(No Model.)

J. J. O'CONNELL.

SIGNAL APPARATUS FOR TELEPHONE SYSTEMS.

No. 509,484. Patented Nov. 28, 1893.

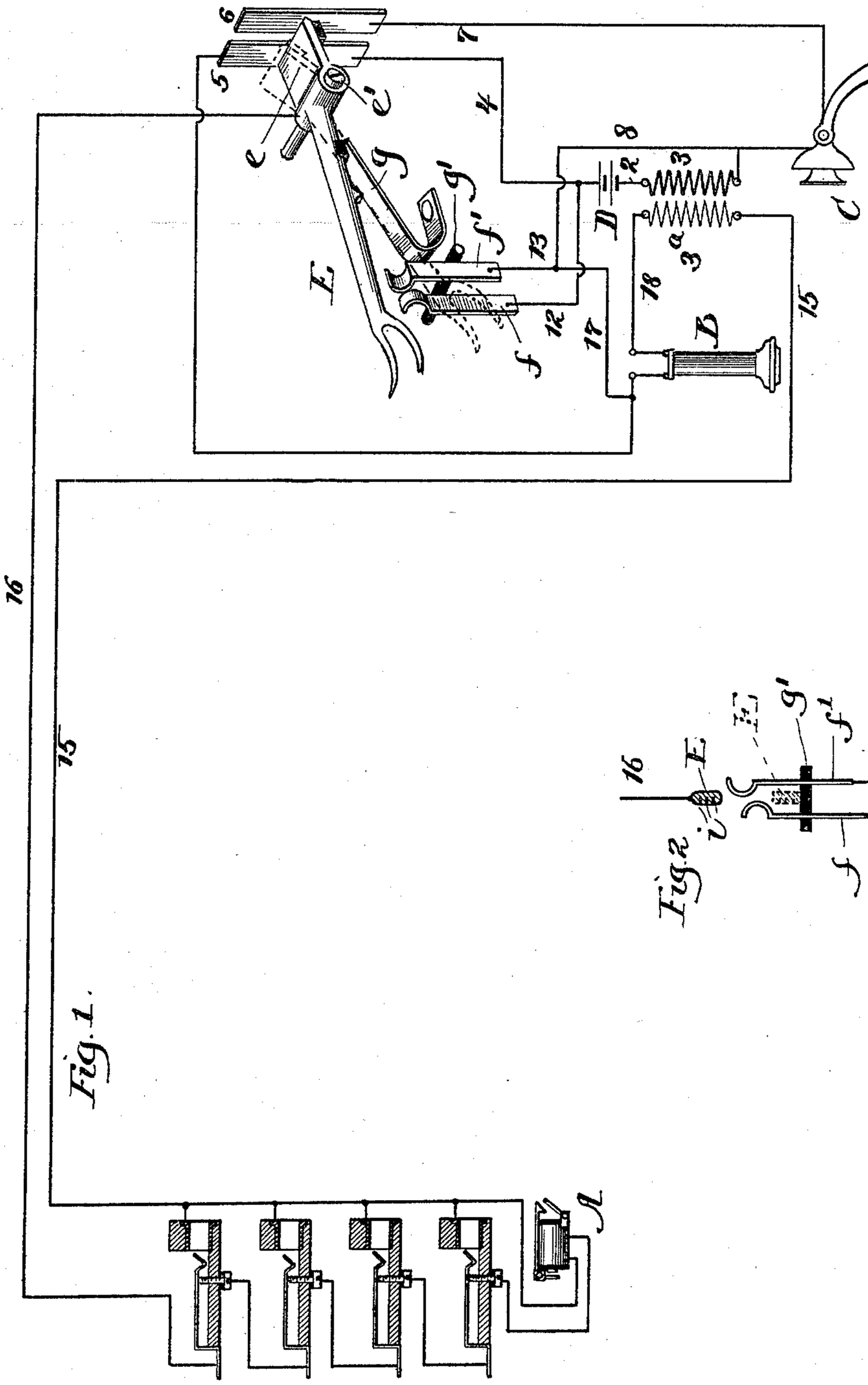

Fig. 1.

Fig. 2.

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SIGNAL APPARATUS FOR TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 509,484, dated November 28, 1893.

Application filed April 17, 1893. Serial No. 470,600. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. O'CONNELL, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Signal Apparatus for Telephone Systems, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The purpose of the present invention is to dispense with the generator now commonly employed in connection with telephones at subscribers' stations for the purpose of operating a signal at the exchange office. This object I accomplish by providing suitable means for so making and breaking the local circuit of the transmitter battery at the subscriber's telephone that the induced current over the telephone line shall operate the signal at the exchange office. I am aware that it is not new to effect the transmission of signals by means of inductive coils, and I am also aware that the transmission of signals from a telephone generator has been effected by the removal and replacement of the telephone upon its lever or hook; but so far as I am aware, it has never before been proposed to utilize the induction coil of a telephone for transmitting the desired signal, while at the same time controlling the operation of such induction coil for such signal purpose by making and breaking the local circuit of the transmitter battery.

Figure 1 is a diagrammatic view showing the central office connected up with the subscriber's station and displaying in detail the structure and relation of the circuit parts at the subscriber's end. Fig. 2 is a detail of the spring contact plates with a modified form supporting lever in cross section.

The drawings illustrate by diagrammatic view, a subscriber's station, the multiple switch-board at an exchange office, and the line connecting the same.

A designates an annunciator at the exchange office. This annunciator may serve the purpose of either a "calling drop" or a "clearing-out drop" or, as is frequently the case, may be used for both purposes.

B denotes the telephone and C is the transmitter at the subscriber's station. The transmitter C is placed in circuit of the local transmitter battery D, this battery being connected by a wire 2 with the primary 3 of the induction coil. A wire 4 leads from the battery D to a terminal plate 5 and from a companion terminal plate 6, a wire 7 leads to the transmitter C, a wire 8 connecting the transmitter with the primary coil 3. The local circuit of battery D through the transmitter C and over wires 4, 7 and 8 is normally open at the terminals 5 and 6 but will be closed when the telephone B is removed from its lever or hook E, as the rear end of this lever E is provided with an extension *e* which will bridge the terminals 5 and 6 and thus close the local circuit at such point. The lever E is pivoted as at *e'* and is forced upward by a suitable spring 9 when the telephone is removed from the free end of the lever. Adjacent the free end of the lever are placed the spring plates *f* and *f'*, the plate *f* being connected by a wire 12 with battery D, and the plate *f'* being connected by a wire 13 with the wire 8 of the local battery circuit. The plates *f* and *f'* are normally apart a sufficient distance to prevent passage of current at such point, but as the lever E passes between the upper curved ends of these plates it will momentarily complete the circuit at such point as will presently more fully appear.

The stop *g'* limits the downward movement of the lever or hook E, which will rest upon the stop when the telephone is upon the lever or hook.

From the foregoing description it will be seen that when the lever or hook E has the telephone hung thereon and is against the stop *g'*, the local circuit of the battery D will be broken at the terminals 5 and 6, and the circuit over wires 12 and 13 and through plates *f* and *f'* will also be broken at such plates. As soon, however, as the subscriber removes the telephone B from the hook or lever E, the spring 9 will force upward the lever thereby causing it for an instant to establish contact

between the plates *f* and *f'* as the lever passes between the curved ends of such plates. During the instant that contact is thus established between the plates *f* and *f'*, the local circuit of the battery D will be completed through the primary coil 3 over wire 8 to wire 13, to contact plate *f'*, through lever E, to contact plate *f* and by wire 12 to battery. The passage of current over the local circuit and through the primary 3 of the induction coil will induce current in the secondary 3ª of the induction coil, and this induced current will pass by wire 15 to the annunciator A at the exchange office, thence returning by wire 16 to the hook or lever E, thence to contact plate *f'* and by wire 17 to wire 18 that connects with the secondary 3ª of the induction coil. The annunciator A will thus be caused to indicate to the operator at the exchange office that the desired connection is to be made. As soon as the hook or lever has passed upward between the contact plates *f* and *f'*, the extension *e* at the rear end of this hook or lever will bear against and establish contact between the terminal plates 5 and 6, thereby completing the local circuit of the battery D over wires 4, 7 and 8, through transmitter C and through terminals 5 and 6. The closing of the local circuit of the battery D will induce current in the secondary 3ª of the induction coil, and this current will pass from the secondary 3ª by wire 15 to the spring-jack S of the multiple switch-board at the exchange office, and from such spring-jack by the wire 16 to the lever E and thence by extension *e* and contact terminal 5 to the wire 18 in which the telephone B is interposed. When the subscriber, having finished conversation, replaces the telephone B upon the hook or lever E, it will be drawn down against the force of the spring 9 thereby forcing the hook or lever between the contact plates *f* and *f'* until it bears against the stop *g*. As the hook E is thus drawn downward, the extension *e* at the rear end of this hook will open the local transmitter circuit at the terminals 5 and 6 and will then close the local circuit by passing between the upper ends of the spring plates *f* and *f'*. During the instant that the hook E in its downward movement is between the upper ends of the plates *f* and *f'*, and the local circuit from battery D is closed at such point, an induced current will pass from the secondary 3ª of the induction coil, by wire 15 to the annunciator A and from such annunciator by wire 16, to hook E, spring plates *f'*, wire 17, through telephone B and wire 18 to coil 3ª. The exchange operator will thus be notified that the subscriber has finished the conversation.

Some insulating strips *i* (Fig. 2) may be set in kerfs of lever E at its point of contact with one of the spring-plates *f f'* thus causing a rapid make and break of the local battery circuit during the shift of the lever E past the plates. By such provision the secondary impulses are multiplied and the signaling of central office more certainly assured.

Obviously, the detail of structure can be varied according to the skill of the mechanic, without departing from the spirit of the invention.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A telephone system comprising a signal, a telephone connected therewith, a transmitter, an induction coil therefor, and a battery in a local circuit, and suitable means actuated by the removal and replacement of the telephone for making and breaking the local battery circuit through the primary helix of said induction coil, in such manner as to produce an induced current adapted to operate the signal, substantially as described.

2. A telephone system comprising a signal, a telephone connected therewith, a transmitter, an induction coil therefor, and a battery in a local circuit, a telephone hook switch and suitable means whereby said hook switch is caused to make and break the local transmitter circuit in order to produce an induced current adapted to operate the signal, substantially as described.

3. A telephone system comprising a signal, a telephone connected therewith, a transmitter, an induction coil and a battery in a local circuit, a telephone hook or support, terminals for said local circuit in position to be closed by said hook when the telephone is removed therefrom and supplemental terminals connected with said local circuit and arranged in position to be momentarily closed by the hook when it is shifted, substantially as described.

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