

F. E. D'HUMY.
PERFORATING APPARATUS.
APPLICATION FILED JUNE 25, 1909.

944,612.

Patented Dec. 28, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

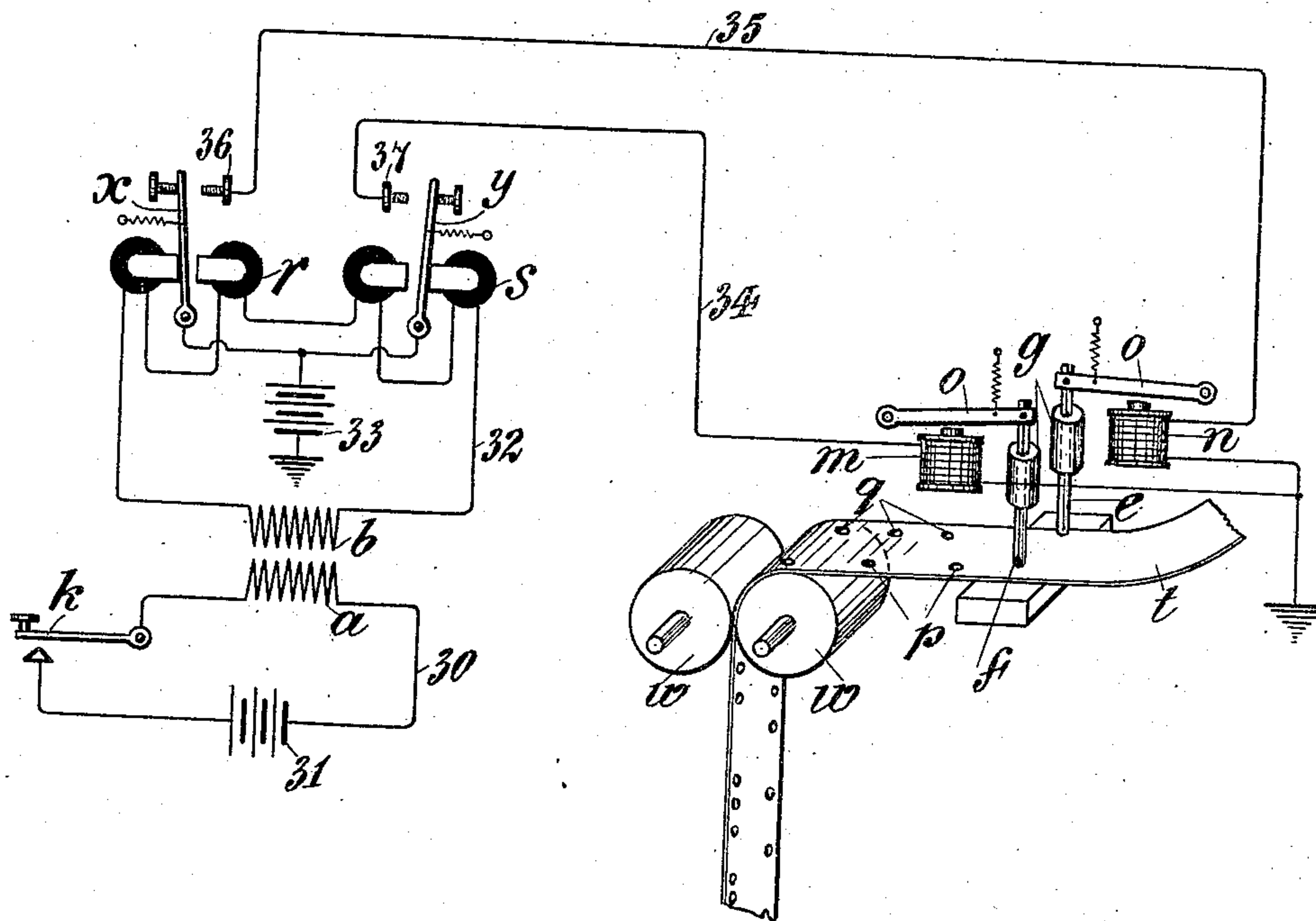
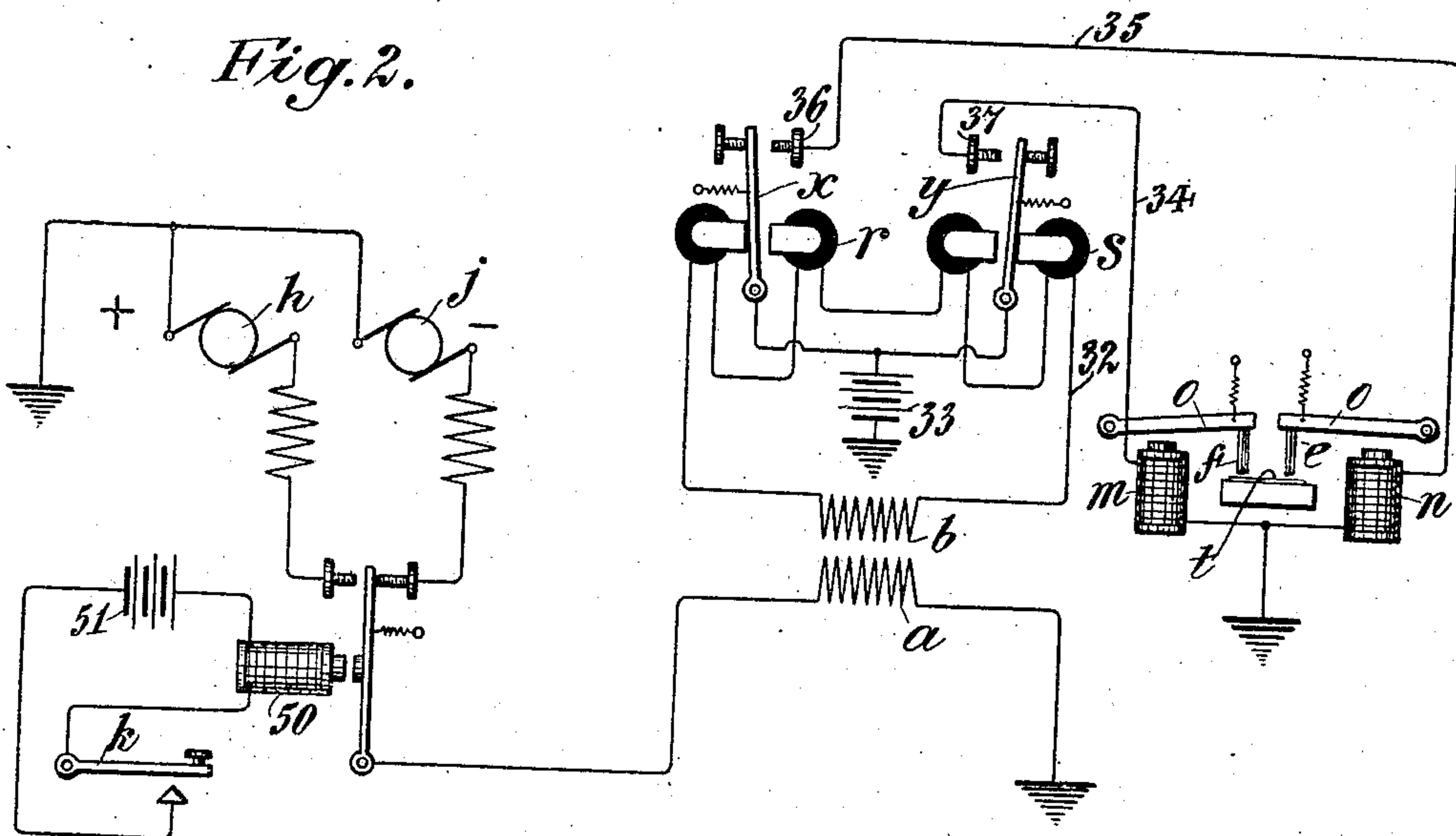


Fig. 2.



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Fig. 3.

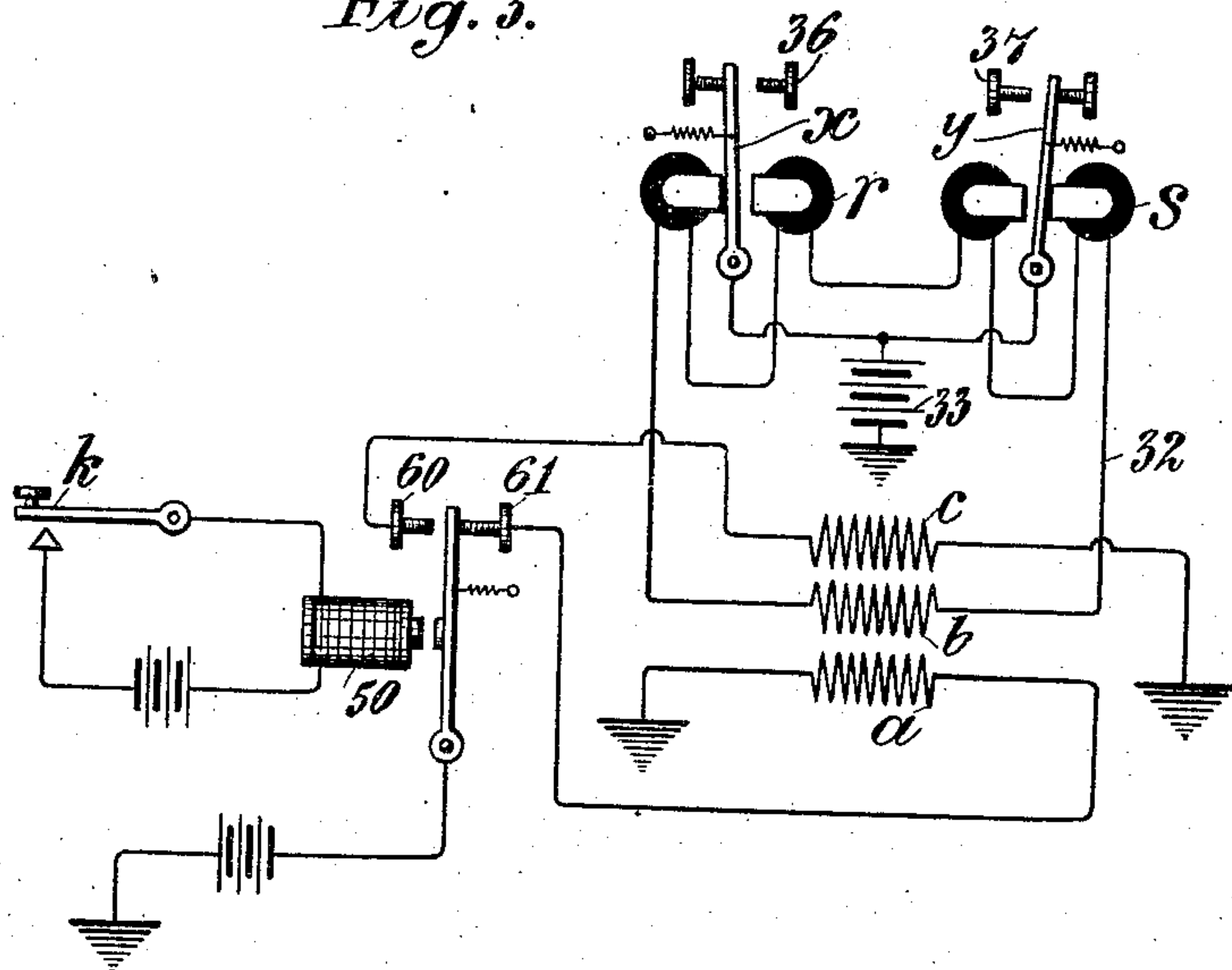


Fig. 4.

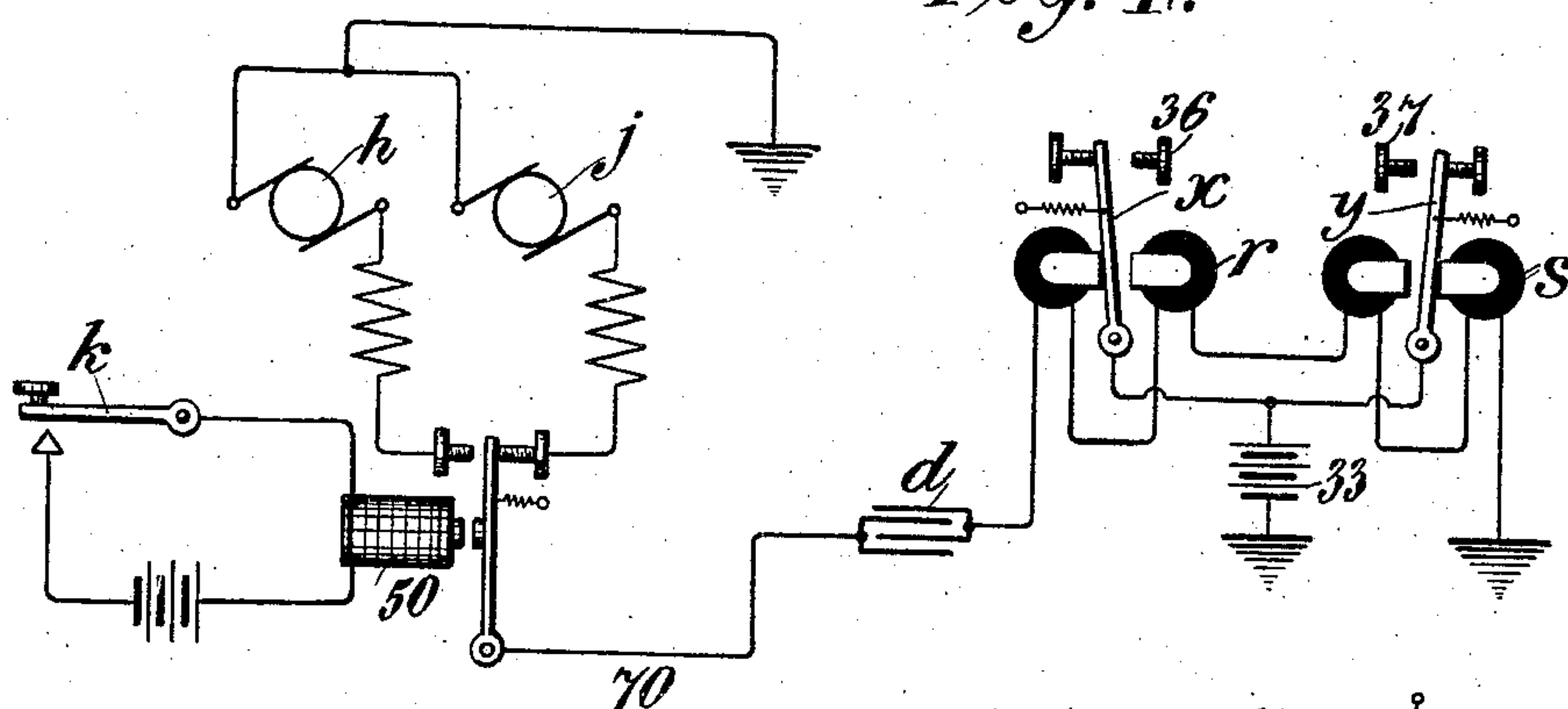
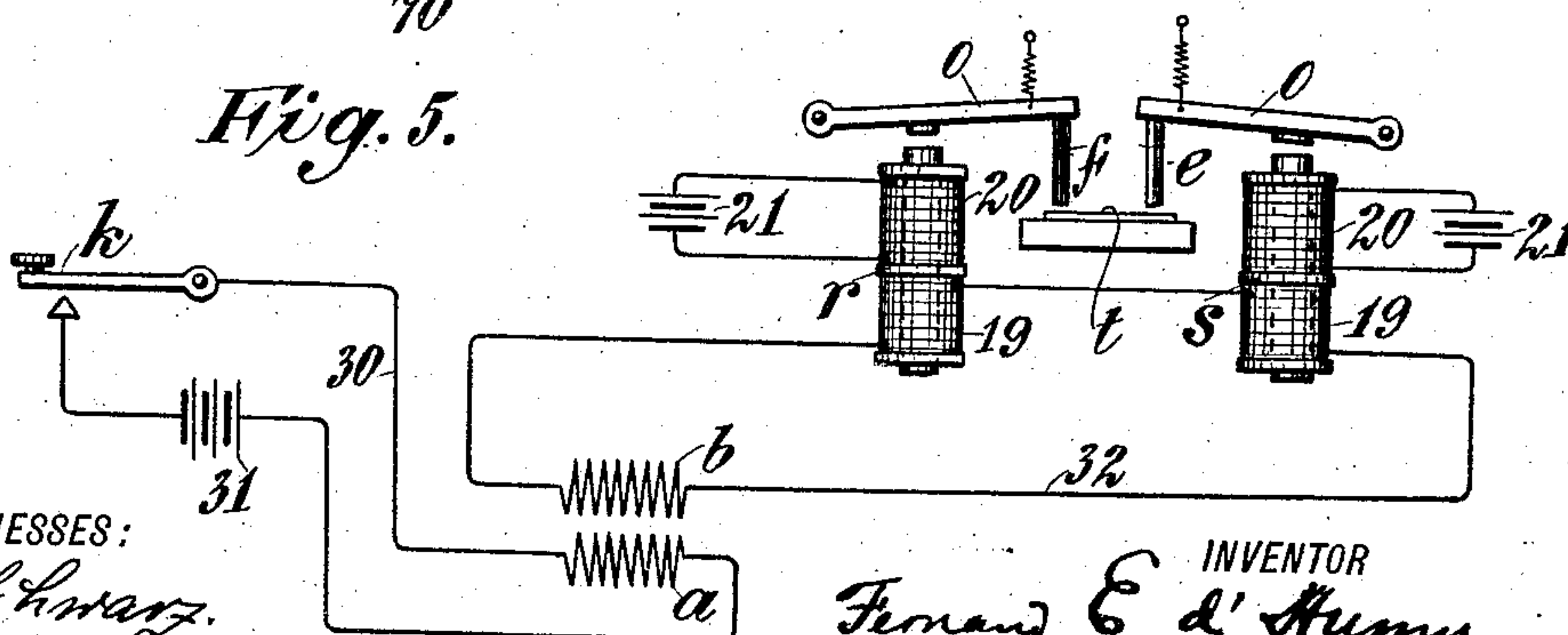


Fig. 5.



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UNITED STATES PATENT OFFICE.

FERNAND E. D'HUMY, OF ENGLEWOOD, NEW JERSEY.

PERFORATING APPARATUS.

944,612.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FERNAND E. D'HUMY, a citizen of the United States, and a resident of Englewood, in the county of Bergen and State of New Jersey, have made certain new and useful Improvements in Perforating Apparatus, of which the following is a specification.

This invention relates to telegraph apparatus in which a perforated strip is manually prepared at the transmitting station and is reproduced electro-magnetically at the distant station, where it is passed through a local circuit and transcribed by an operator.

The object of this invention is to simplify and improve the apparatus for perforating the tape. The paper tape is advanced at a uniform rate and perforated in two lines near opposite edges so that a perforation in one line followed by a perforation in the other line marks the beginning and termination of a dot or dash, depending upon the distance separating the perforations. These perforations are made by a sharp tubular punch and are circular and of small diameter. The punches are operated by an electro-magnet. There are two punches, one for each line of holes, each punch is operated by an electro-magnet and it is necessary to give each punch a short, rapid movement down and back as the progressive movement of the tape is not halted when the perforation is made. In my improvement the two electro-magnets are placed in one circuit, they are oppositely polarized and the first punch is operated by a short electric impulse of one polarity and the other punch is operated by a short electric impulse of the opposite polarity. A Morse key is used to perforate the tape, the key is manipulated by an operator employing the Morse code consisting of dots, dashes, and spaces. This Morse key is in a local circuit which includes the primary of an induction coil, the secondary coil is in circuit with the punching magnets; when the operator closes his key an impulse of one polarity is induced in the secondary or punching magnet circuit, when the operator opens his key an impulse of opposite polarity is induced in said secondary circuit. One impulse operates one magnet, the other impulse operates the other magnet, so that first one punch is operated and then the other punch is operated, the two punches, as described, thus marking the beginning

and termination of a dot or a dash depending upon the time interval separating the down-stroke and the up-stroke of the Morse key.

The accompanying drawings illustrate the invention. Figure 1 shows a pair of electromagnetic punches, operated by a Morse key, through an induction coil, by polarized relays. Fig. 2 shows a modification in which the Morse key operates to reverse the polarity of the circuit through the primary coil. Fig. 3 shows a modification of the means for reversing the polarity of current in the primary circuit. Fig. 4 shows a pole changing transmitter and a condenser in circuit with the relays. Fig. 5 is a modification of Fig. 1 showing the relays polarized by local circuits.

In Fig. 1 there is a paper tape *t* to be perforated with holes, in two lines, as *p*, and *q*; tape *t*, is advanced by a motor-driven train of wheels suitably regulated and represented by the rollers *w*. There are two tubular punches *e* and *f* reciprocating in suitable guides *g*, each punch is jointed to a pivoted lever *o*, which is spring retracted. One lever *o* is operated by magnet *m*, the other lever *o* is operated by magnet *n*; magnet *m* is in circuit 34 electrically connected to the contact point 37 of relay *s*; magnet *n* is in circuit 35 connected to contact point 36 of relay *r*. The relays *r* and *s* are polarized, relay *r* has an armature lever *x* operating to make and break the circuit 33, 36, 35, relay *s* has an armature lever *y* operating to make and break the circuit 33, 37, 34. The coils of relays *r* and *s* are in circuit 32 with the secondary *b* of an induction coil; Morse key *k* is in a local circuit 30, 31, with primary coil *a* in inductive relation to secondary coil *b*. When the key *k* is closed the establishment of a closed circuit through coil *a* induces a short impulse of one polarity in secondary coil *b* and circuit 32; as the relays *r* and *s* are oppositely polarized the described impulse operates one relay and not the other so that, let us say, the magnet *m* is operated and the punch *f* makes a movement down and up. When the key *k* is opened and circuit in the primary coil *a* is broken the induced impulse in secondary coil *b* is of the opposite polarity and the other relay is operated, thus operating the other magnet *n*, which depresses its punch *e*, said punch making a rapid down and up movement or excursion. As well known the length of time the key *k* is

held depressed determines the character of a dot, or a dash, and the spaces between letters or the spaces forming part of a letter are characteristically indicated by the manipulation of the key *k*.

In Fig. 2 the key *k* is in a local circuit 51 with magnet 50 which operates a pole changing transmitter so that either the source of current *h* of one polarity or the source of current *j* of the opposite polarity is connected in circuit with primary coil *a*; the operation is otherwise like that shown in Fig. 1.

In Fig. 3 there is an induction coil having a secondary *b* and the primary coil is in two sections *a* and *c*. The key *k* is in a local circuit with the magnet 50; the armature bar of the magnet 50 is connected to a source of electricity and has a front contact 60 and a rear contact 61; contact 60 is in circuit with coil section *c* and contact 61 is in circuit with coil section *a*, the coils *a* and *c* are reversely connected so that the same polarity of current will oppositely affect the secondary *b*, it is another way of reversing the current through the primary or exciting coil of the inductorium.

Fig. 4 shows the arrangement I prefer for practical operations, the Morse key *k* is in a local circuit with the magnet 50 of a pole changing transmitter, which operates to throw current from either source *h*, *j*, of opposite polarity, into the circuit 70, containing a condenser *d* in series with the coils of the polarized relays *r* and *s*. I regard the condenser *d* as another form of inductive device in the circuit of the polarized relays *r* and *s* and I prefer it because it does not vary the electro-motive force and the impulses are short and sharply defined and all of the same strength and duration.

In Fig. 5 which is a modification of Fig. 1 the relays *r* and *s* have the usual coil 19 and a second coil 20 in a local circuit 21 so that the relay cores are permanently polarized.

What I claim and desire to secure by Letters Patent is:

1. In a perforating apparatus the combination of a suitable tape means for advancing the tape; two separate punching devices, an electro-magnet for each punch; a circuit including a Morse key and the primary of an induction coil and a circuit containing the secondary of said coil and said electro-magnets.

2. In a perforating apparatus the combination of a suitable tape or strip; a pair of punching devices, a magnet for each punch, a circuit including said magnets, a Morse key or transmitter, and means whereby the movement of the key-lever throws induced

impulses of opposite polarity into said magnet circuit.

3. In a perforating apparatus a suitable tape or strip; in combination with a plurality of punching devices, a magnet for each punching device, a circuit including said magnets, a Morse key or transmitter, and means whereby the movement of the key-lever throws a single induced impulse into said circuit on its down-stroke and a single induced impulse of opposite polarity into said circuit upon its up-stroke, substantially as described.

4. In a perforating apparatus, the combination of a suitable tape or strip, a pair of punching devices, a magnet for each punch, a circuit including both said magnets, a vibrating lever and means whereby the movement of the lever throws induced impulses of successively opposite polarity into said circuit at the beginning and end of each vibratory movement of said lever.

5. In a perforating apparatus the combination of a suitable tape or strip, means for advancing it, suitable punching devices, electro-magnetic means for operating the punches, a circuit for said means, a Morse key, a separate circuit therefor and a device for establishing inductive relations between said circuits.

6. In a perforating apparatus the combination of a suitable tape or strip, means for advancing it, suitable punching devices, electro-magnetic means for operating the punches, a circuit therefor, a manually operating circuit changing device, a separate circuit therefor, and means for causing said circuit to act inductively on the first named circuit.

7. In a perforating apparatus the combination of a suitable tape or strip, means for advancing it, a plurality of punching devices, an electro-magnetic device for operating each punch, a circuit for said devices, a manually operated circuit-changing transmitter, a separate circuit therefor, and means for causing one circuit to act inductively on the other circuit.

8. In a perforating apparatus the combination of a suitable tape or strip, means for advancing it, suitable punching devices, electro-magnetic means for operating the punches, a circuit for said means, a Morse key, a separate circuit therefor and a condenser connecting one circuit in inductive relation with the other circuit.

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