

(No Model.)

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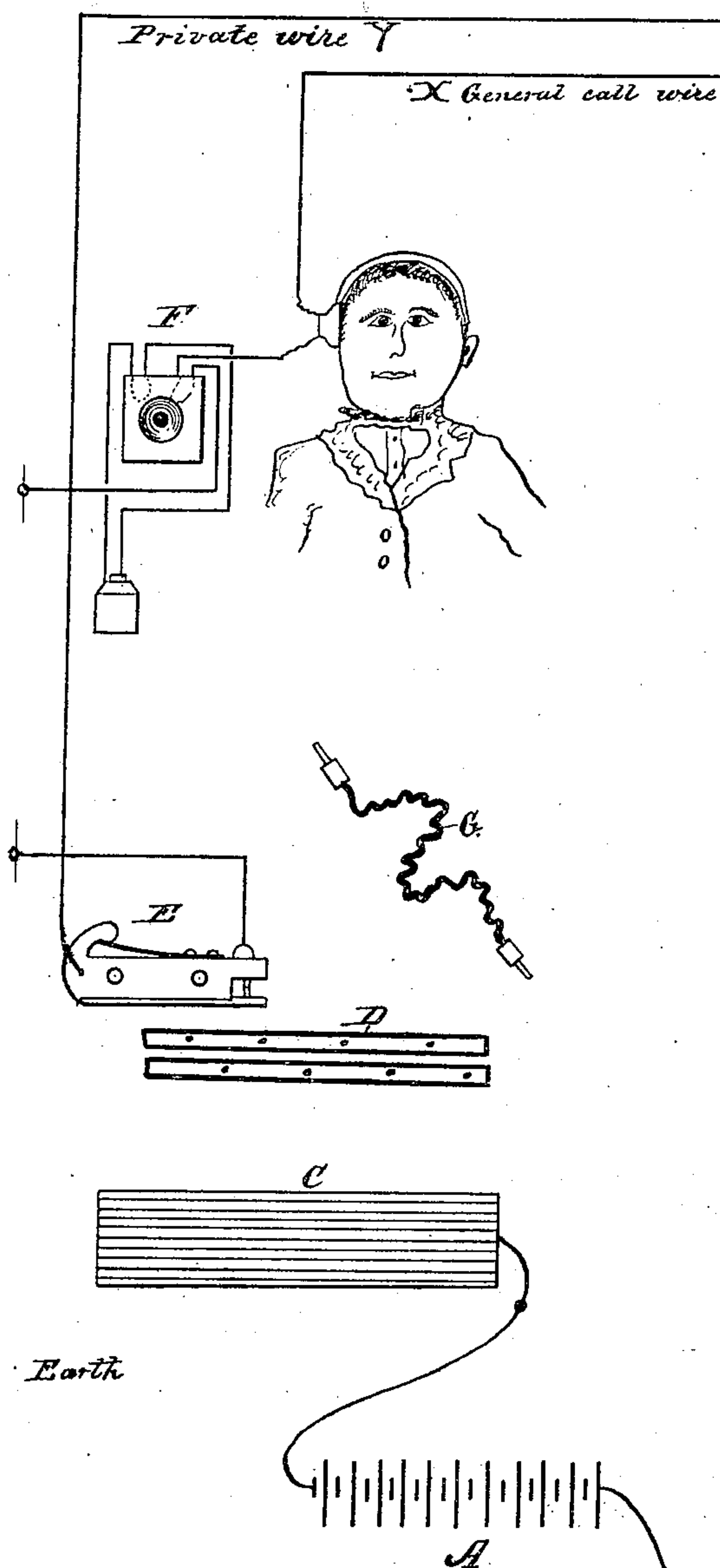
J. M. CROWLEY.

TELEPHONE EXCHANGE SYSTEM.

No. 245,454.

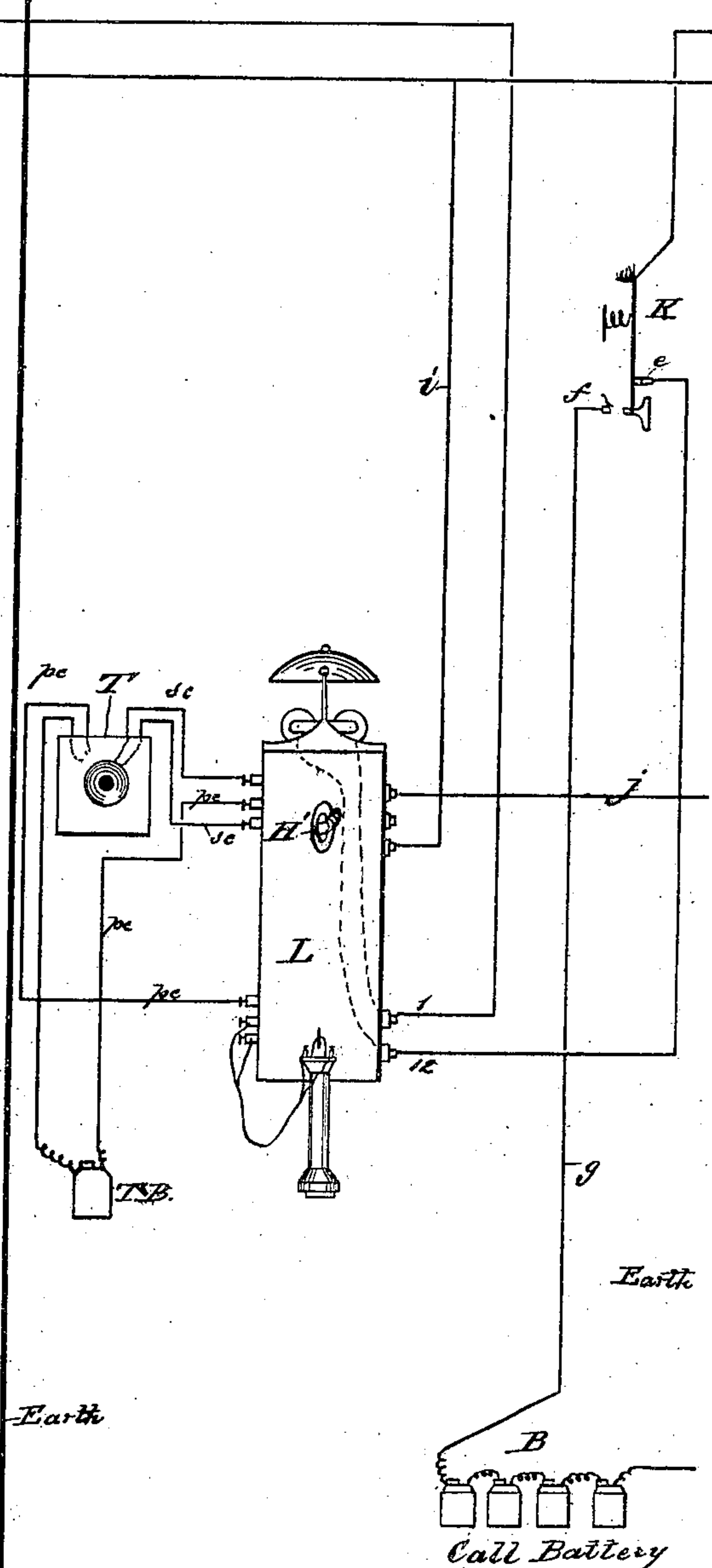
Patented Aug. 9, 1881.

Fig. 1.
Central Office



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Fig. 2.
First Station.



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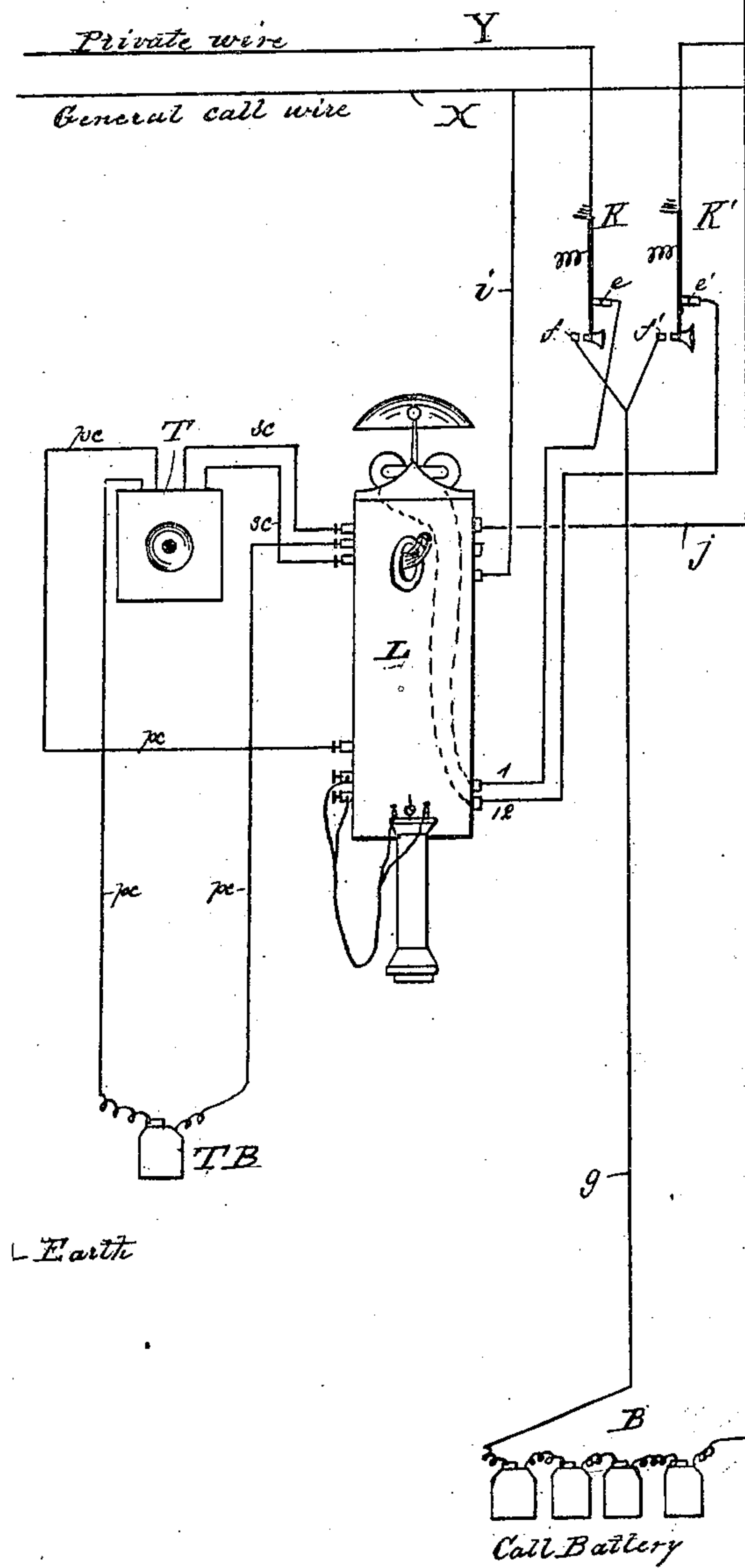
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Fig. 3.

Second Station

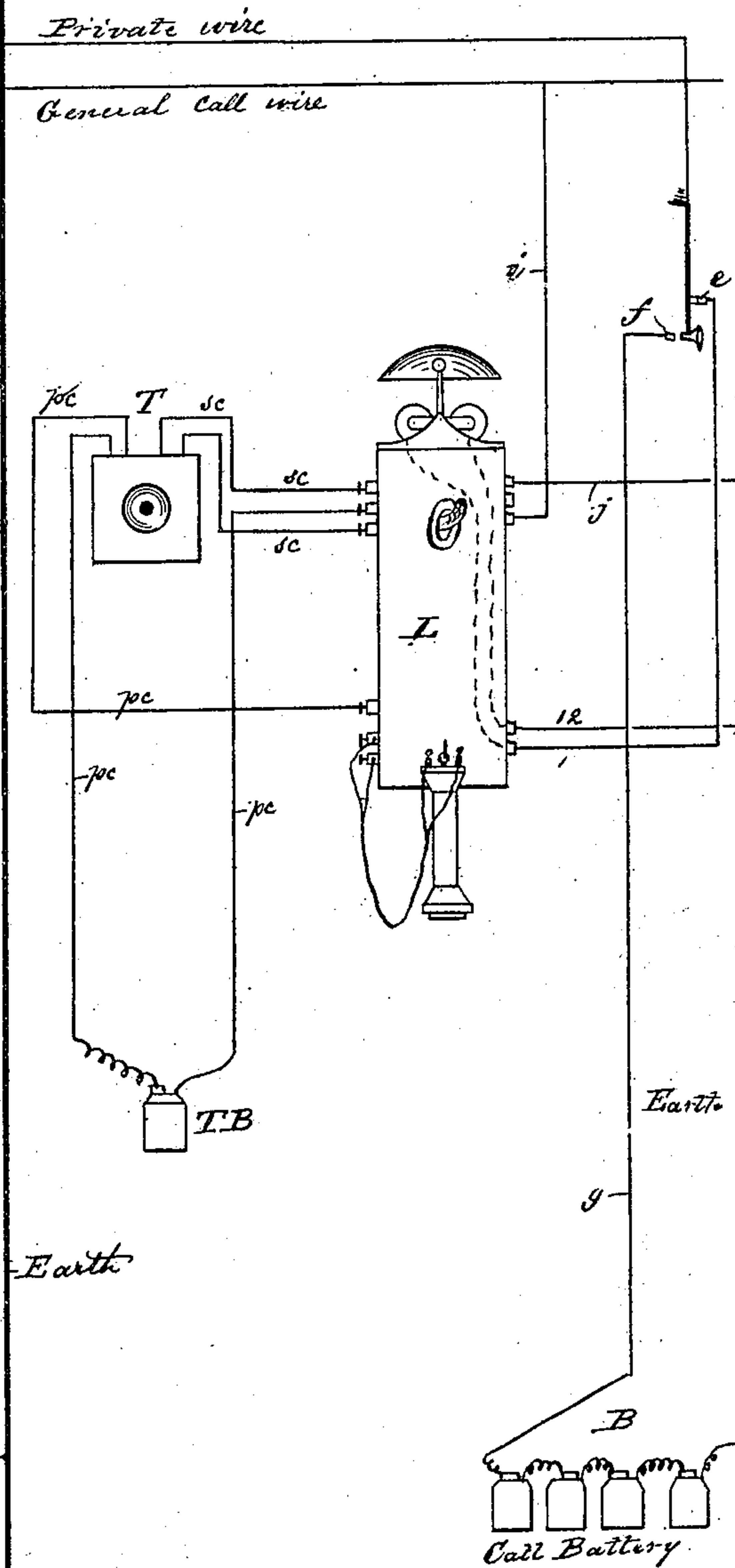


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Fig. 4.

Terminal Station.



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(No Model.)

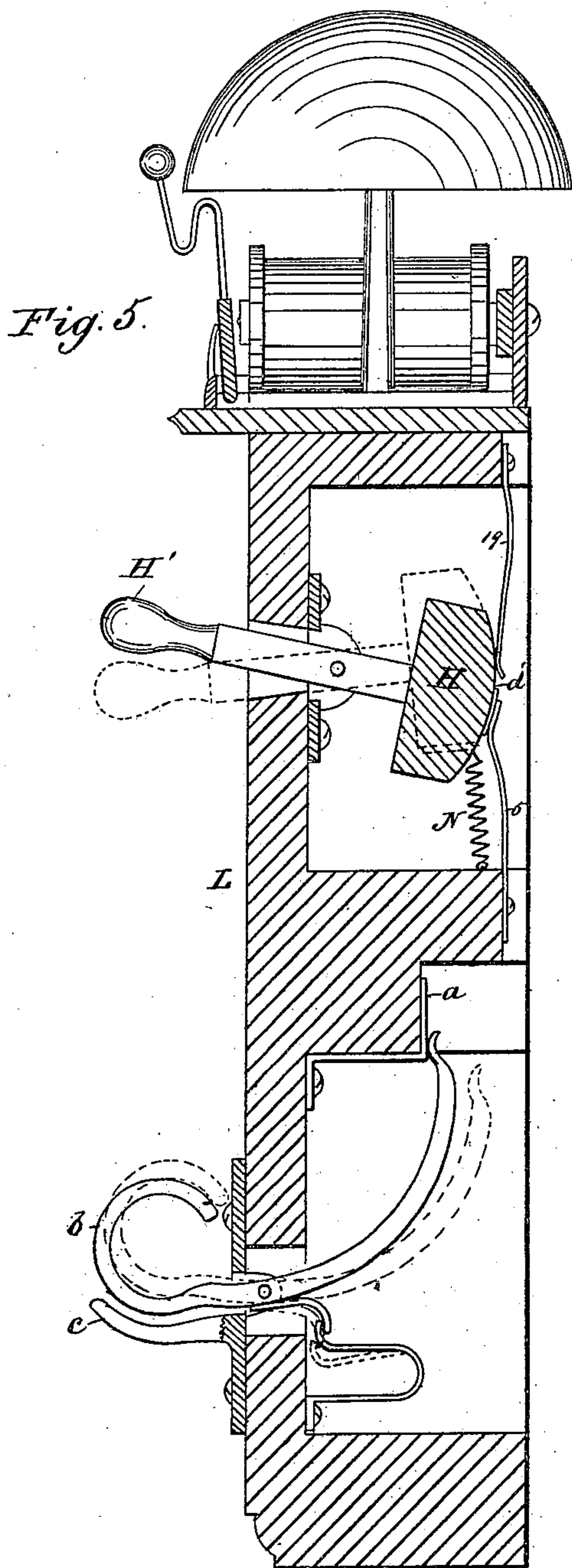
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4 Sheets—Sheet 4.

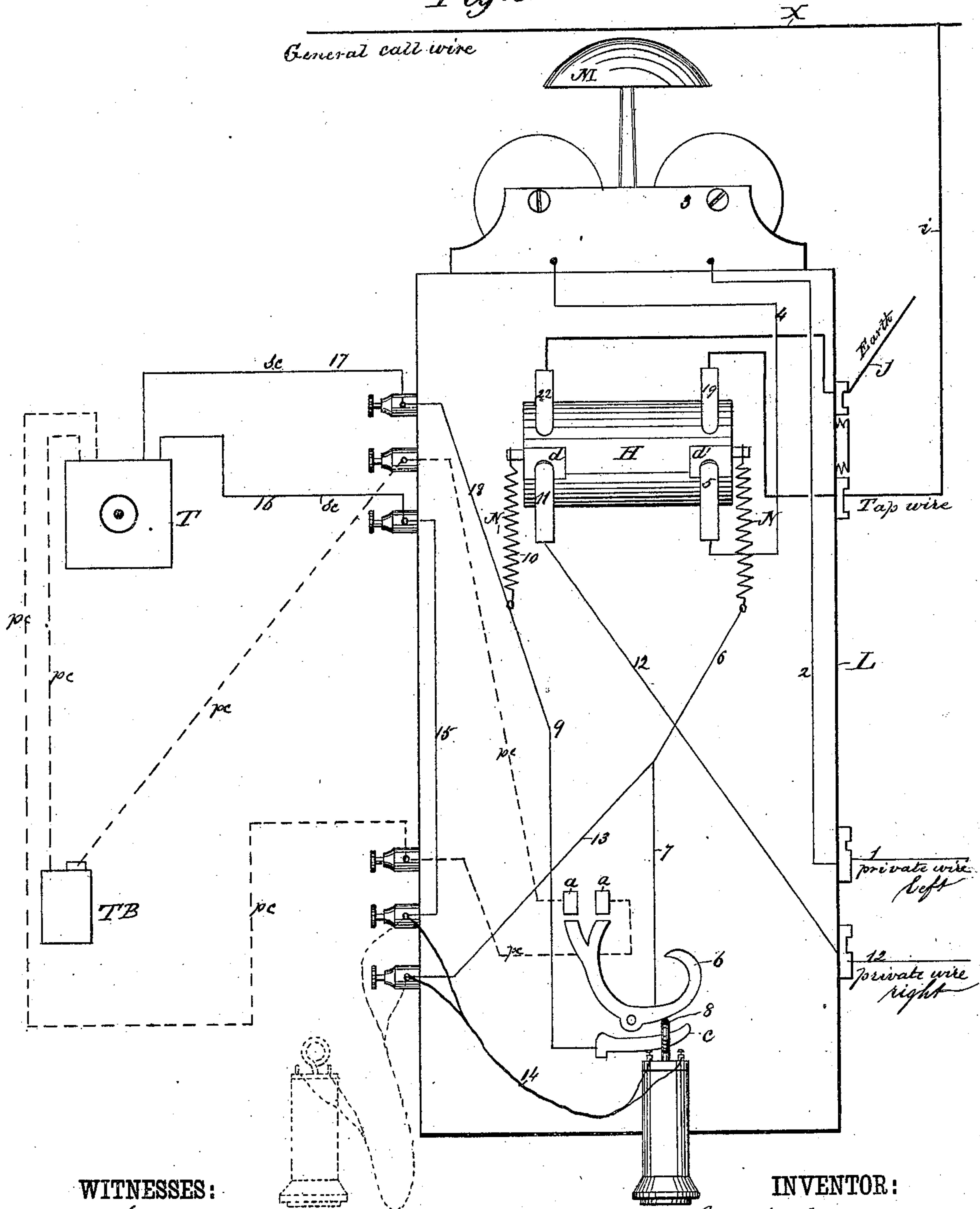
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Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN M. CROWLEY, OF AUGUSTA, GEORGIA.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 245,454, dated August 9, 1881.

Application filed March 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CROWLEY, of Augusta, in the county of Richmond and State of Georgia, have invented a new and Improved Telephone-Exchange System; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is, first, to enable all circuit-wire subscribers to avail themselves of the superior facilities of the "Law" system as relates to the quick and always ready communication with the central-office operator, and at the same time lose none of the advantages of a circuit-wire; secondly, to enable telephonic companies owning the right to use the Law system to utilize the Law bells (with a slight alteration) for circuit as well as for single wires, thereby relieving them of the absolute necessity of using electro-magneto call-bells, or similar special calling apparatus, on the one hand, or incurring, on the other hand, the expense of constructing independent private wires for each and every subscriber, or independent-call wires for certain circuit-stations. A further object is to secure uniformity of apparatus in general.

To these ends my invention contemplates the location of several subscribers on the same private wire running in from the left and out at the right and on to the terminal station, and thence to the ground. The general central office call or tap wire is also connected, as usual, with the Law system at these stations to communicate with the central office, and a separate call-battery (which is only used for calling) is located at each subscriber's station, to call each other on the same circuit with themselves.

My invention consists in the combination of these circuits with the Law bell instrument, and in the application of a three-point back and front contact-key in connection with the call-battery at each station, and the private wire, which key and battery enable the subscriber at his home station to call his neighbor or neighbors on the same private circuit with facility at will and without the aid of the central-office operator; also permitting any individual subscriber on the circuit-wire to use the general tap-wire for communication to or

from the central office, as is done by single-wire subscribers, all as hereinafter more fully described.

Figures 1 to 4 represent several stations, arranged in accordance with my invention, in which Fig. 1 represents the central office, Fig. 2 a first station, Fig. 3 an intermediate station, and Fig. 4 a terminal station, all on a private-circuit wire. Each of the stations, Figs. 2, 3, and 4 are provided with a Blake transmitter, T, and a Law call-bell, L, arranged as hereinafter described. Fig. 5 is an enlarged vertical section of the Law bell instrument; and Fig. 6 is an inside diagram view of the same, showing the arrangement of the circuits therein.

In the drawings, X is the general-call wire, which extends over all the private lines, and is tapped at *i* into each one of the instruments of every subscriber on all the private lines. This general call-wire is connected with a listening operator's telephone at the central office, and also passes through the transmitter at said point, and thence to the ground. The tap-wire *i* of the general-call circuit, after entering the bell of each subscriber, has a special or contingent outlet, *j*, to the earth, the heavy vertical margin-lines, which divide off the stations, representing the earth-connections. Y is the private-line wire. This runs into each one of the subscriber's instruments at 1 and out at 12, passing through the normally closed contacts *e e'* of the back-and-forth contact-keys K, and after traversing the instrument at the terminal station passes to the ground. This private wire Y at the central office connects with a spring-jack, E, which has a ground-connection that may be broken at will by an elastic coupling, G, connecting with a battery-plate, C, and battery A, by tapping upon which plate C by the end of the connection G the central office may call any one on the private line.

B is a special-call battery for each subscriber, which has one earth-connection and a wire, *g*, leading to a contact, *f*, in front of the normally closed contacts *e*, or on the opposite side of the three-point key K. This battery B has a normally broken circuit, and is only used for calling, and when thus required the key K is pressed forward to contact *f*, which makes a break at *e* in the private line, and closes the battery B through the private line to one side or the

other of this subscriber, but not on both sides. Thus, at the first private-line station, Fig. 2, the closing of key K on *f* calls all of the subscribers on the private line on the right. At this station but one key K is required, for the reason that this subscriber does not require a bell to call central office, because the telephone at central office, being on the listening operator's head, said subscriber can at once talk to central office through his transmitter. At the second private-line station, Fig. 3, (and other intermediate stations,) two keys, K K', are required. By closing key K on contact *f* the call-battery B of that station is closed through wire *g* to the left, ringing the bells on the left to the ground-connection of the central office, but not on the right, because battery B of the second station is disconnected at *f'* and makes a circuit only through the half of the private-line circuit to the left. To call any of his neighbors on the right at this second or intermediate station, key K' is closed on contact *f'*, which throws the battery B of that station onto the right-hand section of the private wire, leaving connection for the left-hand portion broken at *f*. The result is that this will cause the bells of his neighbor or neighbors on the right to ring, but will not disturb the bells of the neighbors on the left. The terminal station, Fig. 4, is provided, like the first station, with only one key for calling in one direction.

Each station is, as before stated, equipped with a Blake transmitter, T, and a Law bell, L. Each transmitter is provided with a talking-battery, T B, of a constant character, and the wire *p c* from which battery passes through the transmitter and constitutes the primary circuit. The secondary circuit *s c* passes from the transmitter into the instrument L and then traverses the line.

I will now proceed to describe how the primary circuit *p c* and the secondary circuit *s c* are controlled within the Law bell-instrument.

Referring to Figs. 5 and 6, which represent, in enlarged views, the structure of the instrument L and arrangement of circuits within the same, H is a movable head or abutment, bearing two metal contacts, *d d'*, which may be thrown into electrical connection with the two corresponding contact-plates 22 and 19 above or the two corresponding electrical contacts 11 and 5, below. The two contacts 22 and 19 belong to the general call or tap wire, and connect respectively with the earth and the line, while the two contacts 11 and 5 belong to the private line and connect with other wires within the instrument. The abutment H has a lever-handle, H', projecting through a hole in the front of the case, which lever is normally held up with the contacts *d d'* down upon plates 11 and 5 by the agency of springs N, but which lever may be pulled down at will to bring contacts *d d'* upon plates 22 and 19, and thus throw the instrument off the private line and onto the general call or tap wire.

In the lower part of the instrument is a pivoted hook, *b*, and a stationary hook, *c*, which

are made to constitute two terminals of the circuit-wire, so that when the telephone-ring is placed between the sections *b* and *c* the electric circuit is closed through 7 and 9, and the magnet of the telephone is cut out of circuit to avoid unnecessary resistance to the line. When, however, the telephone is out and in operative condition the circuit is shunted through wires 13 and 15, and made to pass through the telephone to permit the message to be received.

In order to prevent the elements of the talking-battery T B from being uselessly consumed when the telephone is hung up, the circuit of this talking-battery is arranged to be broken by the act of hanging up the telephone on its hook. This simultaneous breaking of the circuit of the talking-battery and cutting out of the telephone-magnets by the act of hanging up the telephone I do not claim as new. For this purpose, however, I introduce two plates, *a a*, within the instrument, which constitute the poles of the talking-battery, and when these poles are electrically connected the talking-battery is operative, and when they are disconnected the battery is inoperative. This connection and disconnection I cause to be made by the end of the pivoted hook *b*, thus when the telephone is hung up the hook *b* is tilted and the poles *a a* are disconnected, and when the telephone is out and operative the poles *a a* are connected by the tilting of hook *b*.

In order that the working of the instrument may be more clearly understood, I will now proceed to describe the circuits for the different positions of the instruments.

We will suppose the instrument to occupy the position shown in Fig. 6, which is the normal position for communication between subscribers on the private line. The current from the call-battery of the party wishing to communicate comes in at 1, passes up 2 to the bell, gives the call, and passes thence through 4, 5, *d'*, 6, 7, *b*, 8, *c*, 9, 10, *d*, 11, and 12, along the line to the ground, and thence to the call-battery which generated it, the telephone of this instrument being out of the circuit, and this talking-battery inoperative. This subscriber then takes down his telephone, which act establishes the circuit of his talking-battery by closing the poles *a a* and at the same time breaks the connection between 7 and 9, which causes the current to be shunted through 13 to the telephone, as shown in dotted lines, and thence to 15. This subscriber's instrument is now in operative condition to hear and talk from the action of his talking-battery, and the call-battery of the other party is no longer required, and is inoperative. The primary current then passes, as shown by the dotted lines, while the secondary circuit *s c* traverses the lines to the ground, passing in the instrument from 1 to 2, to 3, through the bell-magnets, down 4 to 5, *d'*, 6, 13, 14, to telephone, 15 to 16, through transmitter 17, 18, 10, *d*, 11, 12, private line to one ground-connection, and back to other ground-connection, to wire 1 again.

This is the action as between subscribers on the private line. If it is desired to communicate with the central office, the subscriber pulls down his lever H', which act throws the metal plates *d d'* out of contact with 11 and 5, and in contact with 22 and 19. The result is that the whole instrument is put upon the general call-line, and communication with the central office may be had in the same manner as just described.

The principal advantages of my invention are to be found, first, in the fact that subscribers on a private line may call and communicate with each other without the delay and embarrassment of calling the central office and waiting for the line to be free; and, secondly, in the great reduction of the number of bell-rings, which to many is a great source of annoyance. Furthermore, as the call-battery is only used momentarily for calling, no considerable consumption of battery material is involved, which might otherwise be an objection to the use of so many batteries.

Having thus described my invention, what I claim as new is—

1. The combination of a general-call circuit, a special or private-line circuit, a special-call battery for each subscriber, and one or more back and front contact-keys, arranged in the private-line circuit and adapted to simultaneously break the private-line circuit and connect the call-battery by the same movement, substantially as shown and described.

2. The combination of a general-call circuit, a private-line circuit, a special-call battery for each subscriber, one or more back and front contact-keys, arranged in the private-line circuit and adapted to simultaneously break the private-line circuit and connect the call-battery, and an instrument, L, constructed substantially as described, and having a set of contact-faces for the general-call line, a separate set of contact faces for the private line, and means for using them interchangeably, as described.

JOHN M. CROWLEY.

Witnesses:

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