended that the secretary be paid \$300, for services during the past year, and that meetings during the present convention be held from 11 A. M. to 8 P. M. each day, during the session. The report was accepted.

The election of officers being the next business before the convention, ex-Governor Marshall Jewell, of Connecticut, was unanimously elected president, and was conducted to the chair by Mr. Sabin, of San Francisco. In taking the chair, President Jewell said he was much gratified by the manner in which his name had been received by the members of the association. Speaking of the telephone, he said that no invention had ever so rapidly established itself in our business and social life; that it was the most progressive of modern inventions, and one that would do more to facilitate business than any of its competitors, not excepting steam. Looking over the audience before him, he could not help thinking what a splendid National Republican Committee the delegates would make. If he could only have such bright, intelligent, progressive men at his back, he would not care which side he was on, as it would be sure to win. The telephone is becoming more and more indispensable to business men and in our homes, and he congratulated the association on the prospect before it for the next year. The new president's speech called forth prolonged applause.

On the nomination of Mr. E. V. Cherry, of Cincinnati, Mr. James B. Speed, of Louisville, was unanimously elected vice-president. Mr. C. N. Fay, of Chicago, was elected secretary, and Mr. F. G. Beach, also of Chicago, treasurer. Mr. George C. Maynard, of Washington, was elected his own successor for three years on the advisory committee. Messrs. F. O. Vaille, of Denver; W. H. Eckert, of New York; George L. Phillips, of Boston, and Robert Morton, of Philadelphia, were chosen as the executive committee.

The secretary read a communication from the American Bell Telephone Company, tendering the delegates an excursion down the harbor and a dinner at the Hotel Nantasket, Nantasket Beach, at 4 o'clock on Thursday, Sept. 7. The invitation was accepted, with the thanks of the association, and a committee of three, Messrs. E. V. Cherry, of Cincinnati, W. A. Jackson, of Detroit, and J. W. Luxbury, of Providence, was appointed to take charge of the details.

On motion of Mr. Cherry, the thanks of the association were tendered to the retiring president, Mr. George L. Phillips, who was also elected an honorary member of the association. The thanks of the association were also tendered the retiring vice-president, secretary and treasurer.

The preliminary business being disposed of, the reports of the various committees were taken up in order.

Mr. Morris F. Tyler, of the Committee on Legislation, reported that in New Hampshire, by statute, the highways for telegraph and telephone wires are public property, so that no damages have to be paid for running the wires along the roads in that State.

The question whether a telephone company can discriminate between subscribers by giving connection to one firm or company and refusing it to an opposition firm or company, has been several times in the law courts, but no satisfactory decision has yet been arrived at by the higher courts. The American Union Telegraph Company obtained a mandamus in one or two instances, but before the cases, which were appealed, could be formally argued in the higher courts, the company had consolidated with the Western Union. Several cases of the same kind

were now pending, though Mr. Tyler thought they would come to a decision of some kind.

In Indiana, the statute defines the responsibility of the company for failure of the instruments to work, and says that no damages can be collected unless the want of ordinary care on the part of the company can be proved. No matter how much actual damage may be sustained, no special damages can be collected, except a rebate on the tolls during the time the instrument was out of order.

The question whether a man can summarily remove the wires of a telephone company from the roof of his house has come up in Connecticut. Mr. Tyler thought it was questionable whether, if the removal were not done maliciously, the telephone company could obtain redress.

At Cincinnati a case was brought to trial, and it was decided that a telephone company had a right to remove an instrument from a subscriber's place where it was used for immoral or illegal purposes.

Mr. Spang, of Reading, asked whether no decision had ever been given permitting telegraph or telephone companies to trim the trees on streets and highways near their lines.

Mr. Tyler replied in the negative, and said that trees are the property of the land-owners, and a telegraph or telephone company trimming them runs the risk of paying damages.

A vote of thanks was rendered Mr. Tyler for his able, exhaustive and instructive report.

The report of the Committee on Central Office Systems and Apparatus and Exchange Statistics was read by Mr. Fay, who said that before reporting he would like to follow up the remarks which Mr. Tyler had made, as to the inadequacies of the returns received from exchanges. So many of them came in late—some that very morning—that they gave the committee great trouble in getting averages; in fact, he had to change the averages five different times.

Out of about 600 exchanges, the whole number of exchanges reporting was only 81, covering about 80,000 telephone subscribers.

Of exchanges having more than 1,000 subscribers, the Metropolitan Telephone & Telegraph Company, of New York City, comes first, with 2,878; the Law Company, of the same city, has 578; Chicago has 2,593; Cincinnati, 2,156; Providence, 1,906; San Francisco, 1,294; Boston, 1,186; Detroit, 1,110; Albany, 1,100; Buffalo, 1,047; Louisville, 1,024; Baltimore, 1,017. The smallest number of subscribers in any exchange reporting is ten.

During the year there has been a general increase in the number of subscribers, all along the line.

The number of connections made runs as high as 20,000 (in Cincinnati) and as low as 60 (in Washington, Ind.). The average of all is about five connections per day for each subscriber. Sixteen managers report using magneto-bells exclusively; two, battery-bells; six use both. Twenty-three exchanges, out of eighty-one reporting, put more than one subscriber on a wire; of these, fifteen are discontinuing the practice.

Seventeen managers preferred female operators; one (Evansville, Ind.) enthusiastically said he preferred them by all odds; four preferred male operators, and one had no preference.

Mr. Fay presented other statistics, but their value was greatly impaired by the fact that some of those who sent in replies to the questions of the committee did not seem to fully understand what was wanted.

Mr. Fay said that the exchanges which work to the best advantage are those that have only two operators. Those that have more than two do not show so good a record. The ability of operators to handle subscribers does not increase as the number of lines and of operators is added to, but rather diminishes.

Where no change has been made in rates, the business has grown rapidly during the year. In all of the exchanges there has been a healthy growth, which is likely to continue for some time to come, and there is no fear that the limit of the business has been anywhere reached. In Chicago, new subscribers are now almost invariably secured without solicitation. Where rates have been advanced, some of the smaller of the older subscribers have dropped out, but their places have been filled by larger and stronger houses at current rates.

Speaking of the number of connections on trunk lines, of which it was important to know

the capacity, Mr. Fay said that the highest number of connections made on the trunk lines in Chicago was 180 per day, which he thought was about as large a number as could be made on such a line. An extra-territorial line, in Mr. Fay's opinion, ought to do 70 or 80 messages a day. Figuring on such a basis, it ought not to be difficult to arrive at what would be the correct tariff to adopt. Between Boston and Providence only 40 messages a day could be obtained.

In conclusion, Mr. Fay said that the reports he had given showed a very gratifying condition of the business in general, and if published would, he thought, be interesting to the subscribers of the various exchanges, and, by given them an idea of the amount of work done, would tend to facilitate the handling of business.

In answer to an inquiry as to whether the Law system was in use only in large cities, or generally, Mr. Fay said that it was used in St. Louis, where seven or eight hundred subscribers were worked on the Law system, and one exchange on the other system. It had also been recently established in Philadelphia and the Law Telegraph Company, in New York used it for its upward of 500 subscribers. Mr. Carson added that the Southern Bell Telephone Company operated 25 or 30 of its exchanges on the Law system, and that the managers reported great satisfaction with it, and that the amount of business on lines worked under the Law system had much increased since it was established.

Mr. Nightingale, of Utica, asked if clearing-out relays were still in use. Mr. Fay said such relays were in use in some shape on every one-wire system. The difficulty was that when a subscriber neglected to ring off, the effect was the same as if the conversation was still in progress.

The chairman of the Committee on Line Construction and Maintenance, Mr. Ross, not being present, and the other members not being prepared to report, the chair asked for remarks on the subject.

Mr. Fay wanted information in regard to the building of long lines, particularly with reference to the avoidance of induction. He called upon Mr. Jackson, who had recently built some long lines—one of them ninety miles in length—to state his experience.

Mr. Jackson said they had used cross-arms eight feet long, placing the wires at the outer ends of the arms. No other anti-induction method had been employed. There is some induction on the lines; still, subscribers can converse very well over them. He had taken the precaution to solder all the joints at intermediate stations. He uses the Jones slant, which is a coil of German silver wire, connected on each side of the call-bell. The lines give excellent satisfaction, except during very hot weather, or just before a thunder-storm. The size of wire used is No. 9. The resistance of the Jones slant, somewhat affects the ringing of the bell; still the bell is loud enough to be heard distinctly in all cases. The wires have been kept away from telegraph lines, except where they cross each other. The Port Huron line runs parallel with the telegraph lines for twenty miles; that line does not work so well as some of the others, though generally well enough for conversation.

Mr. Balcock, of Evansville, Ind., reported that his exchange had 700 miles of No. 14 wire, and that in building one of the lines, 45 miles long, the lineman got drunk and neglected to put on any insulators, merely tying the wire to the poles. After the wire was up, he could see no difference between its working and that of others that were insulated, and they had built some of their other lines also without insulators and they had worked well. The exchange now has 400 miles of lines which have been working for a year without insulators. He was not an electrician himself, but those who claimed to be electricians had told him that, although the line might work in dry weather, he would be unable to do anything with them in wet weather; he had not, however, found that this prediction had come true. On an 8-mile line he has often whispered over it of an evening, and the whisper has been heard distinctly at the other end, although on twenty miles of it there are no insulators. The exchange has two 40-mile lines running parallel, the one insulated and the other not, and no one can tell by the working which one he is on.

Mr. Fay said that he had recently built a line

in Illinois, with wires 13 inches apart, which, from a telegraphic standpoint, is as fine a line as any in America, but he had just heard from the superintendent that it could not be worked. He thought he had better go home and take off the insulators and try it then!

Mr. Platt, of Poughkeepsie, N. Y., wanted information in regard to soldering joints, and asked if there had been any decision on the subject. Some discussion ensued, in which it was shown that as a general thing joints were not soldered.

Mr. Babcock said that about half the lines of his exchange were soldered and half not, and that they could not see any difference in the working.

Mr. Fay said that troubles on some lines had been corrected by cutting out bad joints and making new ones.

In Cincinnati, Mr. Eckert said, when old lines were taken down, the joints were always resoldered, if the wire was to be used again.

Mr. Sabin asked for a vote on the question of the advisability of soldering joints, and the show of hands demonstrated that all present were in favor of soldering joints, although nearly all admitted that they rarely did solder them.

Mr. Jackson said that in Michigan they had tried working the wires in metallic circuit, and the effect was to improve the working of the wires. There were noises still, but not so much annoyance from that cause as before.

Mr. Vaille said the Colorado lines were very clear, and free from inductive troubles. The lines from Denver west, in the mountains, about 40 miles, were interfered with by electric storms in the spring, which would come on about 10 or 11 in the forenoon, and go off early in the afternoon; at other times they would come on in the middle of the day and go off in an hour or two. The size of wire used was, for long lines, No. 12, but in general, No. 14.

Mr. Eckert said that at Cincinnati four parallel lines had been built, 25 miles in length, with a device for killing the induction. The wires were nine inches apart, and there was no more induction on them than on ordinary city lines, although the telegraph lines run on the opposite side of the street. In his opinion the induction of electric light, telegraph and telephone lines could be got rid of by the use of the "induction-killer." On the Hamilton line, 25 miles long, a whisper can be heard at any time in the day.

At 2:55 o'clock the convention adjourned until 11 o'clock the following morning.

On the second day, Wednesday, September 6, the convention was called to order by the president at 11:15 A. M.

A communication was received from Mr. E. F. Phillips, of Providence, inviting delegates to the convention to a clam-bake at that place, on Friday the 8th. The invitation was accepted with the thanks of the association, and a committee appointed to take charge of the details.

Mr. Geo. L. Phillips suggested that the next meeting be held in the early part of December, that being a time when members can with less inconvenience leave their business; and that a committee of three be appointed to consider the time and place of the next meeting. The suggestion was adopted, and Messrs. Speed, Uline and Jackson were appointed a committee for that purpose. The committee subsequently reported, recommending Cincinnati as the place, and the third Tuesday in October, 1889, as the time of the next meeting. Adopted.

Mr. Choate, of Washington, presented a resolution recommending an exhibition of electrical inventions, to be held at Washington in January or February, 1894, and that a committee of fifteen be appointed to report on the feasibility of the project at the next meeting of the association.

Mr. Phillips said the resolution did not seem to require much discussion; he thought such an exhibition would be a good thing, and recommended the adoption of the resolution.

Mr. Pope also thought the resolution a good one, and suggested that correspondence be had with other electrical societies. He thought that if a good committee were appointed there would be no doubt of its success.

It having been suggested that an appropriation might be obtained from Congress in aid of the proposed exhibition, the chair said the time was too short to admit of any congressional appropriation being obtained. If the electric light, telephone, telegraph, electric railway and electric

machinery manufacturing interests combined, they could hold the exhibition without assistance from Congress. It could only be done by gentlemen of business energy; it would, however, require considerable money and three or four years' time to perfect the arrangements. The telephone companies would have nothing to exhibit that they do not daily exhibit to all their subscribers. It was the manufacturers who would derive most benefit from such an exhibition, and they should encourage it.

Mr. Choate said that if Congress offered to make an appropriation it would probably not be refused; but the committee could go ahead without any appropriation, and without being authorized to spend any money or to commit the association to the matter.

After some discussion the resolution was amended by striking out the words "January or February, 1894," and substituting the words "at such time and place as may be deemed advisable."

Mr. Carson thought that the association could not undertake, of itself, to bring about such an exhibition, but might initiate a movement that would produce that result by corresponding with other societies.

After some further discussion, Mr. Sargent moved to lay the resolution on the table. Carried. A subsequent motion to take up the resolution was lost.

The report of the Committee on Cables and Subterranean Lines was read by Mr. Lockwood. Everything relating to underground lines for telephones, he said, was at present in an unsatisfactory condition. The first practical lines for the transmission of electricity, both in England and America, were underground. In England, Sir Francis Reynolds had experimented as early as 1816, and he foresaw then the trouble and inconvenience arising from the retardation caused by the induction of the earth. Induction of this kind, however, is different from the telephone induction, or cross-talk, as it is called at Evansville, where conversation on one wire is heard on another. Inductive retardation caused by earth currents was too much for the underground system in Germany. The underground system in England is also similarly troubled, especially where a rapid system is in use; and the telephone is the most rapid system of telegraphy extant. The 2,000 miles of cables in Germany are only used for telegraphic purposes. Telephone wires are all run overhead.

In Mr. Lockwood's opinion, the failure of the old systems of running wires underground was principally due to the poor materials used. Considering the first-class nature of gutta-percha as an insulator, when kept from the air, also the perfection to which it has been brought, ought to make it possible for us to get good underground cables, if we are willing to pay for them. In Paris, the wires run on shelves under the city, but are not subject to the same disadvantages as ordinary underground lines. They are worked in metallic circuit, and each wire is closer to its own wire than to any other conductor. Even if underground wires were possible for telegraphic purposes, that is no argument that they would be for telephone use. Mr. Bell tried, and Mr. Brooks succeeded in patenting, the metallic circuit, although it had previously been patented by Mr. Siemens. In 1871, there were 5,000 miles of cables suspended in England. In 1874 the Gold and Stock Telegraph Co.'s wires were carried overhead, from 61 Broadway to 193 Broadway, by kerite cables. Provided cables are not too long, and are provided with anti-induction appliances, they can be used without any trouble. The suspension of the cables is an important matter. A suspending wire or strand is not to be recommended. The Western Electric cables are prepared with long wires for suspending. The Eckert system, of which mention has already been made in the convention, is an original and highly ingenious invention. In conclusion, he would say that the cables before the telephonic public are all admirable.

The Committee on Call Bells was not prepared to make a report.

Mr. Jackson read the report of the Committee on Telephone Supplies. As regards line wire, there are three kinds, he said—iron, steel and phosphor-bronze. There was a difference of opinion in regard to the respective merits of No. 12 B. B. or E. B. B. iron and 14 steel. In large cities, where the wires are subjected to the influence

of bituminous coal gas, No. 12 iron be considered the better; but in smaller cities 14 steel is preferable. He would not recommend small wires for long lines. Experiments with phosphor-bronze have not, up to the present, been very successful, on account of its high resistance and brittleness, but from later samples of phosphor-bronze wire recently made it was thought that many of the defects might be remedied.

As regards batteries, the Leclanché, with porous cup, has been generally adopted, and may be considered the standard telephone battery of to-day. It is not, however, without its weaknesses and shortcomings, especially its rapid weakening when called into long and frequent service.

The Law Battery has many excellent points, which recommend it for general adoption. One of the most important of these is the fact that the porous cup is dispensed with, and in consequence the battery is susceptible of greater economy in renewal. The whole battery being covered, evaporation is necessarily prevented.

The "Diamond" Carbon Battery is of the same general form as the Law, though differing somewhat in construction. It has not, however, been long enough in practical use for the committee to form an opinion as to its merits.

The committee add that there is great need of a form of battery combining the elements of constancy, strength, economy and cleanliness, and strongly recommend the subject to the attention of experimental and inventive minds.

In the matter of switch cords, Mr. Jackson said that little progress has been made during the year. He added that a cord is wanted that will not ravel at the ends, thus causing "cut-outs" in subscribers' conversation. A greater degree of perfection is required in fastening the tips. They should be light in weight and free from kinks or twists.

The Committee on Electrical Disturbances reported through Mr. Sargent, who said that it was a great mistake to imagine that any kind of a line would do for a telephone line. They ought to be properly built and everything possible done to prevent retardation and induction. Retardation appears to give most trouble on long lines. Mr. Sargent favored overhead cables, and said that there is no instance in which kerite cables have failed to give perfect satisfaction, while their permanence and reliability are well known. By the Brooks cable, in New Jersey, conversation was carried on clearly and distinctly. The Eckert & Sely induction killer works to perfection on the Hamilton line, and is to be tried on the worst wires leading out of New York. Wires ought to be kept free from the earth, by using metallic circuit.

Mr. Sargent read an extract from THE OPERATOR in reference to the sound of the croaking of frogs and singing of birds being heard in the telephone connected with a line passing through a marshy region, and said that Mr. Chittlock, the electrician, after reading the item in THE OPERATOR, made experiments, and heard similar noises.

In conclusion, he said that good work in the construction of lines is as necessary as in any other department of telephone work, and closed by hoping that "we may soon reach that point where induction will cease from troubling and earth currents be at rest."

Mr. Fay said that he and Col. Cowry, gen. supt., W. U. Tel. Co., had some time ago asked Messrs. Siemens Bros., of England, for an estimate, with a view to placing all the wires in the city of Chicago underground. Siemens Bros., in a very carefully prepared and elaborate report, guaranteed their gutta-percha cable to work perfectly within the limits of the city (three or four miles), but would give no guarantee for telephone lines, unless they were worked metallic circuit.

In reply to a question from Mr. Sargent, Mr. Speed said that the first phosphor-bronze wire he had used was too brittle, and No. 20 was too small. When No. 20 kinks it is liable to break. The principal trouble he had found with phosphor-bronze wire was its cost. It doesn't rust, doesn't stretch, and can be drawn up as tight as a fiddle-string, so that there is no danger of a cross. The wire more recently made by the company is much preferable to that first turned out. It lasts a long time, and for exchange purposes resistance amounts to little.

No. 14 steel wire Mr. Speed considers much superior to No. 12 iron. The latter is heavy, and the

grain is coarse, so that it does not take the coating very well, and is liable to crack. No. 14 steel, however, does take it nicely, resists corrosion, and stands atmospheric action much better than iron. It is also lighter, and stands up better. He therefore considers steel preferable to iron; but if phosphor-bronze continues to give the satisfaction he expects, he thinks that it will be better than either.

An incomplete report from the Committee on Exchange Rates was ordered recommended to Mr. Durant, chairman of that committee, to be completed and returned to the secretary in time to be printed with the rest of the proceedings.

On motion of Mr. Fay, the number of the standing committees was reduced from eight to five. Those on Cables and Electrical Disturbances were consolidated, as were also those on Line Construction and Maintenance, Call Bells, and Electrical Supplies. The number of the members of each of these committees was, however, increased from three to five.

The various standing committees for next year will be appointed by the chair, the members being notified when such appointments are made.

The convention as an official body adjourned at 2:30 P. M.

Resignation of President Green.

At the quarterly meeting of the directors of the Western Union Telegraph Company, held in this city on Wednesday, Sept. 13, Dr. Norvin Green formally announced that he would retire from the presidency of the company at the end of his present term. The resignation takes effect on October 10th. The annual meeting of the stockholders of the company takes place on the day following, when a new president will be chosen. Mr. Russell Sage is authority for the statement that Mr. Jay Gould is to assume the presidency, "inasmuch as he is the largest stockholder." In such an event Gen. Thomas T. Eckert would be president, so far as routine work in the management of the company is concerned. Gould not long ago placed himself in the president's chair of the Wabash Railway Company under similar circumstances, superseding Solon Humphreys, and placing the executive cares upon Vice-President Hopkins. In Wall street Dr. Green's resignation is regarded as simply a move to make room for Mr. Gould.

As of interest in this connection, we reproduce an item published in the Aug. 15 issue of THE OPERATOR:

The Philadelphia Press of Aug. 11 had a special dispatch from New York, saying that Dr. Norvin Green was about to retire from the presidency of the Western Union Telegraph Company, to accept a similar position in the Louisville & Nashville Railway Company. The dispatch went on to say that the latter position was worth \$50,000; that Railroad Commissioner Fink had been offered and declined it, and that in the event of Dr. Green's resignation from the Western Union Telegraph Company he would be succeeded as president by Mr. Jay Gould. Dr. Green, when asked about the correctness of the report, read the dispatch over several times, and then said: "There is not the slightest truth in this statement. I do not contemplate resigning from the Western Union just now. I suppose I shall at some future day. A man cannot last always, you know. When I do resign, it shall be to go out of active business entirely."

In declaring his intention of retiring from the presidency of the Western Union Company—just a month after making the above emphatic denial—Dr. Green blandly remarked that when he accepted the position he solemnly pledged his wife that he would retire at the end of five years—which time he has completed—and make his home again among old friends in Kentucky.

To a reporter who called upon him after the meeting, President Green declined to say why he was about to leave the executive chair of the Western Union Company.

Although the resignation had been the talk of "the street" for at least three or four weeks, when the announcement was made the Doctor's associates were apparently taken by surprise.

and when he withdrew from the room a committee of three was appointed to wait upon him and ascertain whether his decision was irrevocable. Messrs. C. W. Field, Samuel Sloan and Jay Gould constituted the committee. They returned after a few minutes and stated that the president was fixed in his resolution to resign. Dr. Green made a verbal review of the company's history during the five years he had been at its head, and later he was requested to write out his remarks, that they might be entered upon the minutes of the meeting.

The emoluments derived from the presidency of the Western Union (the president of which also fills the same position in several other companies—Gold & Stock, International Ocean and a number of smaller ones—and draws a salary from each) foot up about \$50,000, or as much as is paid the President of the United States. Dr. Green, it is said, retires with enough of the world's goods to keep him comfortably during the remainder of his life. He recently purchased a handsome residence in Louisville, Ky., and intends settling down there.

In his address after announcing his retirement, Dr. Green paid a deserved compliment to his colleagues. He said: "I must also acknowledge the able, willing, and most valuable assistance of Vice-President Van Horne, the auditor, secretary and treasurer, and during the past two years of Vice-President and General Manager Eckert and his efficient staff. In yielding up to you the vast interests confided to my charge I shall be able to say with pride and pleasure that I leave this great company more prosperous and powerful than it has ever been at any previous period of its existence."

He also said that his annual report, now in the hands of the printers, would show gross receipts of \$17,100,000 and net profits of \$7,100,000. In five years the increase in the gross receipts had been 80 per cent., and in the net profits 130 per cent. Before the end of the present year, the mileage of the company would be 400,000, capitalized at the rate of \$200 a mile. In five years the length of the wires had increased from 194,233 to 374,294 miles; the offices from 7,500 to 12,050, and the messages from 21,158,941 to 39,000,000.

The quarterly statement placed the net revenues of the company for the quarter ending with the close of the present month, based upon nearly completed returns for July, partial returns for August, and estimating the business for September, at "about" \$2,250,000. Added to this amount is a surplus of \$1,664,240.13 on hand July 1, making a total of \$3,914,240.13. From this sum is deducted \$106,850 for interest on bonded debt and \$20,000 on account of sinking funds, leaving a balance of \$3,787,390.13. An appropriation of \$1,199,770 is made for the payment of the current quarterly dividend of 1½ per cent. on the company's capital stock. A surplus is thus shown amounting to \$2,587,620.13.

Mr. Pender's Visit.

Mr. John Pender, M. P., president of the Eastern Telegraph Company and the Eastern Extension Telegraph Company, and chairman of the Direct United States Cable Company, and connected as president or director with many financial companies in England, arrived in New York on Aug. 30, by the steamer Scythia.

Mr. Pender is apparently between fifty and sixty years old. He has a broad, open countenance, fringed with a gray beard, and looks much more like a country gentleman than the shrewd man of business and successful financial manager which his career has proved him to be. He declares that his visit to this country is purely for recreation. He is obliged to be in England when Parliament assembles, about the 24th of October. Referring to the report that his visit had some connection with his probable election as a director of the Western Union Telegraph Company and the listing of the stock on the other side, Mr. Pender said: "That anticipates too much. Something of the rumors you speak of I have also heard, but no definite overtures have yet been made to me with reference to my election as a director of the Western Union Company. I shall, of course, take

much interest in the condition of the telegraph system here, and shall very much enjoy a chat with some of its leading representatives. The system of which I am president connects England with all the Mediterranean ports—Egypt, India, China, Japan, Australia, New Zealand and the Cape of Good Hope. There is not now an important centre of commerce in the world that is not connected with England by submarine telegraph, and consequently with America. My impression is that nine-tenths of the commerce of the world is now conducted by means of submarine telegraphs. The capital embarked in it represents \$27,000,000 sterling."

Mr. Pender was asked what progress the telephone was making in England.

"We have not made the best of it there," he said. "We have been somewhat hampered by injudicious government interference. Such enterprises should always be left to private management, at least until a high standard of excellence is attained. Improvements are made faster than they would be brought about under a system of government monopoly. When perfected, it may be united with the government system of postal telegraphy and worked very economically. I believe all the American telegraph systems will eventually fall into the hands of the government. I have been the means of introducing the telephone into India and Egypt. It is a mode of communication especially adapted to climates where the hot weather compels business men to stay indoors as much as possible. As regards telegraphing in general, my idea is that it should be made thoroughly international, so as to benefit all nations alike."

Mr. John W. Fuller, the secretary and traffic manager of the Direct Cable Company, which position he has held since the company started in 1874, gave the reporter of one of the morning papers a sketch of the more important cable systems that unite England with the rest of the world.

"There are," he said, "eight Atlantic cables—four owned by the Anglo-American, one by the Direct Cable Company, one by the French Company and two by the American Cable Company. The chief system connecting with France exclusively is the Submarine Telegraph Company and the International Telegraph Company. Reuter's cable uniting with Germany is more or less connected with the British Government postal system. Then there is the German Union Telegraph Company connecting England with Germany and also by special wires with the Atlantic cables at Valentia, Ireland. There is the Hindoo-European system which works by cable to Germany and thence overland through various countries to India. The Great Northern Telegraph Company connects England with Denmark and thence by Wladivostock, a port of Russia in the Yellow Sea. Thence it connects by cable with Japan, Shanghai and Hong Kong, China."

"The more important of the cable systems are the Eastern and Eastern Extension Telegraph Company, of which Mr. Pender is president. The Eastern Telegraph Company has its special wire between London and Porthcurno, Cornwall. Thence by cable the system extends to Vigo and Lisbon in Portugal, Gibraltar, Malta and Egypt. It has further an alternate system by cable from Marseilles to Algiers and thence to Malta and Alexandria. Another cable proceeds from Otranto in Italy through the Levant, passing and connecting with the Greek Islands and Cyprus on to Alexandria. A cable is also laid from Trieste, Austria, connecting with this system to Egypt. It has a cable between Constantinople and Odessa, and has special wires between Alexandria and Suez, thence by duplicate cables to Aden and Bombay, and from Aden to Zanzibar, Mozambique and Cape Colony. The Eastern Extension Telegraph Company's system proceeds from Madras, India, by duplicate cables, one via Rangoon to Penang, the other to Penang, Malacca and Singapore. From Singapore one branch of the main system proceeds to Saigon, Cochin China, Hong Kong and Manila. At Hong Kong it connects with a further system to Amoy, Shanghai and Japan. The other branch proceeds from Singapore to Java and Australia, thence by government land lines and cable to New Zealand. In the various submarine cable systems under British auspices 65,000 nautical miles of cable have been laid."

Mr. Pender was met on his arrival by a perfect

flood of invitations from Wm. M. Everts, Jay Gould and others, nearly all of which he was compelled to decline. On August 31, he met a large party of leading New Yorkers, at the invitation of Mr. Hewitt, at a sumptuous dinner at the Union Club. On the following day, Mr. Pender visited the Western Union general office in company with Mr. Gould, who escorted him through the building. The "Cable King" seemed much interested in listening to Mr. Gould's explanations of the workings of the Western Union system and in examining the various departments of the service.

Mr. Pender, accompanied by a distinguished party, left the same day for the Yellowstone National Park, to visit which was one of the principal objects of his visit.

Another Account of the Denver Strike.

To the Editor of The Operator:

SIR: There has been a great diversity of reports circulated all over the country in regard to the recent strike of the operators of Denver office, and I think that in justice to the operators, as well as to the management, an unprejudiced statement of the matter should be given through the columns of THE OPERATOR.

As is well known, the salaries paid in Denver are (or rather were) considerably less than those paid in cities of corresponding size, both East and West, although at one time the first-class salary in Denver was \$125; but that was far back in "the good old days of long ago." When Mr. Bates, the present assistant superintendent and manager, took charge of the office, the salaries were somewhat less than at present; that is, the lower grades of salaries were. Fifty and fifty-five dollars a month were paid, where now sixty and sixty-five rule; but the first-class salary of \$75 has never been changed.

About three months ago, a petition was drawn up and signed by the entire force, asking for an increase of salary and a change in the manner of computing extra work. This petition was entirely ignored by the manager, with the exception of the clause referring to extra work, which was duly approved and sent in.

In about two months, or maybe less, the operators were informed that their petition had been granted, and that they would hereafter be required to work but 56 hours a week for day and 50 hours a week for night work—a concession on the part of the company of one hour per week.

This act of charity did not, however, fill the bill, and another petition, similar to the previous one, was respectfully submitted to the manager. This never saw daylight. It was pigeon-holed and no action taken upon it. After waiting a reasonable time for an answer to the petition, the operators asked Mr. Bates for an interview. They wished to lay before him their grievances, and find out what he intended doing in regard to them. A time was named, but as Mr. Bates was ill that day the meeting did not take place until five o'clock on the evening of August 1. In the course of the interview, which was very harmonious, Mr. Bates promised to do what he could to have the salaries of those men who he thought deserved it raised. He promised also that he would endeavor to have the rule which prevented an operator from working in any other office in Mr. Dickey's district rescinded. Everything progressed satisfactorily, and every one seemed pleased. The men went to work feeling that soon their services would be appreciated, and in a substantial way. The morrow, however, brought new developments.

Some time previous to this trouble about wages, Mr. Bellmaine, an operator who had been taking C. U. B. for a long time, and who was considered one of the best men in the office, resigned to take an \$85 position at Cheyenne. Mr. Bates accepted his resignation, but refused to let Mr. Bellmaine go to Cheyenne, to work, saying that there was a rule in vogue preventing men from going from one office to another in Mr. Dickey's district. Mr. Bellmaine then applied for a position at Kansas City, and Mr. Woodring, chief operator there, offered him a situation. Mr. Bates making no objection to his going there. It seems that, from some cause, Mr. Bates had a personal feeling against Bellmaine, and had written Mr. Woodring, giving Bellmaine anything but a flattering "character."

All this took place before the interview spoken of. During this interview, Mr. Bates assured the operators that he would do nothing to prevent Mr. Bellmaine getting work at Kansas City. On the contrary, he had already telegraphed Mr. Woodring that he had no objection to his employing him. He said nothing, however, about the letter he had written concerning Mr. Bellmaine.

The developments spoken of came in the shape of a message from Mr. Woodring to Bellmaine, telling him he could not give him work, on account of a letter received from Mr. Bates. This was the first intimation any one had of the double-dealing on the part of the manager, and, after thinking it over seriously, the men agreed that a man who was guilty of underhand work in one thing would probably deceive them in others, and so concluded that it was not safe to trust their interests in his hands. They therefore obtained another interview, the time being fixed at 5 o'clock, the hour when the day men are through and the night men begin their labors.

The whole force, with one exception, that of Mr. J. I. Briggs, marched into the battery-room, where Mr. Bates was awaiting them. It could be plainly seen that the manager was either greatly excited or very angry.

The spokesman, Mr. Ed. Street, told Mr. Bates that on account of matters which had come to the knowledge of the operators on that day, they had concluded that his word could not be relied upon, and therefore they would have to obtain a surance from some one else in authority that their salaries would be increased.

Mr. Bates inquired what the ultimatum would be if he refused to ask for other assurance. The answer was that they had decided not to go to work until such assurance were given from Mr. Dickey. Mr. Bates became excited and exclaimed: "You can all quit, then, and not one of you shall ever work for the Western Union again."

With this threat hanging over them the men filed sadly and solemnly out. They had taken a very risky step, perhaps put themselves on the black list for ever, but their consciences assured them that they had done right in trying to throw off a yoke which no man could bear without sacrificing some of his manhood.

That night the office was run by the manager, chief operators, check boys and one man who had pledged himself to stand by his comrades, but who broke his pledge, namely, J. I. Briggs. The strikers assembled downstairs, in front of the office, to await developments. About 9 o'clock a note was received from Manager Bates, saying that Mr. Dickey advised them to go back to work, and he would see what he could do in regard to having their grievances mitigated. Had this communication come direct from Mr. Dickey the trouble would have then and there been ended. As it was, there was too great a feeling of distrust and fear of duplicity on the part of Manager Bates; so they remained out, after sending a message to Superintendent Dickey, to the effect above stated. For ten days they hung around the office, expecting to hear something from Superintendent Dickey. As nothing more was received, and as all communication with the East was cut off, they began to think seriously over their position, and some of the faint hearts talked about going back to work. They were, however, dissuaded from this, and encouraged to wait until Mr. Dickey should arrive in person, as it was expected he would every day.

In the meantime the office had been filled up pretty well with men from Omaha, including "Dad" Armstrong and Frank Crittenden, from the W. U. Omaha office.

On Tuesday afternoon two of the men—Messrs. Perrin and A. E. Dorr—resolved themselves into a committee of two, and decided to go back to work, whether or no. The presence of Superintendent Dickey at the time doubtless had considerable to do with their action, but they were rather faint-hearted young men any way.

Had they not gone back to work on the day they did, the fight would, it is thought, have been won by the strikers. Mr. J. J. Dickey, superintendent of the Western District, had taken it upon himself to come out to Denver to adjust the matter, and had he not had an idea of making some concession he would hardly have left Omaha, for it was just as easy for him to declare the strikers all "black-listed" from there as from here; but when he saw that the ranks

were broken and two of the strikers had gone back to work, he guessed, and rightly, too, that others would soon be glad to follow in their footsteps; and so when he had an interview with the men, he told them he could have nothing to do with them as a body, but would talk to them as individuals.

This decided the men, or rather the majority, that the case was hopeless, and the next morning several of them applied for work, and were told that if they signed a paper stating that they felt that they had done wrong and acted hastily in the matter, also that they believed all the newspaper talk about Manager Bates to be false, etc., they would be put to work at their old salaries. Two of the men, Messrs. Wm. Stanton and John Brady, signed this paper and went to work. The rest refused to sign any such document, and consequently were barred out.

A day passed, and the strikers began to think that if they could get the "backsliders" out again they would yet win the fight. With this end in view they talked to them, and Messrs. Brady, Stanton and Dorr once more unfurled the flag of freedom and joined the strikers. Mr. Perrin, however, could not be persuaded, and stuck to Manager Bates. Had financial assistance from the East arrived when it was expected, and in fact when it was promised, things would in all probability have turned out differently. The company knew that the men were short of money, and believed that soon they would be reduced to an extremity, as was the case. Twenty-nine dollars received from Chicago, and fifty dollars donated by the local society of printers, was all the money received; about five dollars for each man.

It is worthy of mention that several men who could have gone to work at good salaries preferred to remain with their confrères and sink or swim with them. Mr. Ormsby, who is now in the East, was one of these.

The strikers remained out fourteen days before anything was done toward giving up the fight. When they saw it was useless to stay here any longer, especially as men were arriving from the East every day, they pulled out for a more congenial clime.

The men who comprise the present force are as follows: Messrs. F. F. Clohesey, chief operator, Richard Waycott, of New York, Frank Heims, of New York, C. E. Backmeister, of St. Louis, J. I. Briggs, formerly of St. Joseph, Mo., C. J. Perrin, of Denver and Mr. Lawton, night chief. This list does not include the check-boys and railroad men, of whom there are about as many more.

The strikers have all left town, with one or two exceptions, and the strike is a thing of the past; but it has not been without its uses. It has compelled the company to pay decent salaries here, as is shown by the fact that the best men now employed are getting from \$80 to \$90 a month. It has also shown to the fraternity that nothing can be accomplished without unity. Had the boys all been members of the Brotherhood, and their action had been sanctioned by that organization, the result would have been different. Another thing it has shown, is that superintendents are not always infallible, as in the case of Assistant Superintendent Bates. He claimed that the rule depriving Denver operators of the privilege of working in other offices in Superintendent Dickey's district was sanctioned by Mr. Dickey, while Mr. Dickey affirmed that there was no such rule extant. Mr. Bates has yet to learn the art of strategy, but as he is comparatively a young man, he will no doubt in time prove efficient in that line. Experience is a jewel. DENVER, Col., August 27, 1882. * * *

From the Secretary of the Brotherhood.

To the Editor of The Operator:

SIR: Please announce through your columns that the officers of the Brotherhood earnestly desire, and have done so from the first, the co-operation of railroad operators; and that the right hand of fellowship is extended to all classes of operators, both ladies and gentlemen. Our interests are identical, and we not only desire but urge them to join us. To this end, therefore, we invite all who wish to enlist under our flag to send name and address (those that are fictitious will receive no attention) to "Corresponding Secretary," Box 422, No. 21 Park Row, New York, and they will be interviewed, or hear from us by mail. SECRETARY.



PUBLISHED SEMI-MONTHLY

At No. 9 Murray Street, New York.

Entered at the N. Y. Post-office as second-class matter.

W. J. JOHNSTON, Editor and Publisher.

NEW YORK, SEPTEMBER 15, 1882.

Americans visiting Europe will find *THE OPERATOR* on file at the AMERICAN EXCHANGE AND READING ROOM, No. 449 Strand, London.

Subscribers desiring their addresses changed, should give the old as well as the new address.

THE TELEPHONE CONVENTION.

It would be difficult to obtain a body of men more representative of American enterprise than those who were brought together by the convention of the National Telephone Association, in Boston, on the 5th instant, a fact which was noticed by Gov. Jewell, the chairman of the convention, a gentleman who has had a large experience with meetings of public men. The facts and figures presented—not the least being the convention itself—indicate that America, the birthplace of the telephone, is in no danger of losing the position she has hitherto occupied, of leading the world in telephonic development. Great credit is due the American Bell Telephone Company for its liberal attitude toward the convention. There is no doubt but that the rapid extension of the telephone in America is largely due to the wise policy of that company, in the adoption of the license system, and in other respects; and the courtesy of the company toward the members of the association, the good feeling thereby engendered on all hands, and the *esprit de corps* stimulated by coming together, getting acquainted and comparing notes of progress, cannot fail to give a still further impetus to telephony.

A noticeable feature of the reports and discussions of the convention was their practical character. It is this tendency to take a practical and utilitarian view of things that has given America the lead in electrical and other invention.

While the reports of the committees indicate a marked increase in the use of the telephone throughout the country during the past year, and a renewed interest in the problems of the telephonist, there remains much yet to be done to make the telephone thoroughly effective. But little has been accomplished toward the suppression of that bugbear of telephonists, induction; and but little advance has been made toward the substitution of underground cables for overhead lines, which are becoming so burdensome. These are the problems that most urgently demand attention—though the solution of the first would perhaps render that of the second simple—and the ones to which it is to be hoped the committees will devote earnest consideration, and be able to report satisfactory progress toward their solution at the next convention.

It is to be regretted that more interest was not taken by exchanges throughout the country

in the matter of furnishing statistical information to the committee charged with its collection. The partial returns obtained indicate how interesting and valuable complete statistics, covering the entire country, would be; and we would like to see at the next convention full responses from all the exchanges of the country. We trust that the Committee on Statistics will prepare a circular of inquiry which will elicit full information from every exchange manager who takes any interest in his profession.

Taken altogether, both in its business and social aspects, the telephone convention was a credit to itself and to the country; it is an institution calculated to do much good, and whose usefulness will probably grow with its years.

A CORRESPONDENT writes to say that the statement of Mr. Corrigan, in our last issue, in regard to the manner in which he was treated by Assistant Superintendent Bates, of Denver, was incorrect in various particulars, and that Mr. Corrigan really was ill-treated, despite his assertion to the contrary. If Mr. Corrigan is satisfied with his experience with Mr. Bates—and he seems to be—we do not see that there is any more to be said in reference to the matter. The statements of the Denver trouble which we have received have been somewhat conflicting, but as the heat of passion is now dying out, it is probable that we shall get at the real facts. We print in another column a temperate article giving the operators' side of the story, which we have no doubt is in the main correct. We see no reason for changing the view first taken of the matter, that the petition of the operators was a reasonable one, deserving at least respectful consideration, and that Mr. Bates' weak and vacillating—if not deceitful—action in the matter brought on the trouble, for which there would otherwise have been no occasion. As the scale of wages of the office had to be raised in the end, it would have been far more graceful to have given the benefit of the advance to those who had served under the old and inadequate scale. A superintendent who would neglect an opportunity to do an act of justice conducive toward general good feeling, and go out of the way to gratuitously stir up bad blood among employes, would not seem to need good business qualifications, to say the least.

FOR many years frictional electricity was the only form known; then the discoveries of Galvani and Volta gave to the world the galvanic battery or voltaic pile, and the old fashioned electrical machine stepped into the background as a scientific toy. Now it begins to look as if the battery were to be in turn supplanted by a new form of electric generator—the dynamo-electric machine. Scarce a day but witnesses some new encroachment of the dynamo upon the domain where the battery has hitherto reigned supreme. Already it is beginning to be applied to electro-plating; in the Western Union office in this city it has been employed for several years to supply currents for telegraph lines, and to such a degree of nicety has it been brought for this purpose that is used to furnish the electricity for even the quadruplex lines, where the polarity of the current is constantly being reversed, and where any deviation from steadiness would be fatal; and a company has been successfully experimenting on one of the elevated railways in this city, with small

dynamos on locomotives, for operating danger signals. The space occupied by the battery, and its uncleanness, render it objectionable, and with the introduction of electric accumulators in connection with dynamos it seems probable that ere long "main batteries" in large cities will cease to be, a change which does not much concern the operators of the present day, but to the "old-timer," who often had to unite the functions of battery-man with those of operator, will not be a matter for regret.

PROBABLY no problem now occupying the attention of men of science is so pregnant of far-reaching results as that of the substitution of the free forces of nature—those contained in the direct heat of the sun, in waterfalls, tides and running streams and in winds—for our present source of power, coal, in the conversion of which there is so great expense and waste. Electricity undoubtedly furnishes the means of utilizing these enormous but hitherto waste forces, and every advance in electrical knowledge brings us nearer to that end, particularly the recent development of dynamo-electric machines, the electric transmission of power and the storage battery. Two projected experiments shortly to be made in Europe will be of great interest in this connection. The first is the proposed use of the 3,000 horse-power of the river Isar, at Munich, to drive the dynamo-electric machines in the forthcoming electrical exhibition in that city, and to show the possibility of employing it to light streets and houses at a distance of some miles, as well as to distribute the force to the various workshops. The other is the establishment of works at Vienna for the conversion of a portion of the current of the Danube into electricity, which is to be stored in accumulators of different dimensions, and delivered to customers for use, either for electric lighting or for motive power. Besides being thus accumulated the electricity is also to be conducted directly through underground wires. By combining the two methods together electrical centers will be erected in several parts of the town, from which it is proposed to supply manufacturers, etc., with the required current.

THE recent decision of the Post Office Department of Great Britain that applications from responsible persons for licenses to establish telephone exchanges will be entertained has given an impetus to the telephone business of that country, and there is a prospect of fun ahead. The prospectus of a new company—The London and Globe Telephone Company—has just been issued, and the United Company, which at present has a monopoly of the private telephone business, promises to make things lively for the new venture. The new company has arranged to acquire a considerable number of patents, among which are the Dolbear telephone receiver the Dolbear transmitter, the Ander's microphone transmitter, a telephone exchange switchboard, a signal bell, and the Skriuanow dry battery. The prospectus of the company says: "It is confidently believed that if a telephone business be conducted, not at monopoly prices, but on terms advantageous to the general public, its extension in this country and on the continent would rapidly approximate to the extraordinary progress which has marked its introduction in the United States." The company further proposes to introduce the American district telegraph system into England and other countries. It is announced that the company will be prepared to sell its telephones, instead of letting them out on hire, as has been hitherto done.

IN many ways electricity is working a silent change in our modes of life, but it is in business circles that its influence is felt the most. In one mode of business—that of the wholesale merchant—the development of the telephone and private telegraphs bids fair to work a complete revolution. A favorite theme with the romance writers of the last generation was the description of the counting-house of a great mercantile establishment, with its adjoining warerooms, piled with the products of different parts of the globe, filled with the cheerful bustle of porters and clerks, and redolent of spicy orders. All this is changing; the merchant now occupies two or three finely furnished rooms in an imposing block near the business centre of the city, and deals entirely with samples, while he communicates by telephone or telegraph with his warehouses, which may be two or three miles away. With trustworthy houses, says the *Sun*, it is as safe to buy by sample as it is to inspect mountains of goods. The new method makes business easier, and has the further advantage of saving time.

THE numerous popular handbooks on "What to do in Emergencies" will soon have to be revised in order to include an emergency not hitherto provided for, but which is becoming frequent—that of violent shock from contact with powerfully charged electric wires, producing insensibility, and sometimes death. The subject is one worthy the attention of physicians. It would be well to know how far resuscitation may be possible in cases of apparent death from this cause, and to ascertain and make publicly known the best methods to be employed in such cases. There is no good reason why electric light wires may not be put underground, and they should be put there, but it is evident that even if this were done accidents would still occur at terminals, as in the case of the young man at Cincinnati, elsewhere referred to, who climbed up to adjust one of the lamps, and was rendered insensible by a shock. Danger to ignorant or foolhardy persons cannot be entirely guarded against, but might be lessened by the electric light companies, by oral and printed cautions to those who have access to the lamps.

THE telephone convention was marked by many amenities, none of which was more graceful or more neatly accomplished than the presentation made to Mr. Eugene F. Phillips, of Providence, which was an appropriate expression of the esteem in which that generous and public-spirited gentleman is held by all classes of electrical workers. The committee, consisting of Messrs. Sabin, Lytle, Knight, Pope, Darling and Truex, first conceived the idea of making the presentation only after they had started for the grounds where the clam-bake was served. Arriving there, they quietly announced the scheme and intimated that any who felt so disposed might contribute. Every one at once joined heartily in the matter, and Mr. Sabin rode into Providence and had the gift at the grounds in time to have it presented to Mr. Phillips, to whom it came as a genuine surprise.

SINCE our last issue an event has occurred which may some day be looked back upon as marking the commencement of an era—we refer to the successful inauguration in this city of the Edison system of electric lighting, the first attempt at lighting a large district by incandescent electric lamps. The thoroughness with which every detail was looked after, and the complete success of the experiment, atone for the long de-

lay and the many unfulfilled promises made by Mr. Edison. The beauty of the lights cannot fail to be appreciated by all who see them. The one-time humble telegraph boy has good reason to be satisfied with the result of his labors, and may well feel proud of the splendid response to his "*Fiat lux*."

WHAT Mr. John Pender, M. P., does not know about telegraphs now he will no doubt learn before he returns to England, under the able tutorship of Mr. Gould. There are many other things that Mr. Gould can teach his distinguished guest. He will hardly care to initiate him into the mysteries of blind pools, and tell him how innocent and confiding Brother Jay was taken in by wily and unscrupulous Alonzo; but though he never meddles with politics Mr. Gould can undoubtedly, if he choose, give his friend, who should be an adept in politics, some valuable points about how to control a country. Few visitors to America have the good fortune of Mr. Pender, in securing such a Mentor as Mr. Gould.

If there be any gas company that feels apprehensive about the encroachment of electric lighting upon the gas interest, let it emulate the example of the gas company of St. Paul, Minn., which has taken the bull by the horns by going into the electric lighting business itself. If, however, the prediction made by Dr. Siemens, in his address to the British Association, be correct, that the gas companies will find their real field of usefulness, and a far wider one, in furnishing gas for heating and for power, they can well afford to give up the field of illumination to electricity.

CAPTAIN McEVOY, of England, who has invented an application of the induction balance for finding metallic objects at the bottom of the sea, might find an excellent opportunity for testing the value of his invention in the Baltic sea. It is reported that during the manoeuvres of the German ironclad squadron in the Baltic last June a torpedo got mislaid. As soon as the captain of the ironclad Kronprinz, to which it belonged, missed it, he offered a reward for its discovery, but it has not yet been found. It is fifteen feet long, weighty in proportion, and at present a terror to navigators.

We would again call the attention of old-time telegraphists to the meeting of the Old-Timers' Association, which takes place at Niagara on the 20th inst., and to that of the Military Telegraph Corps at the same place on the following day. No more enjoyable social occasion could well be conceived by those who have the privilege of taking part in the meetings. We send greeting to the "Old Guard," and trust that their enjoyment of the present occasion will be in direct ratio to the difficulties and privations they had to contend with in the days they commemorate.

MANY communications have been received by THE OPERATOR from railroad operators and others throughout the country desirous of uniting with the Brotherhood, and who have been at a loss to know where to apply for that purpose. We are glad to see that the Brotherhood has awakened to the importance of opening its ranks to all classes of operators. Our correspondents will find in another column an authentic communication giving the desired information.

TELEGRAPH operators in Germany only send and receive about fifteen words a minute, but they should not be harshly judged on that ac-

count. Just look at the words. Think of receiving messages for the "Berliner gemeinschaftliche Lebens-Versicherungs Gesellschaft," or for "Seine Durchlaucht der Grossherzog von Mecklenburg-Schwerin-Hohenschwangau." What wonder if the operators of Germany feel like organizing for protection?

A DECIMAL point is an apparently insignificant object, but its omission in an article in our last issue made a very great difference in the description of the Woltère underground conduit, the diameter of which was given as 6 to 10 metres instead of .06 to .10 metres. A conduit in which three railway trains could pass with ease would, no doubt, possess some advantages in the way of lessening the effects of induction, but would hardly be likely to come into extensive use.

THE announcement of the resignation of President Green, of the Western Union Telegraph Company, which is made to-day, will be received with much regret. During his five years' occupancy of an arduous and responsible position, Dr. Green has acquired and maintained the esteem of those who have been associated with him. He is an upright gentleman, who did honor to the place he held. He leaves it with a clear record, and we are sorry to see him go.

THE very interesting character of the proceedings at the telephone convention, and the effort we have made to give a good report of them, have produced an unusual pressure upon our columns, and caused several interesting communications and articles to be held over for a future issue. We would like to have said more about the convention—to have spoken of the familiar faces met there, as well as at Providence—but want of space forbids.

UPON the suggestion of the general director of telegraphs of Italy, the municipal authorities of Rome have ordered to be placed upon the house No. 17 Via del Prefetti, a tablet, with the following self-explanatory inscription: "S. P. Q. R. In this house lived Samuel Finley Breese Morse, from February 20, 1830, to January 5, 1831. He was the Inventor of the Electric Telegraph. Born in Charlestown, April 23, 1791; died in New York, April 2, 1872."

WHAT is the matter with the operators of Minnesota? One of them, in Minneapolis, makes "Gold Valeraster Co." out of "Gold Seal Oyster Co.," and another, in St. Paul, receives the name of Mr. Epenetus Howe, the Greenback candidate for Governor of New York, as "E. Pontius Horse." Commenting upon the latter error, a daily paper unkindly says that it indicates a want of familiarity of operators with their Bibles.

M. JABLOCHKOFF, well known as the inventor of the Jablochhoff system of electric lighting, has brought out a new electro-motor, which will, it is stated, give better effects than the motors at present before the public. The cost of the new dynamo machine is said to be small. An opportunity of seeing the machine will be afforded at the forthcoming exhibition at the Crystal Palace in the autumn.

A REPORTER of one of the New York dailies has undertaken to find out what becomes of old and unserviceable telegraph wires. He has learned that one thoughtful member of the Farmers' Club has bought hundreds of miles of this old wire, which he uses for training grapevines.

Successful Inauguration of the Edison Electric Lighting System.

The first district of the Edison Electric Illuminating Company was publicly lighted for the first time on Monday, September 4. Two engines in the Pearl street station were started, and the customers of the company were notified that the light was ready for use. This first attempt to light a large district by incandescent lamps proved entirely successful. Mr. Edison's countenance showed that he was greatly pleased.

"I have accomplished all that I promised," he said. "It was not without some fear that I started the machinery this evening. I half expected that some new phenomena would interfere with the working of the light. But it has been entirely successful. You will see that we have only one engine running now. It supplies 800 globes with light. We have six engines, which will all be in successful operation before the end of the winter. We expect to have three running next week. We have a greater demand for the light than we can supply at present, owing to the insufficiency of men to put down the wires. We have to educate the men to the use and management of our machinery. We have only one experienced engineer here now. A man came down from our machine shop in Goerck street the other day, and put his oil can between two conductors. He was a badly frightened man a second later, for the can melted away as quickly as the oil that it contained. Another workman, while employed at a wire in Fulton street, used a screw-driver. He was surprised to see his screw-driver burn away, and returned to the station in great haste to know what was the matter."

The down town district which is now complete covers about half a mile square of buildings beginning at Wall street and bounded in the other direction by Nassau street and the East river. From fifty to five times that number of men have been employed for nearly three years in lighting the station or district ready. The mains measure nine miles and the number of houses served by them will be 1,300. The station contains the largest dynamos in the world, six of a capacity for 5,000 lights each. The machinery in the building weighs 180 tons, and the furnaces and boilers look like those of an ocean steamship.

The Drexel building, containing 100 lights, the Times office, the Park Bank, and the Herald office were among the places lighted on the opening night.

The district has been lighted daily since that time, and no hitch of any kind has occurred. Over 3,000 lamps are connected in the circuits, but not all of this number are illuminated at one time, as subscribers turn them on or off at pleasure. At present writing, the company is running from one to three engines, according to the number of lights in use. The lights give entire satisfaction, and since the success of the system has been demonstrated applications for connection are numerous.

The Suggested Electrical Exposition.

To the Editor of The Operator:

SIR: Notwithstanding the fact that the Telephone Convention, at its recent session at Boston, did not adopt the resolutions I offered, providing for the appointment of a committee to look into the feasibility of inaugurating an Electrical Exposition, to be held in 1884, I am still satisfied that the proposition was a good one, and that the large number who advocated and voted for it will feel assured in the progress of future events that they acted prudently and wisely. As practical men, compelled to deal directly, to a greater or less extent, almost every day of their experience with the many branches of electrical science, they feel the need of every adjunct that will make the science more tangible and real to them. In the old plodding days of the telegraph (I think I may safely use that expression in these more stirring times of electrical development) many of these same men knew they would have been greatly benefited by helps such as are presented to them to-day as telephone men by such meetings as the Telephone Convention affords. Now there are progressive men also in the telephone work who were not tele-

graph men. These all now feel that as telephonists they are one, and any movement, cautiously and properly taken, under the auspices of the whole body, looking to the improvement of our field of knowledge should be fostered and encouraged. Such a movement would be most fully exemplified in an electrical exposition. Whether the telephone convention should assume any responsibility in regard to such a movement, may be a question; but that telephone men are interested in it there can be no doubt. I believe, too, that we may look at it from another standpoint, and say that stockholders are also interested. The impulse that such expositions as were held in Paris and London, lately, gives to the business, would enhance its value to no small degree.

I write this not from any dissatisfaction with the action of the convention. The hearty support the resolutions received, on so short a time to explain their objects, convinces me that it was largely because of lack of opportunity to further explain them to members before the session that influenced the action of some of them at least.

Other parties now will take up the matter, perhaps; and there may yet be an exhibition that will be a credit to the United States and a great advantage to all persons engaged in the business of electricity of whatever department.

WARREN CHOATE.

WASHINGTON, D. C., Sept., 1882.

Telegraphic and Electrical Matters in St. Paul.

To the Editor of The Operator:

SIR: The rapid progress made in electrical matters in the course of a year, for a city like this, is something wonderful. A few statistics may be of interest to some of our readers.

Prior to the first of the year we were without electric lights; to-day we have two companies—the St. Paul Electric Light and Power Company, using the arc and incandescent light of the U. S. Electric Light Company, and the gas company, using the Fuller arc light. Both companies are extending their lines daily. They have 110 lights in operation now.

The Western Union Company had in this city on January 1st, 1,400 cells of battery, 35 sets Morse, 1 quad, and 1 duplex. Since that date 6 new lines, 2 quads, 2 duplex, 2 sets repeaters, 5 Morse sets, 900 cells battery and a switch-board for 70 lines have been added. 50 operators and 25 clerks are now employed here. The Mutual Union Telegraph Company has opened two branch offices and leased one wire to the Globe for specials. Although a new company, comparatively speaking, it is beginning to make itself felt in business circles. Taking the following table as a basis, it will give some idea of the nature of its growth. Commencing with December last, when the company began work, the increase has been: Jan., 105; Feb., 145; March, 318; April, 390; May, 425; June, 510; July, 600 per cent.

The St. Paul Electrical Works have had to move into larger quarters. Their place of business is now over the Dispatch office. Visiting operators can spend a half-hour very pleasantly looking over the mechanism in this establishment. Mr. H. E. Thompson, the proprietor, is a courteous gentleman, and is always pleased to show members of the profession around.

The St. Paul telephone exchange is a well-managed institution. Since January last, over 100 new instruments have been added. Five lines connect St. Paul with Minneapolis, Stillwater and Minnetonka. During the season the office has been thoroughly overhauled, and new patent switch-boards have been put in.

The funeral of Charles E. Schultz, of Minneapolis, who was murdered at Julesburg, Neb., took place from his brother's residence August 30, and was largely attended. The following gentlemen acted as pall-bearers: Mr. Vanbergen, chief operator Mutual Union Company, Mr. W. J. Maguire, night chief Western Union, Mr. E. Killroy, Mr. Nellins, all of Minneapolis, and Mr. H. E. Minor, of the Mutual Union Company, St. Paul.

Mr. Schultz and family wish to publicly thank Superintendent McMichael, Manager Tuttle, of the Western Union, Chief Operator Vanbergen, of the Mutual Union, Minneapolis, Mr. H. C. Hope, Superintendent of Telegraph, C. St. P. M. & O. R. R., St. Paul, Minn., and others, for kindness rendered. Manager Tuttle went to Julesburg

Neb., and brought the body home, but was unable to find any clue to the perpetrators of the foul deed.

Mr. and Mrs. Lord have resigned their positions with the Western Union here and accepted a station at Stevens, Minn., on the Manitoba railroad. Mr. W. J. Widrick, of the Western Union, has resigned and gone to Buffalo, N. Y. Mr. Wm. McDonald, of the Western Union, has accepted a position with the Globe as press-report operator. Mr. John Reeves has been appointed operator in the M. U. branch office in the Globe building. Mr. Thomas Dudley, an old-timer, and Mr. Coffee, of the W. U. Chicago office, have accepted positions with the W. U. here. Mr. Clark Davidson, chief operator of the C. St. P. M. & O. R. R., has returned from his trip East.

Among our numerous visitors this month, we had the pleasure of meeting Mr. W. J. Lloyd, chief operator W. U., Chicago, Mr. D. L. Sweet, ex-manager Board of Trade Telegraph Company, of Chicago, and Manager Weller, of the W. U., Milwaukee. Mr. M. J. Burke, chief operator of the W. U., Chicago, passed through here, on his way to take charge of Brainerd office.

Mr. J. E. Johnson, of the Northern Pacific, has been transferred from St. Paul to Fargo, D. T. Mr. Emmet O'Brien is "subbing" for Mr. C. E. Corser at the M. U. branch office here.

OBSERVER.

Richmond Changes.

To the Editor of The Operator:

SIR: The Richmond office has undergone many changes within the past month. First came the resignation of Mr. Robert Morton, the former American Union superintendent, who succeeded Mr. R. M. J. Paynter. Mr. Paynter had been manager here for years and was again restored to his old position, but, unfortunately, dissensions arose between a New York official and Superintendent Kate, which ended in the resignation of both Mr. Kates and Mr. Paynter. Mr. J. B. Tree, of Nashville, was sent here as manager and acting superintendent on the first of August. How long this arrangement is to last nobody seems to know. Mr. Tree is very much liked so far, and it is to be hoped he will be retained. Among all the changes which have been made Mr. Fred. M. Cudlipp, who has been chief operator for the past six or eight years, and has always been very popular with the men, still holds his old position.

There is a new company building wires south from Washington, the Southern Telegraph Company, said to be a part of the B. & O. system. An office has been rented on Main street, a short distance from the Western Union office, and the company expects to open for business about the 15th of this month, with Mr. Paynter as manager. Mr. George T. Harrison, the oldest man in the service here, has resigned to accept a position with the new company.

Several new men are expected to arrive soon to complete the W. U. force, which has been short for some time. Operators seem to be very scarce in the South, and it is difficult to secure first-class men to fill the vacancies. OCCASIONAL.

RICHMOND, Va., Sept. 5, 1882.

The Old Timers' Reunion.

To the Editor of The Operator:

SIR: The time for the second annual meeting of the Old Timers' Association, at Niagara Falls, Sept. 20, is close at hand. The Committee of Arrangements gives assurance of ample entertainment to the delegates. One feature will be a ride to all points of interest. Accommodations at the International Hotel at about half the usual rates. Six dollars, or as much less as circumstances will permit, will cover the expenses of the banquet and ride. The facilities of the committee have been inadequate to arrange for transportation, and each one is asked to make such provision for himself; hoping that those in authority will exercise all consistent generosity. The reunion of the members of the U. S. Military Telegraphs occurs on the 21st, and it is hoped that many, designing to attend the meeting, will kill two birds with one stone, by arriving one day earlier, and enjoy both reunions. Let all make an extra effort to attend and meet and enjoy the occasion with their old-time friends.

J. C. MATTOON,

BALTIMORE, Md., Sept. 12, 1882.

TELEPHONE DEPARTMENT.

The telephone business is flourishing in the West. The Missouri & Kansas Telephone Company recently paid the large sum of \$100,000 for the Kansas City exchange, and within a week refused an offer of \$150,000 for the same property.

Mr. O. E. Madden has been appointed assistant general manager of the American Bell Telephone Company. The announcement was made during the Boston Convention, and quite a pleasant time—with several excellent impromptu speeches—followed at the rooms of the "204 Club." Mr. Chas. M. Whitcomb will probably be Mr. Madden's successor as superintendent of agencies.

It is rumored that a new telephone has been patented and put upon the market on most advantageous terms, a company having been formed for working the instrument in opposition to the Bell system, the principle of which this patent is said not to infringe. We understand that the new receiver consists of a primary and secondary wire wound round a metallic bar, at each end of which is a fixed disc. One of the joint patentees is Mr. H. R. Kempe, of the postal telegraph department.—*London Electrician*.

The wages of telephone operators vary greatly in different parts of the country, those in the West receiving, as a rule, higher wages than those in the East. Chicago pays 25 per cent. more than New York, and Denver 25 per cent. more than Chicago. The average pay is less than thirty dollars a month. About four-fifths of the operators are girls, the remaining one-fifth being principally night operators. Telephone managers say that ladies make the best operators because, as they value their positions more than operators of the other sex, they are more attentive and polite to subscribers.

A new electrical instrument, devised by Captain M'Evoy, is likely to be of considerable value in submarine operations, such as searching for torpedoes, sunken vessels, lost anchors, etc., and it may be that submarine telegraph cable work may be aided by its employment. The instrument is based on the induction balance of Professor Hughes. The instrument is so arranged that when let down by means of a cable to the bottom of the ocean, the operator, who is listening to a telephone, hears a loud noise when the case containing the apparatus is brought within the influence of the submerged metallic body.

It is well known that overhead telegraph wires erected in the vicinity of large works are soon destroyed by the action of the smoke and fumes given off. Messrs. Walter T. Glover & Co., of Manchester, have invented a special composition for covering such wires, which, it is said, will effectually preserve wires from similar effects. It may also be used for telephone wires, as it affords effective insulation. Messrs. Glover have lately received practical evidence of the preservative effects of their composition in the fact that a line running through one of the smokiest districts of Manchester has recently been inspected and found to be in excellent condition, although supplied fourteen years ago.—*London Electrician*.

In a letter to a Rome paper, M. de Rossi, the Italian telephonist, among other interesting matters, gives an account of the interest taken by Arabi Pasha in telephony. He says: "Last year, in September, I was installing telephones in Cairo. The Khédive had already several telephones, but he could not communicate with his harem and other parts of his properties without seeking aid of the central office, as he had not yet a connection board. At last he asked for one, and I was charged to superintend the work. We had been working about two hours when Arabi Pasha came to us. This was not the first time I had seen him, though it was the first time I spoke to him. Notwithstanding what the English newspapers had said of him, I knew him to be a most gentle temper, and to be a lover of beautiful and useful. I knew also that he was a passionate admirer of electricity, and tolerably learned in the science; I expected, therefore, to be questioned, nor was I mistaken. After he had looked over the apparatus he asked explanations. He spoke of the Ader system, and of the Gower system, and of the Edison sys-

tem, as if he himself had been a telephonist. My workmen, both English, looked on in surprise, and I was equally astonished."

At the annual meeting of the American Association for the Advancement of Science, at Montreal, on Aug. 25, Prof. A. Graham Bell read a paper relating to his methods for the exploration of bullets in human bodies by a painless method. He uses the telephone in conjunction with the induction balance, and last year endeavored to trace the bullet in President Garfield's body by such means, but with indifferent success. This, he explains, was caused chiefly by a wire mattress being placed under the hair one, which was unknown at the time, and rendered the effects of the instrument inoperative. Prof. Bell explained the modus operandi of his methods, and indicated the steady progress which he had made, advancing step by step and overcoming the chief difficulties in the way. When he first operated, the instrument would locate a bullet at one inch distance; now a bullet held at a distance of five inches gives very decided indications of its presence, and with recent improvements Dr. Frank Hamilton has located with certainty a bullet imbedded in the body of an American officer.

Prof. Bell and Mr. Tainter are now endeavoring to simplify the apparatus, and his last work was to arrange an exploring needle to be used after the bullet is located, but before any operation. If the bullet is correctly located, it can be reached by the needle without much danger. When the needle touches the bullet a battery is formed, and a sudden tick announces the fact; then the operation can follow with the assurance of success.

At the same meeting Prof. Bell read a paper on a proposed method of producing artificial respiration by means of a vacuum jacket, the value of which was recognized by the association, and the thanks of the section were extended to the author, adding that the scientific men of America view with great satisfaction the action of Prof. Bell in devoting his great talents and experience to the cause of suffering humanity.

DASHES HERE AND THERE.

Western Union stock is quoted at 93½. Last week it was 89½.

The best conductor of electricity at present known is silver; the worst is solid paraffine.

If you want to become a telegraph operator, send twenty-five cents to C. E. Jones & Bro., Cincinnati, O., for best illustrated instruction book.—*Advt.*

A syndicate of London capitalists have entered into a contract for the construction of an electric railway upon the Edison system between Geneva and Fernex and Geneva and St Julien.

Germany has 5,900 telegraph offices, about 37,800 miles of aerial line, with about 117,000 miles of wire, and about 1,560 miles of subterranean line, with 10,000 miles of wire.

M. Geoffroy, a wire manufacturer in Paris, has taken a patent for covering electric wires with asbestos. Experiments, which will be repeated officially, have proved that the copper can be burned without any spark being conducted outside.

"The intelligent compositor" sometimes does remarkable execution on "copy" that falls into his cruel hands, but the telegraph operator can give him odds and then beat him. When the Mississippi River Commission is tortured into "Miss Essie Spiriver Commission," language fails to do justice to the occasion.—*San Francisco Examiner*.

The following appears in the *Sun* of this city: TO THE EDITOR OF THE SUN—Sir: How is it that Mr. Edison employs only German Engineers in East Newark? CLIFFORD.

MR. EDISON'S REPLY.

We hired twenty Germans from Castle Garden to encourage emigration and help build up the country. EDISON.

A young man employed about the Grand Opera House, in Cincinnati, climbed up to fix the electric light, that was temporarily out of order, Tuesday evening, September 5, and in the dark his face and one hand came in contact with

the wire. He was instantly knocked senseless, and fell to the ground. His fall was broken by the heads and shoulders of the passers by. His hand and face were somewhat burned, but otherwise he was not much hurt.

Faure storage batteries are now used with much success in lighting several of the principal cafés in Paris. The Grand Opera House and some of the other theatres there are also being fitted up with accumulators. The architect of the Grand Opera House was very much opposed to them until after the fire caused by the overheating of the electric light wires. He is now putting in accumulators, and will have nothing else.

A Syracuse, N. Y., dispatch says, George B. Pope, a Central Railroad telegraph operator at East Syracuse, married Jessie Hilton, aged 16, on August 30. After the wedding he left her and went around town celebrating the event. Instead of going home to his bride, he went to a hotel about midnight, where he was taken ill and died of heart disease. His young wife did not know where he was until she was informed of his death.

The stockholders of the Montreal Telegraph Company in Canada forwarded from Montreal, on September 1, to Mr. Erastus Wiman, of New York, a fine copy of the *Encyclopædia Britannica*, in a handsome case, as a token of appreciation of Mr. Wiman's success in consolidating the telegraph interests of the Dominion and placing the affairs of the company on a satisfactory and permanent basis. Subscriptions for the gift were limited to one cent for each share of stock held.

Negotiations have been made by the Force and Light Company with Stephenson, the car-builder, to run a number of tramway cars with stored electricity. The inventor Faure claims that within a year he will run a locomotive with it at the rate of two hundred miles per hour. It is stated less than four dollars per day will cover cost of energy on a car. Light and power can be furnished by the same accumulator, and renewing is required every three hours.—*Industrial Review*.

The medals awarded to American exhibitors of improvements in electricity at the Paris Electrical Exhibition have been distributed through the State Department. The medal given on the Cumming periphery contact for telegraphs contains on one side a Grecian female head with a laurel wreath chaplet surrounded by the words: "Republique Française," and on the obverse side is a spreading laurel branch with a pendant scroll, inclosing the name "Cumming," surrounded by the words: "Exposition Internationale D'Electricite, Paris, 1881." A handsome engraved certificate accompanies each medal.

In the course of a lecture, Mr. Joseph W. Swan, whose name has been closely connected with electric lighting since 1879 at least, thus spoke: "The oft-repeated question, 'Will electricity supersede gas?' could be promptly answered if we were confined to the arc method of producing the electric light, for the simple reason that it is impossible in that way to produce individual lights of moderate power. The arc does well for lighting streets and large inclosed spaces like railroad stations, but it is totally unsuited for domestic purposes. For the latter the only hope lies in the method of producing light by electrical incandescence."

The office of the Smith & Rhodes Electric Co., of this city, has been removed from No. 37 Barclay street to a more desirable location for reaching the retail trade, namely, No. 95 Fifth avenue. The success of the company has been remarkable. For a time it was unable to keep up with its orders. Now, however, the burners are being manufactured in larger quantities, and as this has reduced the cost of production, the company has very sensibly made a considerable reduction in the price. In addition to the automatic burner, Mr. Rhodes has recently perfected an improved pendant burner, which is sold at a very low price, and is free from the defects of most of such burners that have so far been put upon the market. The advertisement of the company will be found in another column.

Superintendents of telegraph (railroad or commercial), managers of electric light companies, telephone exchanges and telegraph offices, railroad and telegraph purchasing agents, inven-

rs. and patentees, manufacturers, dealers and apply companies, publishers, patent agents and solicitors, electricians, engineers, electrotypers, actrical and optical instrument, model and pattern makers, metal dealers, photo-lithographers, wood engravers, and all others connected directly or indirectly with electricity, in the trade or professionally, are specially requested to send their names and addresses immediately to the undersigned, to be inserted, free of charge, in "Berly's British, Continental and American Electrical Directory and Advertiser," for 1893. Circulars mailed free on application. Address all communications to George Cumming, General Agent for "Berly's Electrical Directory" (copyrighted), 219 East Eighteenth street, New York City.

About 8 o'clock on the morning of September 1, the operators in the main Baltimore office of the Western Union Telegraph Company were startled by a crackling noise. On opening the switch-board in the operating room, a volume of flame burst forth, and it was discovered that fire was raging upward through the cupola, extending above the roof, by which all the wires, over 150 in number, are conducted into the office. Several engines arrived promptly and the fire was speedily extinguished. Every wire leading into the office was burned off, but at 11 o'clock wires temporarily placed in the battery-room were working and communication was had in all directions. The fire did not extend outside the switch-board and cupola, and, except by water, the building was not damaged. The loss to the Western Union company will not exceed a few thousand dollars. The company occupies the entire building except the first floor, which is used by Alexander Brown & Son, bankers, who own the building. It is not known how the fire originated.

During the visit of the Naval Board of Visitors to the Newport torpedo station, on Aug. 4, a device for exploding torpedoes under an enemy's vessel, designed by Lieut. J. C. McLean, of the American Navy, who was a delegate to the recent Electrical Congress at Paris, was successfully experimented with. A launch was set out by means of electricity, no one being on board, and was made, by the use of one electric wire, to do eight different things, among which were to start, stop, back, go to port and to starboard, and to drop and fire mines and countermines, which were rigged at the ends of spars placed on each side of the launch's bow. Lieut. Commander Royal B. Bradford, who was at a key-board on shore, had perfect control of the launch by the aid of one wire. The electrical part of the experiment was in charge of Lieut. Commander Caldwell, who was in the electrical building at the torpedo station, which was a long distance from the spot where the key-board was located. Capt. J. O. Selfridge's device for protecting a ship from an enemy's torpedoes, which may be planted at the entrance to a harbor, was shown, and successfully experimented with.

NEW YORK CITY ITEMS

Echoes from 195.
"The day we celebrate"—Pay day.
Mr. Tom Landy is traffic chief on the South and Erie.
Mr. Hennessy "Hs," of Boston, is now working here.
Mr. "Jakey" Stephenson is now working on the Long Island wires.
Mr. W. E. Peirce, of 195, is taking New England press at Norwich, Conn.
Silas W. Rankin, of Troy, N. Y., is working here a few days on the Newport quad.
Miss Dickinson "D," of Boston, is subbing for Miss M. Davis, who is on a visit to his old home in Chassett.
Mr. H. Henry, who studied for and practiced the ministry out West until his voice failed, is again working nights in 195.
Mr. F. Haupt, ex-manager of the A. & P. N. Y. office, and latterly in charge of the cable quadruplex, is seriously ill with malarial fever.
Mr. W. Miller, after an illness of over three months, is again at his old post on the Boston printer, but his health is by no means robust yet.

The efforts of a certain class of men in 195 to avoid paying their "subs" on pay day would often be ludicrous if they were not so contemptible.

→ Messrs. Cleverdon and Jackson, in the daytime, and the veteran Abe Locke, at night, are the gentlemen who manipulate the Baltimore quad.

Chief C. A. Meyer has been detailed by Manager Dealy to look after the weak spots in the office, and he is discharging his duties with benefit to the service.

Mr. Thos. Brennan, who is now acting as assistant manager, besides attending to his former duties as senior chief operator, is probably the busiest man in 195.

Mr. M. J. P. Kavanagh, now of Chicago, called last Sunday to see his old friends here. He has three months leave of absence to visit a sick sister in Newfoundland.

It is some months since Mr. John Donnelly took unto himself a wife, but, as he kept the matter very quiet, this will probably be the first intimation thereof to many of his old friends.

Mr. Theo. Southard—assisted by "Judge" Dowling and Will Ward in the day time, and Mr. Quinn nights—presides over "Clark's" table, to which all undelivered and misdirected messages, amounting to over a hundred daily, are referred.

Messrs. Dalton, Kerrins, Newton and Keene form the quartette who work the regular Boston quad. They exhibit bulletins daily purporting to be from the seat of war in Egypt, relating especially to the welfare of O. M. K. and Dempsey Pasha.

It is sometimes a question in 195 whether Mr. Jas. Merrihew, Asst. Gen. Supt., or Mr. W. J. Dealy, is the manager of New York office; but the employes would probably be satisfied with either gentleman, both being uniformly affable and impartial to all.

Mr. Maurice Brick is recognized as the substitute agent in 195. Not a day passes that he does not receive many dispatches from members of the night force, requesting him to procure them "subs." On the other hand, those who desire extra work also apply to him.

Mr. Geo. W. Walcott sends the afternoon New England press reports. The entire batch of news received during the day is sent to Mr. Walcott's desk from the associated press room, and it is left to his discretion what items he shall send. As Mr. Walcott has handled this wire for years, it is evident that his discrimination has given satisfaction.

When the summer rush set in, all the ladies were withdrawn from the Eastern division. Miss Mattie Birmingham, who works 53 East, was also withdrawn, but the operators on her wire petitioned headquarters to allow her to remain, and the request was complied with. She is now the only lady operator in the male department.

On Wednesday, the 30th ult., 800 messages were sent on the Philadelphia printer between 8 a. m. and 5:30 p. m. Of these Mr. Bull Noyes sent 697, and Mr. T. Fullon 103. When it became evident that the previous record of 770 messages would be beaten excitement ran high, and one or two small wagers were laid that the number would not reach 800 before 5:30 o'clock; but when Mr. Noyes reached the eight hundredth message he had 20 seconds to spare.

Other City Items.

Mr. C. H. Sewall, formerly secretary and general superintendent of the Albany, N. Y., A. D. T. Co., has been appointed assistant general superintendent of the A. D. T. Co. in this city, vice Mr. W. E. Huntington, whose resignation we noticed some months ago.
Mr. W. H. Hall, of the American Rapid, one day last week sent 2,000 words of special to Pittsburgh in 53 minutes, or an average of nearly 87 words a minute. Mr. Hall is an old-timer. In 1863, during the war, he was in charge of the Cairo, Ill., office, and prevented a treasonable dispatch from passing through his office, for which General Grant sent him a personal letter of thanks.

We are glad to know that the United States Circular Delivering Company, of 39 and 41

Fourth street, this city, of which Mr. H. W. Pope is president and Mr. Geo. F. Truell secretary and general manager, is doing even a larger business than was expected by its projectors. The company employs only uniformed men for delivering the circulars, catalogues, pamphlets, periodicals, etc., which it handles, and gives excellent satisfaction to those who do business with it.

We learn that Mr. Gerrit Smith, whose resignation of the position of Engineer-in-Chief of the American Rapid was noticed in this column last issue, has returned to the service of the Western Union. Mr. Smith has done so much to perfect the automatic system of the Rapid Company that we may now look for considerable improvement in the Wheatstone system, recently adopted by the Western Union. Mr. Theo. F. Taylor, who not long ago also resigned from the American Rapid, is now with the Postal Company, engaged perfecting the Leggo automatic system.

Mr. William Fix is manufacturing a large lot of instruments for the Electric Signal and Time Register Co. In an advertisement in another column Mr. Fix draws attention to the facilities he possesses for furnishing electrical apparatus of every description for district telegraph and kindred purposes at remarkably low prices. Mr. Fix gives exclusive attention to the manufacture of such instruments, and does strictly first-class work. Another important recommendation for him is that he manufactures the instruments used by most, if not all, of the various district telegraph companies.

Mr. Robert Stewart, superintendent of the B. & O. Telegraph Company, was in town last week. We learn from him that the new B. & O. line from New York to Baltimore is making rapid progress. The line is very substantially built, the poles being 30 feet in height and 7 inches at the top, with accommodations for 21 wires. It is expected that it will be ready to be opened for business on the first of November. The company will open an office in Brooklyn, N. Y., about the 20th of this month, and additional offices throughout this city and at other points will be established soon afterward.

Mr. F. A. Cloudman, night chief of the Mutual Union office of this city, has the heartfelt sympathy of his friends and associates in the terrible bereavement that has befallen him. On the morning of August 26 he was summoned to Boston by the announcement of the death of his infant son. While yet far from home, another son, aged three years and eight months, lisped a playful "good-by" to his mother, and started for the garden gate, "to watch for papa." An open cistern, a stumble, and the child lay at the bottom of the well, with a fractured skull. When Mr. Cloudman reached his stricken home the lifeless remains of his two children awaited him.

The reunion of the members of the United States Military Telegraph Corps, at Niagara Falls, on the 21st inst., following that of the "Old Timers" on the 20th, promises to be a most interesting and enjoyable occasion. The society has issued a cordial invitation to all who served in the corps, and the responses indicate that a large attendance may be expected. With a view to making favorable arrangements for transportation, all members of the corps or of the "Old Timers" association in New York and vicinity, who propose to attend the re-union, are requested to call upon or send their names to Mr. Jesse H. Bunnell, 112 Liberty street, New York, or Col. James R. Gilmore, U. S. Army Building, corner Houston and Greene streets, New York, on or before the 18th inst.

On Saturday, September 2, Mr. W. Willoughby Marks, the well-known superintendent of the Bishop Gutta-Percha Works, of this city, celebrated his fifty-sixth birthday. On the following Monday, 4th, at United States Lodge, No. 207 F. & A. M., in the Masonic Temple, Mr. Marks, who is Past Master of the lodge, was presented with a beautiful Past Master's apron. Grand Secretary Ehlers, of the 6th Masonic District, made the presentation address, to which Mr. Marks responded in a neat little impromptu speech. Past Deputy Grand Master John C. Cobin was also present. The apron was a gift from Mr. Marks' son, Mr. W. Wolcott Marks, also of the Bishop Gutta-Percha Works, who is now Master of United States Lodge. Mr. Marks, senior, is now spending a well-earned two-weeks' vacation at his birthplace in Connecticut.

PERSONAL.

Mr. Oscar Philibert, operator of the Mexican National Construction Co., has been duly installed in the company's new office at Monterey, Mexico, the present terminus of the road.

If you want to become a telegraph operator send 25 cents to C. E. Jones & Bro., Cincinnati, for best illustrated instruction book.—*Advt.*

Mr. J. W. Kates, late superintendent, and R. M. J. Paynter, late manager, of the W. U., at Richmond, Va., have resigned and gone into partnership in the manufacture and sale of electrical supplies.

Miss S. S. Burget, manager New Hamburg, N. Y., W. U. office, has gone on an extended vacation to visit friends in Western New York, Ohio and Michigan. Miss Bullock takes her place during her absence.

NORTHWESTERN OHIO RAILWAY.—Mr. H. W. Bigelow, late night operator at Walbridge, has resigned to accept a position in the East. Mr. Charles F. Strong, late of the B. & O. R. R., succeeds Mr. Bigelow. The road is doing a moderate but steadily increasing business.

Mr. George Eitemiller, who has achieved a national reputation for rapid and accurate telegraphic transmission, was in New York on Sept. 1, on a brief vacation. Mr. Eitemiller holds the position of night chief of the Western Union office at Pittsburgh. He has not "lost his grip," though he seldom has occasion now to "make it lively" for the man at the other end.

Mr. E. V. Matlack, of the Laredo, Texas, military telegraph office, has gone to Brownsville, Texas, to take charge of the Signal Service office at that place, the operator of which has contracted the yellow fever. Brownsville is quarantined against by the whole surrounding country. All honor to such men as Mr. Matlack, who are willing to enter even the jaws of death at duty's call.

Mr. Edison, since honors and wealth have poured in upon him, has not grown any more particular in the matter of dress than when he was plain Tom Edison, telegraph operator. At the recent inauguration of his electric lighting system, for which occasion he had invited all the newspaper men to be present, he wore a white high-crowned Derby hat and a collarless shirt, which is described as being "white in some places."

ATLANTA, GA.—Several changes have occurred in the telegraphic service. Messrs. C. B. Davidson and R. B. Rowe have left to accept situations elsewhere. The force now consists of Messrs. J. M. Stephens, manager; P. Holcombe, day chief; P. E. Murray and A. H. Crist, night chiefs, and Messrs. R. H. Alston, E. E. Williams, E. P. Tebau, E. Claude Dunn, J. W. Ragsdale, Chas. A. Hamilton and Sid Stevens. Business is good and "the organization" flourishing.

MINNEAPOLIS, MINN.—Mr. H. A. Tuttle is manager, vice Mr. J. W. Booth, resigned. Mr. J. L. Cassidy, of St. Louis, is day chief, and Mr. W. J. Maguire, formerly of Kansas City, Mo., is night chief, vice Mr. R. T. Reed, resigned to accept the position of train dispatcher for the Canada Pacific Railway, at Brandon, Man. Mr. J. A. Root, who has been taking night press report for the past year, has gone into other business. Mr. Root came from the Chicago office, where he ranked among the most expert operators. Mr. Samuel Cassidy, also a skillful operator, takes the place left vacant by Mr. Root's resignation. Under the efficient management of superintendent I. McMichael, the Northwest is having much better telegraphic service than formerly, under the Northwestern Company. Wages of employes have been materially advanced since the change.

A Buffalo correspondent relates that two years ago he happened in Kansas City, Mo., and while there visited the Western Union office. One of the first persons that met his view was Mr. Albert Twohey. He says, "I saluted him with 'Hello! Twohey,' when he approached me, and said, in a whisper, 'Call me Maloney.' It appeared that he had been working for two months under the name of Maloney. Albert Twohey was once the pride of the Erie Railroad telegraph department, a fine peuman and a promising young man. His career as a commercial

operator began in this city with the Western Union Company. Shortly after he left for the West. Away from home influences, he began to go downward, and has sunk lower and lower, until now, as recently related in THE OPERATOR, he lies in the Kansas City jail for stealing the clothing of a fellow-operator."

Gen. Edwards S. Sanford, vice-president of the Adams Express Company, and who had long been prominently connected with telegraphic enterprises, died suddenly on Sept. 9, at the residence of his son-in-law, in Sharon Hill, near Darby, Pa., of heart disease. General Sanford was born in Medway, Mass., sixty-five years ago. While a young man he became Philadelphia agent for the Adams Express Company, and only left that position to become general superintendent. Soon afterward the American Telegraph Company was organized and General Sanford was elected president. This office he filled with honor until the company was finally merged into the Western Union Company.

At the time of his death General Sanford was a director in the Western Union Telegraph Company, and also a director in the International Ocean Telegraph Company. He is said to have been worth about \$1,000,000 personally. His funeral took place from his late residence in Brooklyn, on Sept. 12. President Green and General Eckert, of the Western Union Company, were among the pall-bearers.

NASHVILLE, TENN.—After fifteen months hard work in an old rookery, poorly ventilated and uncomfortable in many respects, we greet THE OPERATOR from our elegant and comfortable quarters in a large and imposing building just completed. Mr. Austin H. Stewart, our respected chief, has displayed excellent taste in the interior arrangement of the office, and good judgment in the location of "way" and "through" wires. We now have 31 wires running into the office. We work quadruplex with St. Louis, Cincinnati, Montgomery and Louisville, and duplex with Atlanta, Chattanooga and Augusta. The operating-room is an elegant, well-ventilated apartment, 33x43, with a fifteen foot ceiling. Altogether, Nashville now has one of the best appointed offices in the country. The day force comprises Messrs. A. H. Stewart, chief; Neil S. Brown, assistant; T. S. Ford, T. A. Boyle, J. W. Thompson, Oliver Whaley, P. B. McNeal, L. W. Corrington, J. F. Fleming, R. H. Hunt, E. F. Pearce, F. S. Adams. The night force, Messrs. J. U. Rust, chief; E. W. Morgan, W. C. Atkinson, A. A. Wyllie, H. B. Geer, J. H. Ford and Ralph Rockwell. THE OPERATOR is always heartily welcome, and is very liberally subscribed for here. X.

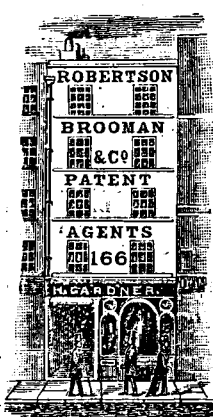
DIED.

BUSSARD.—At Baltimore, April 8, 1882, of consumption, Ed. L. Bussard, in his twenty-fifth year.

All Persons Sending for

Catalogues or ordering articles advertised in our columns will do us and our Advertisers both a great favor by mentioning that they saw the advertisement in

"THE OPERATOR."



ENGLISH
PATENT OFFICE

H. GARDNER,
166 Fleet St.,
London.

Successor to
Messrs. Robertson, Brooman
& Co.

Gives prompt personal attention, and obtains Patents for Inventions, Protection for Trade Marks, etc., at fixed and moderate charges.

PAMPHLET OF COSTS GRATIS.
Thirty years' practical experience.

Provisional Protection, £8

OPERATORS' CRAMP CURED BY



LITTLE GIANT FRENCH BATTERY

Relieves Rheumatism
and all Nervous Complaints.
Supersedes all others. Send for circular.
C. E. JONES & BRO.
Cincinnati, Ohio.

FOUND AT LAST.

A CHEAP COUNTER CLIP.

(PATENTED.)
CHEAPER THAN PASTE.
Blanks Removed Without Tearing.
Price, post-paid, 15 cents. Per doz., post-paid, \$1.50.
Discounts to the trade or to Telegraph Cos., in quantities.
Larger sizes made to screw to wall for Paper Bags, Wrapping Paper, &c. Address,
W. W. PRICHARD, IRONTON, Ohio.

BROWNLEE & CO.,

DEALERS IN

CEDAR TELEGRAPH POLES.

Light Poles for Telephone Lines and Long
Poles for City Use Constantly on Hand.
OFFICE: FOOT OF SHELBY ST., DETROIT, MICH.

I HAVE ON HAND A

LARGE QUANTITY

Of new and first-class

Kerite Insulated Wire,

For which I have now no use, and will sell

IN SUCH LENGTHS AS MAY BE DESIRED

AT PRICES

Lower than it has ever been Sold for Before

Send three-cent stamp for sample.

J. H. LONGSTREET,

9 Barclay Street, - - - New York.

UNION

Electric Manufacturing Company

Nos. 7 & 9 Bond Street,
New York.

Telegraph Engineers and Contractors.

Manufacturers of

Telegraph Instruments, Gold and Stock Instruments,
Electric Light Apparatus, Domestic Appliances, District System and Fire-Alarm Boxes, Railway Signals, Telephone Apparatus, etc., etc.

Dealers in Electric Supplies of all Kinds.

Agents for the sale of goods of the celebrated

SILVERTOWN WORKS, LONDON.

Agents for the American Insulator Co.
Agents for the Celebrated K. K. Insulated Wire, also
The Kerner Stylographic Pen.]

WILLIAM FIX,

100 WOOSTER STREET, NEW YORK,

MANUFACTURER OF

DISTRICT TELEGRAPH SPECIALTIES,

TO ALL THE DIFFERENT DISTRICT TELEGRAPH COMPANIES.

Double Pen Registers. Call Boxes. Electric Bells. Batteries and Annunciators. Electric Lamps. Independent Wire and Local Burglar Alarm Apparatus, and Every Description of

ELECTRICAL INSTRUMENTS AND APPLIANCES.

Having for nearly ten years given exclusive attention to the manufacture of the above class of instruments, I can furnish them to Telegraphic and Electrical Companies and others

STRICTLY FIRST-CLASS IN QUALITY,

AT PRICES

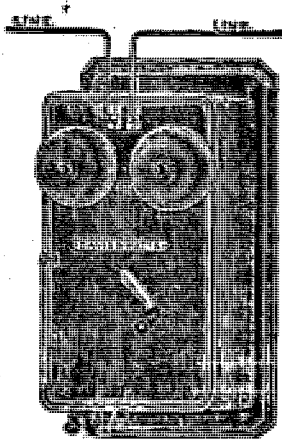
MUCH LOWER THAN THEY CAN BE PURCHASED FOR ANYWHERE ELSE
ESTIMATES PROMPTLY FURNISHED.

MAGNETO

SIGNAL BELLS

NO BATTERY

REQUIRED.



Price, \$4.00 each.

Liberal Discount in Large Lots.

We have a large number of second-hand Magneto Bells, without the Telephone switch or connections, for sale at extremely low prices. These bells are admirably adapted for Stable, Hotel, Restaurant and many other purposes where a call bell of any sort would be of service for signaling or summoning all kinds of employes, servants, etc. They will ring on any length of line, and give a clear, loud sound. The great advantage in using such an instrument is, you can signal back.

All who use electric bells know the disadvantages of a battery, the attention required to keep it at a proper standard and prevent its weakening being of itself source of much trouble and annoyance, to say nothing of the inconvenience experienced when it does run down, or, in winter, freezes. These troubles are obviated by using Magneto Bells, which are always perfectly reliable, and can be set up at much less expense than bells with batteries.

SOME PLACES WHERE THEY WILL BE VALUABLE.

RESIDENCES: To summon stable hands, coachman, kitchen and other servants, etc.
HOTELS: To summon porters, janitor, dining-room servants, waiters, bell-boys, baggage man or others.
STORES: Foremen from one floor to another, janitor, engineer or other employes.
OFFICES: Salesmen, clerks, errand boys, chiefs of departments, etc., etc., etc.

These are but a very few of the uses to which they can be put. Many others will suggest themselves by experience.

Recall: No battery required, no skill necessary to set up or operate them, and always reliable.

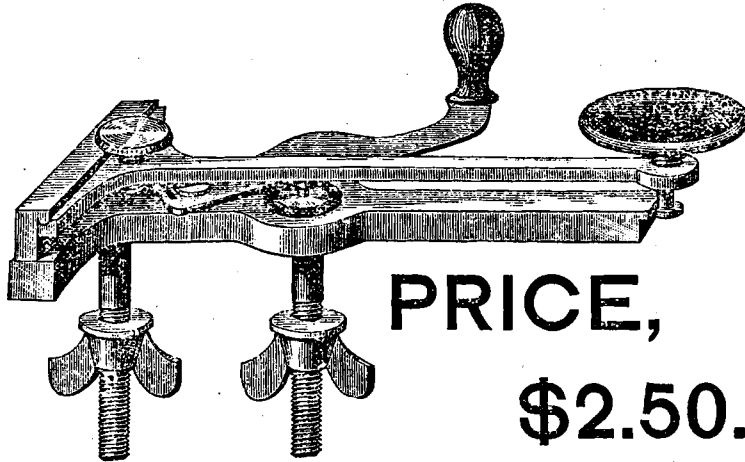
DAVIS & WATTS, Baltimore, Md.,

Manufacturers and dealers in all kinds of Electrical and Telephone Instruments and Supplies. Quotations promptly and cheerfully furnished.

THE "VICTOR" TELEGRAPH KEY.

PATENT APPLIED FOR.

The Greatest Improvement in Telegraph Keys ever made.
THE EASIEST WORKING. **THE MOST POSITIVE CONTACT.**



PRICE,
\$2.50.

The Lightest Lever.

The Most Perfect in Construction.

No Trunnion Connections.

No Side Motion to Lever.

No Back Adjusting Screw.

The Neatest, Nicest, Handiest and
 Best Key in the
 World.

Do not be deceived. The Victor Key is the best telegraph key ever made, and any one who has tried it will tell you so.

Although the Victor Key has achieved a success never before attained in so short a time by any other invention, there may be some who have not had the pleasure of seeing how perfect an instrument it is. For the benefit of those who have not had this pleasure we append a few extracts from a great number of letters received by us from purchasers of these keys in different parts of the country. They tell the story of the excellence of the Victor Key in no uncertain language.

"The Victor Key received some weeks ago 'right side up with care.' I am very much pleased with the key, and would not part with it for five times its cost, could I not get another. Persons have tried it who have had more experience with keys than I have, and all have pronounced it to be as perfect a key as can be made. I myself have written with a great many keys, but I must say the Victor takes the 'horse, wagon and bakery,' or, in other words, 'the cake.'"
 L. M. SUTTON,
 San Francisco, Cal.

"We are using one of your new Victor Keys, and in regard to same would say that we think it the most perfect and easiest working key made."
 F. W. LAMENT,
 Shandaken, N. Y.

"The Victor Key which I got from you gives great satisfaction. I have no doubt that it will be a success."
 EUGENE A. SMITH,
 State Geological Survey, Tuscaloosa, Ala.

"The new Victor Key received and fully tested. Can heartily indorse it as the perfection of easy, rapid, non-sticking keys, besides being hand-somer and capable of more delicate adjustment than any other. Such is also the opinion of several other operators here who have tried it."
 C. E. RANDALL,
 Chi., St. P., M. & O. Ry., Merrillan, Wis.

"Victor Key here. 'Sending' much improved. I know Victor's mission will be to raise the mediocre sender above his fellows! Another gem in Tillotson & Co.'s telegraphic crown."
 MOORE SIGWORTH,
 C. & O. Telegraph, Pine Grove, Ky.

"The Victor Key received and is a 'Daisy.' It

is the best we ever used, and for ease and rapidity of adjustment it 'takes the cake.'"

H. T. FAEHNDRICH, {
 C. F. SMITH, {
 Mo. Pac. Ry. Co., Osage, Mo.

"The Victor Key arrived in good order and we have it on main line. It is, without exception, the best key I have ever used. I have used a great many styles of keys, but have found none to equal the Victor. For simplicity, easy adjustment and rapid sending I think it has no equal. Any common operator will find no trouble in sending 35 to 40 words per minute with it. May it have the sale it justly deserves."
 J. B. GLOVER,
 Agt. St. P., M. & M. Ry., Melrose, Minn.

"My Victor Key 'still holds the fort.' The general remark is 'She's a daisy,' or 'Let me rush 'em on that key.' I pronounce the Victor the simplest and best key I ever saw. It is a little gem, and well worth double its price."
 D. O'CONNOR,
 Tiffin, O.

"Victor Key to hand, have tried it, and am very much pleased with it."
 W. E. ROWBOTHAM,
 Galva, Kan.

"I received my Victor Key all right, and like it first rate."
 W. H. FOWLER,
 Agt. and Opr., Atterbury, Ill.

"The Victor Key is the easiest working, easiest adjusted and the best key I ever worked with."
 L. A. HIGGINS,
 Roslyn, N. Y.

"Have had your Victor Key working more than a month, and take pleasure in pronouncing it the best key I have handled yet. It is durable, handsome and beats them all for easy and rapid send-

ing. An ornament to an operator's table."

J. H. JONES,
 Operator in charge Fort Missoula, M. T.

"I like the Victor Key so well that I cannot use any other. I must have another for the other wire. Please hurry shipment and oblige."

CHAS. A. LEWIS,
 Agt. and Opr. Jefferson Barracks, Mo.

"Your Victor Key received safely, and it gives entire satisfaction. Think it far superior to anything in the way of improvement upon old style key that I have seen."
 W. P. BRIGGS,
 Ridgeland, S. C.

"The Victor Key I got of you 'is a daisy,' best I ever tried."
 L. F. BACON,
 Mgr. W. U. Tel. Office, El Dorado, Kan.

"The Victor Key 'is a daisy.' It discounts the old style."
 J. H. BAILEY,
 W. U. Tel. Co., Santa Cruz, Cal.

"After a month's trial I consider your new Victor Key greatly superior to any key in use."
 B. F. DILLON,
 Chief Opr. W. U. Tel. Co., Savannah, Ga.

"The Victor Key to hand in good order. Nice, neat—beyond a doubt the best I ever saw."
 W. T. FULTON,
 Agt. and Opr., Ashland, Md.

"I like the Victor Keys very much; best I ever saw or used."
 A. E. TOWSLEE,
 D. M., O. & S. Ry., Osceola, Ia.

"The Victor Key is the firmest and best working key we have in the office. It is far ahead of anything I have used yet, as it can be worked with great ease. I would advise telegraphers to use the Victor Key."
 F. L. WILSON,
 R., W. & O. R. R., DeKalb Jet., N. Y.

Inclose \$2.50 and receive by mail, post-paid and registered, a key which will lighten your labors and gladden your heart.

MANUFACTURED ONLY BY

L. C. TILLOTSON & CO.,

Manufacturers and Dealers in Telegraph and Telephone Supplies of Every Description.
 NOS. 5 AND 7 DEY STREET, NEW YORK.

THE BISHOP GUTTA PERCHA WORKS OF NEW YORK CITY.

SAMUEL BOARDMAN, Agent.

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ESTABLISHED IN 1847.

ORIGINAL AND ONLY MANUFACTURERS IN THE U. S. OF

GUTTA PERCHA INSULATED ELECTRICAL WIRES AND CABLES

OF EVERY DESCRIPTION, FOR

Telegraphic, Telephonic and Electrical Purposes.

Cutta Percha Insulated

SUBMARINE CABLES, 50 Regular Sizes—One to ten conductors.

SUBTERRANEAN CABLES.—Any number of wires, hempen-armored covered.

AERIAL CABLES.—Any number of conductors; any desired insulation; lead or hempen covered.

LEAD-COVERED CABLE.—Any desired insulation; any length covered continuously without a break.

ANTI-INDUCTION TELEPHONE (Lead-Covered) CABLES.—As used by the Metropolitan Telephone & Telegraph Co.

TORPEDO CABLES.—One to four conductors. Recommended and in use by the United States, European and South American Governments.

MARKS' COMPOUND INSULATED WIRES.—For office, outdoor, underground and battery use.

G. P. OFFICE WIRES.—For all electrical purposes; cotton or tape covered and saturated if desired.

FUSE, LEADING AND CONNECTING WIRES.—For submarine and subterranean blasting.

ALWAYS HAVE ON HAND:

Wires of Every Variety of Insulation,

Burglar Alarm and Annunciator Wires,

TELEGRAPH, TELEPHONE AND ELECTRIC LIGHTING WIRES, CORDAGE AND CABLES
OF EVERY DESCRIPTION.COPPER MAGNET WIRES, { Perfect Insulation,
Highest Conductivity,

GERMAN SILVER RESISTANCE WIRE,

TELEPHONE FLEXIBLE CORDS, MEDICAL CORDS,

FLEXIBLE ELEVATOR CABLES, { Any number of
Conductors,

B. B. Galvanized Iron Wire, Double Braided.

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OFFICE AT THE WORKS.

CORRESPONDENCE SOLICITED.

NEW YORK.

INDIANAPOLIS,
MANUFACTURERS OF

CHICAGO,

Telegraph Instruments and Supplies, Hotel and House Annunciators, Burglar Alarms and Call Bells, Electro-Mercurial Fire Alarm, Electric Gas-Lighting Apparatus, Magneto Call Bells, Telephone Exchange Switch Boards, etc.,
Underground and Aerial Cables, and Telephone Apparatus of Every Description.

J. H. BUNNELL & CO.'S

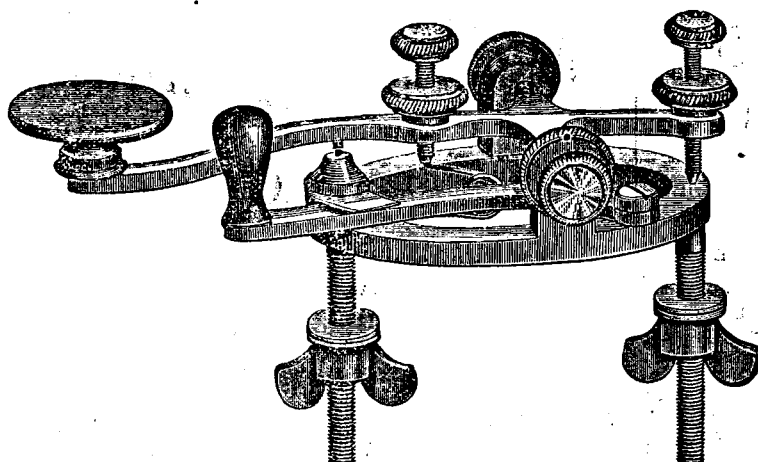
NEW STEEL LEVER SOLID TRUNNION **KEY**

J. H. BUNNELL & CO.,

112

LIBERTY STREET,

New York.

BEST IN THE
WORLD.PATENTED Feb. 15
1881.

We have much pleasure in being first to make and bring to the notice of Telegraphers and Managers of Telegraphs this new and important improvement in keys.

We offer it as being *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, \$3.00. FINELY FINISHED, AND LEVER NICKEL-PLATED.
LIBERAL DISCOUNT ON ORDERS FOR COMPANY SUPPLY.

Steel Lever Key sent by mail post paid, to any part of U. S. or Canada on receipt of the above price, by registered letter or money order.

OUR STEEL LEVER SOLID TRUNNION KEY

is now well known throughout the United States and Canadas as being the most satisfactory, durable and perfect key for Morse Telegraphing.

Its great popularity since its first introduction has caused many attempts to produce a key having at least equal merit. But, after two years' trial in thousands of different places, it still remains

“A NUMBER 1,” AHEAD OF ALL,
while its competitors drop out and cease to be heard from.

Various absurd contrivances, more like ticket punches than telegraph keys, continue to be put forward as being equal or better keys, but we would say to all who wish to possess a perfect instrument that

“THE BUNNELL STEEL LEVER KEY”

is, beyond all comparison, the best.

J. H. BUNNELL & CO.,

FIRST-CLASS TELEGRAPH INSTRUMENTS AND MATERIALS OF EVERY DESCRIPTION,
112 LIBERTY STREET, NEW YORK.

A. G. DAY,

MANUFACTURER OF
Kerite Insulated Telegraph
Wire and Cables.

OFFICE: 120 BROADWAY, NEW YORK.
Factory: Seymour, Conn.

The discovery of the insulating compound, known as Kerite, is the result of more than ten years of uninterrupted experiment and application, as well as twenty years' previous experiment and experience in the manufacture of India-rubber. About ten years of this time was spent in assisting Mr. Charles Goodyear in the experimental department, while perfecting his improvement in vulcanized India-rubber and its varied applications. The necessities of the telegraph business requiring an indestructible insulation, stimulated me to the discovery and perfecting of my compound known as Kerite, which combines the great advantage of durability with perfect insulation. Kerite insulation is proof against the action of the corrosive elements in the earth, air and water; and, where it has been practically tested, has proved its superiority to all other insulation.

DURABLE QUALITIES OF KERITE.

It is not injuriously affected by the extremes of heat and cold experienced in our climate, nor by length of exposure to the atmosphere. It will endure long-continued heat below two hundred degrees Fahrenheit, while for short intervals it may be subjected to from two hundred and fifty to three hundred degrees; and it may be safely immersed in boiling water. The action of water, salt or fresh, not only protects all its qualities, but very much improves its insulation. It is also unchanged by being placed in the ground. Any corrosive elements in the earth do not act upon it; nor is it injured by the roots of plants, which soon destroy gutta-percha. There are thousands of miles in use throughout the country, by Fire Alarm and other Telegraph Companies of all our principal cities. It has been used largely in the city of New York, under all conditions and exposures for the last nine years. Constant exposure to the sun and atmospheric changes are the severest tests that can be given it in practical use.

Eminent Electricians and Practical Telegraphists

commend and recognize the Kerite insulation as superior to all others. At the Centennial Exhibition at Philadelphia, Sir William Thomson, the eminent electrician and scientist, awarded to the

Kerite Insulated Wire and Cables
A DIPLOMA FOR
"Excellence of the Insulation and Durability of the Insulator."

For sale by all dealers in Telegraphic Materials.
For further particulars, address

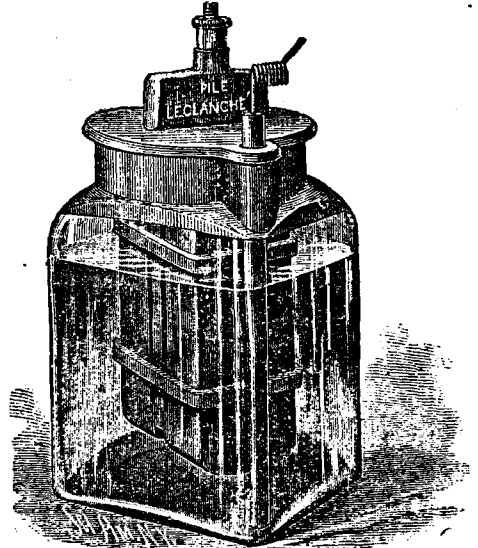
A. G. DAY,
120 Broadway, New York
C. B. HOTCHKISS, GEN. AGT.



The Works of the JNO. A. ROEBLING'S SONS CO., at Trenton, N. J., have facilities for producing large quantities of Telegraph Wire on short notice. The Belgian system of rolling long lengths of wire rods, and improved methods of galvanizing, were first introduced in the United States at these works. It insures the production of wire with few joints, and with a thick coating of zinc.

Leclanche Battery.

(PATENTED.)



PRISM BATTERY, COMPLETE.
Size of Jar 6x4 1/4 inches.

GREAT TELEPHONE BATTERY.

The Realization of
SIMPLICITY AND EFFICIENCY
In Electric Open Circuit Batteries.

Free from acid. Emits no odor. Does not get out of order. Lasts without renewal from six months to several years, according to use.

ADOPTED AND USED BY THE
American Bell Telephone Company
Metropolitan Telephone and Telegraph Company.
Western Union Telegraph Company.
Gold and Stock Telegraph Company, with their battery telephones.
And by all the Telephone Companies and Exchanges in the United States.

The attention of the public is called to the new form of Leclanche Battery, in which the porous cell is dispensed with and for it substituted a pair of compressed Placques or Prisms, which are simply strapped to the Carbon (as shown in cut).

The Prism Battery is more easily and cheaply cleaned and renewed than any other battery. Beware of Infringements and Worthless Imitations.

Every genuine Leclanche Battery has the words Pile-Leclanche stamped on the carbon head, jar and prisms. All others are spurious.
"Prism" and Porous Cell Batteries for sale in any quantity Zinc and Sal Ammoniac of superior quality.

The Leclanche Battery Co.,
149 West 18th St., New York.
L. G. TILLOTSON & CO., Sole Agents.
5 & 7 Dey Street, New York.

PINS AND BRACKETS.

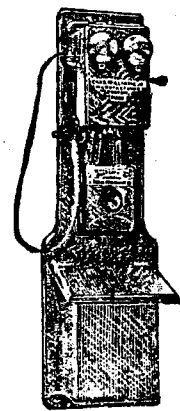
We are now prepared to furnish
Pins, Plain, at \$10 per thousand.
Pins, Painted, \$11 per thousand.
Brackets, Plain, \$13 per thousand.
Brackets, Painted, \$15 per thousand.
BEST QUALITY OF OAK.

SPECIAL REDUCTION ON LARGE ORDERS
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CHARLES WILLIAMS, JR.,

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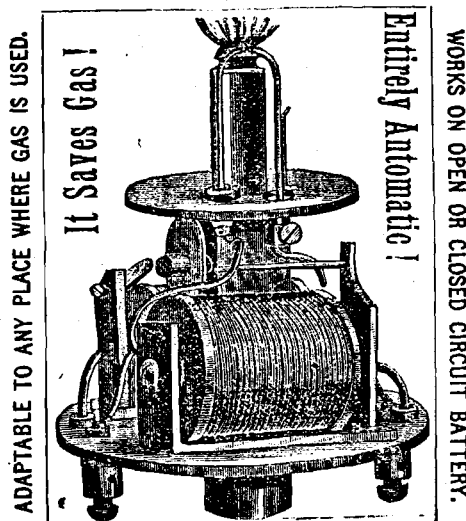
109 Court Street, Boston, Mass.,
AUTHORIZED MANUFACTURER OF
THE AMERICAN
BELL TELEPHONE CO.



Magneto, Crank and Push Button Call Bells, Electric Bells, District Bells and Switches for Exchanges, Annunciators, etc.

Telegraph and Electrical Instruments, Batteries, Wire, Insulators, and Telephone Supplies of every Description.

Rhodes' Electric Gas Burner.



Patented: May 31, 1881; April 20, 1882; May 2, 1882.

Following are a few of the merits of this Burner:

1st.—It is entirely automatic or self-acting; at one operation turning on and igniting the gas or extinguishing it.

2d.—Its ease of application to ordinary gas fixtures.

3d.—Its simplicity of construction and arrangement: having no complicated parts liable to get out of order.

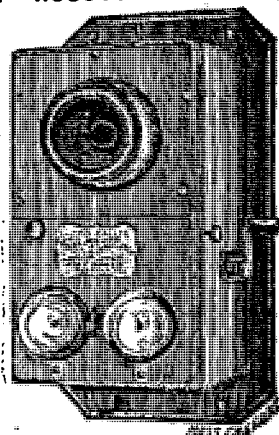
4th.—Its saving of gas: as no lights need be kept burning where it is in use; the mere pressure of an electric button lighting the gas wherever needed.

5th.—Its removal of a fruitful cause of fires by dispensing with the use of matches.

SMITH & RHODES ELECTRIC COMPANY
(Limited.)

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**BOWEN'S IMPROV'D
CHAMPION ACOUSTIC TELEPHONES!**



WITH CALL BELL ATTACHMENTS.

A superior instrument, containing latest valuable improvements. Transmits distinctly and is not troubled by the wind or weather like others. The most practical, durable and complete mechanical telephone for business lines. Working parts made of metal inclosed in a finely finished walnut case, and combined with Magneto Call Bells, or furnished without, as may be desired. Each instrument has a lightning arrester, cut-out switch, and is supplied to order with annunciator drops or burglar-alarm attachments. Flexible ear tubes put on for noisy locations; the best private line combination for railroad stations. Us—either copper, bronze or galvanized steel cable wire. Works one mile. All trimmings nickel-plated. *Handsomest and most business-like acoustic telephone yet produced!* Mechanical Telephones of several different makes supplied; also Telegraph Instruments, Call Bells, Alarms, Annunciators, Batteries, Wire, &c. **Special Discount to Operators, Railroad and Telegraph Companies.**

Send for circulars. ADDRESS—
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Telegraph Engineers and Contractors, Wire
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MANUFACTURERS OF

Submarine, Subterranean and Aerial Cables
of every description, for Telegraph, Tele-
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Henley's Patent Ozokerited Core,
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Estimates for any kind of cables or core furnished.

OFFICE:
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COMPLETE SETS OF MACHINERY

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Wire Stranding Machines.
Complete sets of Machinery for Purifying India Rubber
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Lapping Machines for Covering Wire with Silk, Cotton,
Flax, Hemp, Tape, etc.

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MANUFACTURERS OF

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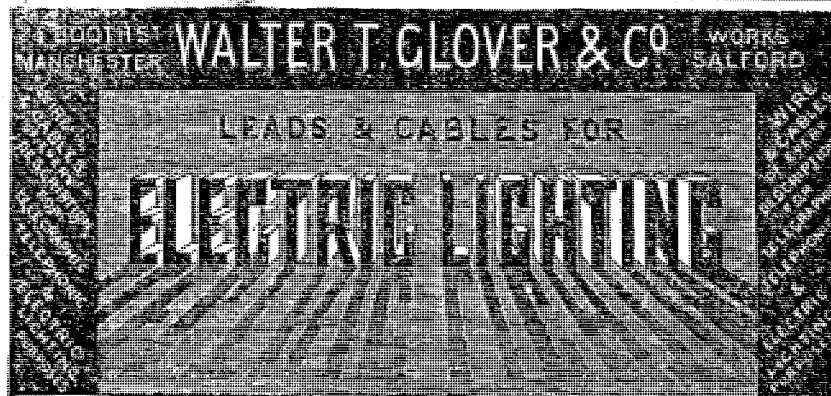
Over 100-lb. Pieces Without Weld or Joint.

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FENCING WIRE, SUBMARINE CABLE WIRE, STRAND AND STAY WIRE
AND GALVANIZED BINDING WIRE.

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MANUFACTURERS OF BEST PATENT

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Of High Conductivity, in 100-lb. Pieces, without Joint or Weld.

Iron and Steel Wire Drawers, Patent Galvanizers.

Cable Wire. Telegraph and Telephone Line Wire to all specifications. Best Galvanized
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Galvanized Steel Wire for Long Spans.

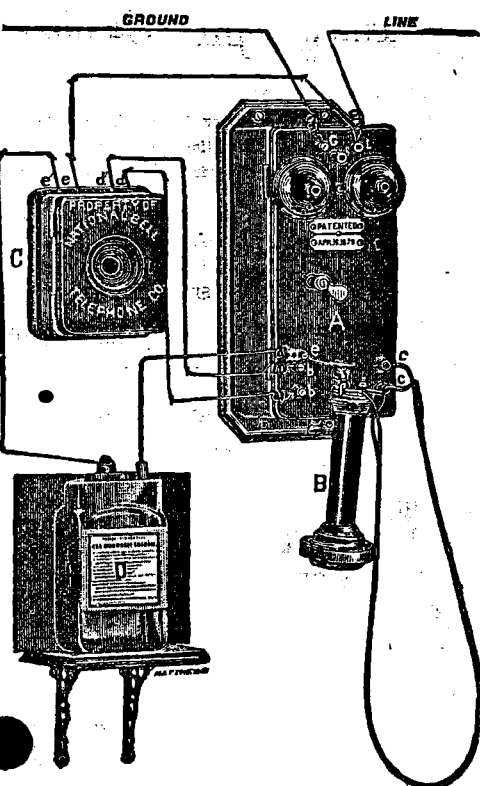
Contractors to the English Postal Telegraph Department and Railway
Companies.

PRIZE MEDALS—London, 1862; Paris, 1867; Moscow, 1872; Vienna, 1873; Paris, 1878; Philadelphia, 1876.

American Telegraph and Telephone Companies using wire in large quantities are invited to write for
prices. Inquiries can be sent direct, or to THE ELECTRICAL SUPPLY COMPANY, 109 Liberty street,
New York, sole agents for the sale of our telegraph and telephone line wire in the United States.

The American Bell Telephone Company.

H. FORBES, President. W. R. DRIVER, Treasurer
THEO. N. VAIL, General Manager.



This Company, owning the Original Patents of Alexander Graham Bell for the Electric Speaking Telephone, and other patents covering improvements upon the same, and controlling, except for certain limited territory, under an arrangement with the Western Union Telegraph Company, the Gold and Stock Telegraph Company, the American Speaking Telephone Company, and the Harmonic Telegraph Company, the patents owned by those companies, is now prepared to furnish, upon application, either directly or through any of its agents, Telephones of different styles, and applicable to a variety of uses.

This company desires to arrange with persons of responsibility for establishing

District or Exchange Systems,

In all unoccupied territory, similar to those now in operation in all the principal cities in this country.

Responsible and energetic persons are required to act as licensees for the purpose of establishing

PRIVATE LINE AND CLUB LINE

systems, for business or social uses. Also to introduce the telephone for

SPEAKING TUBE

purposes, for which instruments will be leased for a term of years at a nominal rental.

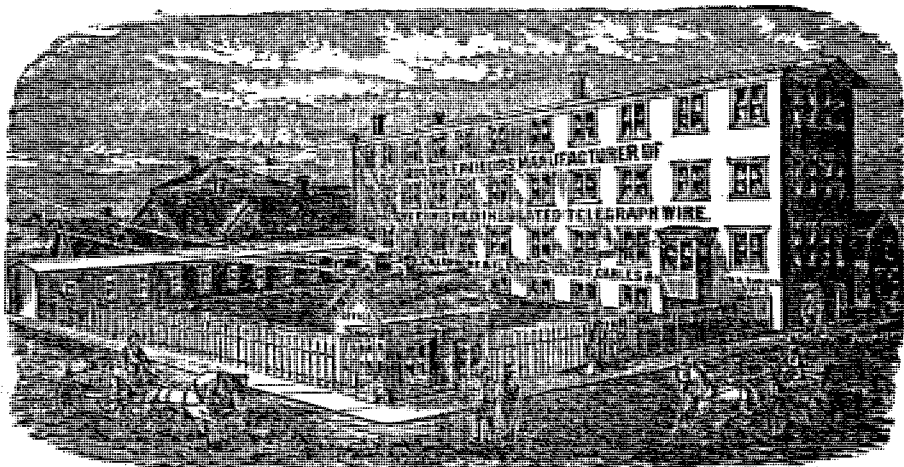
This Company will arrange for telephone lines between cities and towns where Exchange systems already exist, in order to afford facilities for personal communication between subscribers or customers of such systems.

We respectfully invite attention to this matter, and any further information relating thereto can be obtained from the Company,

NO. 95 MILK STREET, BOSTON, MASS.

All persons using Telephones, not licensed by this Company, are hereby respectfully notified that they are liable to prosecution, and for damages for infringement, and will be prosecuted accordingly to the full extent of the law.

EUGENE F. PHILLIPS,
PROVIDENCE, R. I.



MANUFACTURER OF PATENT FINISHED

Insulated Telegraph Wire

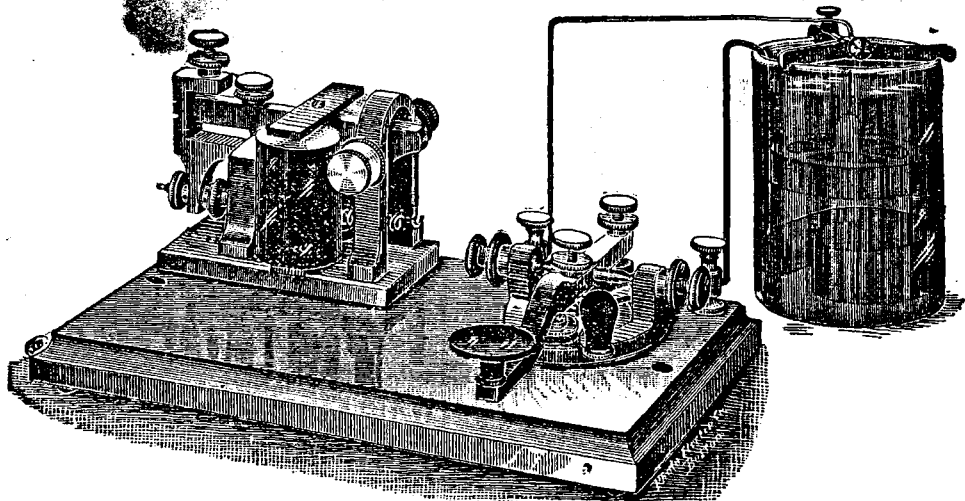
TELEPHONE AND ELECTRIC CORDAGE.

MAGNET-WIRE,

PATENT RUBBER-COVERED WIRE, BURGLAR ALARM AND ANNUNCIATOR WIRE, LEAD-ENCASED WIRE, CABLES, ETC.

W. H. SAWYER, Electrician and Superintendent.

JEROME REDDING & CO'S LEARNERS' INSTRUMENT.



Price for the Complete "Gem" Learners' Outfit, \$3.75.

Consisting of the above large-sized Sounder and Key, a large Cell of Callaud Battery, one roll of Office Wire, Book of Instructions, Chemicals, etc. The only low-priced Learners' Instrument that has nicely finished BRASS Sounder and Key Lever, with perfect adjustments for both.

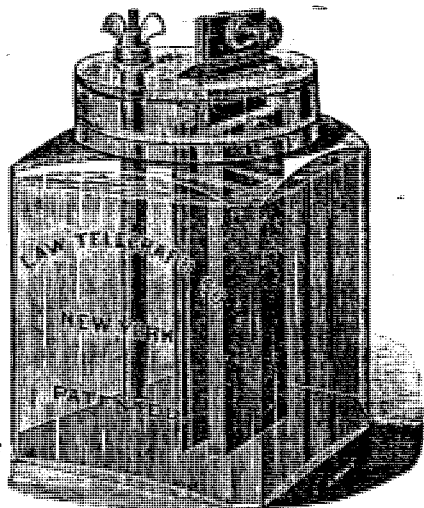
Price for Complete Outfit.....	\$3.75	Price for Instrument alone, by mail, post-paid..	\$3.60
" Instrument alone.....	3.00	" Instrument alone, for lines 1 to 15	
" the whole outfit (except Glass Jar),		miles.....	3.60
with Key and Sounder separate, by		" Instrument alone, for lines 1 to 15	
mail, post-paid.....	4.32	miles, by mail, post-paid.....	4.05

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JEROME REDDING & CO.,
Manufacturers of Telegraph and Electrical Supplies,
NO. 30 HANOVER STREET, BOSTON, MASS.

THE LAW BATTERY.

THE GREATEST
TELEPHONE BATTERY.



As a Telephone Battery, the "LAW" unquestionably excels all others, for the following reasons, viz.:

- 1st. The cost of renewing is about ten cents per year, as against more than one dollar per year for others.
- 2d. The cells are all exactly alike.
- 3d. They continue exactly alike.
- 4th. They never get out of order.
- 5th. The first cost is less than any other.
- 6th. The connections never corrode.
- 7th. Every part of the battery is exposed to view, and if a fault exists it is instantly seen.
- 8th. The water cannot evaporate.
- 9th. The sal ammoniac cannot escape.
- 10th. The parts are not liable to break.

With the introduction of the "LAW," the objection to the use of a battery in connection with the telephone sinks into insignificance, for the care is nothing, of injury or interruption to the service there is none, and the cost of maintenance is less than one cent per month.

The battery is not an experiment; but an established fact.

It has been in use by the Law Telegraph Company for two years.

The materials used in its construction are the very best. No acids. No odors. Great recuperative power. Nothing to renew except the zinc and sal ammoniac—no porous cup, plaque or prism. Fits the standard size battery-box.

The Bell Telephone Co. of Missouri writes: "We have been testing the 'Law Battery' for several months in our telephone circuits, in competition with the various styles of Leclanché and Callaud batteries. For transmitter work the 'Law' excels all others in uniformity of action. As a result of the test referred to, we have concluded to adopt the 'Law.' We have upward of 250 cells now in use."

DIRECTIONS FOR USE.—Put in one-half pound of sal ammoniac and fill with water to the shoulder.

PRICE, \$1.25 PER CELL.

Manufactured and for sale by the
LAW TELEGRAPH COMPANY,
140 FULTON STREET, NEW YORK.

WILLIAM A. CHILDS, Manager.

FRANK SHAW, Engineer.

INVENTORS' AGENCY, FOR THE Patenting, Introduction and Sale of INVENTIONS.

Those Relating to Electricity a Specialty.

Patent specifications for electrical or other inventions drawn. Information given as to whether inventions are patentable or not.

Excellent facilities for placing inventions of merit, especially electrical inventions.

Opportunities constantly offered for profitable investments in patents, and chances to secure large interest in several new inventions by furnishing means to take out patents.

List of important patents now for sale forwarded on application, or shown and explained at the office.

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J. H. LONGSTREET No. 9 Barclay Street, NEW YORK

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**TELEGRAPH INSTRUMENTS,
TELEPHONE AND TELEGRAPH SUPPLIES
OF EVERY DESCRIPTION,
ANNUNCIATORS AND BURGLAR ALARM
APPARATUS, BATTERIES AND
BATTERY MATERIAL.**

Telegraph Instruments for Railroad
Use a Specialty.

IMPORTANT TO TELEGRAPHERS.



THE KERNER STYLOGRAPHIC PEN

A new invention, long needed by the telegraphic fraternity. Holds more ink, writes longer without re-filling, writes better, never blots, never fails. Enables operators to copy close and neat. It is something every telegraph operator ought to have. The exceedingly low price at which the Kerner Stylographic Pen is sold puts within the reach of every person a first-class, durable and convenient writing instrument.

EVERY PEN WARRANTED.

We manufacture the following styles:

No. 1 Pen, plain.....	\$1.00
No. 2, engraved.....	1.25
No. 3, gold mounted.....	1.50
No. 4, entire gold cap.....	3.00

Any of the above sent post-paid on receipt of price. Enclose 10c. for registration.

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A CONSOLIDATION OF

THE UNION ELECTRIC SIGNAL CO., AND OF THE INTERLOCKING SWITCH & SIGNAL CO.
Of Boston, Mass. Of Harrisburg, Pa.

SOLE OWNERS AND MANUFACTURERS OF THE ONLY PRACTICALLY SUCCESSFUL SYSTEM OF

OPERATING RAILROAD SIGNALS AUTOMATICALLY

ALSO OF

**APPARATUS FOR OPERATING AND INTERLOCKING SWITCHES, SIGNALS AND
GATES BY LEVERS, HYDRAULICS, PNEUMATICS OR ELECTRICITY.**

ALSO MANUFACTURERS OF

FROGS, CROSSINGS, SWITCHES AND SWITCH STANDS.

Plans, estimates and detailed descriptions, together with references to apparatus in practical operation, will be furnished upon application.

Phosphor-Bronze Telephone Wire.



"Phosphor-Bronze."

The STRONGEST, TOUGHEST and BEST for line wires of electric and acoustic telephones. Will not STRETCH nor RUST. RESISTS SMOKE, ACIDS and DAMPNESS. TENACITY more than FOUR times its weight per mile.

**PHOSPHOR-BRONZE RODS, SPRING
METAL AND WIRE,**

superior to German silver or brass for electrical apparatus. Already extensively used throughout the country. Address

THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,

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Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the United States.

THE FITCH CHLORINE BATTERY.

PATENTED SEPT. 16, 1879.

The cheapest, cleanest, most economical, durable and decidedly the

Best Open-Circuit Battery

in use for Telephones, Annunciators and Electric Bells. After several years of constant use, it is pronounced to-day as being far superior in constancy and power to all other batteries for the above purposes, notwithstanding all statements to the contrary. We have made several valuable improvements in this Battery, among which is the substitution of a non-corrosive and adjustable clamp, in place of the old style lead cap, which warrants us in saying that the Chlorine Battery has no equal in the market and all we ask is a trial.



Price, \$1.50 per cell.

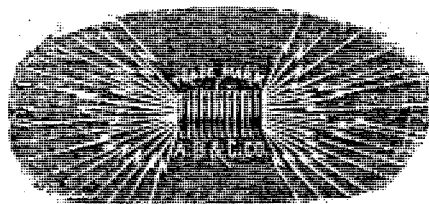
Liberal Discount to the Trade.

Partrick & Carter,

Sole Agents and Manufacturers,

NO. 114 SOUTH SECOND STREET, Philadelphia, Pa

THE ANSONIA BRASS & COPPER CO.,



MANUFACTURERS OF

Pure Electric Copper Wire,

For Magnets, Telephones, Electric Lights, &c., With H. Splittorf's Patented Liquid Insulation, covered with Cotton or Silk.

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WIRE PROOF HOUSE AND OFFICE WIRE FOR IN DOOR USE IN ELECTRIC LIGHTING.

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Nos. 19 and 21 Cliff Street, NEW YORK.

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POST & COMPANY,

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LICENSED MANUFACTURERS OF

American Bell Telephone Co.'s

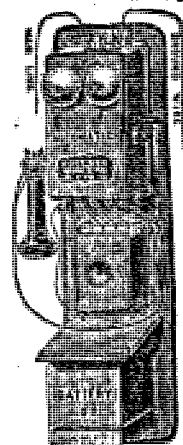
MAGNETO & ELECTRO CALL BELLS, ETC

Manufacturers of all kinds of Telephone Instruments, Bells, Plugs, Switch Boards, Annunciator Drops, Spring Jacks, Magneto-Engines for Switch Tables, and dealers in all kinds of Telephone Supplies and Tools; in stock and for sale at lowest prices.

Galvanized Line Wire, all numbers; Insulated Wire, all numbers; Insulators and Brackets, all sizes; Batteries, all kinds and sizes, at lowest prices.

FULL ASSORTMENT OF

Telegraph Instruments.



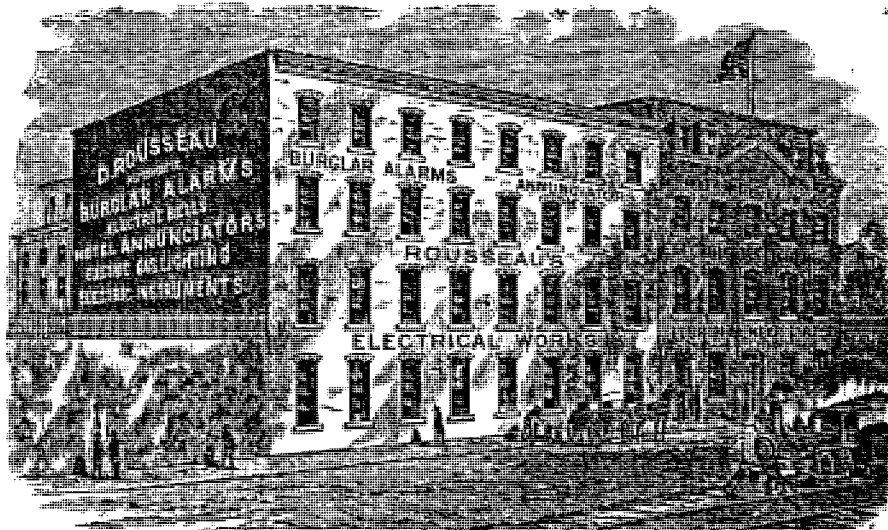
Agents and Managers of Exchanges are requested to correspond with us before purchasing.

We call special attention to our new improved Magneto Call Bells. Samples sent on application to agents and exchanges.

POST & CO., Cincinnati, O.

ROUSSEAU'S ELECTRICAL WORKS,

FOURTH AVE., NEAR 138th ST.



Office: 181 BROADWAY, NEW YORK.

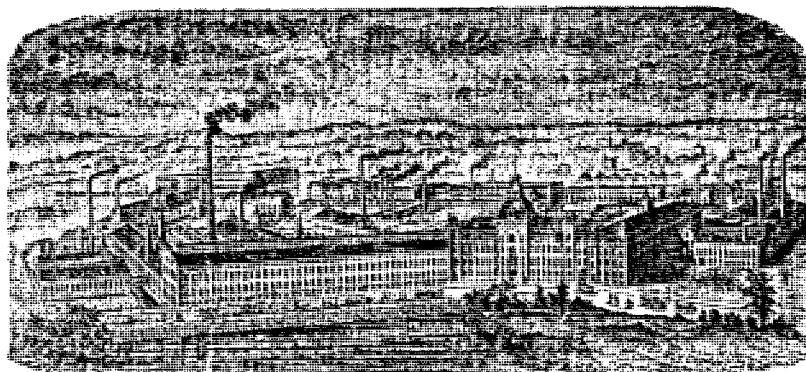
PATENT IMPROVED BURGLAR ALARMS, HOUSE ANNUNCIATORS, HOTEL ANNUNCIATORS, ELECTRIC CALL BELLS, ELECTRIC BURNERS AND ELECTRIC GAS LIGHTING APPARATUS. SPECIAL RATES TO THE TRADE.

TELEGRAPH WIRE.

TELEPHONE WIRE

WASHBURN & MOEN MANUFACTURING COMPANY.

ESTABLISHED 1831. CAPITAL \$1,500,000.



WORCESTER, MASS.

21 Cliff Street, New York.

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This Company having given careful attention to Telegraph Wire from the introduction of the Art of Telegraphy, and especially with reference to the conditions necessary to highest electric conductivity, does not hesitate to recommend this class of its products as unequaled in that particular. Being the first to

MAKE A SPECIALTY OF TELEGRAPH WIRE.

and anticipating at an early day the great demand that would exist for that article, they have adopted and fully proved certain methods and appliances for the production of Telegraph as well as of Telephone Wire which are peculiar to themselves. Among them may be mentioned the

Patent Continuous Rolling Mill,

Patent Continuous Galvanizing Bath,

And the Belgian Rolling Mill

(In connection with the DOUBLE SIEMENS FURNACE).

All Wire made by this Company for Telegraph or Telephone purposes is thoroughly tested before shipping, with regard to Conductivity, Tensile and Torsion strength, as well as Elongation.

Prices and terms for Telegraph or Telephone Wire—Plain, Oiled or Galvanized—given upon application.

N. B.—The qualities known as Extra Best Best (E. B. B.) and Best Best (B. B.) kept constantly in stock.

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Electric Company,
 550 Washington Street,
 BOSTON, MASS.,

MANUFACTURERS AND DEALERS IN

ELECTRIC SUPPLIES,

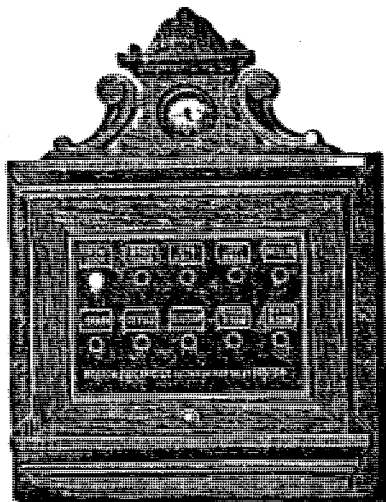
Electric Gas Lighting Apparatus,

ELECTRIC BELLS,

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Electric Light Supplies, Telegraph
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ELEPHONE SUPPLIES, ETC



**HOTEL AND HOUSE
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Elegant in Design, Style and Finish.

LINE SUPPLIES

AT BOTTOM PRICES.

Galvanized Iron Wire,

Galvanized Steel Wire,

Screw Glass Insulators,

Porcelain Insulators,

Rubber Hooks,

Brackets and Pins,

Batteries of all kinds,

Battery Supplies

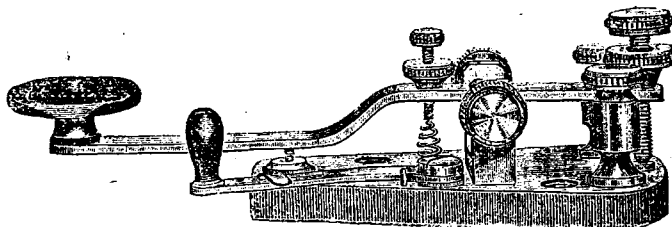
and Chemicals.

SEND FOR CATALOGUE.

**PARTRICK & CARTER'S
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PERFECTION AT LAST!

The Acme Steel Lever Key.



PRICE, BY MAIL, TO ALL PARTS OF THE UNITED STATES AND CANADA, \$3.

For beauty of design, lightness, easy working, durability, and for fast sending, surpasses all other keys ever made. This key has hard rubber base, with top connections, and is entirely nickel-plated, and has received the indorsement of hundreds of operators throughout the country as being the "perfection of all keys." Since the introduction of the "Acme" key every mail brings fresh evidence that the "Acme" is destined to be the most popular key ever placed before the telegraphic profession.

THE NEW GIANT SOUNDER PERFECTED.

PRICE, \$5 BY MAIL.

embodiment of the principle contained in the Giant Sounder, and which is absolutely owned and controlled by us. Buy from us and you will get the original.

THE CHAMPION LIGHTNING ARRESTER AND CUT-OUT.

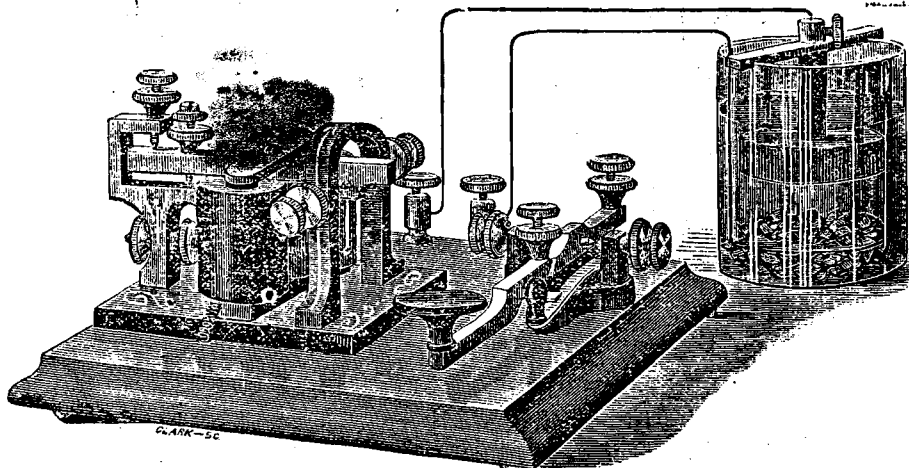
PRICE, \$1.25 BY MAIL.

The Lightning Arrester, Cut-Out and Ground Switch combined, of which we are the originators, has been extensively copied and imitated, BUT NEVER EQUALED.

PREMIUM LEARNERS' APPARATUS.

ONLY \$5.

NOT THE CHEAPEST, BUT GUARANTEED THE BEST



The PREMIUM LEARNERS' APPARATUS AND OUTFIT comprises the famous "NEW GIANT SOUNDER PERFECTED," and the "NEW CURVED KEY," placed upon a splendidly polished base, with a cell of Callaud Battery, Chemicals, Office Wire, and an excellent Book of Instruction, for \$5, when the money accompanies the order.

These instruments are the exact size and form of those upon which we received the highest award at the late Centennial Exhibition over all competitors. Everything reliable, and so guaranteed, or money refunded. Our book of instruction contains full and explicit information as to setting up the battery, running of wires, &c.

Price, Complete Outfit.....	Money in advance \$5.00
" Instrument without Battery.....	" " 4.20
" " wound with finer wires for lines of one to 15 miles.....	" " 5.00
" Cell of Battery, Complete.....	" " 80
" Premium Sounder, Separate Base.....	" " 2.50
" Key.....	" " 1.75
" Premium Learners' Instrument Key and Sounder entirely Nickel-plated, without battery.....	" " 5.20
" Complete Nickel-plated Instrument, with battery and outfit.....	" " 6.00
" " Sounder, separate base.....	" " 3.25
" " Key.....	" " 2.00

Instruments without battery, sent by mail, 55 cents extra. Battery jars cannot be sent by mail. All orders will receive our prompt and careful attention. To prevent delay in shipment, full shipping instructions with town, county and State, should be given. Remittances should be made by P. O. money order, registered letter, draft or express, which will insure safe delivery. Send for catalogues and circulars before purchasing elsewhere.

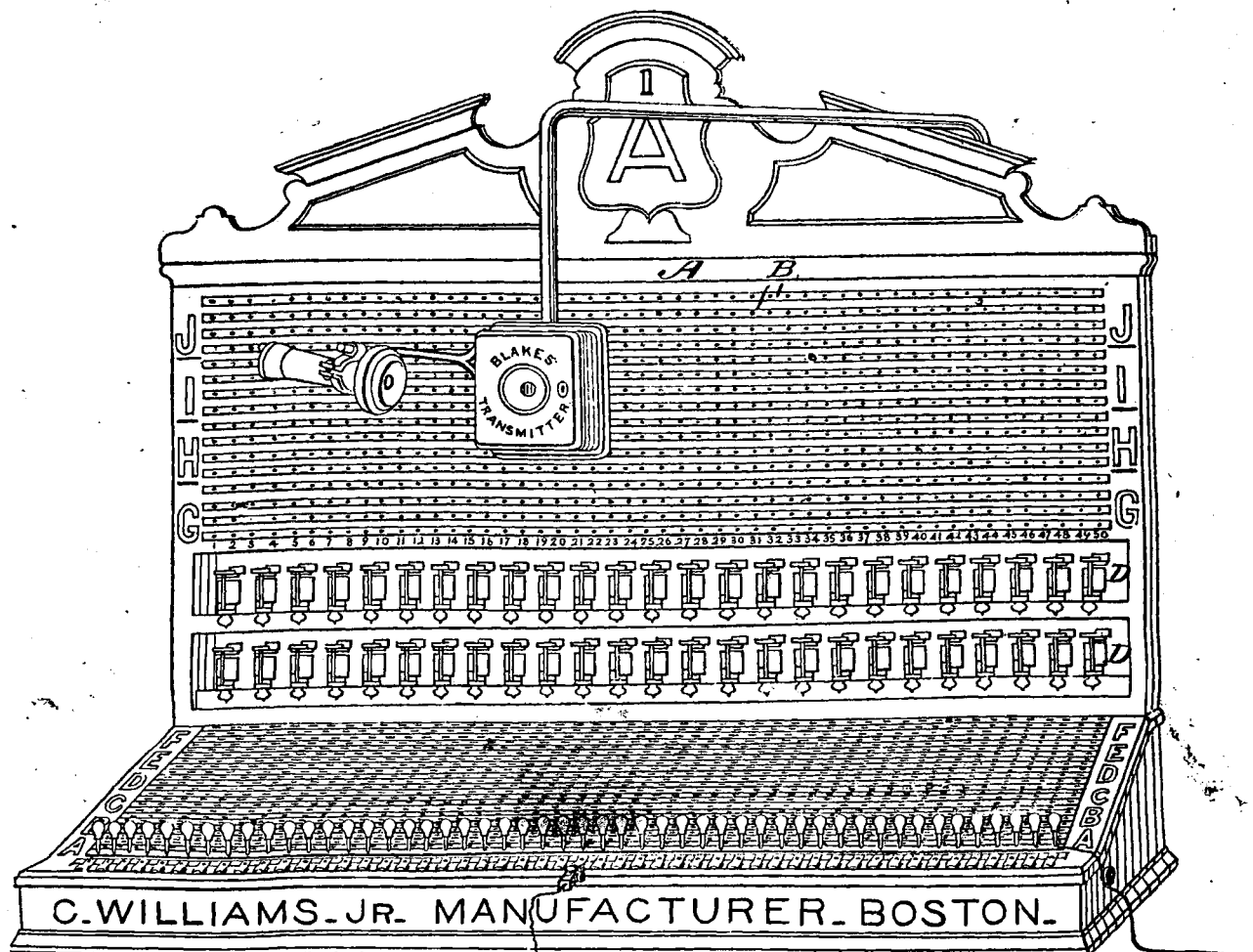
PARTRICK & CARTER,

MANUFACTURERS OF TELEGRAPH INSTRUMENTS AND SUPPLIES

No. 114 South Second Street, Philadelphia, Pa.

THE WILLIAMS

SPRING CENTRAL OFFICE SWITCH.



PATENTED, AUG. 9. OCT. 25. AND NOV. 29. 1881.
JUNE 6. AND AUG. 1. 1882.

Ground

The above cut represents the Switch Board referred to by Mr. T. D. Lockwood, in his excellent book, "Practical Information for Telephonists," recently published by W. J. Johnston.

This Illustration Shows all the Improvements Made in the Board.

The Switch was on exhibition at the recent Telephone Convention at Boston, and all who examined it recognized its distinctive merits.

Descriptive circular will be mailed free on application.

MANUFACTURED BY

CHARLES WILLIAMS, Jr.,

109 TO 115 COURT ST., BOSTON.