

(No Model.)

2 Sheets—Sheet 1.

D. J. CARTWRIGHT.

PROTECTOR FOR ELECTRICAL INSTRUMENTS.

No. 320,912.

Patented June 30, 1885.

FIG. 1.

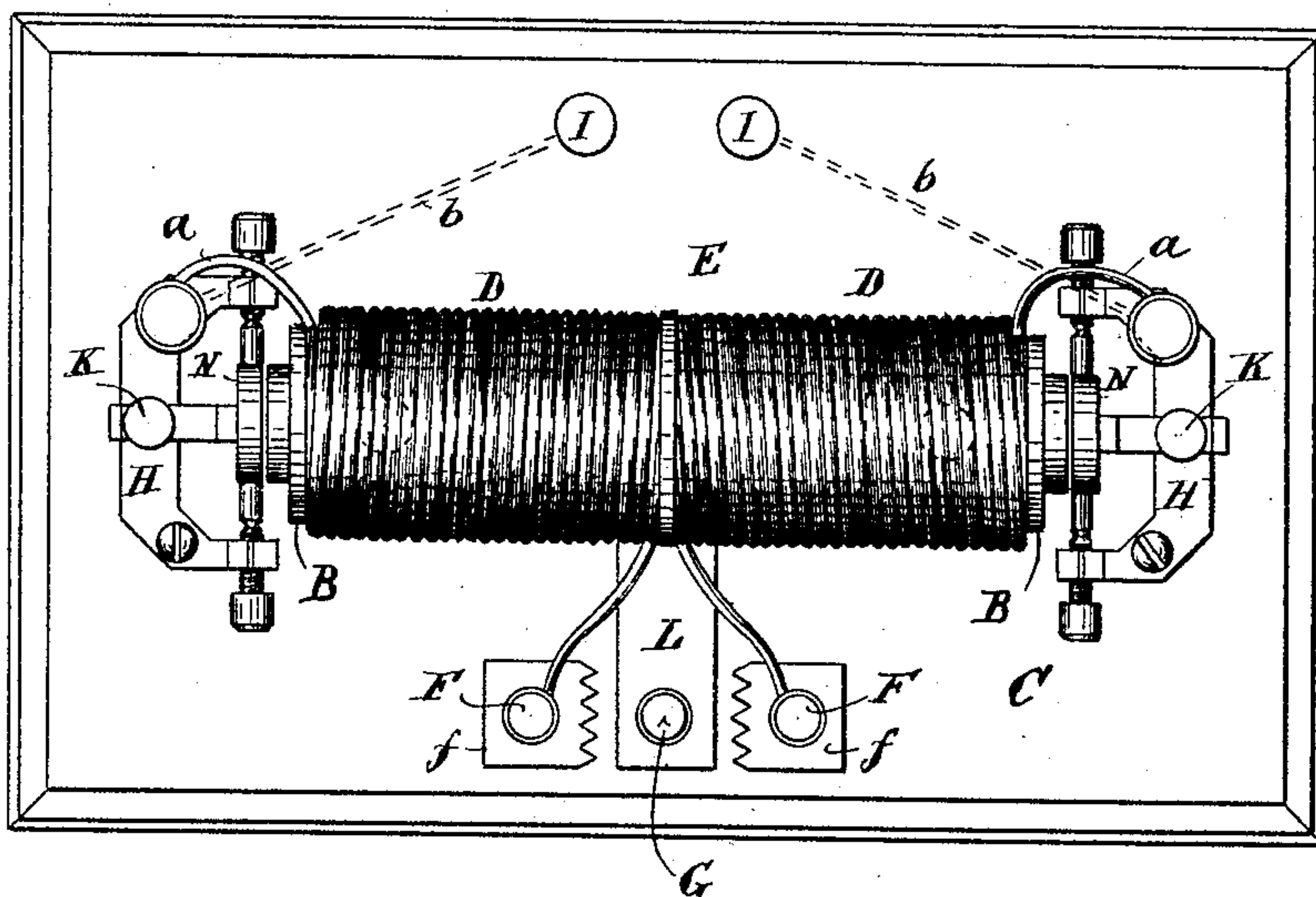


FIG. 2.

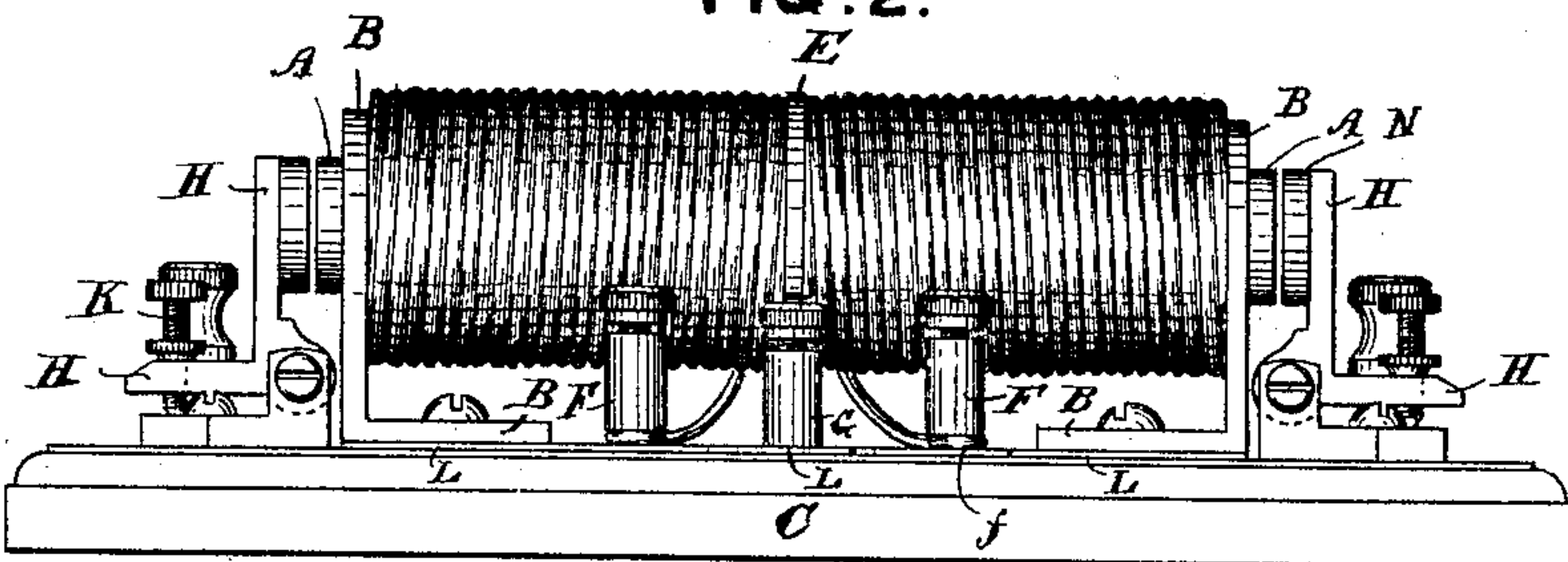
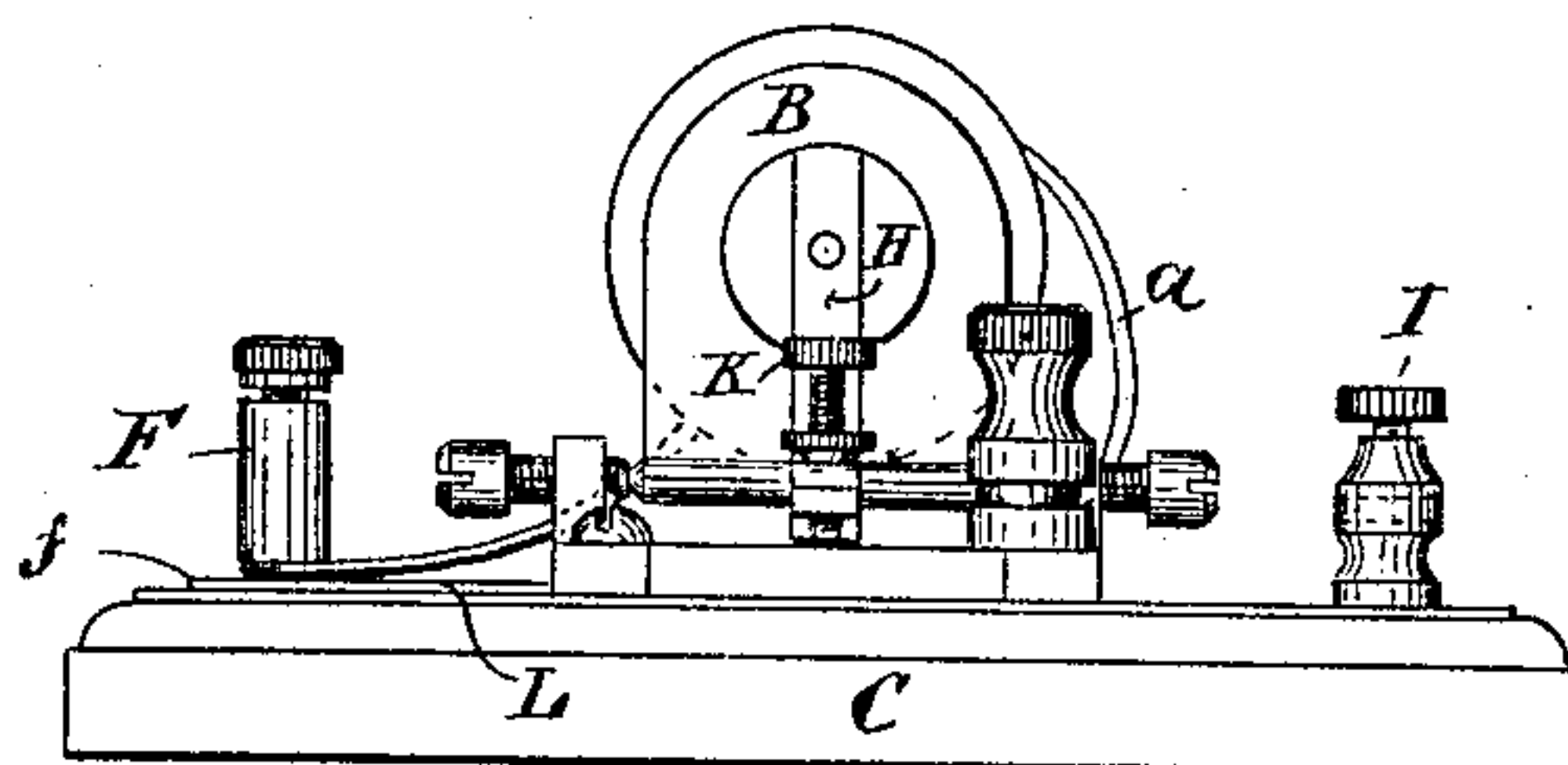


FIG. 3.



Witnesses.

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FIG. 4.

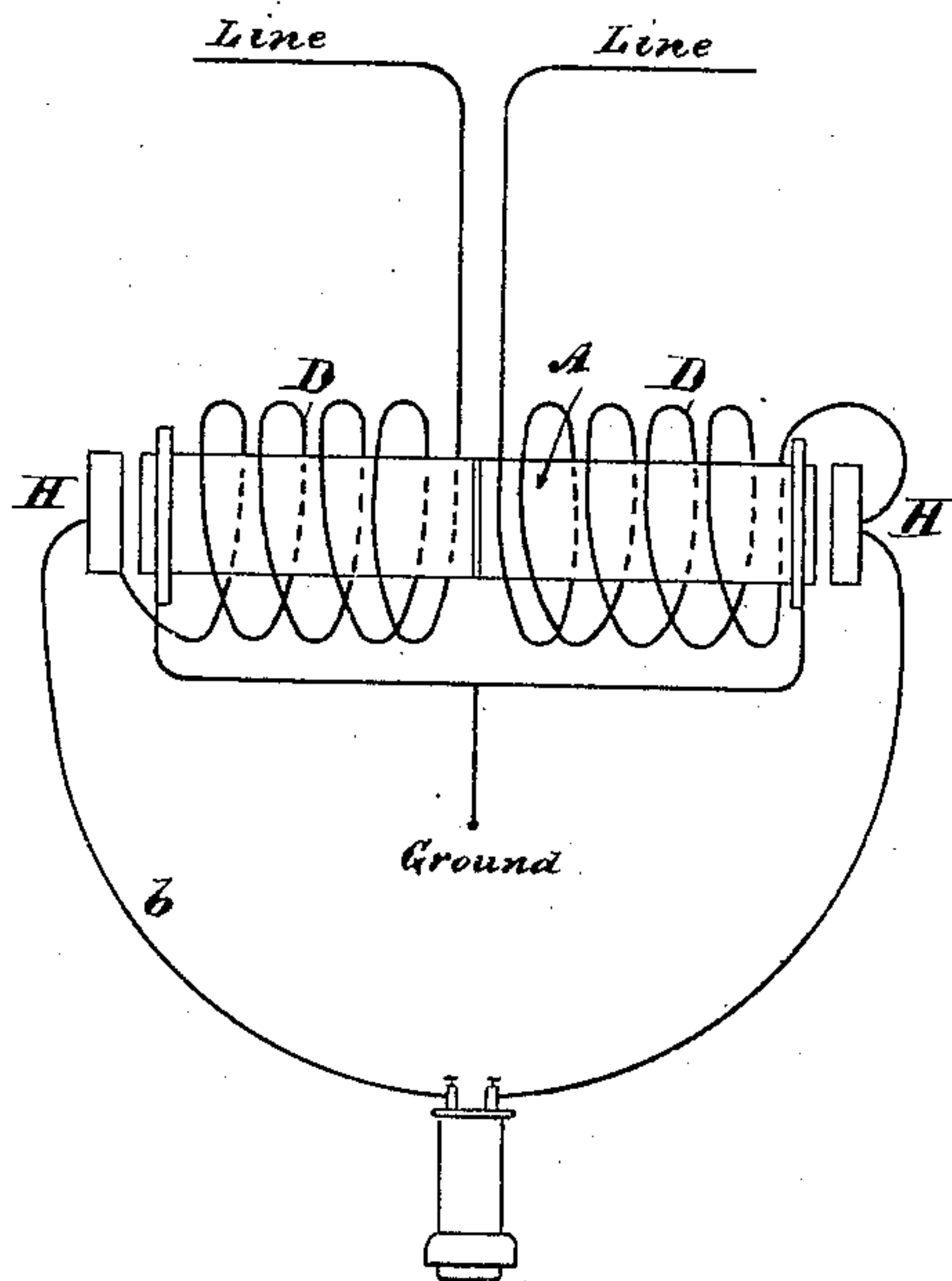


FIG. 5.

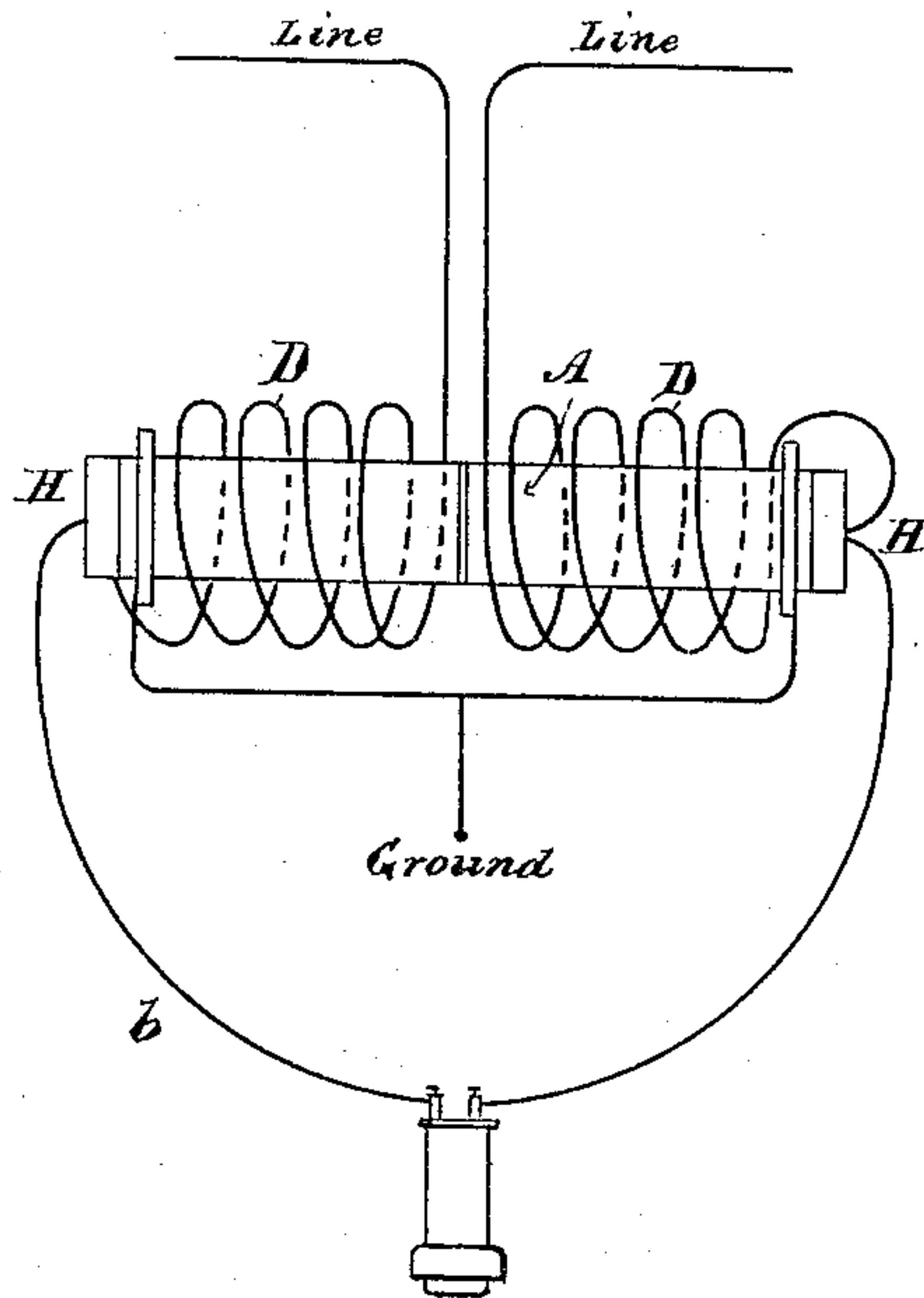


FIG. 6.

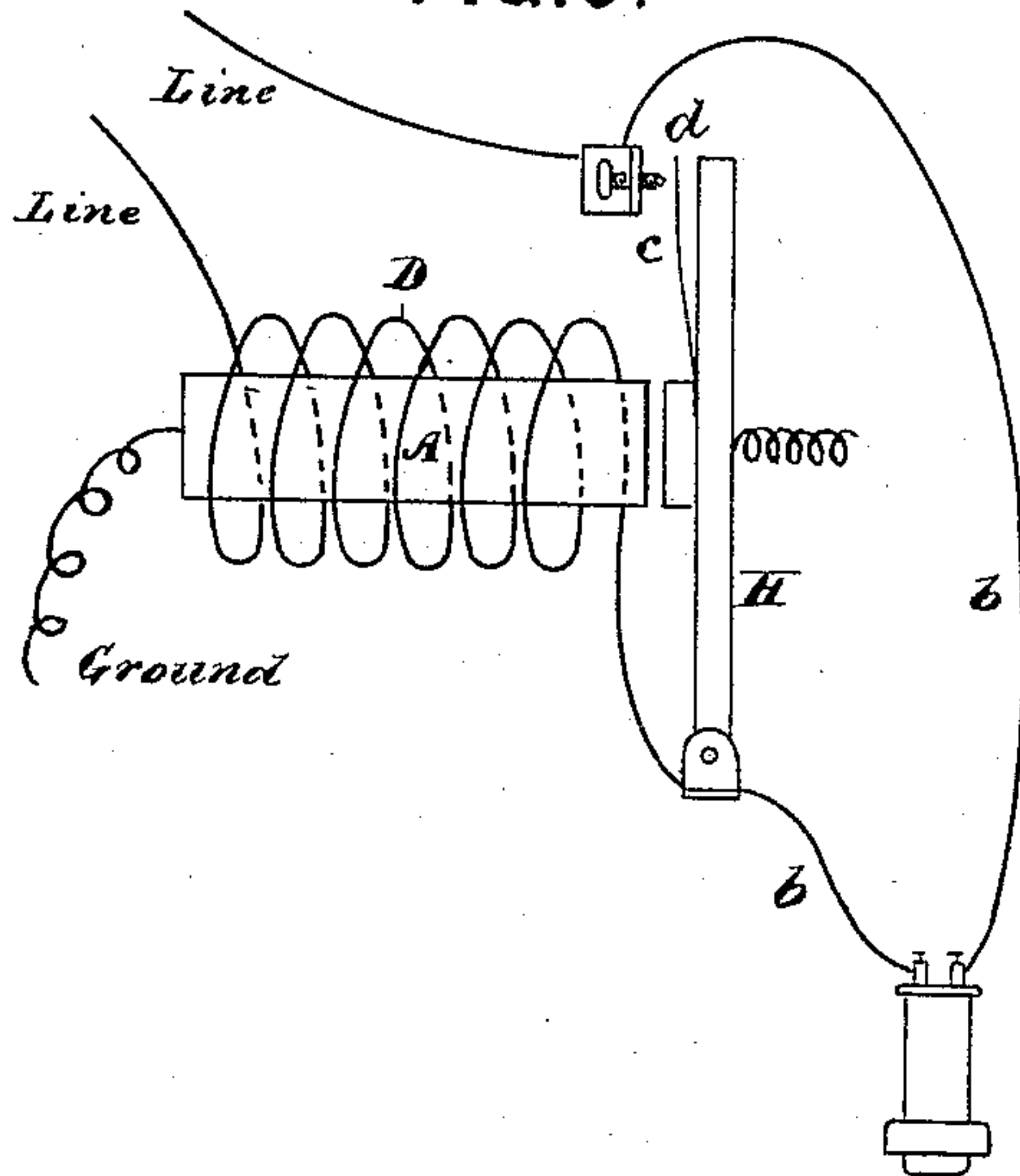
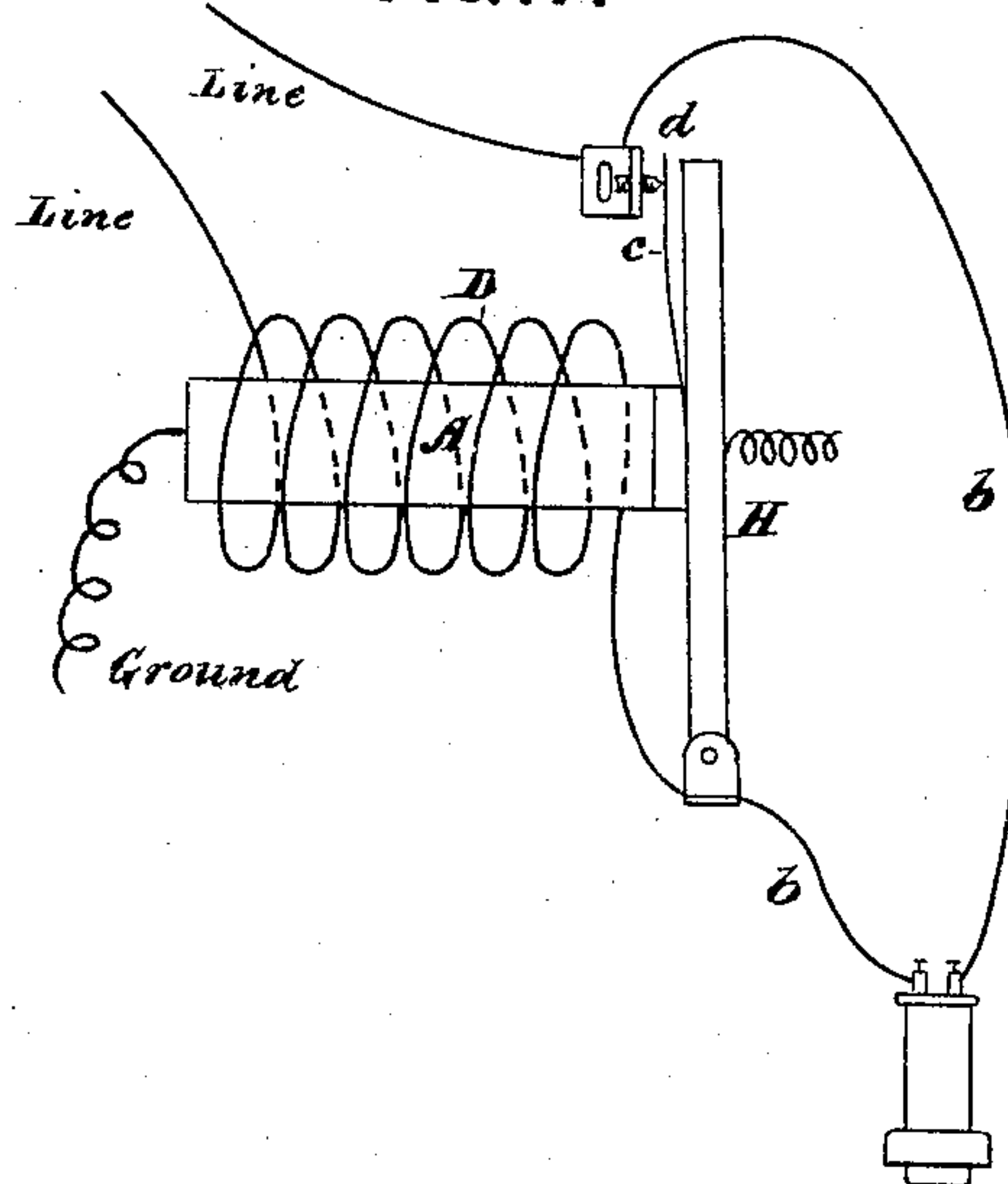


FIG. 7.



Witnesses.

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PROTECTOR FOR ELECTRICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 320,912, dated June 30, 1885.

Application filed February 28, 1885. (No model.)

To all whom it may concern:

Be it known that I, DAVID J. CARTWRIGHT, of Revere, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Protectors for Electrical Instruments, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to that class of electrical devices which are intended to automatically divert from a circuit any current the strength of which is sufficient to destroy, injure, or interfere with the action of the telephone or other instrument in the circuit, and thus to prevent the accidents caused by abnormal currents on the line due to contact with other circuits, to lightning, or to atmospheric electrical disturbances. In these devices there is an electro-magnet placed in the telephone or other circuit which it is desired to protect, and provided with an armature which is not moved unless an abnormal current passes through the electro-magnet, but which when moved by said current connects the line with the ground and cuts out the telephone or other instrument.

My invention consists in establishing the ground-connection through the armature and pole-piece or armature and core of this electro-magnet, whereby the use of contact-stops is avoided and simplicity and certainty of action are secured.

My invention also consists in certain details of construction as will be hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a plan view of a device embodying the principle of my invention. Fig. 2 is side view in elevation, and Fig. 3 an end view in elevation, of the device. Fig. 4 is a diagram showing the electrical connections of the apparatus when the armature is not attracted and the telephone or other instrument is in the circuit. Fig. 5 is a diagram showing the electrical connections when the armature is attracted and the telephone or other instrument is cut out of the circuit; and Figs. 6 and 7 are diagrams which show the electrical connections in another form of apparatus which embodies the principle of my invention, Fig. 6 showing the connections when the telephone or other instrument is in the circuit, and Fig. 7 when it is cut out of the circuit.

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

The device represented in Figs. 1, 2, 3, 4, 5 is intended for use at an intermediate station, but with certain modifications, as will be hereinafter described, it can also be used at a terminal station.

Referring to the drawings, A is an iron core, which is supported at each end upon angle-irons B B, attached to the base-plate C. Upon this core are placed two helices, D D, separated from each other at the center of the core by a washer of hard rubber or other suitable insulating material, and wound in the same direction, one from the center of the core and the other from the extreme end of the core. The inside end of one of these helices is connected by means of wire and binding-post F to one side of the line, and the outside end of the helix is connected through the armature-lever H, wires *a b*, and binding-post I to one of the terminals of the telephone or other instrument. The outside end of the other helix is connected to the other side of the line, and the inside end of this helix is connected through the other armature-lever, H, wires *a b*, and binding-post I to the other terminal of the telephone or other instrument. As shown by Figs. 4 and 5, it will thus be seen that a current entering from either side of the line will, when the armatures are not attracted, pass through both helices in the same direction. It is obvious that the wire of which these helices are composed must be comparatively thick in order to carry a strong current without injury. The armature-lever to which the armature N is attached is made of metal in bell-crank form, and is pivoted to the base-plate C, so that the weight of the lever is sufficient to overcome the attraction of the armature caused by the normal current which passes through the helices. If desired, this armature-lever may be held back by a spring.

The adjusting-screw K in one arm of the armature-lever enables the distance of the armature from the core to be regulated at will.

Each of the angle-irons supporting the core rests upon a T-shaped metallic plate, L, which is connected to the ground at G.

When the instrument is in its normal condition, and the current upon the line is of normal strength, and not of sufficient strength to

attract the armatures, the helices D D and the telephone or other instrument which it is desired to protect are in the circuit, as shown in Fig. 4; but if a current of abnormal strength is put upon the line from any source, as might happen from contact with an electric-light circuit with the telephone-circuit, or from lightning, or any other atmospheric electrical disturbance, the armatures are instantly attracted, and the line is connected with earth through the armature, the core, and pole-piece on the side from which the current enters, and the telephone or other instrument is cut out, and thus protected from injury, as shown in Fig. 5.

It will thus be seen that in this instrument the current is never broken, but that the action of the abnormal current upon the armature is to shunt the telephone or other protected instrument, and at the same time connect the line to ground, thus preventing the production of sparks at the contact-points and the vibratory movement of the armature, which are objectionable features in other instruments of this class.

As is well known to electricians, the production of a spark at the contact-points is a serious disadvantage, for the reason that besides burning the points, and thus rendering the instrument useless, it may be the cause of fires.

By supporting the core upon two angle-pieces of iron the instrument is rendered more compact, its construction is cheapened, and, moreover, the mass of iron near the poles causes the armature to respond with great promptness. I do not, however, limit myself to this manner of construction.

When the instrument is used at a terminal station, connection is made between the ground-post G and that one of the binding-posts F which is not connected to the line.

It is obvious that each of the coils D D may be in the form of a solenoid or suction coil, so that the armature at each end will enter the coil when attracted, and will then make contact with the central core connected to the earth.

In Figs. 6 and 7 I have shown the electrical connections in another form of instrument which embodies the principle of my invention. This is an ordinary electro-magnet whose armature-lever H is provided with a metallic spring, C, which, when the armature is attracted, makes contact with a contact-point, d,

connected with the line if at an intermediate station, and with the ground if at a terminal station. One terminal of the telephone is connected to this contact-point, and the other terminal of the telephone is connected through the armature to one end of the coil of the electro-magnet. The other end of the coil of the electro-magnet is connected to the line, and the core of the electro-magnet is connected to the earth.

When the current is normal, the telephone or other instrument to be protected is in the circuit; but when a current of abnormal strength comes on the line the armature-lever is attracted, and the spring C makes contact with the contact-point d, thus cutting out the telephone and connecting the line to ground through the armature and the core of the electro-magnet.

This invention is applicable to the protection of any form of electric instrument, such as fire-alarm apparatus, watch-clocks, telegraph-instruments, and time-systems.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A protector for electrical instruments, having the core of its electro-magnet connected to ground and its armature connected to a shunt containing the telephone or other instrument to be protected, substantially as and for the purpose set forth.

2. The combination of the core A, electrically connected to the ground, the coils D D, each connected to opposite sides of the line, and the armature-levers H H, connected, respectively, to one of the terminals of the telephone or other instrument to be protected, substantially as and for the purpose set forth.

3. The combination of the core A, coils D D, angle-irons B B, supporting the core, and ground-plate L, electrically connected to the angle-irons B B, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand to this specification before the two subscribing witnesses.

DAVID J. CARTWRIGHT.

Witnesses:

ALEX. L. HAYES,

JOHN W. CARTWRIGHT.