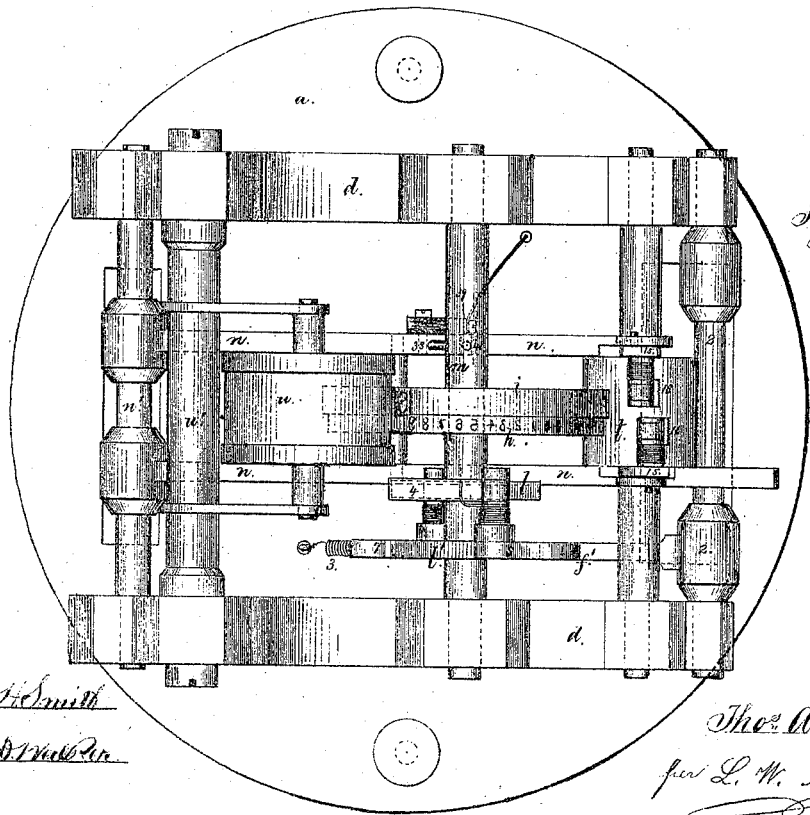
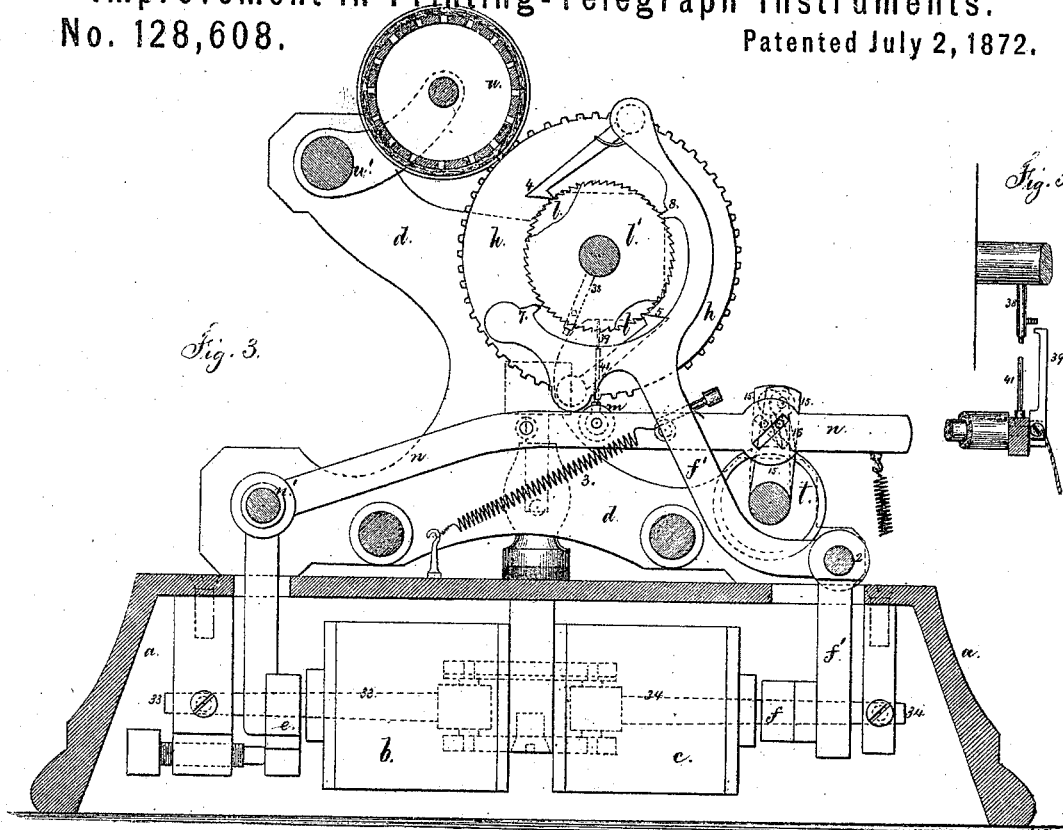


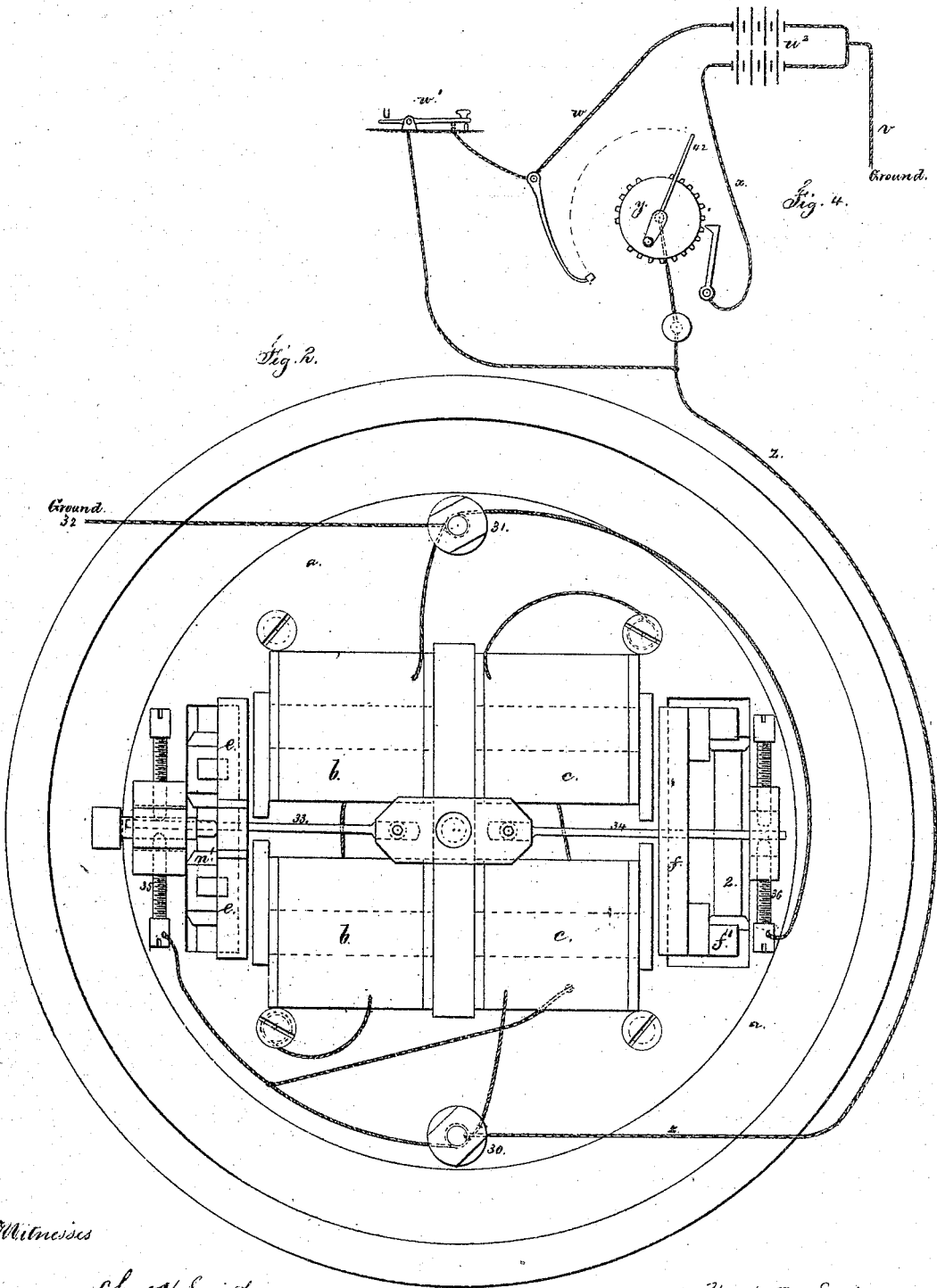
T. A. EDISON.  
Improvement in Printing-Telegraph Instruments.  
No. 128,608. Patented July 2, 1872.



Witnesses,  
Chas. Schmidt  
Geo. A. Miller

Theo. A. Edison,  
per L. W. Ferrell

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Witnesses

*Chas. H. Smith*  
*Geo. S. Walder*

*Thos. A. Edison*  
*per L. W. Correll*  
*att'y.*

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN PRINTING-TELEGRAPH INSTRUMENTS.

Specification forming part of Letters Patent No. 128,608, dated July 2, 1872.

*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 Printing-Telegraphs, and the following is declared to be a correct description thereof.

Printing-telegraphs have been constructed to work upon a single wire by means of two electro-magnets and one polarized magnet, so combined with each other that a current of one polarity is made to act upon one electro-magnet and an opposite current upon the other magnet by arranging cut-offs upon the electro-magnets and rendering them active or inactive, as the case may be, by the polarized magnet. My present invention consists of a compound electro-magnet, constructed in such a manner that when a current of one polarity enters both parts of the magnet the polarity of the current acting upon the devices of the compound magnet determine which part shall become active or magnetic, thereby dispensing with a third magnet. In this manner two operations, distinct from each other, can be performed with the use of only one line-wire. I also provide a unison connection, so that the act of transmitting pulsations from the sending station can be availed of to set all the type-wheels of the several instruments placed in one electrical circuit at a zero-point at each complete revolution of the type-wheel, thereby insuring accuracy in transmission in consequence of the frequent unison action.

In the drawing, Fig. 1 is a plan. Fig. 2 is an inverted plan. Fig. 3 is a vertical section, and Fig. 4 is a diagram illustrative of the connections.

The base *a* contains within it the compound magnet *b c*, and upon said base are the frames *d*, carrying the respective shafts and axes. The part *b* of the compound magnet acts upon the armature *e* of the printing and paper-feeding mechanism; and the portion *c* acts upon the armature *f* and lever *f'* to operate the type-wheel. The type-wheel is made of two rings upon arms, the one ring *h* having figures, signs, or fractions, and the other ring, *i*, has

letters or similar characters, so that either one or the other can be printed at will, because the characters on one wheel come opposite a blank space on the other wheel, as illustrated in the drawing, in which the figures and fractions come between the terminal letters of the alphabet, facilitating the construction and setting of the wheel, and allowing the letters to be printed on one line and the figures and fractions on another, and there is a portion of the type-wheel where there are not any characters, and at this part the unison connection is made to operate. The lever *f'* is on a fulcrum, 2, and the spring 3 acts to draw the armature from the magnet when the electrical circuit is broken. The lever *f'* has arms carrying the spring-pawls 4 and 5, that have hooked ends acting upon the wheel *l* so as to move the said wheel *l* one tooth at each vibration of the lever *f'*, the pawl 4, upon the return movement of the armature, giving a partial movement to the type-wheel so as to insure the catching of the pawl 5 over the next foot and lessen the amount of play of the escapement-lever. The lever *f'* has stop-spurs, 7 and 8, acting with the reverse ratchet-teeth of the wheel *l'* to check the movement and prevent the momentum carrying the type-wheel more than one letter at a time. The stop-spurs 7 and 8 are arranged so that the holding-faces are at right angles to lines drawn from the center of motion 2, so that the locking will be of the most reliable character, there being no tendency to move the spurs by the concussion of the wheel against them in stopping.

The printing or impression is effected by the pad *m* upon the lever *n*, that is mounted upon the axis or fulcrum *n'* and actuated by the armature *e* to the magnet *b*. The paper is fed along by the movement of the impression-lever. The roller *t* is mounted upon an axis that has upon each side of the roller sleeves that carry crank-arms 15 and spring-pawls or points 16, and in the ends of the two portions of the lever *n* that pass contiguous to these arms 15 are diagonal slots placed in opposite positions and taking pins that project from the arms 15, so that as the lever *n* rises one pawl, 16, will

bind the paper to the roller *t* and carry both forward, and the other pawl will be drawn back, so that as the lever *n* descends the first-named pawl 16 is drawn back and the other pawl made to operate in feeding the paper. Thus the paper can be moved along with facility, as there are two movements to each impression of the letter or type; consequently but one-half the motion of the lever is required as would be the case if only one feed-pawl was used. The ink is supplied to the types by means of a hollow perforated drum, *u*, or roller, into which the ink is introduced, and around this roller a cloth or felt surface is attached, as seen in Fig. 3, to rest upon the types of the type-wheel. The ink gradually passes through the perforations and the surrounding cloth, and thus the quantity necessary for the types is furnished. The roller *u* is upon arms swinging upon the shaft *w'*, so that the ink-roller lies constantly in contact with the type-wheel. The connections for the compound magnet are illustrated in the plan, Fig. 2; and diagram, Fig. 3. The battery at *w*<sup>2</sup> is divided, a connection, *v*, passing from near the center to the ground. The wire *w* passes to the finger-key *w'*, and from the other end of the battery the wire *x* passes to the transmitting instrument *y*; thence to the line-wire *z*, uniting with a wire from the finger-key and passing to the binding-screw 30 of the instrument. The wire *z* passes from the binding-screw 31 of one instrument to the screw 30 of the next, and so on through as many instruments as there are in the line, and then connecting to the ground at 32, beyond the last instrument. Between the helices *b b* and *c c* of the compound magnet are steel tongues 33 34, hinged at one end and swinging freely horizontally. The polarity of *b* and *c* will, with a positive current, attract by means of the arms at the ends of the soft-iron magnet the tongue 34 to the circuit-closer 36, and repelling the tongue 33 from 35. By changing the currents the reverse movements take place of the tongue. The transmitting-dial *y* is made in any usual manner, so as to give the pulsations through the wire *z* and screw 30, and the current being positive the compound magnet as charged connects 34 and 36 and breaks 33 and 35 by the reversed polarity; hence the current will be directed through the helices *c*, the base-plate forming a part of the circuit, to operate the type-wheel by the armature *f* and lever *f'*. The current passes from the helix *c* to the bed *a* of the instrument; thence through the tongue 34, (which is in metallic contact with the base,) circuit-closer 36, to the screw 31 of the line or ground wire, returning by 32 and *v*. If the finger-key *w'* is closed when the circuit through *y* is broken the direction of current is instantly changed and the compound magnet *b c* is altered in its polarity, 34 and 36 separating and 33 and 35 closing, so that the magnet *b* is made fully operative to

effect the printing; the current passing from 31 to the magnet *b*, thence to the base *a*, switch 33, closer 35, binding-screw 30, to the key *w'*, and battery, and vice versa.

In order to insure unison of movement in the type-wheels of several machines in one line or circuit, I provide two or more blank spaces on each type-wheel, and employ an arm, 38, on the type-wheel shaft, which, when a given one of these blank spaces is opposite the impression-pad, comes in contact with the insulated circuit-closing spring 39, so that a direct current passes through this spring, the type-wheel shaft, and the bed of the machine instead of the magnet *c*; hence the magnet ceases to be operative, although the current proceeds to other machines and operates upon the same, bringing them to the same position should they not be in that position. Upon reversing the current through *w'* the impression-magnet *b* operates the lever *n*, lifts the spring from contact with the arm 38, breaking the current through 39, and simultaneously the stud 41, coming against the end of the arm 38, prevents the movement of the lever *n* sufficiently to impress or feed the paper; the spring 39, being slightly under strain by the arm 38, clears the same, as the parts resume their normal position. These parts are shown more clearly in Fig. 5.

By having an arm upon the transmitting instrument, as shown at 42, and locating the same so as to close the circuit between *w* and *z*, at the period in the rotation of the dial when the machines are to be brought to a normal position, the machinery becomes self-operating without the use of the finger-key, and applies a correcting movement to all the type-wheels in the electrical circuit every rotation of the type-wheel, hence insuring great accuracy.

I do not claim a hollow perforated inking-drum, as the same is shown in the patent of S. S. Laws, No. 99,273.

I claim as my invention—

1. A compound magnet provided with steel tongues that direct the force of the electrical current through one portion of the magnet or through another portion, according to the direction in which the current passes to said compound magnet, substantially as specified.
2. The double-acting pawls 4 5, stops 7 8, and lever *f'*, combined with the ratchet and type-wheel, as set forth.
3. Two type-wheels on one shaft parallel to each other, and arranged so that the blank spaces upon one wheel come opposite to the characters on the other, and vice versa, substantially as set forth.
4. The hollow perforated inking-drum surrounded with a surface of fibrous material, and arranged so that the said surface is in contact with the type-wheel, as and for the purposes specified.

5. The pawls 16 16, and crank-arms actuated by the lever *n* to feed the paper, in the manner specified.

6. The arrangement of the magnets that operate the type-wheel and printing mechanism within the bed of the machine, as set forth.

7. The circuit-closing spring 39 and arm 38, arranged, substantially as set forth, to stop the action of the magnet *b*, for the purpose of bringing several machines in one main circuit into unison, substantially as set forth.

8. The combination of the compound magnet, the type-wheel, and actuating mechanism with the printing and paper-feeding mechanism, substantially as set forth.

Signed this 24th day of May, A. D. 1870.

THOMAS A. EDISON.

Witnesses:

HAROLD SERRELL,  
GEO. T. PINCKNEY.