

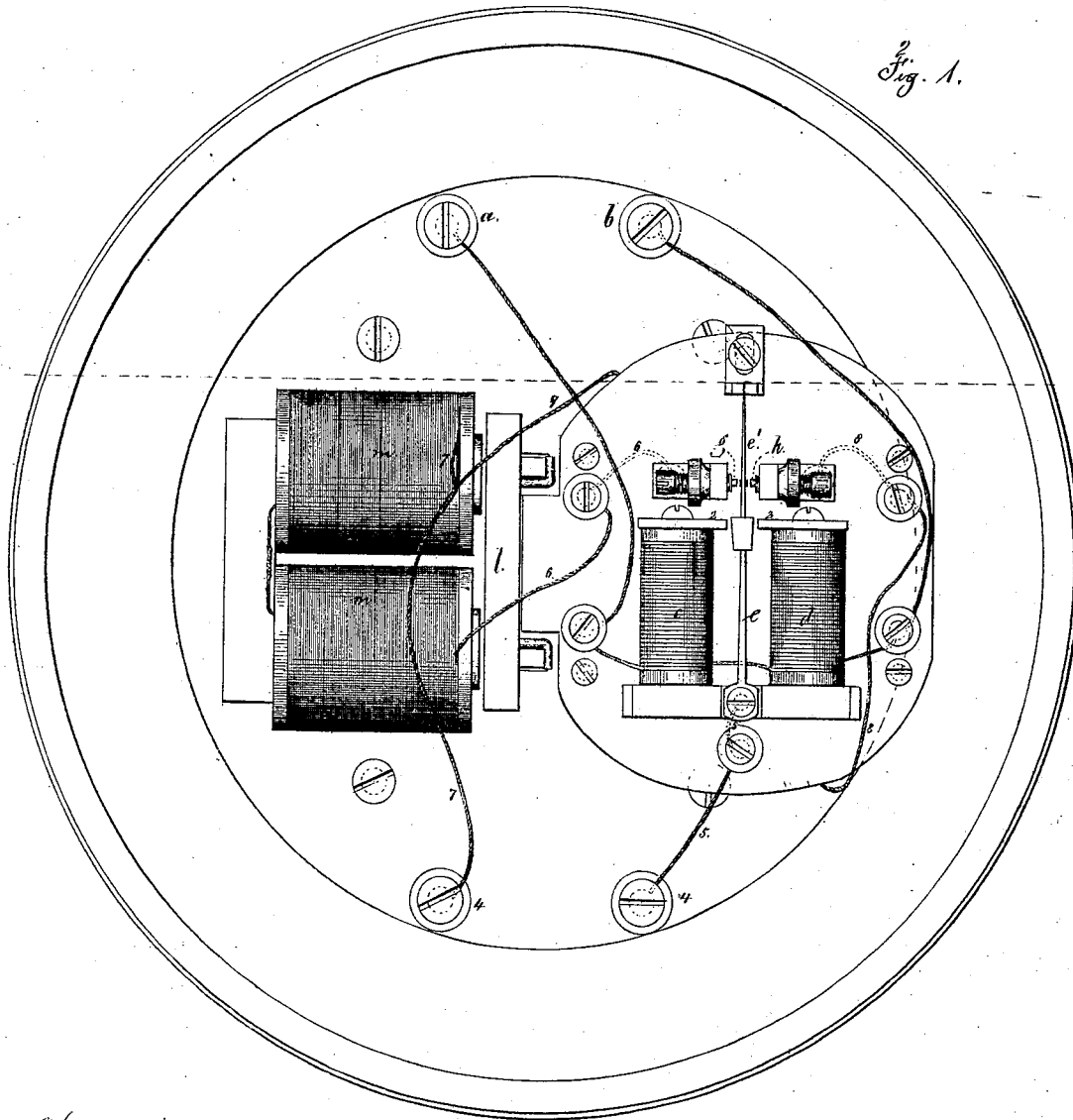
T. A. EDISON.

2 Sheets—Sheet 1.

Printing Telegraph Apparatus.

No. 113,033.

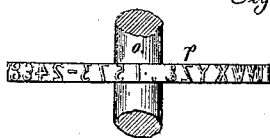
Patented March 28, 1871.



Witnesses.

Chas. H. Smith
Geo. A. Barker

Fig. 4.



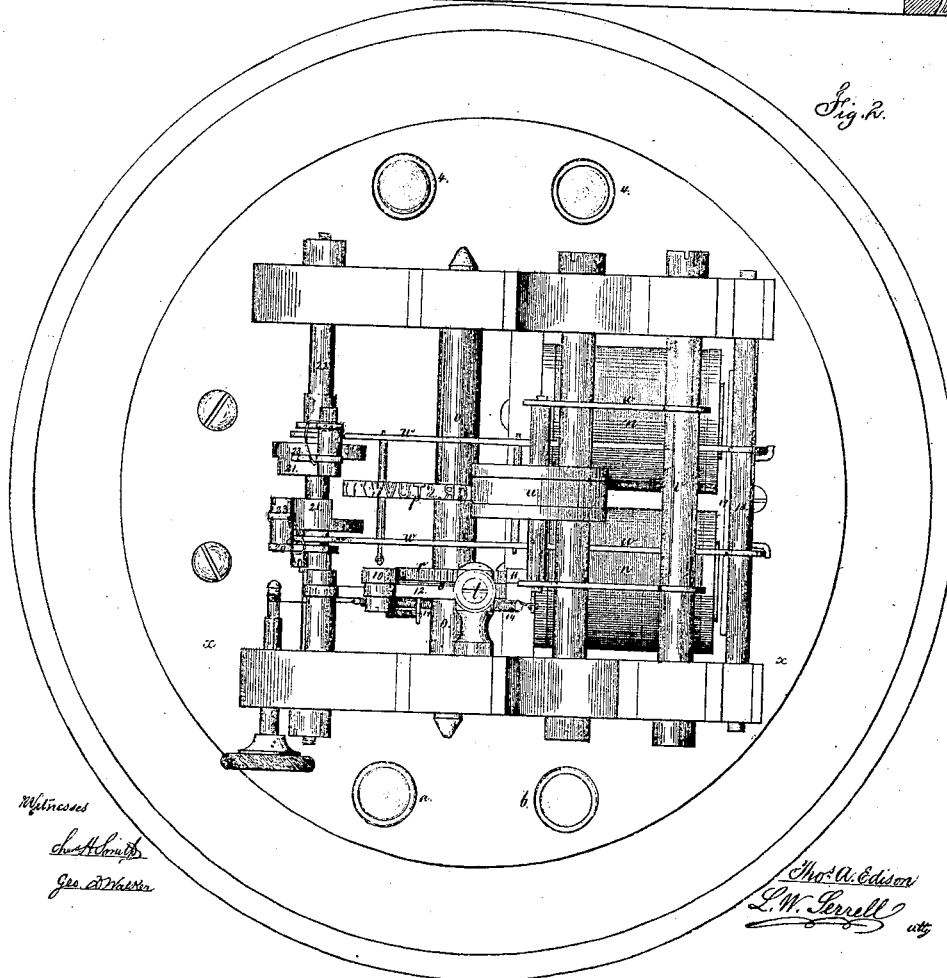
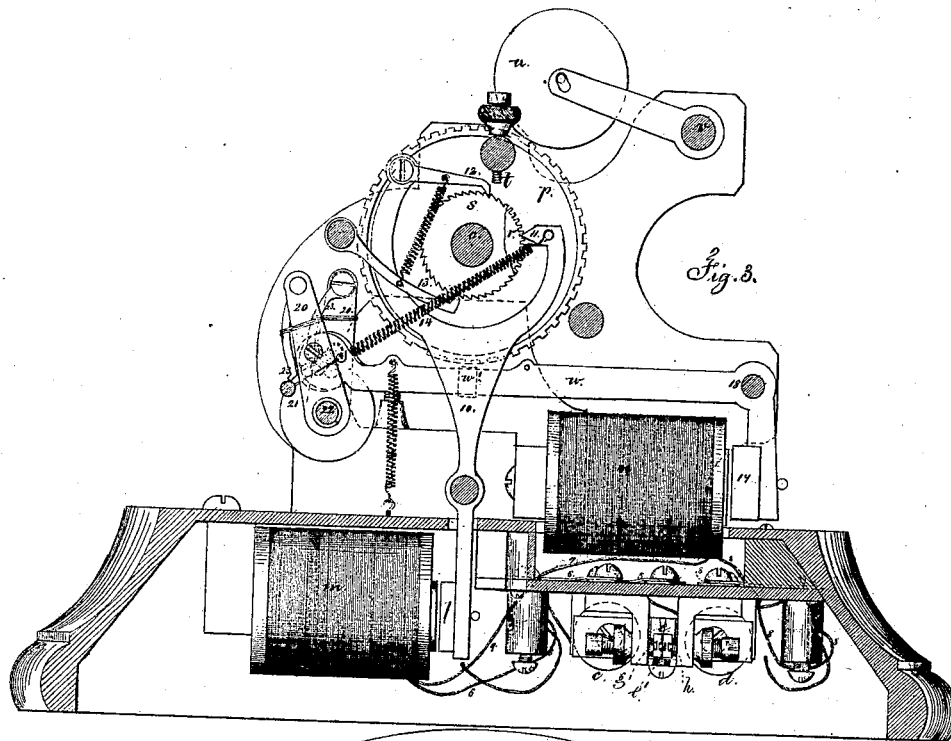
Thomas A. Edison
Lemuel W. Searell
att.

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No. 113,033.

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Witnesses
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Thos. A. Edison
L. W. Serrell atty

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN PRINTING-TELEGRAPH APPARATUS.

Specification forming part of Letters Patent No. **113,033**, dated March 23, 1871.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Newark, in the county of Essex and State of New Jersey, have invented and made a new and useful Improvement in Telegraph Apparatus, and the following is declared to be a correct description of the same.

The object of this invention is to operate a local circuit and one of two electro-magnets therein from a distant station over one wire by means of pulsations of one polarity operating one electro-magnet in the said local circuit, and pulsations of the opposite polarity operating the other electro-magnet in the said local circuit.

Several stations on one line, each having its own local circuit, can be operated in unison, and I apply to the said magnets means for actuating a type-wheel and a printing-lever at the proper times by reversing the polarity of the current, and I arrange the type-wheel characters in such a manner that the printing of fractions in the quotations of gold, stocks, or market prices is greatly facilitated.

My present invention relates especially to a polarized bar or switch that in a normal condition is maintained in a central position between two circuit-closers by the action of a spring or its equivalent, and adjacent to this polarized bar or switch are the coils and cores of an electro-magnet—one on each side thereof—so that when pulsations of one polarity are sent through the helices the polarized bar or switch is attracted to one side and makes and breaks each pulsation the circuit of a local battery, and thereby actuates one electro-magnet, and when the pulsations in the first-named electro-magnet are of a different polarity the polarized bar or switch works on the other side to make and break the local circuit through a second magnet arranged in that local circuit.

In the drawings, Figure 1 is an inverted plan of my telegraph-instrument. Fig. 2 is a plan of the same. Fig. 3 is a section at the line *xx*, and Fig. 4 is an edge view of the type-wheel separately.

The line-wires are connected with the binding-screws *a b*, and from these the wires pass to the helices *c d* of the soft-iron cores, forming an electro-magnet. Between these helices is the polarized bar or switch *e*, that is made

so that it can swing between the poles of the electro-magnet. At one end this bar or switch is connected by a screw, (or it might be by a spring-tongue,) and the other end in its normal condition is midway between the poles 2 2 of the electro-magnet *c d*, and also between the circuit-closers *g h*, and it is held in that position by the thin spring-tongue *e'* or an equivalent yielding centering device. The local-circuit wires come from the battery to the binding-screws 4 4. The wire 5 connects the switch *e* to one of these screws 4. The circuit-closer *g*, wire 6, electro-magnet *m*, and wire 7 connect with the other battery-screw 4, so that when pulsations of one polarity pass through the electro-magnet *c d* the tongue *e* closes the local circuit through *g* and incites the electro-magnet *m*; but when pulsations of the opposite polarity are sent the magnet *m* is not incited, but the electro-magnet *n* is rendered operative by the local circuit, being connected through the screw 4, wire 5, switch *e*, circuit-closer *h*, wire 8, magnet *n*, wires 9 and 7, and binding-screw 4.

Each positive pulsation of electricity in the main line gives a pulsation in one of the magnets in the local circuit, and these pulsations can be repeated to whatever extent desired, because the switch *e* returns to a central or normal position each pulsation, and when the polarity of the main current is changed so as to be negative then the other magnet in the local circuit will be similarly incited, each pulsation in the main circuit. By these means the local circuit at a distant station or the local circuits at more than one distant station are made to operate different magnets, according to the polarity of the current sent, and hence one magnet or set of magnets in the distant local circuit or circuits will be incited to perform one operation, and afterward the other magnet or magnets to perform a different operation. I have shown these magnets *m* and *n* in connection with the printing-telegraph mechanism.

The armature *l* of the magnet *m* has a forked lever, 10, upon one arm of which is a wedge-shaped tooth, 11, and upon the other arm is the pawl 12. Upon the shaft *o* of the type-wheel *p* are two ratchet-wheels, *r* and *s*. The pawl 12, acting upon the teeth of *s*, gives mo-

tion to the type-wheel *p* and its end runs under the adjustable stop *t* and blocks the parts, so that the momentum will not cause the type-wheel to turn too far. The swinging pawl 13 takes the teeth of *s*, preventing any back movement, and as the armature *l* recedes by the action of the spring 14 the tooth 11 takes into the teeth of the wheel *r*, and by the inclined wedge-acting end completes the movement of the type-wheel necessary for bringing the next character into place for printing and holds said type-wheel firmly in place. The pawl 12 draws back to take another tooth of *s* as the tooth 11 comes up against *r*. The type-wheel is inked by the roller *u*, that is mounted upon arms and the shaft *v*. The printing-lever *w* swings upon the shaft 18, and is actuated by the armature 19 of the magnet *n*, and said lever *w* carries the printing-pad *w'*. The paper is fed along by clamps. The lever 20 and segment 21 move together upon the cross-bar 22, and the lever 20 carries a clamping-pawl, 23, the end of which is contiguous to the segment 21. These parts are duplicated on the other side of the strip of paper and motion is given to one clamp to seize and carry forward the paper as the other clamp draws back, this movement being effected by slots in the ends of the printing-lever inclined in opposite directions and acting upon pins that project from the respective levers 20.

The type-wheel is made with letters and figures and a hyphen or fractional sign, so that the name of the article can be printed and the price in figures and fractions and in quotations of market-values it is usual to reckon in eighths, quarters, or halves. I therefore arrange the figures that will be employed as numerators—such as 1, 5, 7, 3—in the first portion of the line of figures, and then place a hyphen and the other figures thereafter, so that the numerators can first be impressed, then the hyphen or fractional sign, then the denominators. Thereby a saving in time is effected, because the fraction entire can be printed in less than a rotation of the type-wheel—thus: 1-8, 1-4, 3-8, 1-2, 5-8, 3-4, 7-8.

I am aware that in H. and E. Highton's English Patent, No. 12,039, a horseshoe-magnet is pivoted to swing between two electro-magnets to make and break local circuits; but this device is not adapted to a rapid movement and

acts in a different manner to my polarized bar or switch. In my apparatus the spring acts instantly to bring the switch to a central position and break the local circuit simultaneously with the break in the main circuit.

I am also aware that a bar has been polarized by the main currents, to act as a switch and direct the local current to one of two magnets; but said bar was moved only by a change in the polarity of the current.

I claim as my invention—

1. A polarized bar or switch and connections acting as a relay to electro-magnets placed in a local circuit, in combination with an electro-magnet in the main line acting upon such polarized bar or switch to complete the local circuit through one of the two electro-magnets, according to the polarity of the current sent, substantially as set forth.

2. A local circuit, two electro-magnets, a type-wheel, and impression mechanism, in combination with the polarized bar or switch and electro-magnet, substantially as and for the purposes set forth.

3. A series of polarized relays worked in one main circuit and controlling local circuits that operate either type-wheel magnets or printing-magnets, substantially as set forth.

4. A polarized relay having its tongue or switch centered between the poles of an electro-magnet and between the circuit-closers when in a normal condition, substantially as set forth.

5. A type-wheel having letters, figures, and fractional signs arranged in groups for numerators and for denominators on opposite sides of a fractional sign, substantially as set forth, to print letters, figures, and fractions, as specified.

6. A type-wheel with figures arranged on each side of a hyphen or fractional sign, as and for the purposes set forth.

7. The type-wheel motor composed of a vibrating arm and pawls, 12 and 13, combined with a wedge-acting tooth in the manner and for the purposes set forth.

Signed by me this 17th day of November, A. D. 1870.

THOMAS A. EDISON.

Witnesses:

CHAS. H. SMITH,
GEO. T. PINCKNEY.