

VOL. XII.—No. 17.

NEW YORK, SEPTEMBER 1, 1881.

{ ONE DOLLAR A YEAR.
& 6 CENTS PER COPY.

ANACREONTIC.

List me now, I plume a knight.
Lo! No faded antique wight—
Spindle-shank and ample shield,
Sneaking from the battle field—
But my knight of later day
Claims the poet's bravest lay.
Proudly tossing to the rear,
Waves the goose quill from his ear;
Helmetless, his shining nub
Braves th' official stuffed club.
Ne'er he plated armor wears,
Solely for a shield he bears,
'Neath the haughty archèd lip,
On a small patent office clip.
Lance nor spear nor sword wants he,
Give him but the brass key;
Thirsts he not for bleeding corse,
Merely would he slaughter Morse.
With sulphuric acid bright,
Pledge my telegraphic knight!
Brim the cell of gravity;
Drain the jar and mirthful be
Quick'ning with 'lectricity.
Now once more come pledge my knight,
Lo! no faded antique wight—
Spindle-shanked and ample shield,
Sneaking from the battle field—
But a knight of later day,
Worth the poet's bravest lay.

FRANK C. PRESCOTT.

OAKLAND, Cal., Aug. 18, 1881.

The Paris Exhibition Well Under Way.

[From The Operator's own Special Correspondent.]

On the day preceding the opening of the exhibition all work preceding the opening of the exhibition all work was ordered suspended and a general clearing up requested, that due respect might be paid to President Grévy and a few high state officers who wished to make a private inspection before the general public were admitted. The gentlemen arrived at 10.30 A. M. and, under the guidance of the French Commissioners, leisurely sauntered through the hall, stopping here and there to inspect some object of particular interest, and continued their visit until about noon. With the exception of some music by a military band, there was no display or ostentation of any kind, and, had the dignitaries not been pointed out, I would not have known that they were in the building. During the remainder of the day a favored few were admitted on complimentary tickets and on the following morning the doors were thrown open to the public. Considering what a fine opportunity there was for an imposing opening ceremony, we foreigners were surprised at the extreme simplicity of the affair.

The Executive Committee of the U. S. Commissioners, consisting of Dr. F. L. Freeman, of the Patent Office; Capt. D. P. Heap, U. S. A., and Lieut. T. C. McLean, U. S. N., called a meeting of the American exhibitors on Aug. 5, to ascertain how nearly ready they would be to open on the 11th, and also to consider the question of decorating the space allotted to them. The Commissioners thought that the American section had a "flat" appearance, or, as Dr. Freeman expressed it, looking at our section from the galleries, and comparing it with the display being made by other countries, was like looking into a hole. The reason for this is that our exhibit is of a different nature from the others, which are made up largely of railroad signals, post office systems, requiring the use of structures of some kind, and other apparatus that have glass houses or canopies over them, while the American exhibit contains many dynamo machine and telephone and telegraph instruments, and collectively does not require the use of very imposing edifices to show them off to advantage. The Commissioners, however, "filled up the hole" by planting a high pole at each corner of the section and hanging a paper cornice around the span, supported at intervals between the high poles by shorter ones made up of bundles of signal service field telegraph poles, and the whole thing abundantly decorated with American flags and eagles. Although by no means proud of the small exhibit from our country, that could make such a great show, our patriotism is satisfied to some extent in the knowledge that visitors will have no trouble in finding us.

It is unfortunate that the subject of the Exposition was not brought before the last session of Congress, and an appropriation secured to cover general expenses. The money for the decorations and the expenses of the Commission was raised by an assessment levied upon the exhibitors of 30 francs for each square metre of space they use, which in some cases was quite a tax. There seems also to have been a lack of general information in America on the subject of the Exposition, which may account for our small delegation. Many thought that only electrical novelties were to be shown, and were ignorant of its general and historical nature. Prof. Gray, for instance, exhibits nothing but his harmonic system of telegraphy, while he could have filled a large room with his experiments and inventions, dating back over fifteen years. Edison, who had agents here, was in a position to be better informed, and fills up two rooms with his

productions. Everything he has invented is on exhibition, and his rooms attract much attention. Unhappily, they open off the gallery and are some distance away from the rest of the Americans, so that we do not get the full benefit of his presence.

The nave of the palace has been divided into two parts, one half being set apart for foreign exhibitors and the other for French. In these two divisions are conspicuous four large pavilions—that of the French Ministry of Posts and Telegraphs, which is the largest of all; that of the London Post-office, that of the city of Paris, and finally that of the French and foreign railways. In the middle of the nave, on the boundary line between the French and foreign divisions, an immense tower supports an electric lighthouse. At the foot of the door is a fountain and rockwork. By an ingenious method of lighting, the water is rendered luminous, so that the fountain spurts forth, as it were, liquid diamonds. One half of the building is glazed with common glass and the other half with black glass. In the latter section the electric light is introduced. Seeds of the same plants, planted in the same mold and at the same time, are exposed to the two forms of light, the sunlight and that of electricity, to see under which conditions they will grow the more rapidly.

One of the more noticeable inventions on the ground floor is the automobile safety barriers of the Austrian railways, which will fall as trains approach and recede. The electrical balloon, small and white, with its tiny sail has a dove-like appearance. Its flight appears uncertain, but its inventor believes that he has succeeded in greatly simplifying aerial locomotion and rendering it safe and certain. In the pavilion of M. Cochery, French Minister of Posts and Telegraphs, six operators, working a single wire, transmit six different dispatches, operating on little key-boards with five wire keys and with arbitrary signals. What they telegraph comes out printed, but the whole staff cannot turn out between them more than one hundred and twenty-five words a minute, which, as compared to the Edison apparatus, is as the old-fashioned slow coach to steam locomotion. An electrical machine operates in the Edison exhibit, which, manipulated by four operators, telegraphs at the rate of 1,200 words per minute.

Among other startling things in the British exhibit is the Muirhead quadruplex in operation. The American Union Company had two sets of these instruments, but, either from lack of skill on the part of our electricians, or for some better

reason, they never could be made to work.

From the galleries overhead float the blended banners of the nations, the Stars and Stripes, the Union Jack, the red, white and blue of France, the red, yellow, and black of Belgium, the yellow and red of Spain, the yellow and black of Russia; and strangest sight of all, the red, white and black pennon of Germany hangs for the first time in eleven years in peaceful friendliness beside the tricolor. The German flag was last seen in Paris on the lances of the Uhlans, as they rode down the Champs Elysées, ten years and more ago. Among the flags are set lamps shaded with ground-glass globes, that glow as pearls of flame with the imprisoned fire of the electric light.

The up-stairs galleries alone contain wonders enough to compose an ordinary exhibition. These galleries are divided into twenty-eight rooms, each of which is devoted to some special application of electricity, and each illuminated by a different system of electric lighting. In the nave all the systems of lighting operate simultaneously in producing a general effect; in the upper rooms the public is able to judge each system by itself.

The first of these twenty-eight rooms contains pictures and objects of art illuminated by Clère's sun lamp. The second has been transformed into a theatre. In this theatre the electric light is used for footlights. The scene shifting and lighting are done by electricity. A knob is pressed and a stage decoration is changed. On the first trial of the machinery there were some hitches, and a little girl had a narrow escape from being killed by the fall of an antique cross in a market place. Two rooms are fitted up to represent a complete French dwelling apartment or flat—salon, dining room, bedroom, kitchen, bathroom—in which are exhibited all the appliances of electricity to domestic uses. Vessels are raised from the pantry and let down by electricity. An electrical lustre is suspended over the dining table, and the marking board of a billiard table is worked by the same agency. It gets through the tasks of many servants noiselessly and with the precision of clock-work. The automatic electrical sewing machine of Olivier is very elegant and useful. It costs little, and the force generating the electricity can be provided to do ten hours' work at an expense of fifty centimes daily. While the seamstress holds the cloth she can, if she pleases, be noiselessly fanned.

Rooms 7 and 8 are divided into six elegant little salons. Wires put these salons in communication with the Opéra and Théâtre Française, and by means of telephones the performances of these two theatres are heard, even to the smallest details. The telephone does not lose any sound—the applause, the footsteps of the actors, nor even the noise of the moving of a chair. The only parts of the performance that the telephone cannot transmit are gestures of the actors and the scenery.

No. 9 contains electric and magneto therapeutic appliances; No. 10, fire alarms and Sauter & Lemonnier's lamps; No. 11, photography; No. 12, Gramme lighting system; No. 13, Siemens' lamps and instruments of precision; Nos. 14, 15, 13 and C, general and accessory telegraphy. The middle of the galleries contain various exhibitions—the display of the General Telephonic Company, incandescent lamps of the Heran Maxim system, Jaspas, Liège and Anatole Gérard burners and Thomassini lamps; No. 17 contains a collection of piles; No. 18, a retrospective exhibition of the instruments of Volta, Galvani, Armstrong, Ampère, etc.; No. 20, electrical clocks and time-keepers and Gibbs' lamps; rooms 19 and 20 contain a reading room and bibliographical exhibition, lighted by the Lontin and Daft systems; room D is a lecture hall, lighted by the Swan and Brush methods. The remaining rooms have been assigned to Edison.

The machines and apparatus on exhibition are not yet all in working order. Of course, there are many specimens of electrical architecture, such as primitive induction coils, old fashioned dynamo-machines, dial telegraphs, etc., that have all been described and laid away on the shelf years ago. They make their appearance now like things of the past come to mark the progress of time. Beyond having an historical

interest, they have little value. Among the number is the first telephone made by Philip Reiss in 1861, and described at length by Prescott.

On August 18 the Superior Committee held a meeting to organize a jury to make the awards. There are 1,800 exhibitors, of whom 600 are foreign and 1,200 French. In spite of this difference, the committee decided that the jury shall be equally composed of French and foreign members. Each section will, therefore, appoint a number of jurymen in proportion to the importance of its exhibit. The Committee decided to place at the disposal of the jury 50 gold medals, 200 of silver and 500 of bronze.

A fire, attributed to a defect in the fitting up of some incandescent lamps, broke out on Thursday, Aug. 25, in the reading-room of the exhibition. The alarm was quickly given and the fire was extinguished before it had spread far. In attempting to tear out the wires with his hand a German was twice knocked down. A scientific commission, headed by M. M. Du Moncel and Breguet, made an examination of the connections of the various exhibitors and there is now no further danger to be feared.

The experimental lighting up of the exhibition took place on the evening of Aug. 26, M. Gambetta, President of the Chamber of Deputies, being present. The combined illumination of all the various systems in the area of the Palace of Industry had not, contrary to expectation, a blinding effect. The spectacle, however, was very fine.

There is an electric lamp for about every square metre of space in the building. Admittance to the night exhibition costs 1f. 50c., and to the day exhibition 1f. Besides lighting up the grand staircase and his own section, Edison proposes to place a number of his incandescent lamps in some of the neighboring concert gardens in the Champs Elysées. It is not known whether his ramifications will extend as far as the Jardin Mabille, which is quite near, but it is hoped not.

A track has been laid for the Electric Railway, of which we have heard so much, from a point on the Place de la Concorde into the building, a distance of perhaps an eighth of a mile. In the German experiments both of the rails are used as conductors, and are, consequently, heavily charged with electricity. Horses and cattle, in crossing these tracks, sometimes receive very heavy shocks, and the trouble has become so serious as to take the form of a real objection to the use of the system. An iron rod has been hung on 12-foot poles along one side of the track from the Place de la Concorde. This rod is used as one of the conductors, a small car running along it, connected by a wire to the main car, which, in turn, passes the current into one of the tracks and the earth. This means may overcome the objection of having both rails charged, but it seems to be a cumbersome way of doing it.

One evening last winter an operator, who is at present employed at 195 Broadway, sought a bachelor's usual solace after dinner in his pipe. He packed the tobacco into the bowl solidly and stretched himself out for half an hour's quiet comfort. After the first few puffs the ashes in the pipe bowl had risen over its edge and were in danger of falling upon the carpet, when the smoker, not wishing to burn his fingers, and being a young man of expedients, drew one of those rubber-handled Western Union styluses from his pocket to pack the ashes down. He noticed that before the rubber touched the ashes small pieces of the latter flew to meet and adhered to it. He then remembered what he had read on the subject and saw that it was only an illustration of the old experiment that hard rubber and flannel rubbed together electrified the former so that it would attract light bodies. In pulling the stylus from his pocket there was friction enough between it and the flannel of his vest to charge the rubber and cause the above result. Our friend then performed several other old but interesting experiments with his stylus, and finally made up his mind that he knew all about it and laid it away. Like many other men, he did not know that the idea, properly developed, was worth a fortune to him.

There is on exhibition here a machine, just patented, called the Electric Middlings Purifier. It is designed to separate flour from the wheat shells after the bolting process has been gone through with. The residue, which consists mostly of the shells from the

grains of wheat contains also a good deal of flour which cannot be separated by the ordinary process. It is called middlings, and is sold for horse feed, and sometimes a low quality of bread is made from it. The Electric Purifier has seven cylinders of hard rubber revolving over a sort of tray, so arranged that the middlings gradually work from one end of the tray to the other and in the journey pass under each of the seven rollers. Over the upper side of each roller is fastened a piece of sheep skin with the wool side pressing against it. As the roller turns, the friction between it and the wool causes it to become electrified and as it passes over the middlings the light pieces of shell, being attracted, fly up to meet it and adhere to it until they reach the opposite side, when they meet a light scraper, which rubs them off. They then drop into a small slide and are carried away. The flour, being heavier, remains in the tray until the lower end is reached, when the impurities having been removed by some one of the seven electrified rollers it is run off and saved. The principle governing this process is exactly the same as that existing between the rubber handle of the stylus and the tobacco ashes. It has been suggested to the gentleman having charge of the purifier that cat's skin might be an improvement over sheep's skin for electrifying purposes. It presents the advantage, also, of being plenty, cheap, and of providing a use for cats.

The Telegraphic Situation—That "One Man in Charleston" Heard From Again.

When this paper ridiculed the stock-jobbing cranks who persisted in taking the Western Union monopoly—or consolidation, or whatever it is—into court, intending to break the bonds of consolidation in that unfair manner, and when we advocated new lines as the only legitimate way to compete for public patronage, we were sure that we had struck the key-note to the only scheme that could result satisfactorily to the commercial men of the country. The managers of the late American Union Company gave us some good lessons in the organization of telegraph companies, and, now that the invocation of the law has been wisely abandoned, the sensible portion of the "Anti-monopolists" has begun to profit by the teachings of Mr. Gould and his subordinates.

In the meantime some of the local managers of the Western Union seem to have done all in their power to promote the success of the embryo opposition. By attempted reductions of salary and increasing hours of labor, they drove some of their best men away. "cheap" ones being hired in their places, all of which has gone a long way toward alienating the loyalty of the operators and the confidence and patronage of the general public.

We have already reported the holding of public meetings to censure the Western Union service; we have reprinted extracts from the *Atchison (Kansas) Globe*, the *Kansas City Journal*, and other papers, all going to prove that if the company wants its telegraphing done satisfactorily to the public it must deal fairly with its men. We have now to reecho the cry from far-away Utah. The *Odgen (Utah) Pilot*, of the 15th of August, says:

"We are reliably informed that the scarcity of first-class telegraphers is something unprecedented, and those Western Union managers who, under the new regime, have endeavored, in hiring third-rate men, to curry official favor by reducing expenses, now find themselves in a sorry plight, being unable to handle their business with anything like satisfaction to the public or the head managers at New York, and are being called to account therefor. The *Odgen* office is an exception to the above, good wages being the rule at this point. But at Kansas City and Omaha the "Hams" (telegraphic vernacular for poor operators) are in the ascendant and, through incompetent work, are provoking indig-

nation and unfavorable criticism from the press and the public."

From Minnesota we hear, through the St. Paul Dispatch of August 15, that

"A gentleman who has had a great deal of trouble regarding the transmission of his business between this office and eastern points, remarked to a Dispatch representative the other day that the Western Union Company pursued a very short-sighted policy in the management of their business at St. Paul. They have neither well-constructed lines nor men in their office competent to transact their business. They hire men at a small salary to operate their instruments, and the result is that every month they lose an amount of money sufficient to pay for almost double the force they now employ. * * * The gentleman mentioned is connected with the press of St. Paul, and is the correspondent of the most influential eastern paper. Matter which he files in the early hours in the evening is frequently delayed, because of the state of affairs mentioned, until it is too late to forward it, and the company thus loses the business."

From the Montevideo (Minn.) Leader, of Aug. 14, we have:

"Three instances in view. The first, that of a telegram which was sent from Stillwater to St. Paul (20 miles) at 5 o'clock in the evening, asking for a fire engine to assist in saving a large lumber establishment in that city, which was on fire and threatened a conflagration. But, notwithstanding the fact that a city was in danger and needed prompt relief, the telegram, sent at 5 in the evening, was not delivered until 9 o'clock the next morning. The second relates to a case in this city where a child was very sick. The parents presented a message to the operator at this office about 6 o'clock P. M., and paid full rates in order that it might be delivered that night. It was urgent, and directed that a physician be surely sent the following day. Mark the result: The message was delivered the next day at 9:30 A. M., one and a half hours after the train left for Montevideo, although the operator assuredly states that the message was put through that night. The fault then was in the non-delivery of the message after its receipt in St. Paul. The third case is where a message was taken to the office in Granite Falls, Sunday week, to be sent to Minneapolis, informing a father of the death of his child and asking him to come by Monday morning's train. The sender was assured the message would be sent that night. Result: It was put through the next day in the afternoon. Now, we submit that this is an imposition as well as an injustice. A person may be lying at the point of death and the services of a physician be needed to save the life of that person, and yet if a telegram is handed in and paid for, with the understanding that it be immediately transmitted, it does not receive as much, and sometimes not the half, attention as a message announcing the decline or rise of the hundredth part of a cent on a bushel of wheat. The above cases are certainly in the nature of a breach of contract, and if there is no redress we would suggest the enactment of a law making such negligence, either upon the part of the company or the operator in its employ, a penal offence, punishable by fine and imprisonment, or both."

Even an English paper, *Design and Work*, says:

"The Western Union operators are beginning to envy their English confrères. The management are reducing pay and increasing the hours of duty, an insane step, which is likely to be prejudicial to the would-be monopolists."

Opinions, privately expressed in all quarters, are still stronger. Col. J. J. S. Wilson, late W. U. Superintendent at Chicago, and a pioneer telegrapher, in an interview published in the *New York Times* of Aug. 15, says:

"The Western Union has increased its force during the last few years, but there has been a tendency to give smaller wages and employ an inferior class of operators. The recent economy in Western Union, which, it was said, was to save a million dollars, and make up a large proportion of its dividends, I should judge, could only be effected by not keeping up the properties. Of course, inferior operators render a poorer service. That is inevitable. Besides, the tendency

to reduce salaries has created great dissatisfaction among the men."

A reliable correspondent, writing from Chattanooga, Tenn, says:

"Summer business here is usually light, with a reduction of force, but this year it has been very heavy, with an increase; and if it keeps up this winter, five or six men will have to be added to work the cotton business off promptly. Operators are very scarce in this part of the country, and the cry for first-class work in the South at \$75 per month does not seem to have the desired effect; and, consequently, the business comes in all manner of "bulled up" shape. In 1870 to '75 the salaries in this office were \$110 to \$125, and not enough business doing to keep a duplex working. Now neither the out-let nor the pay is sufficient. The majority of first-class offices have had the extra pay for extra service cut off, working men 16 hours out of 24 for \$75 per month—or, at least, \$90 men doing it with no pay (extra) because they cannot get men at \$75 to fill vacancies caused by those leaving to better themselves in Chicago, Cincinnati, New York and other places, where they have slightly increased, to fill up the force. For my part I think the winter business in the South is going to be a matter of lawsuits with the company during the whole season. Why not pay good salaries and get their old men back—men who know how to handle the business in first-class shape?"

Another responsible correspondent writes from St. Paul, Minn.

"Some of our best men have resigned and accepted positions elsewhere, at better salaries, and their places being filled by a very inferior class of operators, has been the cause of much dissatisfaction among the business men of this city, on account of unnecessary delays and inaccuracy. The local manager, Mr. F. B. Jilson, is in no wise to blame for this. He is deserving of considerable credit for doing as well as he has under the existing difficulties, as is also our worthy chief, Mr. C. B. Davison, for, since the "consolidation," business has greatly increased, and the force has been inadequate.

"It is impossible to obtain competent men at the present salaries, which are from \$40 to \$70. Among a force of 30 men, there are but 4 or 5 that receive over \$60. Ten hours constitute a day's work on the day force, and 8½ with 1 hour at noon, on the night force. Extra is paid for at the rate of 30c. per hour for all that receive below \$50 per month and 35 cents per hour to those above that amount. It will readily be seen that the man who works from 6:30 P. M. until 3 A. M., does not report for "noon relief" next day with a very cheerful demeanor to finish the work of the preceding day. It is true, the night force are paid extra for Sunday service, but as they work 57 hours for six days, against 49 elsewhere for seven days, there is good reason for complaint. While seeking a remedy for the existing dissatisfaction in Kansas City, St. Joe and elsewhere, I hope that General Eckert will not overlook the Northwest."

An Elgin, Ill., correspondent says:

"All old operators in this section are quitting the service and engaging in more remunerative employment, at least where their services will be appreciated."

From all the large cities there are complaints that operators are scarce, and that those employed by the several companies are compelled to do double duty—as an operator remarked the other day to a reporter of the Cincinnati *Enquirer*: "The company seems to be employing every amateur that can make the alphabet." This same operator said: "If the companies would pay living salaries they could get all the good men they need. The railroad lines now are paying fully as well as the Western Union, and as the work is much easier and living cheaper the best men are leaving the cities and going to the country towns, and the city offices are filling up with the poorer class of young and inexperienced operators. A great many first-class operators, too, have been driven into other business by the ruinously low salaries that the telegraph companies are now paying."

Another "old-timer" said to the same newspaper man: "Well, this won't last long. It

seems to me that telegraphic prospects are brightening. The business is growing so fast that capitalists will organize new companies. I think the Western Union has played out all the consolidation string they have, and the next company that comes along will come to stay. Do you know," said the expert, "that a telegram is an unknown thing in two-thirds of the homes in this city, and, in fact, in the country. One-half the business houses in Cincinnati never receive a telegram. They depend entirely upon the mails. Pretty soon they will all use the wires. No; I do not think that the outlook is so awfully discouraging. If the operators will only demand what they ought to have, they will soon be able to get it."

From personal assurances given us at headquarters in this city, we feel sure that the doings of these petty official swashbucklers are without authority, and if we find this to be a correct surmise we shall point them out by name. Meanwhile the fact stands that they have fooled not only themselves but their superior officers, and they had better resign.

Telephone Transmitter Batteries.

Telephone exchange managers, young and old, experienced and inexperienced, have had an interest in the question: "What battery is, under ordinary circumstances, best adapted for the operation of a battery telephone?"

The two battery telephones in common use, as is well known, are the Blake and Edison transmitters. The question is a serious one to all, and in various forms it has constantly been repeated during the three past years of the exchange business.

This exchange business, this little giant of the Western hemisphere, has, no doubt, been the cause of a tremendous boom in the Leclanché battery.

This battery was the first one to suggest itself as being most eminently suitable for transmitter work. Its comparatively high electromotive force, or vim; its cleanliness; its freedom from corrosive acids and chemicals, and its longevity, all contributed to render its claim to notice a powerful one.

It was at once installed as the transmitter battery par excellence; its virtues were legion, and its faults few and insignificant.

The months flew by and the managers and superintendents of small exchanges found themselves in charge of large ones, for the business, under the influence of popular necessity, had grown like the remarkable beanstalk of the fabled Jack, and the expense began to be a factor.

It was then discovered that the Leclanché had some faults, after all. It was expensive in first cost; it would soon become weak if used more than a few minutes at a time; it would, sometimes, without any apparent cause, get a very weak back and prove itself to be unable to do its work; it would corrode its own wires, and so on, *ad libitum*, to the end of the melancholy chapter.

It was the old, old story; from one extreme the telephone expert had jumped to the other, and the battery that at first had no serious drawbacks, now was nothing but one gigantic fault.

Many persons undertook to experiment on transmitter batteries for themselves, with results more or less successful.

One eminent electrician made a battery by filling a porous cup with a mixture of chloride of lime and crushed carbon round the carbon plate, sealing this mixture up and immersing the whole in a solution of common salt.

He reported that the battery so made worked satisfactorily. But I would not recommend it for general use; it is apt to be disappointing.

Another man, ascertaining from electrical text-books that peroxide of lead was a better

depolarizer for batteries than the peroxide of manganese, and finding out that De La Rive had experimented with it, forthwith jumped to the conclusion that he was the discoverer of this great fact in physics, and constructed, with immense enthusiasm, a battery using the said peroxide of lead, combined with carbon, as the mixture to be placed round the rod of carbon in the porous cup. In course of time comes the chlorine battery inventor, describing his battery with a profundity of chemical symbolism, and displaying a marvelous knowledge of chemical nomenclature. This invention was backed by Prof. Carhart and ought to have succeeded, but it cannot be denied that it has so far fallen flat, after a short but vivid couscation.

Soon came another battery, aspiring to the favor of telephonists. Surely in this the force of simplicity can no further go; for this cell has no porous cup, has no depolarizer, but consists simply of two opposing plates immersed together in a solution of sal ammoniac.

This is now well known by the name of the "Law Battery," because introduced and manufactured by the Law Telegraph Company, of New York.

It possesses several well-defined advantages, chief among which, as previously indicated, is its simplicity of construction. Its extreme cheapness is also noteworthy, since it only costs \$1.25 per cell complete, subject to discounts in quantities, and somewhere about 10 cents per cell per annum for maintenance.

The cover is tightly attached, so that evaporation, or creeping of the saline solutions cannot ensue, and yet the cover can be easily put on and off at pleasure, as the sealing is effected by a rubber ring placed around the neck of the jar, over which the cover fits tightly.

It is said that the connections have never been known to corrode, and as they are exposed to view, it has been an easy matter to determine the question.

As yet no fault, it is stated, has been found with the battery, and, judging by the large number of cells which, reports say, have been sold during the brief time it has been before the telephone public, it is growing in popular favor. Nearly all of the exchanges in the country are trying it experimentally, and many, it is said, have adopted it exclusively.

Some enterprising persons and electricians, acting upon the suggestion of J. T. Sprague, the English electrician, have endeavored to prove the Leclanché patent invalid, but there is no sufficient ground for such an assumption.

The Leclanché battery, claiming the use of peroxide of manganese when moistened by a liquid containing a salt in solution which has no chemical action upon the manganese, the manganese to be in a porous cell, was patented April 23, 1867, and has, therefore, three years still to run. It was re-issued with much broader claims on February 17th, 1874, and the patent for the Leclanché prism battery was granted July 13, 1875. This has still eleven years to run.

After the revolution already recorded against the Leclanché battery took place, the inevitable reaction set in, and it is once more regarded as a very fine battery—and by many, indeed, the best, all things being equal—for a battery transmitter.

On the score of economy, I am disposed to regard the prism form as the most desirable, as dispensing with a porous cup.

I will here give, for the benefit of the uninitiated, a short description of both:

The Leclanché cell, ordinary form, is simply a plate of carbon set in a cup of porous earthen ware, and surrounded with a mixture of peroxide of manganese and granulated carbon. When full, this is sealed up by a resinous cement. The carbon plate sticks up through the cement, and is fitted with a cap of lead, surmounted by a binding screw, for connection to the circuit wire. Two holes are made through the cement.

The porous cup, with its contents, is then placed in a glass jar, which is filled to the shoulder with a saturated solution of sal ammoniac; while in one corner of the glass jar stands a rod or pencil of zinc, fitted with a spiral connecting wire, which forms the negative pole. This, then, is the ordinary form of the Leclanché battery. The object of the peroxide in the porous cup is to prevent polarization by absorbing the hydrogen produced by the galvanic action; the object of the granulated carbon is to increase the surface

of the carbon plate, and likewise to assist the manganese in its work, by presenting a number of salient points to work on. A cap of lead is placed on the carbon, in order to form a good point of connection with the conducting wires, and the holes through the sealing mixture are provided for the escape of any gases that may generate in the porous cup.

To set up the battery, take about four ounces of salammoniac, put it in the glass jar, and fill the jar one-third full with water. Stir it up, pour about a tablespoonful of the water and sal ammoniac into the holes of the porous cup, then put the porous cup into the glass jar and fill it to the shoulder, never higher, as the dryer the contents of the porous cup are, the better they will work. Put in the zinc, which should always be of rolled metal, and the cell is set up.

The Prism cell is somewhat different in construction, although the principle is identical. In it, instead of surrounding the carbon plate with a mixture of granulated carbon and peroxide of manganese in a porous cup, the depolarizer is formed of a mass composed of equal proportions of peroxide of manganese and granulated carbon, the whole held together by the introduction of from five to ten per cent. of some cementing substance, such as resin; the carbon plate is inclosed in this mass, and the entire substance is subjected to hydraulic pressure in a hot mold. The zinc in this battery may be of any desired form.

The zinc forms one pole and the mixture the other. Both are fitted with screw connections, and immersed in a solution of sal ammoniac in the glass jar. This style is to be preferred, and is not so expensive as the other. In the use of the Leclanché battery in any form, care must be taken that the vapor of ammonia does not eat away the conducting wires.

An occasional lookout should be kept for the formation of white lead between the carbon and its lead cap. If the battery fails to get up strength, ram a small screw-driver through the holes in the sealing mixture and see that they are clear. It frequently happens that they become stopped up and the gas cannot escape.

If the battery be used in connection with a magneto bell, care must be taken that the wires are so connected that the circuit is completely opened when the telephone is hung up. It is also well to look out that the wires from the battery do not cross any damp place, otherwise a cross connection may occur, the effect on the transmitter being diminished, causing a bitter wail from the suffering patron of the telephone.

If the battery be in a warm place, the solution soon evaporates; therefore, don't put it in a warm place if you can help it; but if you can't help it, do your best to make it air-tight and inspect frequently. In places where the transmitter is to be continuously employed use a blue vitriol battery.

To sum up, the two best batteries for telephone transmitter purposes at present before the public seem to be the Leclanché and the Law. As between these two opinions differ. For burglar alarm purposes, electric bells and the like, the Leclanché is undoubtedly preferable, and as a telephone battery not inferior to the Law. The Law battery, however, is the result of long and patient experiments on the part of the Law Telegraph Company to arrive at the best, simplest and most economical battery by telephone use, and ought to be accorded a fair trial for telephone exchanges. Those who use either the Law or the Leclanché will not be far astray. It would do no harm, however, for exchanges who have heretofore used neither or only one, to give both a fair and equal test. By this means they will be better enabled to arrive at a proper conclusion as to which of the batteries best suits the particular requirements of their exchange. T. D. L.

Progress of Opposition Companies.

Mr. J. D. Flynn, prominently identified with the Baltimore & Ohio Telegraph, recently said, in answer to the inquiry whether it was a fact that the Baltimore & Ohio was soon to establish its own telegraph system, "Yes, and we expect to be ready for business within 60 days, or as soon as we can make the necessary arrangements. We have already over 1,200 miles of wire in operation, and could establish a very respectable

business as it is. These lines extend to Chicago, and were being extended through to St. Louis when we were interrupted by legal obstructions at Vincennes. We are now pushing on beyond there, and have material distributed along between 20 and 30 miles on the railroad beyond that point. We shall run other lines to Chicago by way of Peoria as soon as we get the St. Louis connection effected. Our most important business yet in establishing our lines is to reach New York City, and this is well in train. That done we can open up whenever we please. Cleveland and Toledo will naturally be touched later, being too important business points to be left out. When the machinery is fully in operation we shall push out in different directions and form a complete system. It is not a bubble blown up to sell out. You may be sure of that."

With regard to the other companies, the Mutual Union seems at present to be the only dangerous rival. That company is making tremendous efforts to open up some time in October, so as to catch a share of the fall trade. A circular issued by them says that their old line, between Boston, Mass., and Washington, D. C., has been fully equipped, passing through the cities of Providence, Hartford, New York, Philadelphia and Baltimore, with connections from the main line to Newport and Springfield, Mass., Newark, N. J., and Wilmington, Del., a small link of the Newark line being not quite finished. The extension of the company's lines which was contemplated four months ago, and for the building of which bonds were subscribed, is under construction, and the rapidity with which the work is being prosecuted bids fair to promise that the entire line between New York and Chicago, by way of Albany, Buffalo, Cleveland, Toledo and Detroit, will be open for business by the early part of October; another line will connect Boston with Albany by way of Springfield. A contract has been made with the Chicago and Milwaukee Telegraph Company for the use of their poles between Chicago and Milwaukee, and it is expected that the new lines which are being built between Milwaukee and St. Paul, and Chicago and St. Louis, by the Mutual Union Telegraph Company, will be finished simultaneously with the line from New York to Chicago. A southerly line has also been surveyed between Washington and Chicago, by way of Cumberland, Wheeling and Pittsburg, including Cincinnati, Zanesville, Columbus, Indianapolis, Terra Haute and Vandalia, and is being rapidly pushed toward completion, so that it is confidently expected that the company will have two independent routes to the West ready for service within the next ninety days. A contract has also been made to extend the company's lines from St. Louis to Kansas City, and it is thought that they will be built before the approach of winter. A connection has also been made from Boston to Bangor by way of Portland, and that line is to be completed by Nov. 1.

As a matter of interest, to show how rapid the construction of the company has been carried out, they call attention to the fact that up to date there have been built 2,000 miles of pole line, one-half of which was erected during the months of June and July; and Mr. Walter Katté, the engineer of the company, reports that construction is progressing at an average of over 500 miles a month, and adds that "upon the poles already erected there have been strung more than 10,000 miles of wire."

The Postal Telegraph Company seems to do little but beat gongs, and we are not sure that its ultimate objects are genuine. The name of its speculating president, James R. Keene, does not seem to inspire much confidence in financial circles, although the same might have been said of Jay Gould in connection with the late American Union. But, taken all in all, the impression seems to prevail that there is a colored gentleman concealed somewhere in this Postal Telegraph wood-pile.

It has recently been rumored that a combination of interests has been entered into between the Mutual Union, the American Rapid, the Canadian Mutual, and the Baltimore and Ohio Railroad systems of telegraph lines. It has also

been stated that the Mutual Union was seeking to form a union with the Postal Telegraph Company, James R. Keene's organization. It is understood that bankers interested in the Mutual Union Company have suggested to the Postal Telegraph Company the idea of a combination which would make only one great opposition to them to the Western Union. No formal negotiations, however, can be said to have been entered upon, and some members of the Mutual Union Company reject the idea of association with the Postal Telegraph Company until it has brought forth works meet for consideration. As to the other negotiations referred to, it is stated authoritatively that nothing has yet been settled, and that no details of the negotiations can be given at the present moment.

An officer of the Mutual Union said: "So far as we are concerned, the Postal Telegraph Company is a myth. It is easy enough to organize a company on paper; it costs \$15 and the rent of an office. We know that the Mutual Union, the Rapid, and the Baltimore & Ohio Company have lines and property, which the other company has not. You might as well talk of consolidating an elephant with a butterfly as to talk of the Mutual Union being absorbed by the Postal Telegraph. Moreover, the Mutual Union will never be consolidated with any company—will never be absorbed—never. You can state that fact in as emphatic terms as you please.

"We have been negotiating with the Rapid Telegraph and the Baltimore and Ohio Companies for a combination of interests. But the negotiations are not yet completed, and if much publicity were given to them it might work us an injury. The probabilities are that they will end in what will be an absorption of the Rapid and the Baltimore and Ohio systems by the Mutual Union. I know that Mr. John W. Garrett is opposed to surrendering the control of any of his property, but we have got the promise of an alliance with the Baltimore and Ohio system, on terms to be arranged subsequently."

Regarding the progress of the Mutual Union's lines, it was stated that the company is preparing for the construction of 500 miles of line in one. The Canadian Mutual Telegraph Company is being organized in Canada for the purpose of extending the lines of the Mutual Union throughout the Dominion. The lines from the East to Chicago, St. Paul, St. Louis and Kansas City are nearly completed. The company has about sixty gangs of men at work on the lines, and is said to be building at the rate of 1,000 miles a month. A separate southern line from Washington to Chicago is nearly two-thirds finished. It will tap Frederick, Maryland, Cumberland, Pittsburgh, Cincinnati, Indianapolis and Springfield, Ill.

"We do not propose," continued the gentleman above referred to, "to open our lines to only a few places at a time so that the Western Union will be able to beat us in detail by reducing a small proportion of its rates. We shall take our time, and when the opposition system is opened it will be over a very considerable portion of the United States. Then, if the Western Union wishes to fight us, it will have to reduce its rates so as to affect a very wide area. As for us, we do not wish to slaughter rates. The Mutual Union is a business enterprise, and it will seek to obtain profitable returns."

Referring to the above, a gentleman connected with the Postal Telegraph Company, in answer to inquiries, said:

"All I can say is that we are going to furnish the people of the United States with cheap telegraphy, and it will only need the building of our experimental line from New York to Chicago to demonstrate our ability to do so. We are about to close contracts for the building of that line, and I will warrant that it will be completed in a shorter time than any other line of its distance was built in. With that line finished, and the merits of our system proved, it will simply mean that our company, in a year from next January, will have its lines all over the country. The Chicago line will be finished by next January. We intend to make our rate to Chicago 25 cents for 20 words, against 50 cents for 10 words by the Western Union, and we can make a profit at that rate. We never offered to consolidate with the Mutual Union Company. We have refused offers of union from bondholders interested in that com-

pany. In fact, the lines of the Mutual Union would be of no value to us, for we could not furnish cheap telegraphy to the public over them.

"The Postal Telegraph Company proposes to construct immediately its trunk line of telegraph from New York to Chicago, composed of two compound steel and copper wires, with a resistance of only two ohms and three ohms to the mile, respectively, and equip them with the Leggo Automatic and Gray Harmonic systems. One thousand words per minute can be sent on each wire in opposite directions simultaneously."

A Clearing-House System for Telephone Exchanges.

A satisfactory telephone service is almost wholly dependent upon the central office. The more perfect the system for manipulating the calls of subscribers at that point, so in proportion is the service more satisfactory. The public already recognize the telephone as not only a great convenience but as an absolute necessity. They are willing to pay what many of them consider an exorbitant rental for its use, but at the same time they demand in return, not only good service but, as far as possible, a perfect one.

It is generally acknowledged that the service in cities where large exchanges are operated is deficient, inasmuch as a subscriber is forced to wait (usually with ear at telephone) for a connection with the person desired until patience ceases to be a virtue, and opinions of the telephone and of the management and operators, not at all complimentary to either, are indulged in. All this is no fault of the telephone (thanks to Professor Bell), neither that of the system of wires, although often anything but first-class, but more particularly to the system prevailing at the central office for answering calls and the proper distribution and attention after being received.

Improvements in Central office apparatus, more particularly switch-boards, have been made and adopted whereby the time necessary for answering calls has been greatly reduced. Connections between subscribers upon any one board or section under control of a single attendant can be made in acceptable time, but in the case of subscribers whose lines are located upon different boards the reverse is equally true. The greater proportion of calls being of the latter class, it is necessary to render the systems more perfect in such detail as pertains to this class of communication, which is termed "trunk" or "cross connections."

The methods of communication between the attendants of different boards or tables at present in vogue are: First, by word of mouth; second, by slips of paper, and third, by a telephone circuit.

The first named is objectionable, as it creates a continual hub-bub and confusion, also great liability to error. The second, that of using a slip of paper bearing in pencil mark the number or name of the subscriber calling and the one desired, also the number of the strip upon which the connection will be made, is an improvement upon the first, but is not perfection, as actual use attests. The slip, after being properly filled out by the attendant, is placed upon a "file," there to await the arrival of an office boy for transportation to the table or board connecting with the subscriber desired. Any one who has served a few years in a large telegraph office is well aware that office boys, as a rule, are not gifted with "high velocity." Their work, to them, has the stamp of monotony, and they get imbued with the idea that when one message is removed from a "file" another, Phoenix-like, will replace it when their backs are turned. Relying, then, upon this method, it is natural to infer that more or less delay will arise at this point.

The third, which is communication between the attendants of the several tables of an exchange

by telephone, is comparatively of recent date and not thoroughly tested as yet, but would seem to entail unnecessary extra labor upon the attendant.

A new and novel method of communication between the tables or boards of an exchange has recently been devised and patented by Mr. W. H. Sawyer, of Providence, R. I. It is called the Clearing-House system and may be briefly described as follows:

A space sufficient for an ordinary sized desk is selected near the centre of a group of boards or tables. Communication between the tables and the Clearing-House is obtained by means of tubes (preferably of paper to lessen the noise) about 1½ inches in diameter and slightly inclined.

The inclination, which is ½ of an inch to the foot, more or less, is amply sufficient to insure the rapid passage of a ball through the tube.

The balls, which are about one inch in diameter, of suitable material, such as ivory, or even wood coated with a silicate preparation, have three flat surfaces near together, made by grinding or cutting. The letter designating the table to which they belong is also painted upon the ball near the flat surfaces. The method of procedure is as follows:

Subscriber No. 15, located on table A, desires to communicate with subscriber 375, located on table H. The attendant at table A, upon receiving this information from subscriber 15, takes from a tray or box at the left one of the balls, and with a pencil places upon the surfaces (15)-(375) the figure 2 denoting that the connection will be made upon strip No. 2.

This ball is then dropped in a hole in the surface of table A at a convenient point, from whence it rolls by gravity to the Clearing House; time consumed, from 2 to 4 seconds, depending upon the distance. The clerk at the Clearing House at once picks up the ball and examines it. He understands it is intended for table H, as all subscribers between 350 and 400 are connected with table H. In 2 or 3 seconds it reaches table H. The attendant at table H picks it out from a tray or shallow box and comprehends at a glance that subscriber 375 is wanted on strip No. 2. Subscriber 375 is thereupon called up and informed that subscriber 15 desires to communicate. The ball is then marked with an X, or any pre-arranged sign or character, and dropped in a hole in the surface of table H, which communicates with the Clearing House.

The clerk at the Clearing House noticing the X, or that the ball is marked denoting that the connection has been made, places it in a tray in front of him which is also in front of a check clerk, who picks out the ball and makes the desired entry on a check sheet or book, to the effect that subscriber 15 has conversed with subscriber 375.

The pencil marks are then erased with slight moisture by the check clerk and the ball returned to table A by simply dropping it in the tube leading to that table.

In case subscriber 375 did not respond to the calls, a different prearranged mark would be placed upon the ball by the attendant at table H and the ball returned to table A, the connections on the strip 2 straightened, and subscriber 15 notified of inability to raise 375. In case of line trouble, the ball could be marked in some other prearranged manner, and by means of a tube from the Clearing House to the Inspector's Department, proper notification of such trouble could be thus promptly transmitted.

It will be seen by the foregoing description that the proper delivery of the calls by this system is controlled by gravitation, as against boy-power and will in the ticket system.

A ball must reach its destination in from 10 to 12 seconds, and not only is this true in one instance, but invariably so. A ball once dropped in the hole cannot go astray, drop on the floor or be blown away.

No office boys are necessary. The salary of an office boy is not large, but half a dozen in an exchange are a decided expense.

With a properly arranged exchange in other respects, not a word need be spoken, and above all every call has a certain successive order which of itself would be a satisfaction to subscribers to whom the fact was communicated.

The check sheet kept by the clerk at the Clearing House affords complete information regard-

ing the absolute number of connections made for every subscriber.

This is a valuable feature. One fact greatly in favor of its adoption is the small expense attending its introduction; the paper tubes and balls costing but a small sum. Mr. H. B. Lytle, General Manager of the Telephone Dispatch Co., Boston, is now testing Mr. Sawyer's system with a view of adoption.

Free Advertising for Telegraph "Colleges."

The following appeared recently in the Cincinnati Enquirer:

"A dispatch from Wall street on Thursday said: 'The Western Union Company say they have more business than they can handle, and are short fifty operators at their main office here.' A prominent telegrapher in Washington says: 'I guess it is so, and that the Western Union were about as bad off in the West as in the East, as a great deal of Cincinnati business lately was being delayed at Washington.' Another telegrapher attributes the 'unfinished business' to a lack of operators, and looks for an advance of salaries."

On the following day there appeared in the Enquirer an advertisement as follows, with, of course, the name of the "college":

A - YOUNG MEN - To learn telegraphy; operators wanted all over the country; see yesterday's (Saturday) Enquirer, fourth page, sixth column.

As well as being cruelly misleading to our rising youth, this coincidence proves that the Cincinnati Enquirer gives twelve lines of free puffs for five lines of paid "ads."

The interest the paper seems to have taken lately in parading before the public the scarcity of operators, increased wages paid, etc., would lead us to believe that there is a close connection between the Enquirer office and the "college."

The Trenton, N. J., Daily Emporium gives us the following:

"Wanted-Young men and ladies to learn telegraphing. Instructions given at residences when desired. For terms, etc., apply to J. K. Sutphen, 35 Copper street, for one week."

The Emporium sustains its grandiloquent title by giving only a little puff for a little advertisement-five lines of each.

Our next telegraph "college" advertisement is taken from a paper supposed to be interested in the welfare of railroad men. It states that, "knowing the demand for young men's services as telegraph operators, the advertisers-though they don't give their names, but only that of the school-have opened a school for the thorough instruction of telegraphy, and a complete knowledge of all its branches connected with commercial and railroad business."

This is supplemented by both editorial and general notices, one of them three-quarters of a column long.

It is gravely stated that "good telegraph operators are, at the present time, in great demand all over the country, and with the rapid increase in railroading, it is probable that the demand will not be supplied for many years to come;" and that there is "not a railroad in the United States to-day that does not most seriously suffer from the lack of competent operators;" that "we have the promise that any young man or boy of average intelligence and good habits, who enters the school and avails himself of the course of instruction, may at the end of the term feel reasonably certain of a good appointment," and that "there are but few boys or young men, ambitious to succeed in life, who may not easily command a sufficient sum of money to complete a thorough education in telegraphy, especially where it is reasonably certain that they will at once, upon the completion of their education, step into positions, the salaries of which will quickly enable them to return the money where it was obtained."

All this, as well as proving how politely the spider may invite the fly into his parlor, proves also that the enterprising journal from which we copy the advertisement can outbid the Enquirer,

by giving a seventy-two-line puff to obtain a nine-line "ad."

As a matter of fact, nothing could be more misleading than the statements quoted, a fact which is illustrated with grim satire on another page of the same issue containing the advertisement whers, under the title "Railroading in Colorado," its own correspondents says: "Operators are thicker than politicians at a ward caucus. Wages are no better than East. Brakemen get only \$60.00 a month and telegraph operators all the way from a free lunch to \$50.00 a month."

From this showing alone those whom the paper advises to learn telegraphing may make \$10 a month more by learning to twist a brake scientifically.

The story that "operators" are scarce is literally true-the craftiness is shown in concealing the fact that such "operators" as are turned out from these schools are, as the correspondent above quoted says, "thicker than politicians at a ward caucus," and working, according to the same classical authority, for a salary estimated at "all the way from a free lunch to \$50 per month." The science of telegraphing is now about as near perfection as it ever can be, and while operators of a low grade, such as bear "college diplomas," are to be found starving, the superior class of manipulators, owing to the short-sighted policy of the companies in reducing salaries and the like, are extremely scarce, and will be until the "economical" mania wears off and fair salaries are again paid for first-class work. To attain this standard requires from two to five years' steady practice in a large commercial office. The ranks are being continually recruited from the better class of office boys and messengers, who literally absorb the mysteries of the craft in their tender years, grow up with the business, and attain a degree of proficiency which no college student can ever expect. Another peculiarity of telegraphing is that not one man or woman in a hundred who commences to learn it after the age of twenty-one years can ever hope to be worth \$50 per month to any telegraph company. At that age they might as well attempt to learn the piano-forte and become star players.

In the matter of salary, telegraphers are proverbially badly paid. Considering the exhausting labor, the long hours, and the patience, skill and intelligence which are indispensable for the proper administration of even a small telegraph office, there is scarcely a business in the world which is so poorly remunerated. Even in places where there is a large telegraph patronage, the salaries are surprisingly low. The railroad operators are even more poorly paid. For the double duty of acting as train dispatcher and operator, and putting in twelve or fifteen consecutive hours' work daily, only \$30 per month is paid by one of the largest Eastern railroads.

Now, if these wily advertisers would only be truthful we should not complain, but when they speak glowingly of "superior situations," "\$100 a month," "\$50 a month," and other absurd statements, we protest, as much in the interest of their prospective young and inexperienced victims as in the interest of our sadly abused profession.

The following resolutions, signed by a number of operators, gives a glowing account of the school above referred to, and is well worth reading:

Whereas, This school, presumably, seeks to create false impressions among young men, boys and others, as to telegraphy and its real condition, for the purpose of securing a pecuniary profit to the proprietors who actually offer the supposed prominence of their positions as full or partial guarantee of employment, whenever the student becomes more or less familiar with the art, and

Whereas, We possess official statements from various railroads centering in this city, showing that where one vacancy occurs, ten or fifteen applications for positions in the telegraph service are received; and

Whereas, Telegraphy is overrun with cheap telegraphers, just expert enough that salary is no object to them, making the business less profitable than any other pursuit requiring equal qualifications; and

Whereas, Throughout the United States and Canada, all the large cities contain one or more schools, colleges and places of this kind, where

telegraphy is "taught," and every month countless numbers of their victims are sent adrift; but where one succeeds in getting a situation, however simple, he is compelled to learn over again or become a common nuisance on the wires, interrupting and delaying business, regardless of its import; therefore,

Be it Resolved, That we, the undersigned telegraphers, actuated by a proper feeling of concern for the future welfare and standing of the occupation we follow, as a means of livelihood and the support of those dependent upon our exertions, with a considerate sense of justice toward the public, offer this testimony, confirmed by the number of years' practice and observation shown opposite our respective names, that we fully recognize and respect the right of persons to engage in any legitimate business, for profit or other advantages to be derived therefrom; but that bartering in positions, and deceiving, intentionally or otherwise, so that it results in personal gain, is not right or legitimate; and, further,

Be it Resolved, That we call on the fraternity at large and friends everywhere, to use all honorable means in their power to abolish this reckless teaching of telegraphy; and refuse all patronage, and as far as practicable, endeavor to curtail the circulation of any paper, pamphlet or circular offering free encouragement to such illegitimate practices. And further,

Be it Resolved, That our object is not to injure or intimidate, but to arouse the fraternity and the public to an appreciation of the magnitude and dangers of this constantly-increasing evil; that people trusting business, property and life in the hands of irresponsible boys, who have spent two, three, or four months in a "telegraph school" shall know that the proprietors of said "schools" are responsible for the present unsatisfactory condition of telegraphy, and the loss of life and property resulting from the inexperience of their students.

Years.		Years.	
J. A. Hamley.....	16	F. C. Robertson.....	8
Jas. M. Wright.....	13	D. F. Desmond.....	7
J. M. Cronenberg...13		E. M. Williams.....	7
J. H. Holsey.....	12	F. J. Krumling.....	6
A. W. Pearce.....	11	P. J. Raiby.....	6
M. W. Russell.....	10	H. H. Cramer.....	6
A. D. Campbell.....	10	C. O. Stowe.....	2
G. E. Rauck.....	9		

Consolidation in Canada.

On the 19th ult. it was announced here that the amalgamation of the Canadian telegraph companies, under a guarantee of 8 per cent. to the Montreal and 6 per cent. to the Dominion companies, by the Western Union, had been completed by the President of the latter signing the agreement transferring all interests to the Great Northwestern Company, whose head office is now in Toronto. This consolidates all the telegraph interests in Canada. When this project was first proposed it was met by the keenest opposition, and because the Western Union Company, which controlled the Dominion line, was a party to the arrangement, a patriotic outcry was raised against American interference in Canadian institutions. Boards of Trade in various cities were summoned to protest; the Government was called upon to intervene, and, finally, the courts were appealed to and granted an injunction. The real cause of the outcry was, it is alleged, the prospect of an ending to the low rates which permitted the uniform transmission of ten-word messages, irrespective of distance, for 20 cents; night rates from Montreal to Chicago, 1,500 miles, for 25 cents, and press reports, 500 miles, for 10 cents per 100 words. By limiting the increased tolls to 25 cents for 10 words, the press rates to 25 cents for 100 words, guaranteeing the stockholders a fixed dividend of 8 per cent., and satisfying the Government that the new arrangements would be under Canadian management, public apprehension was quieted and the legal difficulties surmounted. The consequence will be that the Western Union Company will have its revenues increased at least \$100,000 per annum and virtually control the entire telegraph system of British North America. It is a condition of the agreement that the charge for ten-word messages in Canada shall not exceed twenty-five cents, except in case a specific par-

liamentary or local tax should be levied, when the rate would be liable to increase in proportion to the amount of taxation.

This must undoubtedly prove a valuable addition to the Western Union system. The last annual report of the Montreal Company shows that in proportion to the population in extent of territory, no country possesses telegraphic facilities equal to those of the Dominion. There are nearly 25,000 miles of wire included in the combined companies, 17,000 poles, with 2,500 offices. The combined capital invested is over \$3,000,000 and the total receipts last year were \$750,000. The company under which the consolidation has taken place is the North-western of Canada, of which Mr. Erastus Wilman, of New York, is President. The company owns lines extending through the Northwest territory and is now in treaty with the Canadian government for assuming lines hitherto controlled and operated by the government, but without profit. The extent of the system may be measured by the fact that the wires of the company cover an area almost as large as the United States.

Underground Telegraph Lines.

In the annual report of the Engineers' Department of the District of Columbia, recently issued, considerable attention is given to the above subject. The following is a synopsis, which will be of interest to OPERATOR readers:

There are now in the city of Washington 41 miles of telegraph lines, consisting of 1,266 poles, carrying about 336 miles of wire, in addition to telephone and fire alarm wires carried over the tops of the houses, and estimated to amount to 100 miles of wire.

The use of underground telegraph lines is no untried experiment. No telegraph pole is to be seen in London, Paris and other great cities, and there are to-day more than a thousand miles of underground line and 30,000 miles of underground wire in successful operation in Europe. No doubt, therefore, exists as to the perfect feasibility of the system. It is true that the expense is greater than in the system of carrying the wires on poles, but it is a question whether the streets shall be any longer disfigured on account of this expense.

The cost of changing the existing wires from the poles to underground pipes, it is estimated, could probably be brought within \$8,000 a mile for a line of 40 conductors, with a reduction of \$185 for each conductor less than 40. In Paris the cost of pipes and labor has amounted to \$2,350 per mile, and for wires laid in cables of seven conductors each \$108 per mile for each conductor. When laid in the sewers, as 80 miles of underground line are laid in Paris, the wires are placed in seven conductor cables, and inclosed in lead tubes which are attached to the sewers by iron staples, the cost of the cables and the lead sheathing is \$130 per mile for each conductor, and of attachments \$90 per mile for each cable. For the ten miles of the trunk necessary for the present telegraph business of this city the total cost would, therefore, be \$80,000. This expense is to be divided among several companies, and it might be partially reduced by remitting for a term of years the taxes due on the property of the companies. It is, however, a question whether the streets and trees shall be sacrificed to the telegraph lines, and no question of cost ought to allow that question to be decided against the streets. We have 120 miles of shade trees, containing over 50,000 trees of twenty-two different varieties. Ten, or even five, years hence the beauty of these long lines of trees will be world famous, for no other city in the world has anything to compare with them on its streets. To allow the beauty of the streets to be destroyed by unsightly poles and wires, or to allow the trees to be injured for the benefit of the telegraph business, ought certainly not to be permitted. The work of removing the poles should, therefore, be undertaken at once.

The Electric Light—Maxim vs. Edison.

The Commissioner of Patents, to whom Mr. Edison appealed, has finally affirmed the decision given by the Examiner of Interferences and Examiners-in-Chief, in favor of Mr. Maxim, one of the electricians of the United States

Lighting Company, in the case against Mr. Edison, involving the celebrated platinum lamp.

This invention, involving a combination of a thermo-static regulator with a platinum lamp, is the one which was heralded in April, 1879, as the invention of Mr. Edison, which was to effect a complete revolution in illumination. The result of it was for a time very disastrous. The gas stocks were greatly depreciated in value, not only in this country but in Europe. In this country the value of gas stocks was estimated at that time at \$400,000,000. The decline in those stocks in both countries may safely be estimated at not less than \$50,000,000. On the other hand, the stock of the Edison Company shot up from \$100 a share to \$4,000. Maxim and Edison both claimed priority of invention. The claims of the rival inventors were thereupon submitted to the Examiner of Interferences, and after a thorough investigation he decided, Feb. 6, 1881, in favor of Mr. Maxim. Mr. Edison appealed to the Examiners-in-Chief, and they also declared in favor of Mr. Maxim. Finally Mr. Edison appealed to the Commissioner of Patents, and he affirmed the decision of his subordinates. This decision ends the final appeal in the Patent Office, and the practical result will be that a patent will issue to Mr. Maxim. A United States Court can now be invoked to cancel the Edison patent.

The Edison people say they do not use the invention now, and that it is a dead issue anyhow; while officers of the triumphant company say that they really enjoy the glory of defeating Mr. Edison, even upon a dead issue.

The philosopher of the *Detroit Free Press*, in referring to this subject, very aptly says: "Ostensibly the regulator was intended to regulate the currents of electricity so as to preserve a uniform intensity of light. Maxim invented it for this purpose; but Edison's improvement on it left the original inventor altogether in the shade. The Edison Company employed it to regulate the price of Edison's stock on the one hand, and gasstocks on the other. By this remarkable and useful little instrument the price of Edison's stock was advanced to \$4,000 a share, and gas stocks depressed to the extent of over \$60,000,000. These figures show how weak and impotent an invention may be even in the hands of its inventor; but when a man of genius gets hold of it, he makes it tell at once—on the stock board, at any rate."

Telegraph Colleges, So Called.

A correspondent of the *New York Star*, signing himself "Victim No. 2," in a communication recently published in that paper, says: "The institutions known as 'Telegraph Colleges' are nothing more than concerns for robbing poor people of their few dollars, by the men who have the school under their charge. I have attended one of these 'Telegraph Schools' for the past six months, and after all this time I am refused a position as an operator, or even assistant operator, not because I was unfortunate enough to be a graduate of a 'Telegraph School,' but because I was unable to take a position which was offered me. This is all due to the manager of the school, as he promised me faithfully, when I entered his institute and paid my money, that he would finish me at the end of that time, and assured me that I would be capable of taking a position; but I have only suffered and spent my precious time and money, as many hundred other young men and women of this city have, and have not received anything in return. I am sure that I did my part in turning my mind to the study and practice of telegraphy, but I am positive that the man to whom I paid my \$40 (which was the amount charged for one quarter) did not perform his part. * * * Before paying my money I received a circular giving a full list of former pupils and their names signed to letters recommending the school, but I have hunted most of these up and could not find one among the many whose names appeared in the circular that would speak a good word concerning these schools. Just the reverse. I found they were all against them, and stated they were the worst kind of frauds, which is perfectly true. The managers have published their names without authority. You cannot find among the many hundred operators in this city one who will say they attended any of the telegraph schools. There might be several, I dare say, who have previously attended, but are not willing to own

up to it on account of the bad name the schools have received from the directors of the Western Union and other telegraph companies."

Transmitting Speech by the Telegraph Key and Sounder.

I see in your last *Scientific American*, in an article by George M. Hopkins, engravings of a method of transmitting articulate speech by an ordinary key and sounder, but it gives no information as to how it is done except by saying it is only a matter of adjustment. Will you please tell me through the columns of your paper how this is done?
H. F. DODGE.

CLINTON, Mo., Aug. 3, 1881.

[The sounder is mounted on a thin board, and the sounder lever is rigidly secured by the adjusting screws so that the armature is very near the poles of the magnet.

The key is placed on a thin board or on a resonant box, and the screw which passes the key lever and bears upon the spring is loosened until the platinum points are in light contact. By placing the ear in contact with the board upon which the sounder is mounted, and listening while adjusting the key, the proper contact may be readily secured.

Another method of adjusting the key is to turn the back adjusting screw until the contact points of the key touch, allowing the upward pressure of the spring on the key to remain normal. The required delicacy of contact may then be secured by screwing down on the spring so as to increase its upward pressure on the key. The key is mounted as in the other case.

This experiment requires a current whose strength is eight or ten volts.

By listening to the sounder whatever is said in the vicinity of the key may be heard.—*Scientific American*.

Indianapolis (Ind.) Notes.

To the Editor of the Operator:

SIR: Since our last correspondence from here several things of interest to the craft at large have occurred, including the organization of as healthy a union as has been yet reported from any of the other cities. The boys in this city, and, in fact, throughout this "whole neck of woods," hailed with much enthusiasm the attempt of our men to band themselves together in one common union, and be as brother should be to brother, acting in union with a view of bettering their condition. At our meeting, Aug. 7, held in parlor A of the Bates House, the following officers were chosen for the year: Mr. S. L. Douglass, W. U. office, Chief Operator; Mr. E. D. Carlyle, W. U. office, Assistant Chief Operator; Mr. Frank Farrell, Pan Handle, Secretary; Mr. F. M. Ketcham, W. U. office, Treasurer, and an Executive Committee, composed of Messrs. Kinney, MacIntire and Nixon. The Constitution of the Brotherhood of Locomotive Engineers was adopted upon the recommendation of the committee appointed at the preliminary meeting, the Sunday before, with one amendment, prohibiting members teaching our profession. We expect seventy-five members after our next meeting, and the boys along the lines of the many railroads centering here are inquiring as to our condition, and all favor the union. No doubt we will get two-thirds of the railroad operators in Central Indiana in a short time.

The following changes have taken place since our last: Mr. E. L. McClure, of the Bee Line, has resigned and gone to his home in Wabash, Ind.; Mr. Butterfield, of the Western Union, has resigned to "go to Chicago." Con Sullivan has returned from Chicago after a two week's stay. Con says he got sick; so did Geo. Sanuels and Ed Ball, who went with him, and all have returned with the verdict that Chicago is "no good." We are expecting Al Vanlaudingham every moment. Mr. Jno. Crowe has also returned from Louisville, where he went last summer. John stepped in the office unexpectedly last week, humming "Home, Sweet Home," and business stopped till everybody shook hands: John is an old soldier in this office.

We are happy to hear talk of increased wages among the railroad boys here. We claim some of the finest railroad operators in the country, and they think their salaries will soon compare with commercial men.
DUG.



PUBLISHED SEMI-MONTHLY

At No. 9 Murray Street, New York.

W. J. JOHNSTON, Editor and Publisher

NEW YORK, SEPTEMBER 1, 1881.

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 IMPENDING SHADOW.

The electric telegraph has now become so widespread and indispensable to the public at large, that nothing should be overlooked by its managers which will tend to make it more effective and reliable, or to forestall by remedial measures any possible stoppage among the wheels of its machinery, either through the stupid mistakes of local managers or the downright folly of mistaken operators. When widespread discontent is plainly shown to prevail among the men—and such complaints as have seemed to us well founded have already, to a certain extent, been reflected in these columns—it is time for superior officers who have the interest of their company at heart to wake up and investigate the matter, and, if the grievances alleged prove to be well founded, to rectify them.

When the skin-flint Vanderbilt interest in the Western Union was so completely extinguished, last January; when subsequently the deliciously fresh and blithesome spirit of the Talented Young Vice President—whom we all remember as the De Sauty of the old concern—was instantaneously snuffed out; when a number of short-sighted, parsimonious officials were cast adrift to endure the hard trials which they had themselves so often imposed upon others; when the allegorical bushel of barnacles had been scraped off the old hulk, and when above all was recognized the master hand of General Thomas T. Eckert, there was a show of unbounded loyalty for the grand old concern which has rarely been equaled, in which this journal joined no less heartily; and for a time—remembering the brilliant management of the late American Union—a burst of sunshine seemed to bathe the whole profession with radiance and joy.

But the great disappointment came when the Sub Leaders—there are many of them throughout the country—took hold. A shadow then crept over the merry, toiling crew; the enthusiasm became dampened and hesitating, and the old story was soon repeated—the astute General mapping out a brilliant campaign, and the plans of his gifted brain palsied and misdirected by bespangled and loud-mouthed martinet.

Your Sub Leader type of a telegrapher is one of the smart men of the business—that is, he advertises himself as such. He is a good man to hurrah and shout and carry the banner while some one else directs him, but when left to himself he is scarcely heavy enough for the undertaking. There is a good deal of talk and pantomime in such men, but there is little that is substantial.

are alert, after a fashion, but blunder into all kinds of official holes. They are strict disciplinarians, apparently, but there is no intelligent or discriminating philanthropy in them. They are courteous and kind of heart, seemingly, but the sneaking look in the little eye betrays the dissimulating smile upon the lip. All of this class of men, soon after the consolidation, foolishly allowed the immediate but temporary advantage and personal prestige to be gained by hiring a "cheap man" to blind them to the intrinsic value of a good but rather more expensive one. Some of them went boldly at the question and reduced, or attempted to reduce, salaries wholesale. Others seem to have been seized with the belief—or at least, the willingness to believe—that while it might be a trifle unjust, or unwise, to appropriate a workman's money, it was quite right to appropriate his time, of which money is only the representative. In some cases the larger offices, with regard to some departments of the service, were completely "cleaned out," old men with records as high as 31 years, and whose names appear in Mr. Reid's "Telegraph in America" as the earliest of Prof. Morse's operators, being made to walk the plank in 1881, to make room for less competent but "cheaper" labor, thus indorsing the old Vanderbilt principle that if a man works for you you had better screw him down until life is barely left, and when by this process his peculiar dexterity is prematurely lost kick him out with a good conscience, to take some one else in his place on the same hard terms.

But the time has now arrived when some general investigation is necessary. The better class of operators desire no erratic spurts of philanthropy such as the recent paying of "double-extra." There should be no mock heroics. You cannot stem the surging current of a mighty river by damming it up; you must look for and operate upon its many small sources. These lie in the original grounds of complaint, foremost among which are:

1. Inadequacy of pay before the consolidation.
2. Partial reduction of the same since the consolidation.
3. An attempt to abolish pay for "extra" service.
4. Increase of hours of labor, by adding half an hour's, or an hour's, work to each day.
5. The encouragement given to the student's colleges by willingness to hire inefficient labor, on the sole score of cheapness.

The latter grievance, however, we can very well handle in our own way. Another, but less frequent, source of complaint is where the company makes a little "shave" off a sick man's salary. A sick operator should, at least, receive the difference between his own salary and that paid to his temporary substitute.

As a matter of self-preservation the executive officers of the company should look into these affairs. By the hiring of a cheap and inferior kind of labor, messages are delayed or mutilated, and thereby, almost daily, trains are wrecked, husbands sent astray from their wives, fathers from their children, men and women die neglected, sales are lost, notes go to protest, and business men, pressed for time, are sent on all sorts of wild-goose chases. Good work depends primarily upon good pay, and all attempts to secure the former without the latter, no matter how tempting the prospect of big dividends may be, are certain to bring eventual failure upon the whole concern. Telegraphic work is not, like most manual labor, such as can be done in a humdrum and perfunctory way. It requires nice dis-

crimination, solid common sense and neatness of touch, and is a constant strain upon the mind of the worker. This kind of work can only be obtained by employing men whose long years of service have taught them to do, without telling, that which is exactly right in certain peculiar and extraordinary situations, and who, by long association with each other and familiarity with the business, know how best to serve the company's interests.

Summary dismissals of faithful old men who have seen from a quarter of a century to thirty-one years' active service in one situation; uncalled for reductions of salary, and the arbitrary increasing of hours of labor, already too long, are not the methods by which wise men, not blinded by mad dreams of economy, would seek to serve best the interest of the stockholders.

In our last issue we announced, upon the authority of the Cincinnati *Enquirer*, that Col. Clowry was about to be superseded by Mr. Chas. A. Tinker. In making the announcement we felt constrained to say that although Mr. Tinker was well-known as a reliable officer he was "not more so than Col. Clowry himself;" and, having thus recorded our opinion of Col. Clowry, it will scarcely be necessary to say now that we rejoice to hear that the report was an erroneous one. We have, therefore, great pleasure in reprinting the following denial of the rumor, clipped from the editorial columns of the same journal which made the erroneous statement—the usually accurate Cincinnati *Enquirer*:

"The *Enquirer* is glad to correct the report which has been extensively circulated of late, and which at first appeared to have responsible basis, to the effect that Colonel R. C. Clowry, General Superintendent of the Western Union Telegraph Company at Chicago, was to be succeeded by Mr. Charles A. Tinker, of the Baltimore & Ohio line. We make the correction on the authority of the managers of the Western Union Company at New York. Patrons of the company, more particularly those in the West, will be gratified to learn that Colonel Clowry is to be retained. He has many qualities which fit him for the important position of General Superintendent of the Central Division, and has won the esteem of all with whom he has business or social relations. By none are his abilities held in higher regard than by the Western Union Company, whose interests he has served so long and faithfully."

We might also take this opportunity of paying a passing tribute to the industry and fidelity of this pioneer telegrapher, and of hoping that he may remain many more years in his present high position. We believe that another great telegraphic contest for supremacy is not far distant, and since Col. Clowry has always been known to be there when the battle commenced, and never to have left until the victory was gained, his company may soon find that he is preëminently the right man in the right place.

Your professional salary scalper has two grand objects in life. First, to trim sail so as to keep well up before the official wind; and, secondly, to make a "good showing financially" at headquarters. Since the consolidation, reasoning that an undisputed monopoly gave him the trump card, your professional salary scalper set out, smiling blandly, to execute both feats at once. It is not our fault if he has bitten off more than he can masticate. First of all, although he went around with a brass band and beat the gong, and although it was certainly a capital idea—for the company—the boys, somehow, didn't "catch on" very enthusiastically. In fact, to be plain, the salary scalper's efforts at economy failed miserably, owing to circum-

ances not wholly disconnected with the advent of the Mutual Union, Postal and other companies—not to mention the "Brotherhood of Telegraphers." As for keeping well up before the wind, your professional salary scalper had had a still more terrible time, since the official wind—fickle; as any other wind—is, during the past two months, been blowing the way from due north to nor'nor'west, and back again to due north, thus taking up all the salary scalper's vast amount of spare time in trimming official sail and "boxing" the telegraphic compass. Nay, after all is said and done, is it possible that the ridiculous failure of these wonderful economists is due to—that is, is possible that Gen. Eckert has been reading THE OPERATOR's sound advice, given in our issue of August 1st, and that he has ruthlessly sat down—hard—upon the devastating policy those sub-officials who have no higher object than to 'make a good showing' financially?"

WHILE we have every respect for the rules of fair play, which guarantee to every man free trade, there can be little wonder if we discourage the wholesale manufacture of new members of a profession which cannot afford remunerative employment for those who are already engaged in it. While salaries are only kept at their present standard by extraneous methods, which, being understood in the proper quarter, it is scarcely necessary to explain here, it is wrong for these swindling concerns called "Colleges" to lure lying circulars, calculated to entice young men and girls from the country into studying telegraphy, and thus leading them innocently into a life which ultimately can be one of miserable unprofitable labor or downright idleness. In addressing practical operators there can be no use in dilating upon this subject; they can best deal with the subject themselves. Those who contemplate learning the business—which, according to the circulars of these "colleges," is an exceedingly pleasant and desirable one, and may be mastered by any average boy or girl in a few months, when they can at once step into good situations at fabulous salaries—would do well to stop and consider why it is, if all these things are true, that operators should be so scarce as the same circulars show—in fact, why those who have learned and secured the alleged excellent situations at big salaries, do not remain in the business.

It is well known that up to the present time the success of working long wires and cables, quadruplex and duplex, is entirely due to the application of condensers to counteract the detrimental effects of the static charge and discharge on the line. This was an invention of Mr. J. B. Earns, and, as his patent therefor in this country is the property of the Western Union Telegraph Co., other companies have been unable to create "phantom" wires, which are a source of immense profit to the Western Union. We are credibly informed that a new device, and one even more perfect than condensers, has been devised by a well-known electrician of this city, and that patents therefor are soon to be issued. The gentleman invented a very simple system of sextuplex which was put up by the Western Union last year between New York and Philadelphia, and six Morse communications actually accomplished simultaneously. We understand he is securing patents also on two new systems of quadruplex, entirely independent of the Edison-Smith-Jones system now in use besides

two new duplex systems, all of which have proved successful on actual wires, and one of which does not even infringe the Page patent, and has done actual work on 500 miles of wire. It is a matter of congratulation to know that all our eggs have not been confined to one basket.

In illustration of the jaunty air of one of the President's physician's, who appears to be the *Mark Tapley* of the sad event, some of our esteemed contemporaries are referring to an old cable operator, De Sauty, who will be remembered by old-time telegraphers. De Sauty was the operator at the Irish end of the 1858 cable, the first of its kind; but, although the cable worked only for a few weeks, he obtained more fame out of it than its projectors did. The public on this side were being continually informed that the cable was working splendidly, and every message ended with the same phrase, "All right, De Sauty." It is unnecessary to say that De Sauty became the laughing-stock of the whole country, and that when the cable finally collapsed De Sauty's name sank into obscurity. His telegraphic fame still lives, however, and the curious may find it immortalized in some humorous verses in "The Autocrat of the Breakfast Table," by Oliver Wendell Holmes. It might be interesting for our brethren at the forthcoming Old-timers' reunion to take up the question, "What has become of De Sauty?"

THE International Congress of Electricians, "to codify, so to speak, electrical science, and to sound its depths," will convene at the Palace of the Trocadero, Paris, this day two weeks. It is strange news to easy-going telegraph people to learn that M. Cochery has decreed that the meetings shall be secret, and that no prying member of the fourth estate of the realm shall be admitted. While we realize the fact that a Congress of Electricians which seems afraid of being raided by the police—or the newspapers—may still be a very harmless affair, since it is not known that Leo Hartman or O'Dynamite Rossa has been invited, yet we are at a loss to define their object in preserving a mysterious secrecy. There can be nothing desperate in "codifying, so to speak, electrical science and sounding its depths"—whatever that is—and we telegraphers want to hear what is going on, even if the Frenchmen won't let us boss the job.

THE National Telephone Exchange Association, formed at Niagara Falls only one year ago, has in that short time grown to such dimensions that its forthcoming convention at Saratoga, next Tuesday, is looked forward to with intense interest. The rapid growth in seven months shown at their last gathering at Chicago April 5 and 6, was a matter of marvel to even its most sanguine supporters, and we are sure that the reports for the ensuing five months will not be less cheering. The exhibits made by the several manufacturers at these conventions are of great interest and value to those interested in telephones, and we expect to see a large gathering at Saratoga next Tuesday. We hope that, among other subjects, the feasibility of subterranean wires for telephones, and the prospects of adapting the telephone to long-distance ocean cable circuits will be fully and intelligently discussed.

THE fire in the reading room of the Electrical Exhibition, at Paris, attributed to a defect in the fitting up of some incandescent lamps, reveals a new source of possible danger from the electric light. It is little more than a year since the

British Museum, with its store of unique manuscripts and other priceless examples of literary production, was threatened with destruction through the same agency. Upon two different occasions a red-hot morsel of carbon dropped from one of the lamps, setting fire to papers, but the fire was each time promptly extinguished. We have little sympathy with the meddlesome countrymen who lose their lives every once in a while by fooling with the "brushes," but if our electric light people expect to make a success of the thing they will have to provide means for avoiding disastrous fires through the use of their lamps.

By the resignation of Mr. W. B. Somerville, the Western Union Company loses an efficient officer, while its patrons connected with the press find in the change many reasons for regret. For many years a journalist, Mr. Somerville was excellently qualified for his position as Superintendent of Press Transmission. He was equal to any emergency consequent upon a rush of press matter, and was always ready for any turn it might take, while his kind impulses and gentlemanly treatment of those who had dealings with the press department of the company will be kindly remembered by all. Now that he has once more resumed his literary spurs, which he won long ago, we welcome him back cordially to the field of journalism, where he may soon again prove his knighthood.

DISAPPOINTMENTS in regard to the biographies of subjects intended for Our National Portrait Gallery do not, it seems, come singly. Of the candidate for the present number, as in the case of that intended for last month, we have found it utterly impossible, after no end of writing and telegraphing, to secure sufficient data upon which to construct anything like a proper biographical sketch. Everybody who can give the information is "out of town." We shall certainly be able to secure the points before next issue, and the reader would doubtless prefer the delay, annoying as it is, to the very incomplete sketch we could now offer them.

FROM the reports of what the opposition telegraph companies are doing, published in another column, it would appear that the consolidated company is not to be allowed to retain a monopoly of the business so long as some feared it would. Although the Mutual Union has all along kept very quiet, and its officers would give little or no information for publication, we have it from reliable authority that the company already has 10,000 miles of pole lines erected, and that when the Mutual Union opens for business it will cover so large a territory as to be thoroughly prepared for any reduction of rates tactics on the part of the Western Union.

IN consequence of the consolidation of the Canadian lines, operators there may now look for a little of the unpleasant experience through which we have just passed. Duplicate offices in the same town will be closed, and the dual force otherwise reduced, but we hope that the difficult duty will be more tenderly dealt with than it was in the rough-and-tumble American Union-Western Union transfer. The companies themselves may also experience some of our legal troubles, and we should not be surprised to hear of the case speedily in the Court of Queen's Bench, which, we believe, sits this month.

AMONG all the wild claims made by Mr. Edison and his people with regard to electric lighting, nothing seems so absurd as their claim that Edi-

son's patent gives him "the exclusive control of incandescent electric lighting, both in this country and in Europe." Incandescent lighting covers a great many different methods, and while Mr. Edison may claim all that is due to him, he cannot set himself up as a monopoly in the business, to the exclusion of equally meritorious inventors. This will be held to be good law in the courts of France and every other civilized country.

A LONDON journal, the *Saturday Review*, in characteristically claiming for England all that is creditable in electrical science, mentions incidentally Cooke, Wheatstone, A. Graham Bell and other leading electricians as natural born subjects of her most gracious majesty, but still leaves us Edison, though matching his genius with that of an Englishman, Mr. Swan. This is the unkindest cut of all, since Edison, too, first saw the light under the English flag. We are, however, grateful that the *Saturday Review* has not laid claim to Franklin, Morse and Henry.

THERE are two things to which the "electro-technicians" about to assemble in congress in Paris might devote their attention: The safety of ocean cables in time of war, and protection of telegraph offices from unreasonable search by minions of the law. The first of these subjects might well be made a matter of international treaty, and the second might be covered by an official resolution on the subject. The delegates could then be instructed to make proper representations to their respective governments.

JUDGING by our correspondence, that "one man at Charleston," who, according to the plighted troth of a prominent official, had his salary reduced, takes the shine out of Falstaff's seven men in buckram for numerical strength. We have heard from him from the North, South, East and West, and everywhere he is plaintively crying, "Me too." He is about the most numerous "one man" we ever corresponded with.

It seems worthy of note that an ocean steamship, some hundreds of miles out at sea, should be able to telegraph home that no needless alarm should be caused if certain casks and boat-gear were found adrift, since they had just been washed overboard. Yet this was the thoughtful action of the captain of the Faraday, the ship paying out our new cable.

To those officials who are contemplating the introduction into our system of stamps for paid telegrams, to be used as postage stamps are now used for letters, it may be interesting to know that Mr. Fawcett, the English Postmaster General, writing to a Welsh correspondent, remarks that the question of abolishing such stamps is now under consideration.

INVENTORS of underground systems of wires are multiplying fast, now that it seems certain that the aerial lines must go. As soon as it is plainly shown that we have to do it, it will be a cold day when your American genius cannot discover something that will obviate every difficulty now found in the present subterranean system.

THE luckless man who invented that electric lamp which, upon being placed in the Electrical Exhibition, promptly set fire to the establishment, will doubtless get left when the committee on awards come to deal out the medals.

WITH regard to the backwardness of the Electrical Exhibition, a witty French paper, just to hand, says the chief thing lacking there at present is—electricity.

Notes and Queries on Electricity and Electro-Magnetism and Their Applications.

BY T. D. LOCKWOOD.

Practical as far as possible;
Theoretical as far as necessary.

Q. 148. Have any steps been taken toward the general introduction of an improved wire gauge? If so, with what result?

A. It has been universally admitted that the necessity for a new and standard wire gauge is urgent, on account of the uncertainty and unreliability of the various gauges now in use. The Birmingham gauge has been nominally the standard by which wire has generally been sold, but it has been ascertained that this gauge varies with nearly every manufacturer, so that if wire is ordered of a certain gauge, there is no security that the wire received will be of the same size as the wire required. Moreover, the several sizes bear no regular relation to each other. For these reasons the necessity for a standard has of late been generally acknowledged. Preece & Sive-wright, in their text-book on telegraphy, recommend a gauge based upon weight, giving many good reasons why such a standard should be introduced. This gauge was proposed by Messrs. Mallock & Preece.

It is, however, obvious that it is only adapted to one material, since, for example, a wire of copper a mile long, with a diameter of 120 mils., would weigh about 230 pounds, while an iron wire of the same diameter would weigh 200 pounds. In view of the increasing necessity for a standard, in 1879 a committee of the Society of Telegraph Engineers was appointed to consider the various wire gauges in use and proposed, and to report the most proper, if any, for general adoption. In the course of the committee's investigations, it was found that no less than fourteen gauges were in more or less general use, nine of which have the differences in the respective sizes formed arbitrarily or by no regular gradation. The other five are graded upon the principle of geometrical progression, and hence are called geometrical gauges.

The committee, after a careful consideration of each of the fourteen gauges, recommended the gauge of Mr. Latimer Clark for adoption as a standard.

This is a geometrical gauge, in which the gradations are so arranged that each size is 20 per cent. less in weight and electric conductivity than the one immediately preceding it. It varies considerably in many of the sizes from the old Birmingham gauge, but is nearer to it than any other of the geometrical gauges.

Notwithstanding the recommendation of this committee and the necessity of a standard, it does not yet appear that the manufacturers have taken the matter up practically, and the Birmingham wire gauge in all its delightful uncertainty is still, in this country at all events, considered as the wire gauge.

Q. 149. Should a large or small size gauge of wire be preferred for long lines?

A. The longer a line the larger should be the gauge of wire used, as illustrated by the fact that on the short private lines so well known in our cities Nos. 11, 12 and 14 are generally used, on telegraphs of ordinary length between cities; Nos. 8 and 9 are commonly employed, and for the longest telegraph lines—such as those between New York and Chicago, and New York and St. Louis—Nos. 6 and 4 either are, or should be, invariably used. The largest size used in England is No. 4, which is nearly a quarter of an inch in diameter.

Q. 150. What are the reasons for using large wires for long lines?

A. In the first place, the smaller the wire the more care is needed in insulation; the smaller a line wire is the less is its conducting power and, necessarily, the greater is its resistance. In a line the current from a battery has a choice of routes, so to speak, either to traverse the line wire, thereby arriving at the distant point, or to leak to ground over each insulator and down each pole. A certain amount of leakage does take place at every pole and, therefore, the current does actually divide between the two routes in direct proportion to their respective conductivities. Although the amount of electricity which leaks off at one pole is inconsiderable,

when we remember that there is an average of thirty poles to the mile, and possibly a great number of miles to the line, we see that the total amount of leakage is by no means inconsiderable. We must further consider that the resistance of a line wire increases in direct proportion to its length; that is, if a wire 100 miles long has a resistance of 1,000 ohms, when extended to 200 miles long the resistance will be 2,000 ohms—provided the wire is kept the same size. The sum of the whole being that every line, as it is made longer, decreases the resistance of its insulation by adding many more poles, at each of which there will be some leakage, while it also has the resistance of its proper conductor increased, because each mile of wire adds a mile of resistance. It is obvious, then, that to maintain the conductivity of the line at its proper standard, we must increase its size and thereby keep its resistance down. We shall, by so doing economize battery power, because reducing the line resistance practically shortens the circuit. By using smaller batteries we gain incidentally another advantage; namely, the decreased tension of the current and consequently its decreased ability to escape, or the greater ease with which it may be insulated. Another point in favor of large wires is that they are much more durable in proportion than small ones.

Answers to Correspondents.

Is it a common occurrence for a Blake transmitter to act as a receiver? I have one that I am enabled to carry on conversation with without any telephone in circuit. Can you give the reason of its working that way? I hope to see the explanation in your next OPERATOR.

LEWISTON, Me.

A. G. K.

It is by no means uncommon for a Blake transmitter to possess the properties of a receiver.

This property was first discovered by Berliner, and is common to all microphones. The principle is embodied in a patent issued to him entitled a contact receiver. It is explained as follows:

If two electrodes be placed in contact to form part of a circuit, and a current of electricity be passed through them, a repulsion is exerted between them.

This force of repulsion may be weakened or strengthened by varying the strength of the current. As that strength is varied by any appropriate form of battery transmitter or speaking telephone, so will also the force of repulsion at the point in the transmitter which is being used as a receiver be alternately weakened and strengthened accordingly, and will therefore cause its plate to vibrate at the same rate and measure.

The latter vibrations being communicated to the surrounding air, the same kind of sound as uttered against the original transmitter will be reproduced at the second transmitter.

"G1."—The Telegraphers' Mutual Union, of New York, like the Brotherhood of Telegraphers, of Chicago and other cities, and similar organizations throughout the country, is a society of telegraphers for mutual support, benefit and improvement, and incidentally of mutual protection. It is not a secret organization. When a member is out of work, the society endeavors to secure a position for him, and when he is sick he can draw a stated amount per week from the treasury, the other members in the mean time, as far as possible, in turn performing his regular telegraphic duties until his recovery.

G. C., TEXARKANA, ARK.—An ohm is the unit of electrical measurement, just as an inch is a unit in measuring distances. It is so called because first used by the electrician Ohm. An ohm is the unit of resistance to the passage of an electric current, and is about equal to the resistance of 330 feet of No. 9 iron wire of average quality

The Pioneer Telegraphers' Reunion.

To the Editor of The Operator :

SIR: Not half enough has been written in favor of the Old-timers' meeting, to be held at Niagara Falls, Sept. 20. Those who attended the reunion at Cincinnati last year need no urging to be on hand this time. All so thoroughly enjoyed it then that not one of them will miss the coming gathering if he can help it. But the attendance at Cincinnati, although large, was not half so large as it should have been. The telephone convention, held at that time at Niagara Falls, prevented many veterans from going to Cincinnati; the excessive heat usually experienced in the latter place in September deterred many others from going, and still a larger number who did not go would have gone if they had known what a splendid time awaited them. Now that a permanent organization has been made, and the finest place in America chosen for the next meeting, it seems as though there certainly must be a large attendance and a glorious time.

Grand old Niagara! It is probable that there are but few old-timers who have never visited that magnificent locality, but who among them all has not with each succeeding visit been more and more impressed with the beauty, grandeur and awe-inspiring scenes there so lavishly spread out by nature?

But this is only a small part of the enjoyment in store for those who attend the meeting. The greeting of old friends who may never be met elsewhere on earth; the brightening up and rehearsing of early reminiscences of matters connected with telegraphy and old associates in the business; the splendid drives; the banquet, which will undoubtedly be one of the best ever set before a hungry telegrapher. All these and many other excellent features embraced in the programme will make this an occasion that no one can afford to miss.

Let me add, right here, that John C. Lark will be there. Genial, jolly, jovial John C. Lark! Who does not know or has not heard of the "Great American Traveler"? Those who attended the Cincinnati meeting—especially those who took passage in the Highland Chief—will never forget the flood of rich stories and conundrums he favored them with, in his inimitable style, from the inexhaustible supply he has picked up in his extensive journeyings. John says he will be on hand sure.

All persons in good standing who were engaged in the telegraph business in any capacity previous to 1863 are eligible to membership, and may be received upon the payment of an initiation fee of five dollars. Those intending to join the association should write to Mr. J. C. Mattoon, Secretary "Old-Time Telegraphers' Association," care W. U. Tel. Co., Cincinnati, Ohio, at once, inclosing the five dollars. This sum will probably cover nearly, if not quite, all the expenses at Niagara Falls. SUBURB.

"The Old Time Telegraphers' Association."

To the Editor of The Operator :

SIR: The time for the first meeting of the "Old Time Telegraphers' Association," organized at Cincinnati Sept. 7, 1880, is close at hand. The great increase and importance of telegraph business for some time past has prevented my answering much individual correspondence. A lack of time prevents a merited attention to a subject dear to veteran telegraphers. A fair enthusiasm and co-operation is urged from all interested. An inability to send circulars to those who might not easily have access to telegraph papers must be equalized by the individual efforts of each "old-timer" to make the notice of the next meeting at Niagara Falls, Wednesday, Sept. 21, 1881, as widespread as possible. I, inadvertently, announced the third Tuesday in September in the previous card. Please remember, it is *Wednesday, Sept. 21*. As to membership, the general understanding is that all who donated toward the "old-timers' reunion" are members, subject to whatever the per capita expense of the next meeting may be, which should not exceed five dollars, all others being subject to the initiation fee of \$5 for membership. This initiation fee from new members may be all that will be required, at least until the meeting, when definite action will be taken for the future guid-

ance of the Association. It has not been deemed advisable to attempt to arrange for reduced railroad transportation, but that each one will endeavor to make the best possible arrangements for himself, and that the various telegraph superintendents will be as consistently generous in this respect as possible. The Committee of Arrangements report their programme as quite complete—hotel rates reduced to \$2.50 per day, and to the various points of interest one-half the regular charges. It is hoped that each one will exert himself to swell the attendance. I would again urge that all who propose to attend send me their names. Remittances to J. C. Mattoon, W. U. telegraph, Cincinnati, Ohio. Final notice will be given in the next issue of the telegraph papers. J. C. MATTOON,

Sec'y "The Old Time Telegr's Ass'n."
CINCINNATI, O., Aug. 27, 1881.

Chicago Notes.

To The Editor of The Operator :

SIR: Please note following changes and personal:

Appointments: Assistant Chief Thayer to Eastern Division (New York wires), days.

D. L. Wilson succeeds Mr. Thayer as Asst. Chief on Detroit, Cleveland & Toledo wires.

Referring to personal notices of appointments last issue, your correspondent would make a correction, having been wrongly informed regarding an appointment that was rumored as about to take place. Assistant Chief Operator Mr. W. J. Lloyd was promoted from the Western Division (overland wires) to the Eastern (N. Y. wires) nights, succeeding Mr. W. R. Holligan, who was appointed a chief of full rank, vice Mr. W. A. Leary, resigned.

There are those in our profession to whose credit from time to time the favors of promotion are bestowed, and who do not lose in a disagreeable way by such promotions their identity as agreeable gentlemen of good sense and understanding. Your correspondent finds pleasure in declaring that he feels perfectly safe from denials in asserting that all who know the subjects of the last-named promotions, particularly those who have been in any measure affected thereby, will cheerfully accord the high meed of praise above mentioned, and further, that they have fairly won exalted reputations for strict probity of conduct, and as possessors of unusual talents and abilities. Modest, gentle and genial to an admirable degree, they move in their manifold duties with a quiet dignity and an earnest precision that wins the laudations of us all, and appears to assure for them an equality for any promotions to which they may be in the future called. Both young in years, yet their records would form an interesting and instructive biographical sketch. However, we beg their pardons, and spare them until we can add the notes of coming days and coming successes.

Resigned: Sam Wallace, *Inter-Ocean* private line, gone to Washington, D. C. J. McRobie (Asst. Chief N. Y. wires), gone to accept a chiefship in Peoria, Ill., where he hopes to regain declining health. Mac takes with him the unbounded esteem and best wishes of us all. Dave Stormont gone home to Cincinnati. O. M. Stone resigned to go into other and more profitable business.

Arrivals: Mr. Hutchinson, of N. Y.; James Adams, of Ottawa, Ont.; Mr. Wilson, of Clinton, Ia., and several others whose names are not at hand.

On Vacations: Asst. Chief Patten, Mrs. Prescott, Asst. Chief Thompson, and Mr. N. T. Callett.

Visitors: Supt. McMichael, from Minneapolis; Manager Wordsworth, from Cleveland; Hector Scott, Board of Trade, Milwaukee, and Levi Wild, from Ogden, Utah.

CHICAGO, Aug. 24, 1881.

Baltimore Notes.

To the Editor of The Operator :

SIR: The telegraphers of Baltimore held a meeting Sunday, Aug. 14, for the purpose of forming themselves into an organization for the promotion, advancement and benefit of the members of the telegraphic profession. The association was called the Brotherhood of Telegraphers. At a meeting held Aug. 21 a constitution and by-laws were adopted. In case of illness a member is entitled to draw six dollars

per week from the association, provided he has been a member five months. The meeting was a thoroughly representative one, many old operators being present. Greetings are solicited from kindred associations in other cities.

The electric light is making wonderful progress here. Nearly all the large business places are using it with success. By the time of Baltimore's Oriolo festival, which takes place in October, it is thought that almost the entire city will be illuminated.

We regret to chronicle the serious illness of Mr. Jno. Hingerty, of the Union R. R., who is suffering from general debility.

The Mutual District Co., an opponent of the American District, has opened for business. It will be operated in connection with the Mutual Union Co. Mr. Geo. F. West is general manager. Mr. McCormick, of the Union R. R., has gone with the B. & O., also J. A. Glenn, of the P., W. & B. T. Lufrio has gone to Texas. Tom will be missed from the ranks. E. L. Bussard is convalescent and has gone with the A. U. T. J. Sullivan, of the Associated Press has resigned and gone to pastures new. Business lively at all offices; first-class men wanted badly.

BALTIMORE, Aug. 22, 1881. EXCELSIOR.

TELEPHONE DEPARTMENT.

The Staten Island Telephone Co. is making good progress, and will soon be ready to open for business.

Several samples of anti-induction cables manufactured at the Bishop Gutta-Percha Works will be exhibited at the Saratoga Convention.

Ironton and Portsmouth, O., are now connected by telephone; distance 23 miles. Ironton and Proctorville are also connected; distance 24 miles.

The new cable of Mr. P. B. Delany, recently patented, by means of which telephone lines can be run underground without any inconvenience from induction, is highly spoken of by telephonists who have examined it.

Messrs. C. E. Jones & Bro., of Cincinnati, are getting ready to move into more extensive quarters, to accommodate their increasing business. They turn out a large amount of telephone apparatus, including the well-known Jones switch.

At the opening of the Electrical Exhibition, at Paris, the telephone was tried for President Grévy with the Grand Opera, where the "Prayer" from "Masaniello," was sung by the full chorus, the experiment being perfectly successful.

An attractive new advertisement of Messrs. Davis & Watts will be found in this issue. This firm keeps well up with the rapid improvements in telephone apparatus, and can always be depended upon to furnish a high quality of instruments at a reasonable price.

Every one knows, says *Nature*, that the feeblest currents produce audible sounds in the telephone, which is more sensitive than any galvanometer to feeble currents. M. Pellat lately declared that the heat necessary to warm a kilogramme of water one degree would, if converted properly into the energy of electric currents, suffice to produce in a telephone an audible sound for 10,000 years continuously.

Judge Donohue, in Supreme Court, Chambers, has set aside the injunction granted, with the order to show cause, in the case of The People against the Metropolitan Telegraph and Telephone Company. The suit was originally brought by a number of property owners to prevent the defendants from erecting poles in front of their houses or hanging wires thereon. The grounds urged by the plaintiffs were that the Legislature, by its general acts, permitted the use of the streets for telegraphic poles and wires, but that the telephone people had no rights under that law, as the telegraph wire and the telephone wire were, in the eyes of the law, widely different things.

The telephone convention takes place, as already announced, at Congress Hall, Saratoga Springs, N. Y., on Tuesday, Sept. 6. Special rates of railroad fares have been secured. From New York and return by the N. Y. C. R. R. the fare will be \$5.50, tickets obtainable from Sept. 3 to 7, good to Sept. 15, at 413 Broadway and G. C. Depot. From Buffalo and return the rate is

\$9; Indianapolis, \$81.45; Cincinnati, \$27.80; St. Louis, \$30; Chicago, \$21.60. The terms at Congress Hall are to be \$3 a day for a single room occupied by one person; for a room occupied by two persons, \$2.50 a day each. It is believed that the convention will be largely attended. Many valuable reports will be presented.

The Law Telegraph Company will exhibit at Saratoga a new switch table which delegates to the convention should not fail to carefully examine. The principle chiefly involved in its construction, and one we think entirely new, is that which enables two, three or four operators, without leaving their seats, and each independently of the others, to work the same group of subscribers. The tables operated in probably three-quarters of the exchanges have forty to fifty subscribers each. As an illustration of the new table, imagine eight of these condensed into one table, 34 inches square, and the eight operators reduced to four, and seated one on each side of it. These four operators are entirely relieved from the work of sending to and receiving from seven tables orders for connections and disconnections, and are thereby enabled to wait on twice the usual number of subscribers. They can do this, too, with greater accuracy and more dispatch.

The Harrisburg (Pa.) *Telegraph* says it is a somewhat singular fact that an ordinary business man will put up with almost anything he makes use of except the telephone; but from the greatest invention of this or any other century—an instrument that daily saves him more time and labor than all his other improvements put together—he won't stand the slightest nonsense. He turns in a signal. If the answer does not come instantly he swears. He tells the central office the person he wishes to speak with. If the bell does not tap again before he can count a dozen he swears some more, and vows he could go and do the errand in half the time. The telephone, it adds, is the best thing of the age to bring out human nature. A man will show more of himself in five minutes before this delicate little machine than in half a year in ordinary ways. The *Telegraph* goes on to recommend that the bells be made with a little mirror, to enable some of those irascible people who think it strange that the telephone can't go out and harness up a horse for them, to see the latest and most improved specimen of a jackass.

DASHES HERE AND THERE.

Western Union stock is quoted at 88½; last issue it was 89.

An attractive new page advertisement of the Utica Fire Alarm Telegraph Company will be found in the present issue.

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

Two naval officers were killed at the torpedo station, Newport, R. I., Aug. 29, through carelessness in handling the electrical apparatus used to explode torpedoes.

In a re-arranged advertisement in this issue, the Bishop Gutta-Percha Works give cuts of a number of different cables, manufactured by them, including those for both telegraph and telephone purposes.

The cable steamer Faraday, after shipping four hundred tons of coil of the new American cable, sailed from Plymouth, England, Aug. 26, to resume the laying of the cable.

The Government cable steamer Newfield returned to Halifax, N. S., on the 25th ult., after a six weeks' voyage. Six splices of cable have been made and one cable from Grand Manor to Campo Bello and one from Campo Bello to Eastport have been laid.

A fire, similar to the recent one in the W. U. main office in this city, was discovered in the Titusville, Pa., W. U. office, Aug. 24. The fire was found to be at three different places where the wires—insulated though they were—touched the joist and cross-braces. It was put out without much damage.

Last week, at Elizabeth, N. J., Joseph Nevins, aged 26 years, while fixing electric light wires in the Bowker Fertilizing Works, was caught in the shafting and whirled rapidly around.

He was almost eviscerated. One arm was torn from its socket and both legs were broken. He died in a few hours. He leaves a wife and child.

Since the introduction of dynamo-electric machines a good many valuable watches have been almost completely ruined by having their works magnetized. Mr. Maxim, the electrician, has, however, invented a machine, now at the Paris Exhibition, which in a few minutes completely de-magnetizes a watch, leaving it as free in its movements as ever.

The Evans 26-shot sporting rifle, advertised by E. G. Rideout & Co., 10 Barclay street, is a great bargain. We are positively assured that the retail price of these rifles was \$40 each; any one can get the same rifle now by sending to the above-named firm only \$15. They offer to refund the money sent if the rifle is not as represented. Read their large advertisement in this issue.

Messrs. Partrick & Carter's new page advertisement in another part of the present issue will well repay careful perusal. This firm is as enterprising as ever; still turns out the high quality of instruments and apparatus for which it has become so well known among telegraphers everywhere; is constantly adding new and valuable specialities to its stock, and continues to sell good goods at remarkably low prices.

A dispatch from Newport, R. I., says that Capt. T. O. Selfridge, in command of the torpedo station, conducted some interesting and successful experiments on board the United States tug Nina between Fort Adams and Beaver Tail, on the 25th ult., in which he demonstrated the advantages of the system of electric lighting for war purposes on board ship, and by which torpedo boats from shore or from an enemy's ship could easily be detected.

Mr. A. B. Lyman, of Cleveland, O., advertises his well-known O. K. instruments in another column. This O. K. outfit gives so universal satisfaction to purchasers that Mr. Lyman advertises to send it C. O. D., with privilege to examine before any money is paid. This shows the confidence he has in the goods, which, however, is evidently well-founded, as he states that he has never had an instrument or outfit sent in this manner returned to him. Mr. Lyman also has a cheaper outfit, the Sheridan No. 2, which he furnishes for \$4.25.

A report was recently cabled from Paris to the effect that Edison's agent had procured the seizure of the Maxim lamps at the electrical exhibition, on the ground of an alleged infringement of Edison's patents for incandescent electrical lighting. A later dispatch, however, states that the story of the seizing is wholly untrue. It adds that no injunction has been issued having the effect of restraining the sale of the Maxim light or its exhibition at the Paris Exhibition. A descriptive injunction has been issued at Paris against the Maxim, but its friends claim has no such effect or operation.

From the report of the British Postmaster-General, just issued, we learn that the telegraph business in Great Britain continues to constantly grow. The aggregate of messages last year was 29,966,965, which showed a gratifying increase of 3,429,828. Never until now has this department been made to pay. Last year's receipts from telegrams reached a total of more than \$1,040,000, which paid the year's interest in full on the original outlay, all the expenses of the service, and left on hand a small balance. While the excess last year of the number of letters posted was only 4 per cent. over the former year, the excess in messages was 12.

While Superintendent Robert Sheehy, of the Brush Electric Light Company, with a number of men, was preparing on Saturday last to test the four lamps on the one-hundred-and-fifty-foot pole in Union Square, destined to illuminate the park, the hoisting gear at the top of the pole broke just as the lamps had reached the top. The lamps and their "carriage"—a heavy mass of iron weighing more than six hundred pounds—fell with a terrible crash, from the height of more than a hundred feet, on to the platform, twenty-five feet from the ground, upon which five men were working the hoisting apparatus. Two of them were fatally injured, one having died since, and the other being at the point of death. Three were more or less seriously injured.

The new metal of which it is proposed to construct pipes in which to lay telegraph wires under ground is described as very light—only about one-sixth the weight of iron—and, being composed almost entirely of pure carbon, is indestructible, whether in the air or under ground; it does not rust or change by exposure, and is not affected by heat or frost. The most important characteristic claimed for it, however, in connection with underground wires, is its being a perfect insulator. The pipes of the metal need not, it is stated, be buried very deep in the ground, as they may be of a semi-elastic character, adjusting themselves to the slight upheaval and depression of the ground through the action of frost.

A petition has been presented in Boston asking permission to lay tubes through the streets for the purpose of running telegraph and telephone wires underground. The proposed company, if the desired right of way—which wants it to be an exclusive one—can be secured, will lay wires at its own expense in terra cotta, and will let them to all applicants, including telegraph and telephone companies, for a royalty which they say they are willing that the city shall fix if it chooses. All lines owned by the city they promise to take free. The telegraph and telephone companies vigorously oppose the granting of the right, on the ground that, in the first place, it is impracticable, and, in the next place, it is merely a scheme to get control of a valuable right and then use it to make money. The new company has many prominent and wealthy men connected with it, and it is thought the desired permission will be granted at the next hearing, which occurs early in September.

NEW YORK CITY ITEMS.

The body of William A. Irving, a telegraph operator of this city, who was drowned in the Hackensack River on Thursday, was found on Saturday last and sent to Speer's Morgue, Jersey City.

The linemen of Edison's Electric Light Co. have formed a class to study the elementary principles of wiring buildings for the electric light. Mr. E. H. Johnson delivered the first lecture to them.

Mr. W. B. Somerville, who, for two years past, has managed the business relations of the Western Union Telegraph Company with the newspaper press of the country, has resigned his position to re-enter upon the work of journalism.

The hours of duty of the A. D. T. managers, in the majority of the offices, were reduced from twelve to ten hours a day on August 19. The change, which was a much needed one, has given great satisfaction, and was largely the result of the efforts of the General Superintendent, Mr. Wm. F. Chester.

The officers of the Edison Electric Light Company state that the rumor of negotiations between themselves and the United States Electric Lighting Company are absolutely without foundation, and they have no intention whatever of entering into any such negotiations with the United States Company.

The city having awarded to the Brush Electrical Illumination Company a contract to light certain portions of the city in the neighborhood of Madison square, the company immediately proceeded to erect the necessary poles, etc. While working in West Twenty-fifth street, however, they were stopped by an injunction obtained in the Superior Court, by property-owners, who claimed that the poles erected were unsightly and lessened the value of their property. The motion to make the injunction permanent was heard by Judge Speir, who rendered a decision denying the motion and dissolving the temporary injunction.

The stockholders of the Mutual District Telegraph Company, at a special meeting, voted to increase the capital stock of the company from \$250,000 to \$300,000. The stock of the Mutual District Messenger Company was also increased \$1,250. The new stock was at once taken by the syndicate which holds all the old stock, and of which Butler, Stillman and Hubbard are trustees. It is said that the purpose of the company in issuing the new stock is to provide money for construction, as the company is rapidly extend-

ing its lines above Fiftieth street. The Mutual District Company is merely nominal, it having been organized simultaneously with the telegraph company to save all questions of the right of the latter to transact a messenger business under the State law.

PERSONAL.

Mr. H. M. Scott, of the Milwaukee, Wis., W. U. office, was married last week to Miss Hattie F. Wolcott, at Holyoke, Mass.

Miss Carrie Edwards, of the Detroit, Mich., W. U. staff, paid THE OPERATOR office a visit last week. Mr. G. J. Carroll, of the same office, also called.

Mr. Frankenberg, formerly of the government military telegraph service in New Mexico, is now working as operator for the Western Union at Baltimore, Md.

Messrs. Tom Kehoe and C. A. Butterfield, of Mobile, Ala., have resigned to go to Milwaukee and Philadelphia respectively. They are both first-class operators.

Mr. V. M. Moore, for some years connected with the W. U. office, at Henderson and Owensboro, Ky., has accepted a position as operator at Springfield, Tenn.

Mr. E. R. Scott, of Amherstburg, Ont., having returned from his Eastern trip, Miss Fox, who was filling his place, will probably be transferred for a time to the Windsor office.

Professor M. G. Farmer, electrician at the Newport torpedo station, has resigned, to take effect on Sept. 1. Professor Farmer has been electrician at the station for many years.

Mr. H. E. Sheets, formerly agent and operator at Lockwood, is now in G. R. & L. city office, Grand Rapids, Mich. Mr. W. J. Quinlan, at Stanwood, has resigned, and is succeeded by Mr. C. H. Clark.

Mr. W. H. Michener, Manager Mutual Union office, Foxboro, Mass., while taking equestrian exercise a day or two since, was thrown by a vicious horse and sustained a very severe shock to his nervous system.

Mr. Dennis J. Hern has been appointed Superintendent of the Eastern division of the Mutual Union Company, with headquarters at Boston. Mr. Hern is a well-known telegrapher, and his friends will be pleased to hear of his deserved good fortune.

Wanted—To know whereabouts of Silas Williams; last heard of in Indian Territory, five years ago; supposed to be in Texas now. Any information thankfully received by his brother, A. J. Williams, Mgr. W. U. Tel. Co., Elliston, Grant Co., Ky.

Mr. J. B. Bennett, of San Luis Obispo, Cal., is one of the most popular citizens of the town in which he resides. He is a good electrician, in addition to being a good operator, and takes an interest in everything pertaining to the telegraph and telegraph operators.

Mr. Nat Stewart, finding that he was not becoming wealthy upon the salary received for running the Western Union office at Loupoc, Cal., upon "commission," is now successfully engaged in running a fine "ranch" of his own near that place, which, by the way, is the centre of a flourishing temperance community.

Miss Josie A. Norcross, of Santa Barbara, Cal., is one of the best female telegraphers upon the Pacific coast. In addition to hard work in the telegraph office, she acts as agent for the steamship company at that point, a position which of itself is no sinecure. She is said to perform her duties to her employers "like a little man."

Mr. Fred. Anderson—more generally known as "Dad"—has resigned the night chieftainship at St. Paul, Minn., and gone to Milwaukee. He is succeeded by W. L. Gregory, formerly assistant to Clark Davison, Day Chief. H. E. Thompson has left the key, for a time at least, and is now connected with the St. Paul Electric Works.

At Deming, New Mexico, Mr. Gore is the manager of the Western Union, assisted by Mr. J. H. F. Schall, an operator well known upon the frontier. In the office of the Southern Pacific Railroad, at the same place, Mr. Sheppard is manager, with two or three assistants. Mr. Hartwell, ex-train dispatcher at Sacramento, is also at Deming.

Mr Coons, ex-Manager of the Western Union at Bakersfield, Cal., is doing well in the jewelry business in that town. He was one of the oldest employés of the Western Union upon the Pacific Coast, and filled temporarily the office of District Superintendent. The cheap labor policy of the company changed Bakersfield from a salaried to a commission office, and, as is frequently the case, the Western Union lost one of its best men.

Captain Henry W. Howgate, who will be well remembered as Acting Chief Signal Officer, at Washington, under the late Gen. Myer, was arrested at Mt. Clemens, Mich., on the 15th ult., charged by the Government with embezzlement. The alleged frauds are chiefly in connection with the telegraph bills of the Signal Service, and are said to aggregate \$400,000. Captain Howgate has been held in \$40,000 bail. His health is in a precarious condition.

N. C. AND ST. L. PERSONALS.—Chattanooga Division: Charley Heard is operator and freight clerk at Chattanooga, Tenn.; Sam E. Rowden, agent and operator, Wauhatchie, Tenn.; Jno. Morgan is at Whiteside, Tenn.; Sam Ingersoll, at Shellmound, Tenn.; E. W. McCaughey, at Bridgeport, Ala.; Si Willis, day operator, and Wm. Huddleston, night, at Stevenson, Ala.; Jesse Horn, agent and operator at Sherwood, Tenn.; Wm. Stewart, agent and day operator, and M. L. Williams, night, at Cowan, Tenn.

SALAMANCA, N. Y.—The American Rapid Telegraph Company proposes to compete for the \$300 per month business done here exclusively by the W. U. Among the operating fraternity who aspire to higher positions in the dismal future are Thos. W. Potter, Manager; Wm. Melhuish, Assistant Manager; J. S. Taggart, Geo. Rigdon, Geo. W. Leveridge, J. C. Kuhn and S. C. Keynon. The two latter are United Pipe Line men. Among those on the retired list are Wm. Mulcay and Chas. Frank. The latter has been running a student mill (where he was formerly employed, at the Pipe Line office), and had no less than five under instruction when he was nipped in the bud and cast out to the mercy of the winds and waves, to be tossed on the tempestuous sea of life to look for a job. Charlie is a good fellow, but the glitter of filthy lucre (probably \$25 per head) was too much for his avaricious disposition; he took them in, and thus the old, old story, they beat him.

CHATTANOOGA, Tenn.—Mr. J. B. Norris, manager of the American Union, was appointed manager of the consolidated company on the 1st of July, vice Mr. Norris R. Young, resigned. The latter has since been appointed night manager. The day force has somewhat changed, and several new faces are to be seen. They are arranged as follows: Billy Burton, day chief; A. M. Pennock, acting wire chief; Jack Riley, N. Y. duplex; Charles Skelton, New Orleans quad; Sam. Swartz, Montgomery quad; Charles Davidson, Atlanta and Nashville; David Campbell, Washington press; J. E. Martin, Memphis single; Fred. Meyer, Mobile and St. Louis duplex. On the night force are: N. R. Young, chief; E. M. Hickey, New York duplex; John R. Terhune, Southern press, New Orleans quad; Chauncey T. Raymond, Washington press. A new addition to the through circuits is "the Augusta quad," Cincinnati and St. Louis working it, thus making a more complete outlet for Southern business.

BORN.

WEEKS.—Aug. 25, to Henry Weeks, Jr., Manager American Rapid Tel. Co., Rochester, N. Y., a daughter.

WOLCOTT.—Aug. 26, to J. E. Wolcott, Agent Valley R'y., and Manager W. U. Tel. Co., Greentown, O., a son.

MARRIED.

CHAMBERS—CURD.—Aug. 24, Mr. W. D. Chambers, agent and operator C. S. R. R., Burgin, Ky., to Annie B. Curd.

SENFIT—DETTRA.—Aug. 4, 1881, at the parsonage, near Sellersville, Pa., by the Rev. J. G. Dengler, Mr. A. A. Senft, Night Operator and Ticket Agent at Germantown, Philadelphia, to Miss Laura Dettra, eldest daughter of Mr. J. K. Dettra, of Souderton, Pa.

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."
BOOKS.

Descriptive Catalogue—90 pages—of Books relating to Applied Science, including Books on Electricity, Electric Light, Electric Signals, Burglar Alarms and Call Bells, Telephones, etc., sent free on application.
E. & F. N. SPON, 448 Broome Street, N. Y.

THE OPERATOR,

A JOURNAL OF

Telegraphic, Telephonic and Electrical Science, Literature, News and Progress
PUBLISHED SEMI-MONTHLY.

Subscription, including Postage, \$1 per annum, in advance To Foreign Countries in the Universal Postal Union, 25 cts. extra.

TWENTY PAGES EVERY ISSUE, carefully edited in every department. A large and carefully chosen editorial staff. Intelligent and lively correspondents.

AN ALBUM OF PROMINENT TELEGRAPHERS. As an organ of opinion, THE OPERATOR is FIRST, LAST AND ALL THE TIME FOR OPERATORS AND THEIR BEST INTERESTS. It circulates in every quarter of the globe, wherever the telegraph is worked.

"Such a paper is only possible among an intelligent staff of men, such as work the American lines."—Telegraph in America.

Bunnell Steel Lever Key

BY MAIL, POSTAGE PREPAID,

To any one sending us a club of

12 YEARLY SUBSCRIPTIONS

Scarf Pins and Bosom Pins, IN THE FORM OF Miniature Telephones.

These articles of jewelry are of the best Workmanship in Gold, and aside from their distinctive merits as Emblematic of the Telephone Profession they are Unique and Elegant Ornaments.



TELEPHONE PIN (full size).

The above cut shows the Miniature Telephone, full size, fitted as a Badge or Bosom Pin. The Scarf Pins are fitted with long straight pins instead of the short clasps pins. We are now ready to supply this fine jewelry at the following extremely low prices:

Telephone Badge or Bosom Pin	Solid Gold	Rolled Gold
Telephone Scarf Pin	\$5.00	\$2.00
	5.00	2.00

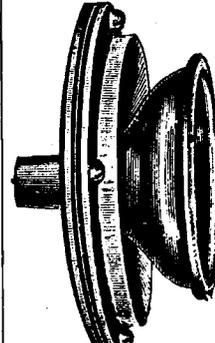
Sent by mail post-paid and registered on receipt of price. Address, W. J. Johnston, P. O. Box 333, No. 9th Street, Philadelphia, Pa.

"ELGIN" TELEPHONE

FOR PRIVATE LINES

(Patented Feb. 22, 1881)

Is Acknowledged the Best in Every Particular by Everybody.



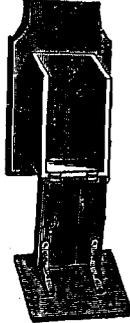
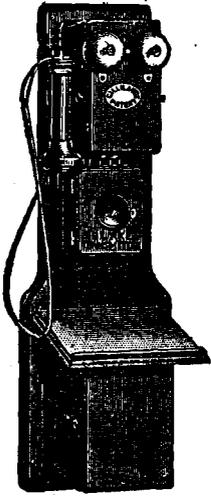
It is made WHOLLY OF METAL, Nickel-Plated and Highly Polished; an ornament to any room or office. It is self-adjusting, requiring no BRACKET or even a screw to hold it in place. It takes the place of the cheap wood and parchment affairs everywhere. Address with stamp for Illustrated Descriptive Circular and Prices.

ELGIN TELEPHONE CO.,
Elgin, Kane County, Ill.

GILLILAND ELECTRIC MANUFACTURING CO.,

E. T. GILLILAND, General Manager,

INDIANAPOLIS, Ind.

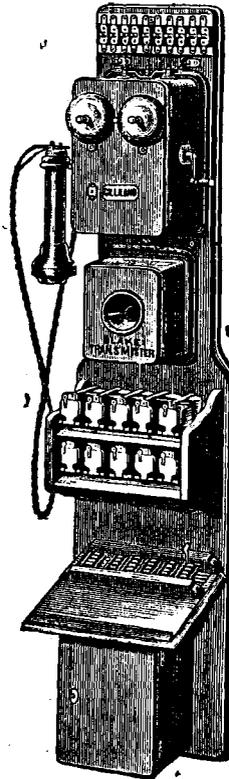


Our latest improved BATTERY BOX has a value of prime importance in that the battery is exposed to view and easy of access in the setting up and cleaning. We furnish the Battery Box on all orders.

STANDARD
Magneto Bell.
33,015 now in use.
2,830 shipped in July.

Over 1,200 of our Switch-boards in use in this country and in Europe

SAMPLES SENT ON APPLICATION TO AGENTS AND EXCHANGES.



TEN-LINE COMBINATION SWITCH BOARD.

10-LINE and 20-LINE SWITCH BOARDS,

For the club system of small towns and villages.

INVALUABLE FOR State and County Institutions, Hospitals, Factories, Depots, Offices, Stores, etc.

Being complete, compact and handsome our

COMBINATION SWITCH BOARDS are universally used; the demand is extraordinary and continuous, giving satisfaction in every particular.

50, 100-Line & Upward SWITCH BOARDS FOR EXCHANGES.

SUPPLIES OF ALL KINDS.

SEND FOR CATALOGUE AND PRICES.

J. H. LONGSTREET,

TELEGRAPH INSTRUMENTS,

Telephone and Telegraph Supplies

OF EVERY DESCRIPTION.

ANNUNCIATORS AND BURGLAR ALARM APPARATUS.

BATTERIES AND BATTERY MATERIAL.

WE ARE MAKING A SPECIALTY OF

TELEGRAPH INSTRUMENTS, for Railroad Use; BOX RELAYS, any required resistance, mahogany bases and boxes; POCKET RELAYS, hard rubber or morocco cases, the best for railroad-wrecking purposes.

KEYS, RELAYS, SOUNDERS, SWITCHES;

a large assortment in stock, and all orders for same promptly filled.

The Cheapest and Best form of Gravity Battery is our improved form of "CROWFOOT," 90c. per cell, with 3 lb. zinc and 6x8 jar.

MORSE KEY, GIANT SOUNDER AND 150 OHM RELAY, Magnets Wound with Silk Wire.

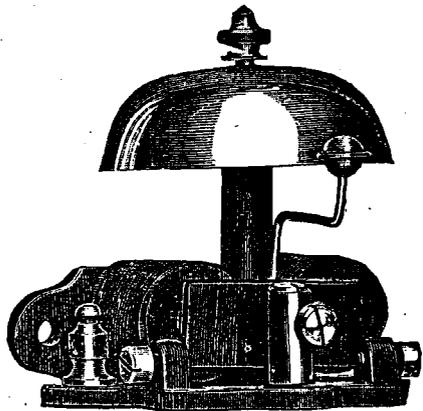
MOUNTED ON POLISHED MAHOGANY BASE, \$13 PER SET.

SEPARATE, \$12 PER SET.

Send for our 60-page Illustrated Catalogue. Our GOODS are the BEST IN QUALITY, and our DISCOUNTS THE LARGEST.

Manufactory and Salesrooms:

9 Barclay St., New York.



METROPOLITAN TELEPHONE BELL.

OUR IMPROVED

Metropolitan Telephone Electric Call.

These favorite signal bells are adapted by their peculiar construction for table and bracket use, and also for wall bells—2 1/4-inch gong, nickel-plated, 40 to 50 ohms resistance. They are made of the best of material, and finely finished on Japanese iron bases. Prices Reduced to \$2.25 each, or \$22 per dozen.

THE METROPOLITAN

Window Connection Lightning Arrester.

CHEAP, SIMPLE AND EFFECTIVE.

The attention of managers of Telephone Exchanges is specially invited to this article. They are INVALUABLE where many lines converge from a given point, the insulating substance being used also as an index for lines.

Price 7c. each, with Screws and Washers. Complete set for 100.

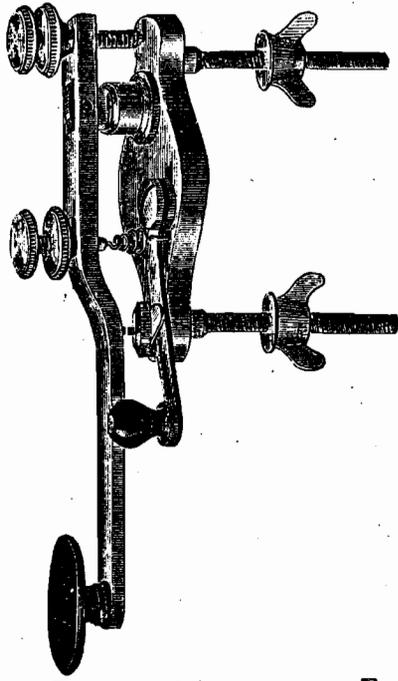
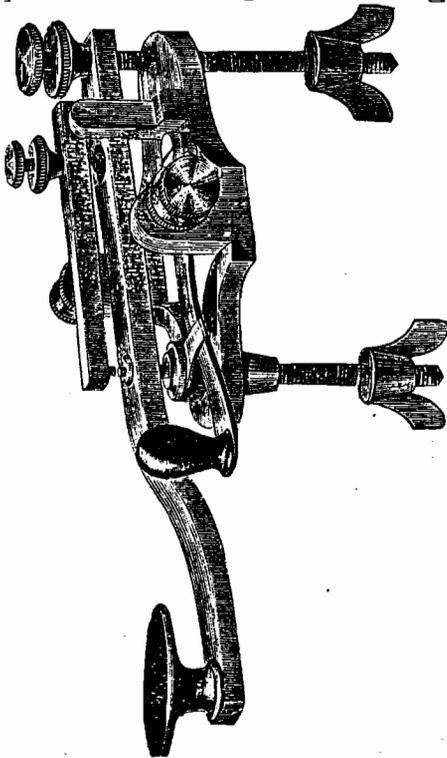
"OUR" SPECIALTIES.

Partrick & Carter,

114 South 2d Street, Phila., Pa.,

MANUFACTURERS AND DEALERS IN

Telegraph, Telephone and Electrical
Instruments and Supplies of
every description.



THE "LATIG" AUXILIARY LEVER NON-STICKING KEY.

PATENTED AUG. 16, 1881. PRICE \$5.00. BY MAIL.

This Key is very *fine finish*, nickel plated, and presents a beautiful appearance, is easy to handle and WARRANTED NEVER TO STICK. It has been extensively tried and has received the *endorsement of the best operators* in the country. It embodies the *only true principle to prevent a key from sticking*, by having a great separation between the anvil and hammer (without increasing the play of the key lever), thereby preventing the formation of the "Electrical Arc" between the platina points, which is the *PRIMARY cause of sticking keys*. We claim this key will never fail to make contact.

Send for Catalogues and Circulars.

"THE EXCELSIOR KEY."

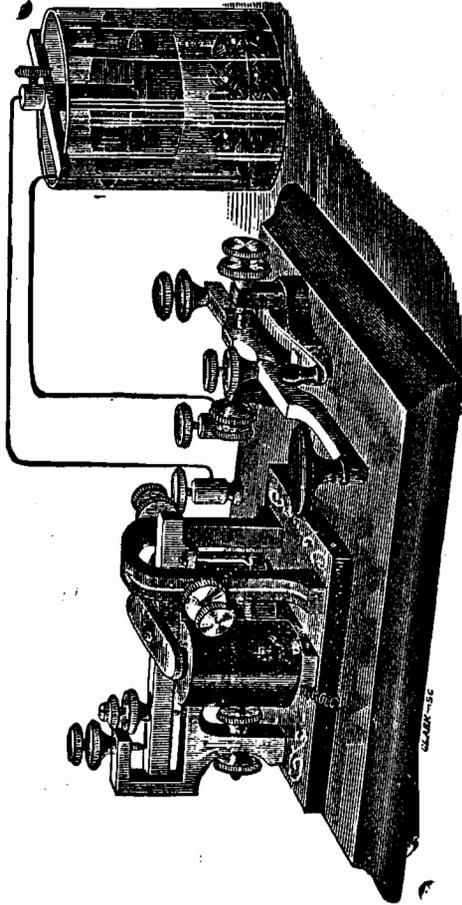
PATENT APPLIED FOR. PRICE \$2.50. BY MAIL.

This Key is made ENTIRELY OF BRASS, nickel plated, with hardened platina points, and it is put forward to meet the long existing demand for a CHEAP, LIGHT, EASY WORKING, FIRST-CLASS KEY, and is without doubt the CHEAPEST and BEST KEY EVER OFFERED FOR THE MONEY.

The Premium Learners' Apparatus and Outfit comprises the famous "NEW GIANT SOUNDER PERFECTED," and the "NEW CURVED KEY," placed upon a polished walnut base, with a cell of Callaud Battery, Chemicals, Office Wire and an excellent Book of Instruction, for \$5.00, when the money accompanies the order.

These instruments are the exact style, size and form of the Instruments upon which we received the highest award at the Centennial Exhibition over all competitors. There is nothing whatsoever in miniature or half made up. Everything perfectly strong and reliable, and so guaranteed, or money refunded. Our Book of Instruction, which accompanies the Instrument, contains full and explicit instructions as to the manner of setting up the Battery, running of wires, etc.

The Premium Instruments can be used upon a line from a few feet to ten miles in length. We have sold thousands and they have received the unqualified endorsement of all who have ever used them, and are pronounced the perfection of Learners' Instruments.



Prices for Premium Learners' Apparatus

Complete outfit, money in advance,	\$5.00
Instrument, without Battery, money in advance,	4.20
Instrument, without Battery, money in advance, wound with finer wires for lines of 1 to 15 miles,	5.00
Cell of Battery, complete, money in advance,	.80
Insulators, Porcelain, with Screws, money in advance,	.05
No. 14 Gal. Iron Wire, per mile, money in advance	10.00
Extra Zincs for Battery, each,	.25
" Coppers "	.15
" Hangers "	.10
" Jars "	.35
Small Office Wire, per foot,	1/4c.

Instruments only, without Battery, sent by mail, 55 cents extra. Remit by P. O. Money Order, Draft, Registered Letter or Express. No goods sent C. O. D. No discount from above prices, except in quantities of half-dozen sets.

Only \$5.00. Premium Learners' Apparatus. Only \$5.00.

NOT THE CHEAPEST, BUT GUARANTEED THE BEST.

TELEGRAPH, TELEPHONE AND ELECTRICAL SUPPLIES,

Send for our Price Lists Before Purchasing Elsewhere.

No. 114 South Second Street, Philadelphia, Pa.

WESTERN ELECTRIC MANUFACTURING CO.

CHICAGO AND NEW YORK.

Telegraph and Telephone Apparatus and Supplies.

THE BEST OF EVERYTHING AT BOTTOM PRICES.

10-232 KINZIE STREET, CHICAGO.

62-68 NEW CHURCH STREET, NEW YORK.

THE DEAF **HEAR**

BY THE USE OF

Peck's Patented Artificial Ear Drums.

Not observed in use, and comfortable to the ear. Cushioned, ventilated and harmless, and perform the office of the natural drums. The only perfected and patented Ear Drums. Also patented in Europe and Canada. Send for Treatise on the Ear, mailed free.

DR. J. P. PECK, Proprietor,
No. 115 Nassau Street, New York.

JOHN A. ROEBLING'S SONS CO., TRENTON, N. J.

And No. 117 Liberty st., New York,
Manufacturers of

GALVANIZED TELEGRAPH WIRE

OF ALL QUALITIES.

- No. 6 Wire in 1/4-mile bundles, 550 pounds per mile.
- No. 7 Wire in 1/4-mile bundles, 470 pounds per mile.
- No. 8 Wire in 1/4-mile bundles, 388 pounds per mile.
- No. 9 Wire in 1/4-mile bundles, 330 pounds per mile.
- No. 10 Wire in 1/4-mile bundles, 288 pounds per mile.
- No. 11 Wire in 1/4-mile bundles, 216 pounds per mile.
- No. 12 Wire in 1/4-mile bundles, 188 pounds per mile.
- No. 14 Wire in 1-mile bundles, 98 pounds per mile.

This Wire possesses the highest electrical conductivity, which is necessary to make Telegraph and Telephone Lines work with certainty and ease.

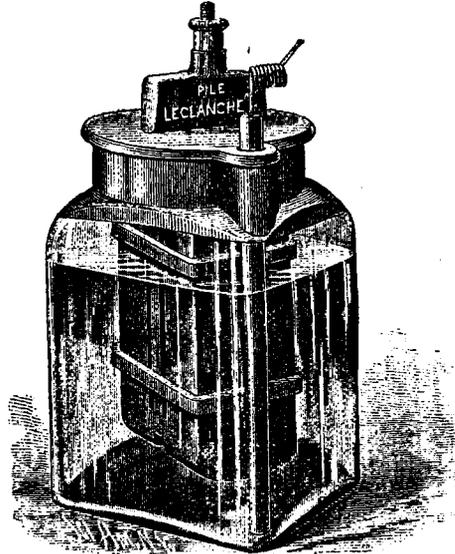
Special attention given to

Telephone Wire,

for which No. 12 is the average size used.

Leclanche Battery.

(PATENTED.)



"Prism Battery" Complete.

-THE-

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.,

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 in the atmosphere.

It will endure long-continued heat below two hundred degs. Fahrenheit, while for short intervals it may be subjected to from two hundred and fifty to three hundred degs.; 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,

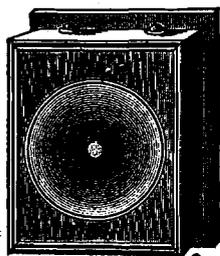
120 Broadway, New York

ANY INFORMATION REGARDING ONE EDWARD McKELVEY, telegraph operator—last heard of in St. Louis, Mo., during 1876—thankfully received by his father, JAS. McKELVEY, Norwood, Ontario, Canada.

BALDWIN, HOPKINS & PEYTON, PATENT ATTORNEYS, WASHINGTON, D. C. Established 1859. Local References Furnished. Patent solicitation and litigation exclusively, in all its branches. Electricity a specialty.

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.

HENRY LINDENMEYR, PAPER WAREHOUSE, Nos. 15 & 17 Beekman St., New York. ALL KINDS OF PAPER MADE TO ORDER.



HOLCOMB'S NEW Amplifying Telephones, FOR PRIVATE LINES. The latest and best. Patented April 26, 1881. These new instruments embody recent and important improvements. They transmit conversation. They transmit music, orders, etc., with almost electric speed and surprising fidelity. The only durable and reliable substitute for the Electric Telephones. Work 2 miles. Price, \$10 per set. See OPERATOR, page 216, June 1, 1881. Illustrated Circulars FREE.

HOLCOMB & CO., Mallet Creek, O.

[Mention THE OPERATOR.]

SECOND-HAND MORSE REGISTERS.

We have on hand a lot of best makes, which have been overhauled and polished. They are as good as new, and we will sell them very cheap.

DAVIS & WATTS, BALTIMORE, MD.

MUTUAL DISTRICT TELEGRAPH CO.

EXECUTIVE OFFICES, 29 MURRAY STREET, NEW YORK.

Offices are being fitted up in various portions of the city for the purpose of furnishing

MESSANGER, POLICE and FIRE SERVICE. NO RENT WILL BE CHARGED FOR CALL BOXES.

The patronage of the public is respectfully solicited.

H. W. POPE, Vice-President and General Manager.

BEST TELEPHONE EXCHANGE SWITCH BOARD IN THE WORLD.

SUPERSEDING ALL OTHERS. Sample and Circular sent to Exchanges on application.

C. E. JONES & BRO., Cincinnati, O.



LITTLE GIANT FRENCH BATTERY RELIEVES RHEUMATISM AND ALL NERVOUS COMPLAINTS. Supersedes all others. Send for circular.

SHORTHAND. TAKIGRAPHY,

The Standard System, successfully taught by mail. A Complete System in a "nut-shell." Send five cents and stamp for copy.

E. W. FARNHAM, General Western Agent, 72 Monroe Street, Chicago.

COMPLETE SETS OF MACHINERY

FOR THE MANUFACTURE OF

Telegraph Cables.

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

THOMAS BARRACLOUGH, 8 KING STREET,

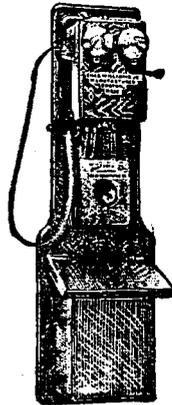
Manchester, - - England. CHARLES WILLIAMS, JR.,

(ESTABLISHED IN 1856.)

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.

THE BISHOP Gutta-Percha Works

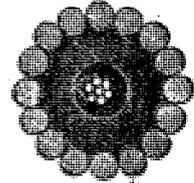
(SAMUEL BOARDMAN, AGENT),

Original and only Manufacturers in the United States of

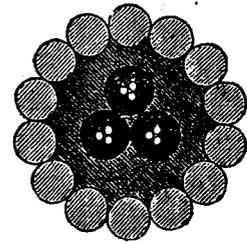
GUTTA-PERCHA INSULATED

Telegraphic Wires and Cables

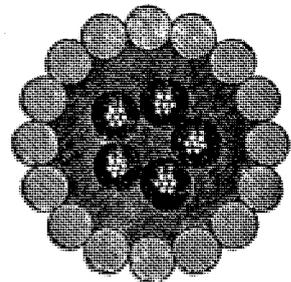
OF EVERY DESCRIPTION.



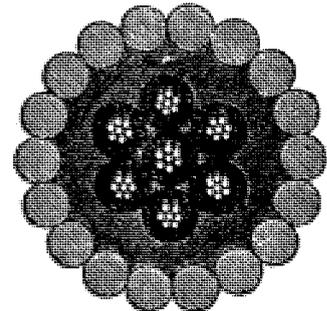
SUBTERRANEAN TELEGRAPH CABLES, SUBMARINE TELEGRAPH CABLES,



LEAD-COVERED CABLES, AERIAL TELEGRAPH CABLES,



TELEPHONE (LEAD-COVERED) CABLES, TORPEDO CABLES.



Agents for Reception of Orders and Sale of Goods: L. G. TILLOTSON & CO., 5 and 7 Dey street, New York. WILLIAM HEATON, 503 Chestnut street, Philadelphia. Address all Communications to W. W. MARKS, Superintendent, 420, 422, 424 and 426 East 25th street, New York. OFFICE AT THE WORKS.

A \$40 Twenty-Six Shot Sporting Rifle for \$15



AN EXTRAORDINARY BARGAIN. THE EVANS TWENTY-SIX SHOT MAGAZINE SPORTING RIFLE.

SHOOTS 26 SHOTS IN 60 SECONDS WITHOUT REMOVING FROM THE SHOULDER.

No hammer in the way. Throwing down the guard EXPOSES LOADS AND COCKS. THE EVANS is without exception the most accurate, longest ranged, easiest loaded, quickest fired, best constructed, simplest and most perfect breech-loading Rifle in the World. The new model and latest improved EVANS MAGAZINE SPORTING RIFLE is exactly as represented in above cut. It is .44 Calibre, centre fire, 26 & 30 inch barrel, engraved black walnut stock, and sighted with graduated sights up to 1200 yards, at which distance it is more accurate than any Rifle in the world. The magazine which is located in the stock as shown in Cut Number 2, contains 26 shots, or more than double the number of any other Repeating Rifle in the world. The working parts are ALL STEEL of the finest quality, case hardened and blued and the New Patent Locking Device makes it POSITELY SAFE TO CARRY when loaded. THE EVANS is a great favorite with Sportsmen on account of the rapidity with which it can be fired, as well as for its accuracy at any distance from 100 to 1200 yards. Owing to the failure of the Evans Rifle Co. we were enabled to purchase their entire stock of \$50,000 worth of perfect Rifles for less than one-third the cost of new manufacture, and as these beautiful and expensive Rifles cannot be made cheap enough to compete with cheaper Rifles they will not be made again. This will be your last chance to secure one at the low Price of \$15 and we pledge our business reputation that they cost to manufacture double what we ask for them.

UNTIL FURTHER NOTICE we will send one new model Rifle as above described carefully boxed for only \$15 and when cash accompanies the order, will send a box of reloadable Metallic Cartridges and samples of the new phoenix 3 ball cartridge, a great invention in ammunition with which three balls can be shot inside a 12-inch ring at 200 yards. SEND MONEY by P. O. order or Registered Letter at our risk, or we will send the Rifle C. O. D. (collect on delivery) with privilege of examination before paying, upon receipt of \$2.00 or your express agent's written guarantee that the Rifle will be returned free if you do not take it, but we do not send the Cartridges C. O. D. as this is an extra inducement to those who send Cash With Order. **WHAT IS SAID OF THE EVANS!** UNSOLICITED TESTIMONIALS! "The Evans has been my constant companion for two years. I have shot 60 Buffaloes at one run, and penises from between my wife's fingers, at 40 paces."—**KIT Kerson, Jr.** "The Evans is simply immense. I am proud of it."—**Joseph Arnold, Vice-president First Nat. Bank, Lockport, N.Y.** "I have used the Evans in competition with the Sharp, Winchester, and Ballard, it beats them all."—**J. Frank Locke, Burnamsville, Minn.** "It shoots like a house a fire! I can clean out a whole band of Indians alone with it. I shall recommend them wherever I go."—**Texas Jack.** "It is the Strongest Shooting Gun I ever put to my shoulder, and as for accuracy it can't be beat. I know it to be the best Rifle in the market."—**A. Boyd of York Sharpshooters' Co.** guarantee every Rifle. Perfect in every respect.

THE EVANS SADDLE RIFLE, similar to the above, except a trifle lighter and 22 inch barrel, price \$14, including swivels and straps. THE EVANS can be used as a single shot breech-loader and the magazine held in reserve if desired. Price of reloading tools for reloading shells, \$4.00, former price \$6.00. Evans cartridges can be reloaded many times. **ORDER NOW**, even if you have no use for a Rifle for some time to come you will never get another such bargain and you can readily sell it for \$30 to 40, and we hereby agree if the rifle is not exactly as represented to refund the money in every instance and pay you \$5.00 for your trouble. **SPECIAL OFFER**—Any one getting up a Club and sending us \$50 will receive 50 new rifles. We refer to any Bank, Mercantile Agency, Express Company, or Newspaper Publisher in this City. ADDRESS **E. C. RIDEOUT & CO., 10 Barclay St. N. Y.**

LOCUST PINS.

We have in stock several thousand 1 1/4 inch locust pins, best quality; all sound and exact as to size; they are in the end much cheaper than oak.

DAVIS & WATTS,
BALTIMORE, MD.

THE EUROPEAN Telephonic Signal Association

are now prepared to receive orders for their

INDIVIDUAL BELL ATTACHMENT,

and solicit the correspondence of Exchanges in relation thereto. We offer a Simple, Compact and Easily-Attached Apparatus, which individualizes the call with Absolute Certainty.

FRED. S. POTTER, Trustee,
New Bedford, Mass.

ZEITSCHRIFT FUR ANGEWANDTE ELECTRISITATSLEHRE.

Editor: **F. UPPENBORN,**
Weinstr 5, Hanover (Germany).

This periodical, which appears semi-monthly, contains the latest developments in

Electrical Science, Telegraphy, Telephony, Electric Light and Electro-Metallurgy,

with particular reference to the progress in electricity made in the

GERMAN EMPIRE.

It is well-illustrated by first-class Lithographs and Engravings, and brings abstracts or lists of all English and German patents.

Subscription Price, M. 20 Yearly (\$5).

Volumes 1879 and 1880 now ready, at M. 24 for both

The Blanchard Foods.

FOODS FOR THE BLOOD, BRAIN AND NERVES

TRADE MARK
(Concentrated and Artificially Digested.)
A SURE NATURAL REMEDY
For all forms of **DYSPEPTIC, WASTING**
and **CHRONIC DISEASE.**

Prescribed by thousands of eminent physicians.

FREE FROM DRUGS.

THESE ARE LIQUID FOODS, PREPARED DIRECTLY FROM **Wheat, Beef, Milk.**

Dr. Blanchard's "Lectures and Essays" on Food, Price 25 cents. ALL DRUGGISTS.
Address **THE BLANCHARD M'FG CO., 27 UNION SQUARE, N. Y.**

DR. BLANCHARD CONSULTED FREE, IF POSTAGE IS PREPAID.

The Tonic Extract of Wheat improves weak digestion, cures sleeplessness, nervousness, constipation, loss of appetite and power. Especially adapted to repair brain waste from study, care or grief. Prevents and cures Bright's disease, diabetes, uterine weaknesses, rheumatism, neuralgia and all malarial diseases. Strengthens to overcome evil habits. Adapted for table use. \$1 each, or six bottles for \$5.

The Fibrin and Wheat restores the confirmed dyspeptic stomach and cures all forms of long standing nervous debility. Vitalizes weakly children and energizes old age. Sure preventive and cure for diphtheria, infantile diarrhoea and cholera infantum. \$2 each, or six bottles for \$10.

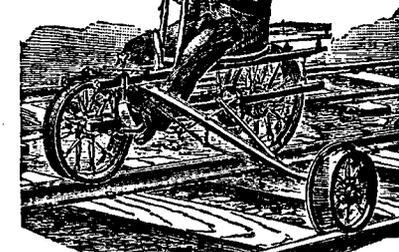
The Beef and Milk is for a very weak condition, and never fails to assimilate, however weak and irritable the stomach. Invaluable for nursing mothers. \$2 each, or six bottles for \$10.

The Life Food is to be taken between meals to relieve sense of "goneness." Never failing remedy for the alcohol, opium and tobacco habit, and for insanity and cancer in their early stages. \$1.50 each, or 6 bottles for \$7.50

THE ONLY ONE-MAN CAR MADE.

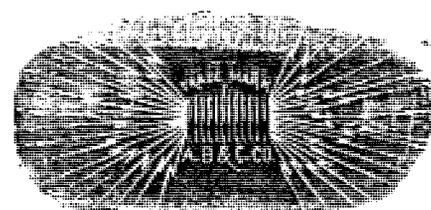
The Patent.
Velocipede
Hand Car.

Used on more than 150 Railroads.
Large Numbers Exported.



Runs Easily, is Durable, and Capable of High Speed. Circulars and endorsements of prominent railroads sent on application.

GEO. S. SHEFFIELD & CO.,
Sole Manufacturers.



PURE ELECTRIC WIRE.

MANUFACTURED BY THE
Ansonia Brass and Copper Co.,
For Magnets, Telegraphs, Telephones, etc., Insulated on the Bare Wire with **H. Spittendorfs Patented Liquid Insulation**, covered with cotton or silk.
All sizes of **BARE AND COVERED WIRE** in stock. The Conductivity of every bundle tested and warranted.

THE ANSONIA WROUGHT GONGS for Clocks, Indicators, Telephones, Call-Bells, Bell-Punches, Steamboat and Railroad use—burnished or nickel-plated.

HAVE YOU RECEIVED
ONE OF
J. H. BUNNELL & CO.'S
NEW, LARGE,
ILLUSTRATED CATALOGUES?

If not, send your address by postal card or letter and you will get one by next mail.

IT CONTAINS Illustrations, Descriptions and the
BOTTOM PRICES
of all things Telegraphic, including all of the very latest and best designs of

TELEGRAPH INSTRUMENTS

of every description, together with all Telegraph and Telephone

LINE MATERIALS,

Tools and Supplies.

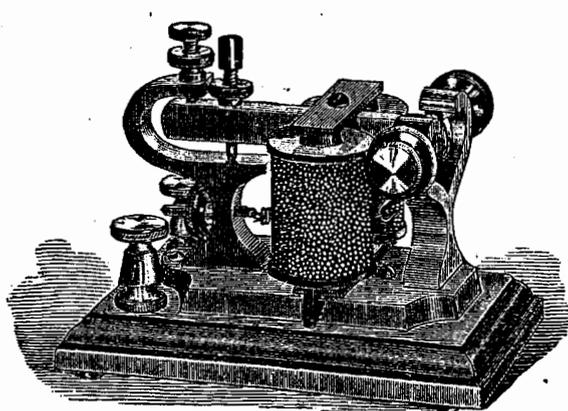
We are thoroughly practical in every department, and our manufactures and selections will be found fully suitable to meet all needs of the most improved

MODERN TELEGRAPH SERVICE.

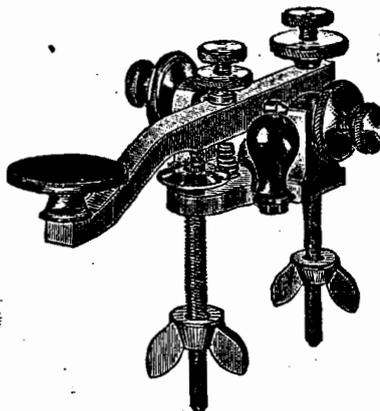
J. H. BUNNELL & CO.,

112 Liberty Street, New York.

THE O. K. SOUNDER AND KEY.



O. K. SOUNDER, PRICE, C. O. D., subject to inspection \$4.



O. K. KEY, PRICE \$2.50.

These instruments are FULL SIZE, made ENTIRELY OF SOLID WHITE METAL, FINELY FINISHED, and are STRONGER, HARDER AND BETTER than brass; look equally as well as Nickel Plated, wear alike clear through and do not tarnish. The key knobs are rubber and the contact joints pure platinum. Sent C. O. D., with privilege to examine before paying charges.

Or I will send the COMPLETE O. K. OUTFIT, C. O. D., with privilege of examination, for \$7.00.

The outfit consists of 1 KEY, 1 SOUNDER, 1 FULL SIZED CELL, CALL AUD BATTERY, 1 ROLL OFFICE WIRE, 1 LB. BLUE VITRIOL, 1 DOUBLE CONNECTOR, 1 BOOK OF INSTRUCTIONS.

To those who want a low priced outfit, I will send my

FAMOUS NO. 2 SHERIDAN, full office outfit, for \$4.25.

Any of my goods sent C. O. D., with privilege to examine, if you send a guarantee from your express agent that the goods are as represented you will pay for them.

SEND STAMP FOR ILLUSTRATED CATALOGUE, GIVING FULL DESCRIPTION AND PARTICULARS OF ALL KINDS OF TELEGRAPH INSTRUMENTS AND SUPPLIES.

A. B. LYMAN,

**36 SOUTH WATER STREET,
CLEVELAND, O.**

DAVIS & WATTS,

BALTIMORE, MD.,

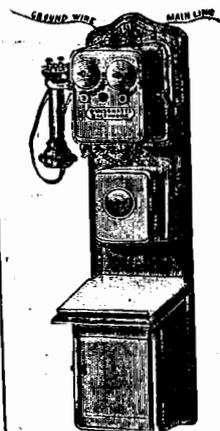
AUTHORIZED MANUFACTURERS
TO

AMERICAN BELL
TELEPHONE COMPANY,

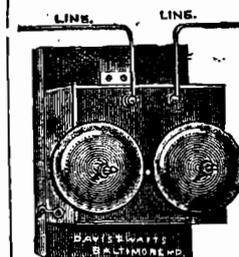
Wholesale and Retail Dealers
and Manufacturers of
all kinds of

Electrical Apparatus and Supplies.

Correspondence solicited. We gladly furnish estimates on lines of any length, and material in any quantity.



We make our MAGNETO BELLS of unexcelled power and durability, either with frictional or tooth gearing. One of each was started in our factory in the middle of April. They have been running ever since at the rate of 240,000 armature revolutions per day of 10 hours without being touched except to oil, and are as strong as ever. Our new automatic shunt is the only perfect one made; cannot possibly fail. We are always glad to send samples.



AUXILIARY
MAGNETO BELL.

This is useful for placing in kitchen, engine-room, etc., to call attention to the signals where the office is, for the time, left vacant. It is placed directly with the main line, and provided with lightning arrester and cut-out.



Owing to changing our Telephone system from Battery to Magneto, we have a large lot of our handsome nickel-plated bells, which we have put on new bases, removing all telephone connection, and will clear out at much less than cost of manufacture. They are wound to 20 ohms, with best silk-covered wire. Gongs are 3 1/2 in. diameter and very loud, working parts incased in nickeled covers—which you like, either vibrator or single stroke.

THE BEST TELEGRAPH INSTRUCTION BOOK.

SMITH'S MANUAL OF TELEGRAPHY

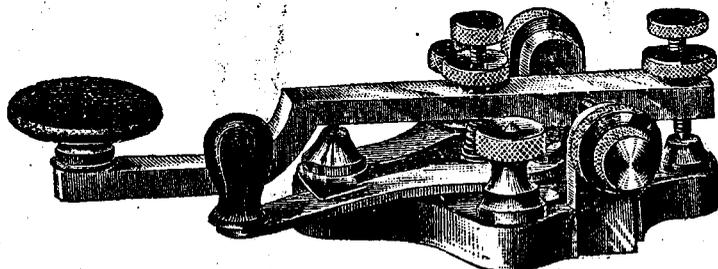
NEW AND REVISED EDITION JUST ISSUED BY

L. G. TILLOTSON & CO.,

PUBLISHERS AND SOLE PROPRIETORS.

In addition to the instructions for learning to Telegraph the Book Contains over ONE HUNDRED ILLUSTRATED PAGES of all of the latest and best Telegraph Instruments, Batteries and Supplies in use Sixteenth Edition. ONE HUNDREDTH THOUSAND. Copy sent to any address, post-paid, on receipt of THIRTY CENTS, or ten three-cent postage stamps.

NEW LEGLESS KEY.



PRICE \$4.00.

The most perfect and beautiful legless key yet offered to Telegraphers is represented in the above cut. This key combines the advantages of the best made keys with the convenience of top-connection. It is without question the neatest and most satisfactory legless key in the market.

Sent post-paid by mail on receipt of price.

L. G. TILLOTSON & CO.,

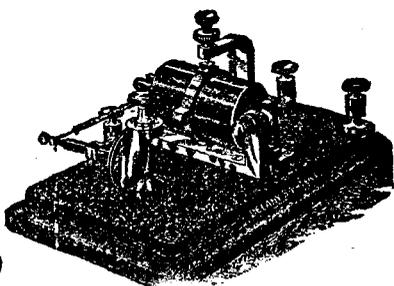
MANUFACTURERS AND DEALERS IN

Telegraph and Telephone Machinery and Supplies and Electrical Apparatus

OF EVERY DESCRIPTION,

NOS. 5 AND 7 DEY STREET, NEW YORK.

THE DELANY RELAY AND SOUNDER.

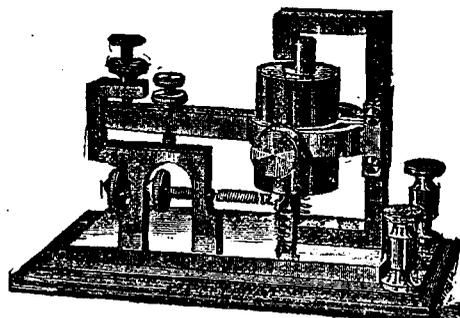


RELAY.

The above cuts illustrate the Delany Patent Telegraph Relay and Sounder, now being manufactured and tested with a view to their general introduction on all Telegraph Lines liable to be affected by the Page Patent. These instruments are in all respects superior to any now in use.

Railroad companies and others desiring instruments for trial should apply to

THE DELANY PATENT RELAY COMPANY,
61 BROADWAY, NEW YORK



SOUNDER.

Eminent Electricians and Practical Telegraphists
Throughout the World Acknowledge

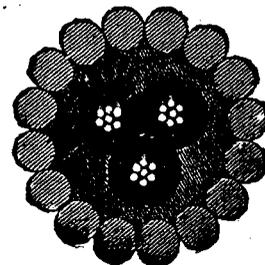
GUTTA-PERCHA

to be the Cheapest and only PERFECT and RELIABLE

INSULATION FOR

Telegraphic Wires and Cables

OF EVERY DESCRIPTION.



THE BISHOP Gutta-Percha Works

(SAMUEL BOARDMAN, AGENT),

Original and only Manufacturers in the United States of

GUTTA-PERCHA INSULATED

SUBMARINE TELEGRAPH CABLES

50 Regular Sizes—One to Ten Conductors.

SUBTERRANEAN TELEGRAPH CABLES

Hempen-Armored Covered.

AERIAL TELEGRAPH CABLES,

Lead or Hempen Covered.

ANTI-INDUCTION

TELEPHONE (LEAD-COVERED) CABLES

as used by the Metropolitan Telephone and Telegraph Company.

TORPEDO CABLES,

Recommended by the European and South American Governments.

LEAD-COVERED CABLES,

For Canal and Streamlet Crossings.

GUTTA-PERCHA

OFFICE WIRE, FUSE, LEADING AND CONNECTING WIRE,

for Subaqueous, Mining and all other Electrical purposes.

MARKS' COMPOUND INSULATED WIRE,

For Office, Outdoor, Underground and Battery Use.

G. P. OFFICE WIRE, COTTON-COVERED.

ALSO HAVE ALWAYS ON HAND

WIRES OF EVERY VARIETY OF INSULATION, Magnet Wire, Telephone Flexible Cords, Flexible Elevator Cables, Electric Cordage,

BURGLAR-ALARM AND ANNUNCIATOR WIRE, Electric Light Wire, Cordage and Cables, Lead-Covered Wire, and Every Description of

PURE GUTTA-PERCHA GOODS;

Gutta-Percha Sheet, for Cable Splices; G. P. Chemical Vessels, for Acid, etc.

Agents for Reception of Orders and Sale of Goods:

L. G. TILLOTSON & CO., 5 and 7 Dey street, New York.

WILLIAM HEATON, 503 Chestnut street, Philadelphia.

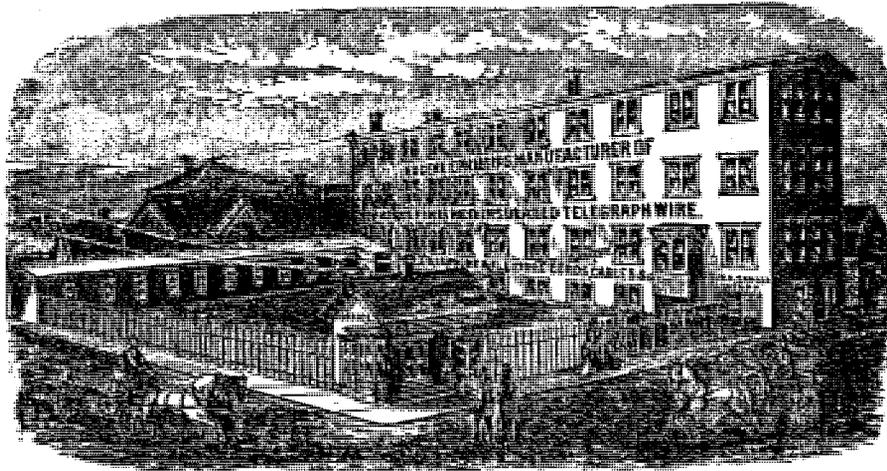
Address all Communications to

W. W. MARKS, Superintendent,

420, 422, 424 and 426 East 25th street, New York.

OFFICE AT THE WORKS.

EUGENE F. PHILLIPS, PROVIDENCE, R. I.



MANUFACTURER OF PATENT FINISHED

Insulated Telegraph Wire

TELEPHONE AND ELECTRIC CORDAGE.

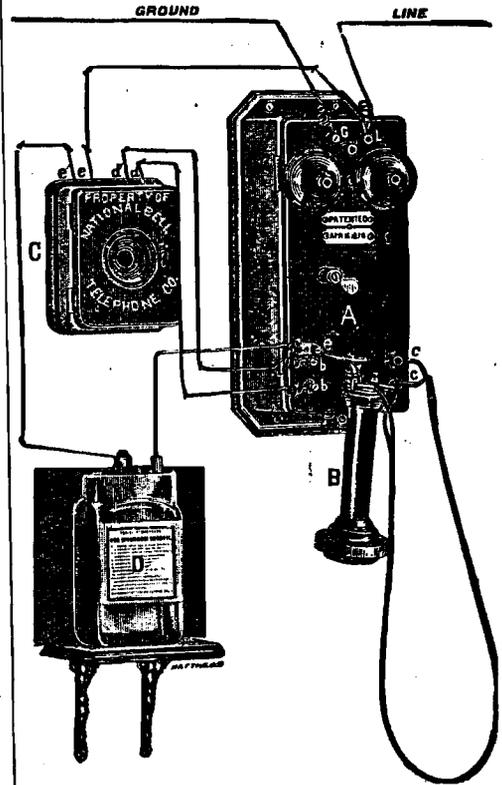
MAGNET WIRE,

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

W. H. SAWYER, Electrician and Superintendent.

The American Bell Telephone Company.

W. 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.

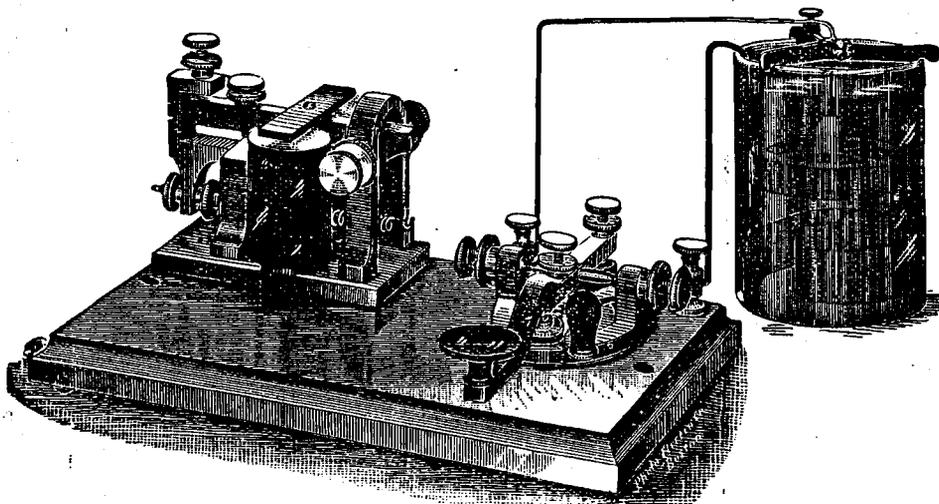
This Company will arrange for telephone lines between cities and towns where Exchange systems already exist, in order to afford facilities for personal communication between subscribers or customers of such systems.

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.

JEROME REDDING & CO.'S LEARNERS' INSTRUMENT.



PRICE FOR THE COMPLETE "GEM" LEARNERS' OUTFIT, \$4.20.

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

Price for Complete Outfit.....	\$4.20	Price for Instrument alone, by mail, post-paid.....	\$4.00
" Instrument alone.....	3.40	" Instrument alone, for lines 1 to 15 miles ...	4.00
" the whole outfit (except Glass Jar) with Key and Sounder separate, by mail, post-paid.....	4.80	Price for Instrument alone, for lines 1 to 15 miles, by mail, post-paid.....	4.50

SEND FOR CIRCULAR.

JEROME REDDING & CO.,

Manufacturers of Telegraph and Electrical Supplies,
No. 30 Hanover Street, Boston, Mass.

A. D. HARBER, Jr., President.
F. W. H. SHEFFIELD, Sec. and Treas.

A. H. PALMER, Gen. Supt.
CHARLES A. ROLFE, Supt. Sales.

THE UTICA FIRE ALARM TELEGRAPH COMPANY,

MANUFACTURERS OF

Fire Alarm Telegraph

AND ALL KINDS OF

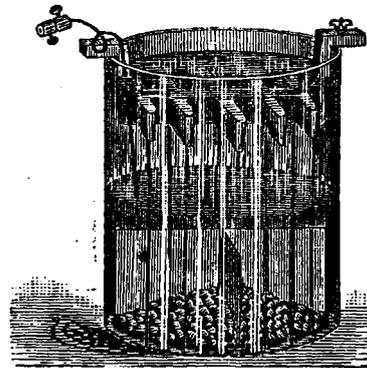
TELEGRAPH INSTRUMENTS,

AND GENERAL DEALERS IN

Telegraph and Telephone Supplies.

Agents for the Central Electric Gas-Lighting and Extinguishing Co.

SPECIALTIES OWNED AND CONTROLLED BY US.—The only Electro-Mechanical Non-Interference Fire Alarm Telegraph Signal Box. The only Electro-Mechanical Balanced Hammer Tower Bell Striker. The only Electro-Mechanical Anti-Adjustment Gravity Armature Gong Strikers.



Authorities of towns, either contemplating the introduction of a complete System of Fire Alarm Telegraph, or an extension of their old ones, should not fail to examine our recent improvements in Fire Alarm Telegraph Instruments, including our improved Pony and Medium Plain Signal Boxes. Our

ELECTRO-MECHANICAL NON-INTERFERENCE SIGNAL BOX,

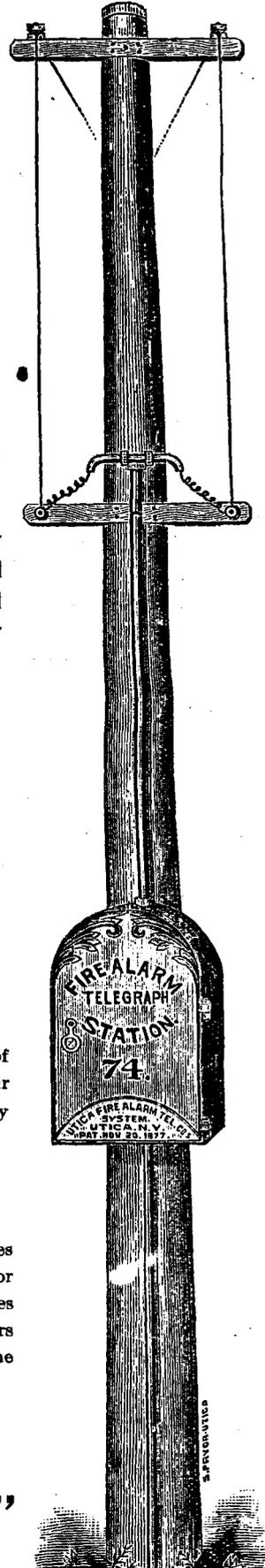
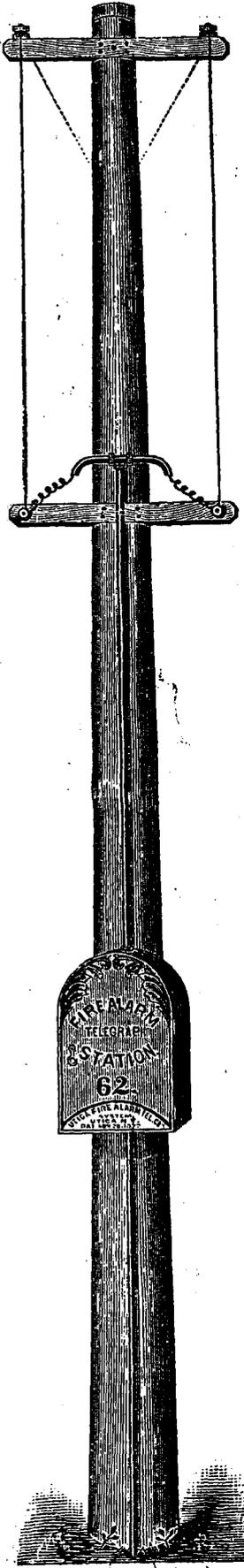
which was invented by us, was patented by us and is controlled by us. It simplifies non-interference, and thereby makes it practical. Electro-Mechanical Gong Strikers for Engine Houses and Engineers' use; Electro-Mechanical Tower Bell Strikers for all sizes of bells—the only Balanced Hammer Tower Bell Striker in existence; Automatic Repeaters for any Number of Circuits; Switch Boards, Galvanometers and all materials for the equipment of Fire Alarm and other Telegraph Systems.

ADDRESS,

UTICA FIRE ALARM TELEGRAPH CO.,

Manufactory, 106 and 108 Liberty Street,

UTICA, N. Y.



TELEGRAPH AND TELEPHONE DEPARTMENT POST & COMPANY.

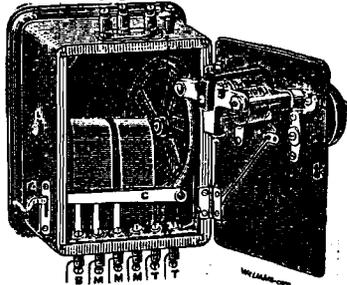
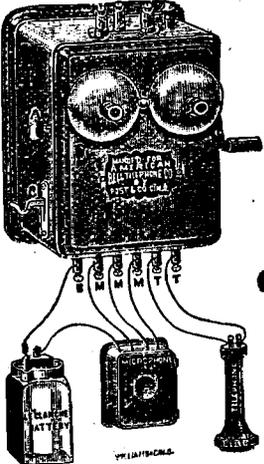
LICENSED MANUFACTURERS OF AMERICAN BELL TELEPHONE CO.

Manufacturers of all kinds of Telegraph, Telephone and Electric Light Supplies

NEW NO. 2 MAGNETO BELL.

BELL CLOSED.
L G L

BELL OPEN.
L G L



POST & CO'S

New No. 2 Magneto Bell.

CINCINNATI, Aug. 1, 1881.

We have just perfected our New No. 2 Automatic Magneto Bell (as per cuts), and are now ready to furnish same to Exchanges and Agents of the American Bell Telephone Co. We guarantee same to ring over 10 miles of wire. We have given great attention to the construction of these bells and they will be found just the bells for short lines of all kinds—will gladly send out one bell or a case of 6 on approbation, to be returned if not satisfactory.

We call especial attention to our new switch-boards as being simple and substantial, NO CORDS TO GET OUT OF ORDER. We make them from 6 lines each up to any size wanted. Send for cuts of same. Our new battery boxes open down the front, so as to get at battery easy. We make them two sizes, for each size well, also very fine ones for parlors and fine offices. Samples of our bells, etc., sent on application. Agents for Roebing's line wire. A full line of OFFICE WIRE, BRACKETS, INSULATORS, etc., on hand at all times at VERY LOWEST prices. Send for catalogue and prices.

Standard No. 1 Magneto Bell, 20,000 in use.

CINCINNATI, Aug. 1, 1881.

Below we give a few important changes we have just made in our Standard Magneto Bells, making them the strongest and best Bells made. All of these important points fully covered by Letters Patent.

1st. Our Horse Shoe Magnets, large and small, are made to lift six times their weight; none are passed unless this result is obtained. This strength is secured by means ONLY KNOWN TO US.

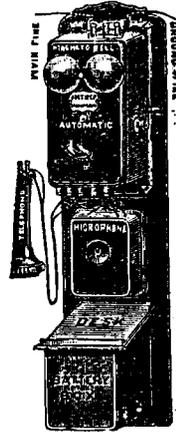
2d. The cylinders of our engine are metallic and enclosed so as to prevent escapes of any kind, and also prevent dust from accumulating on the armature, which in a very short space of time would wear out and destroy the GENERATING POWER of the ENGINE. Other makers NECESSARILY leave the sides open.

3d. Our switch is so constructed that it prevents lightning in ANY FORM from ENTERING THE MICROPHONE, by cutting out the primary and secondary coils entirely—a feature that no other box now manufactured has, and fully covered by our letters patent.

4th. We make the Automatic Hook Bell to use with the PONY CROWN TELEPHONE. NO EXTRA CHARGE. No posts on front. Connection made at top and bottom of Bells.

5th. All Bells tested to not less than 12,000 ohms resistance.

6th. We have so arranged the RINGER, GENERATOR, and FRAME work of our Bells that they can be easily adjusted without disturbing the wires in any manner or moving the base-board or bell.



7th. Test of Standard Magneto Bells at Exposition, Oct. 1, 1880.

Williams Magneto Bells rang through 11,800 ohms resistance, equal to say 370 miles No. 12 wire.

Post & Co.'s Magneto Bells rang through 10,775 ohms resistance, equal to say 625 miles No. 12 wire.

The record of this test is taken from Report of the Jurors in Class 77 on Electrical Instruments, and NEEDS NO COMMENT, as it shows our Bells have nearly double the strength of the others. The Gilliland Bell did not come in, although APPLICATION had been filed to enter same for competition. The jury awarded our Bell the HIGHEST PREMIUM—A SILVER MEDAL. Respectfully,
POST & COMPANY.

POST & COMPANY, CINCINNATI, O.

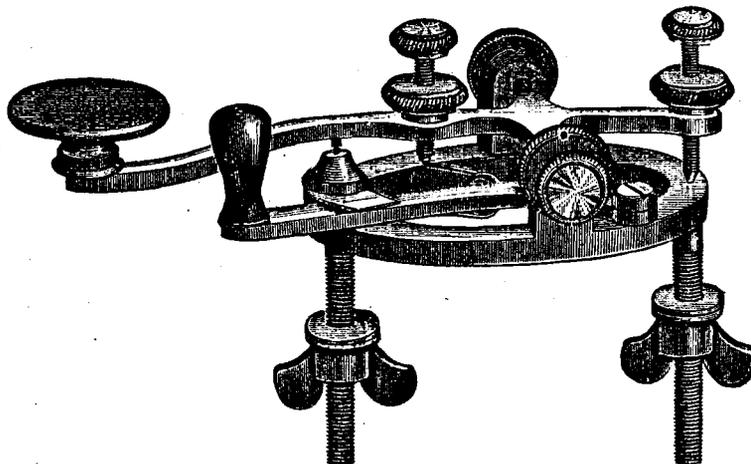
J. H. BUNNELL & CO'S NEW STEEL LEVER SOLID TRUNNION KEY

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.

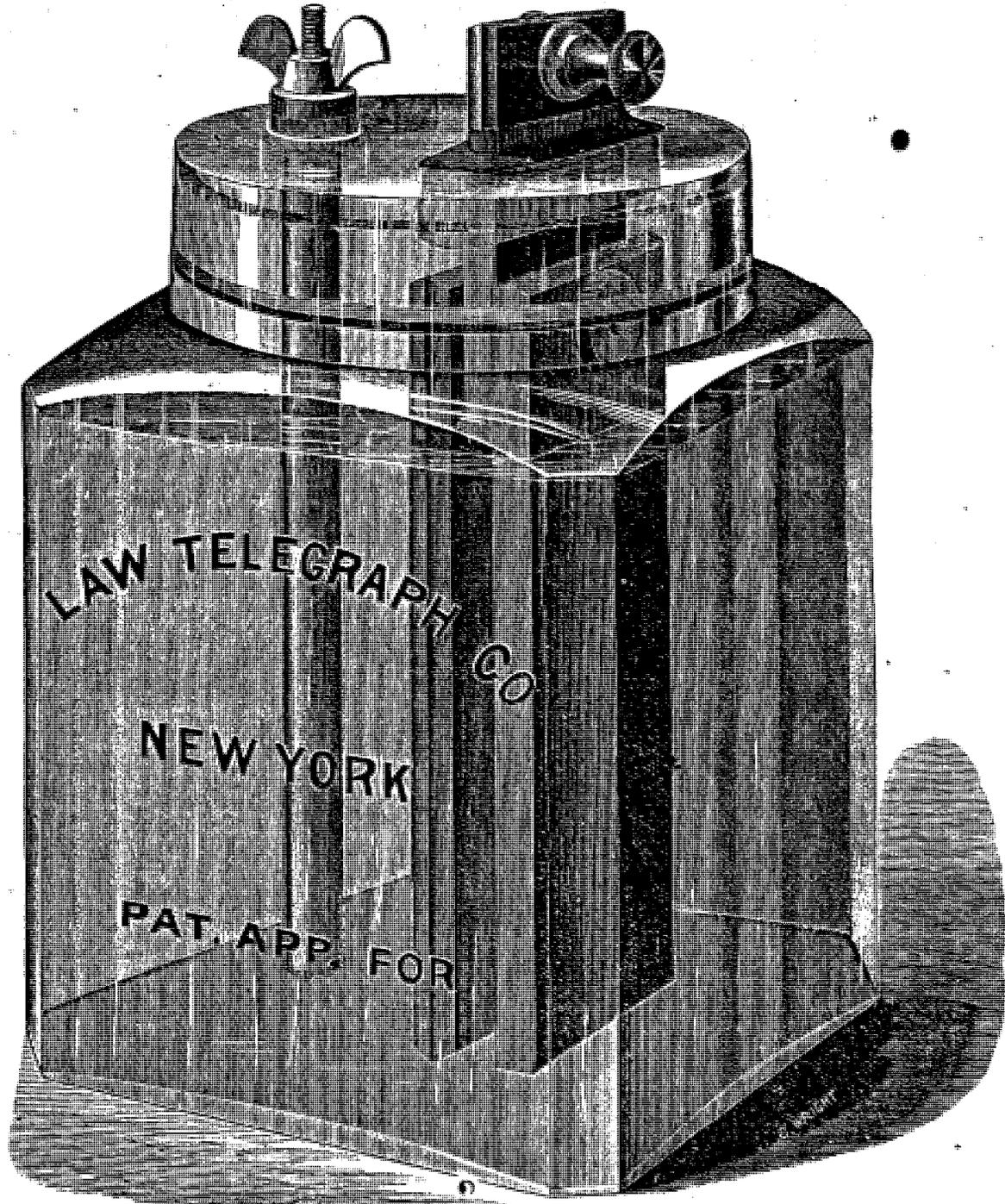
PRICE, \$3.00. FINELY FINISHED, AND LEVER NICKEL-PLATED.

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 mail.

THE
CELEBRATED "LAW" BATTERY,
For Telephone Transmitters.

No Expensive "Prism" to Renew.



No Hidden Corroding Connection.

FOR SALE BY

LAW TELEGRAPH COMPANY, New York.
 WESTERN ELECTRIC M'F'G CO., New York and Chicago.
 GILLILAND ELECTRIC M'F'G CO., Indianapolis.