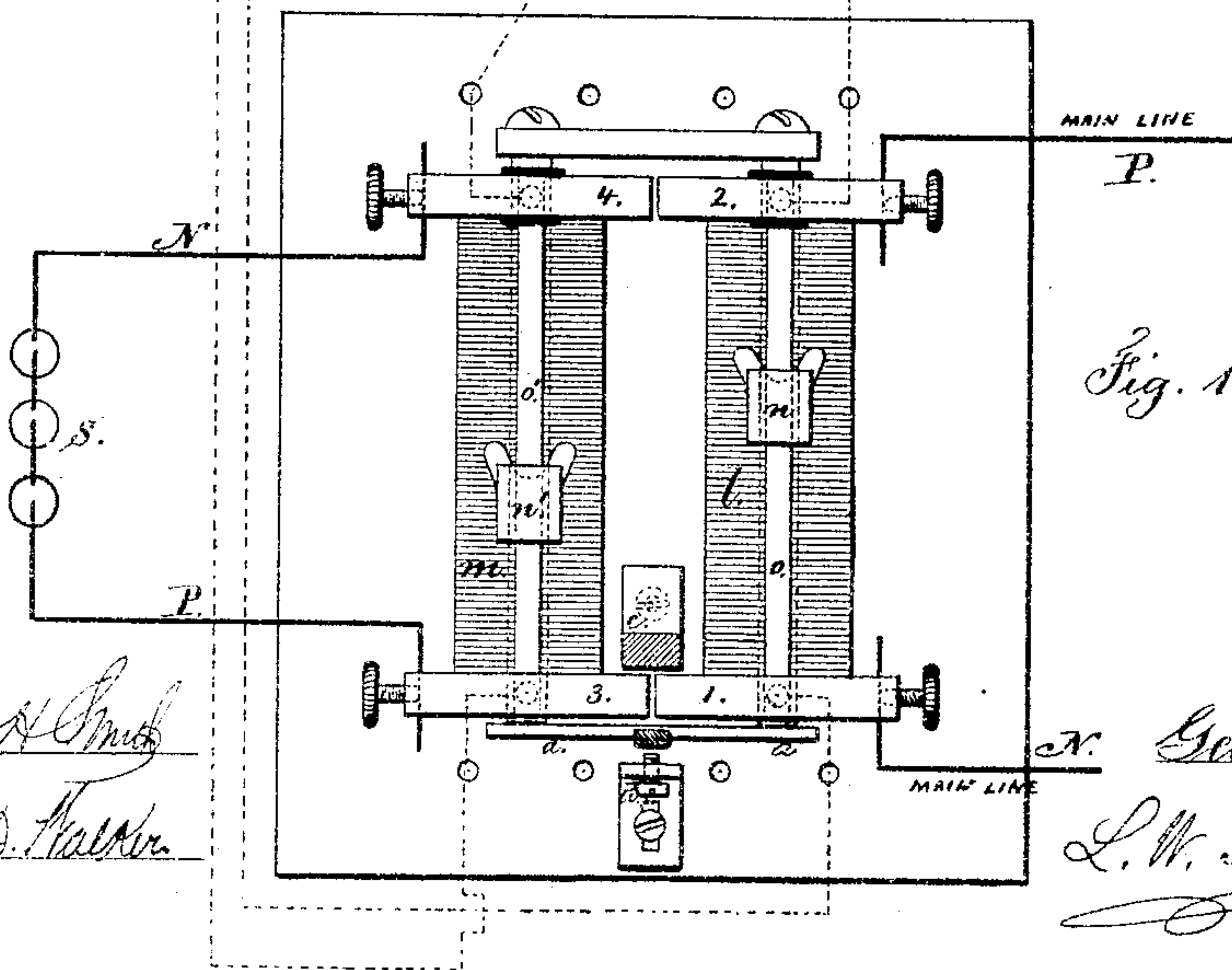
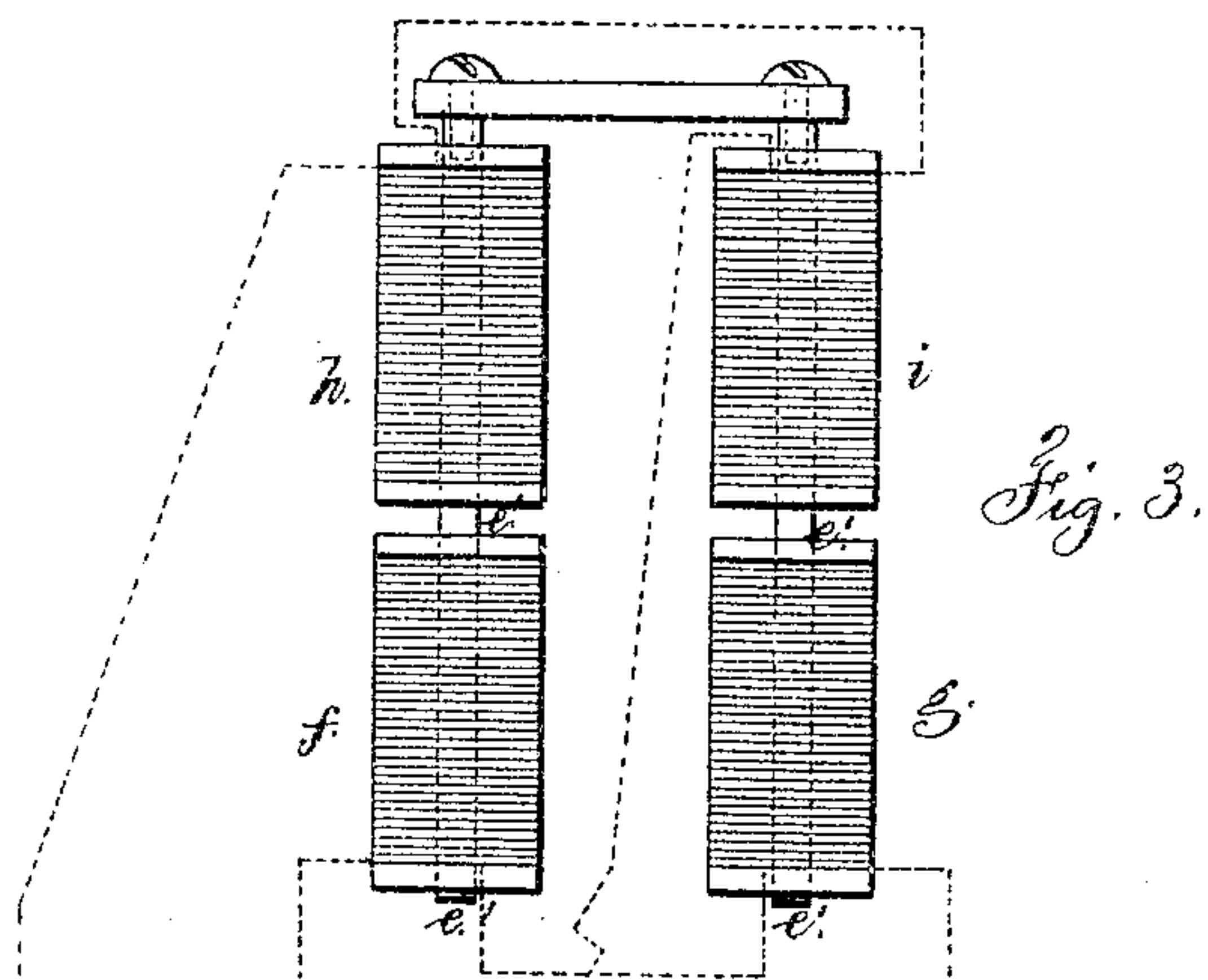
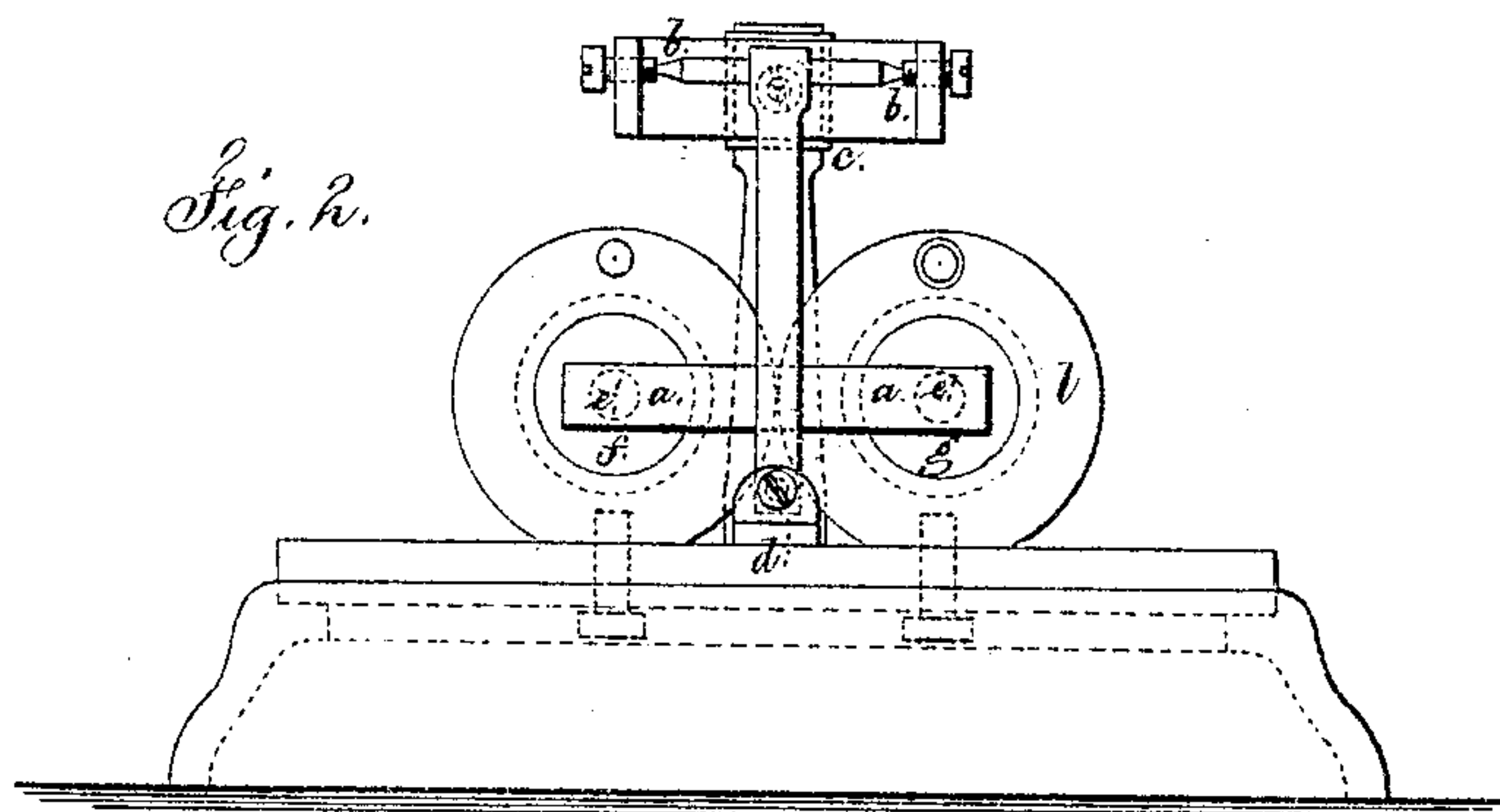


G. LITTLE.

Improvement in Telegraph Apparatus.

No. 130,811.

Patented Aug. 27, 1872.



Witnesses,

*Chas. H. Smith*  
*Geo. D. Walker*

Inventor

*George Little,*  
*L. W. Perrell atty*



# UNITED STATES PATENT OFFICE.

GEORGE LITTLE, OF RUTHERFORD PARK, NEW JERSEY.

## IMPROVEMENT IN TELEGRAPH APPARATUS.

Specification forming part of Letters Patent No. 130,811, dated August 27, 1872.

*To all whom it may concern:*

Be it known that I, GEORGE LITTLE, of Rutherford Park, in the county of Bergen and State of New Jersey, have invented an Improvement in Electro-Magnetic Apparatus for Telegraphic Purposes; and the following is declared to be a correct description of the same.

This invention consists in an electro-magnet adapted to moving an armature for producing sound, or for making or breaking a telegraphic circuit by the action of magnetism without the use of a spring or retractile force applied to such armature, the motion being due to electrical attraction and repulsion. I make use of two helices around the soft-iron core, and these helices are so wound and connected with the main line and a local or constant circuit that when there is a pulsation in the main line the polarity of the electro-magnet will be changed and produce a movement in the armature which is polarized.

In the drawing, Figure 1 is a plan of the instrument. Fig. 2 is an elevation of the same; and Fig. 3 is a plan of the helices and electro-magnet as removed from the rheostats, Fig. 1, and the connections from those helices to the respective parts of the rheostats are indicated by dotted lines.

The armature *a* is hung upon the centers *b*, so as to swing or vibrate in any convenient manner. I have shown the frame *c* for sustaining the same. The extent of vibration is determined by a stop or stops. The stop *d* is shown as an adjusting-screw, and by the vibration of that armature sound may be produced or a local or relay circuit opened or closed. The electro-magnet *e'* is shown of the ordinary U-shape. It might, however, be a single bar with two spools upon it. I have shown the spools or helices *f g h i*. These are separate, and wound with reference to producing the reverse polarity, as hereafter set forth. These spools are of a size to pass freely into the coil-cylinders *l m* of the rheostats. The heads 1 2 3 4 are at the ends of the respective rheostat-coils, and the adjusters *n n'* are made so as to be moved upon the bars *o o'*, and adjust the action of the respective rheostats in dividing the electric current, as in patents heretofore granted to me. The P and N wires of the main line are connected to the heads 1 and 2, and

the P and N wires of the local or constant battery *s* are connected to the heads 3 and 4. The other connections are indicated by the dotted lines, and the electric circuits are as follows: The constant, *s*, being connected to 3 and 4, the current is divided, a portion going from 3 by the adjuster *n'*, rheostat-coil *m*, and head 4, back to the battery, and the regulated proportion passing from 3, by a wire, to the helix *h*; thence through the helix *i* back again to the head 4 and battery. By the helices *h i* the cores *e'* are magnetized and attract the armature *a*, (or the reverse;) hence the action of the local constant battery is to hold the armature *a* toward the cores *e'*. When a pulsation passes along the main-line circuit it enters by the head 2, is divided, a portion going by the rheostat-coil *l* to the head 1 and line-wire, while the other portion goes through the helix *g*, helix *f*, and wire back to the head 1 to the line wire. The helices *f* and *g* are wound in such a manner that the main-line current will incite in the cores *e'* magnetism of opposite polarity to that which had been excited by the helices *h i*; hence the armature *a* will be moved in the opposite direction, producing the sound or making or breaking local or relay circuits, as aforesaid. It is necessary that the armature *a* should be polarized, so as to be attracted by opposite or repelled by similar polarity in the cores, and this polarization of the armature may result from permanent magnetism or from electro-magnetism, said armature being within an electro-magnetic helix. If desired, the main-line pulsation may pass through the helices *h i* in the opposite direction to that from the constant, so as to neutralize the action of these helices on the cores *e'* in a manner similar to that set forth in Letters Patent granted to me December 26, 1871, No. 122,266, or the portion of the current from *s* may be small so that the main-line current acting in *f g* shall overcome and reverse the magnetism in the cores from *h* and *i*. The electro-magnets *f g h i* might be separate from the rheostats instead of being introduced within them; but by availing of the space in the rheostat for receiving an electro-magnet or magnets the instrument is rendered much more compact than heretofore.

I claim as my invention—

1. A soft-iron core and two helices, one in

the main line and the other in a local constant circuit, and arranged, as set forth, to produce opposite polarity in the core, in combination with an armature that is polarized, for the purposes and substantially as set forth.

2. An electro-magnet introduced within a rheostat, substantially as set forth.

3. The rheostat in the main line and the rheostat in the local constant circuit, in com-

bination with the electro-magnets and polarized armature, substantially as set forth.

Signed by me this 22d day of March, A. D. 1872.

GEO. LITTLE.

Witnesses:

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