

G. L. ANDERS & T. A. WATSON.
Individual Signaling Apparatus for District
Telephone Systems.

No. 229,298.

Patented June 29, 1880.

Fig. 4.

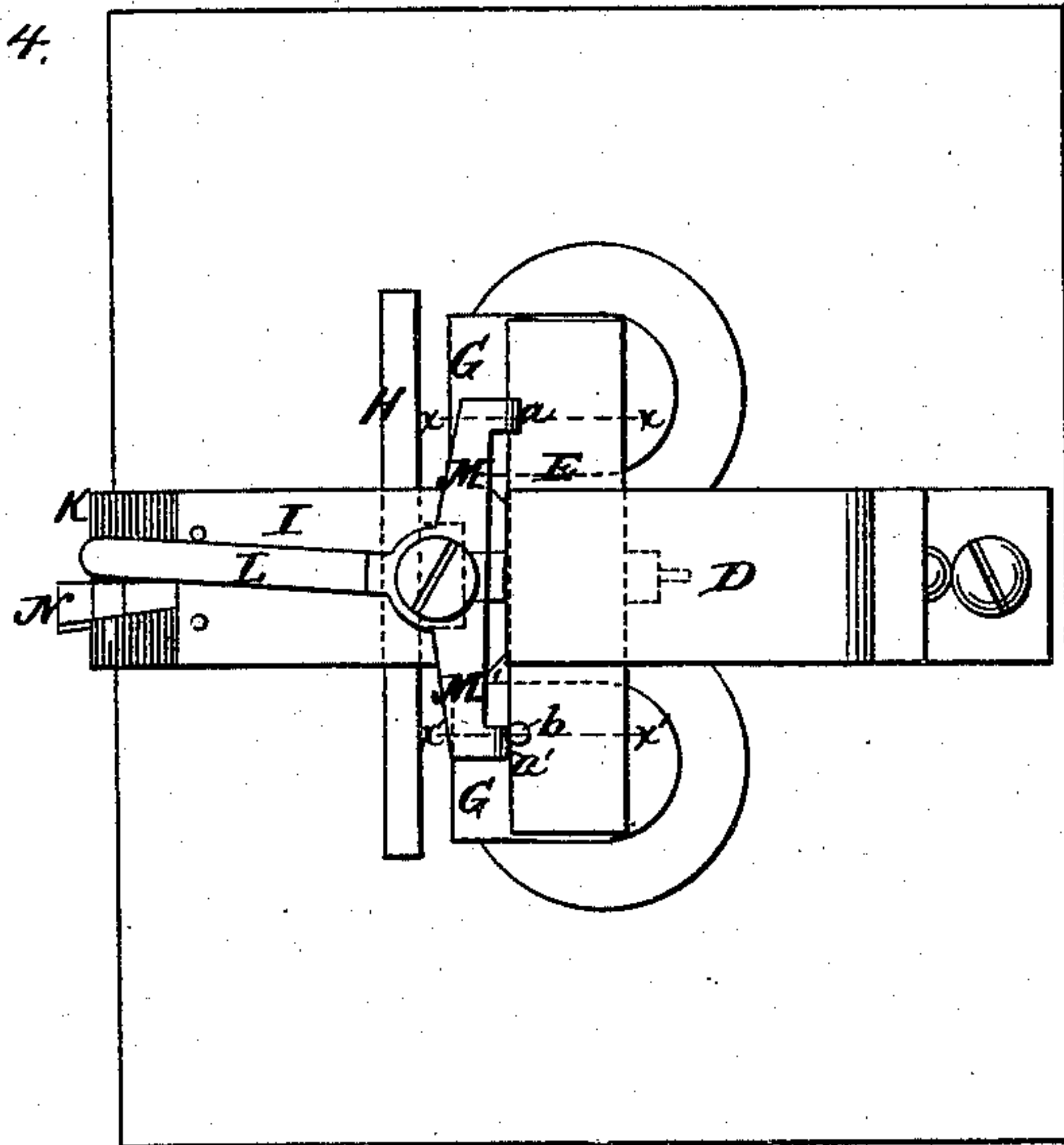


Fig. 4.^a



Fig. 4.^b



Fig. 5.^a



Fig. 5.^b



Fig. 1.

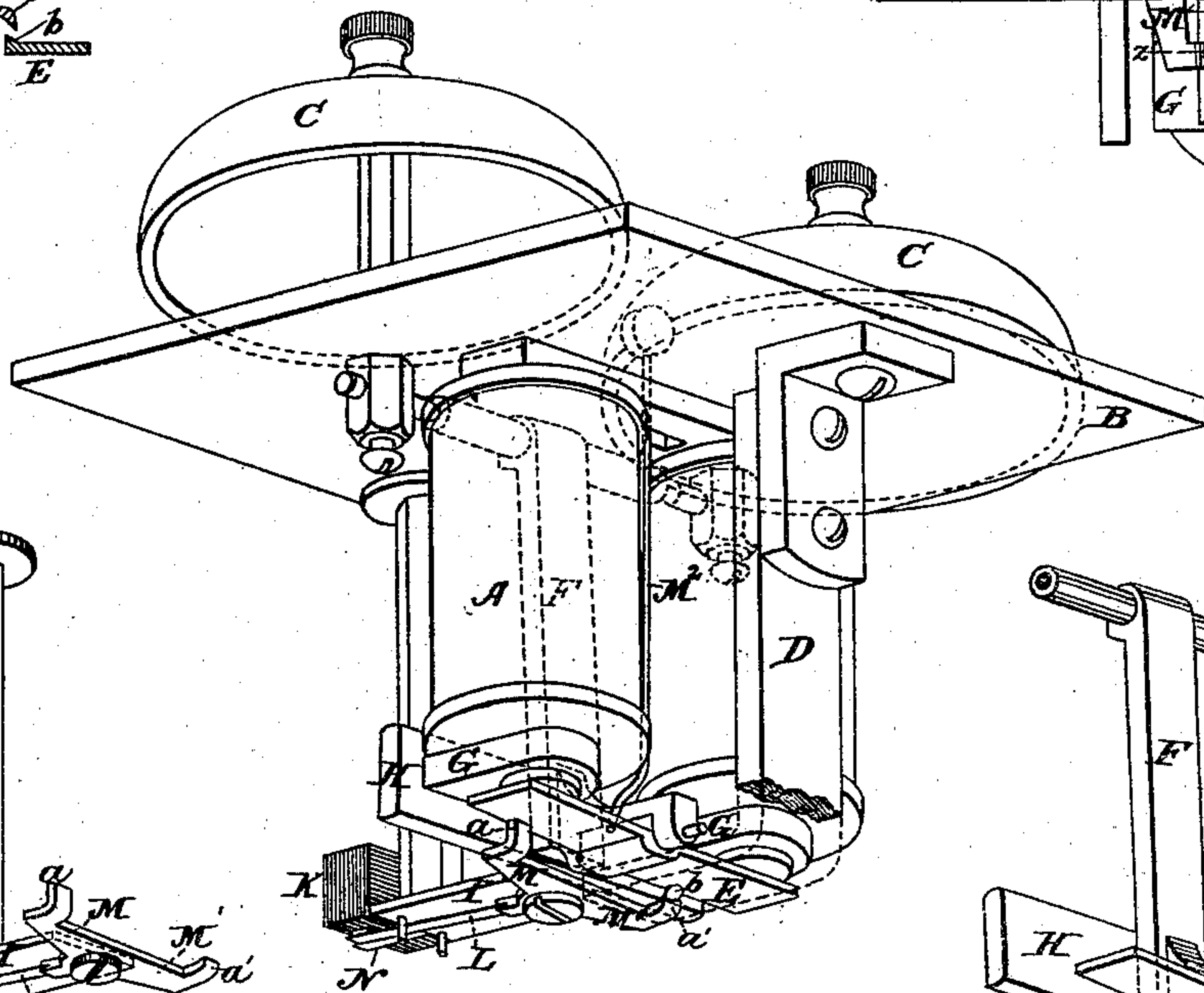


Fig. 2.

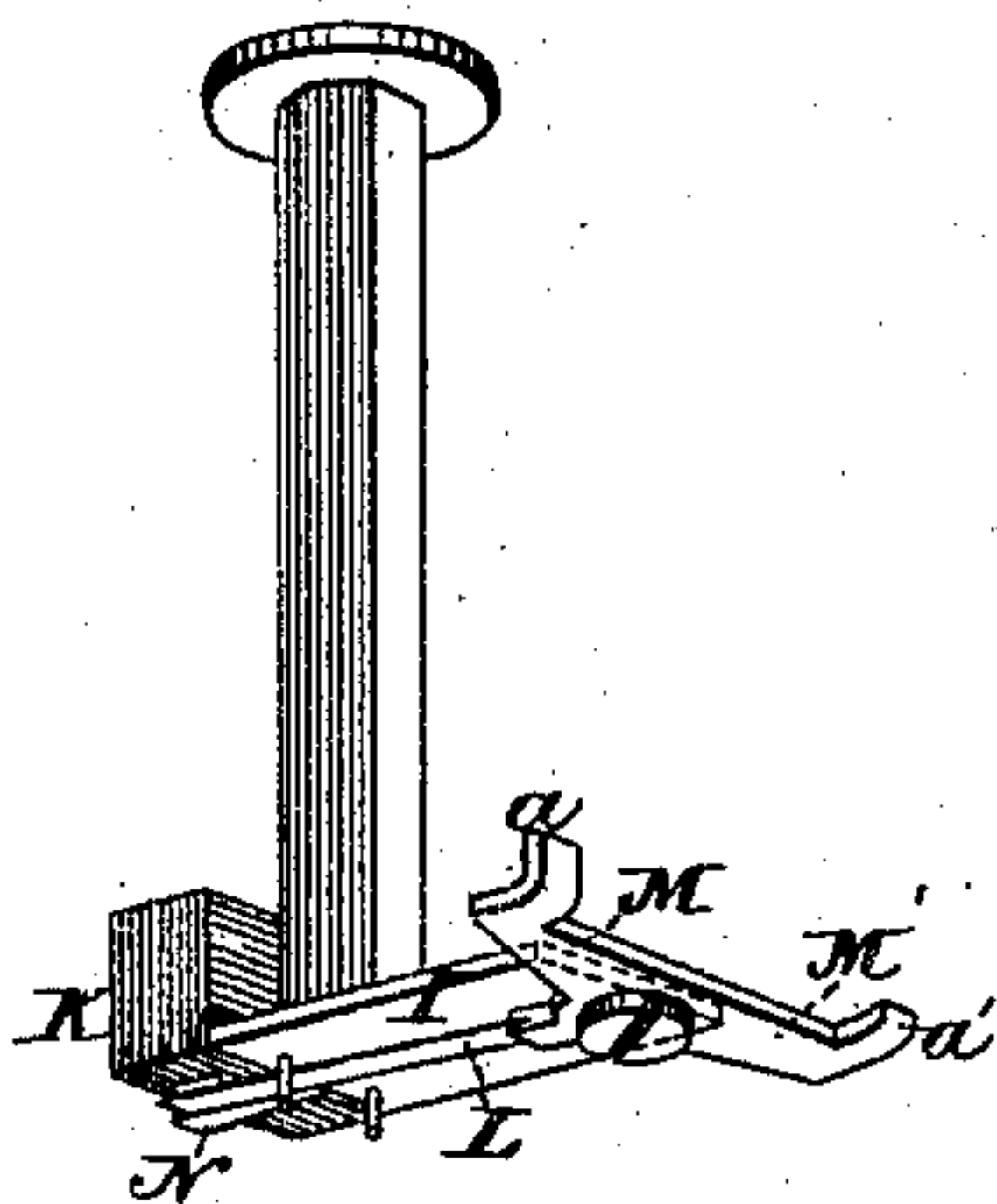
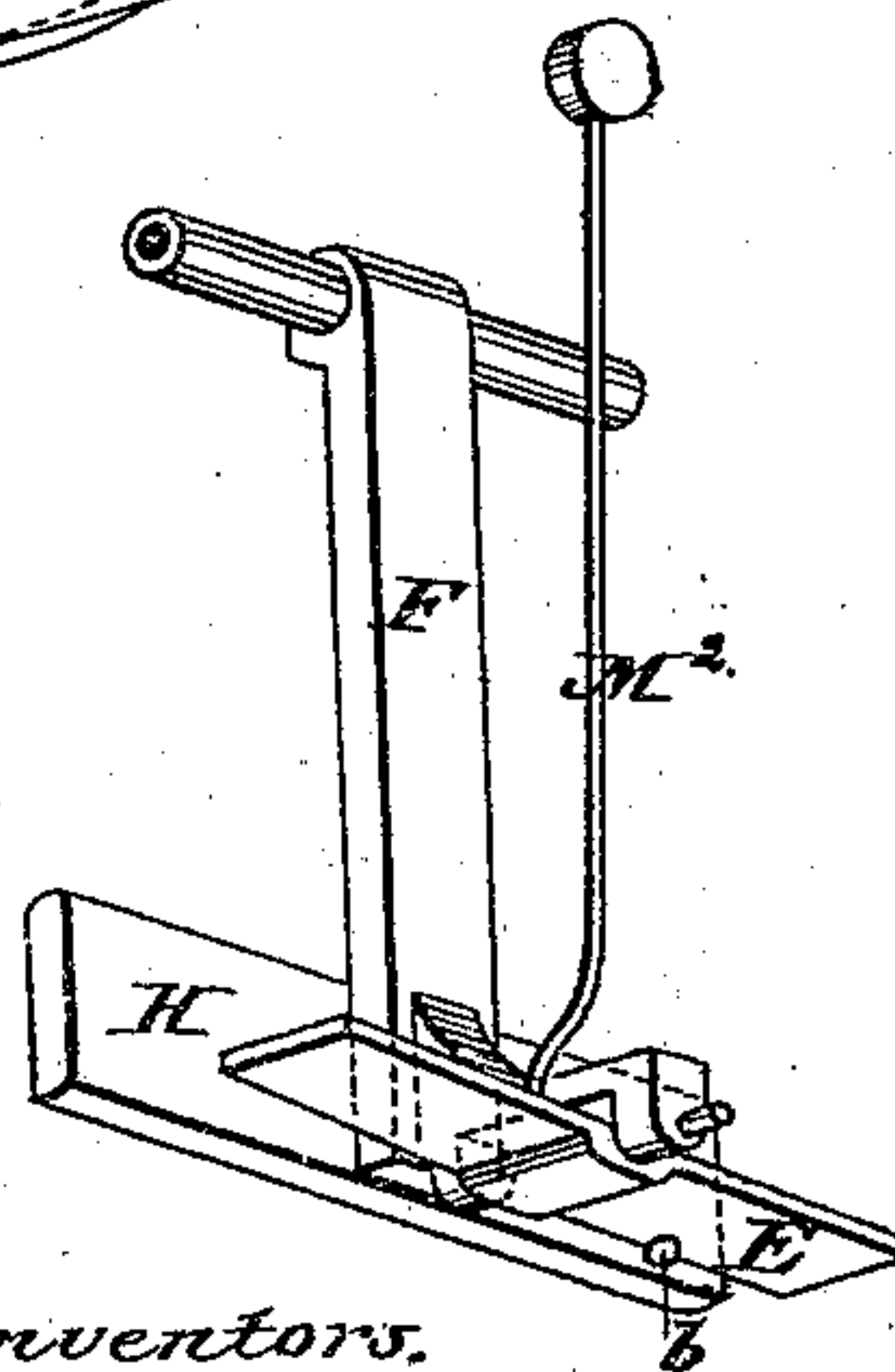


Fig. 3.



Witnesses.

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By their Atty. A. L. Hays

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Fig. 6.

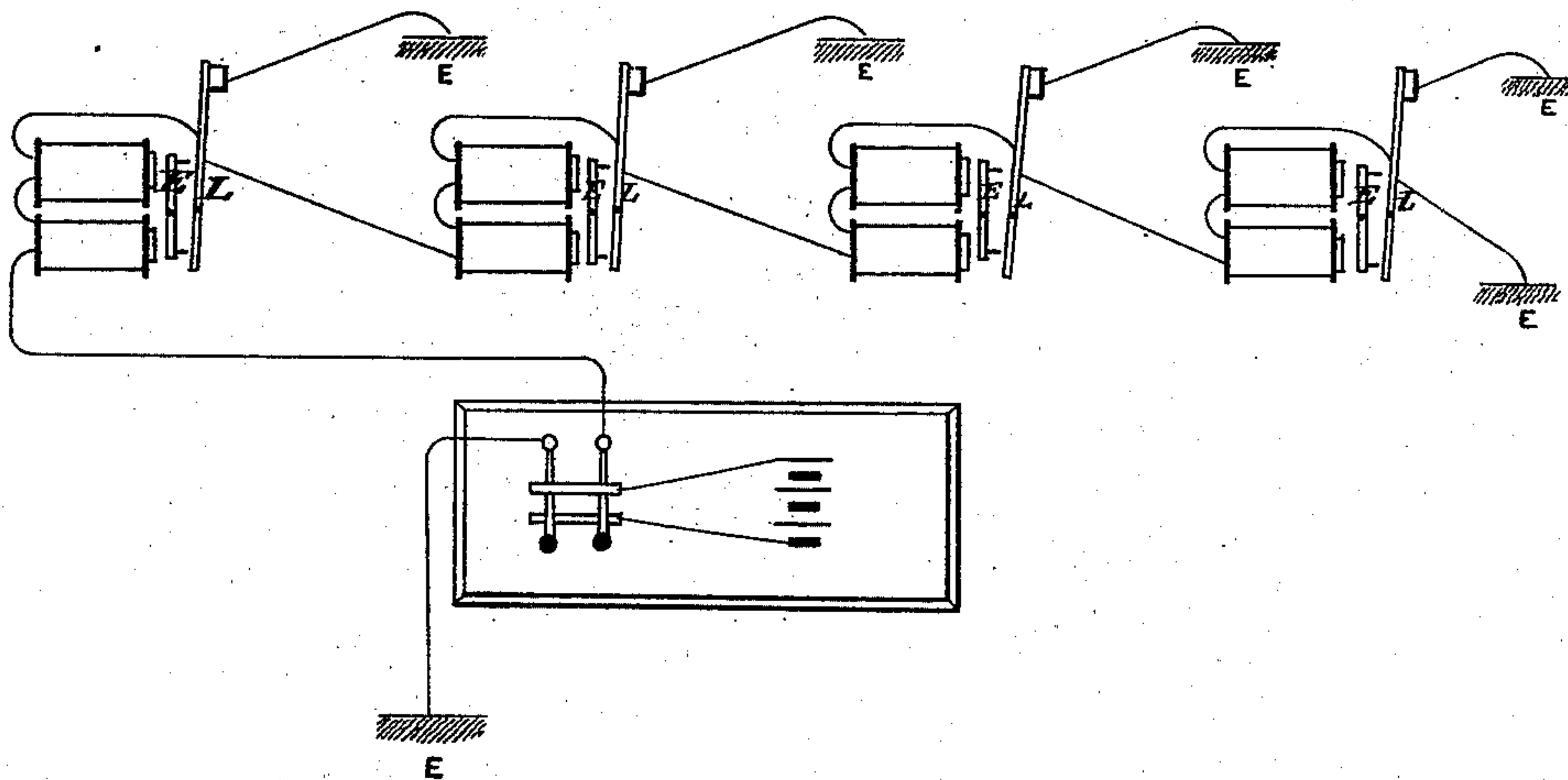
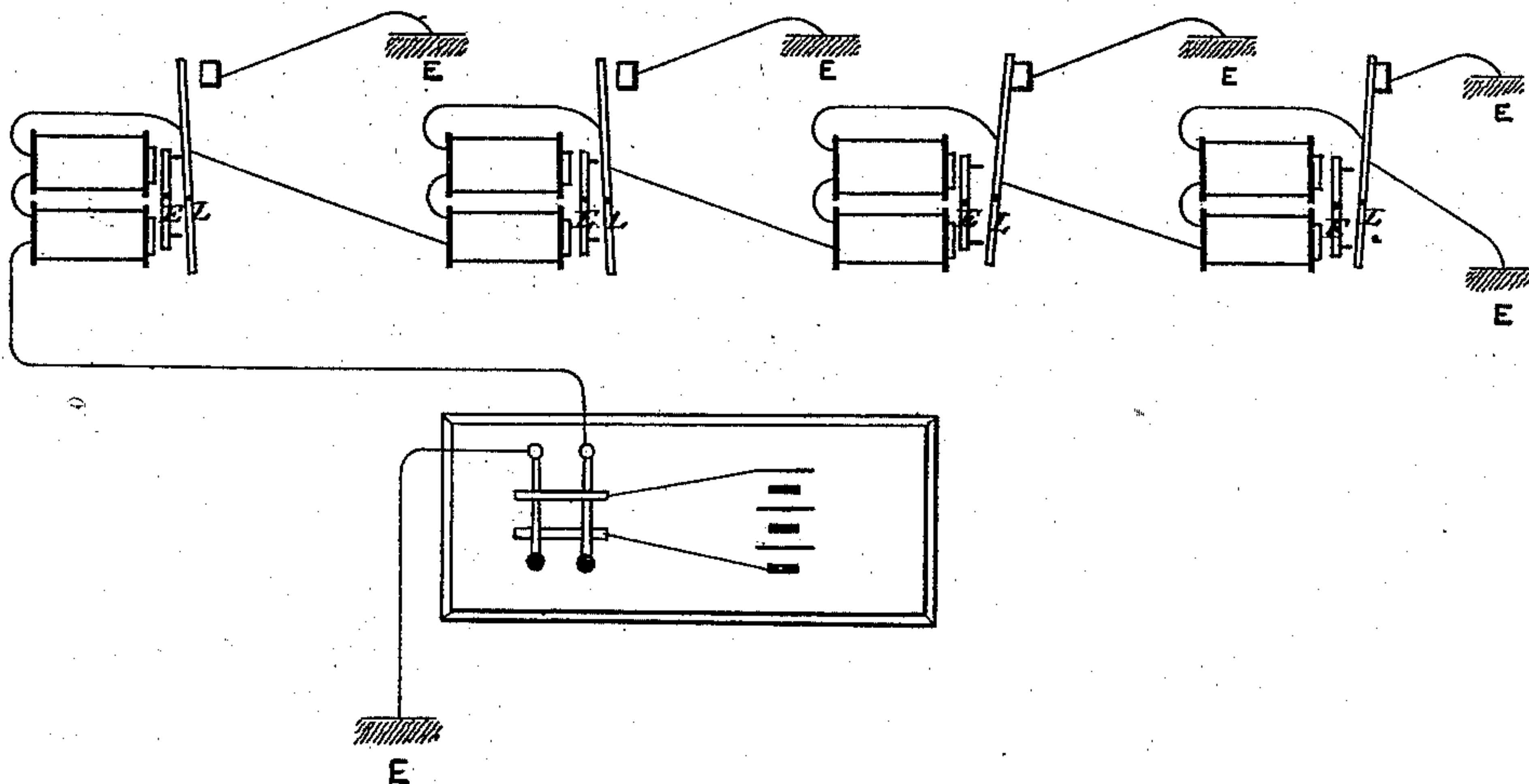


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, AND THOMAS A. WATSON, OF EVERETT,
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INDIVIDUAL SIGNALING APPARATUS FOR DISTRICT TELEPHONE-SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 229,298, dated June 29, 1880.

Application filed January 14, 1880.

To all whom it may concern :

Be it known that we, GEORGE LEE ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, and THOMAS A. WATSON, of Everett, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Individual Signaling Apparatus for District Telephone-Systems, of which the following is a specification.

In this invention, at each station there is a switch permanently connected to the line, which switch can be moved so as to connect the line to earth at each station or to disconnect the line from earth; an electro-magnet operated by the main-line current and moving the switch by the return movement of its neutral armature when the current through said electro-magnet is broken; a polarized armature affected by the main-line current and arranged so as to determine the movement of the switch in one or the other direction, according to the polarity of the current by the interruption of which the movement of the switch is effected; signaling apparatus operated by alternate positive and negative currents of such force or duration as not to attract the neutral armature, and a locking device which prevents the signaling apparatus at any station from being operated except when the line is grounded at that station, the result accomplished by this combination being that any number of these apparatus may be placed on a line and that the signaling apparatus at any station can be operated at will without operating the signaling apparatus at any of the other stations.

In the accompanying drawings an apparatus is shown which embodies the principle of this invention, and in these drawings—

Figure 1 is a perspective view from below of the said apparatus in its normal position. Fig. 2 is a detached view of the switch. Fig. 3 is detached view of the neutral and polarized armatures. Fig. 4 is a plan view of the under side of the apparatus, showing the switch disconnected from the ground-contact and the polarized armature locked. Fig. 4^a is a sectional view of the polarized armature and switch-lever when in this position through the line $x x$, Fig. 4. Fig. 4^b is a sectional view of the polarized armature and switch-lever when in the same po-

sition through the line $x' x'$, Fig. 4. Fig. 5 is a plan view of the under side of the apparatus, showing the switch connected to the ground and the polarized armature free to oscillate. Fig. 5^a is a sectional view of the polarized armature and switch-lever when in this position through the line $z z$. Fig. 5^b is a sectional view of the polarized armature and switch-lever in the same position through the line $z' z'$, Fig. 5. Fig. 6 is a diagram showing the switches at the several instruments on the line all in connection with ground; and Fig. 7, a diagram showing the ground-connections open at two instruments and closed at the third and fourth.

In these several figures the same letters refer to the same parts.

In these several figures, A is an electro-magnet attached to a plate, B, which supports the call-bells C C, and D is a permanent magnet attached to the plate B, and having one extremity bent at right angles, so as to extend over and magnetize an armature, E, which is pivoted above the poles of the electro-magnet A upon a lever, F, which is pivoted on the plate B. In Fig. 1 this bent extremity is shown as broken away.

Upon each of the poles of the electro-magnet A are extension-pieces G G, of soft iron, at right angles to the axis of the magnet, and H is a neutral armature of soft iron, which is attracted by these extension-pieces, and is attached to the lever F. Both the neutral armature and polarized armature therefore move with the lever F; but the polarized armature oscillates on the same. The bell-hammer M² of the call-bells is attached to this polarized armature and is vibrated by its oscillations.

A retracting-spring is attached to the lever F, or the instrument may be so placed that the armature will fall back from the poles of the magnet by its weight when the current is broken.

Attached to a standard on the plate B is a metal plate, I, and a block, K, of some suitable insulating substance. Below the armature H, and pivoted on this plate I, is a metallic lever, L, having two arms, M M', on each side and at right angles to the lever, which arms extend over the polarized armature when

the neutral armature is retracted; but when the neutral armature is attracted the polarized armature in its oscillations clears the ends of the arms M M'.

5 In the block K is placed a plate of metal, N, which is connected to the earth, with which plate the lever L, which is connected to the line, is made to make and break contact, as it may be desired to connect the line to earth at
10 the station or to establish a circuit through the station.

Upon the arm M is a projection, *a*, extending downward, and upon the arm M' is also a projection, *a'*, which differs from the projection *a* by being beveled off on its under inner side.

When the lever L is in the position shown in Fig. 4, and its extremity rests upon the insulating-block K, so that the line-circuit is
20 completed through the station, the arm M will be in such a position that if the end of the polarized armature opposite said arm is attracted it will pass under said arm when the neutral armature makes its backstroke; but if the polarity of the current in the electro-magnet is
25 reversed, so that the end of the polarized armature opposite the arm M is repelled and the end of the polarized armature opposite the arm M' is attracted, as shown in Fig. 5, the projection *a* on the arm will be struck by the armature when the neutral armature makes
30 its backstroke, and will move the end of the lever L into contact with the metallic piece I in contact with the earth.

35 The arm L can be restored to its original position by changing the polarity of the current in the electro-magnet A, and then breaking the current when, on the backstroke of the neutral armature, a projection, *a'*, on the
40 arm M' will be struck by a projection, *b*, on the polarized armature.

When the armatures are in the position shown in Fig. 4 the polarized armature is under the projection *a*, as shown in Fig. 4^a, and
45 consequently the polarized armature is prevented from oscillating; but when the armatures are in the position shown in Fig. 5 the polarized armature is not prevented from being oscillated, for the reason that the projection *a'* on the arm M' and the projection *b* on
50 the polarized armature are beveled off, as shown in Fig. 5.

We do not confine our invention to the particular form of apparatus described, as this
55 can be modified in many ways without departing from the principle of our invention.

The operation of this apparatus is as follows: A series of these instruments are arranged on the line, one at each station, and the switch-
60 lever L on each instrument is in such a position that the earth-connection at each instrument is broken. The current is then put on the line, when the neutral armatures will be attracted and the polarized armatures un-
65 locked. The current is then reversed so as to put the polarized armature into the position shown in Fig. 5, and then, on breaking

the circuit, the neutral armature will be retracted, and the polarized armature will strike the arm M and cause the lever or arm I to
70 move into contact with the plate N, and thus establish an earth-connection at each station, as shown in Fig. 6. When the line is in this condition, should it be desired to ring the signal-bell at any station—say at station No. 3—
75 a current in the reverse direction is closed and broken as many times as there are stations on the line between the central office and the station it is desired to call, the first making
80 and breaking of the current having the effect to remove the switch-lever from the earth-contact at station 1 by the contact of the polarized armature with the arm M', when the neutral armature falls back, the second making
85 and breaking of the current producing the same effect at station No. 2, and so for each succeeding station. The earth-contact at the station which it is desired to call is not removed, and, consequently, for the reason that the polarized armatures at the succeeding sta-
90 tions are locked, as before explained and as shown in Fig. 4, while the polarized armatures at the other stations are in the position shown in Fig. 5, and free to oscillate. The bell at the station which it is desired to call can be rung
95 from the central office by vibrating the polarized armature by alternate positive and negative currents of less force or duration than required to affect the neutral armature, and
100 as the current goes to earth at that station the armatures of the instruments at the stations beyond will not be affected. After the station is called the switch-levers at the preceding stations are put on their respective
105 earth-contacts by the operation before explained.

What we claim as our invention, and desire to secure by Letters Patent of the United States, is—

1. In an electric circuit, a series of switches
110 permanently connected to the main circuit, each of which switches is operated by an electro-magnet acting to simultaneously put all the switches to earth or to consecutively re-
115 move the same from earth, substantially as and for the purpose set forth.

2. In an electric circuit where continuity is unbroken, a series of switches permanently connected thereto, all of which switches are
120 simultaneously put to earth when their operating electro-magnets are discharged after a current in one direction, and which are consecutively removed from earth by succeeding discharges of currents in the opposite direction through their operating electro-magnets, sub-
125 stantially as and for the purpose set forth.

3. The electro-magnet, with its neutral and polarized armature, in combination with a grounding-switch that is operated by said magnet when the same is discharged, substan-
130 tially as and for the purpose set forth.

4. The combination, with a polarized armature, of a bell-hammer attached thereto and vibrated thereby, of a switch for establishing

a ground-connection, which switch when disconnected from earth locks said armature and prevents it from vibrating, substantially as and for the purpose set forth.

5 5. The combination, with an electro-magnet, of the pivoted lever F, carrying a neutral and a polarized armature of said magnet, of the pivoted lever L, which is moved to one side or the other by the backstroke of the neutral
10 armature, according as one pole or the other of the polarized armatures is attracted to the electro-magnet, substantially as and for the purpose set forth.

6. The combination, with the switch-lever

L, provided with the arms M M' and projec- 15
tions *a a'*, constructed as described, of the polarized armature provided with the projection *b*, substantially as and for the purpose set forth.

In witness whereof we have hereunto set 20
our hands in presence of the subscribing witnesses.

GEORGE L. ANDERS.
THOMAS A. WATSON.

Witnesses:

ALEX. L. HAYES,
ARTHUR E. ANDREW.