

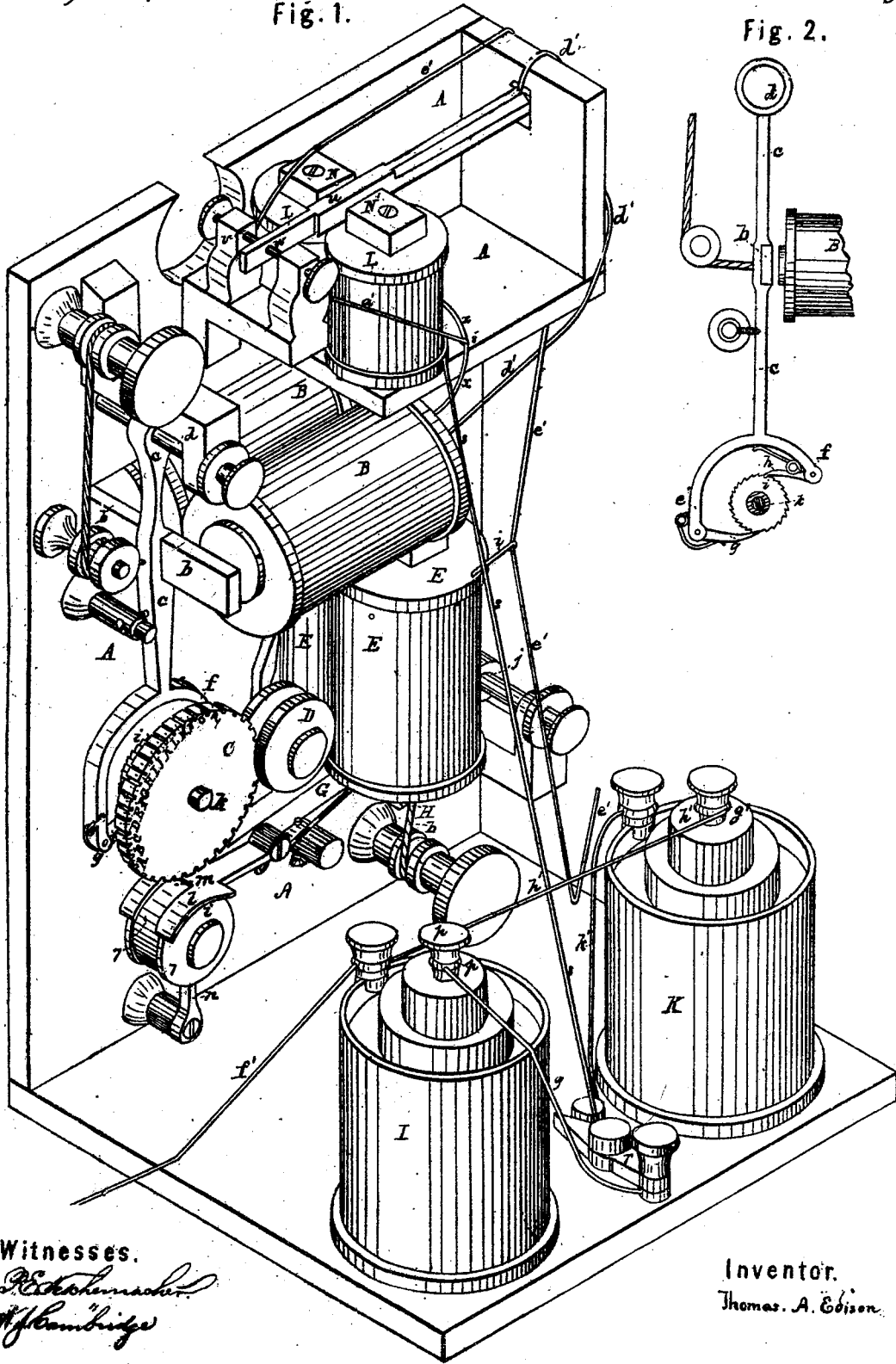
T. A. Edison. Telegraph.

N^o 91,527.

Patented Jun. 22, 1869.

Fig. 1.

Fig. 2.



Witnesses.

R. H. Johnson
W. Cambridge

Inventor.

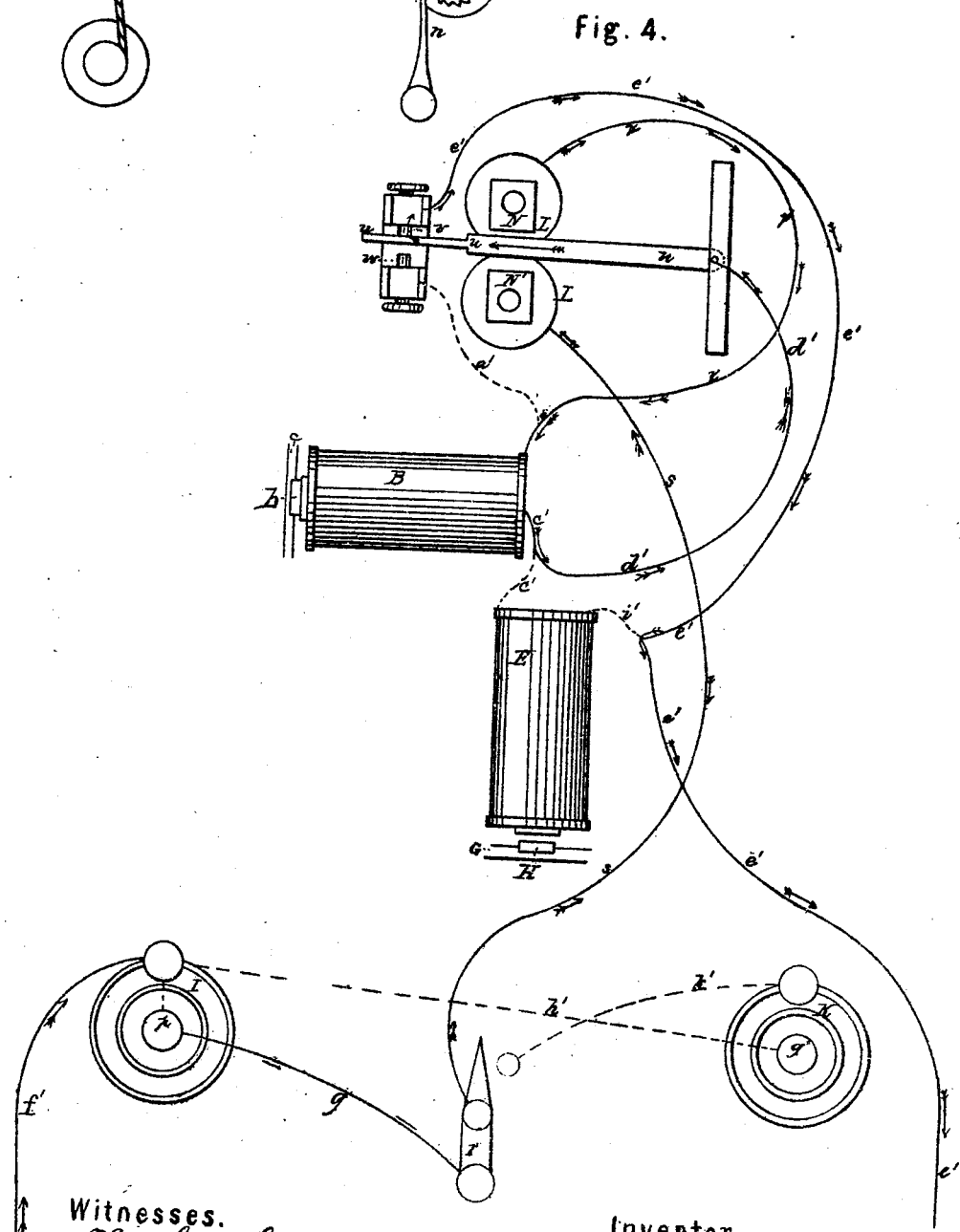
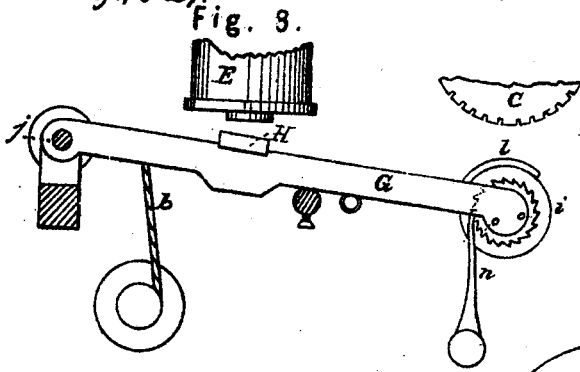
Thomas A. Edison.

T. A. Edison.
Telegraph.

Sheet 23 Sheets

N^o 91,527

Patented Jun. 22, 1869.



Witnesses.
P. C. ...
H. ...

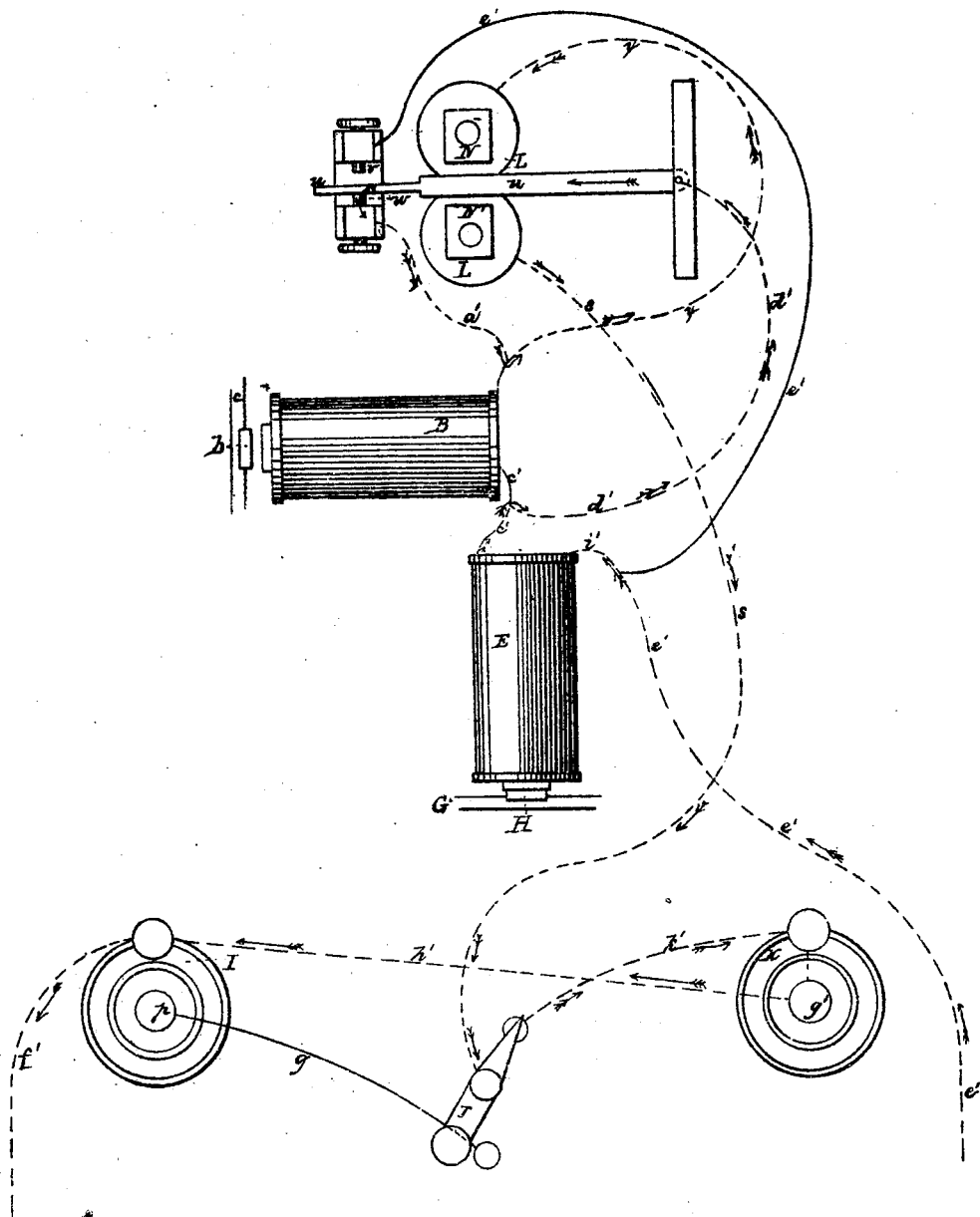
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N^o 91,527.

Patented Jun. 22, 1869.

Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF BOSTON, ASSIGNOR TO JOEL H. HILLS AND WM. E. PLUMMER, OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. 91,527, dated June 22, 1869.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Electro-Magnetic Printing-Telegraphs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a perspective view of my improved instrument; Figs. 2 and 3, details; Figs. 4 and 5, diagrams to be referred to.

This invention has for its object to produce a simple, reliable, and inexpensive printing-telegraph, which will require no attendant at the receiving-station; and consists in the employment of two electro-magnets placed within the same circuit—one for rotating the type-wheel, the other for actuating the printing-hammer—in combination with a polarized relay, which forms an automatic switch that will instantly detect the direction of the current, and cause it, when traveling in one direction, to pass only through the electro-magnet of the type-wheel, and, when reversed so as to travel in the contrary direction, to pass only through the electro-magnet of the printing-hammer, which may thus be brought into operation, to produce the required impression upon the paper, by simply reversing the current at the proper time, no local battery being required at the receiving-station, as all the mechanism is operated by the current from the battery at the transmitting-station.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the framework of the instrument, to which is secured the electro-magnet B, which operates the type-wheel C, the periphery of which is provided with the required letters and characters. The armature *b* of the magnet B is attached to a lever, *c*, which is pivoted at *d*, and is bifurcated at its lower end, as seen in Figs. 1 and 2, the two arms *e f* carrying pawls *g h*, which engage with a ratchet-wheel, *i*, on the hollow shaft of the type-wheel C, which revolves on a stud, *k*, projecting from the frame-work.

It will be seen that the pawls *g* and *h* en-

gage with the ratchet-wheel *i* on opposite sides, so that each vibration of the lever *c* backward or forward will rotate the type-wheel, which receives its supply of ink from the roll D, in a well-known manner.

E is the electro-magnet of the printing-hammer, which latter consists of a roll, *i*, secured to the outer end of a lever, G, which is pivoted at *j*, and carries the armature H of the magnet E. The strip of paper upon which the message is to be printed is led from a reel (not shown) over the roll *i*, upon which it is held with a sufficient degree of friction by a spring-arm, *l*, provided with an open slot, *m*, so as to allow the paper to be brought into contact with the edge of the type-wheel when the lever G is raised against the resistance of the spring *6* by the action of the electro-magnet E. The strip of paper is fed forward between the roll *i* and spring-arm *l* after each impression is made, so as to produce the required space between the letters, by means of a pawl, *n*, which, when the lever G descends, engages with a ratchet-wheel, *o*, Fig. 3, secured to the roll *i*, which is thus rotated at the required times, its edges *7* being roughened, so as to prevent the paper from slipping thereon.

The course of the current through the instrument, and the manner in which the latter is operated, will now be described, reference being had particularly to Figs. 1, 4, and 5:

I K are two batteries, so arranged that but one only is employed at a time.

Referring to Fig. 4, when the battery I is in use, the current passes (as indicated by black lines and arrows) from its copper pole *p*, by the wire *q*, to the key *r*; thence, by the wire *s*, to the electro-magnet of a polarized relay, L, which forms an automatic switch, by means of which the course of the current may be changed, as will be hereafter particularly described, it being well known that the passage of a current of electricity in one direction through the electro-magnet of a polarized relay will cause its tongue or lever *u* to be attracted to the pole N, and thereby brought into contact with the pin *v*, while the reversal of the current will cause it to be attracted to the pole N', and brought into contact with the pin *w*, thereby opening different paths for the current, so that it may be made to pass through either one of the elec-

tro-magnets B or E, one of these magnets being excluded or cut out from the circuit while the current is passing through the other. The construction of this polarized relay, however, being well known, and forming no part of my invention, will not be further described.

The instant the current passes from the wire *s* through the polarized relay the tongue *u* will be attracted by the pole N and brought into contact with the pin *v*, when the current will pass by the wire *x* to the point 8, but as the contact is broken at *w* it cannot follow the wire *a'*, and consequently passes through the electro-magnet B, leaving it by the wire *c'*, and, instead of following this wire to the electro-magnet E, it takes a shorter course, viz., by the wire *d'* to the tongue *u*, thence through the contact-pin *v* to the wire *e'*, and thence to the ground and back to the wire *f'*, (also in connection with the ground,) whence it passes to the zinc pole of the battery I, thereby completing the circuit.

The circuit, after being completed as above described, may be alternately broken and closed by means of an ordinary transmitter, (not shown,) for the purpose of operating the armature *b*, and thereby rotating the type-wheel C, the mechanism connected with which is so arranged that the circuit requires to be closed and broken once in order to move the wheel C a distance equal to that between two successive letters or characters. This insures the circuit being open whenever a letter is brought into the position to allow of its impression being taken off upon the strip of paper.

When the type-wheel has been rotated (by operating the transmitter) until the desired letter has been brought into position beneath the roll *i*, the current is reversed by shifting the key *r* into the position seen in Fig. 5, which disconnects the battery I, and causes the current from the copper pole *g'* of the battery K to pass, by the wires *h'* and *f'*, to the ground-plate, thence to the distant ground-plate, entering the instrument by the wire *c'*. This reversal of the current causes the tongue *u* of the polarized relay to be instantly attracted to the pole N' and brought into contact with the pin *v*, breaking the contact at *r*, as seen in Fig. 5.

The action of the polarized relay is so much quicker than that of an ordinary electro-magnet that the lever *u* is shifted from the point *v* to the point *w* before the electro-magnet B has time to act, and this magnet being cut out of the circuit as soon as the tongue *u* comes in contact with the pin *w*, the current will pass,

as indicated by the red lines and arrows, Fig. 5, by the wires *h'* *f'* *c'* *i'*, to the electro-magnet E of the printing-hammer, and thence, (instead of passing through the electro-magnet B,) by the shortest course, through the wires *c'* *d'*, to the tongue *u*, thence, by the contact-pin *w* and wires *a'* *x*, to the electro-magnet of the polarized relay, and, by the wire *s*, key *r*, and wire *h'*, to the zinc pole of the battery K, completing the circuit and causing the armature H to be attracted to the magnet E, raising the lever G and bringing the paper into contact with the letter on the type-wheel, as required. The key *r* is then moved back into the position seen in Figs. 1 and 4, which again reverses the current and causes it to take the course first described, through the electro-magnet B of the type-wheel, but not through the electro-magnet E, the armature of which ceases to be attracted when the lever G, with the roll *i*, is drawn down by the spring 6 and the paper fed forward to receive the next impression, as required, when the operation continues as before.

It will thus be seen that by the employment of a polarized relay, as above described, either one of the electro-magnets B or E may be brought into action, and the other cut out of the circuit at pleasure by the reversal of the current, which enables me to greatly simplify the construction of printing-telegraphs and reduce their cost.

The above-described invention is designed particularly for transmitting intelligence from a central station to a number of receiving stations included in the circuit, in which case no batteries or operators will be required at the receiving stations; but if messages are to be sent from each station, as well as received, then each instrument will require to be provided with a transmitting instrument, a battery, and an ordinary switch connected with a ground-wire.

What I claim as my invention, and desire to secure by Letters Patent, is—

The two electro-magnets B E, placed within the same circuit, one for operating the type-wheel, the other for operating the printing-hammer, in combination with a polarized relay which forms an automatic switch, whereby either one of the electro-magnets may be brought into action, and the other cut out of the circuit by the reversal of the current, substantially as and for the purpose described.

THOMAS A. EDISON.

Witnesses:

P. E. TESCHEMACHER,
W. J. CAMBRIDGE.