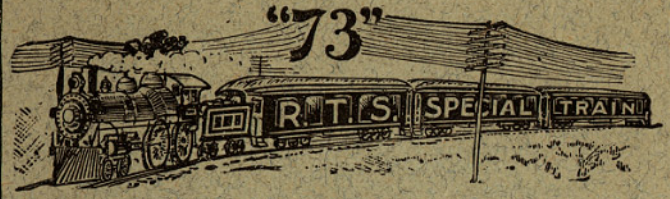
TWENTIETH EDITION.



TRADE MARK

ABRIDGED CATALOGUE
AND
MANUAL
OF
TELEGRAPHY
WITH
DESCRIPTION OF INSTRUMENTS
ADAPTED FOR USE IN
LEARNING THE ART OF OPERATING

J. H. BUNNELL & CO.
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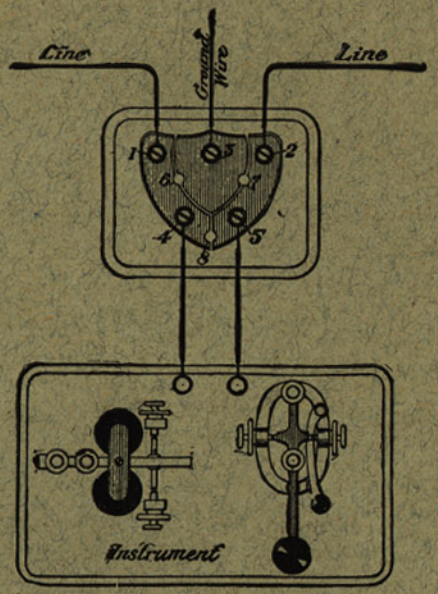
UNION LIGHTNING ARRESTER CONNECTIONS.



The cut shows arrangement of Switch and Instrument at an "Intermediate Station." Line to 1 and 2; Ground Wire to 3 and Instrument Wires to 4 and 5.

Placing peg in 6 or 7 cuts off or grounds the corresponding side of line; peg in 8 cuts out instrument.

TERMINAL STATION WITHOUT BATTERY.

Instrument Wires to 4 and 5. Line Wire to 1. Ground Wire to both 2 and 3.

TERMINAL STATION WITH BATTERY.

Line to 1. One pole of the battery to 2; other pole of battery to 3; ground wire also to 3. The pole of battery connected to 3 must be the reverse of pole connected to line at distant end.

Explanation of the Telegraph.

The telegraph consists in a combination of four things, namely:

A battery, which produces a current of electricity.

A line wire, which conducts that current from one point to another.

A transmitting key.

An electro-magnetic apparatus, which gives out in sounds or sounding strokes all the signals which are made by pulsations of that current from a distant point.

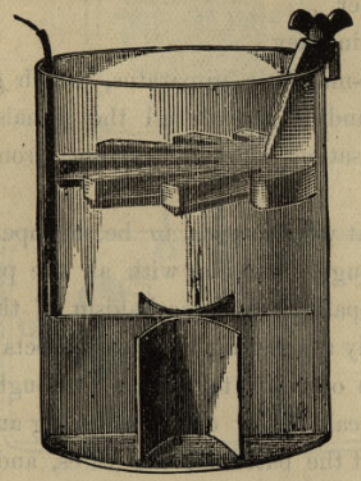
The student who intends to be an operator should become thoroughly familiar with all the practical features of the apparatus and mechanism of the telegraph.

It is not only a great aid to the prospects of advancement for the operator to have a thorough knowledge of the electrical theory of telegraphing and to understand all about the batteries, the wires, and the instruments, but this is for him an opening page to that great book of wonders, Electrical Science, which is now attracting the attention and the enterprise of the civilized world.

The Battery.—As the Battery is the first essential part of a Telegraphic apparatus, the study will properly begin here.

It is by the chemical action in the battery that the electric current is first generated, and in practical Telegraphy this current is made to traverse long or short distances through the conducting medium of metallic wires, and by means of the proper instruments, which are herein described, made to give out tangible

signals which, being arranged in the form of an alphabet, enables us to read or to speak instantaneously through great distances, for the electric current requires but a small fraction of a second's time to travel many hundreds of miles through the wires.



Gravity Battery, Size 5x6, Price, 65c. per cell.

The above cut represents a single cell of Battery of the kind now most generally used for telegraphic purposes throughout the United States. It consists of three parts, namely: The Jar, the Zinc, and the Copper.

The jar is of glass, and is about five inches diameter and seven inches deep.

The "Zinc" is shaped as shown in the cut and is provided with a brass connecting screw at the top of the arm—the arm serves as a means of supporting the Zinc in proper position.

The connecting screw is used to bind or "connect" a copper wine to the Zinc—which is called the "*Negative*" or "Zinc pole" of the battery.

In the bottom of the jar two leaves or strips of sheet copper are joined together, as shown in the cut, and having fastened to them an insulated conducting wire, which, passing out at the upper part of the jar, constitutes what is called the copper or positive pole of the battery.

When the battery is charged for operation if the wire projecting upward from the copper be connected with the zinc by binding the bared end of the wire under the screw in the arm of the zinc, a current of electricity will constantly flow through the wire from copper to zinc, and will cease to flow the moment the wire be disconnected. If the wire from the copper be extended to a mile in length, and its end connected in the same manner with the zinc, the current will flow through its entire length and come back to the zinc, just as surely as though the distance were but a few inches, and will instantaneously cease to flow the moment the wire is disconnected or broken at any point in its entire length.

Where powerful currents are required, additional cells are added by connecting either the copper or zinc pole of the first cell to the opposite pole of the next, and so on; so that in a series of fifteen or twenty cells, if the unconnected pole of the cell at one end was copper that pole would constitute the copper pole of the entire battery, and the unconnected zinc at the other end would be the zinc pole of the entire battery. By

connecting the end of a wire of any length to the zinc or copper pole of such a battery, and its opposite end to the remaining pole, a much more powerful current would pass through the wire than if the Battery consisted of but one cell.

Telegraph companies on their long lines use Batteries of from twenty to a hundred cells each.

Conductors and Insulation.

Mention is made of the use of wire as the medium of conducting currents of electricity from one pole of a battery to any given point, and thence back to the opposite pole, making the "circuit," as it is called, complete. Certain substances are found to conduct electricity with more or less facility, and these substances are called conductors, while through other matter no currents whatever will pass. The latter class of substances are called non-conductors or insulating bodies.

In Telegraphy the principal materials used as conductors are copper, iron, brass and platina, For insulation, gutta-percha, hard and soft rubber, glass, silk and cotton fibre, dry wood, bone and ivory.

Iron in the shape of wire is usually employed as an outside conductor on account of its durability, cheapness and strength, although it is not as perfect a conductor as copper, which latter is generally used for all wires inside of buildings and offices.

In conducting currents of electricity from one point to another, as in Telegraphy, it is found necessary to use non-conductors wherever the wire is fastened for

support, in order to prevent escape of the current at these numerous points. For this purpose, glass is principally used for outside wires. The glass "insulator" is placed on a wooden pin or "bracket" which is fastened to the pole or building on which the wire is to be supported, after which the wire is strung, and tied to the glass with a short piece of iron "tie wire." Inside of offices, hard and soft rubber tubes are used where the wires pass through the windows, and the copper conducting wires are usually covered with a coating of gutta-percha, or wrapped with a continuous covering of cotton or silk. The latter is principally used as a covering for the wires inside the finer instruments. For the handles or knobs to the various instruments which require manipulation, hard rubber is generally used.

The Earth as a Conductor.

It is found that when one pole of a battery is connected with the earth, and the wire from the opposite pole carried to a point at any distance away, and also connected with the earth, the current will flow as readily as though the "circuit" had been made complete by the use of a return wire. It is therefore shown that the earth is practically one vast conductor. This is principally due to the fact that moisture is everywhere present beneath the surface of the earth, and water itself is known to be a very fair conductor.

Telegraph companies make great practical use of earth conduction by using it in all cases for their numerous lines, both long and short, thus saving the

construction of a separate or return wire on every circuit.

Magnets and Keys.

A careful reading of the foregoing will have enabled the student to understand how currents of electricity are generated and made to travel through space. The next feature of the study will be the mechanism employed to make these currents transmit signals.

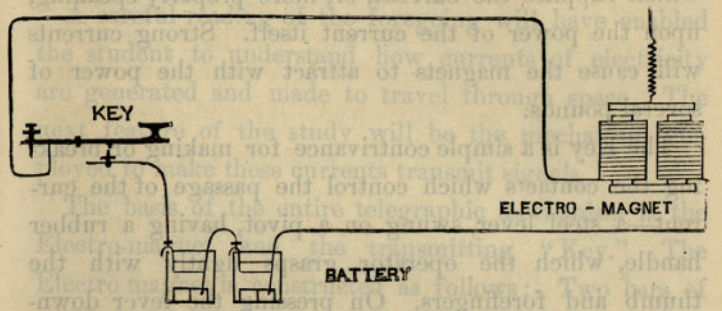
The basis of the entire telegraphic mechanism is the Electro-magnet and the transmitting "Key." The Electro-magnet is constructed as follows: Two bars of soft iron, having round heads of hard rubber, thus making spools of each, are joined together by means of a short flat bar of iron similarly soft. The round bars in the spool of the magnet are called cores, the flat connecting bar at the back is called the "back bar" or "heel piece." The movable flat piece of iron in front which is to be attracted by magnetism to the cores, or withdrawn by the spring when no magnetism excites the cores, is called the Armature.

A silk or cotton-covered wire is wound in continuous turns about the cores, until the diameter of about an inch and a half is attained, and each core or spool of the magnet contains a great number of turns of the wire around it. Now, if a current of electricity be sent through this wire, it will, by its passing through the numerous turns, cause the iron cores within to become magnetic and to possess the power of attracting with considerable force any piece of iron brought near to their ends. The cores being made of soft iron, will lose

their magnetism and cease to exert any attractive power the moment the current ceases to flow. The actual power of the attractive force thus exerted is directly dependent upon the power of the battery which supplies the current, or, more properly speaking, upon the power of the current itself. Strong currents will cause the magnets to attract with the power of several pounds.

The Key is a simple contrivance for making or breaking the contacts which control the passage of the current—a steel lever, swung on a pivot, having a rubber handle, which the operator grasps lightly with the thumb and forefingers. On pressing the lever downward, a platina point projecting under the lever is brought into contact with another platina point set into an insulation of rubber in the base of the key, so that there can be no electrical connection between them unless the key is pressed down, or "closed," as it is termed. A conducting wire being separated at any point, and one of its ends connected with the lever or base of the key, and the other end with the metal set into the rubber insulation, would convey the current while the key was closed, and cease to do so the moment it was opened. Platina is used at the points where the electrical contacts are made and broken, because it does not readily fuse or tarnish. An extra lever at the side of the key is called the "circuit-closer," and is used as a means of keeping the circuit closed when the hand of the operator is not on the key. When the circuit-closer is pushed into its closed position, it makes contact with a brass lip, which latter is fastened to the

rubber along with the lower platina point. This, then has the same effect as though the key was pressed downward and contact made at the points.



The above cut represents a magnet with its armature suspended from a spring, and connected with it by a wire, a battery, and a key. From what has now been explained, it may be seen that when the key is closed a current from the battery will pass through the wire and magnet, and cause the latter to attract the armature, overcoming the resistance of the spring, and that the instant the key is opened the current will cease to flow, the magnet cease to attract, and the spring will instantly draw the armature back to its original position. In this way the armature is made to follow exactly the movements of the key, no matter at what distance they may be placed from each other, although in practice it is found that as the circuits are lengthened, more battery power and more delicate instruments are required than on short lines.

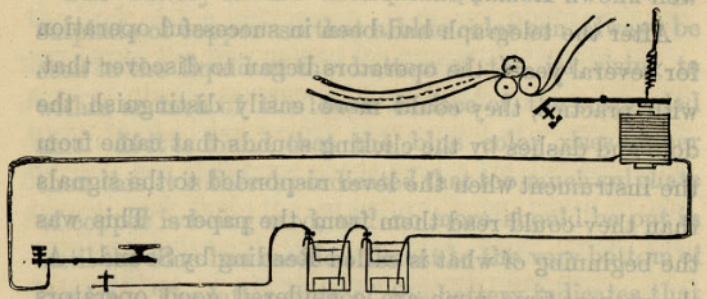
The whole basis of the telegraph system is this duplication at one point, by the magnet and its armature, of the

motions made on the key by the hand of the operator, at another separate and distant point.

During the first years of telegraphy, the Morse Register was the only means employed to put into tangible form the signals transmitted over the wires.

In order to give the clearest possible idea of the operation of a Register, by which it records these signals, reference is made to the next paragraph, containing an outline diagram of the main working parts of the instrument, and an accompanying explanation.

Morse Alphabet and Register.



The armature of the magnet is attached to a lever, and this lever, which swings on a pivot in the middle, is provided at the end with a pointed pin or screw, which is caused to press upwards against a strip of paper whenever the magnet attracts, and to return to its former position when the attraction ceases. Meanwhile the paper is kept moving steadily forward, so that if the lever-pin is pressed against the paper, for only an instant of time, a short mark or *dot* appears pressed or embossed into the paper. If for a longer time, the mark would be proportionately longer, or a *dash*. If

alternately, the marks would come consecutively, and have *spaces* between them. As the Morse Alphabet consists entirely of dots, dashes, spaces, and extra long dashes, the letters and numerals are easily made with these marks and their combinations. So that as the hand of the operator, on the key at a distant point, makes short or long strokes, dots or dashes, or spaces, these same marks appear on the paper as it comes from the Register, and being based on the formation given by the Morse Alphabet, are as easily understood by the receiving operator as though they appeared in the well-known Roman characters.

After the telegraph had been in successful operation for several years, the operators began to discover that, with practice, they could more easily distinguish the dots and dashes by the clicking sounds that came from the instrument when the lever responded to the signals than they could read them from the paper. This was the beginning of what is called Reading by Sound. At the present time none are considered good operators who cannot read by sound, and there are comparatively few Registers in use in the United States.

To Set Up the Instrument and Battery for Practice.

First—Put the battery in operation according to the following directions:

Fill the jar about two-thirds full of water, place the copper in the bottom of the jar in such a way that the eaves of the copper are spread out like an X with the copper wire extending upwards and out of the jar.

Next drop carefully into the bottom of the jar about ½ lb. of blue vitriol and 2 oz. sulphate of zinc.

Then hang the zinc in the jar as shown in the cut, and the battery is ready for operation, although it will not work at its best power until it has been in use for about three days.

To hasten its full action, connect the copper with the zinc by fastening the wire into the clamp screw of the zinc, and leave it so for about twelve or fifteen hours. This is called putting the battery on a "short circuit."

The battery should be kept supplied with enough sulphate of copper so that a blue color can always be seen in the liquid at the bottom of the jar, rising to within an inch of the lower surface of the suspended zinc. If it is found that the blue color rises higher than this, it is thereby indicated that too much sulphate of copper is being used, and no more should be put in until the blue has receded almost to the very bottom of the jar. The latter state of the battery indicates that more sulphate of copper is required. Water should be from time to time added to that in the jar, to replace the loss by evaporation.

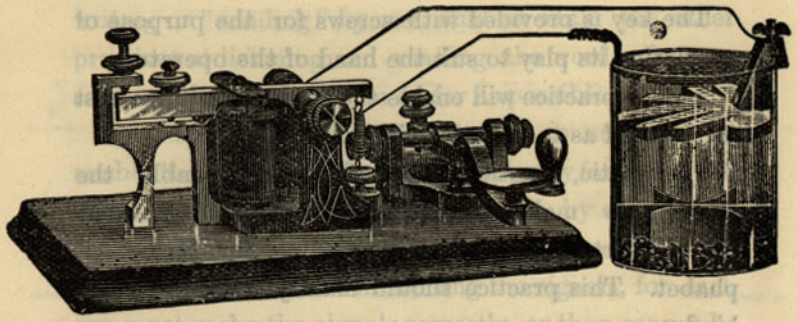
As long as the battery continues in action there is an increase of the quantity of sulphate of zinc in solution in the upper part of the jar. A hydrometer is convenient for the purpose of testing the strength of this solution. When the specific gravity is less than fifteen degrees, the sulphate of zinc solution should be strengthened; when it is thirty degrees, or more, a portion of the top of the liquid should be drawn

off with a syringe or cup, and replaced with fresh water.

Once in eight weeks or three months it will be necessary to thoroughly clean the battery. Take out the zinc carefully, and clean it by scraping with a knife and washing; pour the liquid into a separate jar, leaving behind the oxide and dirt which may have gathered on the bottom of the jar. Now take out the copper and clean it, throw the sediment away, and clean the jar. Pour the clean liquid back into the jar again, replace the copper and zinc, add water enough to cover the zinc, and put in a few crystals of sulphate of copper. The battery will again be ready for use.

In joining together any number of cells, whether of the same or of different kinds of battery, the positive pole of the first cell must be connected with the negative pole of the second cell; the positive of the second with the negative of the third, and so on throughout the whole series. It matters not which pole you commence with, if you are only careful never to connect like poles. This law must be as strictly observed in joining batteries hundreds of miles apart as if they stood side by side.

No battery should be permitted to freeze, for while frozen the current is very much impaired or altogether suspended. A battery while warm works more vigorously, as heat is a promoter of chemical action. The connections must be kept free from rust or dirt, in order to allow the current to pass through them freely.



Having set up the battery according to the preceding directions, connect one wire from the copper pole of the battery to one of the brass binding-posts at the back of the instrument, as shown above, and one wire from the zinc pole to the remaining binding-post; screw down the instrument firmly to the table with the screw in the base, as its best sound is thereby produced. See that none of the screws are loose in their places, and that the armature lever, which is the speaking tongue of the Telegraph, plays freely, with a movement of about one-sixteenth of an inch. The spring, which draws the armature lever upwards, and is called the *adjustment*, should only be set at sufficient tension to raise the lever when no current is passing through the magnets. If drawn too tightly, the spring will not allow the armature to respond to the attractions of the magnets. When the instrument is not in use, leave the circuit-closer of the key open about half the time. This will keep the battery well at work. See that the platina points of the key are kept clean from dirt or dust, thus preventing imperfect contacts from being made.

The key is provided with screws for the purpose of regulating its play to suit the hand of the operator.

A little practice will enable the student to judge best for himself as to how this should be set.

Systematic, continual practice will enable the student to make surprising progress in mastering the art of sending and reading the Morse Alphabet. This practice should mainly consist of three kinds.

I. Morse writing with the Key and without a companion.

II. Combined Morse writing and reading with a companion student.

III. Practice in both Morse writing and reading of messages, social conversation, printed matter, and the Exercises, where the two or more persons practicing are in separate rooms, or at a distance from each other in separate houses, and entirely dependent upon the wire and instruments for their communication with each other.

Regarding the first named, a great amount of single practice should at all times be kept up, as it brings that thorough and unhesitating familiarity with the Morse signals which is necessary before any one can become a telegraph operator. This familiarity with the Morse signals becomes, when fully acquired, as easy as the exercise of speech. An operator does not have to *think* before making a Morse letter on the key any more than he or she does before speaking a word in the English language.

The second step of practice consists in alternate key

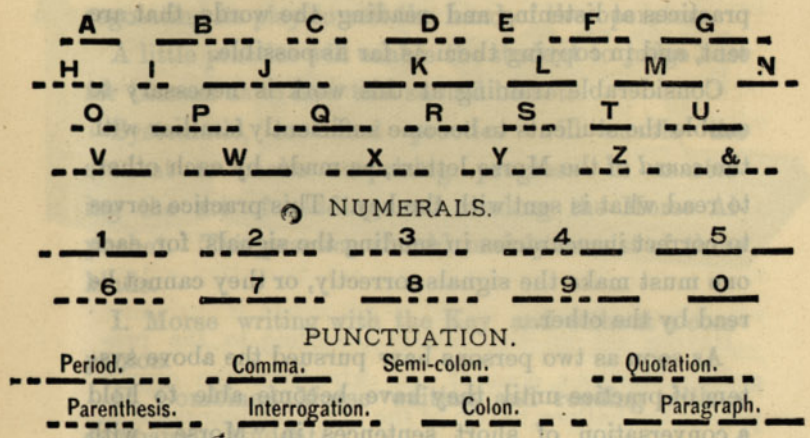
writing or "sending" by one student while the other practices at listening and reading the words that are sent, and in copying them as far as possible.

Considerable training at this work is necessary to enable the students to become sufficiently familiar with the *sound* of the Morse letters, as made by each other, to read what is sent with the key. This practice serves to correct inaccuracies in sending the signals, for each one must make the signals correctly, or they cannot be read by the other.

As soon as two persons have pursued the above system of practice until they have become able to hold a conversation of short sentences in "Morse" with each other, they should begin the separated practice, which is the last and most interesting step in learning telegraphy, and in preparation for the duties of an operator. Set up the instruments in separate rooms, connect them with each other by wire, as explained elsewhere in this book, and practice at sending and receiving messages, printed matter, and conversation, copying everything as it is received.

Wherever it is possible, the student should secure an opportunity to finish his or her practice in a telegraph office. A few weeks of such practice will familiarize the student with the everyday work of a telegraph line, give excellent opportunity to practice at reading by sound in copying the constantly passing messages, and will thoroughly prepare the applicant for a situation as an operator.

THE MORSE TELEGRAPH ALPHABET.



The Morse alphabet consists of what are called dots, dashes and spaces. Combinations of these make intelligible signals. Many of the characters will be found to be the reverse of others: such as A is the reverse of N; B of V; D of U; C of R; Q of X; Z of &; so if the formation of one of each of these letters be obtained, its reverse is easily mastered. C, E, H, I, O, P, R, S, Z, Y, are merely represented by dots and spaces, and, if due regard be given to time, they will be found very easy to commit to memory.

The first step is to memorize the alphabet, so that each character can be called to mind at will; thus, A, dot and dash; B, dash and three dots; C, two dots, space, dot, etc. The period is the only punctuation mark in frequent use, and the student need not learn the others at first.

A dot (E) is made by a single instantaneous, downward stroke of the key. A short dash (T) is made by holding the key down as long as it takes to make three dots. A long dash (L or cipher) is made by holding down as long as required to make five dots. A cipher is prolonged so as to occupy about the time required for seven dots.

The intervals between dots or dashes in the same letter are called breaks. A space in letters should occupy the time required for a dot and break. The space between letters should occupy the time required for two dots and breaks.

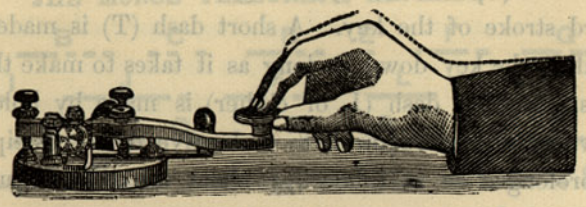
The space between words should occupy the time required for three dots and breaks.

In letters that do not contain spaces, the dots and dashes should follow each other as closely as possible.

The beginner should be careful to form and space his letters correctly, as this will lead to a perfect style in sending.

Position and Movement.

It should be remembered that there is no change in the tone of a sounder, the letter being determined solely by the "time or times" the lever is up or down. The back stroke, so called, is as necessary to reading by sound as the down stroke, and these must be distinguished each from the other; for, without it, the duration of the downward movement could not be determined.



Place the first finger on the top of key button, with the thumb under the edge; and the second finger on the opposite side. Curve the first and second fingers so as to form the quarter section of a circle. Partially close the third and fourth fingers. Allow the wrist to be perfectly limber. Rest the arm on the table at or near the elbow.

Let the grasp upon the key be firm, but not rigid. Never allow the fingers or thumb to leave the key, nor the elbow to leave the table. Avoid too much force, or too light touch, and strive for a medium firm closing of the key.

The motion to be imparted is directly up and down, avoiding all side pressure.

The movement is made principally at the wrist, although the finger and hand must be perfectly elastic.

The fingers, wrist and arm, should move uniformly in the same direction.

The downward movement produces the dots and dashes, and the upward, the breaks and spaces.

Commence the use of the key by making dots in succession at the rate of two every second, and increase the speed five-fold as skill is acquired. Continue to practice dots until 360 per minute can be made with perfect clearness and regularity.

When dots can be readily made as directed, begin with dashes at the rate of two in every three seconds and gradually increase until 120 per minute can be made with perfect regularity.

Next attempt the long dash at the rate of one every second, and increase to ninety per minute.

When perfection is attained, take up the fcllowing exercises in order.

Repeat each exercise until every letter can be made at will correctly.

DOT LETTERS.

E	I	S	H	P	6
.	..	...	....	.....	.....

DOT AND SPACE LETTERS.

Take pains to make spaces uniform, and in the proper place.

O	C	R	Y	Z	&
. .	.. .	. ..	.. ..	.. . .	. ...

DASH LETTERS.

Be careful to proportion short and long dashes accurately.

T	L	M	5	0
—	——	— —	— — —	———

DOTS, WITH DASH, IN SUCCESSION.

Avoid leaving any space between them.

A	U	V	4
.—	..—	...—	....—

DASH, WITH DOTS, IN SUCCESSION.

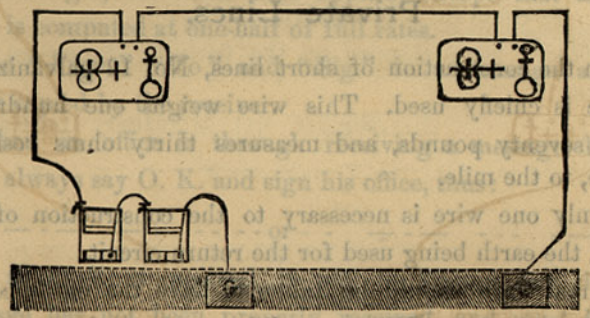
D	B	8
—..	—...	—....

times impossible to make a good ground connection, and in such cases we recommend a metallic circuit, as being more economical than the large battery which would be required to overcome the excessive resistance.

The resistance in the instruments on the line should be proportioned to its length. The rule is to make the resistance in the instruments equal that of the line and battery. Instruments for use on a short circuit are made with five ohms resistance, but for long lines should be proportioned to its length.

In ordering instrument give the length of line and the number of instruments to be used on it.

To Connect Two Instruments with a Short Line.



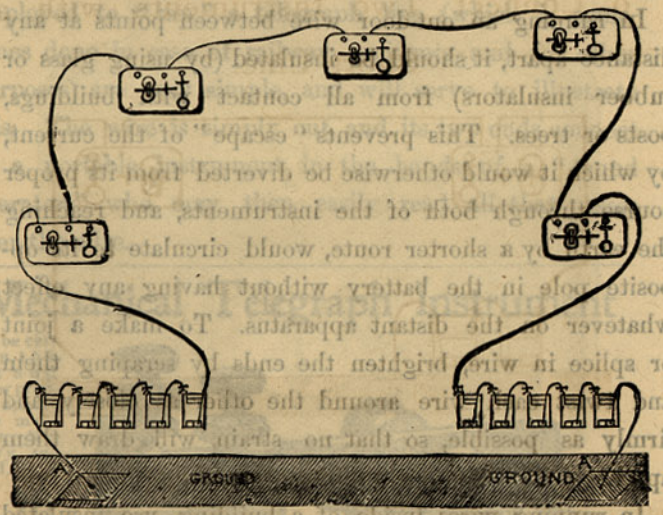
Run a wire from the zinc pole to a gas or water pipe, and carefully connect it, then run a wire from the copper pole to a binding post on the instrument; connect the line wire to the opposite binding post; at the other end of the line attach the wire to one binding post,

then run a wire to the gas or water pipe from the opposite post. If part of the battery is used at each end of the line, always be careful to have the zinc and copper poles of the battery towards each other.

The return circuit may be made either by a continuous wire, as indicated, or by connection with the earth at each end, *G. G.* For wires of but a short distance in length the return wire is best.

Private Line with Several Stations or "Offices" in Connection.

Connect wires, instruments and batteries on such a line as shown in the diagram below, placing the batteries at each end of the line.



Battery at *A* has its zinc pole connected to the earth and its copper to the line; necessarily, therefore, the other battery at *B* presents its zinc pole to the line and

its copper to the earth. If both batteries were connected with the same pole to the line, they would neutralize each other, and no current whatever would be produced.

The line is connected, as shown from the battery, to the first instrument and on to the next in such a way that the current is made to pass through each and every instrument on the route.

It is necessary where two or more offices are connected together on a line, that every key should be kept closed by having its circuit-closer shut, excepting only when sending communications. If any one key on the entire line is left open, all communication is stopped. The reason for this has already been fully explained.

In running an out-door wire between points at any distance apart, it should be insulated (by using glass or rubber insulators) from all contact with buildings, posts or trees. This prevents "escape" of the current, by which it would otherwise be diverted from its proper course through both of the instruments, and reaching the earth by a shorter route, would circulate to its opposite pole in the battery without having any effect whatever on the distant apparatus. To make a joint or splice in wire, brighten the ends by scraping them and twist each wire around the other as closely and firmly as possible, so that no strain will draw them apart.

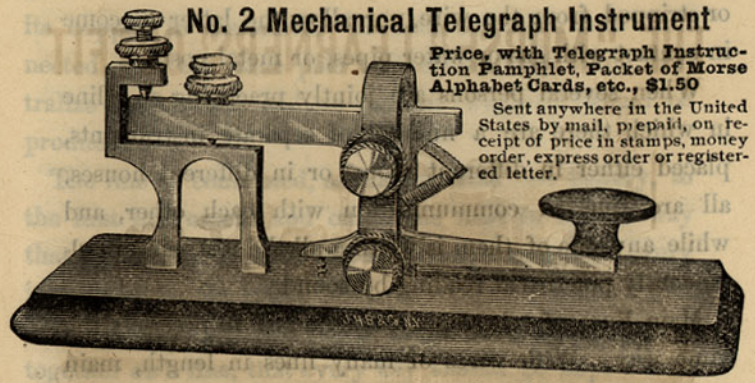
In running wires inside of a building, use insulated copper wire covered either with cotton or gutta-percha; fasten it in place with small staples or tacks, but in doing so be careful not to allow the covering to be opened

or stripped from the wire, nor allow the latter to come in contact with gas or water pipes, or metal posts.

When several persons are jointly practicing on a line in which there are a number of separate instruments, placed either in different rooms or in different houses, all are thus in communication with each other, and while any one of them is writing all the rest can simultaneously practice at reading by sound.

Main lines of telegraph are arranged in precisely the same way. With wires of many lines in length, main batteries, containing a large number of cells, are placed at the end stations. The return circuit is made through the earth the entire distance, and each office connected to the line in the manner here described. The means employed to "tap" a telegraph line (which is sometimes done in case of railway accidents and for other purposes) are very simple, and will serve to illustrate this. The wire is simply cut, and its two ends connect to a portable instrument in the hands of a "sound operator," who may then easily read all that passes over the wire.

No. 2 Mechanical Telegraph Instrument

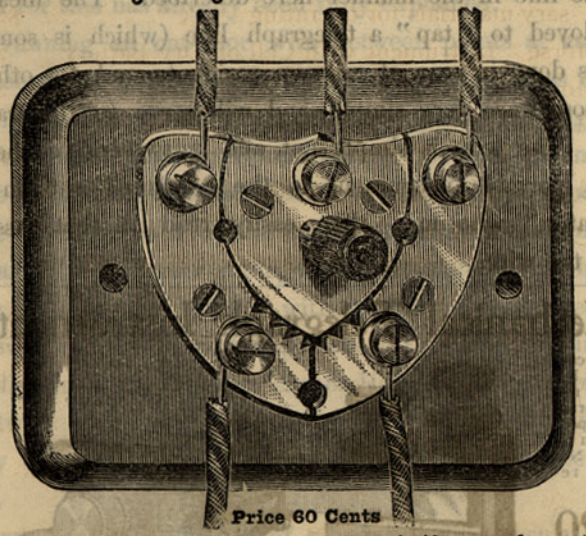


Price, with Telegraph Instruction Pamphlet, Packet of Morse Alphabet Cards, etc., $1.50

Sent anywhere in the United States by mail, prepaid, on receipt of price in stamps, money order, express order or registered letter.

For Morse Alphabet practice in sending and reading by sound and for learning, or teaching Telegraphy, works exactly like the very best Sounder and Key Combination Telegraph Set, giving loud, clear sound with slightest force or movement of Key. All made in first-class Instrument Composition Brass, same pattern as best Giant Sounders.

The Union Lightning Arrester and Ground Switch

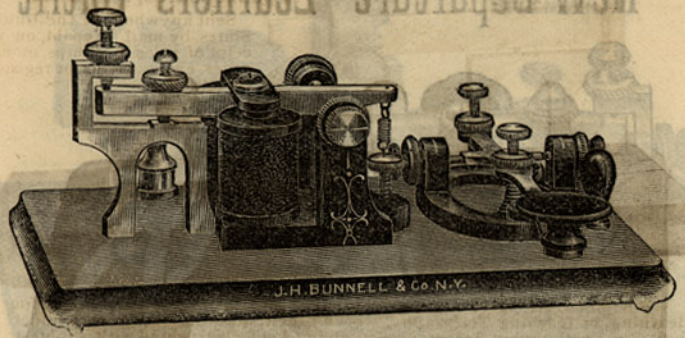


Price 60 Cents

(For mode of connecting the above switch, see inside page of cover.)

As lightning is frequently attracted to out-door lines and thereby enters the offices, sometimes damaging the instruments, or even setting fire to curtains or other inflammable material about the instrument table, a simple and cheap instrument called "lightning arrester and cut out," is used for the purpose of intercepting and carrying to the earth such discharges of lightning as would be liable to cause damage. This apparatus is entirely effective, and is a complete sateguard against lightning.

THE "MORSE" LEARNERS' OUTFIT



Price, **MORSE OUTFIT COMPLETE,** with 5x7 size Crowfoot Gravity Battery, Book of Instructions, Wire, Chemicals and all necessary materials for operating $2 50

"Morse" Instrument with Cell of Dry Battery . 2 25

"Morse" Instrument alone, without battery . . 2 00

"Morse" Learners' Instrument, without Battery, sent by mail, prepaid 2 50

Cell of Wet Battery, complete 65

Cell of Dry Battery. 25

"Morse" Instrument, wound with fine wire, 20 ohms resistance, for use on out-door lines of from 200 feet to 10 or 15 miles in length, price, without Battery, etc. 2 25

Sent by mail, prepaid 2 75

Battery Cannot be Sent by Mail.

The above will be sent C. O. D. to points not over 500 miles distant, if one-third of the amount of the bill sent with the order.

No goods sent more than 500 miles C. O. D.

Remit by Draft, Money Order, Registered Letter, or Express Money Order.

.....THE.....

"New Departure" Learners' Outfit

With Mascot Dry Battery and Steel Lever Key

PRICE, COMPLETE, $2.00

The IDEAL SET for HOME PRACTICE. Always Ready. NEAT, CLEAN, ATTRACTIVE.

The INSTRUMENT is a well-made "MORSE LEARNERS' APPARATUS" with a Steel Lever Key, arranged for use with our "MASCOT DRY BATTERY."

The "circuit-closer" is detached from the key, as it will prolong the life of the battery to leave the circuit open when not using the instrument. With "circuit-closer" detached the Mascot Battery should last for several months' practice. The "circuit-closer" is sent with each apparatus, so that it can be replaced when it is desired to operate two or more instruments on the same circuit with bluestone battery.

Extra Mascot Renewal Cells, 25 cents each.

The magnets can be rewound, at a slight expense, for use on longer, out-door lines.

Instruction Book goes free with each outfit.

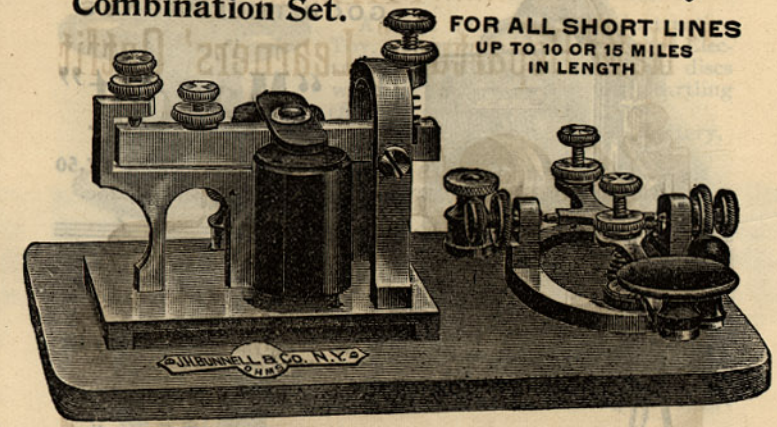
The complete outfit, packed in a wooden box, weighs about 7 lbs.

Shipped by express to any address on receipt of $2.00.

Manual of telegraphy sent free on application.

Giant Sounder and Steel Lever Key Combination Set.

FOR ALL SHORT LINES UP TO 10 OR 15 MILES IN LENGTH



Our standard first-class Giant Sounder, finely finished, with rubber covered coils, wound to 20 ohms' resistance, mounted on polished base, with a Steel Lever Key, making the prettiest and most perfect set of Short Line Instruments ever produced.

Price, - - - - - - - - - - $4.50

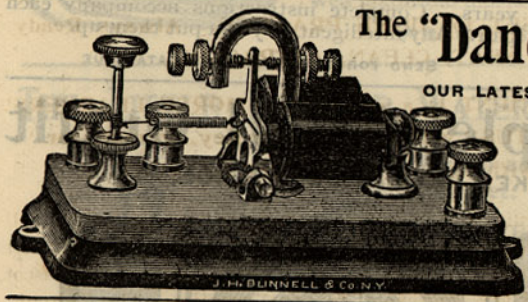
Sent by mail to any distance, carefully boxed and PREPAID by us, on receipt of the above list price.

Same set but wound to four ohms [local], - - - - - - $4.00

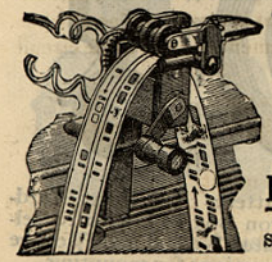
The latter set, with large cell of battery, book of instruction, chemicals, wire, etc., making an Extra Fine Finished Learners' Set, - - - - - $4.75

The "Dandy" Pony Relay

OUR LATEST MODEL



Mounted on polished base with finely finished surbase, platinum contacts, etc. Price, with non-adjustable magnets, rubber covered, $3.25. Cloth covered, $3.00. With adjustable magnets, rubber covered only, $3.50.



The Audible Alphabet

OR

AUTOMATIC TRANSMITTER

For Self Instruction in Learning Telegraph Operating . . . .

Can be used with any Battery Telegraph Instrument.

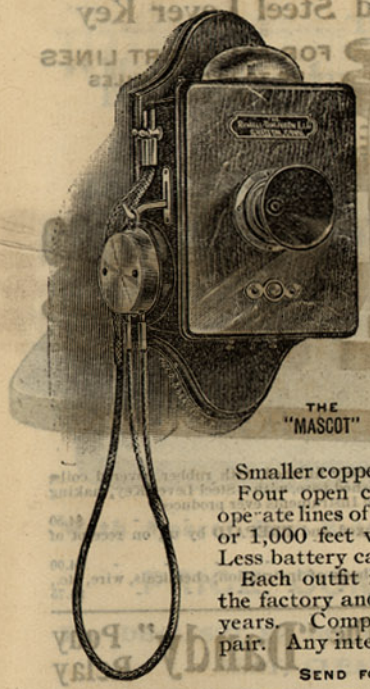
Price Complete as shown in cut, with Book of Instructions and Perforated Ribbons containing 30 Graded Lessons **$2.50**

SENT PREPAID BY MAIL ON RECEIPT OF PRICE

Send for Descriptive Circular.

THE CHEAPEST OF ALL GOOD TELEPHONES IS

The "Mascot"



THE "MASCOT"

Price, per pair, net cash, - **$7.50**
Batteries extra, per cell, 25c.

METALLIC CIRCUITS

Use No. 14 Copper Wire for lines of 2,000 feet.

Use No. 12 Galvanized Iron Wire for lines of 1,000 feet.

Smaller copper wire can be used for shorter lines. Four open circuit batteries at each end will operate lines of 2,000 feet with No. 14 copper wire, or 1,000 feet with No. 12 galvanized iron wire. Less battery can be used on shorter lines.

Each outfit is thoroughly tested before leaving the factory and if properly handled will last for years. Complete instructions accompany each pair. Any intelligent boy can put them up.

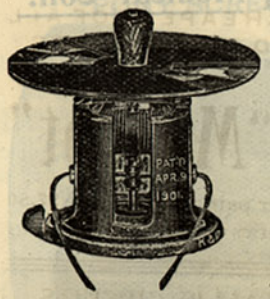
SEND FOR OUR TELEPHONE CATALOGUE

Complete Bell Outfit

PACKED IN NEAT BOX. PRICE, $1.00

CONTENTS—One Mascot Dry Battery. One Neat Hardwood Push Button. One Japanned Iron Box Bell, with Nickel-plated Gong. Seventy-five feet of Insulated Wire. Small Package of Staples and Screws. One Copy of Directions for mounting.

ELECTRIC TOP.



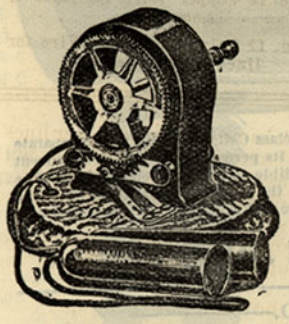
A most interesting and instructive Toy, consisting of a finely finished Electric Motor and a set of colored discs which produce beautiful and startling effects in color changing.

Will run on one cell of Dry Battery.

PRICE, without battery, 75c.
Postage, extra 25c.

Send for our Catalogue of Scientific Toys.

TESLA
MAGNETO
ELECTRIC MACHINE.

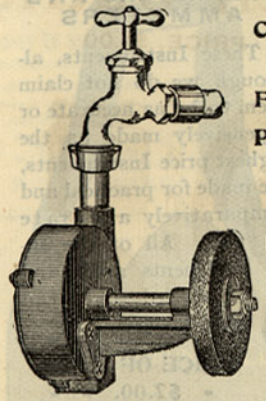


Cut ⅓ Size.

Simple to operate. New in design. Finished in red enamel, with nickel trimmings, and mounted on a polished wood stand. A very attractive, well made and finished machine.

PRICE $1.00.

THE LITTLE HUSTLER WATER MOTOR.



Can be Attached to any Threaded Sink Faucet.

For Sharpening KNIVES, SHEARS.

Polishing SILVERWARE, Etc.

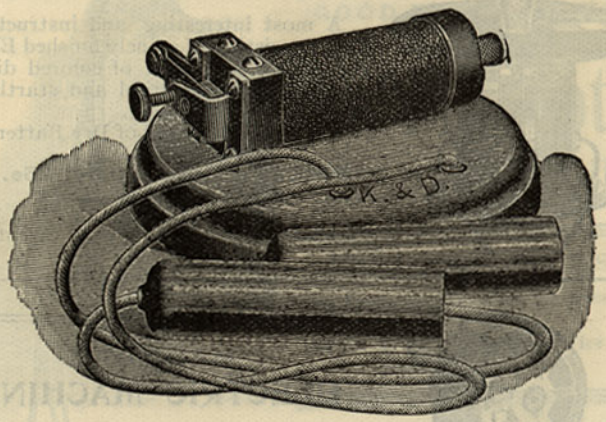
MADE IN TWO SIZES.

Price, with Emery and Buffing Wheel $2.50 and $3.50 EACH.

The larger size being of lower pressure has more power and is suited to a heavier line of work.

The Little Hustler Water Motor is not a Toy!

No. 26 Household Medical Coil.

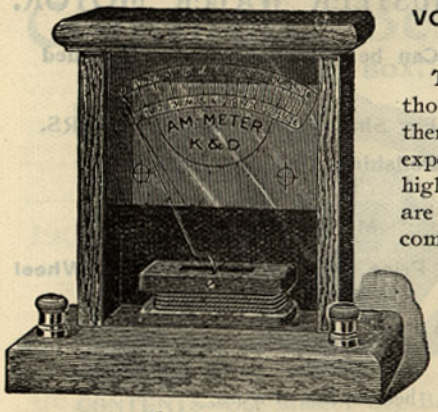


The No. 26 Household Medical Coil is a first-class Coil, to be used with a separate battery. One of the excellent features of this Coil is its perfect regulation. The current at the handles varies from an absolutely imperceptible to a very strong current. The coil and the vibrator parts are self contained and the contacts are pure silver. The spool heads are bright enamel and all metal parts are nickel plated. It is mounted on a round, nicely polished base.

: PRICE, $1.00. :

THE K. & D.

Measuring Instruments,



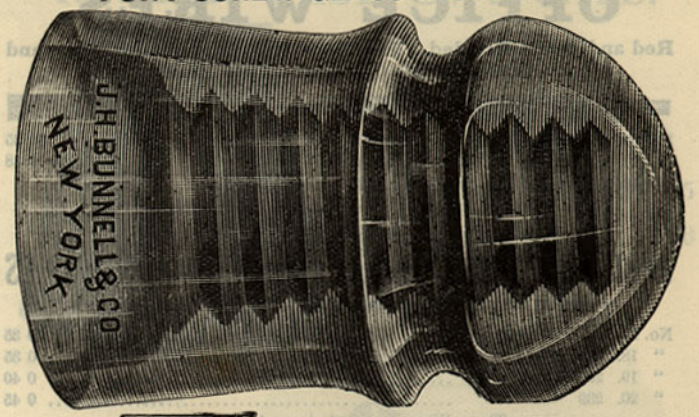
(Cut ½ size.)

VOLTMETERS AND AMMETERS

These Instruments, although we do not claim them to be as accurate or expensively made as the highest price Instruments, are made for practical and comparatively accurate use. All of our instruments are hand calibrated and read from 0 to 15.

PRICE OF EACH
- $2.00. - -

PONY SCREW GLASS INSULATOR.

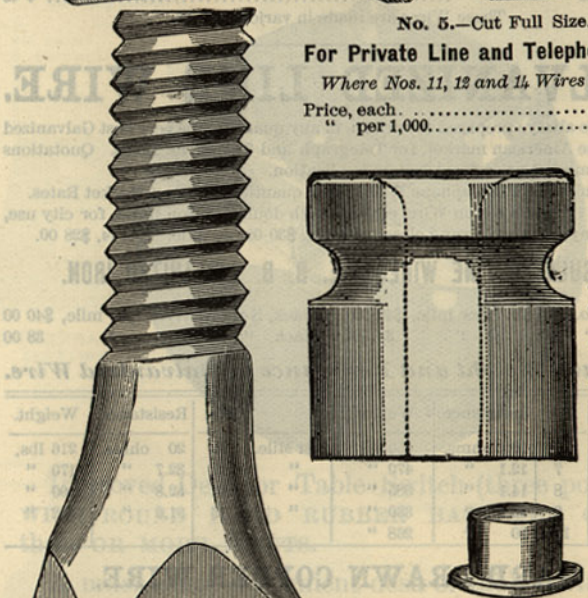


No. 5.—Cut Full Size.

For Private Line and Telephone Wires

Where Nos. 11, 12 and 14 Wires are Used.

Price, each.....$0 03
" per 1,000.....25 00



No. 4.—Ordinary.
Price, each, with Screw.....$0 03
" " without Screw.....02
" Per 1,000.....14 00

No. T.—Push Buttons, Concave, $7.00 per 1,000; ninety cents per 100.

BRACKETS.

Insulator Brackets, best quality Oak, painted, each, three cents; per 1,000, $20.00.

OFFICE WIRES.

Red and White Braided. Paraffined and Compressed Cotton and Linen Double Covered.—Fine Finish.

No. 12.	35 feet, per pound	$0 35	
" 14.	52 " " "	0 35	
" 16.	90 " " "	0 35	
No. 18.	132 feet, per pound		$0 35
" 20.	155 " " "		0 38

These Wires in any other color made to order at the same price.

BURGLAR ALARM, CALL BELL AND ANNUNCIATOR WIRES

DOUBLE COTTON WRAPPED, WAXED AND PARAFFINED.

No. 16.	105 feet, per pound	$0 35
" 18.	155 " " "	0 35
" 19.	200 " " "	0 40
" 20.	239 " " "	0 45

These Wires are made in various colors.

GALVANIZED LINE WIRE.

We are always prepared to furnish, in any quantity, the very best Galvanized Wire in the American market, for Telegraph and Telephone Lines. Quotations at lowest market price furnished on application.

Galvanized Steel Telephone Wire in any quantity. Lowest Market Rates.

No. 12 Galvanized Iron Wire, covered with double Cotton Braid, for city use, where many wires are strung close together, $30 00 per mile. No. 14, $28 00.

INSULATED LINE WIRES. E. B. B. GALVANIZED IRON.

Brown, No. 12	per mile,	$40 00	
Brown, " 14	"	38 00	
Black, No. 12	per mile,		$40 00
Black, " 14	"		38 00

Standard Weight and Resistance of Galvanized Wire.

	No.	Resistance.	Weight.		No.	Resistance.	Weight.
Per Mile.	6	10 ohms.	550 lbs.	Per Mile.	11	20 ohms.	216 lbs.
"	7	12.1 "	470 "	"	12	32.7 "	170 "
"	8	14.1 "	385 "	"	14	52.8 "	100 "
"	9	16.4 "	330 "	"	16	91.6 "	62 "
"	10	20 "	268 "				

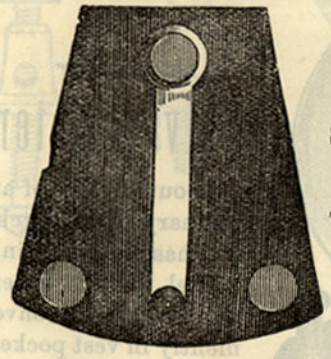
HARD DRAWN COPPER WIRE.

This Wire is made from the best quality of copper, and so hardened as to combine great tensile strength with high electro-conductivity, to a degree never before attained.

Size, .083 in. Diameter. Weight, per mile, 110 lbs. Breaking strain, 365 lbs.
" .104 " " " " " 170 " " " 560 "

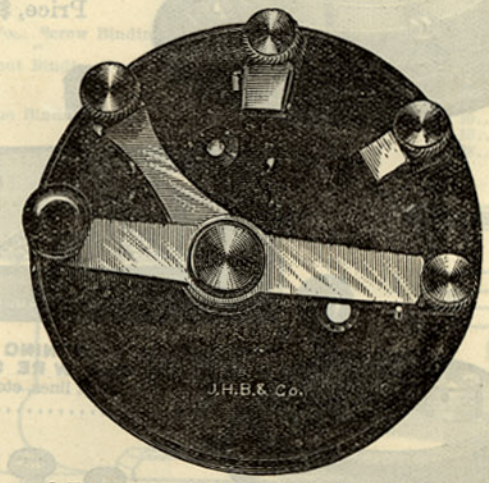
Prices furnished on application.

RUBBER BASE SWITCHES.



Single Point Switch, hard rubber base-- $0 75

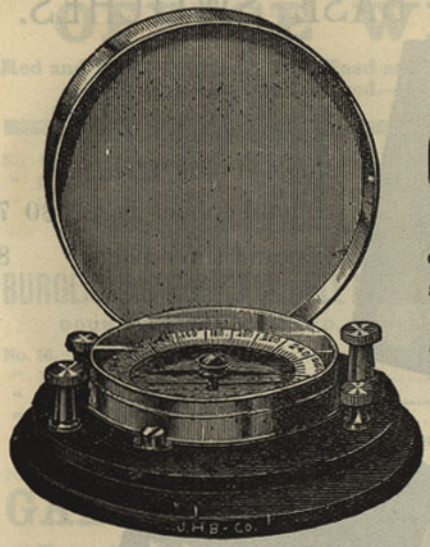
Two and three point. 80



Improved Desk or Table Switch (three point size), WITH ROUND HARD RUBBER BASE FOR one, two, three OR MORE, POINTS.

A much more convenient desk or table switch than the old form, with projecting wires from the bottom. All connections to this switch being provided for by binding posts on the base.

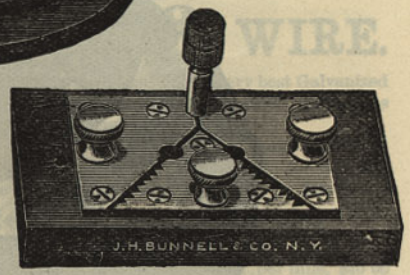
Price, one and two points.....$0 90
" three and four points..... 1 00

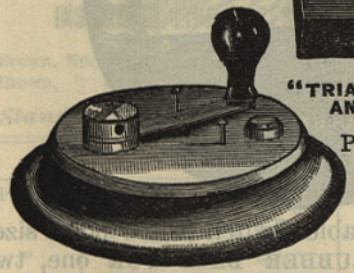


POCKET
Galvanometer.

About the size of an ordinary silver watch, and has a close fitting nickel plated cover. Can be carried conveniently in vest pocket.

Price, $4.00.

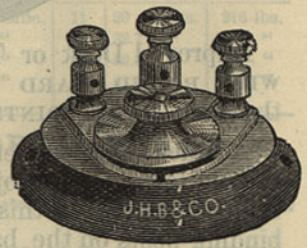




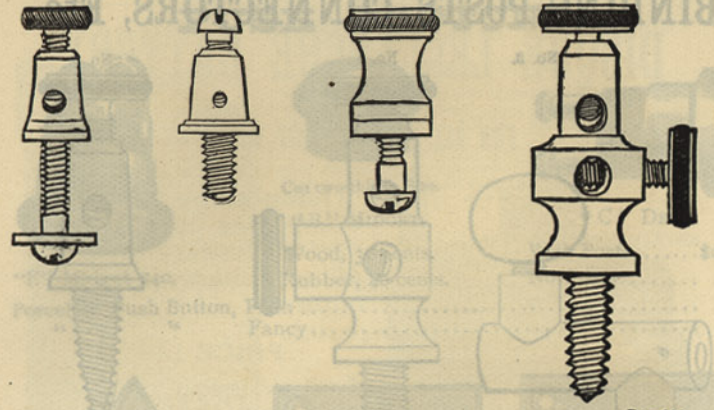
"TRIANGLE" LIGHTNING ARRESTER AND GROUND WIRE SWITCH
For short lines, etc.
Price.....$0 80

Wood Base Circular Switches.

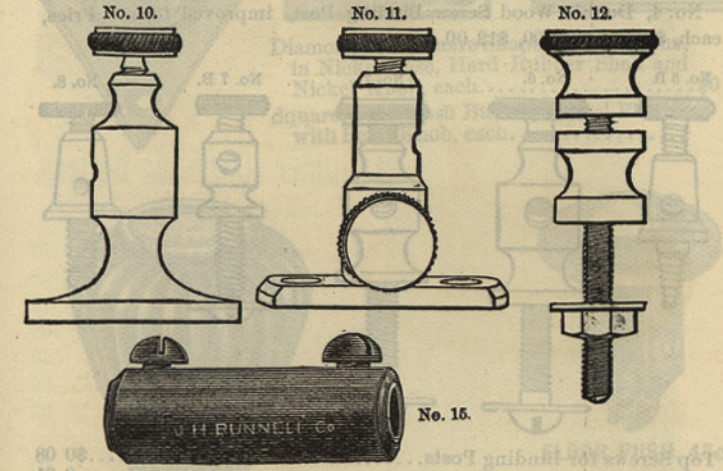
	Solid Base Wire Connectors.	Hollow Base Screw Connectors.
One point	$0 50	$0 30
Two points	55	35
Three "	60	40
Four "	75	



Adjustable Disc Lightning Arresters, $1.20 each.

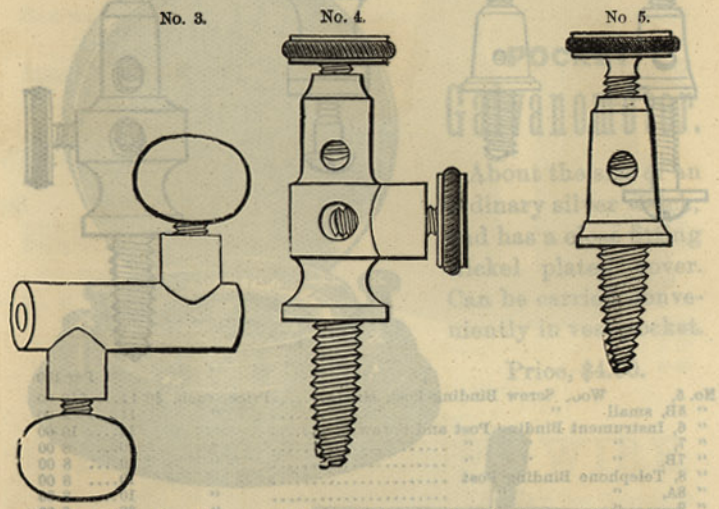


		Per 100
No. 5, Wood Screw Binding Post, single.....Price, each,	$0 12	$10 00
" 5B, small " " " ..... "	11	9 00
" 6, Instrument Binding Post and Screw..... "	12	10 00
" 7, " " " ..... "	10	8 00
" 7B, " " " ..... "	10	8 00
" 8, Telephone Binding Post ..... "	10	8 00
" 8A, " " ..... "	10	8 00
" 9, " " ..... "	08	6 00

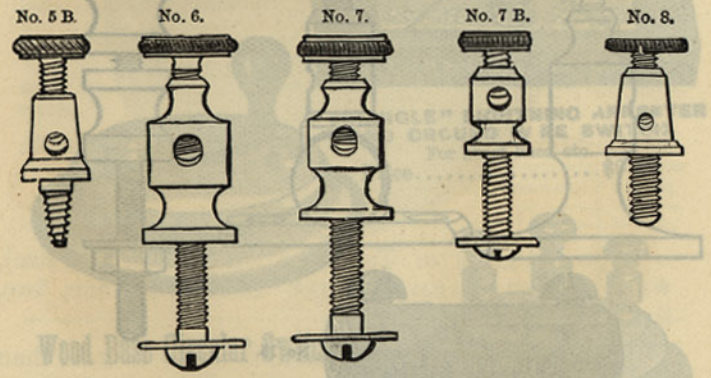


		Per 100
No. 10, Window Tube Binding Post.....Price, each,	$0 16	$14 00
" 11, Double Binding Post with flat base..... "	18	16 00
" 12, English Pattern Binding Post..... "	18	16 00
" 13, Double Wood Screw Binding Post, fine finish "	18	16 00
" 14, Box Bell Binding Post..... "	10	8 00
" 15, Double Connector..... "	12	10 00

BINDING POSTS, CONNECTORS, Etc.

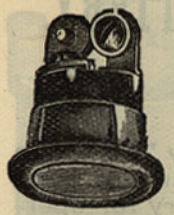


No. 3, Plain Double connector. Price, each, $0 10, ; per 100, $9.00.
No. 4, Double Wood Screw Binding Post, improved form. Price, each, $0 15 ; per 100, $12 00.



Top Screws for Binding Posts	$0 08
Iron Screws " "	0 01
Brass Washers	0 02
Adjustment Screws	0 10
" " Check-Nuts	0 10
Trunnion Screws	0 12
" " Check Nuts	0 10

PUSH BUTTONS.

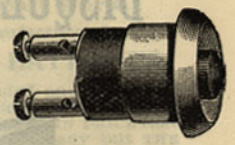


"E" Midget 24c.

Cut two-thirds Size.

"B" MIDGET.

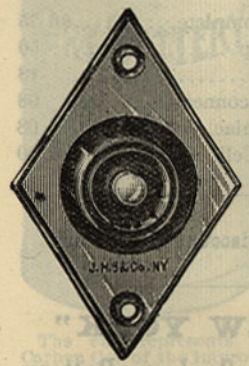
Wood, 30 cents.
Rubber, 40 cents.

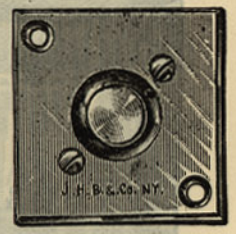


"C" DESK.

With Posts.....$0 32
No Posts..... 30

Porcelain Push Button, Plain 25
" " Fancy 40

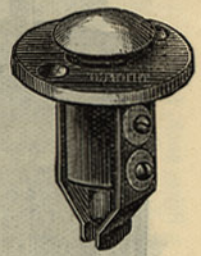




Diamond and Square Shape Push Buttons, in Nickel Base, Hard Rubber Shell and Nickel Knob, each.....$0 45

Square Base Push Button, Nickel-Plated, with Pearl Knob, each..... 45

METAL PEAR PUSH.



FLOOR PUSH, 45c.

Metal Pear Push.

Made of corrugated metal, nickel or bronze finish, very neat, Price, 35c.

DISQUE LECLANCHÉ BATTERY.

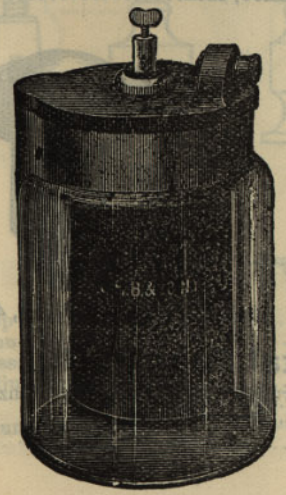
FOR ALL OPEN CIRCUIT WORK.

Adopted by Telephone Companies as the most perfect Battery for operating Telephone Transmitters.

PRICE LIST.

Battery, complete	$0 75
Porous Cup	50
Glass Jar	18
Zinc, with connector	08
Sal Ammoniac, per package.	08
Complete Cell, sealed	90

Special Discount to the Trade.

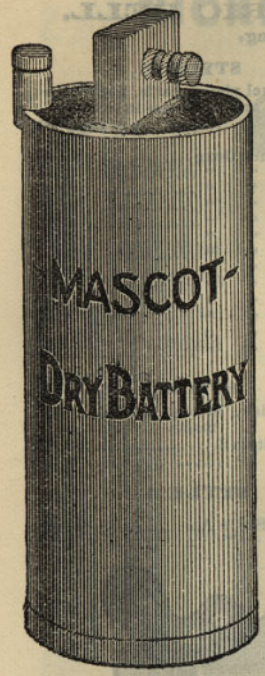


"NEW YORK" Cylinder Carbon Battery.

FOR OPEN CIRCUIT WORK.

Price, per Cell.....complete,		$0 75
Cylinder Carbon...	"	40
Carbon Connector.	"	10
Zinc	"	08
Jar	"	15
Zinc Insulator.....	"	05
Rubber Ring.....	"	02
Sal Ammoniac, per package.....	"	08

The best Battery of its kind in the market. The Carbon Cylinder can be used with any Disque Leclanché jar instead of a porous cup. In order to introduce this battery, we will mail a **sample** Carbon Cylinder, with Carbon Connector and Zinc Insulator, postage prepaid, to any address for 75 cents



WET BATTERIES SUPERSEDED

For All Open Circuit Work.

We are Pioneers in the manufacture of

PRACTICAL DRY BATTERIES.

Having recently extended and improved our manufacturing facilities, we are able to make such a GREAT REDUCTION IN PRICE that there is no excuse for buying any but THE GENUINE.

Our Long Experience enables us to GUARANTEE THE QUALITY to be the VERY BEST for STRENGTH, DURABILITY and RECUPERATION.

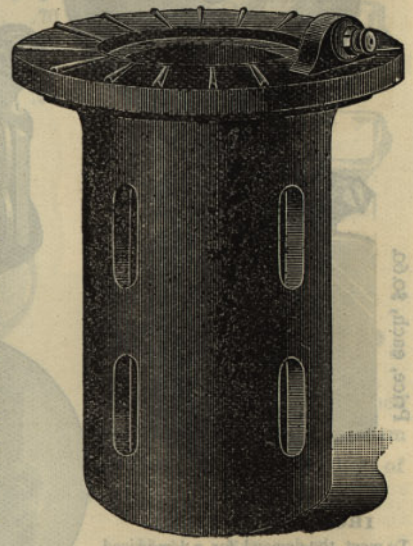
GET OUR PRICES BEFORE PLACING YOUR ORDERS ELSEWHERE.

Our MASCOT is the Cheapest and Best.

Price, per cell	$0 40
" " small size, 3¾ x 1¾ inches....	60

IMPROVED FORM OF

"FULLER BATTERY."



The cut represents the Carbon Cup of the Improved Fuller Cell, made to fit a 6x4 in. jar. It has great current capacity, and high E. M. F. A clay porous cup and Daniel zinc goes inside of the carbon cup.

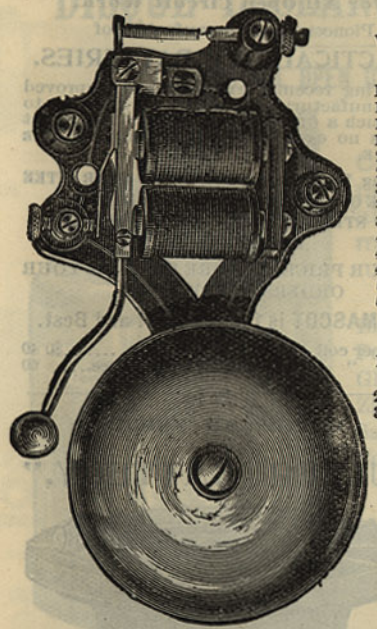
The solution for this cell is the same as for the Standard Fuller, and either bi-chromate of potash can be used or bi-chromate of soda.

The difference between this cell and the Standard Fuller is that a much greater current can be had from the Improved Fuller than from the Standard Fuller, but the advantage of this cell over any other type of Fuller, lies in the fact that the cell requires absolutely no attention on open circuit work in from two to four months.

PRICES.		Improved Fuller Carbon Cup.	
Cell, Complete	$1 50	Porous Cup	$0 20
Carbon	75	Cover	10
Zinc	35	Glass Jar	30

IRON FRAME ELECTRIC BELL.

Single Stroke or Vibrating.



STYLE F.

STYLE F.

With nickel plated parts, highly finished and first-class in every respect.

Frame No.				Each.
1.	3	inch	Gong	$1 65
1.	3½	"	"	1 90
1.	4	"	"	2 15
2.	5	"	"	2 75
2	6	"	"	3 00
3.	6	"	"	3 50
3.	7	"	"	4 00
3.	8	"	"	4 50
4.	8	"	"	5 75
4.	9	"	"	7 50
4.	10	"	"	8 00
5.	10	"	"	11 00
5.	12	"	"	13 50

STYLE S.

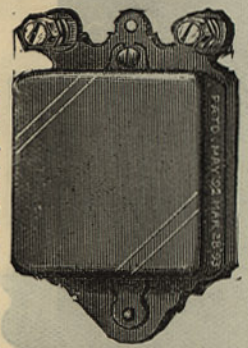
Plain finish, strong, durable, well made.

2½	inch	Style S	$0 60
3	"	"	0 65

STYLE A.

3½	inch	Style A	$0 75
4	"	"	0 85

Price, each, $0.60.

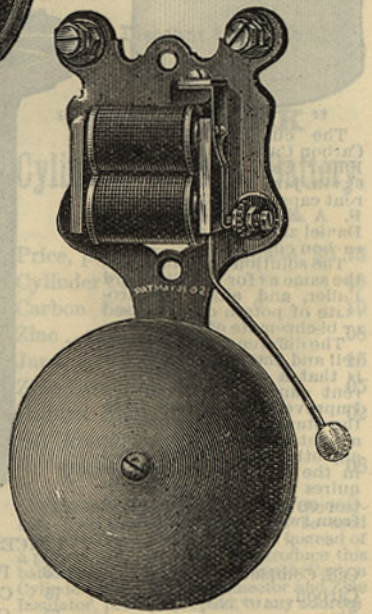


IRON BOX BUZZER.

To meet the demand for a low-priced Buzzer, we have placed this on the market, and feel confident that it will give you the best of satisfaction.

It has pivoted armature, double adjustment and all our latest improvements.

Contact points platinum.



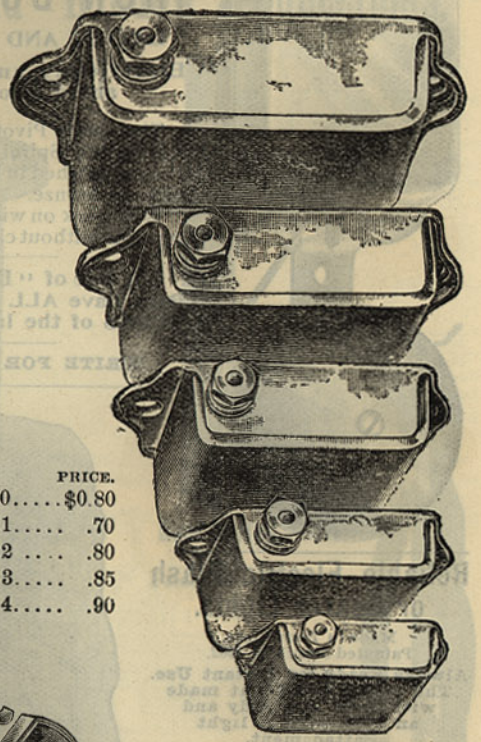
STYLE S.

Get our special prices on Mascot Bells and Dry Batteries.

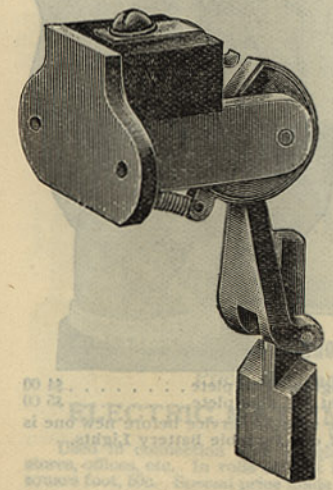
NICKEL BUZZERS.

PIVOTED ARMATURE.

Base and cover made of wrought metal all nickel plated. Platinized contact points.



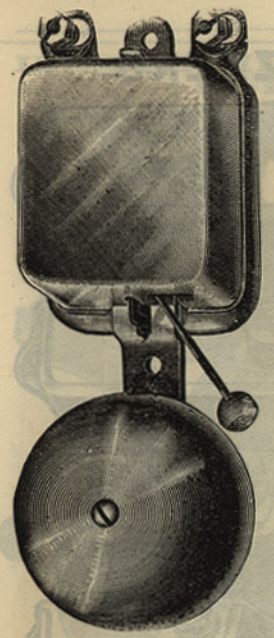
		PRICE.
Nickel Buzzer, No.	0	$0.80
" "	1	.70
" "	2	.80
" "	3	.85
" "	4	.90



DOOR TRIP.

For operating an alarm when door is being opened. Alarm does not work on closing of door.

Price, 60 cents.



"BEEKO" IRON BOX BELLS

LATEST AND BEST DESIGN

Electrically and Mechanically ahead of other types.

They have Pivoted Armatures with Adjustable Spiral Tension Springs. Finely finished in black, Japan, nickel plate or bronze.

Will work on wide ranges of battery strength without change of adjustment

Our line of "Beeko" Wood Box Bells have ALL THE GOOD FEATURES of the Iron Box Type.

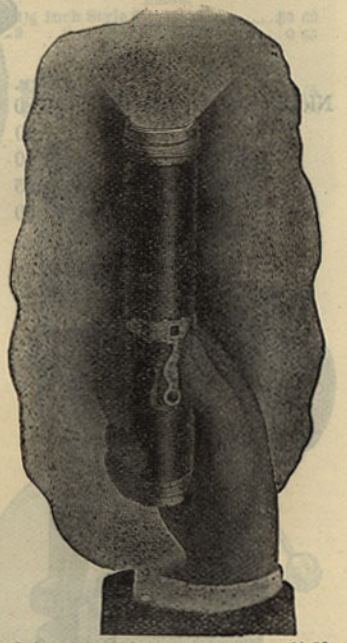
WRITE FOR OUR PRICES.

Reliable Electric Flash or Search Lights.

Made in Four Sizes.
Patented March 18, 1902.

Always Ready for Instant Use. The only Flash Light made with both a steady and an intermittent light attachment.

Useful for emergencies of all kinds and under all conditions. It is absolutely a safe and harmless light with which to examine gas leaks or tanks where an exposed flame is likely to cause explosions, useful for watchmen, policemen, soldiers, ship captains, and in fact, can be used by everyone wherever a light is needed, no matter how dangerous the surroundings.

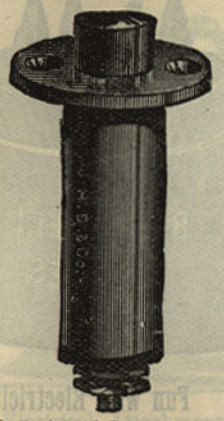


THE RELIABLE ELECTRIC FLASH LIGHTS

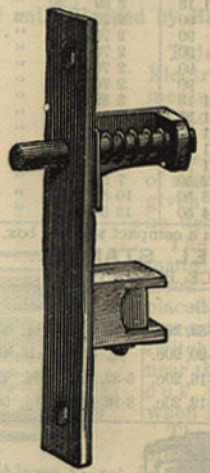
No. 00—1⅛x6 inches. Gives 2000 to 3000 lights. Complete. $3 00
No. 1—1⅛x8 inches. Gives 5000 to 6000 lights. Complete $3 00
No. 2—1⅛x11 inches. Gives 6000 to 7000 lights. Complete $4 00
No. 3—1⅛x13 inches. Gives brighter light. Complete $5 00

Properly used, battery will give three months service before new one is required. Send for complete Catalogue of our Portable Battery Lights.

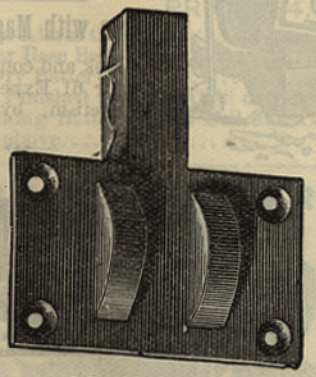
Door and Window Connections.



Cylindrical Door Spring.
Fits a bored hole.
Very easily bored.
Price, 20c. each.



Door Spring.
Plain.
Price, 20c. each.



Improved Double Window Spring.
Price, 40c. each.

Single Window Spring.
Price, 20c. each.

ELECTRIC MATTING.—Applegate's Patent.

Used in connection with Burglar Alarm for the protection of residences, stores, offices, etc. In rolls 50 feet in length, 2, 2½ and 3 feet wide. Price, per square foot, 50c. Special price made for large quantities, also for larger sizes.

Steel Stamping Letters and Figures. 52

SUPERIOR QUALITY.

SIZE.	Figures, per set of 9.	Letters, per set of 28.	Letters or Figures Single.
1-32 inch.	$1 25	$3 75	20 cts. each
1-20 "	1 13	3 39	20 "
1-16 "	90	2 70	15 "
1-12 "	90	2 70	15 "
3-32 "	90	2 70	15 "
1-10 "	90	2 70	15 "
⅛ "	90	2 70	15 "
5-32 "	1 13	3 39	16 "
3-16 "	1 25	3 75	18 "
7-32 "	1 40	4 20	20 "
¼ "	1 50	4 50	20 "
5-16 "	1 75	5 25	25 "
⅜ "	2 50	7 50	35 "
7-16 "	3 50	10 50	45 "
½ "	4 50	13 50	50 "

Every set in a compact wooden box.

STEEL STAMPS.

PRICE, PER LETTER.

For Stamping names or devices upon Steel, Wood, Leather and Metals of all kinds.	inch. 1-32, 20c. 1-20, 20c. 1-16, 20c. 1-12, 20c.	inch. 1-10, 20c. ⅛, 20c. 5-32, 25c. 3-16, 30c.	inch. ¼, 35c. 5-16, 40c. ⅜, 45c. ½, 50c.

Fun with Electricity.

Book and complete Outfit for 60 Experiments in Electricity, by mail, 65 cents.

Fun with Magnetism.

Book and complete Outfit for 61 Experiments in Magnetism, by mail, 36 cents.

No. 1.

No. 2.

AN ELECTRIC SCARF PIN.

Mounted with Brilliant Stones in the Center.

Here is the smallest lamp ever made—emitting a brilliant light. The effect is sensational and marvelous. The lamp is illuminated by a small battery, containing no acid, which can be carried in the vest pocket.

No. 1 Electric Pin gives 2,000 to 4,000 flashes before renewal of battery. By mail, prepaid, $1.00.

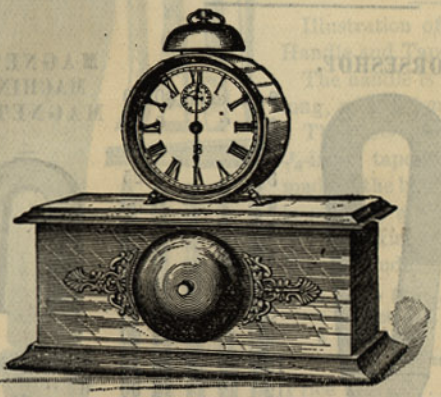
No. 2 is a combination—can be worn as a Scarf Pin or rose. It is operated by 3 small cells in one. Will give 10,000 to 15,000 flashes. By mail, prepaid, $1.50.

Extra Battery for No. 1, 25 cents. Extra Battery for No, 2, 40 cents.

ELECTRIC ALARM CLOCK.

A RELIABLE TIME-PIECE. ALWAYS READY FOR DUTY.

Bell Rings Continuously until Stopped by Hand.



This clock has Electrical Attachments, and can be set to ring one or more Electric Bells located in any part of the house, at any given hour it may be desired.

The contact is made inside of clock. If bell is placed at a distance from clock, a switch can be used near the bell, to cut out the battery when required.

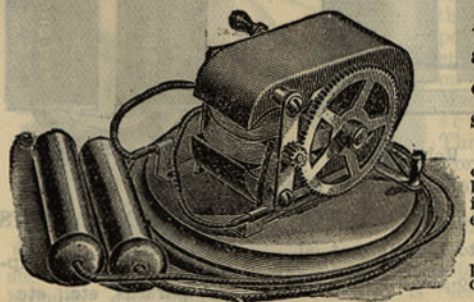
The clocks have Mechanical as well as Electrical Attachment. The Alarm is set in usual way. Full Directions with each outfit.

EARLY RISERS' ELECTRIC ALARM OUTFIT.

PRICE, $4.50

1 Electric Alarm Clock	$2 00
1 Circular Base Bell, 3-inch Gong	2 00
1 Cell, Dry Battery	50
1 Finely Finished Walnut, Oak or Stained Cherry Case, containing Battery, with Bell and Clock on top, complete as above	4 50

MAGNETO ELECTRIC MACHINE.



A very interesting and instructive toy of substantial construction.

Not only harmless to children, but actually benefits those who use it by strengthening the entire nervous system.

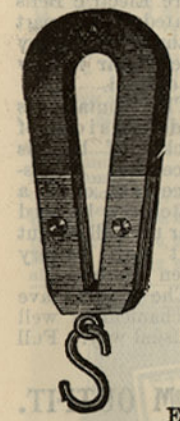
Gives surprisingly powerful current. Lots of fun with it.

Patented April 27, 1897.

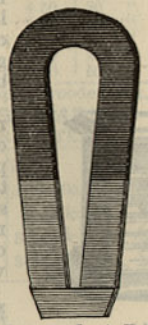
Price, One Dollar.

PERMANENT MAGNETS.

COMPOUND.



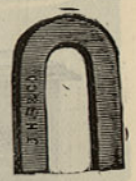
HORSESHOE.



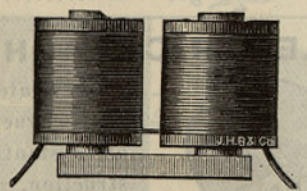
2-in.,	each,	$0 10				
2½	"	0 12				
3	"	0 18				
3½	"	0 25				
4	"	0 30				
5	"	0 50				
6	"	0 90				
7	"	1 50				
8	"	2 00				
9	"	2 50				
10	"	3 15	4-inch	..	$0 75	
12	"	4 00	6	"	.. 1 50	
Compound, 4 Bars, 6	"	6 00	8	"	.. 1 75	
" 4 " 8	"	9 00	9	"	.. 3 00	
" 4 " 10	"	15 00	10	"	.. 4 00	

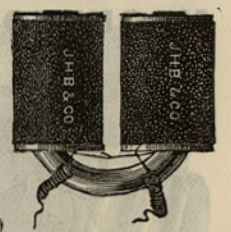
Experimental Bar Magnets, ⅜x6 inches..... 50

MAGNETO MACHINE MAGNETS.



ELECTRO MAGNETS.





Sounder and Pony Relay size low resistance, 5 to 50 ohms, $1 00 to $2 50

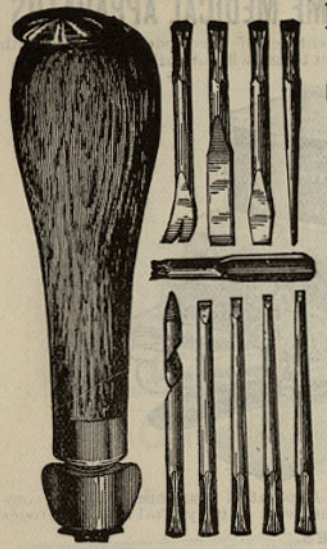
Relay sizes,	50 to 100	"	3 50
"	100 to 150	"	4 50
"	150 to 400	"	5 00

Special Magnets any size to order.

COMMON MAGNETS.

For Bells, Small Apparatus, etc., etc.

Price, 4 ohms, $0 55.



PATENT GIANT HOLLOW HANDLE.

WITH TEN USEFUL TOOLS FOR OFFICE AND GENERAL USE.

Illustration of the Giant Hollow Handle and Tapering Shank Tools.

The handle is ROSEWOOD, 6 inches long, with patent screw top.

The tools are 2½ inches long with $\frac{3}{16}$-inch tapering shank. Being made of the best cast steel, tempered in oil, they are superior to anything of the kind heretofore offered. They include

1 Screw Driver,	1 Gimlet,
1 Scratch Awl,	1 Chisel,
4 Brad Awls,	1 Gouge,

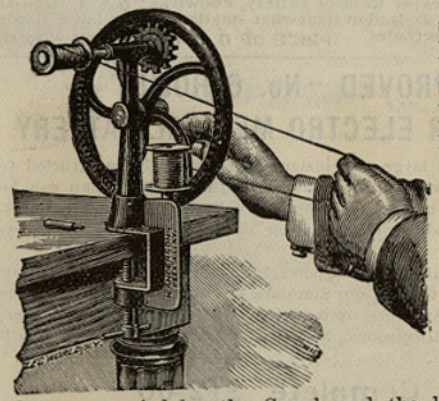
1 Tack Puller.

Price $1 00

Large Size..... ..... 1 50

HAND MAGNET WINDER.

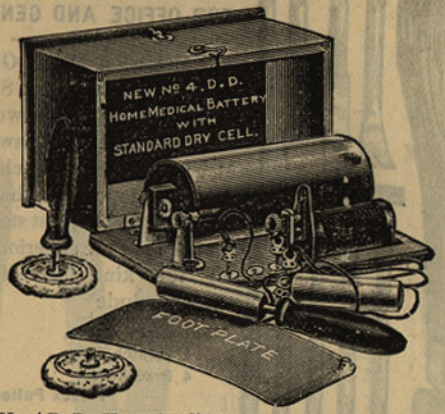
Each, $3.50



The Engraving represents a Magnet being wound from a Spool of Wire, which turns on a Stud projecting from the Clamp. A Hub, like that shown lying on the table, is used to support the Magnet, one end of the Hub screwing on the spindle of the Machine, the other end screwing into the Thread in the Magnet Core. The Spool and Magnet Hubs are interchangeable. To unwind a Magnet, it is placed on the Stud shown occupied by the Spool, and the latter is screwed on the Spindle. The operation of winding is clearly shown by the Illustration.

THE NEW No. 4, D. D., HOME MEDICAL APPARATUS

The unusually complete and excellent set of Electrodes furnished with this instrument makes it very convenient to use with or without assistance.



The New No. 4 D. D., Home Medical Apparatus. Case open at lower compartment, showing the entire apparatus, with Battery, Coil and Electrodes complete.

PRICES.

No. 4, D. D., Apparatus, with Battery and Electrodes Complete	$ 0 00
Extra Battery, per Cell	50
Sponge Electrodes, with 2 handles, per pair	1 50
Tube Hand Electrodes, with 1 handle, per pair	1 00
Connecting Cords, 4 feet with Tips, per pair	60
Foot Plates, each	65
Hair Brush Electrodes (Extra), each	1 75
Special Flexible Sponge Electrode with binding strings attached (Extra), each	1 00

NOTE—We make a cheaper form of Battery, known as "O. S. 4," similar in appearance to our No. 4. D. D., but somewhat smaller, having but a single compartment and fewer electrodes. **PRICE OF O. S. 4 BATTERY, $7 50**

THE IMPROVED "No. 6 HOME" DOUBLE POWER ELECTRO MEDICAL BATTERY

This is a Double-Cell large coil instrument, especially constructed to furnish, when required, very much more powerful currents than can be obtained from any of the usual sizes or forms of Electro Medical Batteries. Its currents are also capable of graduation down to the mildest effects desired.

It comprises an extra large size and powerful induction coil, with indicating scale, operated by two Cells of our Standard Dry Battery, Reversible Pole changing Switch, Battery Switches, for reducing or increasing Battery Power, Conducting Cords, Hand Electrodes, Foot Plate, and Metallic Hair Brush Electrode.

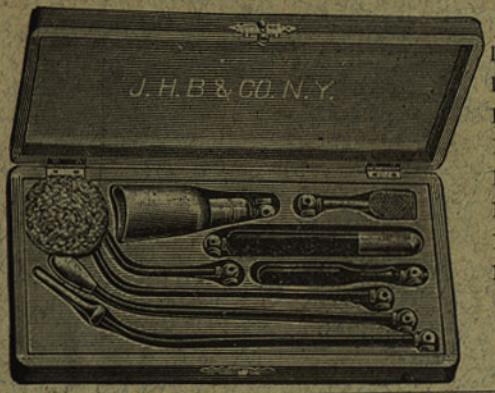
Price, Complete, $12.00

Copy of Electropathic Guide sent with each of our Medical Batteries.

SEND FOR SPECIAL CIRCULAR AND PRICES.

CASE OF ELECTRODES,

OF MOST APPROVED FORM, FINELY FINISHED,



CONTAINING:

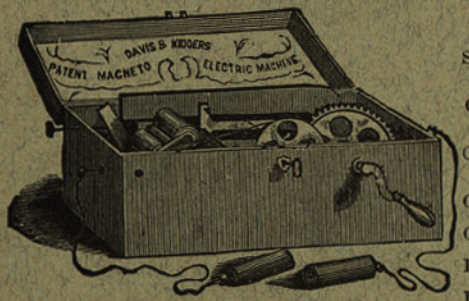
1 Insulated Handle
1 Sponge Electrode
1 Eye "
1 Ear "
1 Throat "
1 Tongue "
1 Womb "
1 Vagina and Rectum Electrode.

Price, $12.00

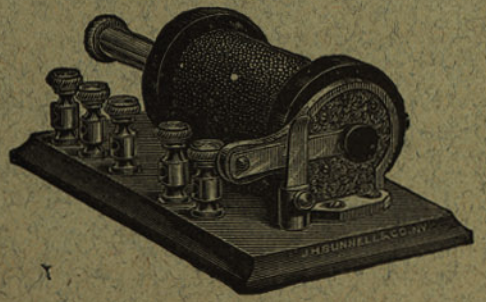
MAGNETO ELECTRIC MACHINES

PRICE, $8.00.

Extra Handles, etc., for Medical Batteries.



Handles, plain, - pair,	$ 50
" nickel-plated, "	75
" " with rosewood handles, pair,	1 50
Sponge Holders, nickel-plated, with rosewood handles, - each,	1 25
Conducting Cords, cotton or worsted covered, 3 feet, - - pair,	35
Conducting Cords, cotton or worsted covered, 4 feet, - - pair,	45
Conducting Cords, silk covered, 4 feet, - pair,	75
Conducting Cords, Kidder Pattern, 4 feet, - pair,	50
Foot Plates, with connections, nickel-plated, each,	1 00
Eye Electrodes, glass, "	1 00



MEDICAL INDUCTION COILS.

Large Size.

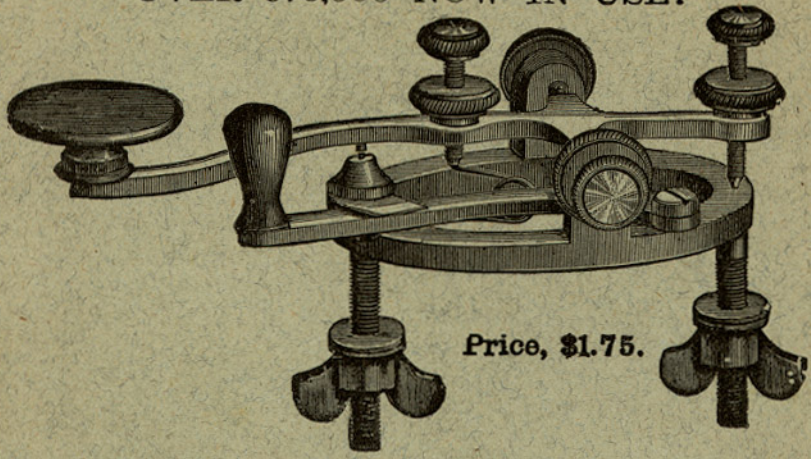
VERY POWERFUL.

Price, complete, with Cords and Handles and one Cell Standard Dry Battery $4 50
Without Battery..... 4 00

Steel Lever Solid Trunnion Key.

PAT. FEB. 15th, 1881.

OVER 373,000 NOW IN USE!

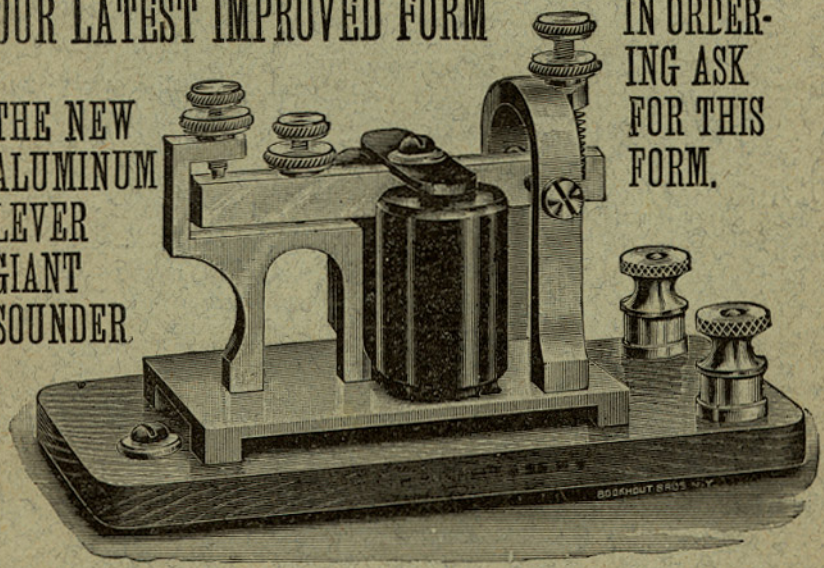


Price, $1.75.

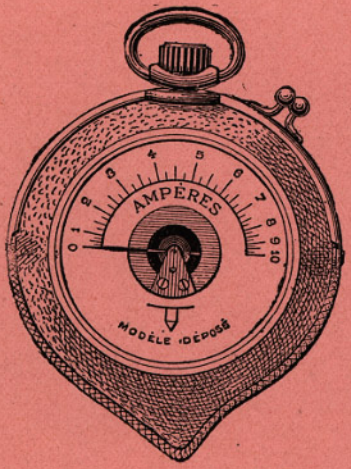
OUR LATEST IMPROVED FORM

IN ORDERING ASK FOR THIS FORM.

THE NEW ALUMINUM LEVER GIANT SOUNDER



Price, 4 Ohm $2.25
" 20 " 2.75

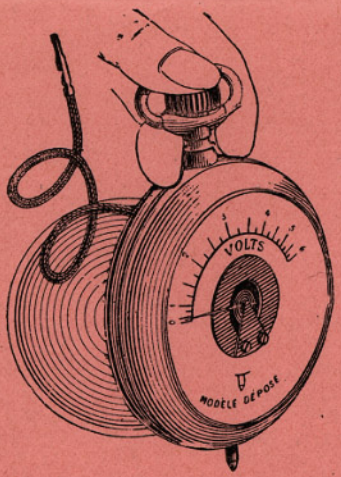


PATENT
FRENCH POCKET VOLT AND AMPERE METERS.

Ranges from 3 to 15 Volts. From 3 to 15 Amperes.

These meters are about the size of an ordinary watch, and are valuable for testing the strength of your battery in Automobile, Launch, Motor Cycle, or wherever the use of a storage or primary battery is indicated.

They are thoroughly accurate, and can be used in any position. The instrument is provided with one conducting cord with metal tip. Connecting this to one pole of the battery and completing the circuit, with the point at the base of the instrument to the other pole, the strength of the battery will be accurately indicated. It is especially valuable in testing the strength of the igniting batteries for all types of engines.



Voltmeter	$14.00
Ammeter	12.00
Polarity Indicators, same size and design	10.00

Discount on application.

In ordering state range desired.

J. H. BUNNELL & CO.
ELECTRICAL APPARATUS AND SUPPLIES
20 PARK PLACE, NEW YORK

FOR TELEGRAPHERS
by a
TELEGRAPHER

A New, Revised and
ENLARGED EDITION
Of the Now Famous Work

A Telegraphic Classic
The Standard
Of the World

POCKET EDITION OF DIAGRAMS

AND

Complete Information for Telegraph Engineers and Students

Is Now Out and Ready for Delivery.

By WILLIS H. JONES
The Electrical Editor of Telegraph Age

BOUND IN FLEXIBLE LEATHER;
334 PAGES

THIS VOLUME is the finest, most complete and comprehensive book on the telegraph ever published. It is colloquial, simple and clear in style, free from technicalities, copious in the amount and diversity of practical information furnished,

It is Splendidly Illustrated by 160 Diagrams

NO SUCH THOROUGH TREATMENT of the subject of the telegraph, clearly explaining the equipment of a modern telegraph office, has ever before been accomplished.

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