Catalogues of Western Electric Manufacturing Co.—No. II.

Telegraph Instruments and Supplies.

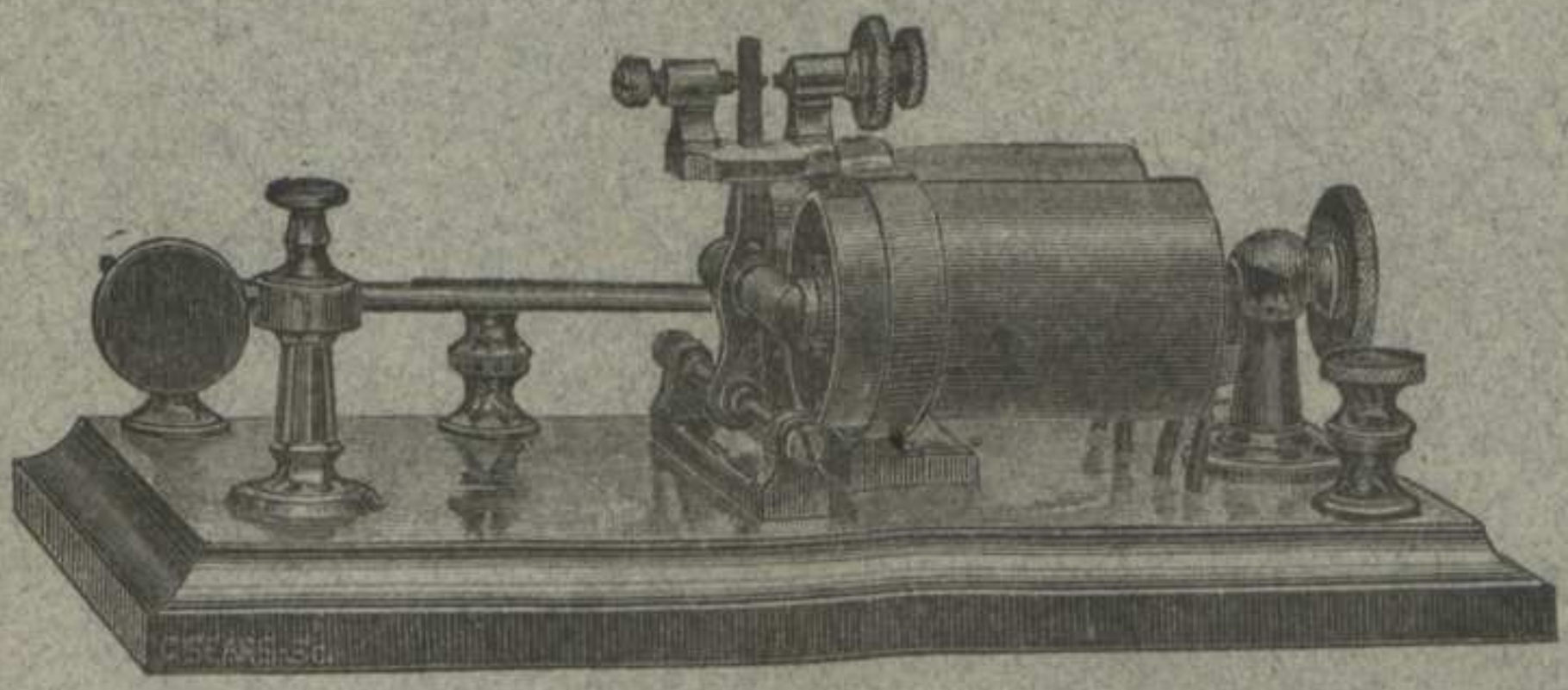
CATALOGUE

OF

TELEGRAPH INSTRUMENTS

AND

SUPPLIES



WESTERN ELECTRIC MANUFACTURING CO.

CHICAGO AND NEW YORK

WESTERN ELECTRIC MANUFACTURING CO.,

220-232 KINZIE ST., CHICAGO.

62-68 NEW CHURCH ST., NEW YORK.

Anson Stager, President.

Enos M. Barton, Vice-President.

M. G. Kellogg, Supt. Manufacturing Dept.

AGENCIES.

PITTSBURGH, - - CHAS. O. ROWE, AGENT.
(First National Bank Building.)

ST. LOUIS, - - - L. C. BAKER, AGENT.
(N. E. Corner Third and Olive Streets.)

CINCINNATI, - - J. E. HOCKETT, AGENT.
(169 Vine Street.)

DETROIT, DETROIT ELECTRICAL WORKS, AGENT.
(98 Griswold Street.)

CATALOGUES OF THE WESTERN ELECTRIC MANUFACTURING COMPANY.

Sent by Mail, post-paid, on receipt of Price in Stamps or Currency.

	PAGES.	PRICE.
I—Complete Set of Catalogues	251	20c.
II—Telegraph Instruments and Supplies	64	6c.
V—Electric Bells, Annunciators, Electro-Mercurial Fire Alarm,	36	3c.
VI—Electro-Medical Apparatus	32	3c.
VII—Manual of Telegraphy and Catalogue of Private Line Instruments	32	free.
VIII—Condensed Price List	20	"
X—Electric Bells, &c., descriptive	12	3c.
XII—Magnets for Mills	20	3c.
XIII—Sir William Thomson's Navigational Instruments	24	5c.
XIV—Telephonic Apparatus	11	3c.

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AND

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CONTENTS

WESTERN ELECTRIC MANUFACTURING CO.

220-232 KINZIE STREET, CHICAGO

62-68 NEW CHURCH STREET, NEW YORK

1882.

INTRODUCTORY.

THE WESTERN ELECTRIC MANUFACTURING COMPANY was organized in Chicago, under the general laws of Illinois, in 1872, and now operates the two largest telegraph shops in America.

The Chicago factory succeeded by purchase or consolidation to the business of the Caton Instrument Factory of the Western Union Telegraph Company, at Ottawa, Ill., and to that of Gray & Barton, and Bliss, Tillotson & Co., and Geo. H. Bliss & Co., of Chicago, and of the Electric Improvement Co., of Galesburg, Ill.

The New York factory was long and favorably known as the telegraph shop of the Western Union Telegraph Company, and was acquired by this Company April 1, 1879. These manufactories are abundantly furnished with the most perfect and modern tools, both for general and special work, known to the trade.

By the payment of high wages and by affording an opportunity for the investment of savings in the stock of the Company, a choice of workmen has been possible, resulting in maintaining a large body of thoroughly skillful mechanics who have had many years experience in the manufacture of electrical instruments.

With such ample resources, the aim has been, and will be, to furnish the trade with the best instruments and goods which can be produced, and at reasonable prices.

All the component parts of electrical instruments and apparatus are made from the raw materials within these shops. A better class of goods can therefore be afforded to customers, at the same prices, than can be obtained elsewhere.

Exclusive attention is given to the manufacture and sale of Electrical and Telegraphic Apparatus, but in this field the intention is to cover the entire ground, as will be apparent from an examination of the following pages.

For many of the illustrations in this edition of our Telegraph Catalogue we are indebted to the kindness of Mr. George B. Prescott. These illustrations are taken from his "Electricity and the Electric Telegraph," and "Speaking Telephone, Electric Light and Other Recent Electrical Inventions."

Departments of Electric Work.

The manufactures of this Company include:

I.—MORSE TELEGRAPH INSTRUMENTS AND TELEGRAPH SUPPLIES.

II.—INSULATED COPPER WIRES.

III.—ELECTRICAL TESTING INSTRUMENTS.

IV.—AMERICAN DISTRICT TELEGRAPH APPARATUS.

V.—MULTIPLEX TELEGRAPH APPARATUS, including the Western Union Standard Quadruplex and Duplex, and Gray's Electro-Harmonic Telegraph Apparatus.

These five departments are covered by the present Catalogue. The remaining departments are described in our other Catalogues. a list of which will be found on page 2 of the cover.

VI.—HOTEL AND HOUSE ANNUNCIATORS, BURGLAR ALARMS AND CALL BELLS.

Several hundred of the finest hotels in the United States and Canada have our Needle Annunciator, and a large number of the best residences in the country are provided with our Burglar Alarm and Electric Call Bells.

VII.—ELECTRO-MERCURIAL FIRE ALARM.

Many of the finest business blocks and hotels in the United States are protected by our Electro-Mercurial Alarm.

VIII.—THE GOLD AND STOCK TELEGRAPH COMPANY'S PRINTING TELEGRAPH INSTRUMENTS.

Including Stock Reporting Printers, and Gray's Automatic Printer for private telegraph lines.

IX.—ELECTRO-MEDICAL APPARATUS.

Including Batteries for the application of both Primary and Secondary Currents, and for the Galvano-Cautery.

Elaborate instruments and all the various appliances are kept on hand and are made to order for physicians and Electropathic Institutes.

Our facilities in this department have been largely extended, and we believe that our Electro-Medical Instruments are unexcelled both in quality and variety.

X.—ELECTRIC GAS-LIGHTING APPARATUS.

The Electric system of Gas Lighting is necessary for the satisfactory lighting of Churches, Theatres, Public Halls, Railroad Depots, etc.

The system which we employ has been adopted for the State Houses of Illinois and Michigan, and other first-class buildings, and possesses the highest merits.

We can furnish no general price list for Electric Gas Lighting, for the reason that no two contracts are alike in their requirements. Buildings will be examined and tenders furnished on application.

XI.—EDISON'S ELECTRIC PEN AND DUPLICATING PRESS.

XII.—THE GAMEWELL FIRE ALARM TELEGRAPH COMPANY'S APPARATUS.

XIII.—SIR WM. THOMSON'S NAVIGATIONAL INSTRUMENTS.

XIV.—UNDERGROUND AND ÆRIAL CABLES.

XV.—TELEPHONE EXCHANGE ANNUNCIATORS, SWITCH-BOARDS, &c., AND TELEPHONE APPARATUS OF EVERY DESCRIPTION.

(Telephones are manufactured only for the patentees.)

MORSE INSTRUMENTS.

Our Magnet Cores are made of the best Norway iron, so thoroughly annealed as to avoid as nearly as possible the presence of permanent magnetism.

The Magnets are wound with wire having 96 to 99 per cent. of the conductivity of pure copper.

We insulate our own wire in the most thorough manner.

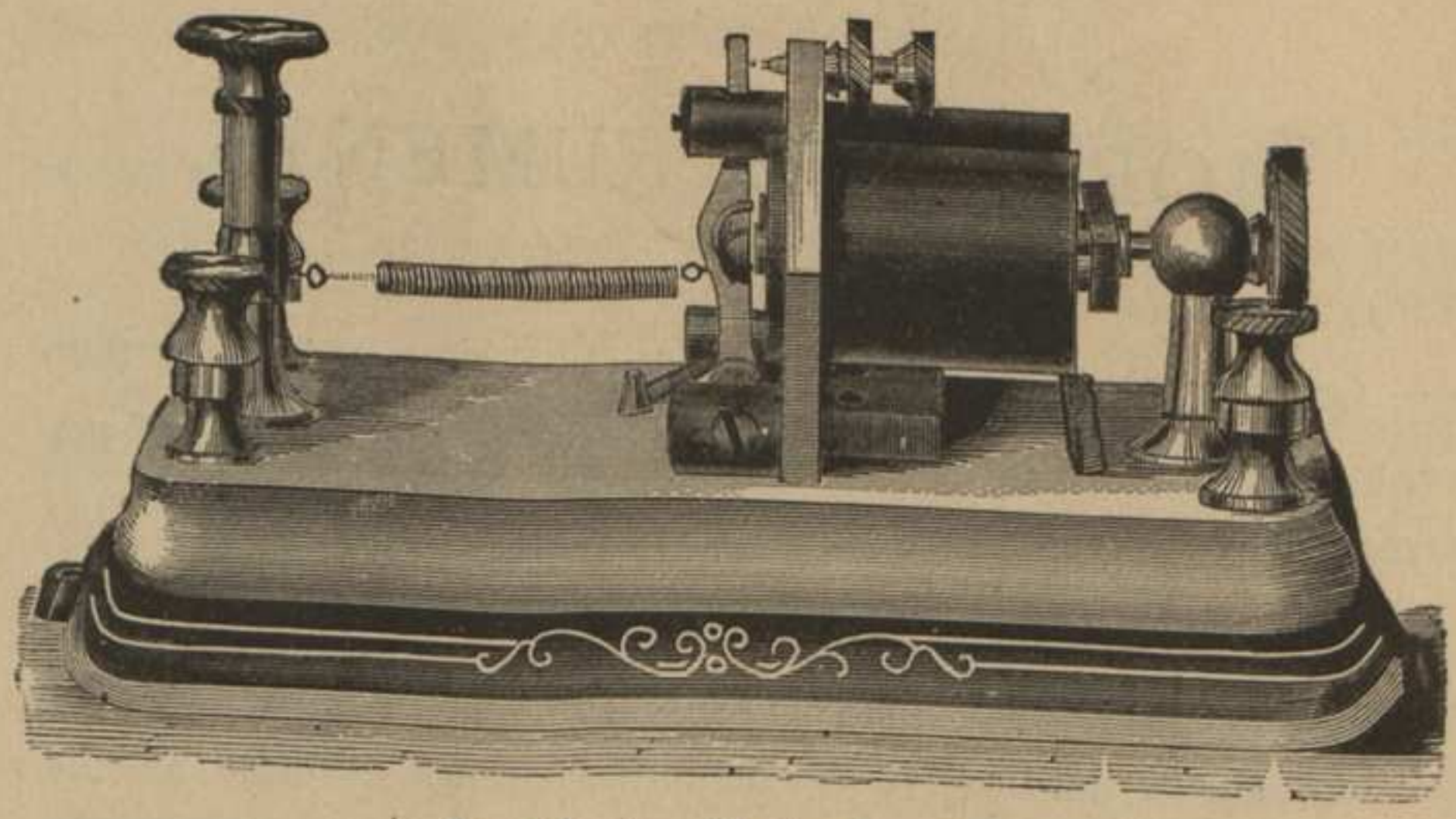
We have always a large quantity of Relays, Sounders and other instruments completed, with the exception of putting wire on the magnets. Upon receipt of an order, we can fill up these magnets with wire of any size, so as to make the resistance exactly as desired.

We prefer to use mahogany in the bases of our instruments for the reason that it takes a high polish, and, especially, because it is the least liable of all the fancy woods to warp or split.

The brass work is all milled to a uniform size, and made of the best metal.

The greatest elegance of design and fineness of finish are combined, consistent with utility and durability of the instruments.

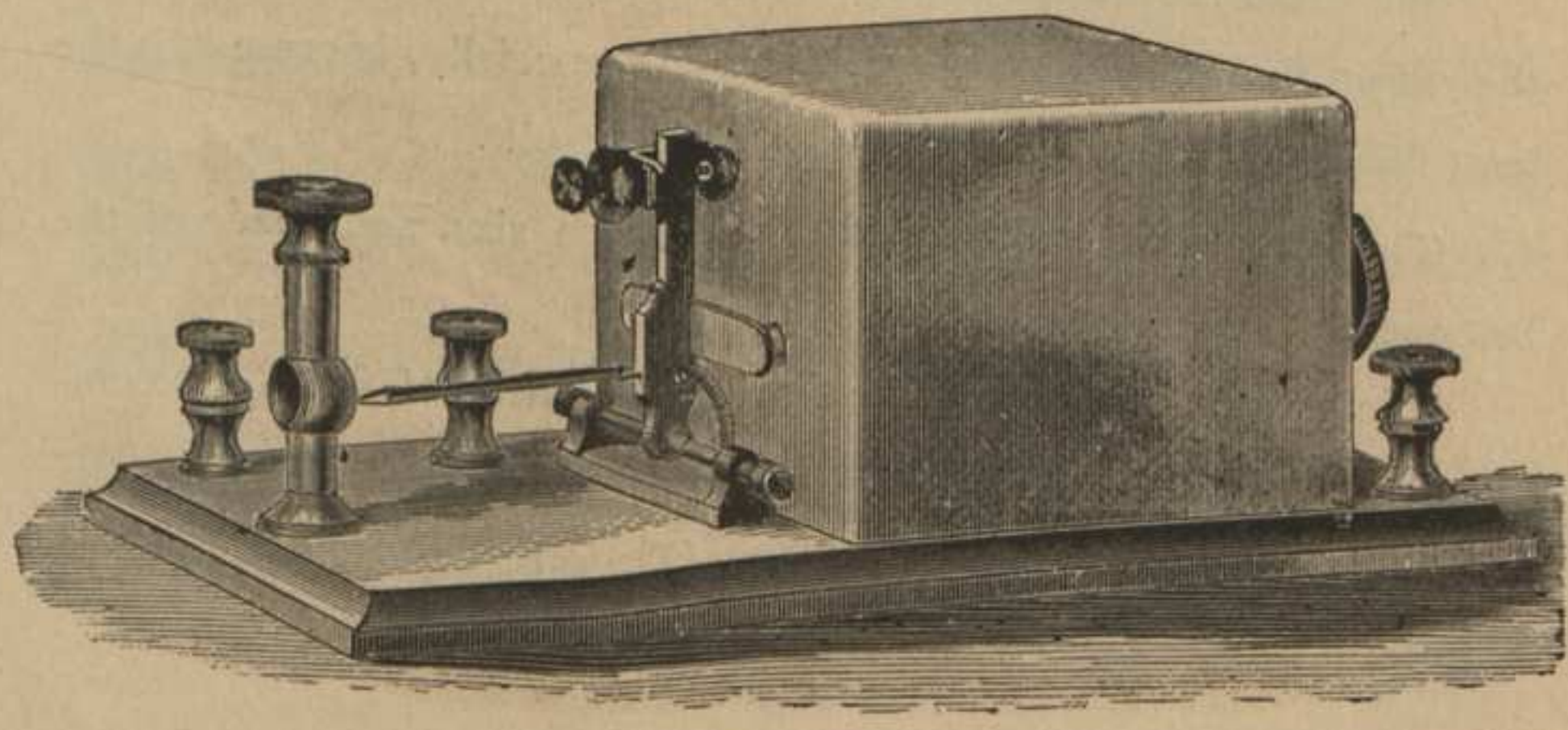
Our Morse Instruments are NICKEL PLATED.



No. 2 Relay, Phelps Pattern.

RELAY.

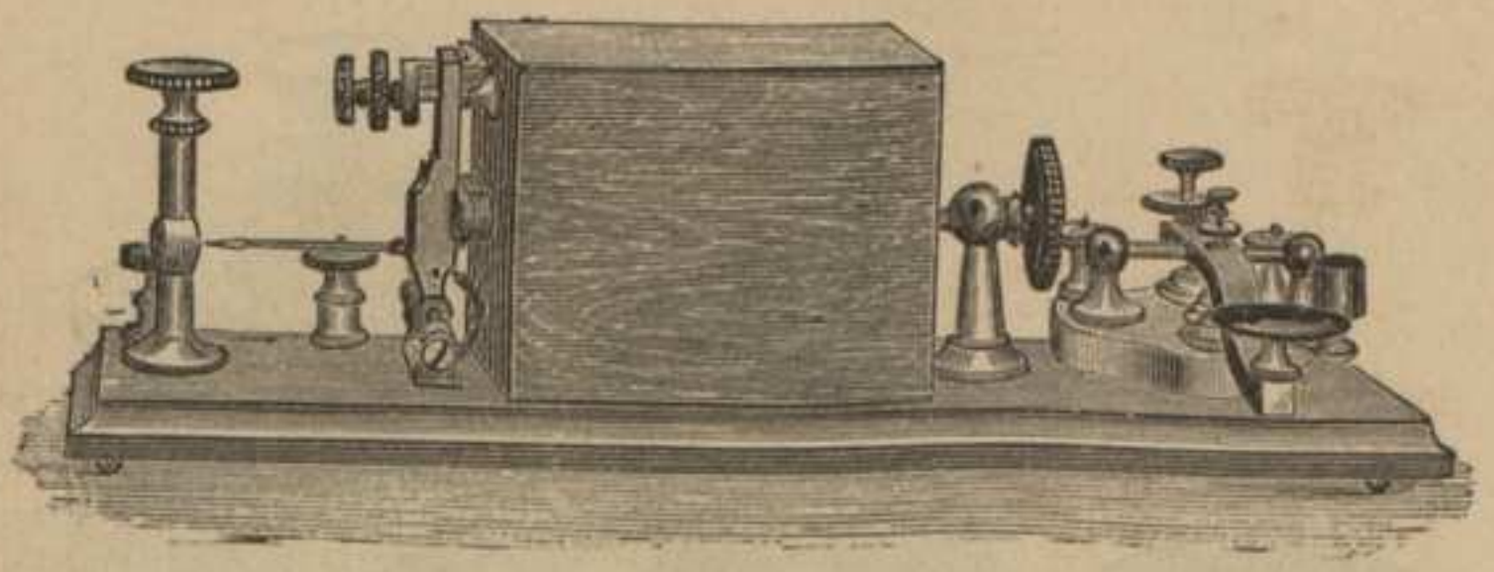
No. 1, Caton Pattern. (See Cover for Cut)	$14 00
" 2, Phelps "	12 00
Polarized, small size, brass finish	8 00



No. 1 Box Relay.

RELAY, BOX.

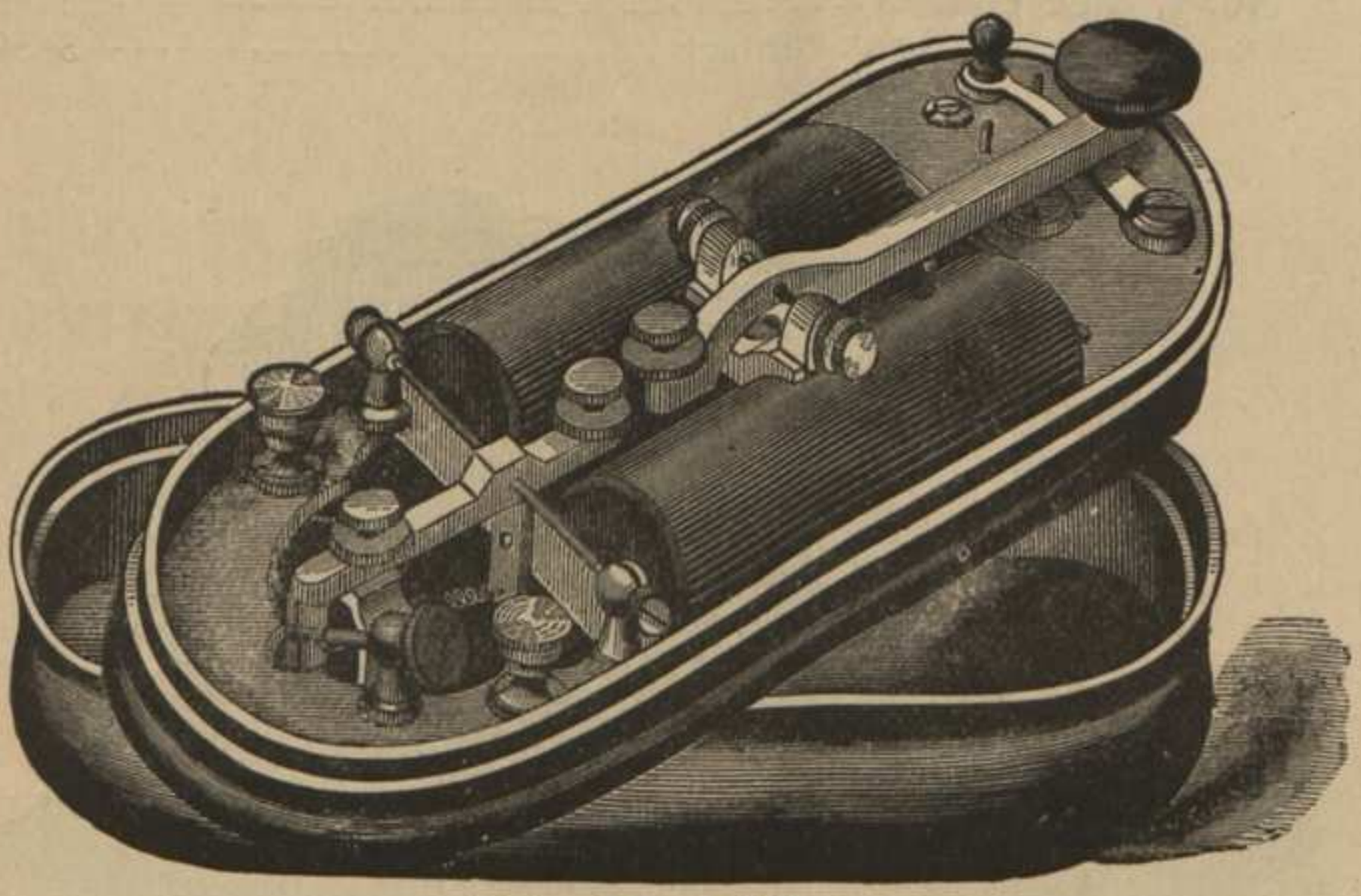
No. 1	$14 00
" 2	12 00
" 3, resistance up to 150 ohms,	11 00



No. 3. Box Relay, with Legless Key.

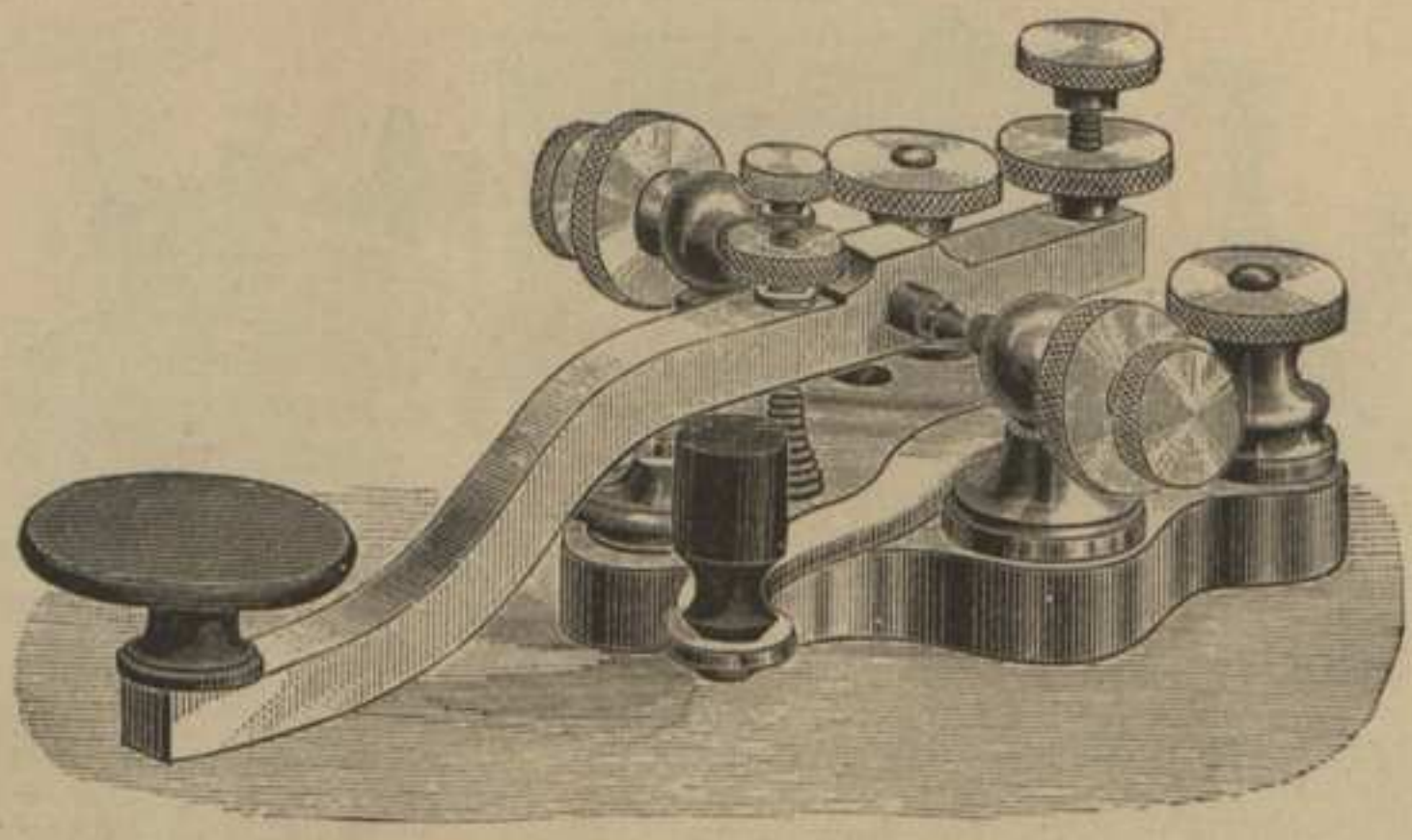
BOX RELAY, KEY ON BASE.

No. 1, with Lewis Legless Key.....$19 00
" 2, " " " " 17 00
" 2, " No. 3 Key 16 00
" 3, " Lewis Legless Key 16 00
" 3, " No. 3 Key..... ..... 15 00



Patent Pocket Relay.

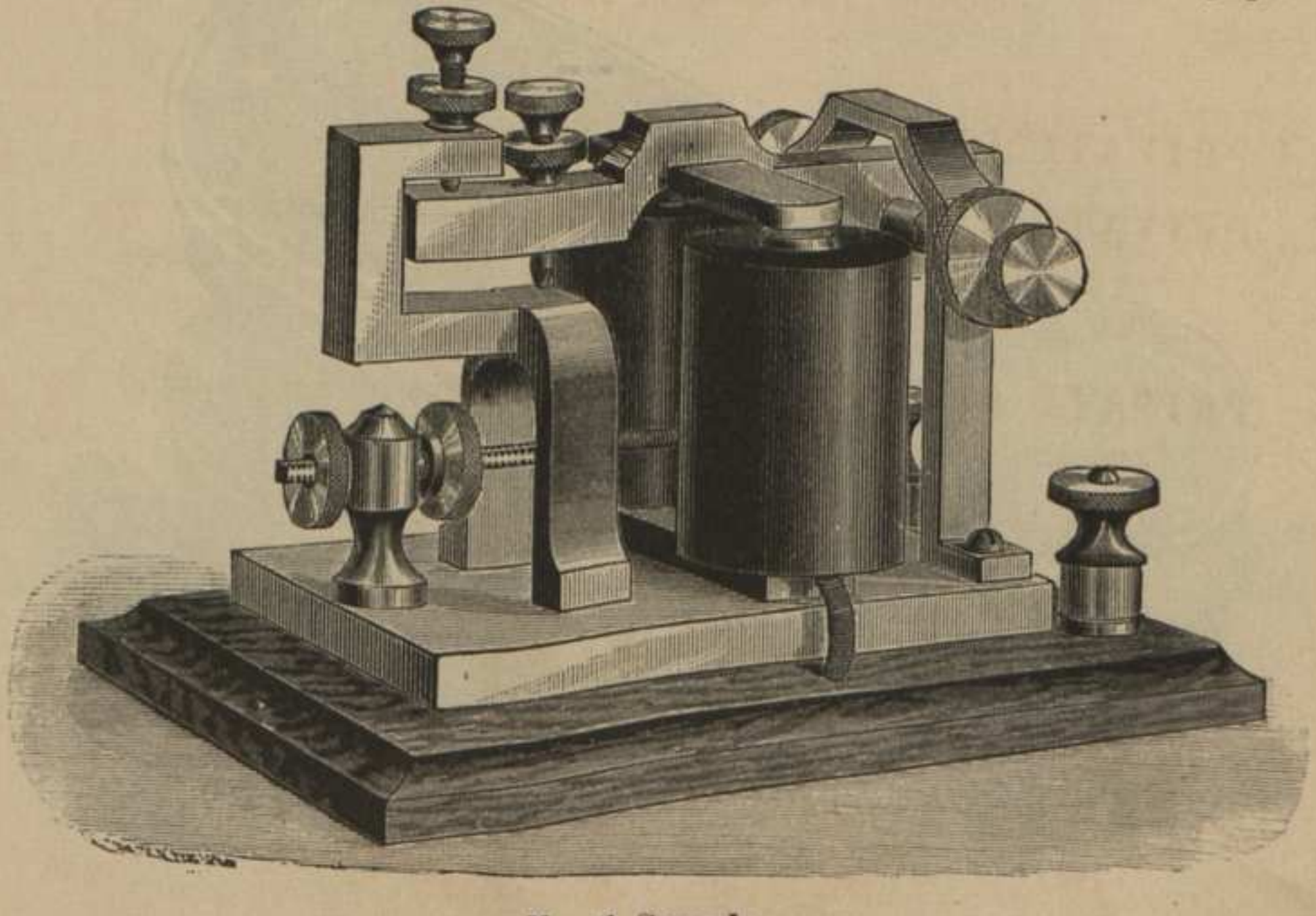
POCKET RELAY, Patent $16 00



No. 1 Lewis Legless Key.

KEY.

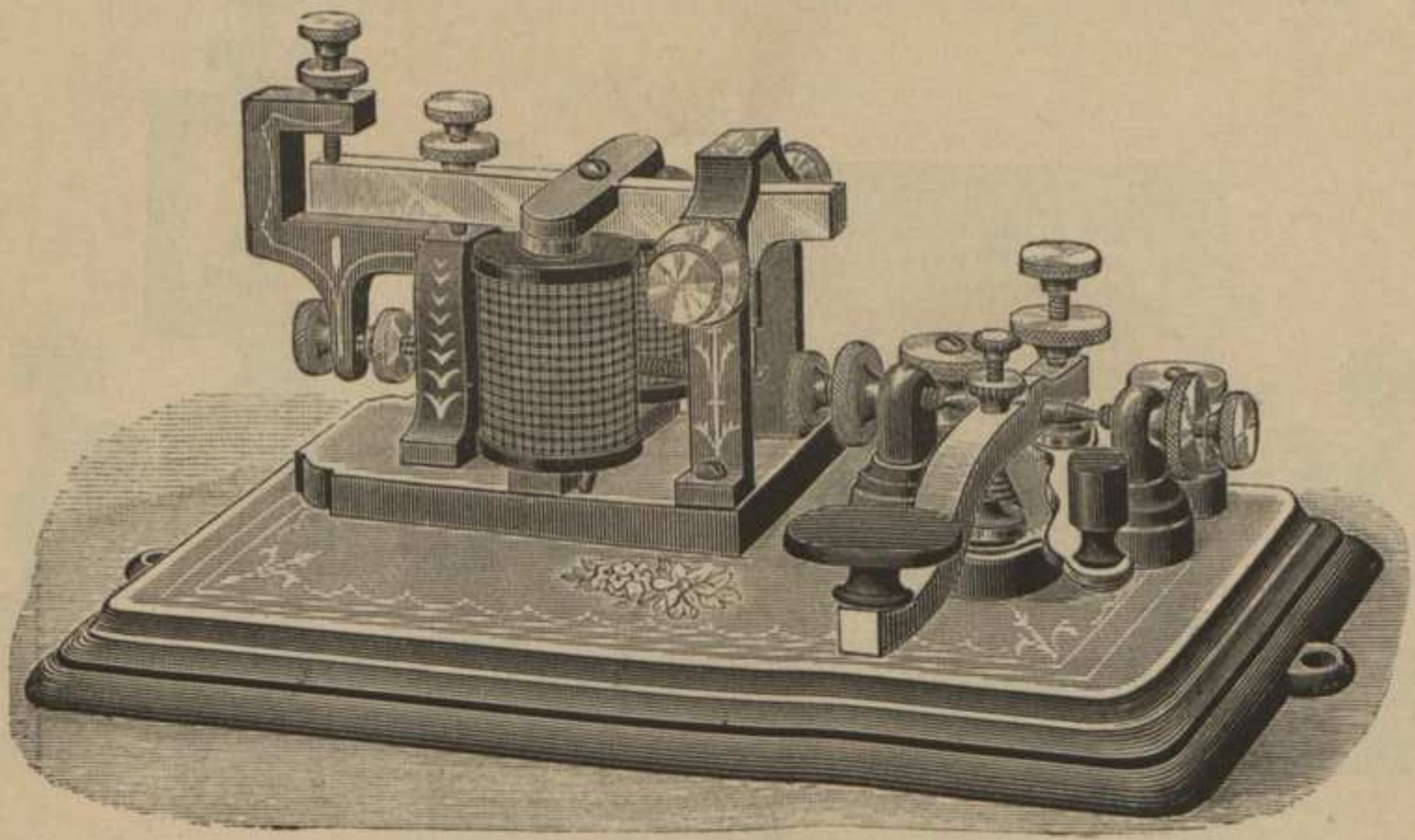
No. 1,	Lewis Patent Legless, Curved Lever	$4 50
" 3,	Lever 3½ inches long, front contact, with circuit-breaker	3 50
No. 3,	back contact	3 25
" 3,	front and back contact	3 50



No. 1 Sounder.

SOUNDER.

No. 1	$ 6 00
Repeating	10 00

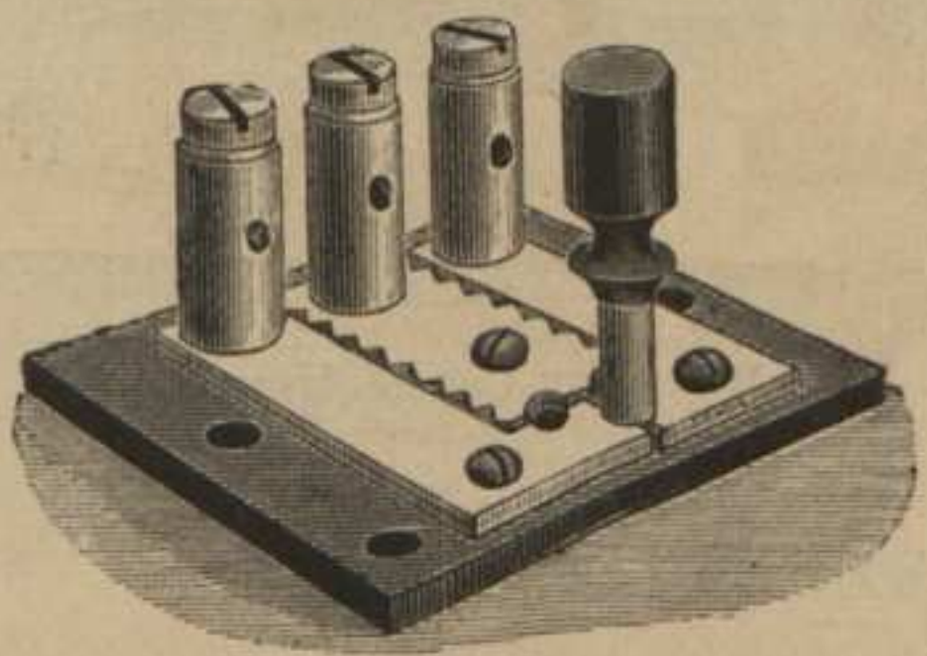


Private Line Instrument.

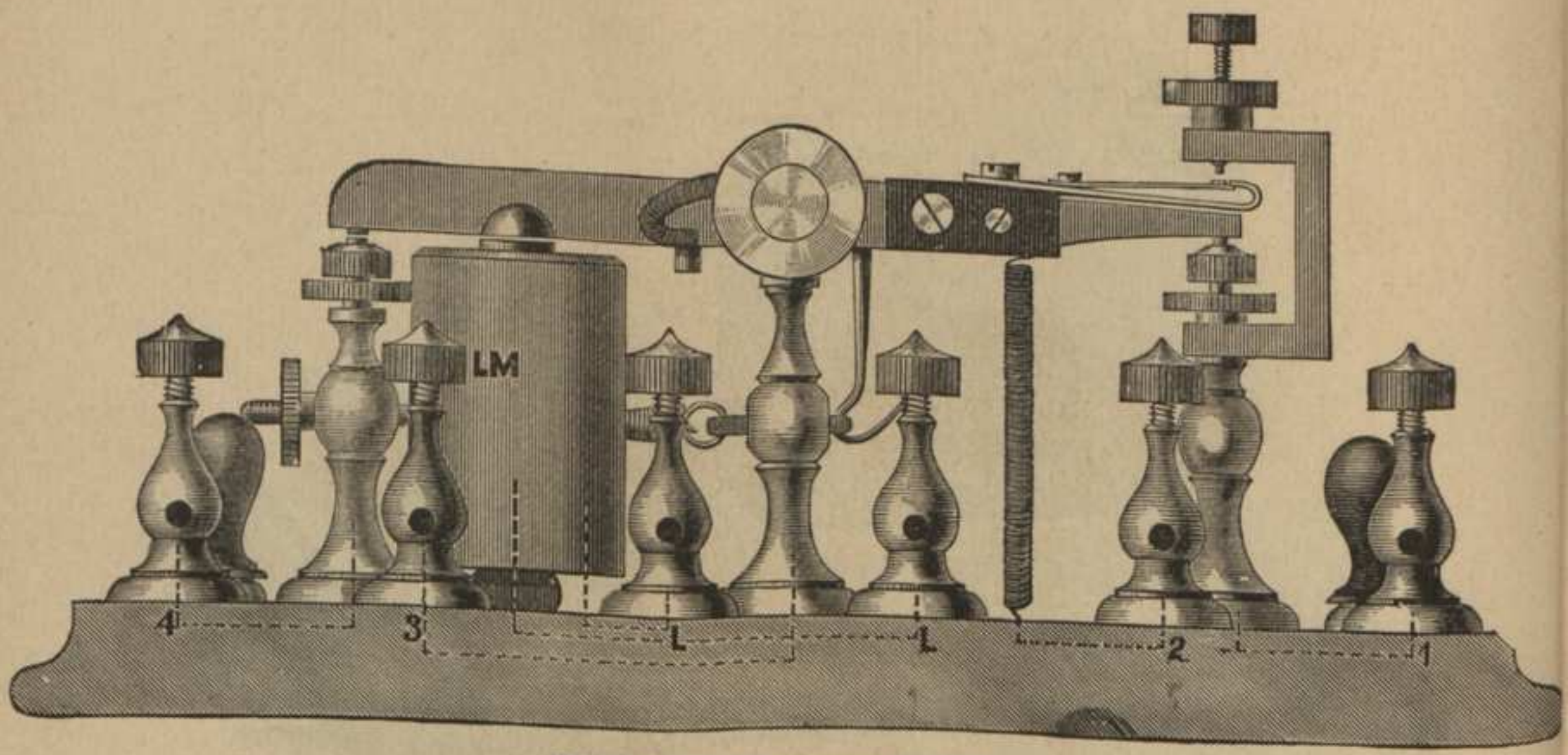
PRIVATE LINE INSTRUMENT $7 00

PRIVATE LINE OUTFIT, including instrument, one cell 6 x 8 Gravity Battery, connecting wire, chemicals and Manual 8 25

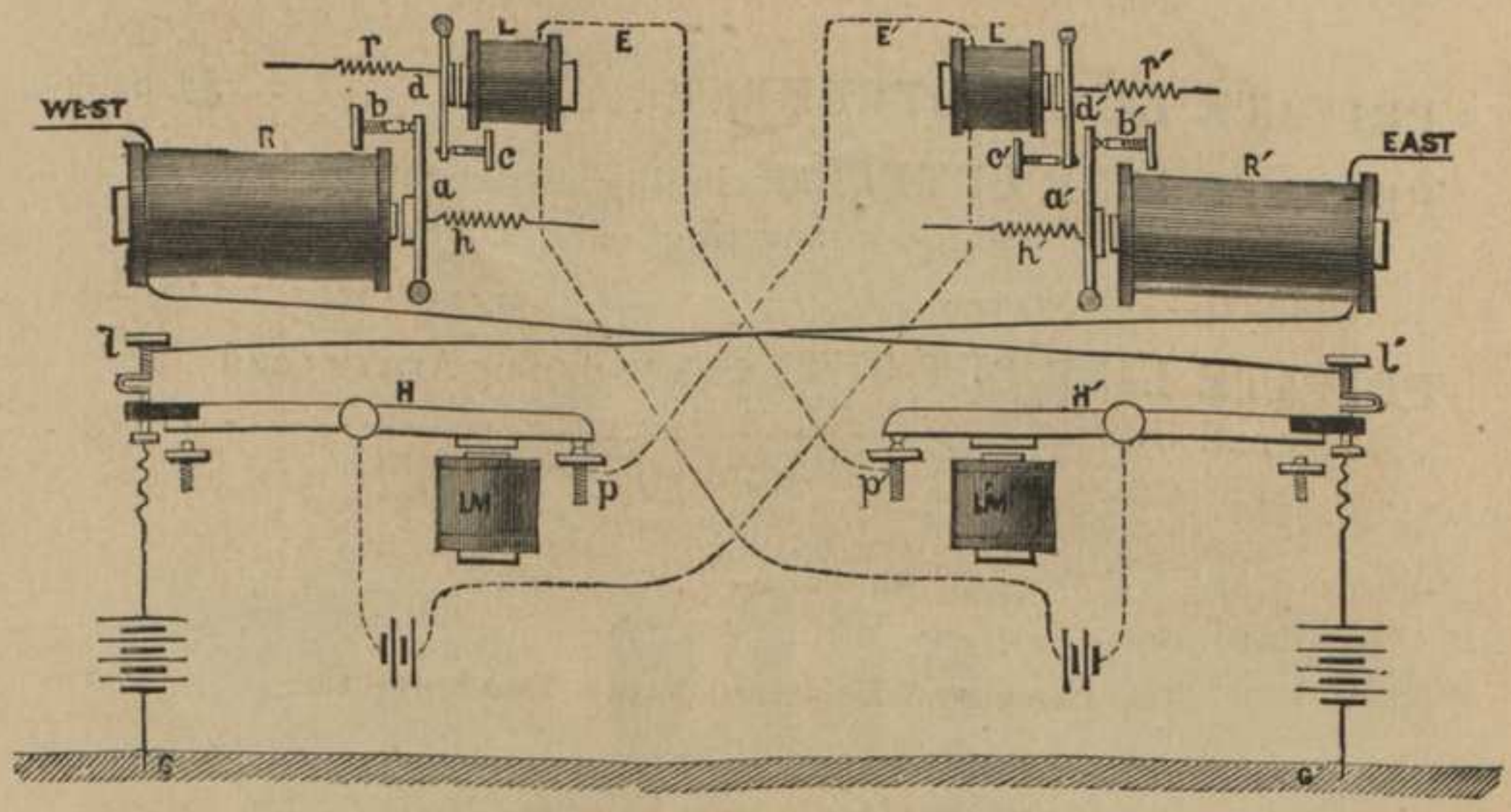
PRIVATE LINE CUT-OUT, with Lightning Arrester and Ground Switch 1 50



Private Line Cut-Out.



Milliken's Repeater Sounder.

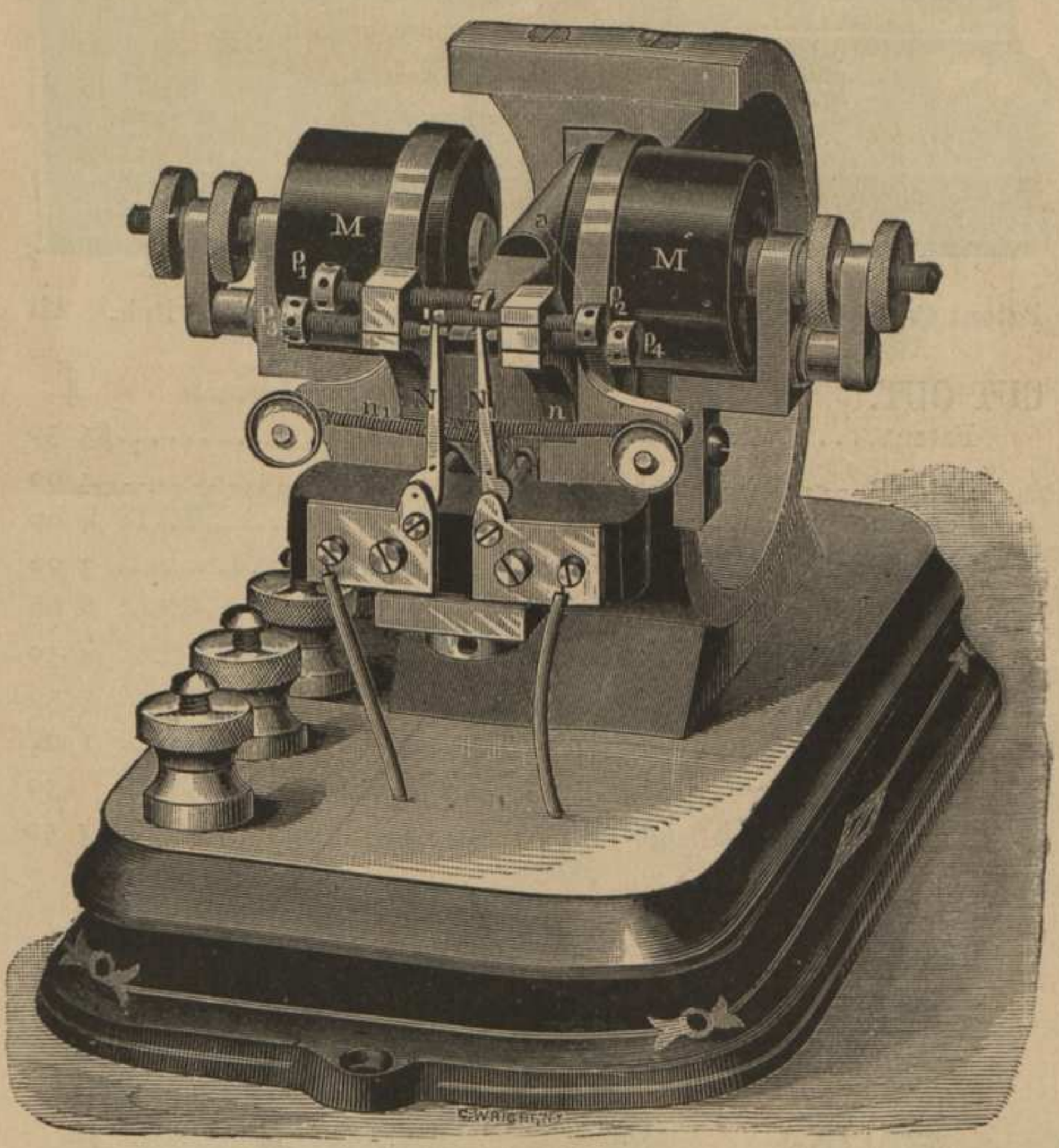


Repeater Connections.

AUTOMATIC REPEATER.

Milliken-Hicks.....$100 00

The Western Union Standard Quadruplex and Duplex.

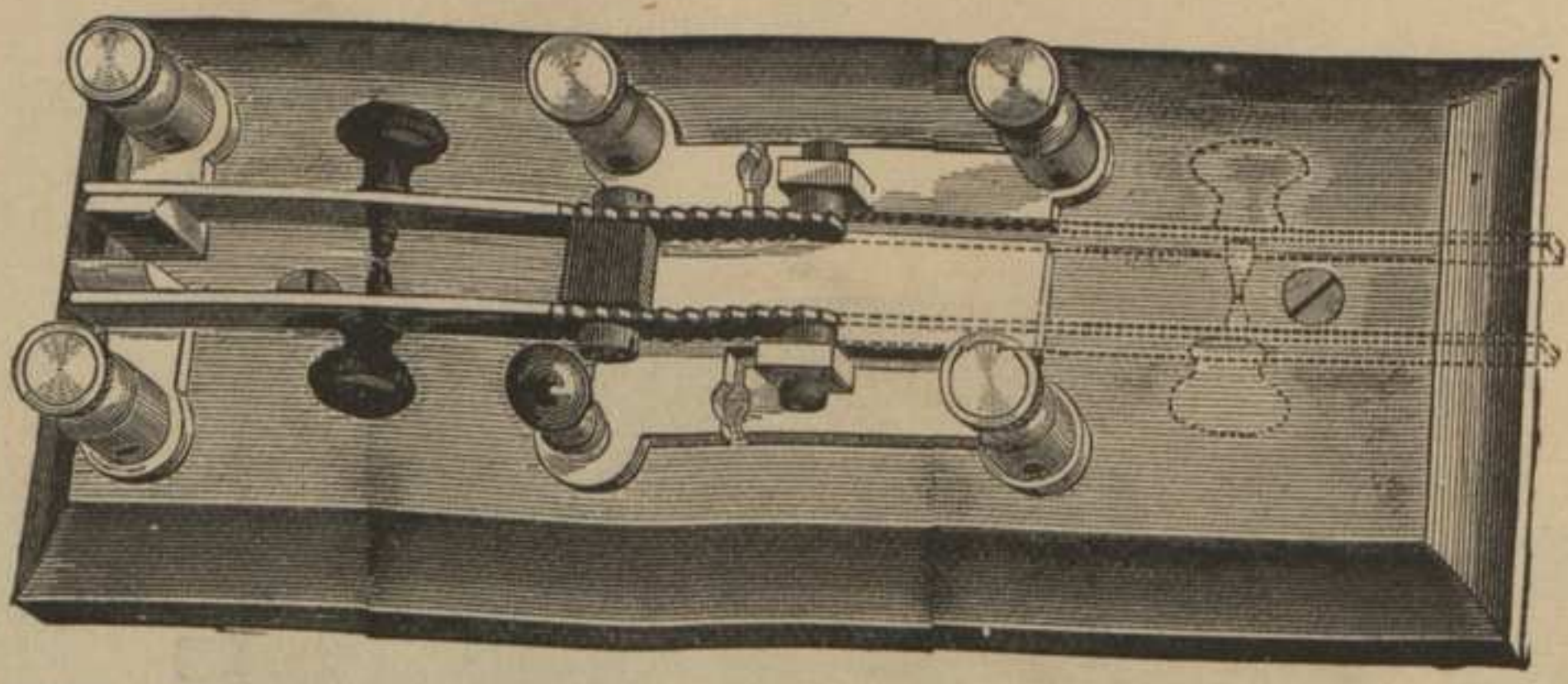


The Compound Polarized Relay (Quadruplex).

Estimates on Quadruplex and Duplex Apparatus (for export) will be furnished upon application.

We also manufacture the apparatus for Gray's Electro-Harmonic Way Duplex. In this system of duplex the Morse or way side does the way business of the line; while the "tone" or through side takes the business between the two most important points.

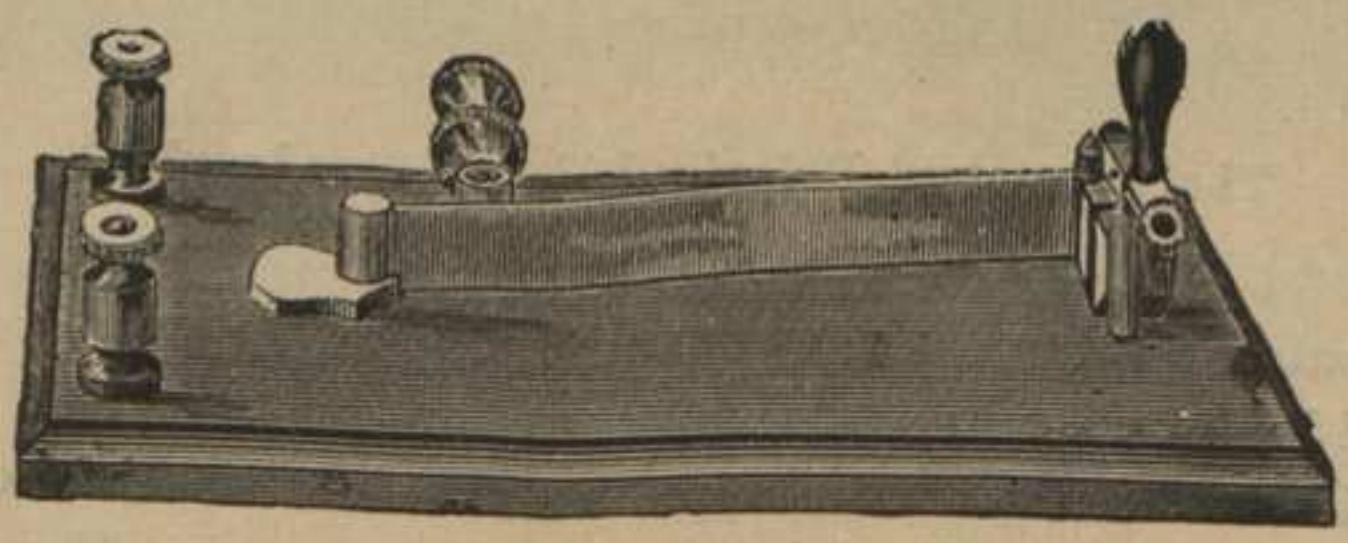
Terms and estimates will be furnished on application.



Patent Cut Out, with Lightning Arrester and Ground Switch. All Connections are on Top.

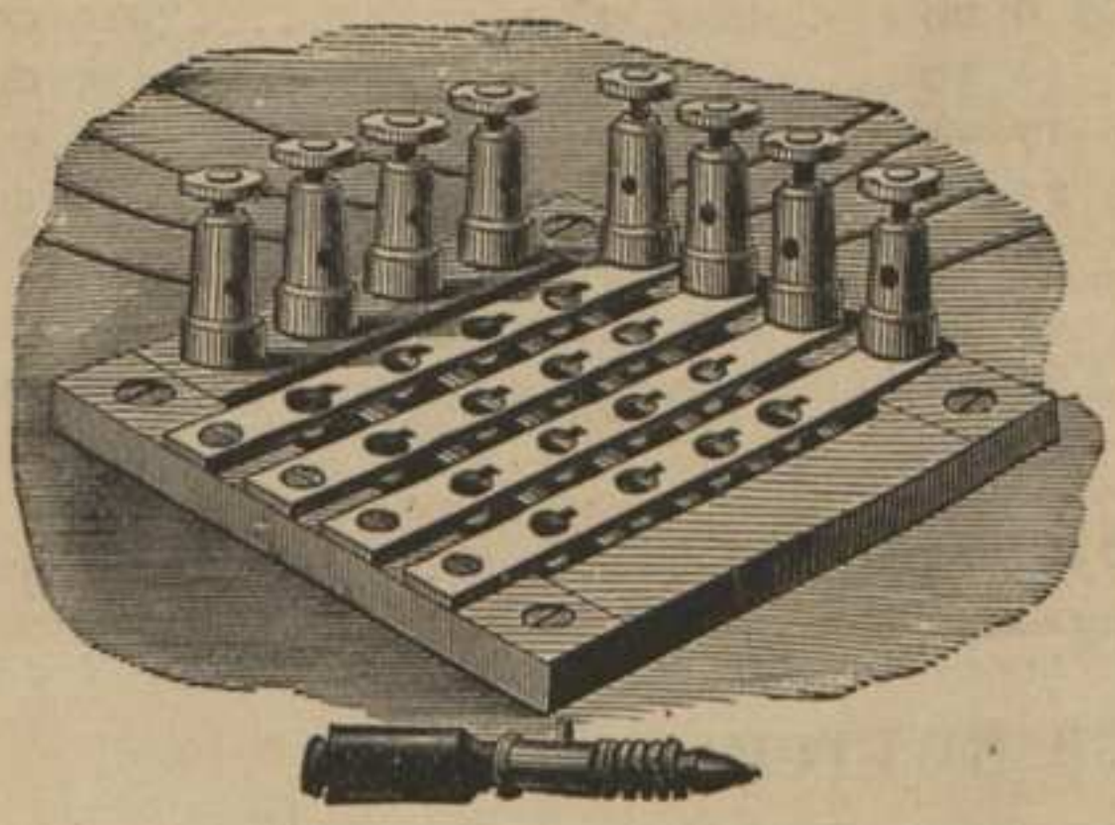
CUT OUT.

Patent	$5 50
Wilson	4 00
Peg, one line	4 00
Plug, single	3 00
" double	6 00
" with Lightning Arrester and Ground Switch	4 50
†Main Line	5 50
Plug for Cut Out	1 00
Peg " " "	30
Private Line, with Lightning Arrester and Ground Switch	1 50

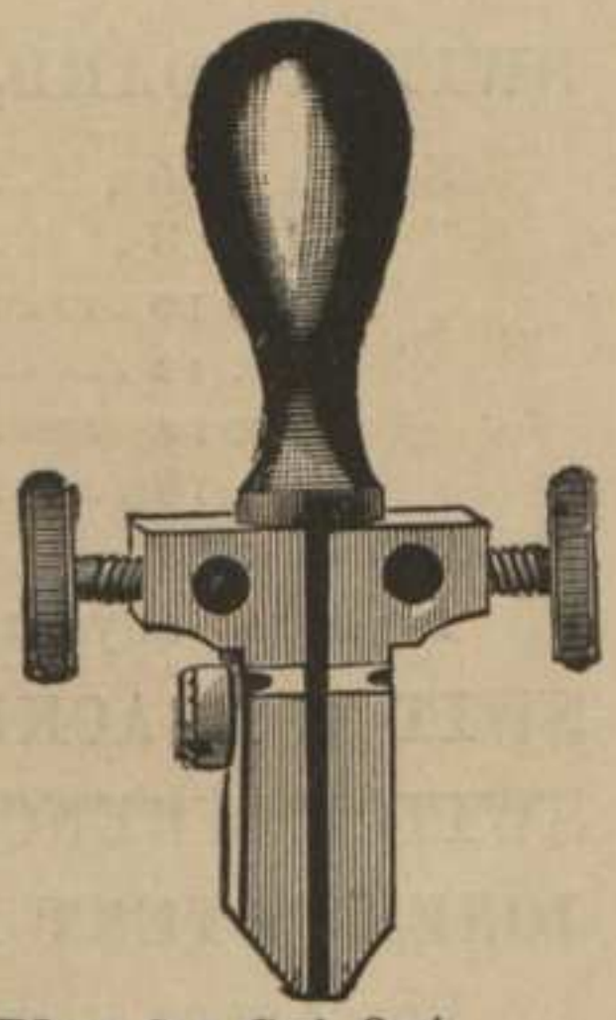


Plug Cut Out.

†To be used on train in case of wreck.



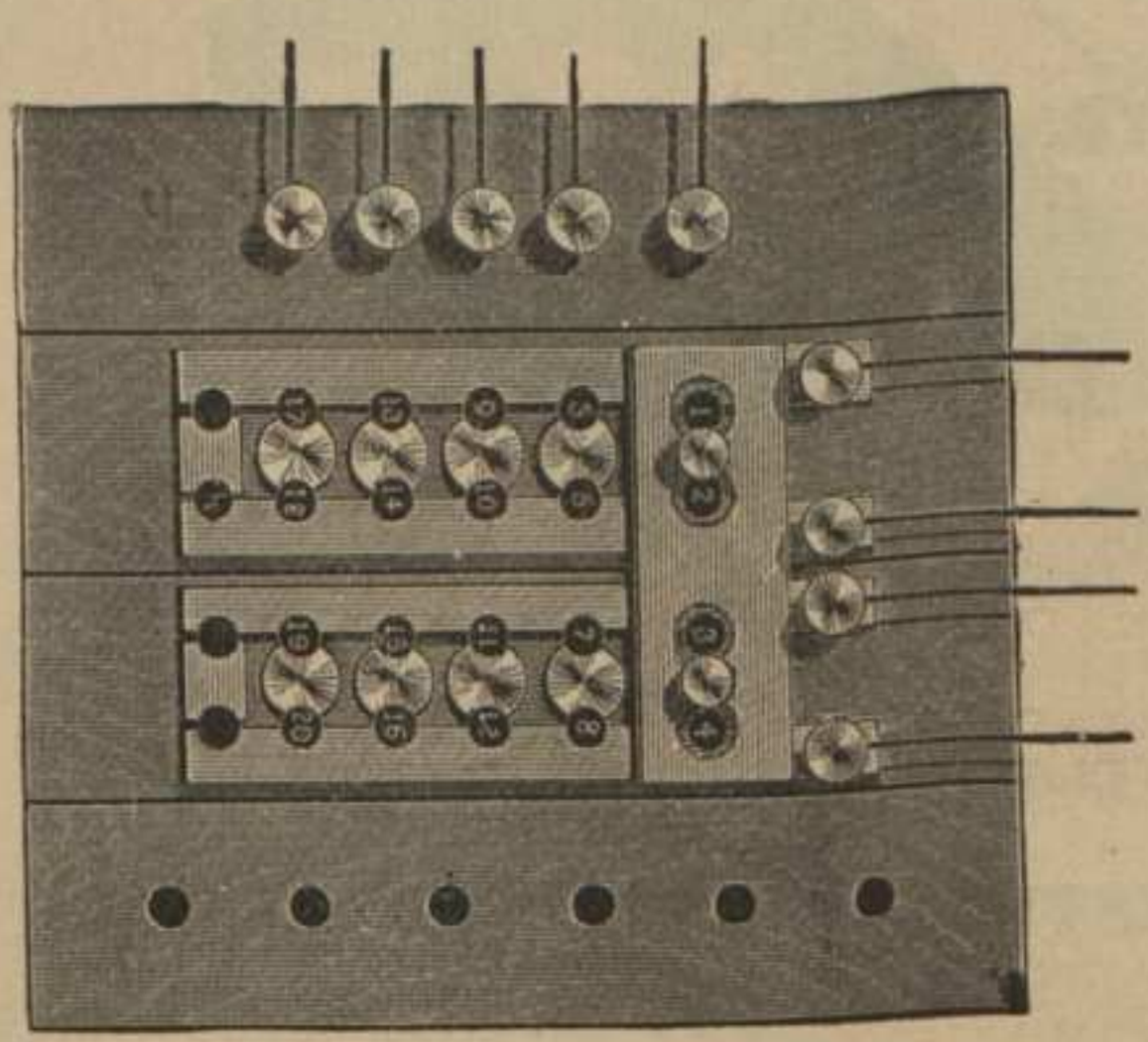
Jones Lock Switch.



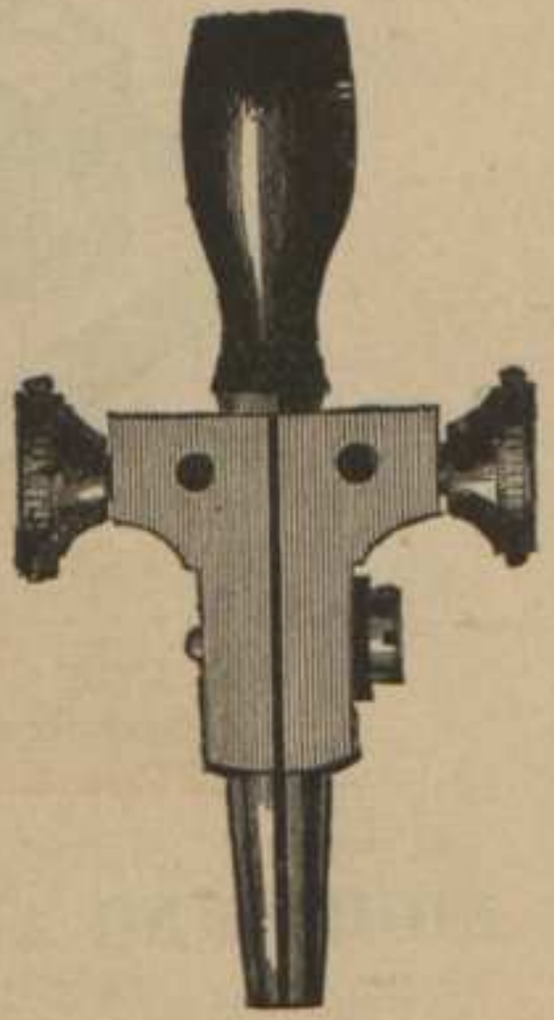
Plug for Cut Out.

SWITCH.

Button Repeater	$6 00
Lever, 2 point	1 25
Lever, 2 point (without binding posts)	1 00
Lever, 3 point	1 50
Neutral point	1 65
Peg, 2 point	1 00
Peg, 3 point	1 25
Pole-changer	3 50
Extension Bell	3 50



4 x 6 (2-line) Peg Switch.



Switch Loop Plug.

SWITCH BOARD, WESTERN UNION, PEG.

Size, 4 x 6	$ 8 00
" 6 x 8	12 50
" 8 x 10	17 50
" 10 x 12	25 00
" 12 x 14	32 50
" 14 x 16	45 00
" 16 x 18	55 00
Size, 18 x 20	$65 00
" 20 x 22	75 00
" 22 x 24	85 00
" 24 x 26	97 50
" 26 x 28	110 00
" 28 x 30	125 00
" 30 x 32	140 00

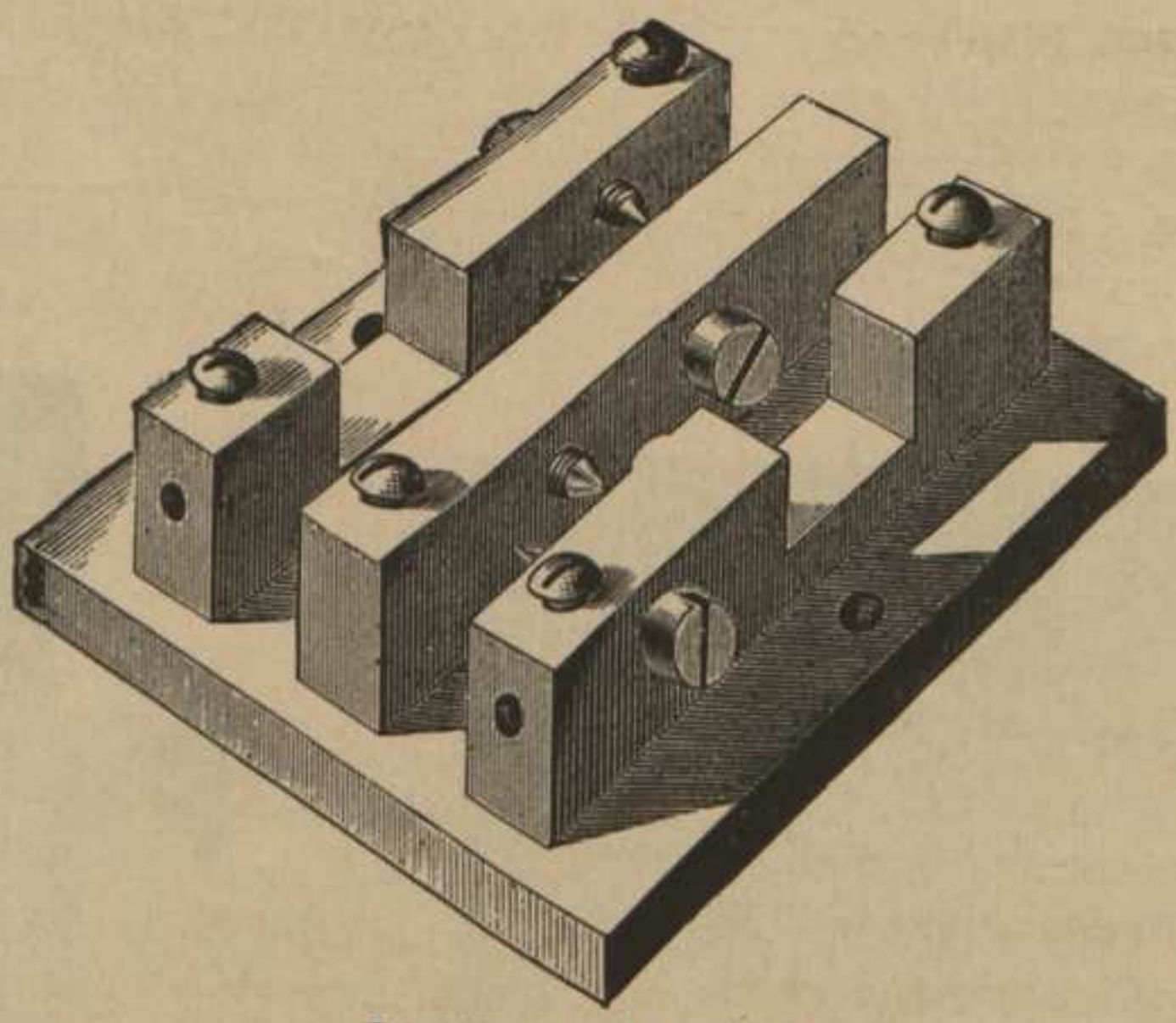
To order, any size.

SWITCH BRACKETS, per pair $1 50
SWITCH WRENCHES, ... 1 25

JONES PATENT LOCK SWITCH.

Prices same as Western Union Peg Switch Boards.

LOOP BOARD, per wire $2 25
LOOP BOARD PLUG 1 50
LOOP CORD 1 50
SPRING JACK, per wire 6 50
" " **PLUG** 2 00
" " **CORD** 1 50



Lightning Arrester.

LIGHTNING ARRESTER.

Single line, 3 Points	$2 50
" " 6 "	3 50
Private line, with Cut Out and Ground Switch	1 50

PARTS OF INSTRUMENTS.

Register Key	$1 25
" Cord	35
" Weight and Pulley	2 25
" " without Pulley	1 75
" Pulley	50
" Reel	3 00
Base, Relay	1 00
" Sounder	60
Binding Post	18
Binding Post, Table, Large	25
" " " Small	20
Key Lever Knob	20
" Circuit Closer Knob	10
Table Adjusting Post	75
Caton " "	1 00
Trunnion Set Screw	20
Adjustment Screw and Nut	20
Relay Springs, per dozen	60
Platinum Point	20

HORSE-SHOE MAGNETS.

Length.	Weight.	Price.
2 inches.	1 oz.	$ 10
2½ "	1½ "	10
3 "	2 "	15
3½ "	3 "	20
4½ "	6 "	30
5 "	9 "	35
6 "	12 "	60
7 "	15 "	75
8 "	20 "	1 00
9 "	30 "	1 35
10 "	40 "	1 75
11 "	60 "	2 00
12 "	64 "	2 25

MACHINE—EXTRA HEAVY.

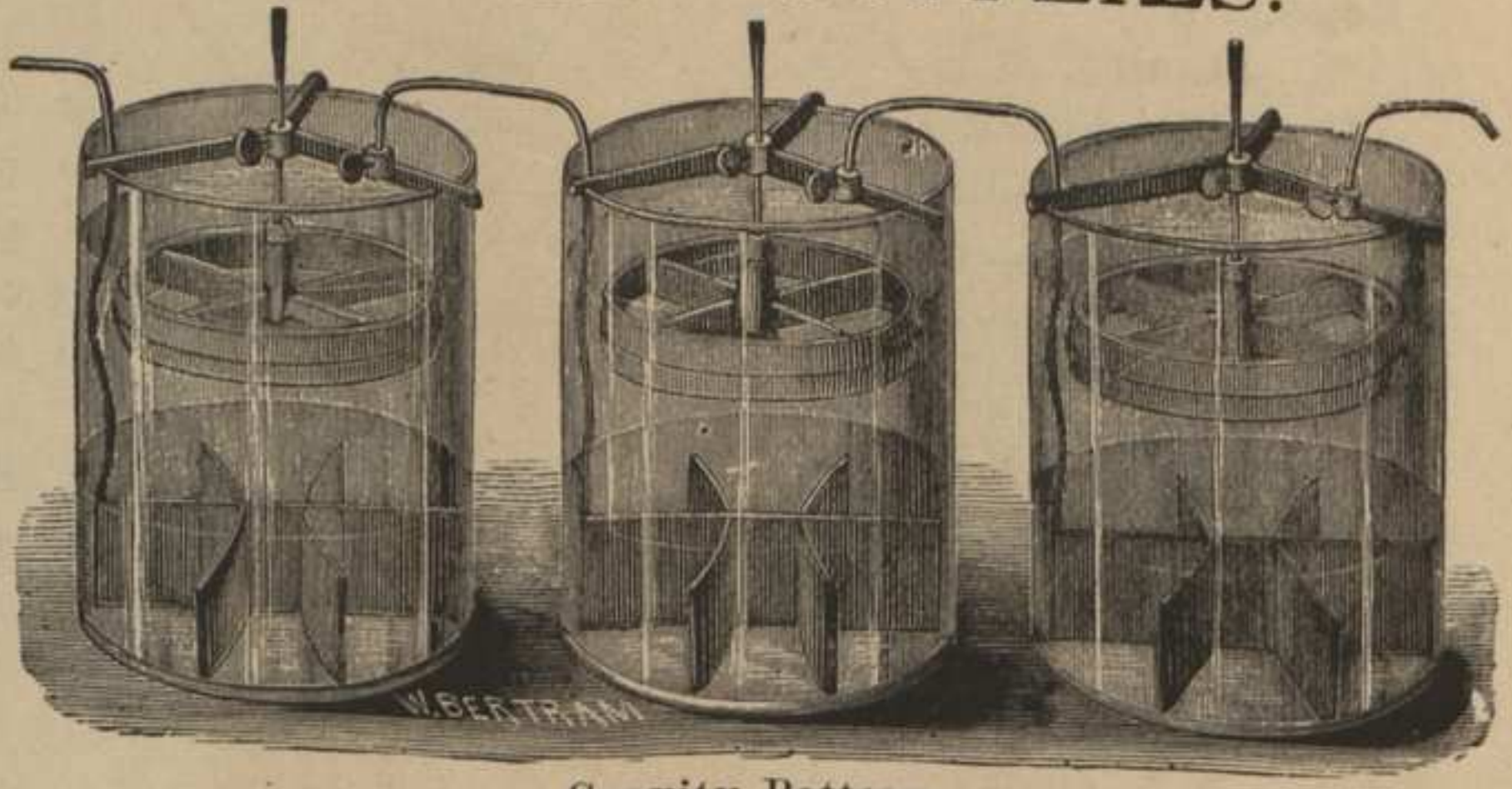
Length.	Weight.	Price.
4 inches.	12 oz.	$0 60
6 "	31 "	1 15
8 "	43 "	1 50
9 "	77 "	2 75
10 "	42 "	net 1 00

BAR MAGNETS.

Length.	Weight.	Price.
4 inches.	1½ oz.	$0 15
9 "	15 "	75
12 "	17½ "	1 00
14 "	25 "	1 35

INDUCTION COILS. Coil with Automatic Break and Plain Commutator, giving ¼-in. spark, on neat mahogany base ---------- $10 00
Similar " Coil, giving ½-in. spark ---------- 15 00
" " 1-in. spark ---------- 30 00
Coil with Cylinder Commutator, giving 1½-in. spark ---- 40 00
Similar " Coil, giving 2-in. spark ---------- 60 00
" " 3-in. spark ---------- 100 00

BATTERY SUPPLIES.

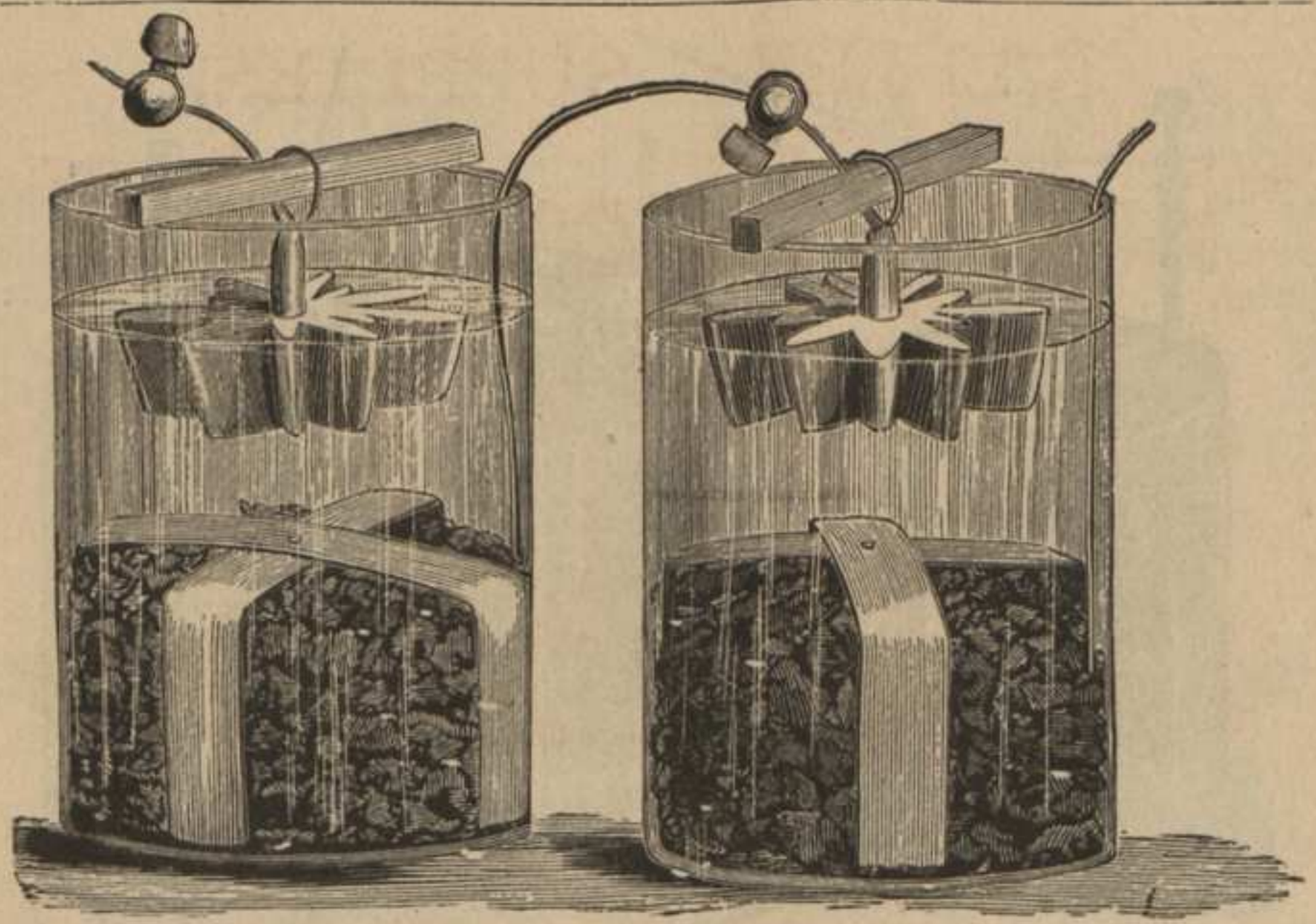


Gravity Battery.

GRAVITY BATTERY.	Main. 5×7 in. No. 1.	Main or Local. 6×8 in. No. 2.	Extra Local 7×8 in. No. 3.
CELL COMPLETE	$0 95	$1 10	$1 30
Zinc	30	40	50
Copper	20	20	20
Tripod Hanger	15	15	15
Jar, Glass	30	35	45

Hill Battery.

HILL BATTERY.	Students', No. 0, 4×5.	Main, No. 1, 5×6.	Main, No. 2, 6×6.	Local No. 3, 6½×6.
CELL COMPLETE	$0 65	$0 90	$1 00	$1 10
Zinc	20	25	30	35
Copper	13	15	20	20
Hanger	12	20	20	20
Jar, Glass	20	30	30	35

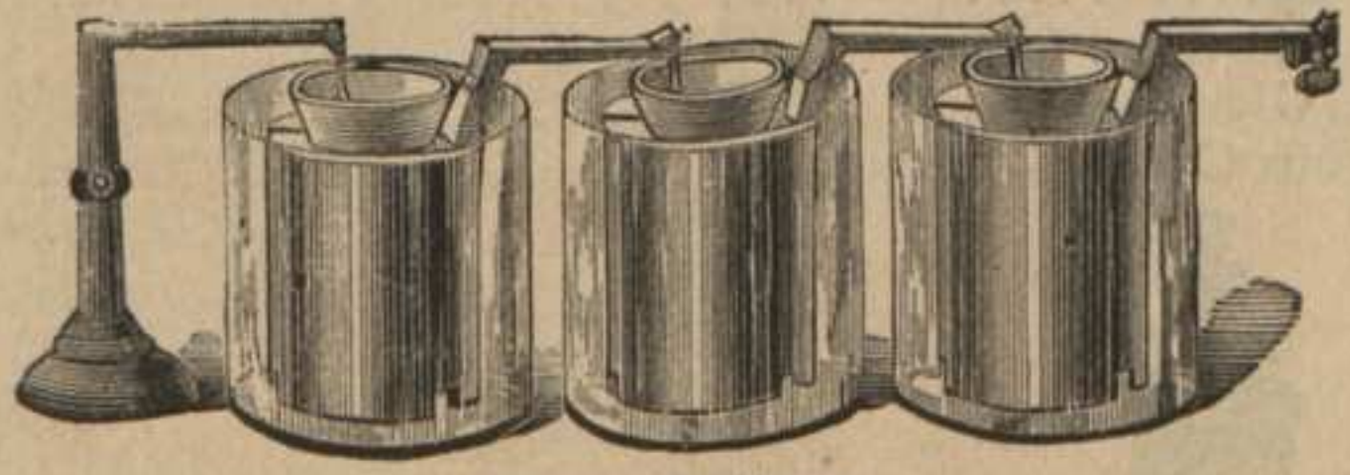


Haskins Battery.

HASKINS BATTERY.

LOCAL AND MAIN (Jar, 6x8).

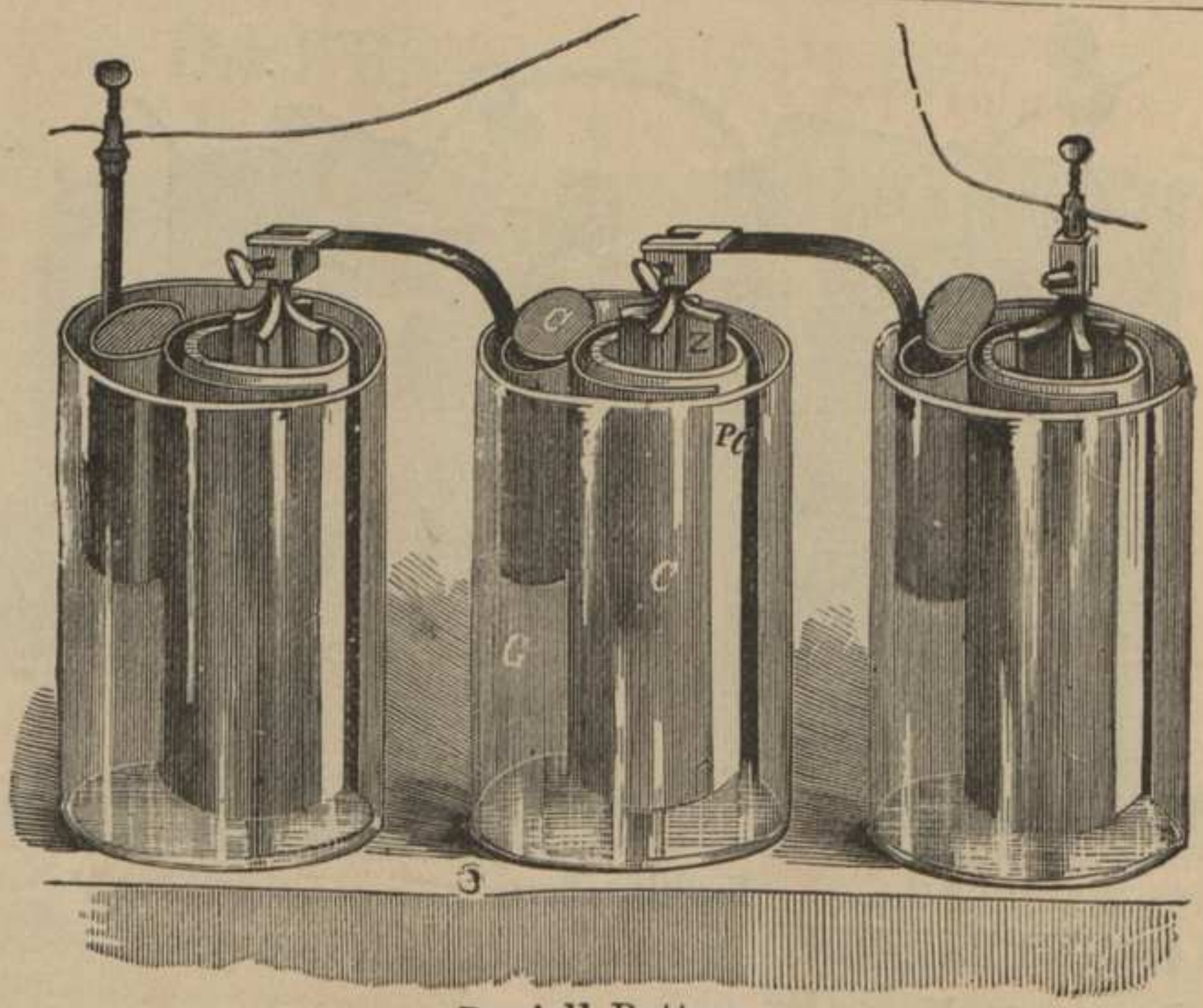
CELL COMPLETE,	$1 30	Connector and Hanger.	20
Zinc.....	50	Jar, Glass.....	35
Copper.....	25		



Grove Battery.

GROVE BATTERY.

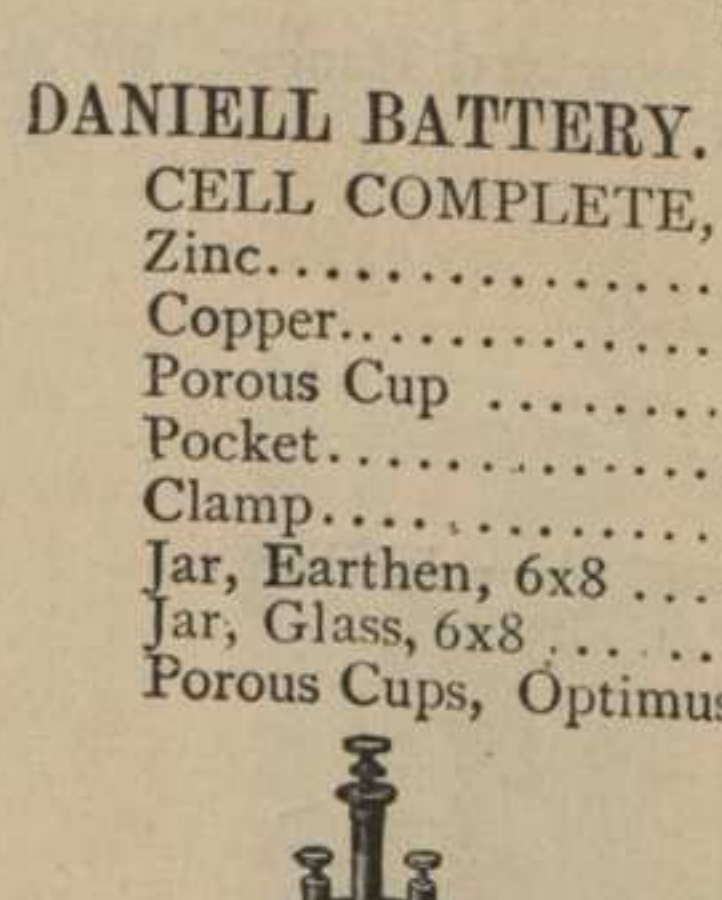
CELL COMPLETE.....	$1 80
Zinc.....	40
Platinum.....	1 00
Porous Cup.....	15
Jar, 3x4.....	25
Porous Cups.....per doz.,	1 25
Standard.....	1 00



Daniell Battery.

DANIELL BATTERY.

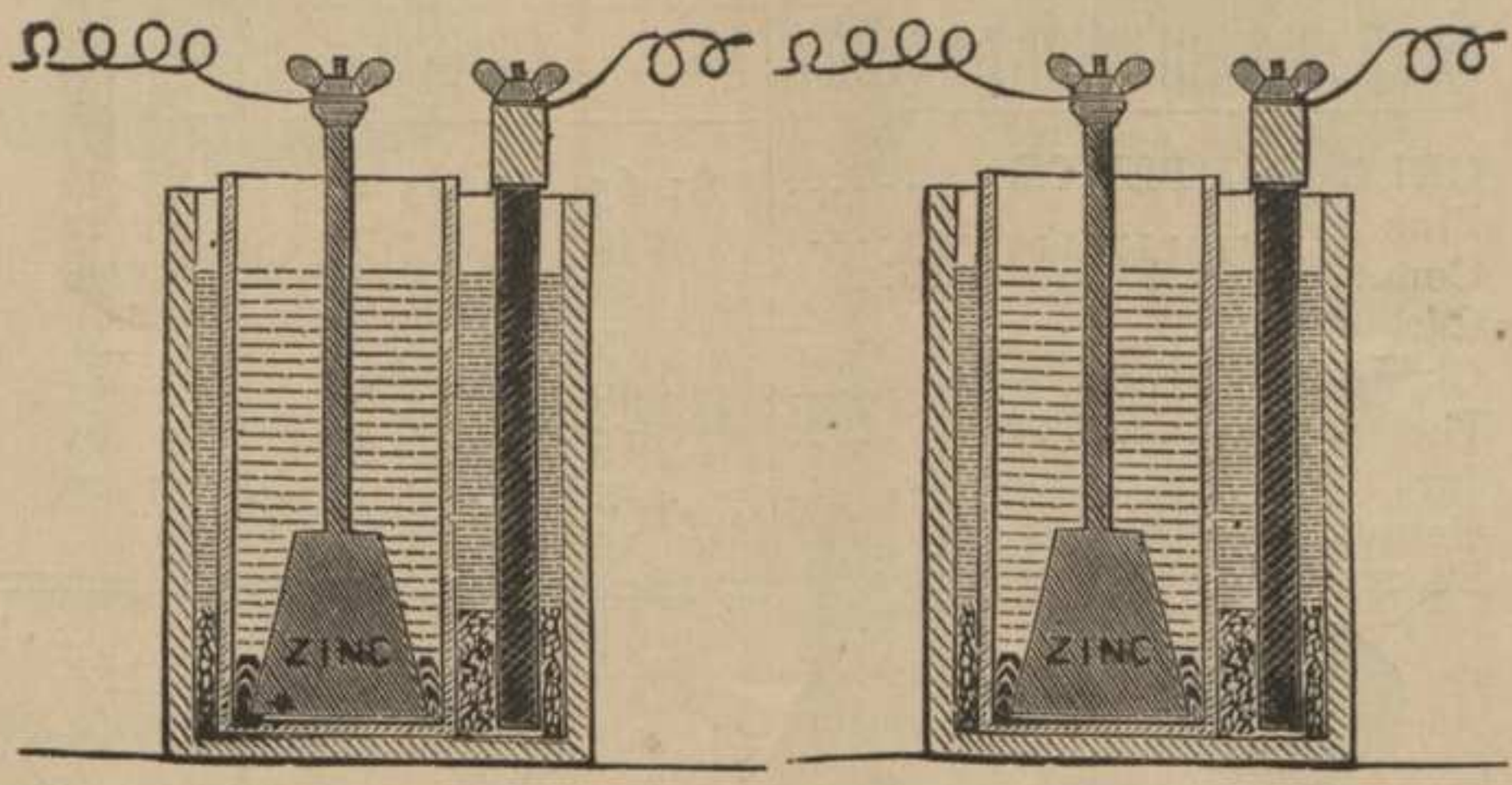
CELL COMPLETE, Earthen Jar	$1	50
Zinc		35
Copper		35
Porous Cup		20
Pocket		15
Clamp		25
Jar, Earthen, 6x8		20
Jar, Glass, 6x8		35
Porous Cups, Optimus, per doz.,	2	25



GRENET BATTERY, CELLS COMPLETE.

No. 1, 6 inches high	$2	00
No. 2, 8 "	3	75
No. 3, 10 "	4	25
No. 4, 12 "	5	75

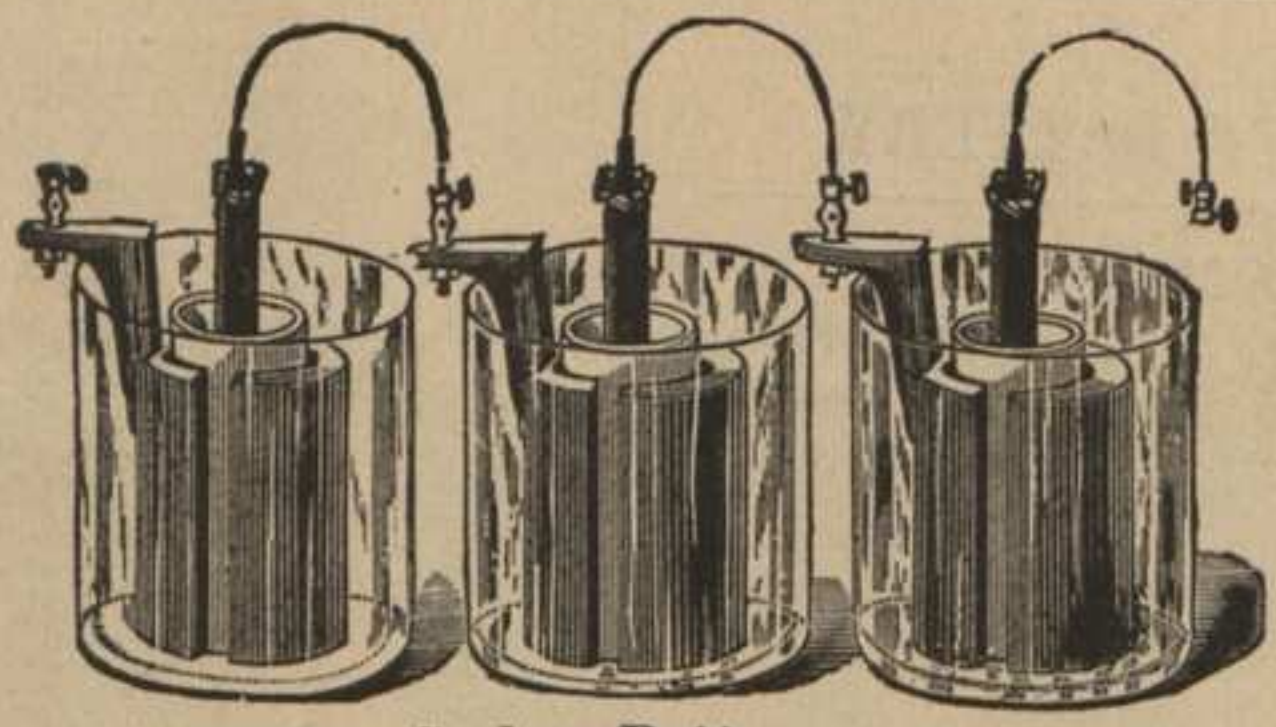
SMEE BATTERY.	No. 1, 3×4 in.	No. 2, 4×5 in.	No. 3, 5×7 in.	No. 4, 6×8 in.
CELL COMPLETE.....	$2 75	$3 75	$5 55	$7 10
Zincs, (rolled) per pair.....	2¼x4½, 50	3x5, 1 00	4x6½, 1 50	5x8½, 2 00
Platinized Silver Plate & Connection	1 50	2 00	3 00	4 00
Zinc Clamp.....	50	50	75	75
Jar.....	25	25	30	35



FULLER'S MERCURY BICHROMATE BATTERY.	No. 1, 5 x 7.	No. 2, 6 x 8.
CELL COMPLETE	$1 50	$1 85
Zinc	25	35
Carbon and Connection.....	60	75
Zinc Connector.....	15	15
Porous Cup.....	20	25
Jar, Glass.....	30	35

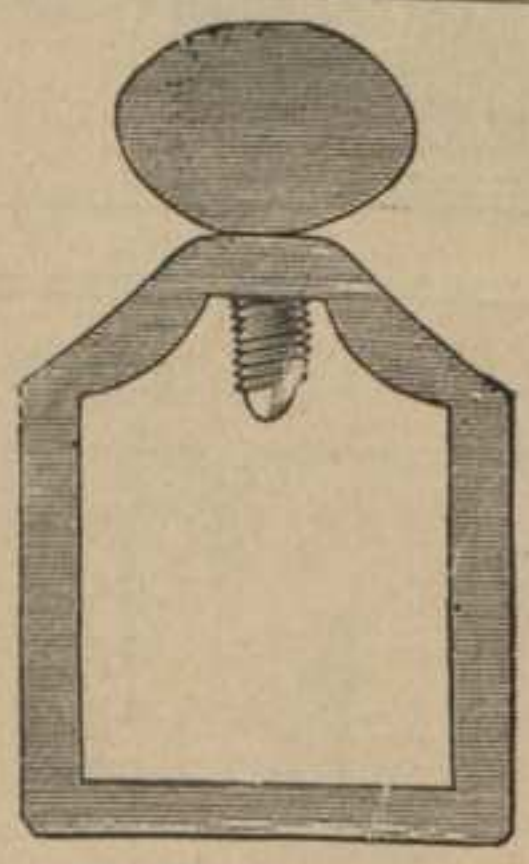
CHLORIDE OF SILVER BATTERY.

CELL COMPLETE.....	$1 50
Silver and Zinc, with Binding Posts and Paraffine Stopper	1 35
Jar, Glass ($5\frac{1}{2}$ x $1\frac{1}{4}$ x $1\frac{1}{4}$)	15
Silver Strip and Chloride	1 20
Allowance for old cell returned.....	60

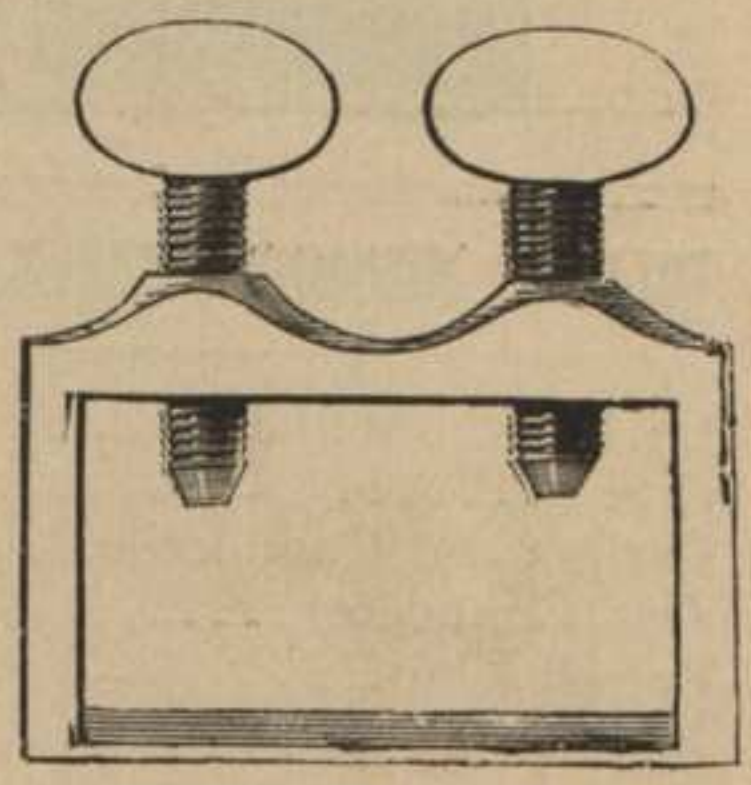


Carbon Battery.

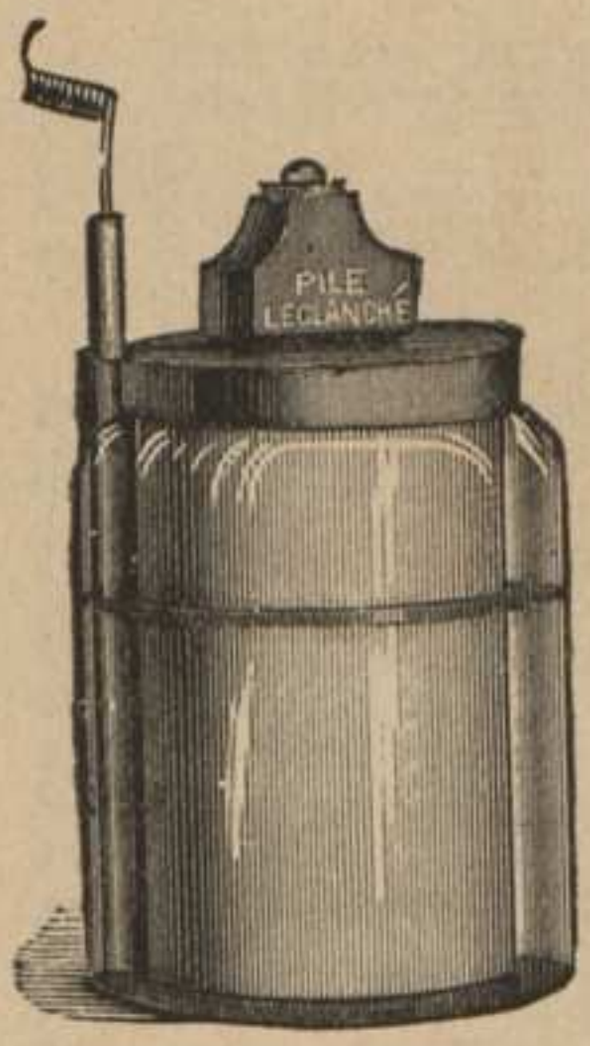
CARBON & BUNSEN BATTERY.	No. 1, 4 x 4.	No. 2, 6 x 8.	No. 3, 6x9x8
CELL COMPLETE	$1 65	$3 25	$5 25
Zinc	40	90	1 25
Connector for Zinc	20	30	20
Carbon	25	80	1 50
Clamp for Carbon	40	60	85
Porous Cup	15	30	65
Jar	25	35	1 00
Porous Cups per doz.	1 25	3 25	----



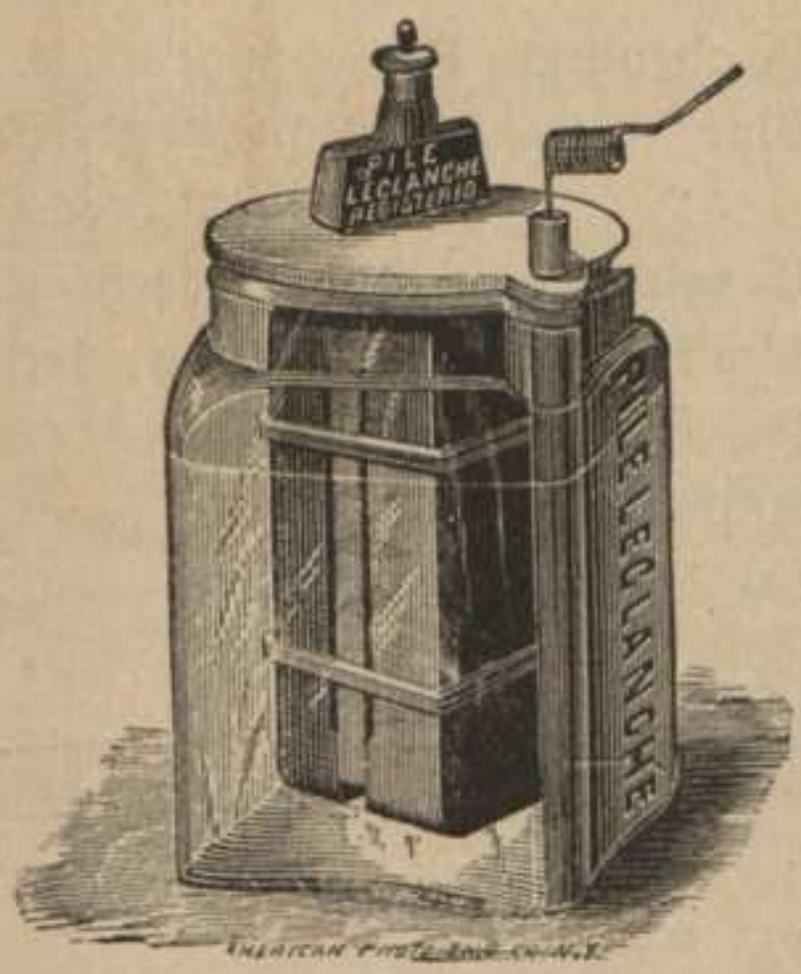
Carbon Clamp No. 1.



Carbon Clamp No. 2



Disque, Complete.

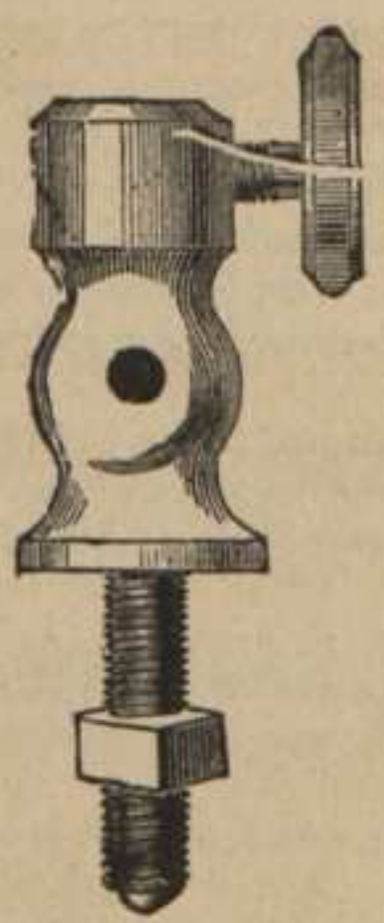


Prism, Complete.

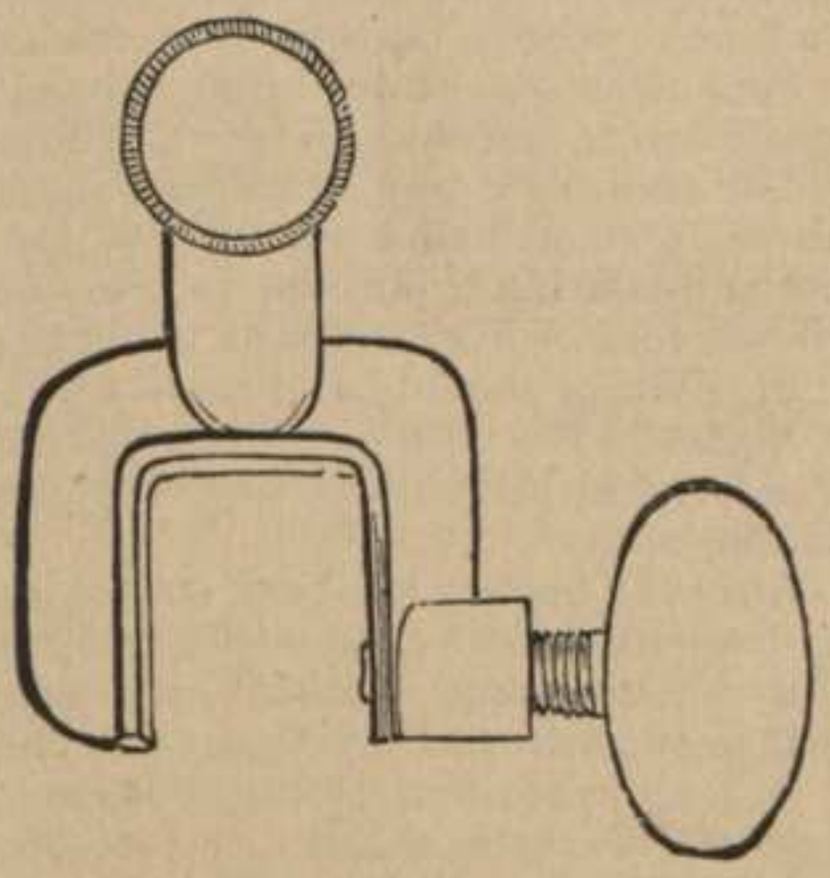
LE CLANCHE BATTERY.

DISQUE.	
CELL, COMPLETE	$2 00
" " sealed,	2 20
Porous Cup	1 75
Jar	15
Zinc, Amalgamated	10

PRISM.	
CELL, COMPLETE	$2 00
Prisms, per pair	1 00
Carbon Mounted, complete	50
Glass Jar	20
Glass Jar Top	12
Zinc	12
Sal Ammoniac, put up in Bag,	08



Carbon Zinc Connector.



Daniell Clamp.

BATTERY SUPPLIES.

Bi-chromate Potash, per lb	$0 25
Blue Vitriol, small packages, per lb	12
" per bbl., at lowest market rates	
Bi-sulphate of Mercury, per oz	15
Fluid for Carbon Battery, per lb	10
Quicksilver, per lb	1 25
Sulphate of Zinc, per lb	12
Sal Ammoniac, per lb	20
Rolled Zinc Plates, per lb	15
Carbon Plates, 6x9x¼	75
Platinum, sheet, per dwt	60
" wire, "	60
Tin Foil, per lb	50

BATTERY UTENSILS.

Brushes, per doz	$3 00
Syringe, No. 6, Solid Piston	2 50
Extra Pipes for "	75
Hydrometer	50

BATTERY DIRECTIONS.

In all except the Blue Vitriol Batteries the zincs should be kept well amalgamated.

GRAVITY BATTERY.—Unfold the copper strip so as to form a cross, and place it in the bottom of the jar.

Suspend the zinc about four inches above the copper, from the tripod, which has a hole to receive the wire from the copper of the next cup.

Pour clean water into the jar so as to cover the zinc. Then drop in blue vitriol in small lumps, not over six or eight ounces per cup at one time.

The resistance may be reduced and the battery be made immediately available by drawing about half a pint of solution of sulphate of zinc from a battery already in use and pouring it into the jar; or, when this cannot be done, by putting into the liquid four or five ounces of pulverized sulphate of zinc.

Blue vitriol should be dropped into the jar as it is consumed, care being taken that it goes to the bottom. The need of blue vitriol is shown by the fading of the blue color, which should be kept as high as the top of the copper, but should never reach the zinc.

After the battery has been started no further attention is required, except to keep it supplied with blue vitriol, until the quantity of sulphate of zinc in solution has become too great. In that case draw out a portion of the top of the liquid with a syringe or a cup and replace it with clear water.

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 15 degrees, there is too little sulphate of zinc; when it is 35 degrees or over, there is too much in solution, and it must be diluted.

When the zincs become coated so as to interfere with the action of the battery, they must be taken out and scraped clean and washed.

DANIELL BATTERY.—Fill the jar and porous cell with water, and the pocket with blue vitriol. The directions for Gravity Battery will apply to the maintenance of the Daniell.

LE CLANCHE BATTERY.—Put six ounces sal-ammoniac into the glass jar, fill one-third full of water, and stir. Put in porous cell and fill with water to neck of jar, pouring a little water into the hole in the porous cup. Put in zinc and connect up battery.

The inside of the rim of the jar should be greased to keep the salts formed from over-running.

The battery should be kept in a dry place, and requires very little attention, except to put in water occasionally to supply the loss by evaporation. In case of failure to work, the solution should be thrown out and fresh sal-ammoniac and water added. If this does no good, soak out the porous cell in warm water. If it still fails, new porous cells must be used.

GROVE BATTERY.—Fill the porous cup with strong nitric acid and the glass jar with dilute sulphuric acid, about 20 parts of water to one of acid. When not in use, the plates should be removed from the jar and the nitric acid emptied out.

FULLER'S MERCURY BICHROMATE BATTERY.—Make a paste by mixing up pulverized bichromate of potash with strong sulphuric acid in about equal parts by weight. Put about ten ounces of this paste into the outside jar, pour over it two or three ounces of sulphuric acid, and fill up with water. Into the porous cell pour a tablespoonful of mercury, put the zinc in place, and fill up with water. The zinc should be lifted out occasionally and the sulphate washed off. Keep a supply of mercury in the porous cell, so as to have the zinc always well amalgamated.

SMEE BATTERY.—The liquid used to charge this battery is dilute sulphuric acid—about one part acid to ten parts water.

CARBON BATTERY.—Fill the glass jar with water; the porous cell with electropoion fluid. The height of the liquids in the jar and the porous cell should be about the same.

CARBON BATTERY, extra size for Nickel Plating.—In the porous cell use a mixture of equal parts by measure of sulphuric acid and water, with two ounces of nitric acid. In the outer jar use a mixture of 12 parts water to one part sulphuric acid. When the liquid in the outer jar becomes milky, use fresh solution. Add a little nitric acid occasionally to porous cell. Keep zinc well amalgamated.

ELECTROPOION FLUID.—To eight pints of water add two pints sulphuric acid. While the mixture is still hot, stir in one pound bichromate of potash, pulverized. It is ready for use when cold. Use an earthen vessel for mixing.

AMALGAMATING SOLUTION.—Mix one pound nitric acid with two pounds muriatic, and add slowly 8 oz. mercury. When dissolved add 3 lbs. more muriatic acid, and stir. Clean the zinc with potash, and dip in this solution for a second or two. Rinse in clear water and rub with battery brush.

Another method of amalgamating zincs is to clean them by dipping in dilute sulphuric acid; then dip into a vessel of mercury, and allow the surplus to drain off.

INSULATED WIRES.

DIMENSIONS OF WIRE GAUGE SIZES IN DECIMAL PARTS OF AN INCH.

No of Wire Gauge.	Size of each No. in decimal parts of an inch of the American Wire Gauge.	Size of each No. in decimal parts of an inch of the Birmingham Wire Gauge.	No. of Wire Gauge.	Size of each No. in decimal parts of an inch of the American Wire Gauge.	Size of each No. in decimal parts of an inch of the Birmingham Wire Gauge.
0000	.460	.454	19	.03539	.042
000	.40964	.425	20	.03196	.035
00	.36480	.380	21	.02846	.032
0	.32495	.340	22	.02535	.028
1	.28930	.300	23	.02257	.025
2	.25763	.284	24	.0201	.022
3	.22942	.259	25	.0179	.020
4	.20431	.238	26	.01594	.018
5	.18194	.220	27	.01419	.016
6	.16202	.203	28	.01264	.014
7	.14428	.180	29	.01126	.013
8	.12849	.165	30	.01002	.012
9	.11443	.148	31	.00893	.010
10	.10189	.134	32	.00795	009
11	.09074	.120	33	.00708	.008
12	.08081	.109	34	.0063	.007
13	.07196	.095	35	.00561	.005
14	.06408	.083	36	.005	.004
15	.05707	.072	37	.00445	
16	.05082	.065	38	.00396	
17	.04525	.058	39	.00353	
18	.0403	.049	40	.00314	

DECIMALS EQUALING PARTS OF AN INCH.

$\frac{1}{64} = .0156$	$\frac{11}{64} = .1718$
$\frac{1}{32} = .0312$	$\frac{3}{16} = .1875$
$\frac{3}{64} = .0468$	$\frac{13}{64} = .2031$
$\frac{1}{16} = .0625$	$\frac{7}{32} = .2187$
$\frac{5}{64} = .0781$	$\frac{15}{64} = .2343$
$\frac{3}{32} = .0937$	$\frac{1}{4} = .2500$
$\frac{7}{64} = .1093$	$\frac{17}{64} = .2656$
$\frac{1}{8} = .1250$	$\frac{9}{32} = .2812$
$\frac{9}{64} = .1406$	$\frac{19}{64} = .2968$
$\frac{5}{32} = .1562$	$\frac{5}{16} = .3125$

The constantly increasing demand for our Insulated Copper Wire has made it necessary to increase, from time to time, our facilities for covering both Office and Magnet Wire.

Our Wire is drawn from Lake Superior Copper, and under galvanometer tests shows a conductivity of from 95 to 100 per cent. of that of pure copper.

Our Office Wire is treated with paraffine, whereby the insulation is rendered perfect. It is finished by machinery, whereby the surface is POLISHED and the covering COMPRESSED, thus securing the handsomest as well as the most perfectly insulated wire in the market. It will not ravel or slip.

In fine wire there is always a difficulty in accurately designating sizes by the wire gauge. There are two reasons for this difficulty:

1st. On account of the variations in the different gauges.

2d. On account of the wearing of the dies through which the wire is drawn. The same hank of wire will sometimes show a variation of one-half of a thousandth of an inch, and the wire when closely examined will often have an elliptical shape instead of being round, the difference in diameters being equal to that named above.

To remedy this difficulty, we designate sizes by thousandths of an inch when accuracy is required.

The first three figures to the right of the decimal point give the diameter in "mils."

In magnet wire a compact, and at the same time a perfect insulation is a matter of prime importance. An actual difference in result, equal to ten per cent. from this source alone, in magnets of fine wire, is often to be found by comparing one instrument with another.

Saving one-half a thousandth of an inch in the thickness of insulation of ordinary relay wire results in clear gain of ten per cent. to the magnetic power without any corresponding loss.

For measuring wire we recommend the "Patent Wire Gauge," the price of which, with cut, will be found under the head of "Builders' and Repairers' Tools." With this gauge wire and sheet metal can be accurately measured to less than half a thousandth of an inch.

The attention of consumers of insulated wire is called to the matter of the difference in the gauges used for measurement. This point is of special importance with reference to the finer sizes of silk-covered magnet wire, where a difference of two or three thousandths of an inch in diameter makes a very appreciable differerence in the value of every pound of wire.

The importance of this matter will be recognized when it is understood that there are no less than three systems of gauging wire in use, and that these systems differ so widely that wire of a certain number by one system may be one or two or even four sizes up or down the scale by another system.

The three systems in use are: Brown & Sharpe's American Wire Gauge, the Stubs or Birmingham Wire Gauge, the Old English Wire Gauge.

Our insulated wires are measured by Brown & Sharpe's Wire Gauge, which we have preferred to the others for several reasons, among which may be mentioned:

I. The divisions of this gauge are found most convenient in practice.

II. This is the only system of measurement for which absolutely reliable and uniform gauges can be cheaply and readily obtained. Gauges intended to measure by the Stubs or by the Old English system differ so much among themselves that no reliance is to be placed upon them.

III. Brown & Sharpe's Gauge has the approval of many of the best American steel and iron workers, and is rapidly growing in favor.

TABLE SHOWING THE DIFFERENCE BETWEEN WIRE GAUGES IN DECIMAL PARTS OF AN INCH.

No.	Brown & Sharpe.	Stubs.	Old English.	No.	Brown & Sharpe.	Stubs.	Old English.
14	.06408	.083	.083	28	.012641	.014	.0165
15	.05706	.072	.072	29	.011257	.013	.0155
16	.05082	.065	.065	30	.010025	.012	.01375
17	.04525	.058	.058	31	.008928	.010	.01225
18	.04030	.049	.049	32	.00795	.009	.01125
19	.03589	.042	.040	33	.00708	.008	.01025
20	.03196	.035	.035	34	.0063	.007	.0095
21	.02846	.032	.0315	35	.00561	.005	.009
22	.025347	.028	.0295	36	.005	.004	.0075
23	.022571	.025	.027	37	.00445		.0065
24	.0201	.022	.025	38	.003965		.00575
25	.0179	.020	.023	39	.003531		.005
26	.01594	.018	.0205	40	.003144		.0045
27	.014195	.016	.01875				

For further convenience in comparing sizes as measured by different gauges, we give below a table showing the numbers of the Stubs and Old English Gauges corresponding to those of B. & S. W. G.:

CORRESPONDING NUMBERS OF WIRE GAUGES; APPROXIMATE.

Brown & Sharpe.	Stubs.	Old English.	Brown & Sharpe.	Stubs.	Old English.
12	14¼	14¼	26	27	28½
13	15	15	27	28	29½
14	16	16	28	29½	30½
15	17	17	29	30½	32
16	17¾	17¾	30	31	33¼
17	18½	18½	31	32	35
18	19¼	19	32	33	35¾
19	19¾	19¾	33	34	36½
20	21	21	34	34¼	37¼
21	22	22½	35	34¾	38¼
22	23	24	36	35	39½
23	23¾	25¼	37	35½	40
24	25	26	38	36	
25	26	27½			

By this table it will be seen that from No. 12 to No. 33 the numbers of B. & S. W. G. range one to two sizes finer than the same numbers of the Stubs Gauge; and that they range finer than the Old English Gauge by one to two sizes from No. 14 to No. 26, and by two and one-half to four sizes from No. 27 to No. 37.

In filling orders for insulated wire, it is our rule to measure the wire in thousandths of an inch with the greatest possible exactness. Where the wire measured lies between two numbers, it is designated by the coarser, unless its variation from the finer number is exceedingly small. On the average, therefore, the purchaser of our wires will get a finer wire than he is charged for.

OFFICE WIRE, Nos. 12 to 20, per lb. ---------- $0 50
Wound and braided, paraffined, compressed, and polished.

Size ----------	12	14	16	18	20
Feet per lb. ----------	40	60	80	110	150

ANNUNCIATOR WIRE, Nos. 14 to 20, per lb. ------$0 50
Double wound, paraffined, compressed and polished.
White, Red and White, Blue, Brown, Black or Yellow, as desired.
No. 18 runs about 150 ft. to the pound.

MAGNET WIRE.

No.	Cotton-Covered. Price per lb.	Silk-Covered. Price per lb.	No.	Cotton-Covered. Price per lb.	Silk-Covered. Price per lb.
16	$0 60	$1 12	27	$1 25	$2 25
17	60	1 12	28	1 35	2 38
18	65	1 12	29	1 50	2 75
19	65	1 12	30	1 65	2 95
20	70	1 12	31	1 80	3 25
21	70	1 20	32	1 95	3 45
22	75	1 30	33	----	3 90
23	83	1 42	34	----	4 10
24	90	1 56	35	----	5 20
25	1 00	1 81	36	----	5 85
26	1 10	2 10	--	----	----

GERMAN-SILVER WIRE.—Double cotton-covered and paraffined, prices twenty per cent. higher than silk-covered copper wire.

RESISTANCE AND WEIGHT TABLE.

The resistances are calculated for pure copper wire. Our wire averages about 97 per cent. of the conductivity of pure copper.

The number of feet to the pound is only approximate for insulated wire.

No.	Diameter.	FEET PER POUND.			RESISTANCE, NAKED COPPER.			
		Cotton-Covered.	Silk-Covered.	Naked.	Ohms per 1000 feet.	Ohms per mile.	Feet per Ohm.	Ohms per pound.
8	.12849			20	.6259	3.3	1600.	.0125
9	.11443			25	7892	4.1	1272.	.0197
10	.10189			32	.8441	4.4	1185.	.0270
11	.09074			40	1.254	6.4	798.	.0501
12	.08081	42	46	50	1.580	8.3	633.	.079
13	.07196	55	60	64	1.995	10.4	504.	.127
14	.06408	68	75	80	2.504	13.2	400.	.200
15	.05707	87	95	101	3.172	16.7	316.	.320
16	.05082	110	120	128	4.001	23.	230.	.512
17	.04525	140	150	161	5.04	26.	198.	.811
18	.0403	175	190	203	6.36	33.	157.	1.29
19	.03539	220	240	256	8.25	43.	121.	2.11
20	.03196	280	305	324	10.12	53	99.	3.27
21	.02846	360	390	408	12.76	68.	76.5	5.20
22	.02535	450	490	514	16.25	85.	61.8	8.35
23	.02257	560	615	649	20.30	108.	48.9	13.3
24	.0201	715	775	818	25.60	135.	39.0	20.9
25	.0179	910	990	1030	32.2	170.	31.0	33.2
26	.01594	1165	1265	1300	40.7	214.	24.6	52.9
27	.01419	1445	1570	1640	51.3	270.	19.5	84.2
28	.01264	1810	1970	2070	64.8	343.	15.4	134.
29	.01126	2280	2480	2617	81.6	432.	12.2	213.
30	.01002	2805	3050	3287	103.	538.	9.8	338.
31	.00893	3605	3920	4144	130.	685.	7.7	539.
32	.00795	4535	4930	5227	164.	865.	6.1	856.
33	.00708		6200	6590	206.	1033.	4.9	1357.
34	.0063		7830	8330	260.	1389.	3.8	2166.
35	.00561		9830	10460	328.	1820.	2.9	3521.
36	.005		12420	13210	414.	2200.	2.4	5469.

KERITE WIRE.—Prices per Foot.

Size of Copper Core.	Outside Diameter in fractions of an inch.		
	4-32	5-32	6-32
No. 14	4c.	5c.	
No. 12			6½c.

KERITE TAPE, per roll 2 00
PARAGON " " 75

PLIABLE CORD.

Silk, per yard $0 15
" 10 Strands, per yard 25
Cotton, per yard 10
" 10 Strands, per yard 15
Silk, Double, for Loops, per yard 45
Cotton, " " " 25
Tinsel, Silk, per yard 15
" Cotton, " 10

WORSTED TELEPHONE CORD.

Single, per yard $0 10
Double, " 20
Double Telephone Cord, Tips, complete (net) 25

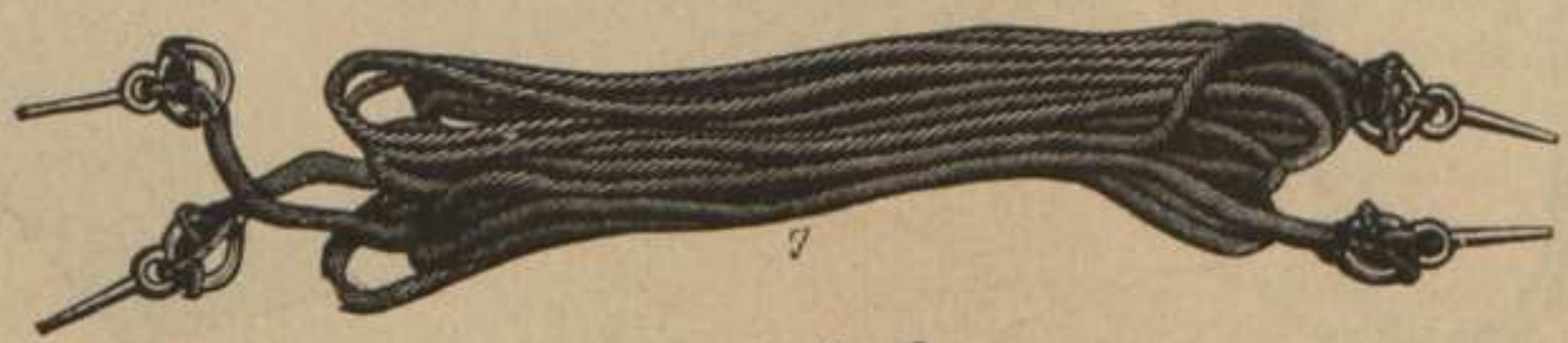
PLAIN WIRE, Naked Copper, to No. 20, per lb 50

HARD RUBBER, Sheet, per lb 2 00

The following Patents relate to office and magnet wire:

Olmstead, No. 129,858, July 23, 1872.
Re-issue No. 6954, Feb. 29, 1876.
" " 6955, " " "

Brooks, No. 45,221, Nov. 29, 1864.
Re-issue No. 2717, Aug., 1867.



Pliable Cord.

OFFICE SUPPLIES.

To meet the large commercial and railroad demand for Manifold Paper we are prepared to furnish it either in white, yellow or manilla sheets cut to any required size.

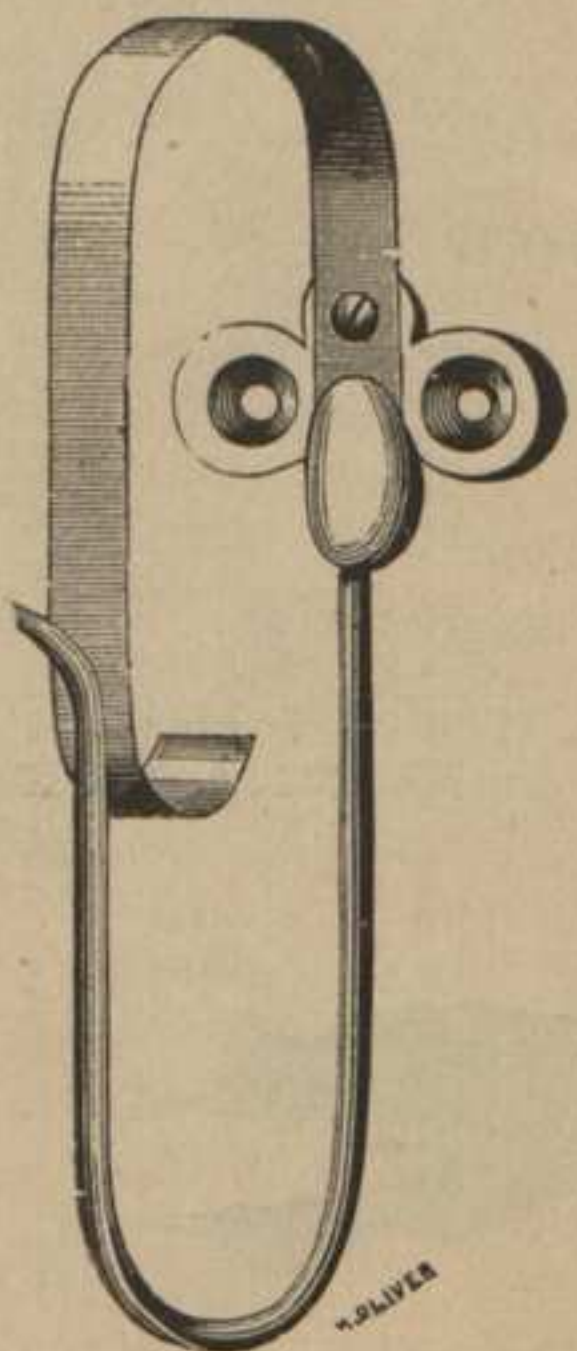
The ordinary size for telegraphic and commercial use is ten by fifteen inches, and for train-dispatching purposes five by eight inches. There are ten large books in the ream and thirty-five small ones.

Our nickel-plated Stylus is fully equal to the best agate.

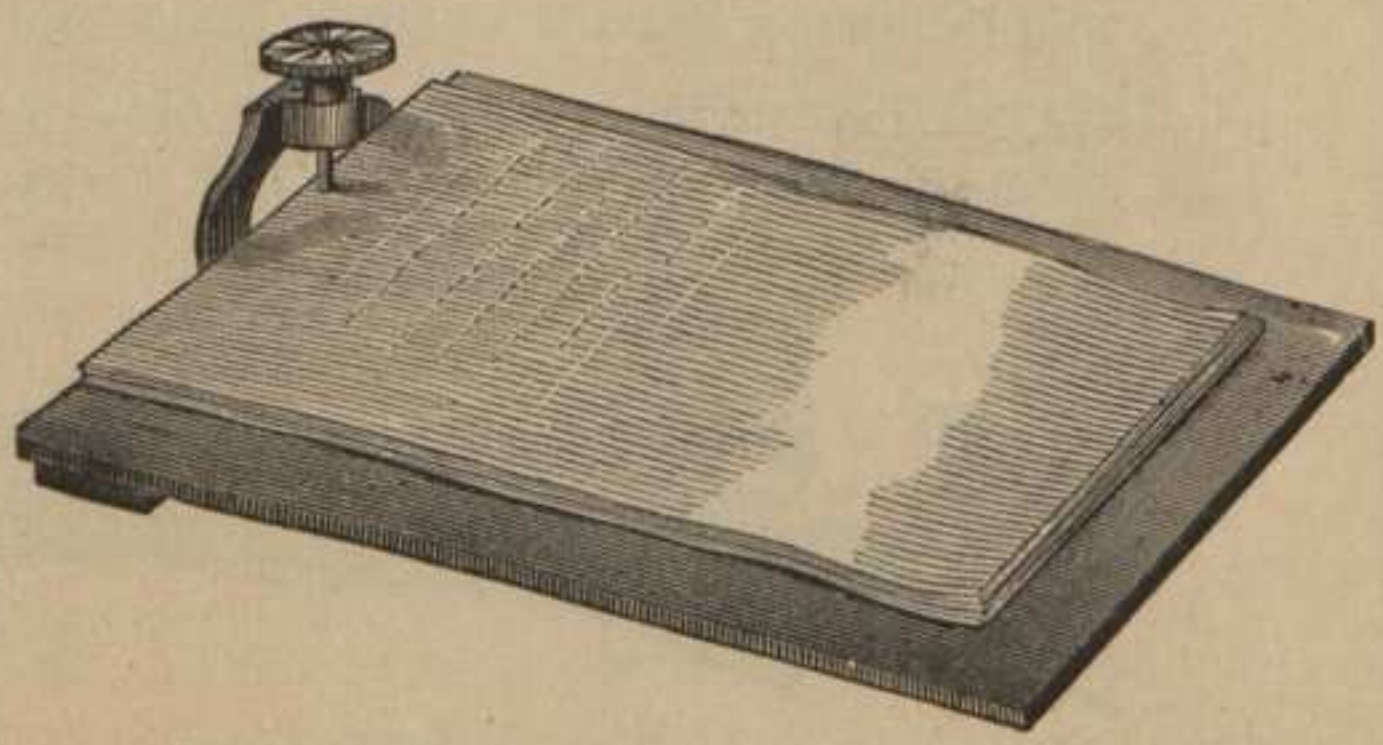
We call attention to the Orton Awl Clip, which is fast displacing the spring patterns, for telegraphic and other uses. It is durable and convenient, and is used by telegraph companies, bankers and merchants.

The Orton Pencil Holder saves the last third or half of the pencil, and is both convenient and economical.

The Orton Safety Hook prevents the loss of messages or papers by being blown away or carelessly dropped. Its popularity is increasing.

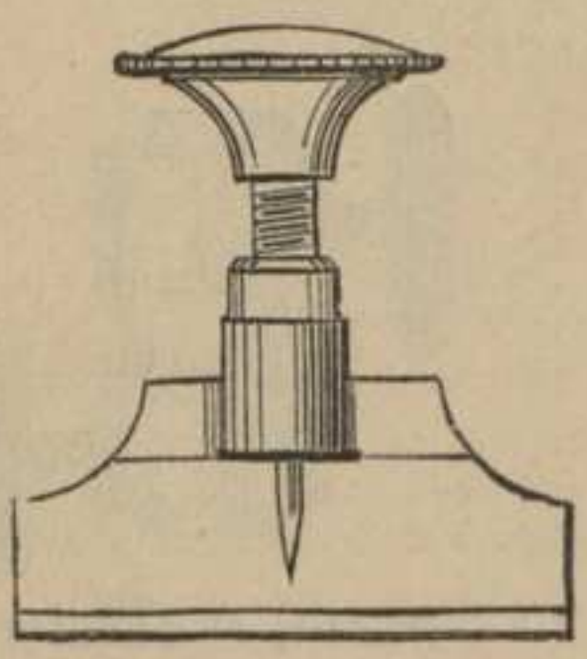


Orton Security Hook.

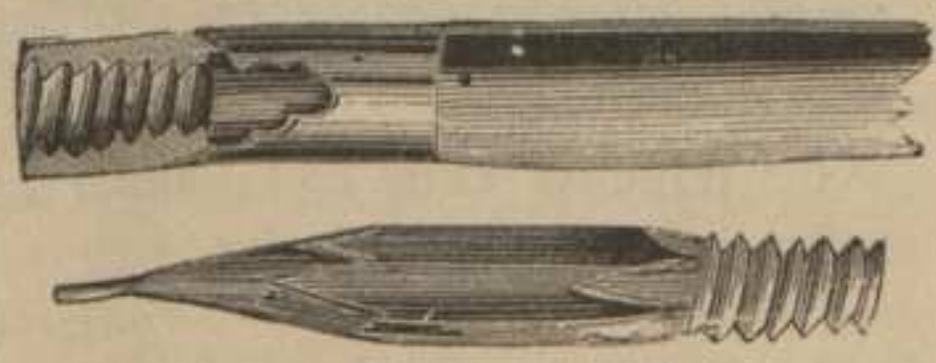


Orton Board Clip

CLIPS.	Each.	Per Dozen.	Per Gross.
Board Clip, No. 1	$0 75	$7 00	
" " 2, Message size	60	5 50	
Brass Clip	20	1 75	
Orton Awl Clip	50	5 40	$57 60
" " Board, Message size	65	7 20	79 20
" Pencil Holder	10	1 00	9 00
" Security Hook	30	3 00	28 80
Plain Hook	15	1 50	
Nickel-Plated Hook, small	10	1 00	



Orton Clip.



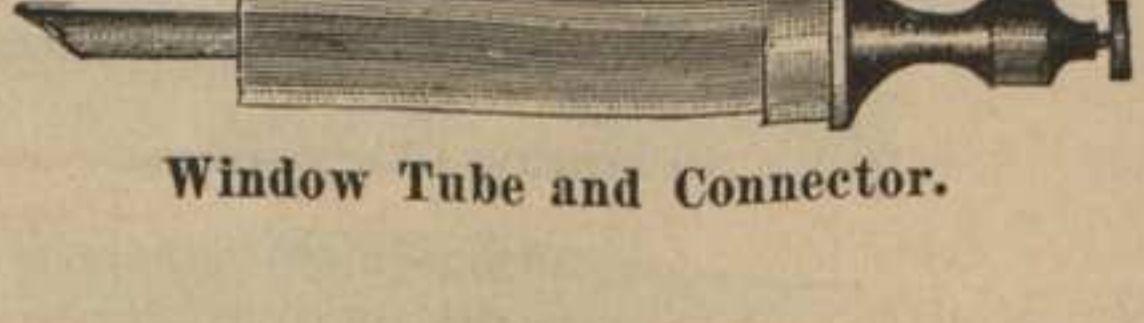
Orton Pencil Holder.

MANIFOLD PAPER.	Size.	Per Book.	10 Books.	100 Books.
Yellow	10×15	$0 45	$4 00	$35 00
" or White	5×8	10	80	7 25
White	10×15	40	3 50	30 00
Manilla	10×15	35	3 00	25 00
"	5×8	10	70	6 25

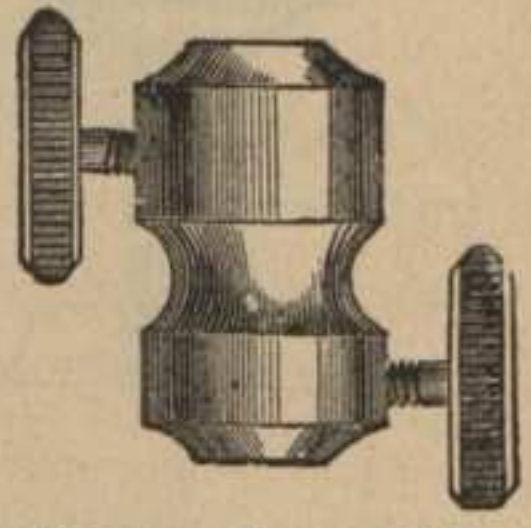
	Size.	Per Sheet.	10 Sheets.	100 Sheets.
Black Sheets	10×15	$0 10	$ 75	$6 00
"	5×8	10	45	4 00

Stylus, Agate, No. 1	$1 00
" Steel	25
" Steel, per dozen	2 00
" " per gross	18 00
Message Paper, per lb	25
" " in case, per lb	20

Printer Paper, per roll	$0 10
Register Paper, ½ in., per roll	08
" " ¾ in., "	10
Binding Post, Table, large	25
" " " small	20
Double Connector	15
" " per dozen	1 75
" " round, one hole	10
Window Connector, for 8 and 9 wire	30
" " for 12 wire	20
Screw Plate, for 8 and 9 wire	1 00



Window Tube and Connector.



Double Connector.

Window Tube, Rough, Hard Rubber, 2½ inch	05
" " " " 3 "	08
" Tubing, " per foot	25

BOOKS.

ALTHAUS.—A Treatise on Electricity, Theoretical and Practical, and its use in the Treatment of Paralysis, Neuralgia and other diseases. By JULIUS ALTHAUS, M. D., M. R. C. P. Lond., Physician to the Infirmary for Epilepsy and Paralysis. 8vo. ; 729 pp. ; $6.00.

BEARD & ROCKWELL.—A Practical Treatise on the Medical and Surgical Uses of Electricity, including Localized and General Faradisation, Local and Central Galvanization, Electrolysis and Galvano-Cautery, with nearly 200 illustrations. By GEO. M. BEARD, A. M., M. D., &c.. &c., and A. D. ROCKWELL, A. M., M. D., &c., &c. ; 8vo. ; pp., 794 ; $6.25.

CLARK & SABINE.—Electric Tables and Formulæ, for the use of Telegraph Inspectors and Operators. By LATIMER CLARK and ROBERT SABINE. 12mo. ; pp., 285 ; $5.00.

CULLEY.—Handbook of Practical Telegraphy, by R. S. CULLEY, Member Inst. C. E., Engineer-in-Chief of Telegraphs to the Post-Office. Seventh Edition, revised and enlarged. 8vo. ; cloth ; pp., 468 ; $6.00.

CUMMING.—Introduction to the Theory of Electricity, with numerous examples. LINNÆUS CUMMING, M. A., late scholar of Trinity College, Cambridge. Assistant Master at Rugby School. 12mo. ; pp., 308 ; 1879 ; $2.25.

DAVIS & RAE.—HAND-BOOK OF ELECTRICAL DIAGRAMS AND CONNECTIONS, by CHARLES H. DAVIS and FRANK B. RAE. 32 plates photo-lithographed and 46 pages descriptive ; $2.00.

DOUGLAS.—Manual of Telegraph Construction : the Mechanical Elements of Electric Telegraph Engineering. By JOHN CHRISTIE DOUGLAS. With diagrams. pp., 468 : $6.50.

GORDON.—A Physical Treatise on Electricity and Magnetism. By J. E. H. GORDON, B. A., Camb., Assistant Secretary of the British Association. 2 vols. ; 8vo. ; pp., 323 and 295 ; 1880 ; $7.00.

GORE.—The Art of Electro-Metallurgy, including all known processes of Electro-Deposition. By G. GORE, LL. D., F. R. S. 56 illustrations ; 16mo ; pp., 391 ; $2.50.

HASKINS.—The Galvanometer and its Uses : a Manual for Electricians and Students. By C. H. HASKINS. Pocket form, illustrated ; Morocco Tucks ; $1.50.

HIGGS.—The Electric Light in its Practical Application. By PAGET HIGGS, LL. D., D. Sc. 8vo. ; pp., 240 ; $3.50.

JENKIN.—ELECTRICITY AND MAGNETISM. By FLEEMING JENKIN, F. R. S., Professor of Engineering in the University of Edinburgh. 16mo. ; pp., 391 ; $1.50.

JENKIN.—Report of the Committee on Electrical Standards appointed by the British Association for the Advancement of Science. Edited by Prof. FLEEMING JENKIN, F. R. S. 8vo. ; 248 pp. ; 7 plates ; 1873 ; $3.75.

LANGDON.—The Application of Electricity to Railway Working. By WM. E. LANGDON. 16mo. ; 315 pp. ; $1.50.

MAXWELL.—A Treatise on Electricity and Magnetism. By JAMES CLERK MAXWELL, M. A. 2 vols. ; 8vo. ; pp. XXIX, 425, and XXIII, 444 ; XX Plates ; 1873 ; $10.40.

MONCEL.—The Telephone, the Microphone and the Phonograph. By Count du MONCEL. 1879 ; pp., 277 ; $1.25.

MONCEL.—Exposé des Applications de l'Électricité, par le Comte Th. du MONCEL. 3d edition ; 5 vols. ; 1872–1878 ; per vol., $5.00.

NIAUDET.—Elementary Treatise on Electric Batteries. From the French of ALFRED NIAUDET. Translated by L. M. FISHBACK. pp., 266 ; $2.50.

POPE.—MODERN PRACTICE OF THE ELECTRIC TELEGRAPH. A HAND-BOOK for Electricians and Operators. By FRANK L. POPE. Ninth Edition revised and enlarged. 8vo. ; cloth ; pp., 155 ; $2.00.

PREECE & SIVEWRIGHT.—TELEGRAPHY. By W. H. PREECE, C. E., Divisional Engineer, Post-Office Telegraphs, and J. SIVEWRIGHT, M. A., Superintendent Engineering Department, Post-Office Telegraphs. 16mo. ; pp., 300 ; $1.50.

PRESCOTT.—Electricity and the Electric Telegraph. By GEORGE B. PRESCOTT. Several hundred illustrations ; 8vo. ; pp., 978 ; $5.00.

PRESCOTT.—The Speaking Telephone, Electric Light, and other recent Electrical Inventions. By GEORGE B. PRESCOTT. 8vo. ; pp., 616 ; 319 illustrations ; 1879 ; $4.00.

ROSELEUR.—Galvanoplastic Manipulations. A Practical Guide for the Gold and Silver Electroplater and the Galvanoplastic Operator. Translated from the French of A. ROSELEUR by A. A. FESQUET. 127 figures ; pp., 495 ; 1872 ; $6.00.

SPRAGUE.—Electricity: its Theory, Sources and Applications. By JOHN T. SPRAGUE, Member of the Society of Telegraphic Engineers. Small 8vo. ; pp., 384 ; $3.00.

URQUHART.—Electric Light, its Production and Use ; embodying plain directions for the working of Galvanic Batteries, Electric Lamps, and Dynamo Electric Machines. By J. W. URQUHART, C. E. ; Edited by F. C. WEBB, M. I. C. E., M. S. T. E., with 94 illustrations ; pp., 290 ; 1880 ; $3.00.

PERIODICALS.

THE JOURNAL OF THE TELEGRAPH.—New York. The Western Union Telegraph Company. $2.00 per annum. Semi-monthly.

THE OPERATOR.—New York. W. J. Johnston. $1.00 per annum. Semi-monthly.

JOURNAL OF THE AMERICAN ELECTRICAL SOCIETY. Chicago: Am. Elec. Soc. $1.25 per number. Published irregularly.

THE TELEGRAPHIC JOURNAL AND ELECTRICAL REVIEW. London : Haughton & Co. 21s. 8d. per annum. Weekly.

THE ELECTRICIAN. London: James Gray, 396 Strand, W. C. 21s. 8d. per annum. Weekly.

ANNALES TÉLÉGRAPHIQUES. Paris: Dunod. 15fr. per annum. Bi-monthly.

JOURNAL TELEGRAPHIQUE. Berne: L. Curchod. 5fr. per annum. Monthly.

LA LUMIÈRE ELECTRIQUE. Paris: A. Glénard, 22 Place Vendome. 60fr. per annum. Weekly.

LINE SUPPLIES.

As agents for the sale of the Telegraph Wire manufactured by the Washburn & Moen Manufacturing Co., of Worcester, Mass., we keep a full stock of their wire on hand, both in Chicago, Cincinnati, New York and Worcester.

We can therefore fill orders for line wire of any size and grade with promptness, and ship from whichever point the lowest freight rate, or the quickest time can be made.

We furnish Line Wire in three grades, as follows:

I. EXTRA BEST BEST.

II. BEST BEST, in *Long Lengths*.

III. Best Best, in ordinary lengths.

1. "*Extra Best Best*," by improved continuous processes fron. very best iron. This grade stands highest of any known Telegraph wire in conductive power, with a "weight per mile ohm" of from 4600 to 5100 lbs. Very uniform in quality, pure, very tough and pliable.

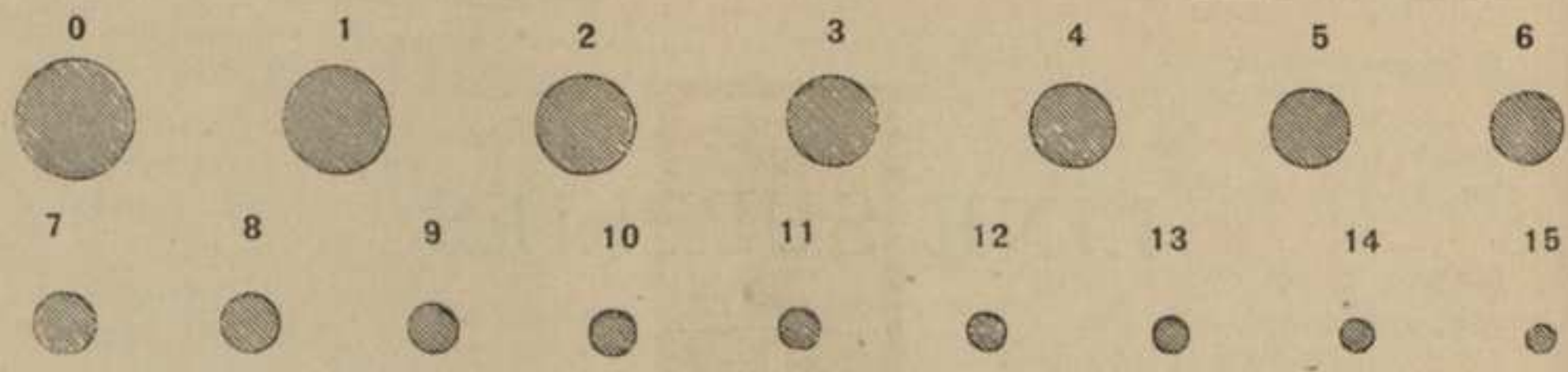
2. "*Best Best.*" Less uniform and tough than the above named; but stands a good mechanical test. "Weight per mile ohm," 5500 to 5800 lbs. Is largely used by some Telegraph Companies, and in railway telegraph service.

3. "*Best.*" A term almost indiscriminately applied to the lower grades of wire designed for Electric service. A harder and less pliable wire, about 6500 weight per mile ohm.

4. "*Steel*," or homogeneous metal, more expressly designed for short line Telephone service, where a measure of conductivity can be exchanged for greater tensile strength in a very light strong wire; 6600 to 7000 weight per mile ohm.

The first named, or "Extra Best Best," is almost exclusively employed in the best Telegraph service, and it is the only description recognized in the elaborate table of tests which form a valuable and indispensable feature of all discussions of Electric science applied to Telegraphy; though there are instances in line construction where long spans call for a wire of greater tensile test strength, and steel is employed for that purpose.

The standard breaking strain of superior galvanized wire is two and one-half times its weight per mile.



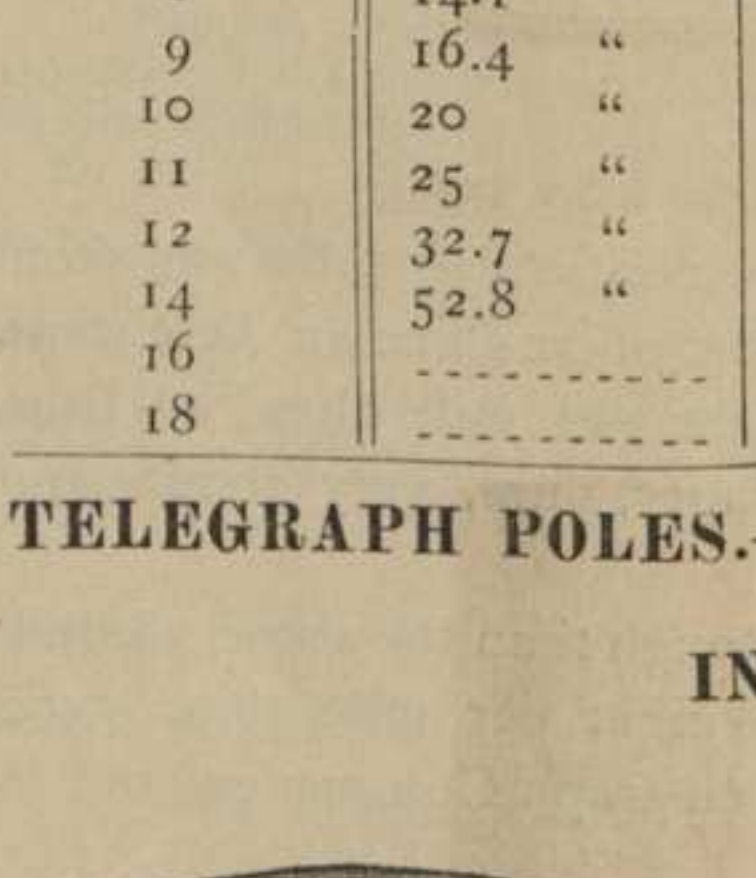
SIZES OF WIRE BY THE NUMBERS OF THE BIRMINGHAM WIRE GAUGE.

Weight and Resistance per Mile of Galvanized Line Wire.

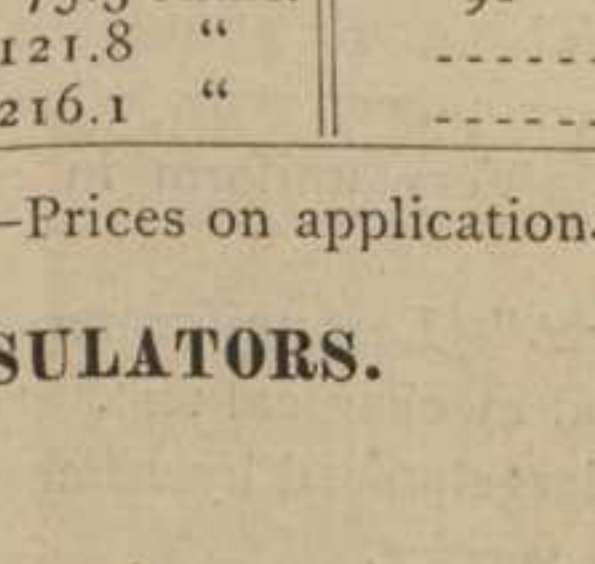
Number.	Resistance.		Weight.	
	Iron.	Steel.	Iron.	Steel.
6	10 ohms.	----------	540 lbs.	------
8	14.1 "	----------	380 "	------
9	16.4 "	----------	320 "	------
10	20 "	----------	273 "	------
11	25 "	----------	215 "	------
12	32.7 "	----------	164 "	------
14	52.8 "	75.3 ohms.	96 "	89 lbs.
16	----------	121.8 "	------	55 "
18	----------	216.1 "	------	31 "

TELEGRAPH POLES.—Prices on application.

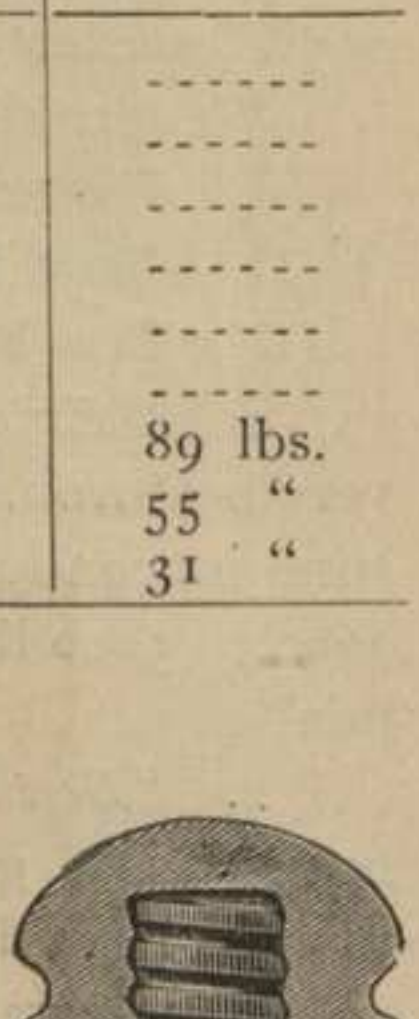
INSULATORS.



Porcelain Insulator.

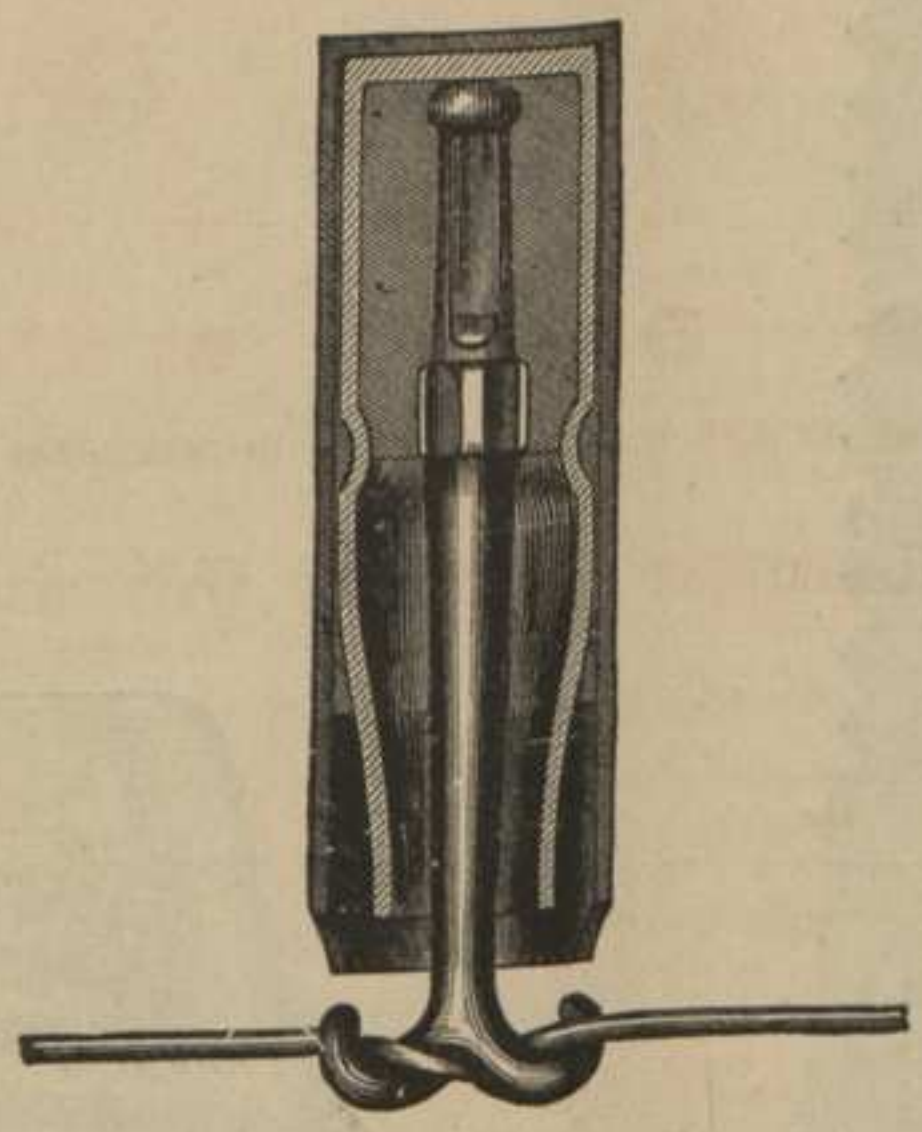


Rubber Hook Insulator.



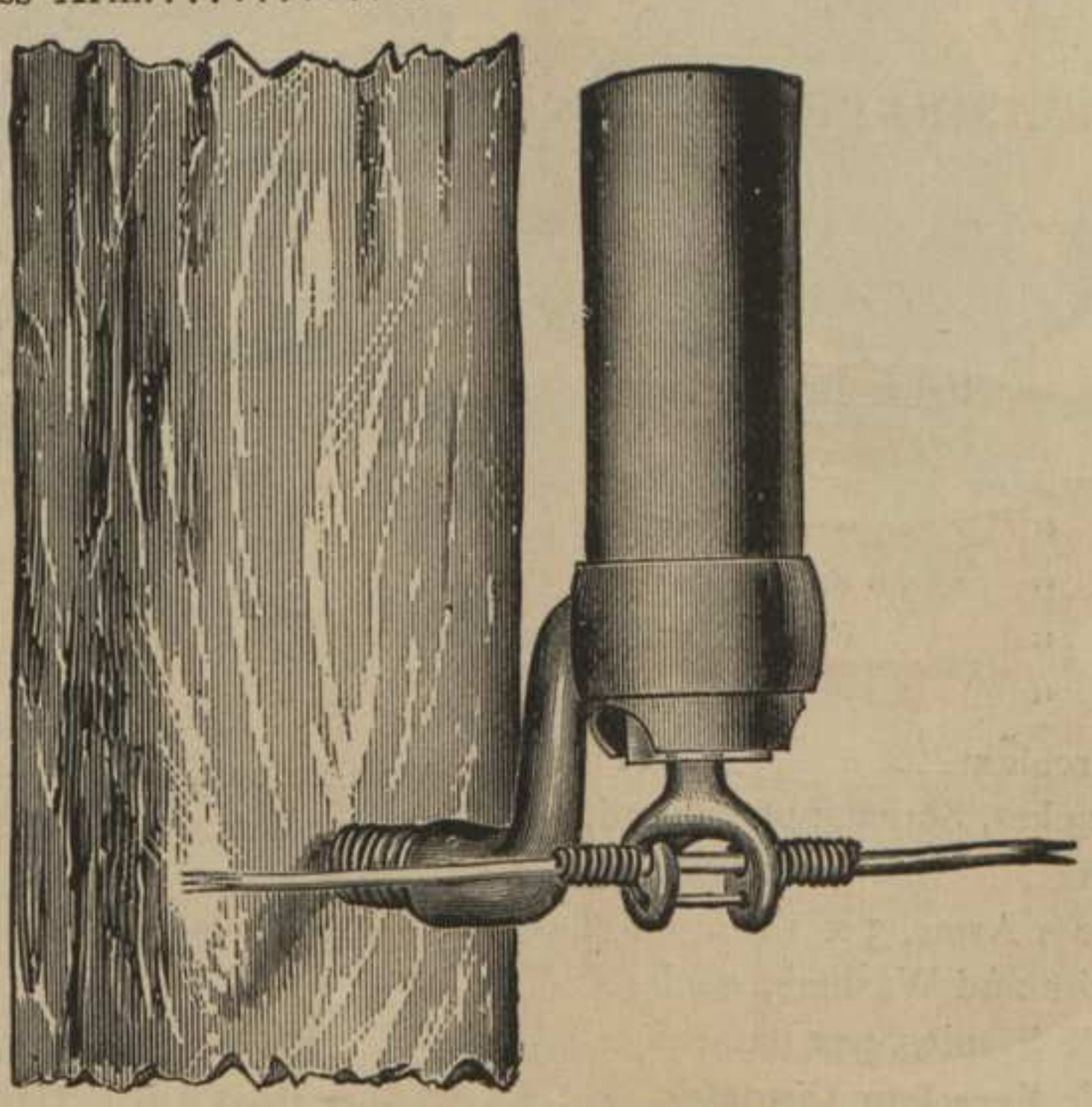
Oak Pin & W. U. Glass Insulator.

Rubber Hook Insulator ---------- 15c.



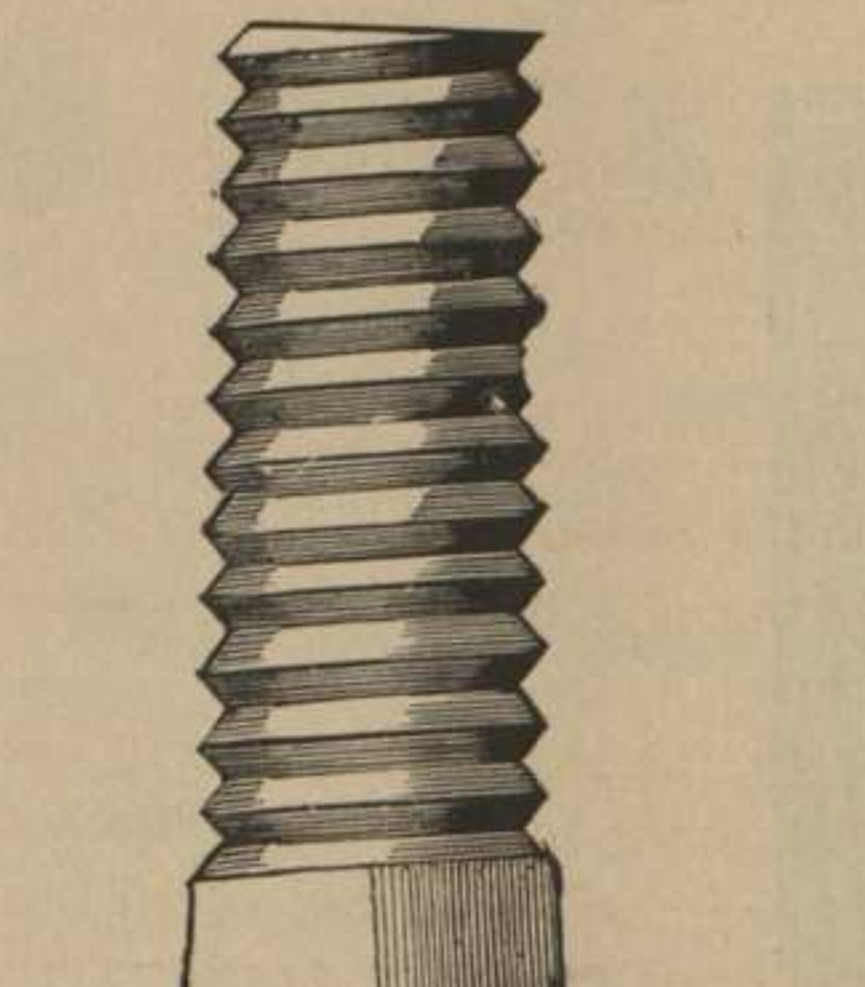
Brooks Cross-Arm Insulator, "S" Hook.

Brooks Cross Arm.....$ 32

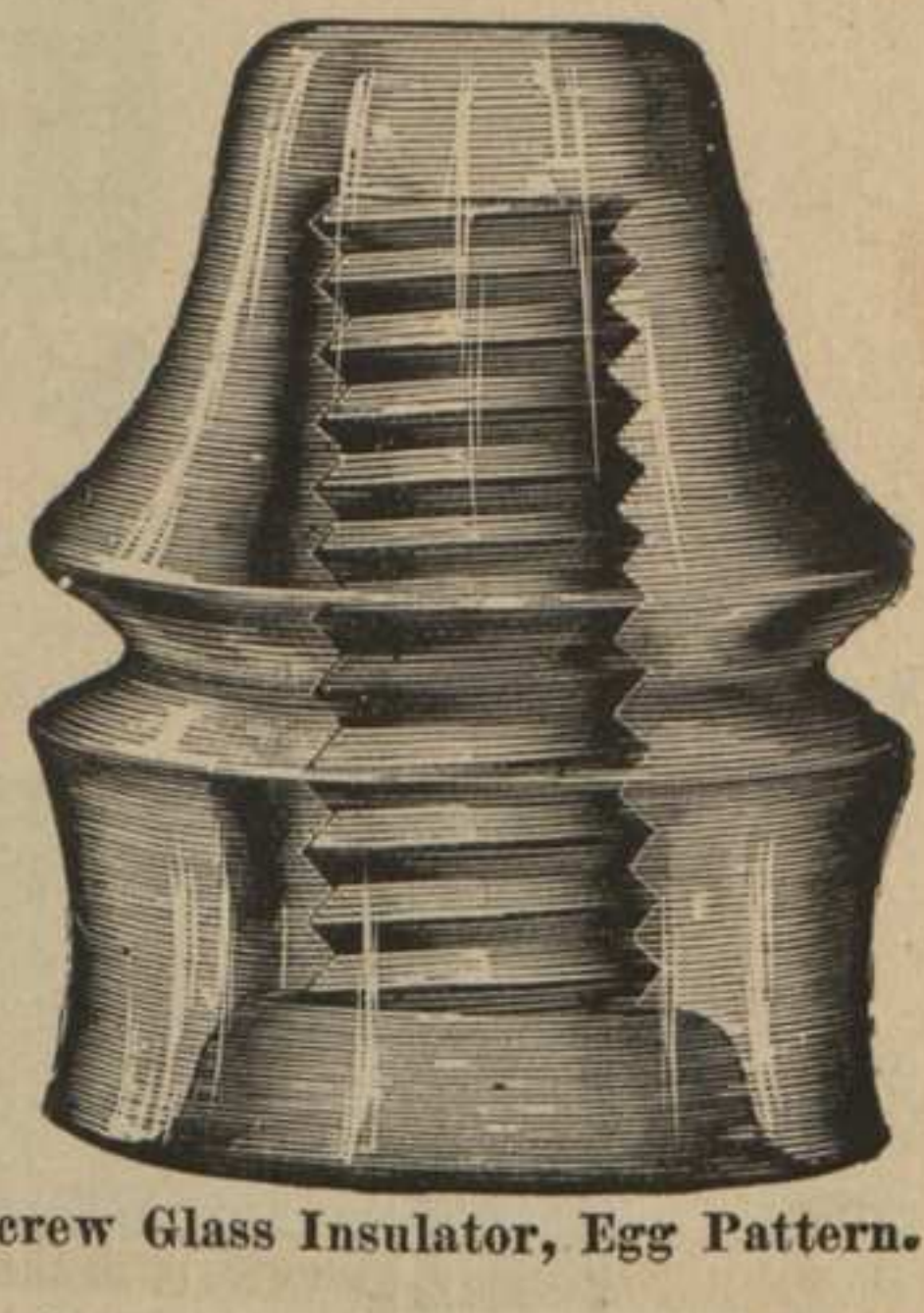


Brooks Screw Shank, with Yates Hook.

Brooks Screw Shank.....$o 40



Screw Bracket.



Screw Glass Insulator, Egg Pattern.

Insulator Screw Glass, Western Union	$0 08
" " No. 1, Egg	09
" " No. 2, "	08
" " No. 3, "	08
" " No. 4, " Pony	04
Porcelain $0 04; with screw	05
Bracket, Screw, not painted, 2½; painted	03
Pin " not painted, 2½; painted	03
Cross Arms, 3 x 4 in., per running foot, painted	05
Bolts and Washers, each	05
Pole Staples, per lb.	30
Pole Step Iron	08
Spikes, per lb.	05
Pole Ring	05
Tie Wires, 13 inches long, annealed iron wire	

BUILDERS' AND REPAIRERS' TOOLS.

In manufacturing Bars, Clamps, Climbers, Pulleys, Splicing Clamps, Reels, Tool Belts, Body and Climbers' Straps, and other tools, great pains is taken to use only the very best materials and to combine the most recent improvements.

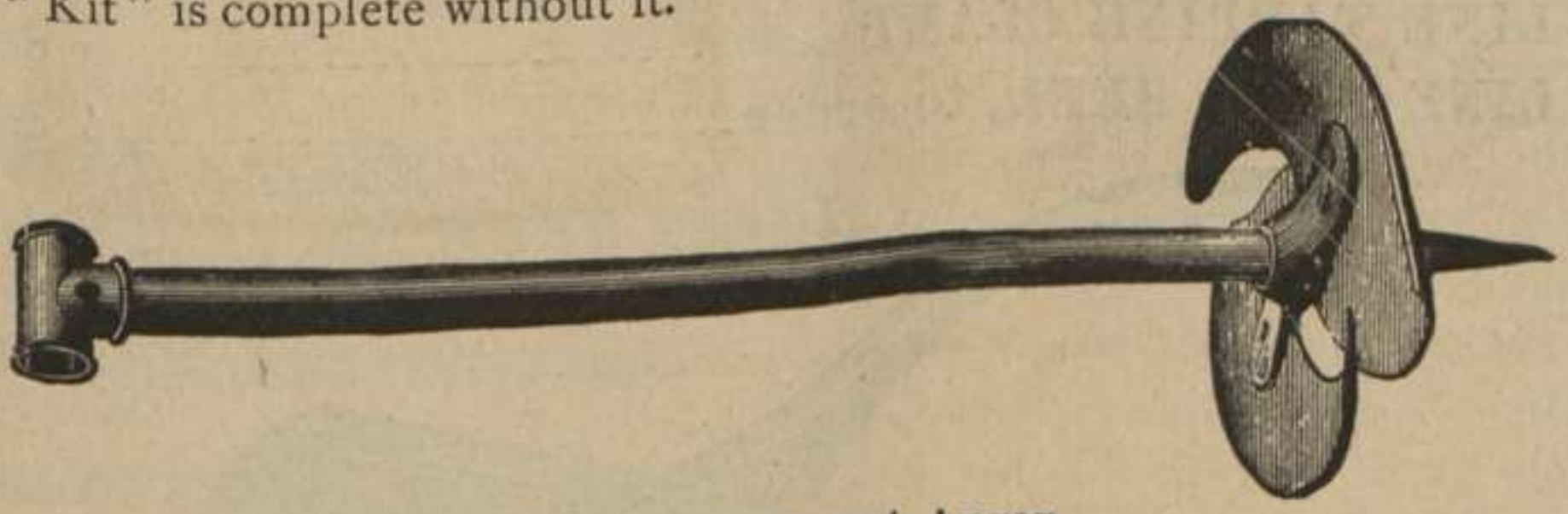
The Vaughan Auger is superior to the old style for use in soft ground, on account of the better shape of the blades and the hollow shaft, which permits air to pass under the dirt, obviating suction

Our Climbers are made to conform to the shape approved by the most experienced builders, and the material used is the best spring steel.

The Patent Wire Gauge will measure line, office and magnet wires; also battery copper and sheet metals with the minutest accuracy. It will be found very convenient.

The Patent Plier is an excellent cutting and connecting tool, and takes the place of more expensive articles.

The Splicing Clamp is an indispensable tool, and no repairer's "Kit" is complete without it.



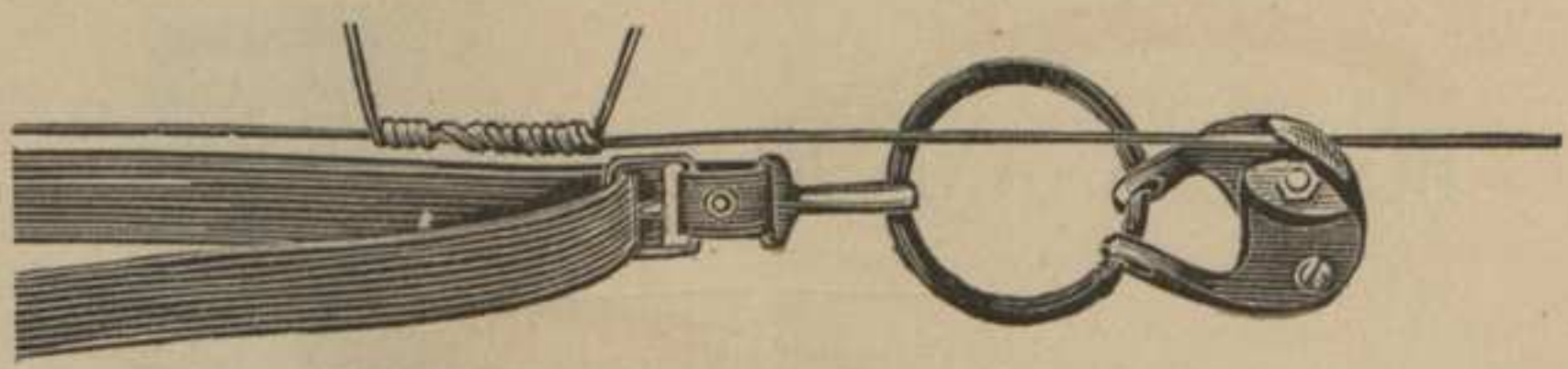
Vaughan's Patent Auger.

AUGERS.

Vaughan's Patent 10 inch	$4 75
" " 11 "	5 00
" " 12 "	5 50

BARS.

Steel Digging, Round	3 00
" " Octagon	4 00
Iron " Steel Tip	2 00
" Tamping, "	1 75



"Come-Along" Eccentric.

CLAMP.

"Come-Along"	Eccentric	$2 00
Brass	Eccentric	2 00
"	" with Strap	2 75
Steel	"	1 50
"	" with Strap	2 25

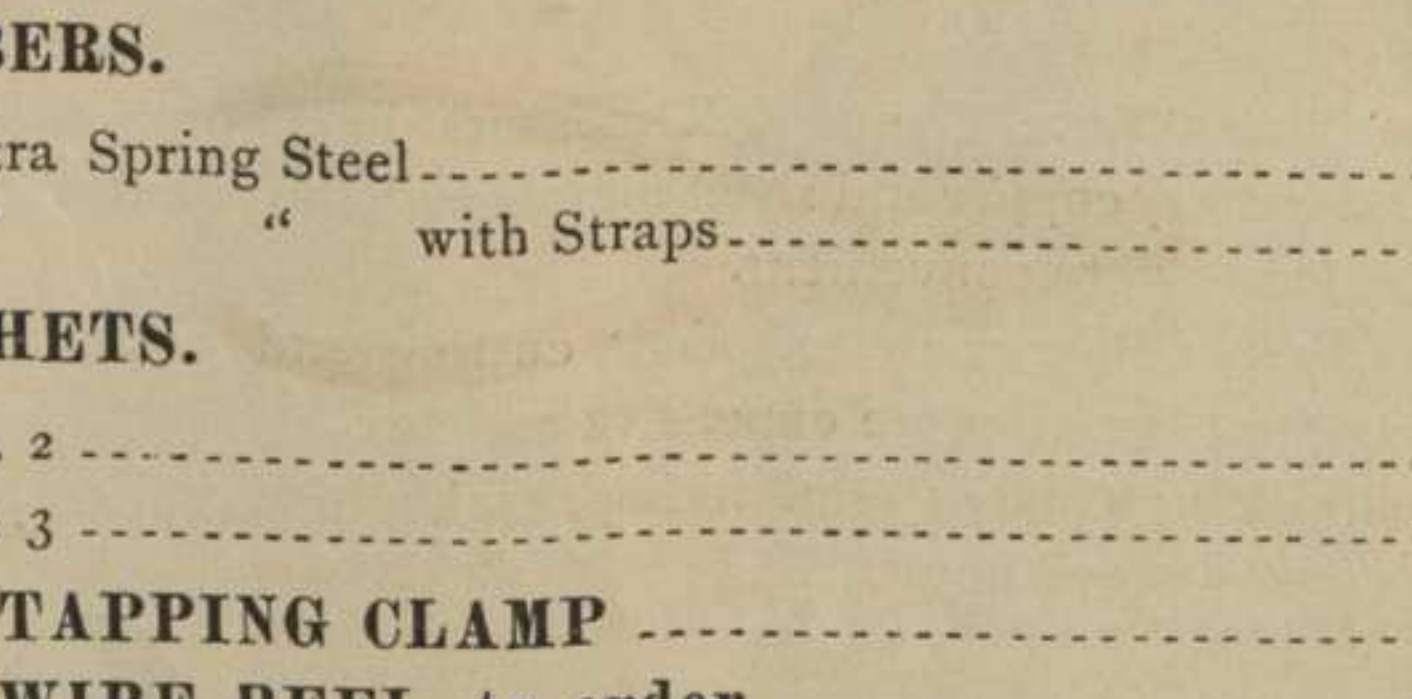
CLIMBERS.

Extra Spring Steel		1 50
"	" with Straps	2 50

HATCHETS.

No. 2	80
No. 3	75

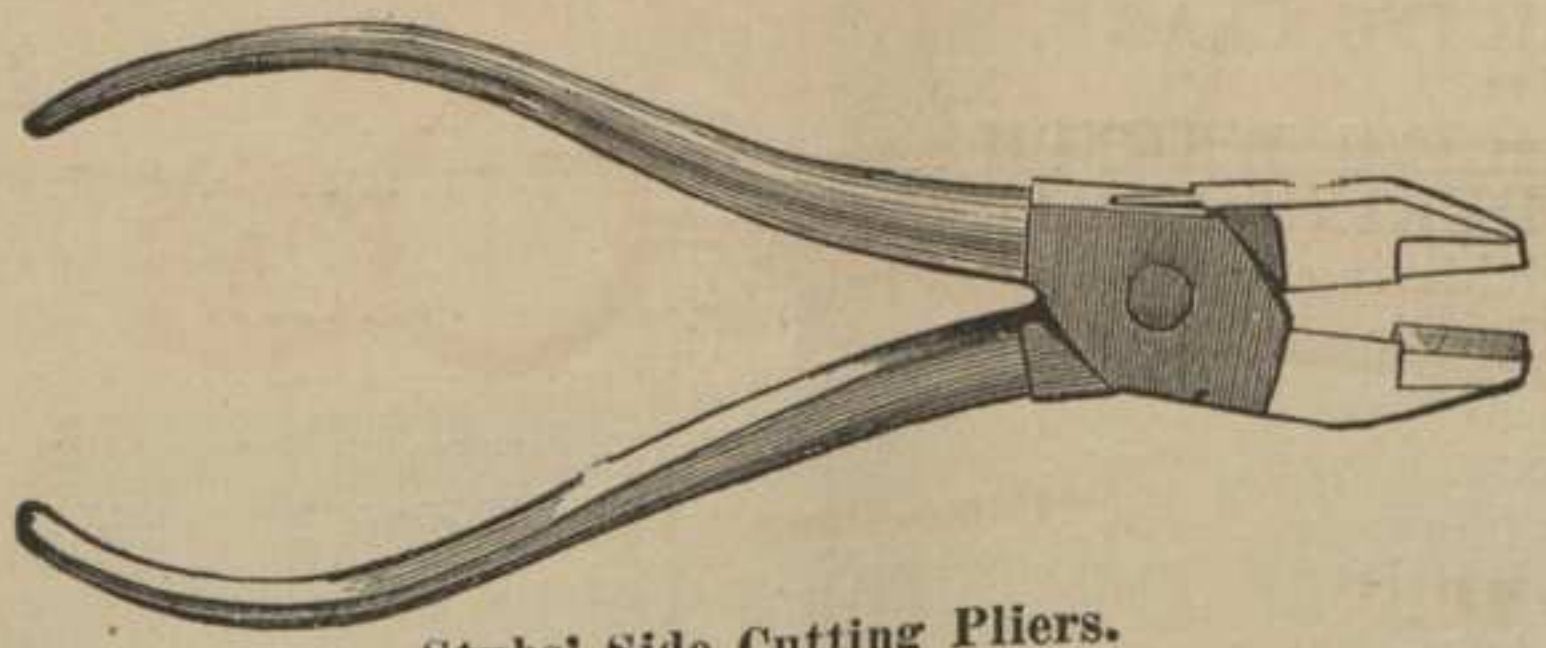
LINE TAPPING CLAMP	4 00
LINE WIRE REEL, to order	10 00



Hall's Patent Cutting Nippers.

NIPPERS.

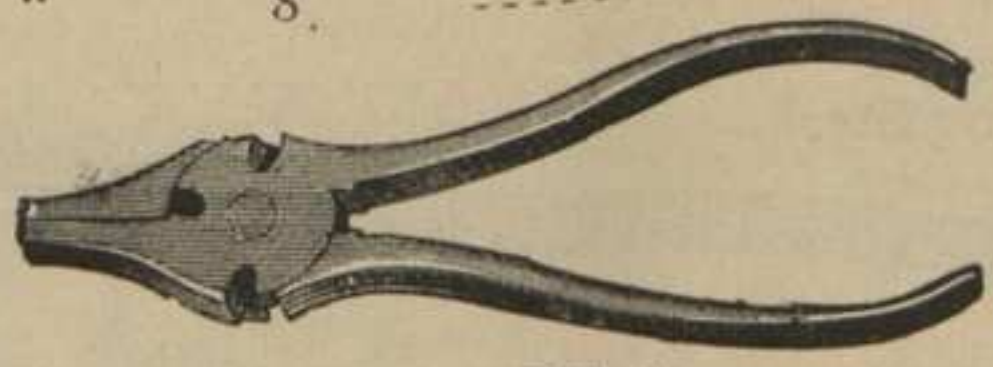
Hall's Patent Cutting,	5 inch	$1 25
" " "	7 "	2 00



Stubs' Side Cutting Pliers.

PLIERS.

Stubs' Side Cutting,	4	inch	$0	90
" "	4½	"		90
" "	5	"		90
" "	6	"	1	00
" "	7	"	1	50
" "	8	"	2	00



Patent Pliers.

Patent, Wire Shears Combined,	4½	inch		75
" " "	6	"		90
" " "	8	"	1	10
" " "	10	"	1	75

POLE RAISER	1	75
PULLEY, ROPE AND CLAMP, Complete	4	25
RATCHET BRACE, 12 inch sweep	2	25
SCREW DRIVER, 2 inch		15
" " 7 "		30

SHOVELS.

Ames L. H., No. 2, per dozen	16 00
Western Union, per dozen	18 00

SPOONS.

Ames' Long Handled, per dozen	14 00

Splicing Clamp.

SPLICING CLAMP, No. 1 ---------- $ 2 25
" " No. 2 ---------- 1 50
SPLICING WRENCH ---------- 75

SOLDERING APPARATUS.

Soldering Pot, Uhlich's Patent ---------- 10 00
Gasoline Furnace for same ---------- 6 00
Charcoal Fire Pot ---------- 3 50
Soldering Coppers, per pair ---------- 1 25
Solder, per pound ---------- 20

TELEPHONE INSPECTOR'S TOOLS.

Complete Set, in Morocco Case ---------- 5 50
Case only ---------- 1 50

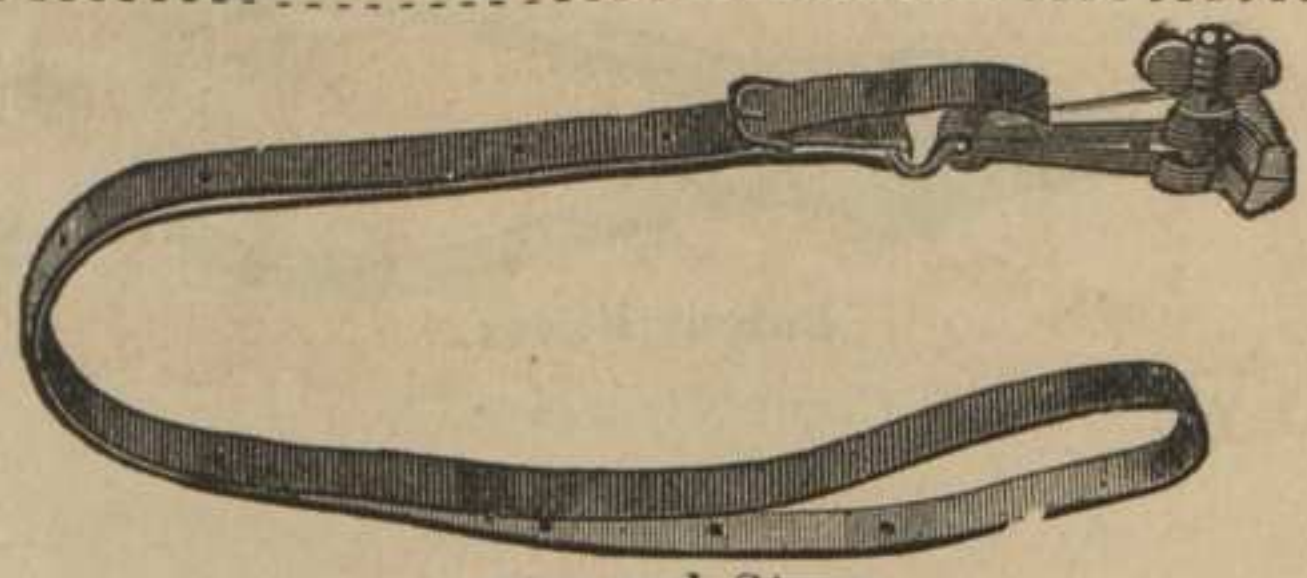
TOOL BAGS.

Best Leather ---------- 4 00
Canvas ---------- 3 25

TOOL BELT ---------- 1 00

TREE TRIMMERS.

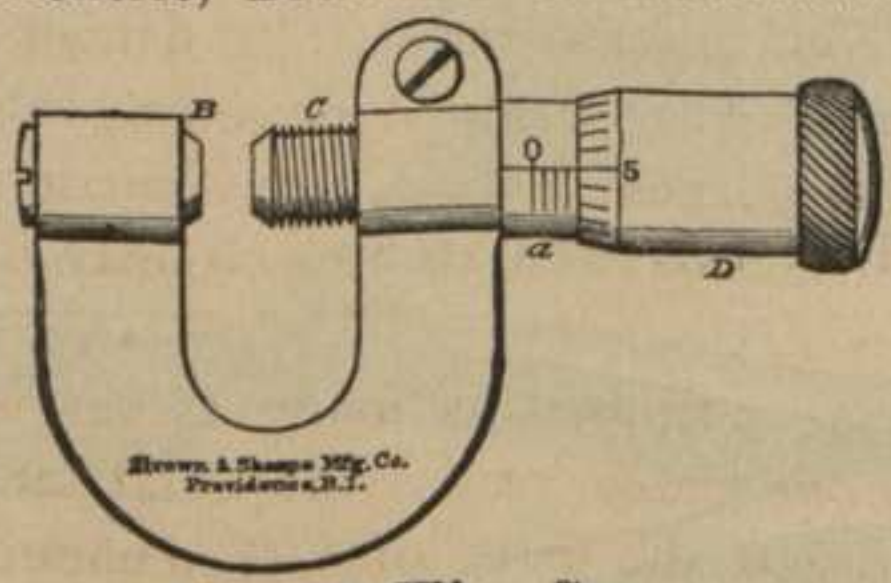
Small ---------- 3 00
Large ---------- 3 25



Vise and Strap.

VISES.

Extra Steel, 6 inch ---------- 90
" with Strap Loop ---------- 1 25
" " ---------- 2 00
Stubs', Steel, 6 inch ---------- 2 25
" " with Loop ---------- 2 75
" " " Strap ---------- 3 50
Vise, with Eccentric, Brockton Combination ---------- 3 25

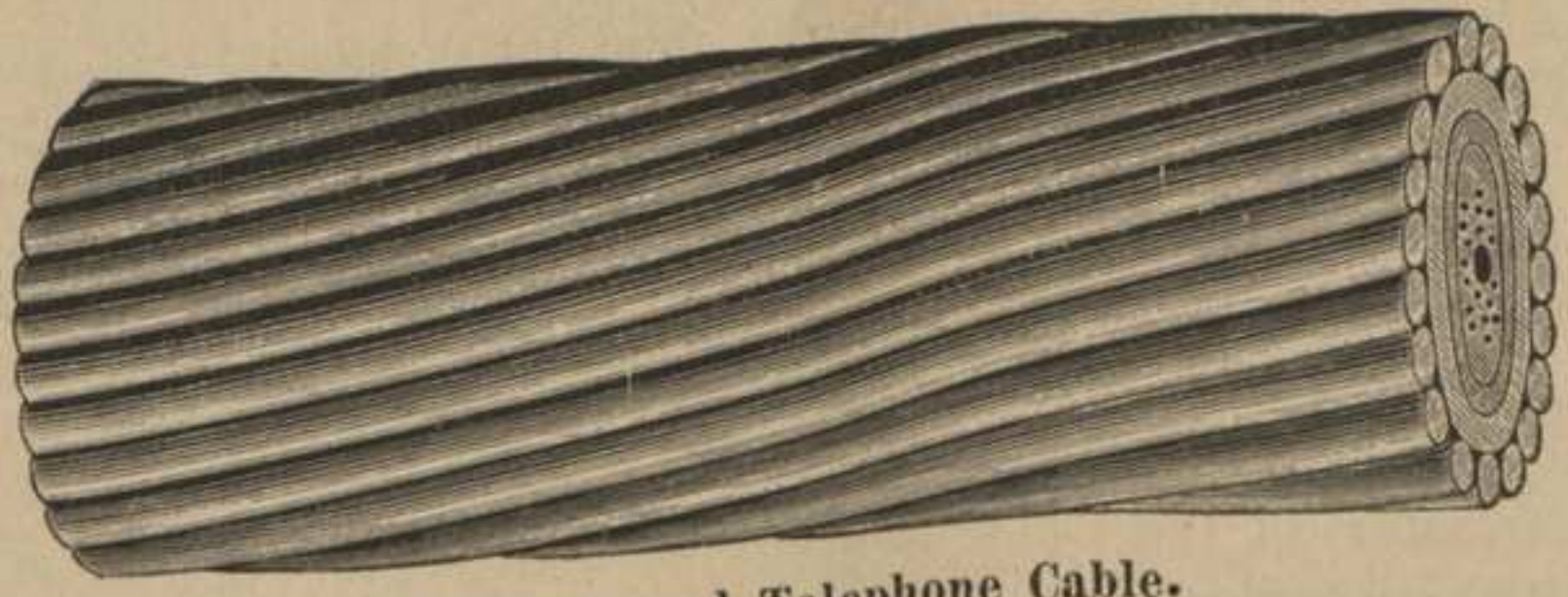


Patent Wire Gauge.

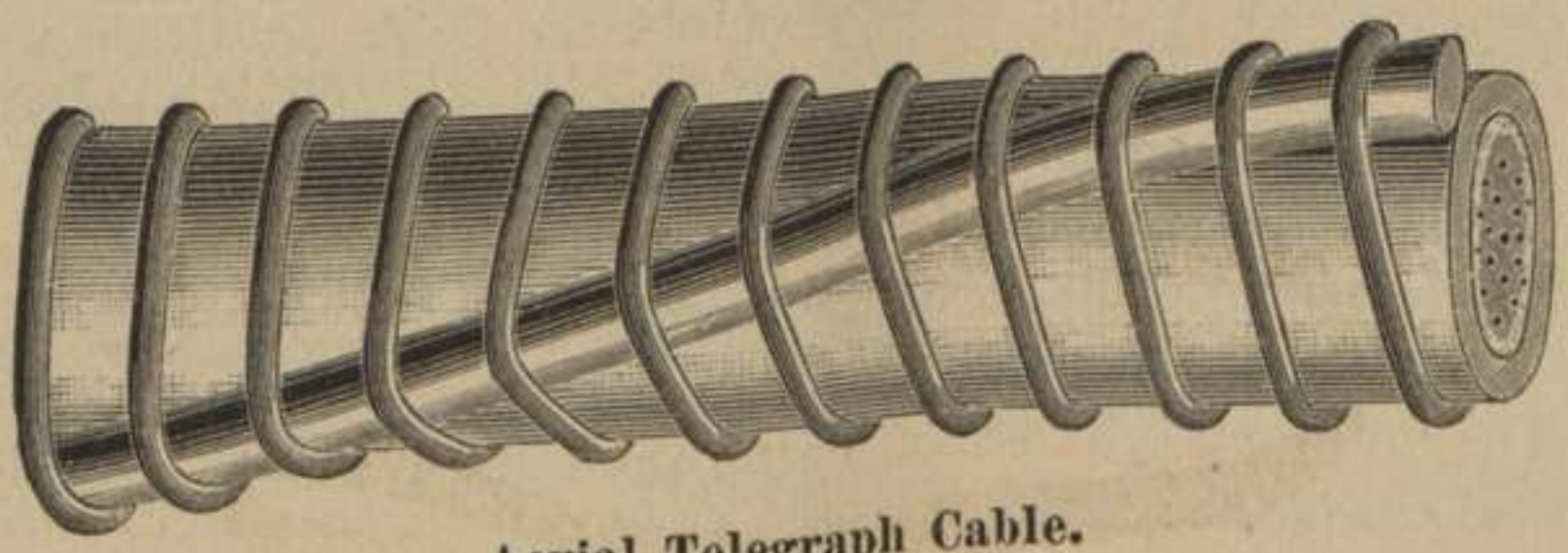
WIRE GAUGE.

Circular ---------- 5 00
Patent ---------- 5 50

UNDERGROUND & AERIAL CABLES.



Underground Telephone Cable.



Aerial Telegraph Cable.

This Cable is manufactured and sold by us under the *Patterson Patents.* It consists of insulated conductors in a lead pipe, the space between the pipe and conductors being filled with hard paraffine wax, forming the best possible insulator for the purpose. The wax is forced into the Cable when hot, and, by a patented process, is prevented from contracting in cooling. As the pipe is completely filled in this way with solid matter, there is no danger whatever of deterioration on account of air or moisture getting into the Cable.

For Telegraph purposes, the Cable is made with large conductors and heavy insulation, and each Cable may contain from one to twenty conductors.

For Telephone purposes, as many as seventy-five conductors may be placed in one Cable, and, by a special patented arrangement, the induction between the wires of a Telephone Cable is entirely eliminated.

Either the Telegraph or the Telephone Cable may be Armored, where such protection is needed. The Armor of the Cable is shown

in the accompanying illustrations. For subterranean or subaqueous use we completely cover the pipe with galvanized iron wires, generally No. 6 or No. 9, according to the character of the place in which the Cable is to be used. For aerial use we lay one or more wires, No. 4 or No. 6, lengthwise with the pipe, for the purpose of giving the Cable sufficient strength, and then wind helically around this wire and the pipe, for the Armor, a No. 14 galvanized iron wire. This Armor may be dispensed with, however, when it is not needed to protect the pipe, as the suspending wires are laid around the Cable in such a manner as to render any tie wires unnecessary for suspending purposes.

A feature of this Cable to which we wish to call especial attention is the fact that it can be repaired at little expense, if broken, in almost any situation. All that is necessary to be done in case of damage by anchor or otherwise, is to take the Cable out of the water, splice the broken wires, dry them and pour on hot paraffine, solder on a small section of pipe, and replace the Armor.

The Cable is made and finished in our shop, and sent out all ready to be put in place, it being flexible so that it can be coiled on a drum two feet in diameter.

The following is a list of Patterson Cables which are now in practical operation:

FOR TELEPHONE LINES,

SUBTERRANEAN AND SUBAQUEOUS.

Length.	Number of Conductors.	Size of Conductors.	Situation.
2640 ft.	5	No. 26	Evansville, Ind.
2300 "	50	" 26	Philadelphia.
1400 "	25	" 26	Norfolk, Va.
1000 "	25	" 26	Norfolk, Va.
490 "	3	" 26	McGregor, Iowa.
440 "	3	" 26	McGregor, Iowa.
400 "	7	" 26	Bridgeport, Conn.
360 "	30	" 26	Buffalo, N. Y.
320 "	12	" 26	Newburyport, Mass.
280 "	7	" 19	Ludington, Mich.
265 "	15	" 26	Green Bay, Wis.
260 "	25	" 26	Michigan City, Ind.
215 "	50	" 26	Toledo, Ohio.
200 "	7	" 19	St. Joseph, Mich.
150 "	50	" 26	Trenton, N. J.
78 "	15	" 26	———, Wis.

AERIAL.

Length.	Number of Conductors.	Size of Conductors.	Situation.
1100 ft.	75, double.	No. 26	Chicago.
3150 "	50, "	" 26	Chicago.
1050 "	50,	" 26	London.
720 "	40.	" 26	Jersey City.

FOR TELEGRAPH LINES.

5150 ft., containing 4 No. 18 conductors, through Musconetcong Tunnel, on Lehigh Valley R. R.

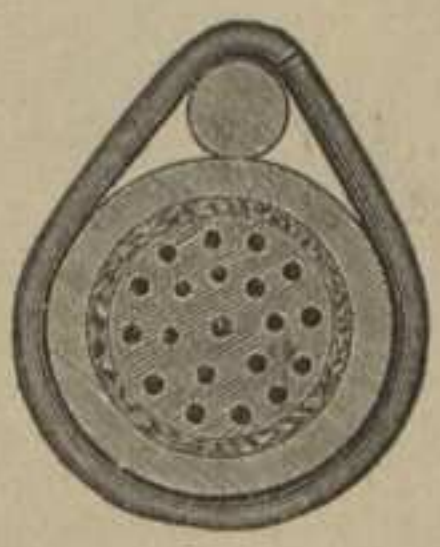
2640 ft., containing 3 No. 19 conductors, under river at Natchez, Miss.

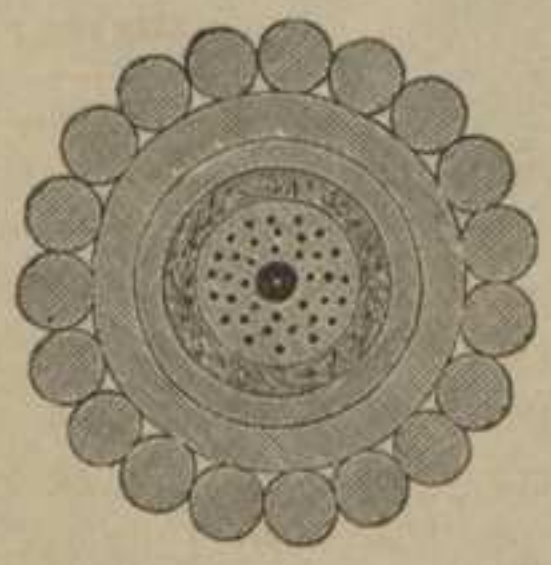
1120 ft., containing 20 No. 19 conductors, Aerial, on Mutual Union Telegraph Company's lines in Chicago.

900 ft. ditto on lines in St. Louis.

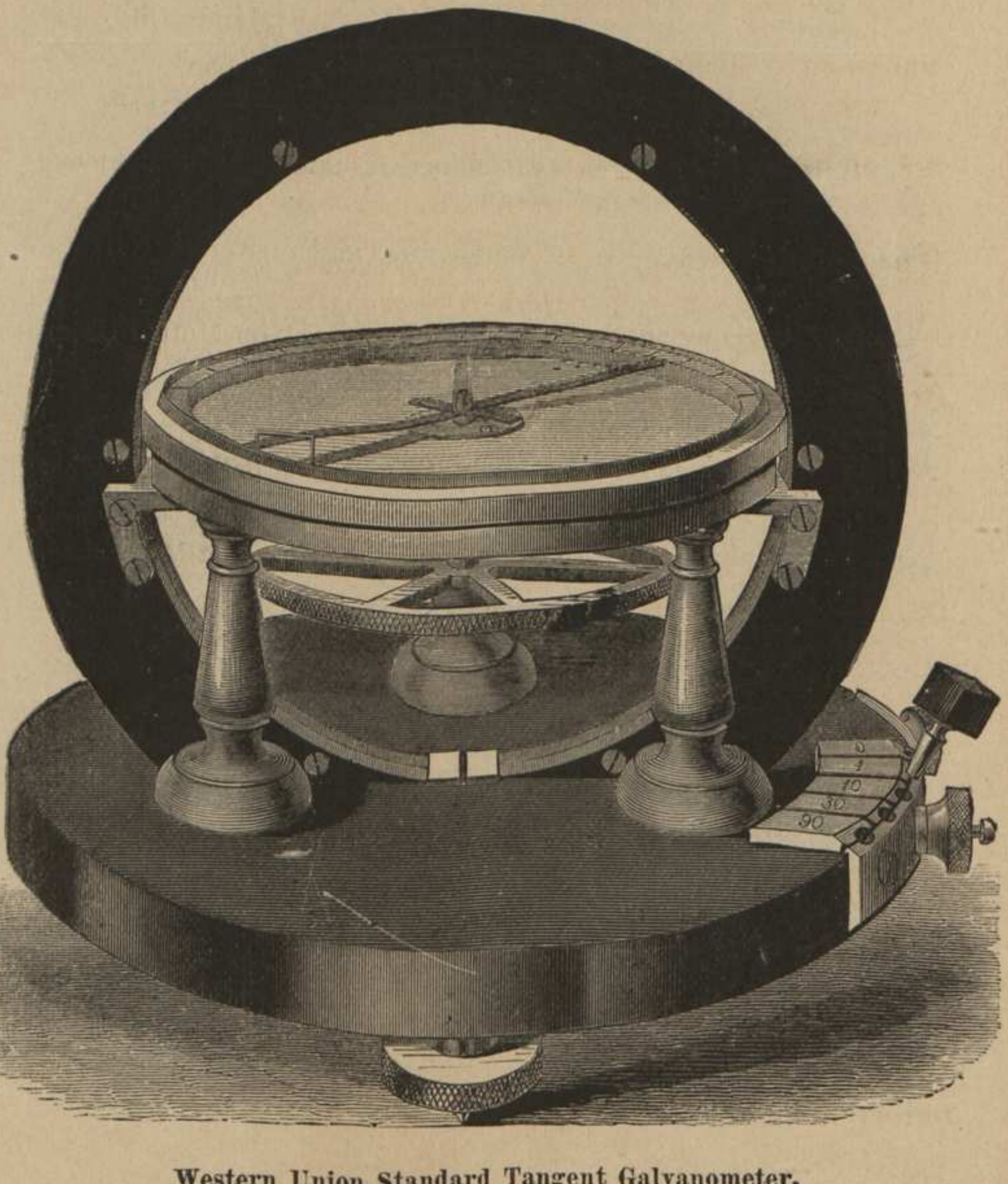
800 ft., containing 20 No. 16 conductors, Aerial, on Baltimore & Ohio Railway Telegraph Company's lines in Chicago.

450 ft., containing 10 No. 16 conductors, under river at Milwaukee, Wis.





ELECTRICAL TESTING INSTRUMENTS.



Western Union Standard Tangent Galvanometer.

e are exclusive manufacturers in the United States, under the patents of Sir William Thomson, of his Reflecting Galvanometers which we furnish with the latest improvements of the inventor.

Thomson's Reflecting Galvanometer, latest improved pattern, dead-beat principle; resistance of coil 40,000 ohms; complete ---------- $200 00

Thomson's Dead-Beat Reflecting Galvanometer, 5,000 ohms resistance, with lamp stand and scale ----- 175 00

Set of Shunts for above, $\frac{1}{9}$, $\frac{1}{99}$, $\frac{1}{999}$, the resistance of galvanometer ---------- 30 00

Wheatstone Bridge, with full set resistance coils to 10,000 ohms, with Key for battery and galvanometer (capacity of measurement up to 1,000,000 ohms) ----- 160 00

Bradley Tangent Galvanometer, with three coils of different resistance, and **Bradley Rheostat,** resistance $\frac{1}{100}$ to 2,111 ohms, combined in leather case ---- 125 00
Galvanometer only ---------- 50 00
Rheostat " ---------- 75 00

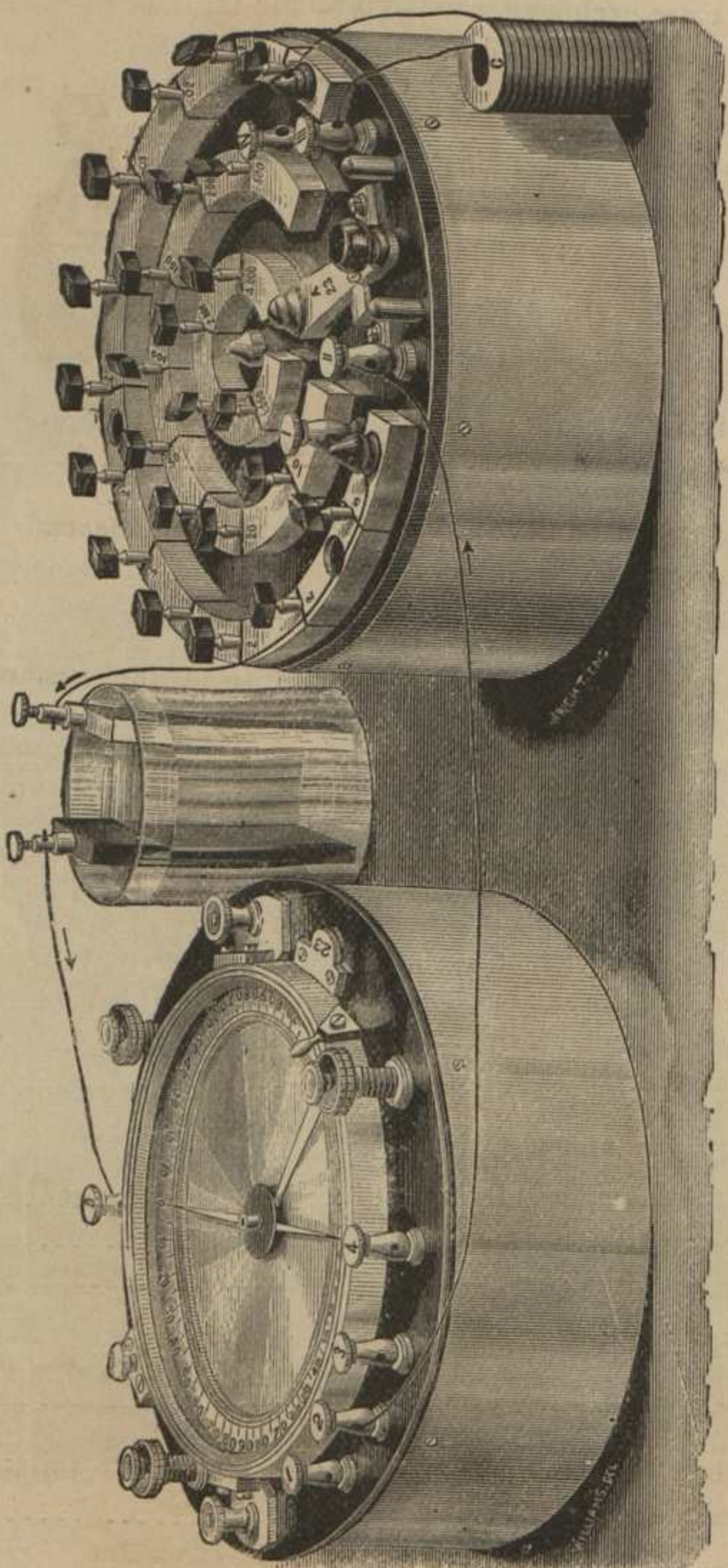
Bradley Tangent Galvanometer, with four coils of different resistance, and **Bradley Rheostat,** resistance $\frac{1}{100}$ to 10,111 ohms, combined in leather case ---- 220 00
Galvanometer only ---------- 85 00
Rheostat " ---------- 135 00

Western Union Standard Tangent Galvanometer,
with resistance coils in base ---------- 150 00
Same, without resistance coils ---------- 135 00
Extra for silk suspension of fibre ---------- 10 00

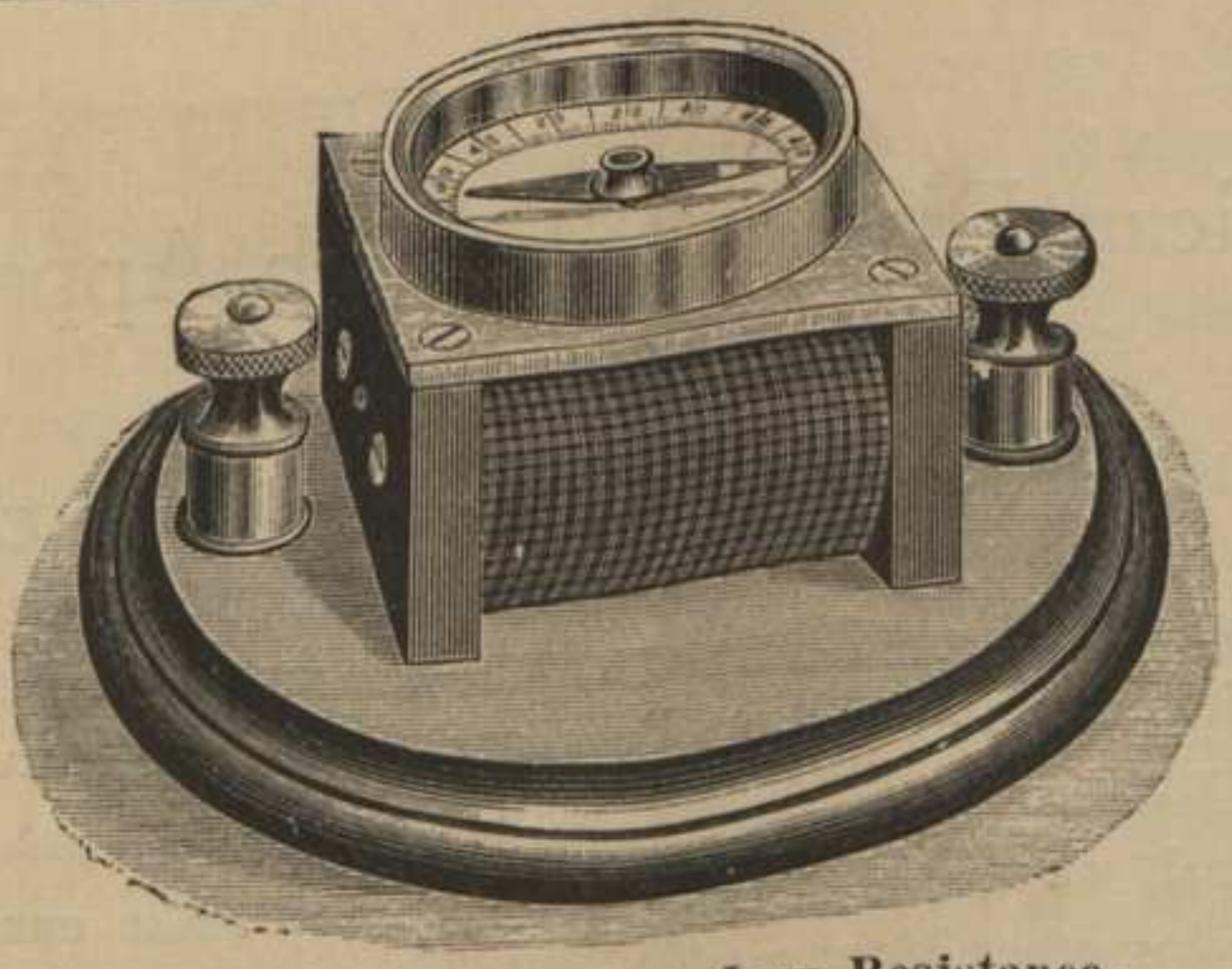
Detector Galvanometer, plain or Astatic Needle, silk suspension, for delicate currents ---------- 50 00

Detector Galvanometer, with two coils of low and high resistance ---------- 12 00

Detector Galvanometer, resistance 100 to 200 ohms-- 8 00



Bradley's Complete Apparatus for Electric Measurement.



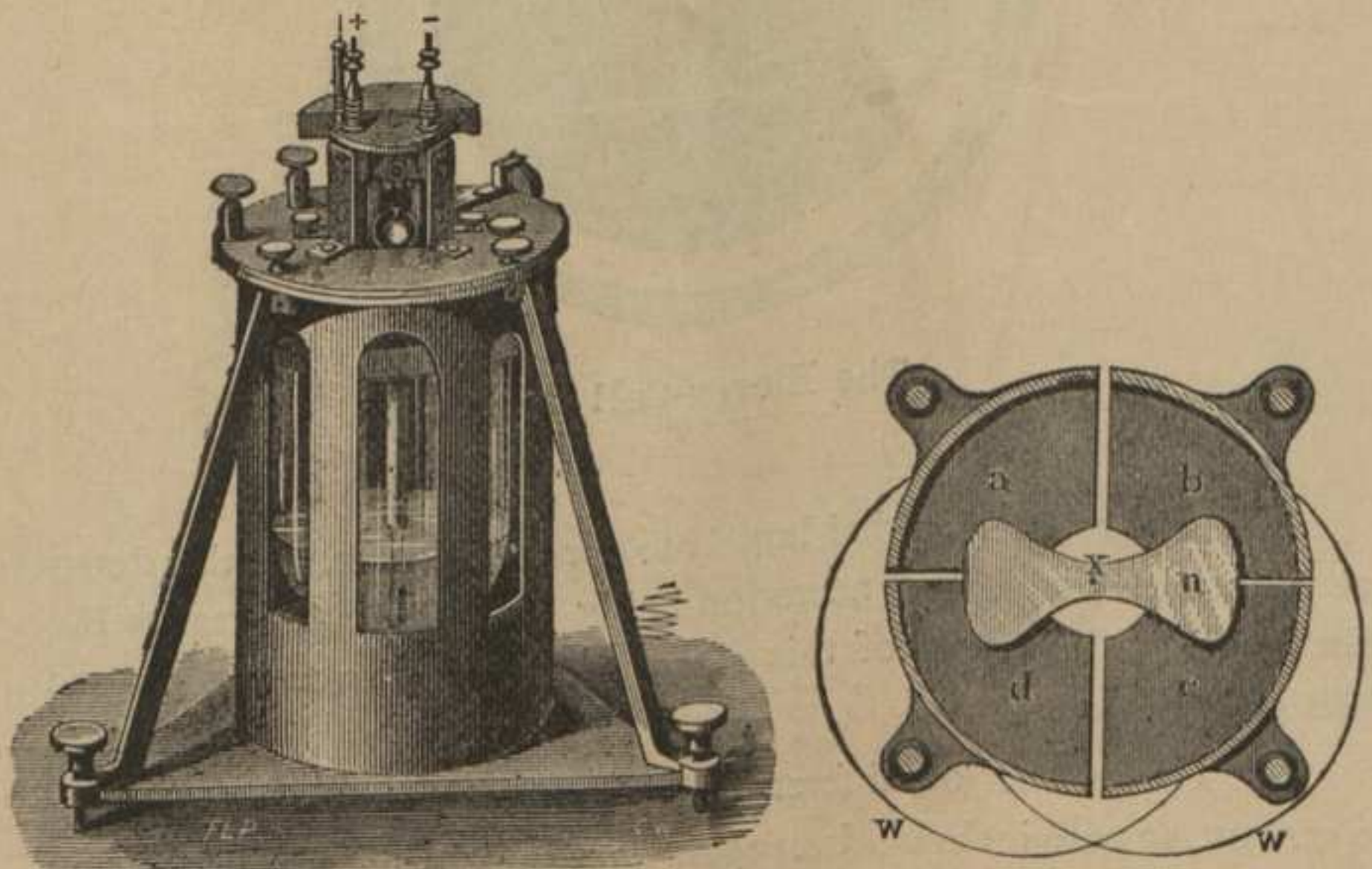
Detector Galvanometer, Low Resistance.

Detector Galvanometer, Low Resistance ---------- $6 00

Standard Condenser, with Mica Insulation, accurately adjusted, 1 Microfarad in 4 Divisions ---------- 175 00

Standard Condenser, with Mica Insulation, ⅛ Microfarad, accurately adjusted ---------- 75 00

Condensers, approximately adjusted, Paraffined Paper Insulation. Price per Microfarad ----------



Thomson's Quadrant Electrometer.

Thomson's Quadrant Electrometer ---------- $200 00

Clark's Standard Battery Cell ---------- 15 00

American District Telegraph Apparatus.

For the furnishing of American District Telegraph Companies, we keep in stock a supply of Eleven Call Boxes, Watchmen's Boxes, Ticket Cases, Office Wire, Registers, Relays, Four Call Boxes, Burglar Boxes, Switch Cases, Line Wire, Bells, and all other apparatus adapted to their service.

As usual, we spare no pains or expense to make our apparatus superior to any other in the market.

The Eleven-Call Box.

We have recently added largely to our manufactures in this department, our most important accession being THE FIELD & FIRMAN BOX. The special advantages of this signal instrument over the common district boxes are:

I. The number of different calls provided is increased from four to ELEVEN, so as to include Messenger, Carriage, Coupé, Express-wagon, Doctor, Laborer, Police, Fire, together with three more which may be made special to suit the convenience of the individual customers.

II. The instruments are provided with apparatus for receiving a Return Signal, the object of which is to certify to the subscriber that his call has been received and is having attention.

III. The instruments are of thorough and careful workmanship, and are Nickel-Plated.

IV. The Boxes all stand cut out of circuit except when a call is being made.

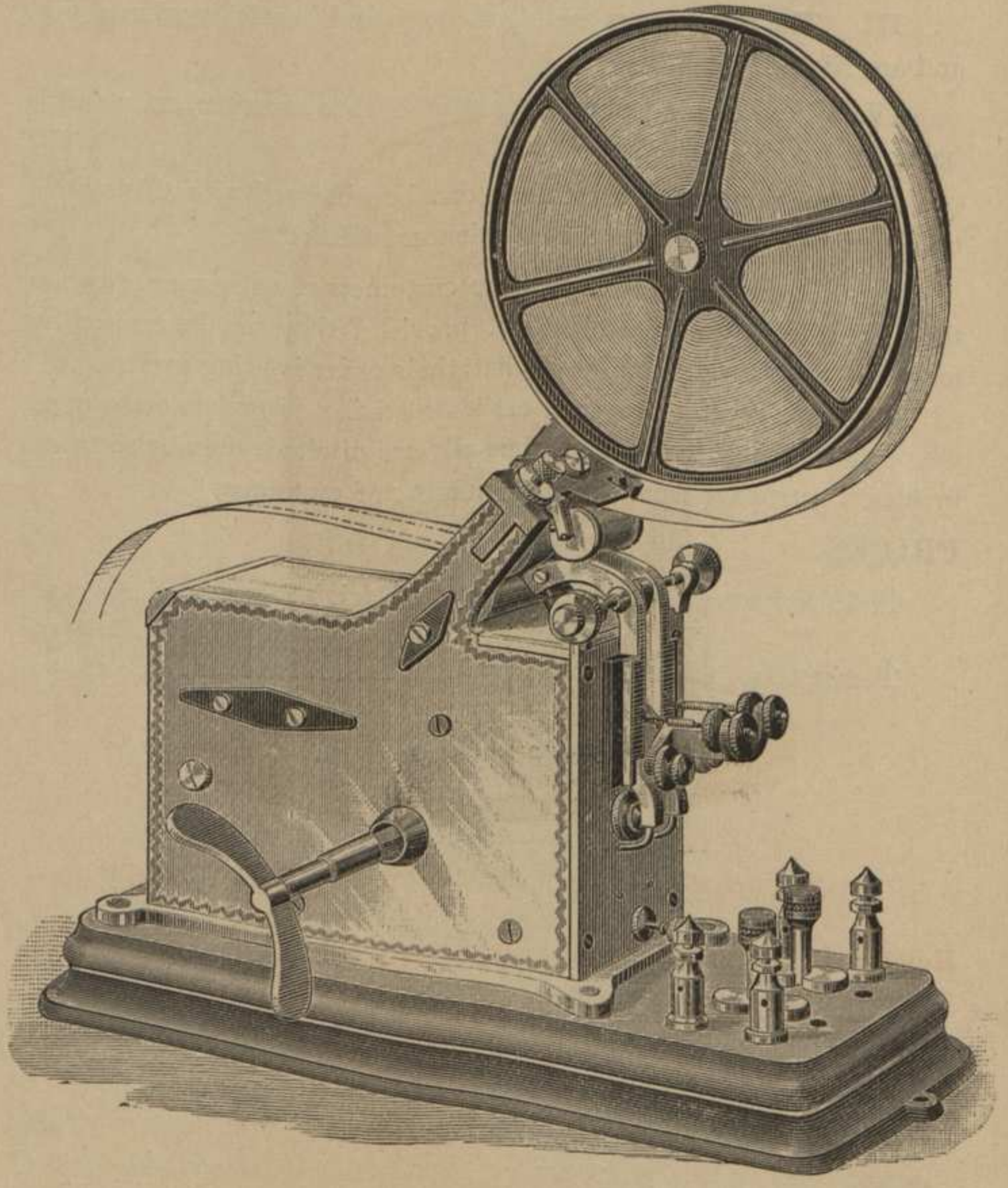
A larger number of subscribers can be obtained with this system on account of the additional conveniences afforded.

It is entirely practicable to serve customers at a distance of two or three miles from the central office, provided they can be assured by means of the answer back signal that their order is being executed.

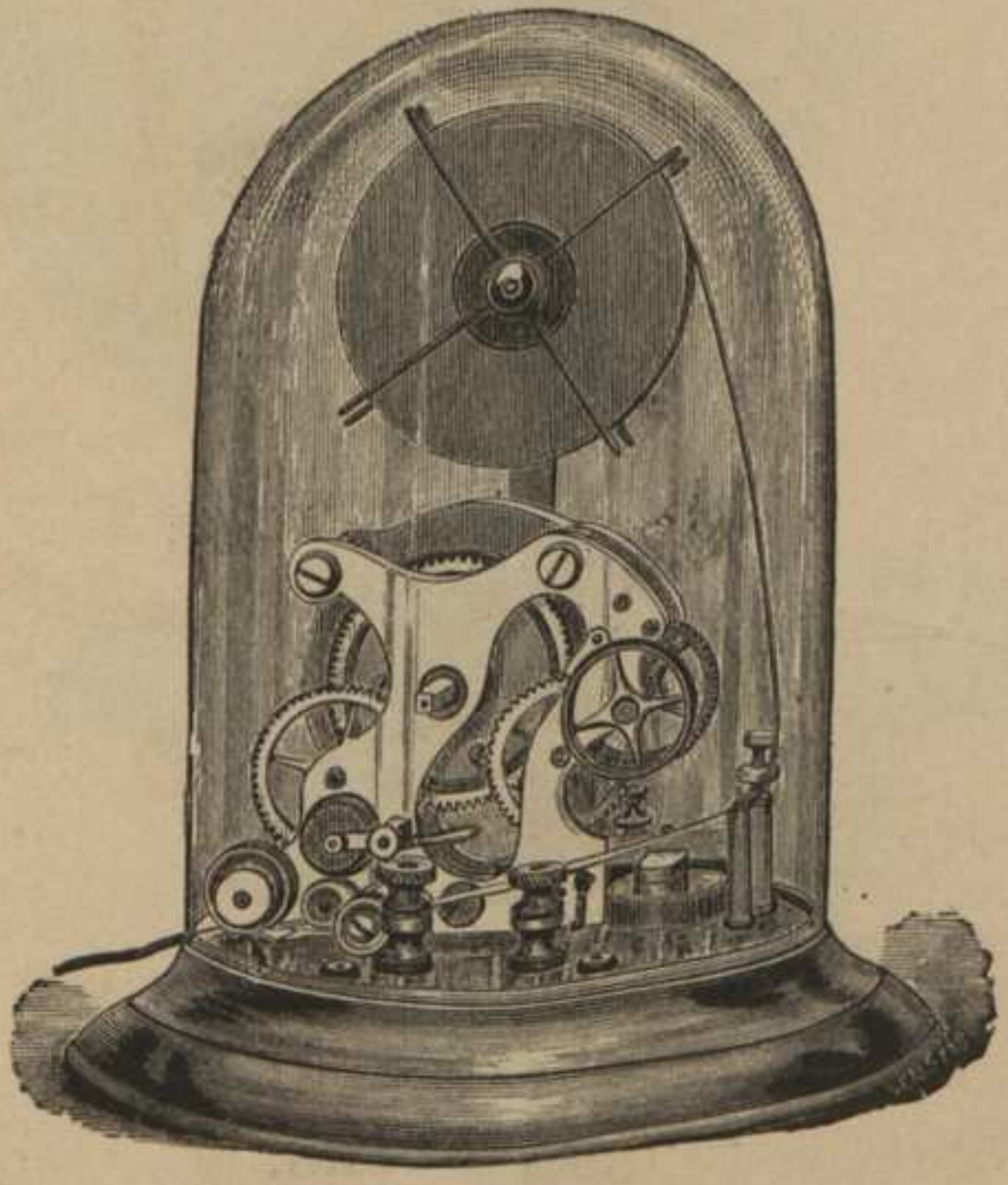
Owing to greater conveniences afforded the customers make more use of their boxes than when the calls are limited, thereby securing increased patronage from the same number of customers.

PRICES.

Field & Firman Box, with "Answer Back" Signal -----	$ 7 50
" " without " " -----	5 50
Ticket Case, 100 numbers ----------	16 50



Double Pen Register.



SPRING REGISTER—INK-WRITING—SELF-STARTING.

Register, Double Pen, Embossing, Self-starting------ $62 50 net.

Ink-Writing, Self-starting ---------- 60 00 "

ELECTRIC BELLS AND ANNUNCIATORS.

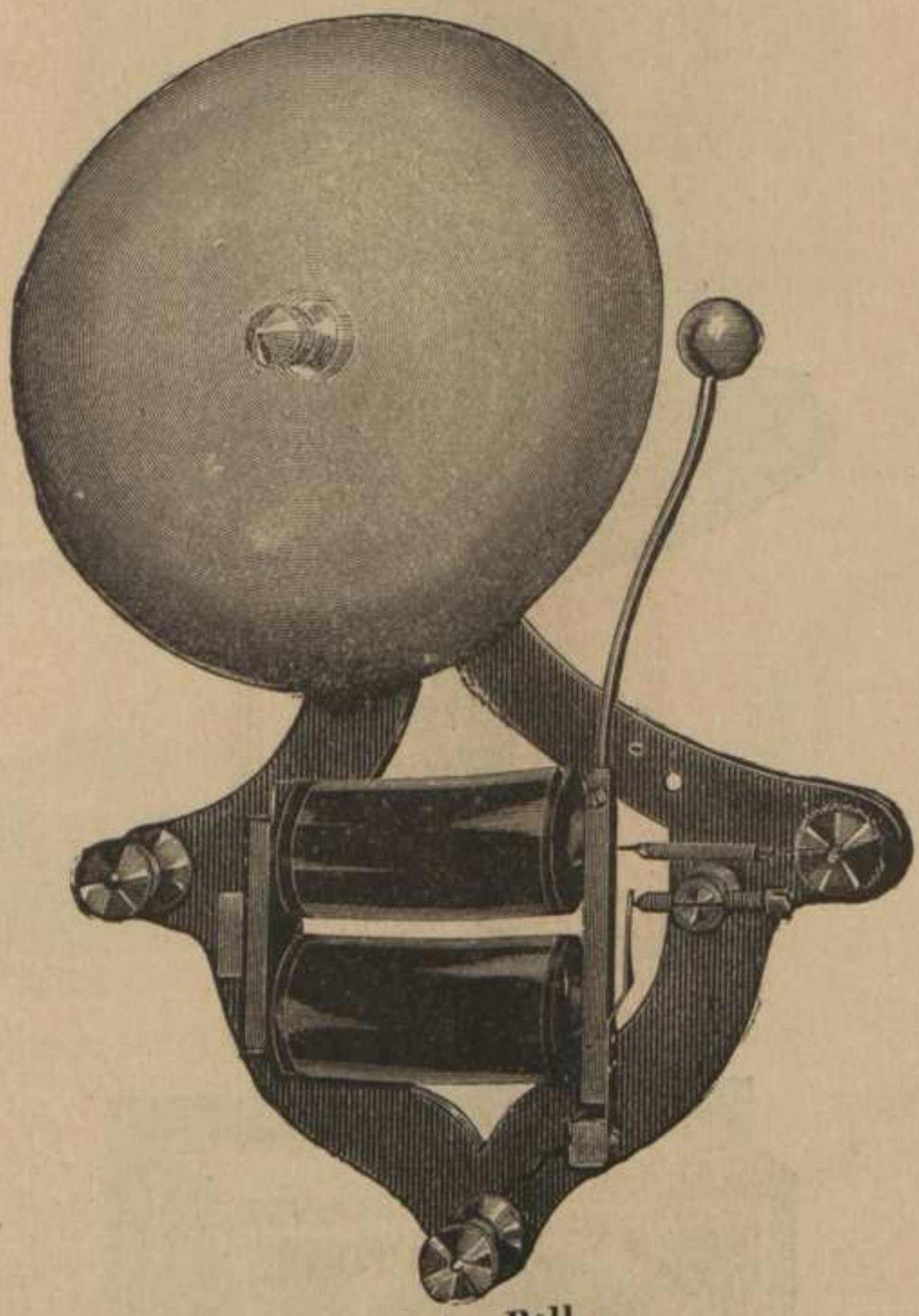
House Call Annunciator.

ANNUNCIATORS.

	HOUSE CALL.	BURGLAR ALARM.
4 Indications	$22 50	$30 00
6 "	27 50	38 50
8 "	32 50	47 00
9 "	35 00	51 00
10 "	37 50	55 00
12 "	42 00	63 00
15 "	48 50	75 00
20 "	60 00	95 00

Hotel Annunciators, 20 Indications and upwards, per Indication, $3.00.

A bell is included with every Annunciator.

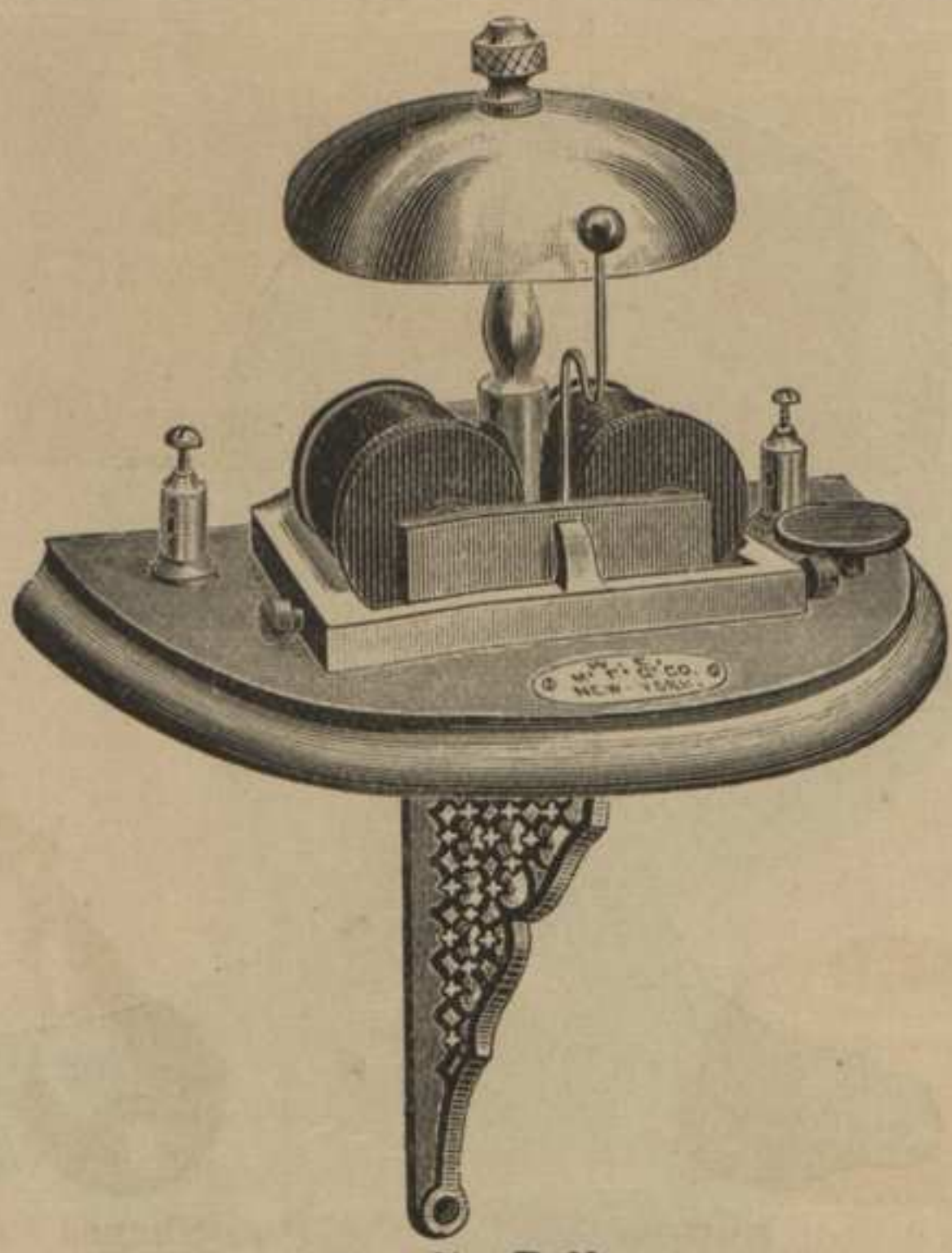


Skeleton Bell.

BELLS.					Single Stroke, or Vibrating.
Walnut Case,	$2\frac{3}{4}$-inch	gong			$ 3 00
" "	3	"	"		3 00
" "	4	"	"		4 00
Mahogany Case,	3	"	"		4 50
Skeleton Form,	4	"	"		6 00
" "	5	"	"		6 50
" "	6	"	"		10 00
" "	7	"	"		11 00
* " "	4	"	"	Lock Attachment	9 00
† " "	4	"	"	Continuity "	9 00
Gravity "	$2\frac{1}{2}$	"	"	with Bracket	4 00

* The Lock Attachment prevents any movement of the bell hammer till it is actuated by the magnets. This bell is used on railroad trains.

† The Continuity Attachment causes the bell to continue ringing until the circuit is changed by hand.



Gravity Bell.

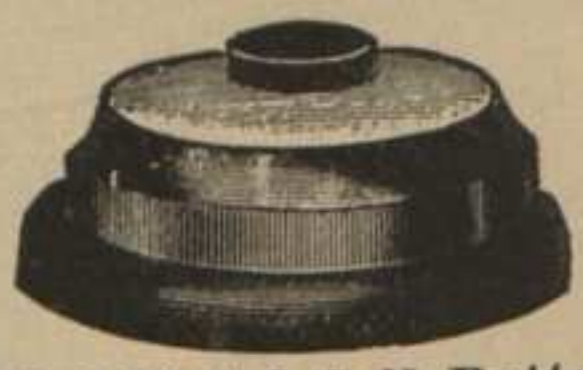
Buzzer.

Buzzer $4 00

In the Buzzer, the vibrating hammer strikes a sounding piece, producing a call which is in certain cases preferable to that of a bell. It is often used to call a clerk or messenger from his desk, without directing general attention to the call.

Compound Call Button.

2	Pushes	$4	00
4	"	7	00
6	"	10	00
8	Pushes	$12	50
10	"	15	00
12	"	17	00



Nickel-Plated Call Button.

Pear-Shaped Call Button.

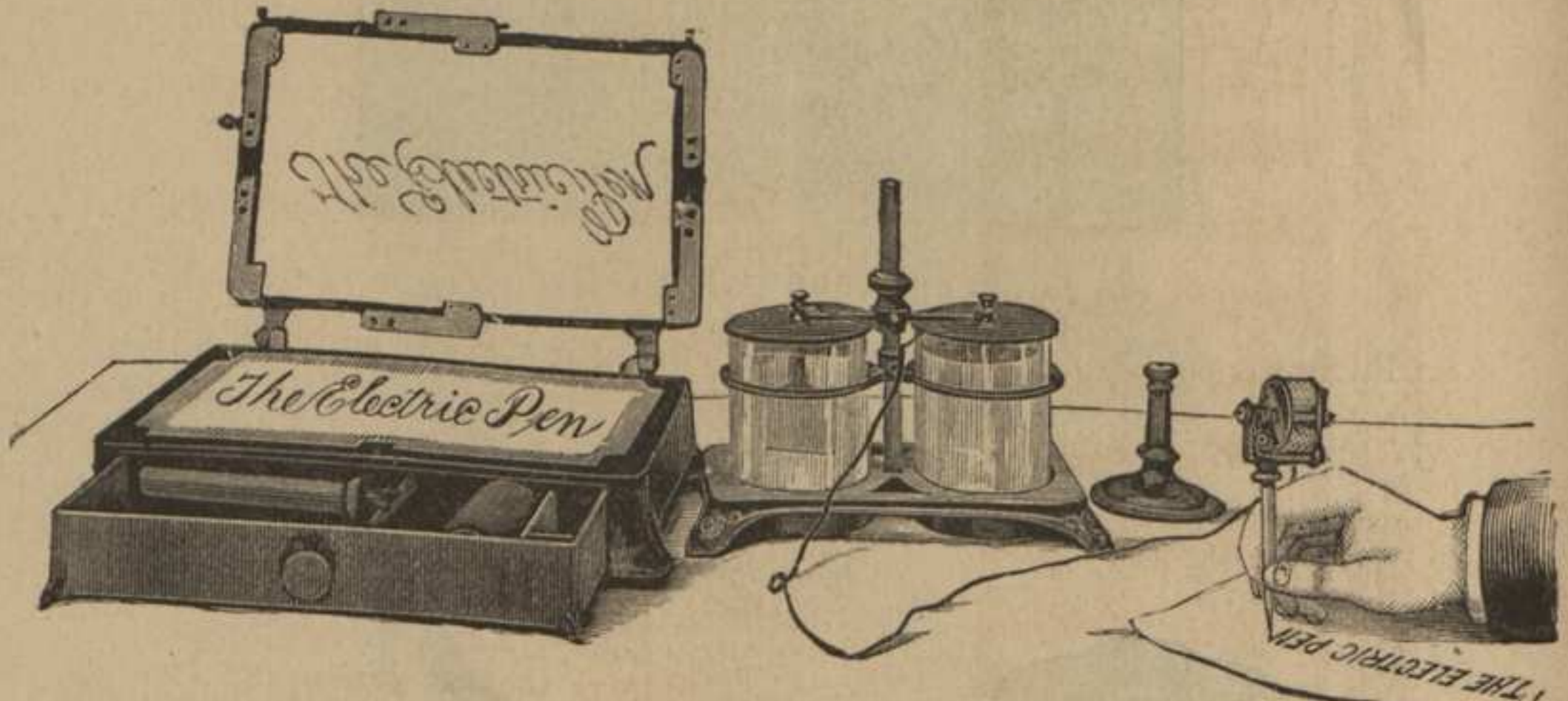
Front Door Pull,	Porcelain	$2 50
" " "	Bronze	3 50
" " " "	Lever	5 00
Battery Switch		1 00
Door Connection		1 00
Window Spring,	Common	25
Young Window Spring		50
Floor Key		1 50
Counter Connection		1 50
Signal Key,	Back Contact	2 75
" "	Front "	3 00
" "	Back and Front, for open circuit	3 00

Bronze Call Button.

Wooden Call Button.

Call Button,	Pear-Shaped	$1 25
"	Polished Rosewood	50
"	Nickel-Plated	1 00
"	Bronze	1 50

EDISON'S ELECTRIC PEN AND DUPLICATING PRESS.

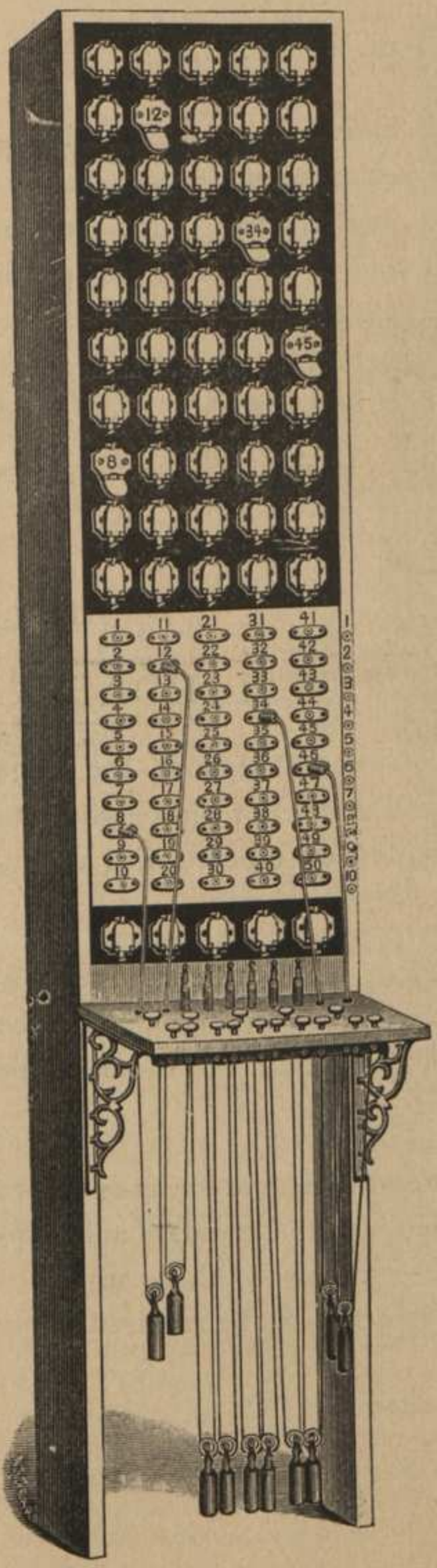


This Duplicating Apparatus is especially adapted to the needs of Railway and Telegraph Companies.

It is unequaled for the speed, economy and convenience with which circulars, notices, diagrams, etc., can be prepared and issued.

No. 1 Outfit, complete, printing 7x11 inches	$25 00
No. 2 " " " 9x11 "	30 00
No. 3 " " " 9x14 "	35 00

Presses No. 1, 7x11	$ 8 00
" " 2, 9x11	12 00
" " 3, 9x14	17 00
Roller No. 1	2 25
" " 2	3 25
" " 3	3 25
Pen	8 00
Battery	5 25
Pen Stand	40
Cord	25
Bottle Watch Oil	10
Screw Driver	10
File	15
Bottle Ink	50



TELEPHONE EXCHANGE APPARATUS.

Our Standard Telephone Exchange Switch Board

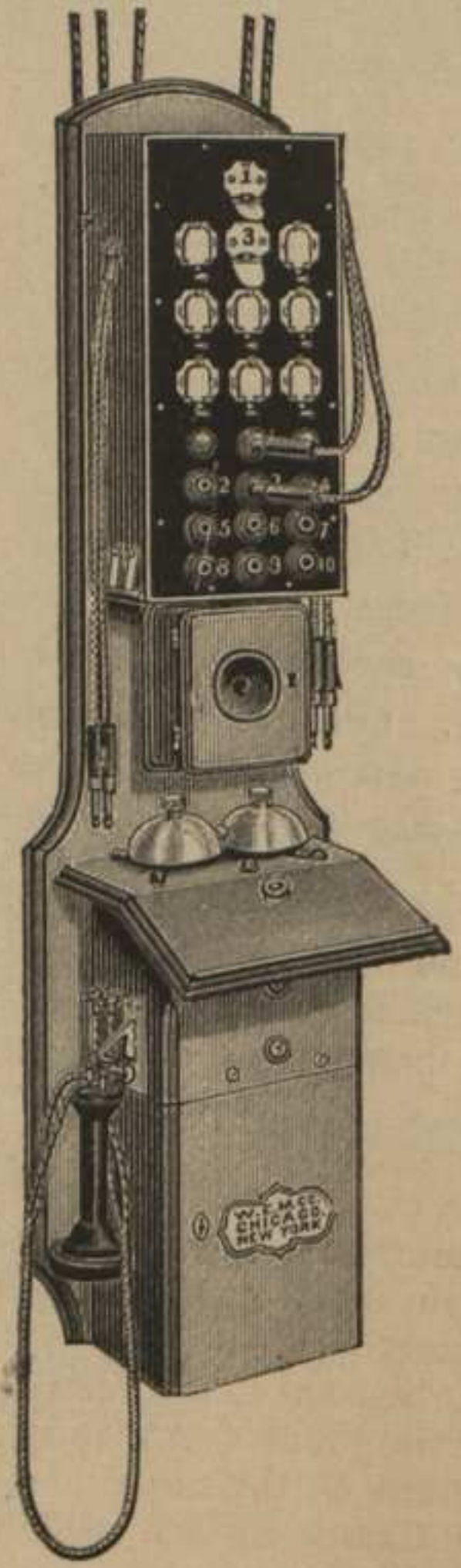
Is believed to be the simplest and most expeditious in manipulation of any yet devised. The movements necessary to connect and disconnect subscribers are reduced to a minimum.

It is now in practical operation in nearly 200 Telephone Exchanges in this country, and is recognized as the most economical and satisfactory Switch Board in the market for Telephone Exchanges which have less than 500 subscribers in one office. It is, however, as well adapted for large Exchanges as any other except the Duplicate Switch Board. Quite a number of these Boards are also in use in foreign countries. It is the standard Board adopted by the Western Telephone Co., Central Telephone Co., Midland Telephone Co., Iowa & Minnesota Telephone Co., and the Iowa Telephone and Telegraph Co.

A complete description of this Switch Board is given in our Catalogue No. XIV., which we send free to Telephone people on application.

THE DUPLICATE SWITCH.

By means of the Duplicate Switch, one or two thousand subscribers can be handled in one office just as promptly and satisfactorily as one or two hundred by any other system. The operation of connecting two subscribers at the switch board consists simply in inserting two plugs. The operator is always listening, so that the calls are instantly attended to. This system is in use in Indianapolis for nearly 800 subscribers in one office, and at Columbus, O., and Toledo, O., for about 600 each.

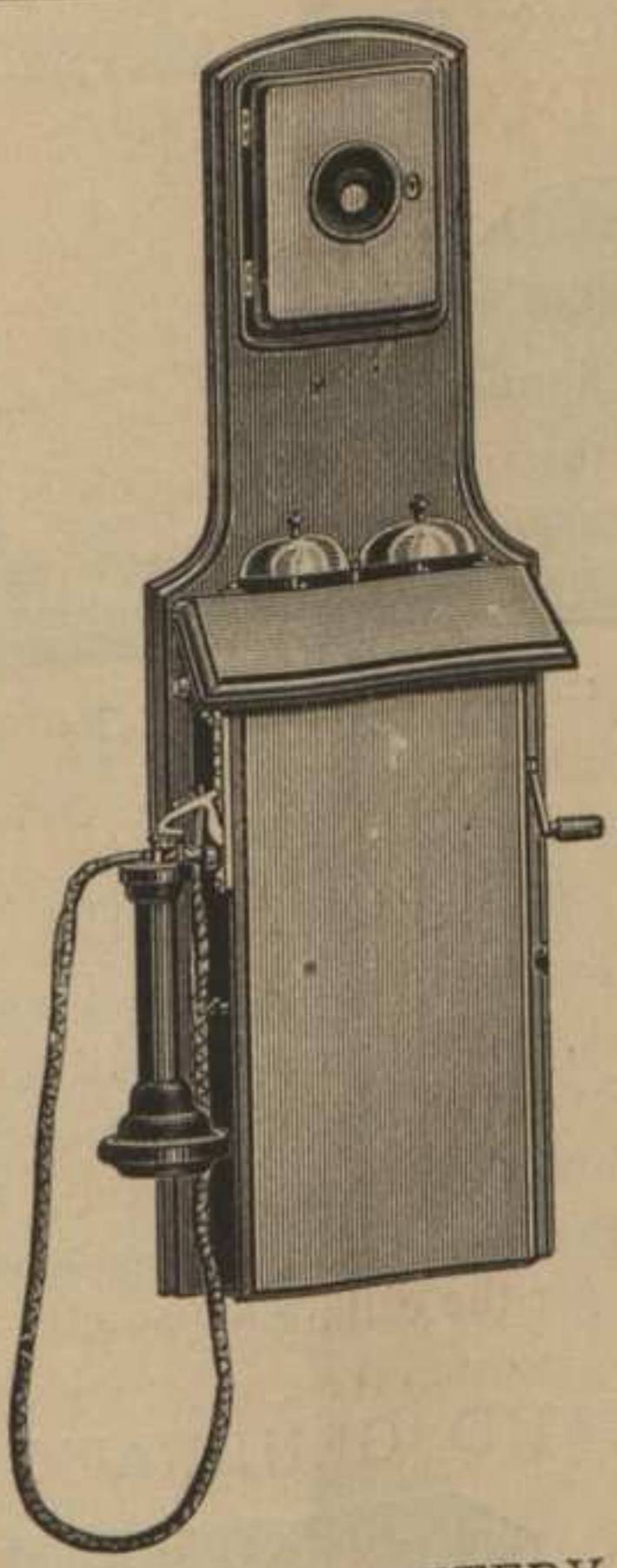


PONY SWITCH BOARD.

This is a complete Telephone Exchange Switch for a small number of wires—say 10 to 24—and is mounted on a board with a Magneto Call Box.

The operation of the board consists simply in inserting plugs, with cords attached, in the spring-jacks of the subscribers wishing to be connected.

The annunciator drops and switches are the same as are used with the Standard and Duplicate Boards; consequently they can be utilized should a larger board be required at any time.



MAGNETO CALL BELL AND BATTERY BOX COMBINED.

In compactness in form and arrangement, thorough workmanship, the power of generator and bell, and the perfect reliability of the switch and circuit, the WESTERN ELECTRIC MAGNETO is acknowledged by all experts to be the best that is made.

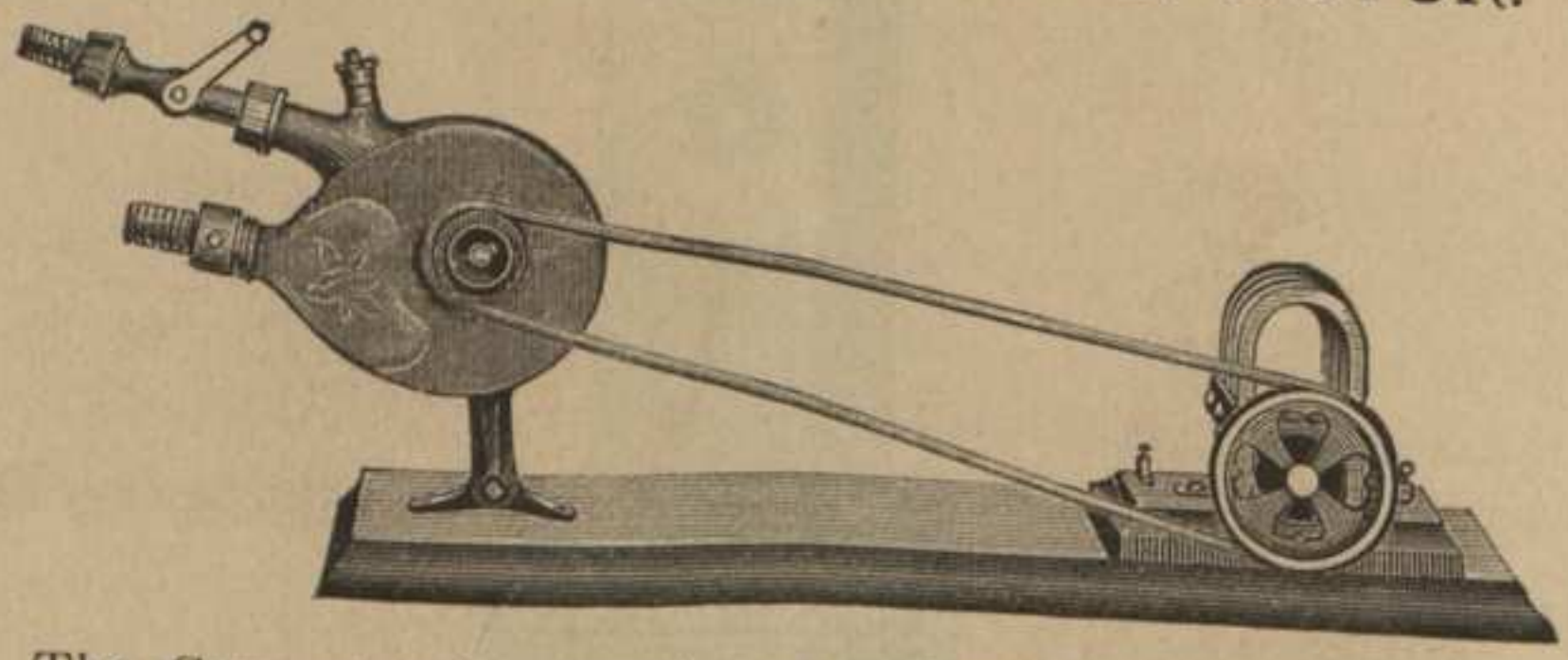
By a peculiar arrangement of the permanent magnets in the bell, polarization of the armature is effected without actual contact between magnets and armature, thus preventing the sticking of armature to the poles of the electro magnets, and therefore permitting it to ring over a greater length of Line.

The switch and the circuit of the box are entirely reliable, there being no position of the switch whereby the circuit may be left open. Even though dust should accumulate in the points and prevent them from closing, the circuit through the box is still intact, and the bell can be rung or the Telephone used without interruption.

The circuit of the box is especially advantageous in protecting the coils from lightning, as there is provided a straight circuit through the box for its escape without passing through any of the coils.

The box is provided with an Automatic Crank Switch, which works when the crank is turned in either direction.

GENERATOR, WITH WATER MOTOR.

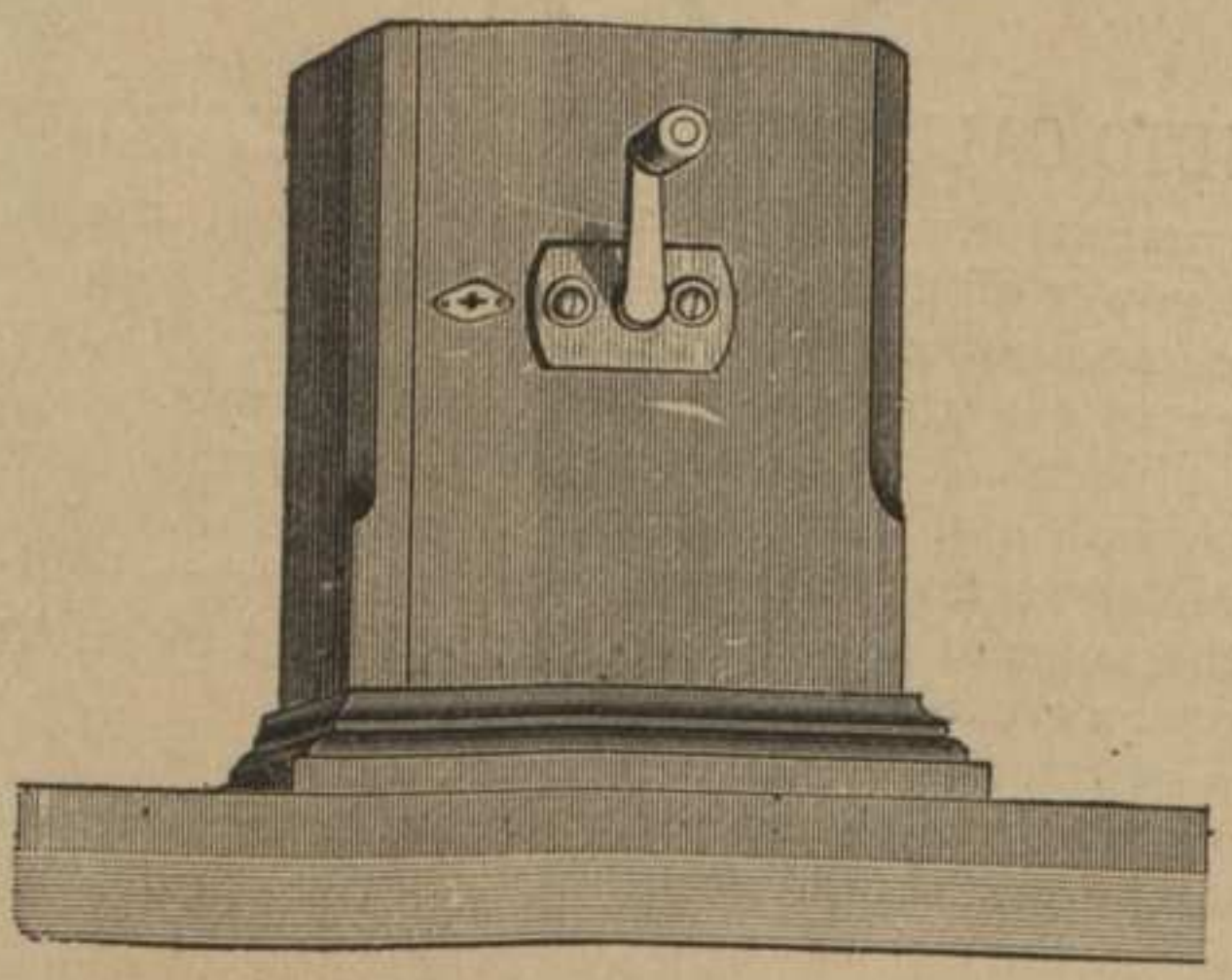


The Generator is sometimes preferred mounted with a small Tuerk Water Motor.

POLECHANGER.

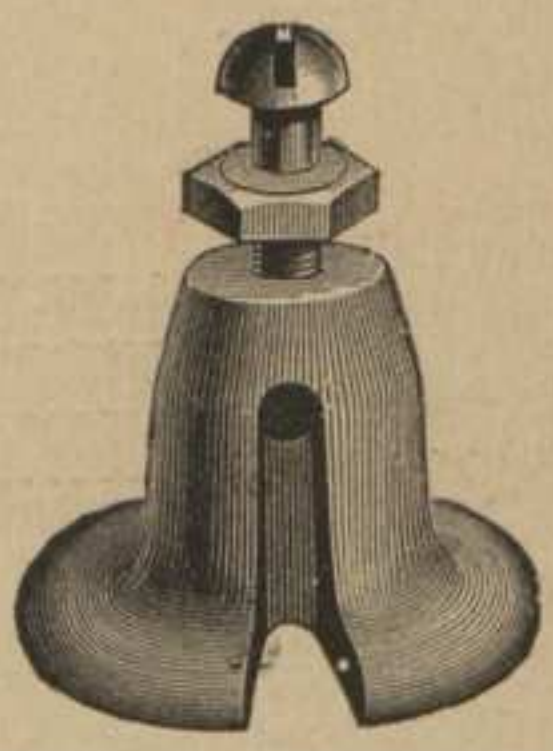
This instrument enables the operator to answer a call by simply pressing a button. It rings either a magneto or a battery bell. Recent improvements have been made in its construction which render it much more reliable than ever before. A battery of about ten gravity cells is generally used with the Polechanger—two to work the instrument and eight for the calling battery.

HAND GENERATOR.



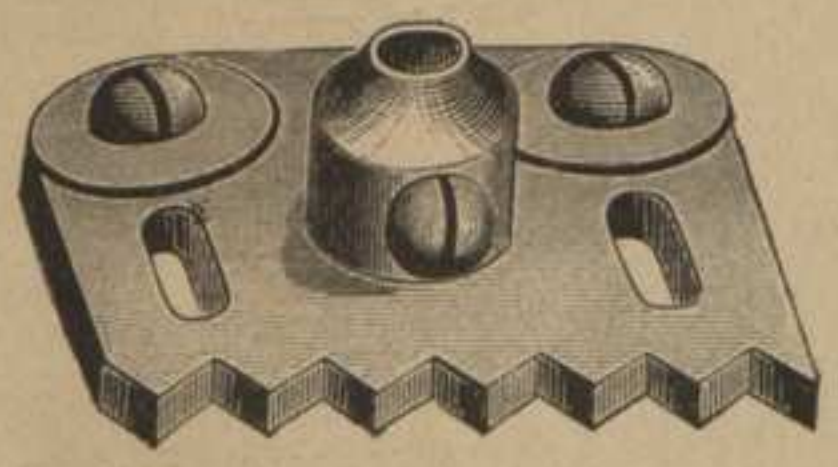
In a small exchange a Hand Generator is often used instead of a Polechanger. In a large exchange it is convenient to have a generator at hand, ready for use in case of any accident to the polechanger or battery.

LIGHTNING ARRESTER AND WINDOW CONNECTOR.



WINDOW CONNECTOR.

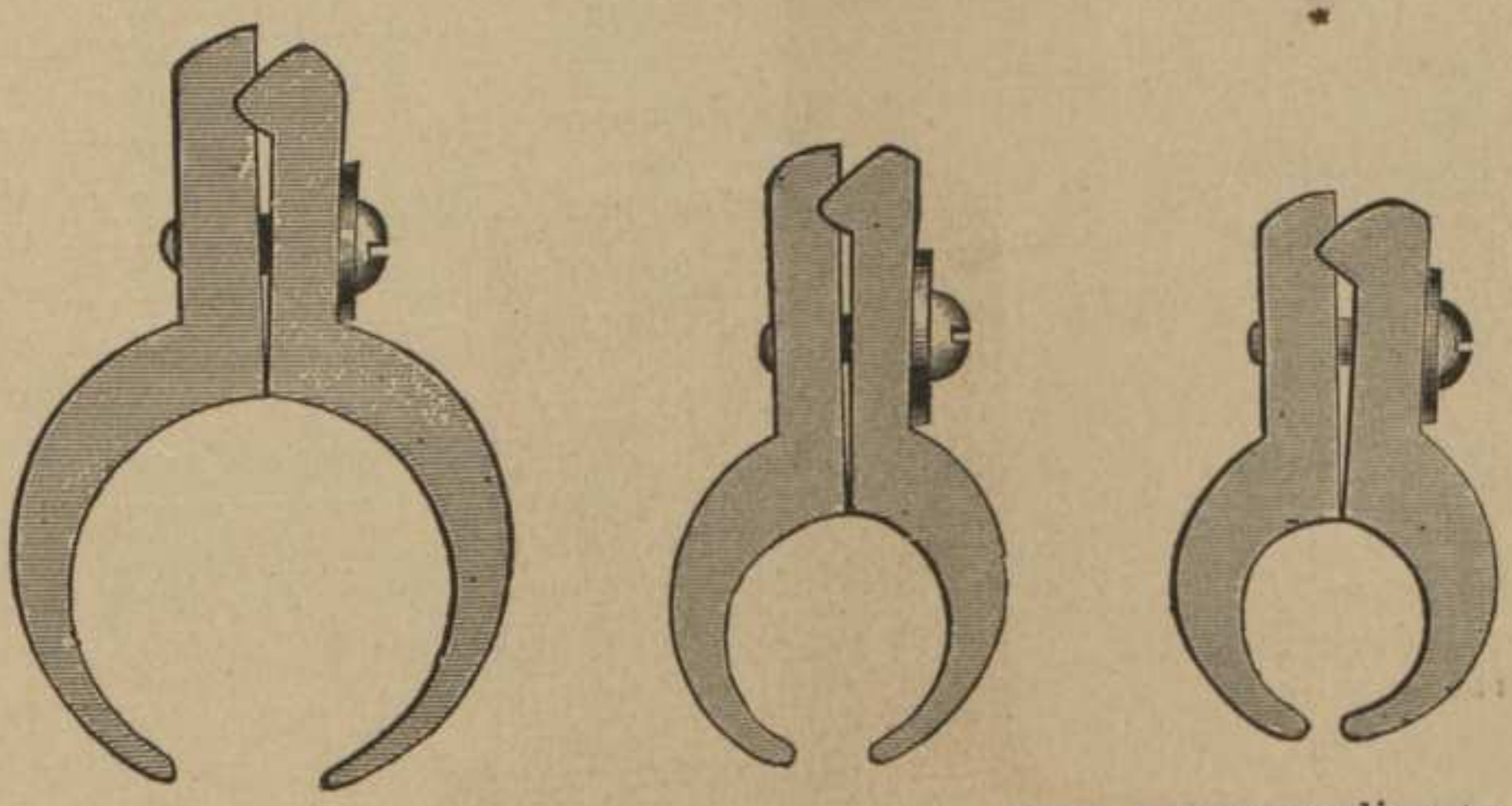
A cheap, safe, and convenient Connector.



LIGHTNING ARRESTER AND WINDOW CONNECTOR COMBINED

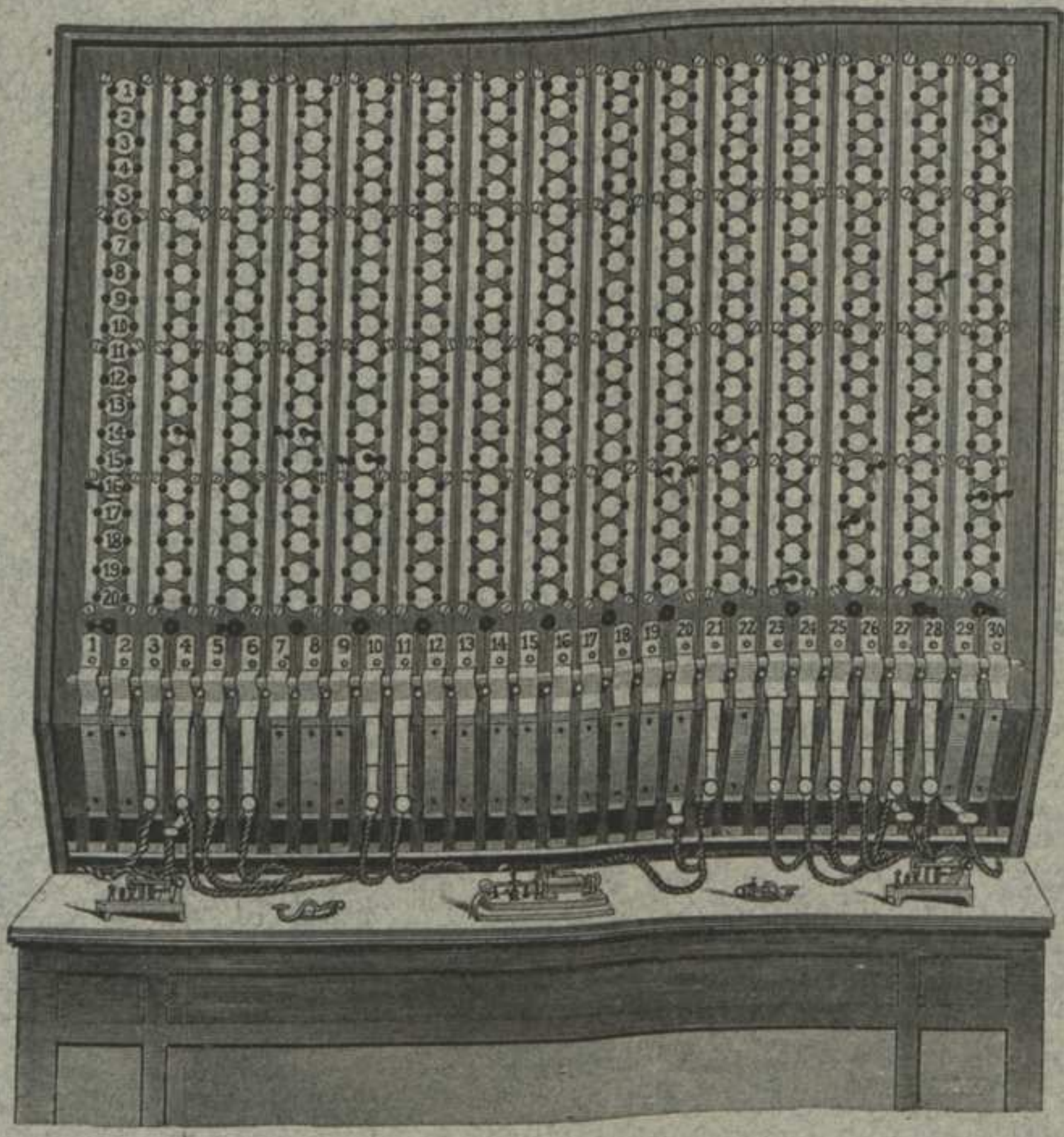
This is found to be a great convenience in Telephone work, both for exchanges and for private lines.

GROUND WIRE CLAMPS.



Ground Wire Clamps are furnished in sizes corresponding to gas and water pipes. One of the greatest sources of trouble in the Telephone business arises from imperfect ground wire connections, due to corrosion, and, that unless soldered, a perfect contact is almost impossible. With the Gilliland Clamp, a reliable and positive connection can be neatly made, and its cost saved in the time required over the old style of connecting.

INDEX.



A SECTION OF THE SWITCH BOARD IN THE NEW YORK OFFICE OF THE WESTERN UNION TELEGRAPH COMPANY.