

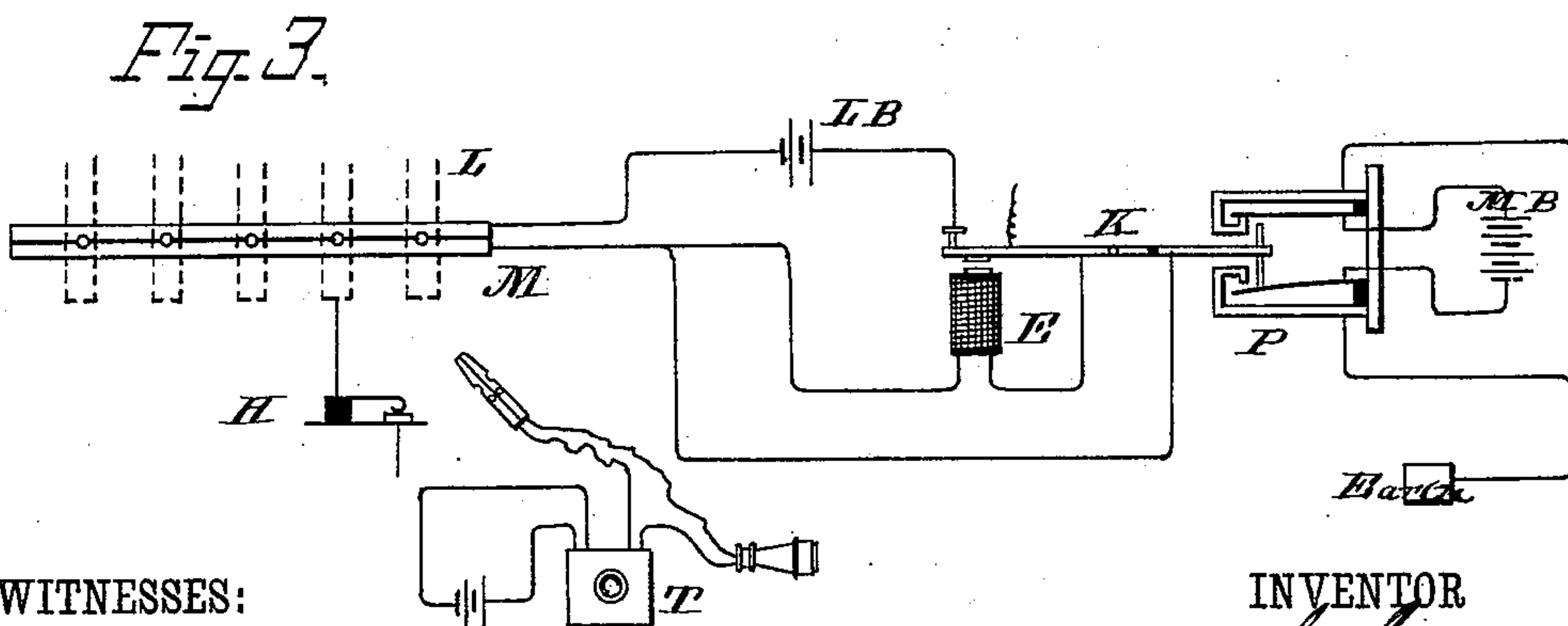
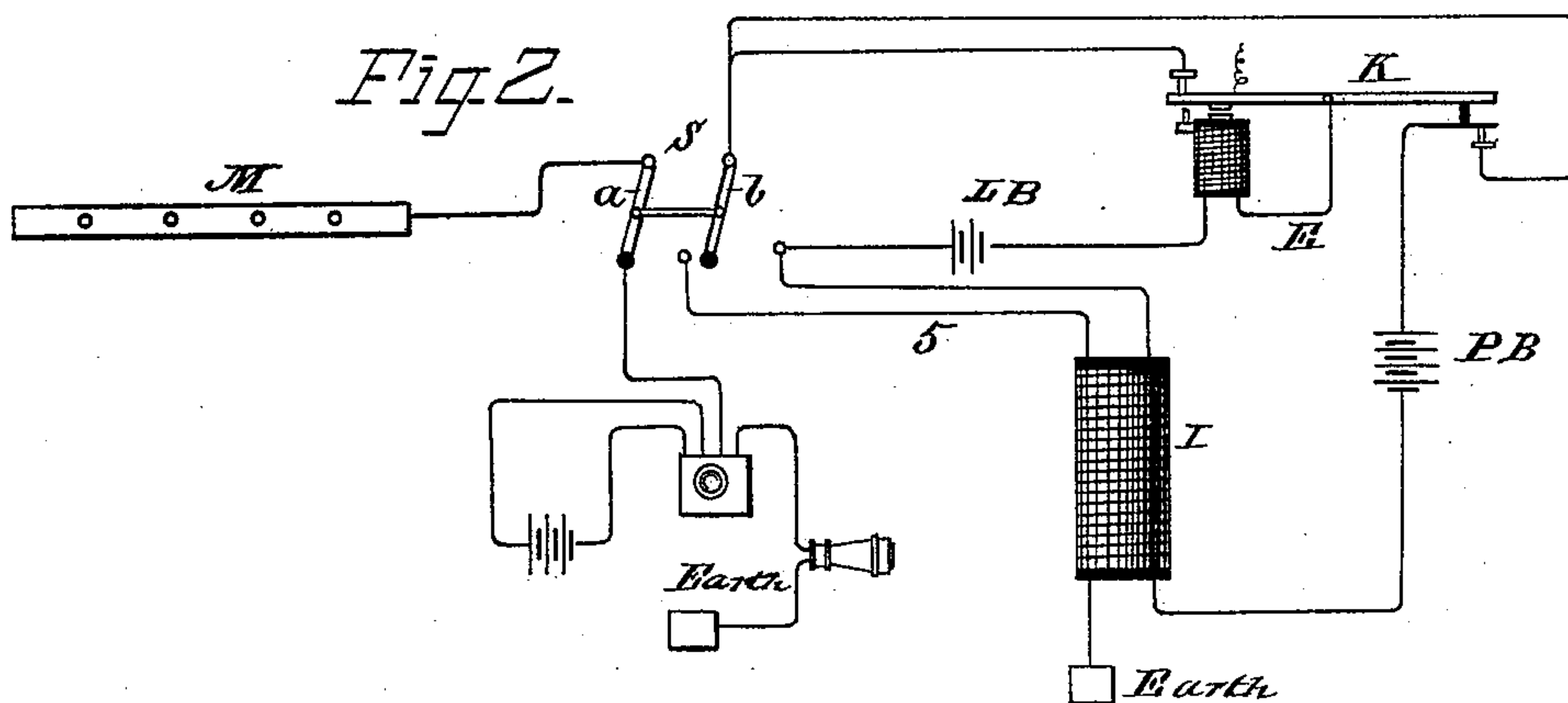
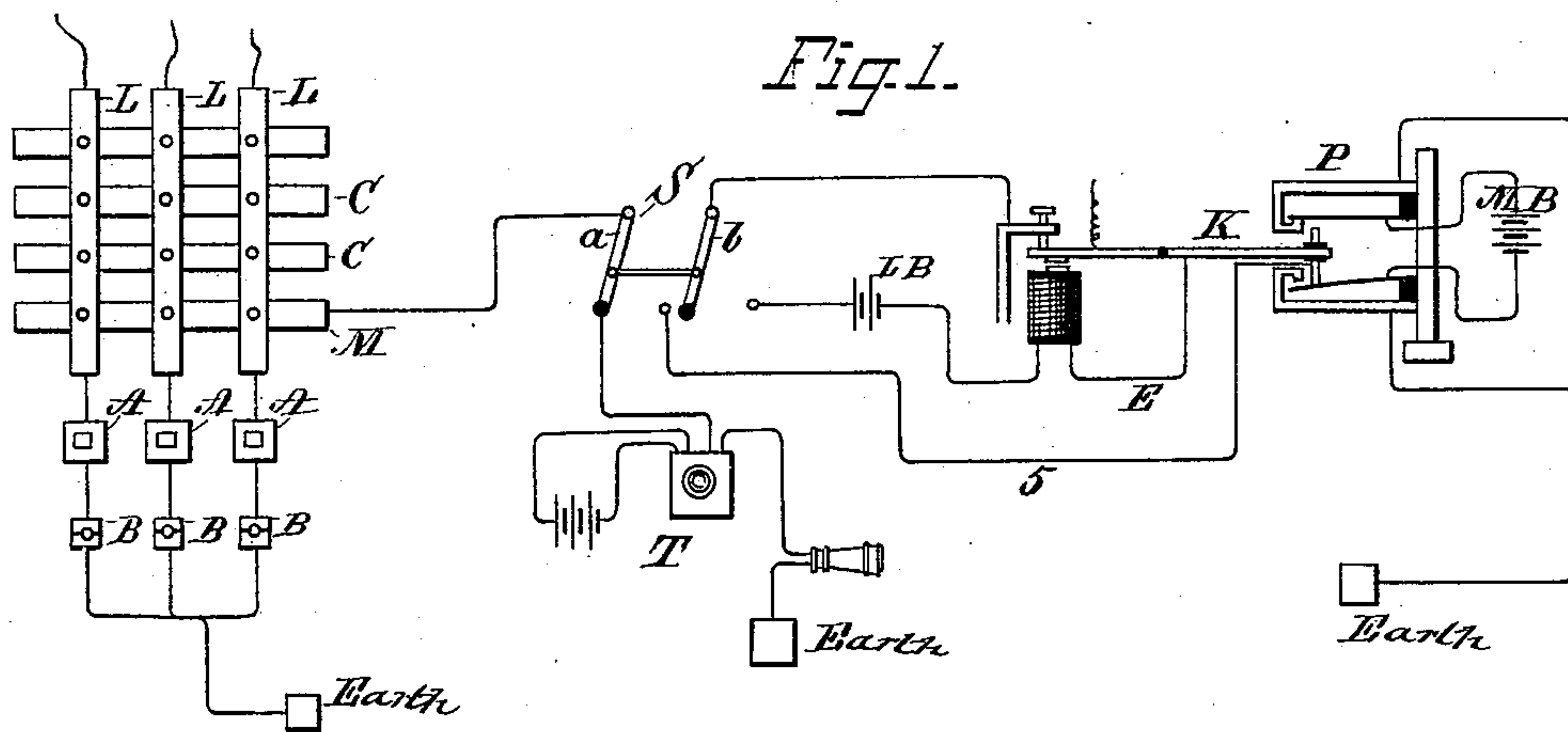
(No Model.)

J. G. SMITH.

SIGNALING APPARATUS FOR TELEPHONE EXCHANGES.

No. 258,681.

Patented May 30, 1882.



WITNESSES:

WITNESSES:
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SIGNALING APPARATUS FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 258,681, dated May 30, 1882.

Application filed March 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. SMITH, a citizen of the United States, and a resident of Hackensack, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Signaling Apparatus for Telephone-Exchanges, of which the following is a specification.

My invention relates to the apparatus used at a telephone-exchange central office for sending a signal or call to any one of the subscribers' or trunk lines centering in said office, and is more particularly designed as an improvement in that class of apparatus in which the signaling or calling currents consist of alternate reversed electric impulses or currents following one another in rapid succession, for the purpose of giving a vibrating signal at a subscriber's station by means of a polarized call-bell.

In the arrangements heretofore employed or proposed for producing such reversed impulses it has been usual to employ a pole-changing or circuit-reversing apparatus for reversing the polarity of the current coming from the signaling-battery, and to keep said apparatus in constant operation by the action of a local battery passing through a local electro magnet or magnets, the circuit to which is constantly and automatically made and broken in a well-known way, and where the reversals of line-current have been produced by the interruption, variations, or reversals of the primary current of an induction-coil. The action of the devices controlling the primary circuit has likewise been secured by means of a local electro-magnet and constantly-working local battery. In these plans, as well as in others employing a local battery and electro-magnetic devices for keeping the signaling apparatus in constant action, the local-battery force is expending itself whether the apparatus is in actual use for signaling purposes or not, and the consequence is a waste of battery material and a necessarily frequent renewal of the battery element, as well as a speedy destruction of the contacts by which the local-battery circuit is made and broken.

The aim of my invention is to remove these objections to the use of electro-magnets and local batteries for keeping the signaling appa-

ratus in operation, while at the same time the efficiency of the apparatus and the promptness with which it may be brought into use for giving a signal are not impaired.

My invention consists in the combination, with the switch devices by which the circuit between the signaling apparatus and the subscriber's line to be signaled is completed, of auxiliary devices, whereby the act of making the connection for the purpose of signaling will simultaneously complete the circuit of the local operating-battery, the circuit of said battery being broken by the act of disconnecting the signaling apparatus from the subscriber's line, and remaining broken until the apparatus is again brought into use.

Figure 1 is a diagram illustrating one arrangement of apparatus that may be employed for carrying out my invention. Fig. 2 is a diagram illustrating the application of the invention to signaling apparatus in which an induction-coil is employed for producing the alternate positive and negative impulses. Fig. 3 is a diagram illustrating another arrangement of devices that may be employed for carrying out my invention.

Referring to Fig. 1, L L L represent line-strips of a central-office switch-board; C C, line-connecting strips; M, a strip or connecting-plate, to which any line may be connected when a signal is to be sent to a subscriber's station; A A A, annunciators, and B B B plug-switches, through which the normal circuits of the lines are completed to ground, and which are constructed in the well-known manner, so that the removal of the plug for the purpose of connecting a line-strip to the strip M will break the normal circuit.

The diagram, so far as described, is merely typical of a central-office switch-board, and the particular arrangement shown is used only for the purposes of illustration.

S represents a switch constructed in two portions, *a* and *b*, insulated from one another, one of which, *a*, when in its normal position, completes the circuit between the strip M and telephone receiving and transmitting apparatus T, and when turned to the right makes connection with a wire, 5, leading to the contacts of a circuit-reverser, P, by which the poles of the main battery M B are changed in rapid

succession when the reverser is in action. This reverser is supposed to be of any ordinary construction, and consists, as here shown, of two hooks connected to ground, two springs insulated from and connected to the opposite poles of the main battery, and a pin or stud of conducting material in the end of vibrating lever K, and insulated therefrom, connected to wire 5, and adapted to press the springs back out of contact with their hooks alternately.

E represents an electro-magnet by means of which the lever K is kept in vibration so long as the current is allowed to flow from a local battery, L B, through the armature-lever and contact-stop for said lever, after the usual manner in automatic vibrators. In the present arrangement the circuit of said local battery is completed only when the switch S is thrown to the right for the purpose of making the connection between the line which is at the time connected to the strip M and the pole-changer P.

The device by which the local battery is called into action is the auxiliary switch-lever *b*, through which and a contact-point suitably placed the circuit of the local battery L B is completed when the lever *b* is thrown to the right. Lever *b* is connected mechanically to lever *a*, but insulated therefrom, so that in the act of throwing the switch *a* to connect a line to the pole-changer the switch *b* is simultaneously operated so as to close the circuit of the local battery and set the pole-changer into operation.

The manner in which the signaling apparatus is used is the same in its principal features as that of switch apparatus in which the local battery is in constant action, and need not be rehearsed in all its details. In the normal position of the switch the circuit from M to the pole-changer P is broken, as is ordinarily the case; but the circuit of the local battery L B is also broken and the pole-changing lever K is stationary. The circuit from M to the telephone apparatus T is closed, so that the central-office operator may, by simply plugging a line-strip to strip M, place himself in oral communication with the corresponding line. When the central-office operator desires to call a subscriber he connects that subscriber's line to M in the ordinary way, and by turning the switch S to the right connects the subscriber's line to the pole-changing apparatus P, thus simultaneously and by the same operation completing the circuit of the local battery L B, so as to set the pole-changer into operation. A series of reversed impulses then flow to line and cause the subscriber's bell to ring in the ordinary way. When the signal has been given the switch S is turned back to its normal position, thus throwing the local battery out of action.

In some pole-changing apparatus the vibrations of the pole-changing lever K are produced by two electro-magnets, into which the local-battery current is alternately admitted; but it is obvious that under such circumstances

no change is required in the arrangement of the switch devices, and that, as already described, it is only necessary to control the circuit of the local battery or batteries by the auxiliary switch.

It is obvious that many other constructions of switch may be employed in place of switch S for simultaneously completing the circuit of the local battery and closing the connection to the circuit-reverser.

It is also apparent that if the lever K were made to interrupt the circuit of the main battery M B, instead of reversing its poles, the principle of the invention would not be changed.

Switch apparatus that may take the place of the switch S will be described farther on in connection with Fig. 3.

In Fig. 2 I have illustrated the application of my invention to signaling apparatus in which the reversed signaling currents are produced by the interruptions, variations, or reversals of a current flowing through the primary circuit of an induction-coil. With signaling apparatus of this kind, when the interruptions, variations, or reversals of the primary current are produced by the vibrations of a lever kept in vibration by an electro magnet or magnets, two local batteries are ordinarily employed, one being the battery for the primary coil and the other the battery for the electro magnet or magnets. In some cases, however, the current from the battery for the operating electro-magnet is also caused to pass through the primary circuit. One local battery only is then required.

My invention is here shown as applied to the first-named arrangement, the auxiliary switch being made to control the circuit of both batteries, so that neither is in action excepting when connection is made between a subscriber's line and the secondary of the induction-coil.

P B represent the battery for the primary circuit of induction-coil I, one pole of which battery is connected, through the contact varying, interrupting, or reversing points of the vibrator K, with the auxiliary switch device *b*, while its other pole is connected, through the primary coil of the induction-coil, with the stud with which the lever *b* makes contact.

L B represent the local battery for electro-magnet E, connected in a similar manner to the auxiliary switch *b*. The wire leading from the point at which connection between strip M and the secondary coil of induction-coil is completed is indicated by the figure 5. As in Fig. 1, when the switch S is turned so as to connect M to the telephone apparatus and to disconnect it from the signaling apparatus, the circuit of local battery L B, as well as of P B, is broken, and said batteries are out of action. When a signal is to be given the switch is turned to the right, thus connecting the subscriber's line, which is plugged to M, to the secondary of the induction-coil, so that the reversed impulses produced therein will flow to line, and simultaneously completing the connections of both batteries L B and P B, so that

the lever K is caused to vibrate, and the current of P B is, by the device here shown, rapidly interrupted. When the switch is turned back to its normal position both batteries are
5 thrown out of action, and remain out of action until a signal is again to be sent to a subscriber's line.

In Fig. 3 the purposes of my invention are accomplished by a modified arrangement of
10 devices, acting, however, on the principle before described. Here the strip M is made in two pieces, insulated from one another by a central longitudinal air-space or strip of insulating material. The poles of the local bat-
15 tery for the vibrator electro-magnet K are connected one to one half and the other to the other half of said strip, so that when a plug is inserted for the purpose of making a connection between a line-strip, L, and the wire
20 leading to the reversed current apparatus said plug will connect the two halves of the strip, and thus complete the circuit of the local battery. One or the other side of the strip is
25 connected directly to the pole-changing apparatus, the secondary of the induction, or other device for setting up the reversed currents. When this device is employed the telephone apparatus T may be introduced into the
30 telephone-lines by spring-jacks, one of which is shown at H, or by any other suitable means. By this arrangement, as before, the act of connecting a subscriber's line to the signaling apparatus simultaneously and by the same operation completes the circuit of and calls into
35 action the local battery, by which the signaling apparatus is caused to perform its proper functions.

I do not limit myself to any particular construction of devices, the gist of my invention
40 consisting in so combining the switch devices and connections of the local battery or batteries and of the signaling apparatus that the act of connecting any subscriber's line to the

signaling apparatus will simultaneously complete the connections of the local battery by
45 which the signaling apparatus is operated.

It is obvious that my invention is applicable to other constructions of central-office switch besides that here indicated, as well as
50 to other constructions of signaling apparatus.

What I claim as my invention is broadly—

1. The combination, with a central-office switch, of devices for connecting a subscriber's line to the signaling apparatus and auxiliary
55 switch devices for completing the connection of the local battery by which the signaling apparatus is operated, combined as set forth, so that the act of connecting any line to the signaling apparatus simultaneously and by
60 the same operation completes the circuit of the local battery or batteries by which the signaling apparatus is controlled or operated.

2. The combination, with a central-office switch, of apparatus for producing reversed electric impulses, a local battery or batteries
65 and electro-magnet for operating said apparatus, a switch device for connecting any subscriber's line to the reversed current apparatus, and auxiliary switch devices for simultaneously and by the same operation complet-
70 ing the circuit of the local battery.

3. The combination, substantially as described, of a pole-changer, a local battery and operating electro-magnet for said pole-changer,
75 a switch for completing the circuit from said pole-changer to line, and auxiliary switch devices for completing simultaneously and by the same operation the circuit of the local battery and operating electro-magnet.

Signed at New York, in the county of New
80 York and State of New York, this 24th day of March, A. D. 1882.

JAMES G. SMITH.

Witnesses:

H. C. TOWNSEND,
THOMAS TOOMEY.