

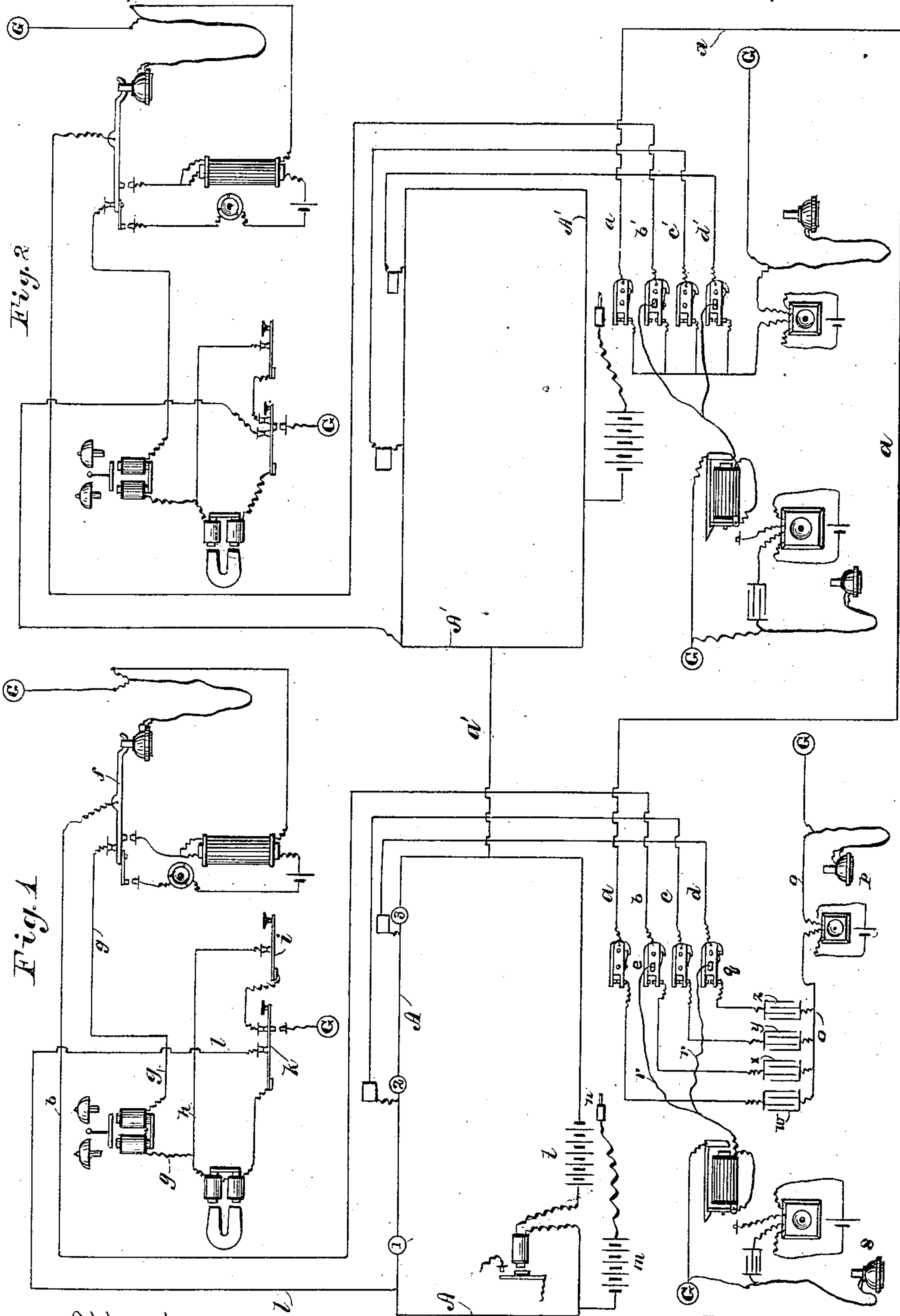
(No Model.)

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SIGNALING CIRCUIT FOR TELEPHONE EXCHANGES.

No. 333,167.

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# UNITED STATES PATENT OFFICE.

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## SIGNALING-CIRCUIT FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 333,167, dated December 29, 1885.

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*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Signaling-Circuits for Telephone-Exchanges, (Case 15,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention is an improved system of circuits for signaling between the terminal stations and the central office.

In the systems now in common use a subscriber signals the central office first to indicate that he wishes to communicate some order, and then the attendant switchman connects the subscriber's telephone-line with the telephone of the listening operator, who receives the subscriber's particular order and informs the switchman thereof. By the use of my system the preliminary call to gain the attention of the central office is dispensed with, and a subscriber is enabled to communicate his particular order immediately on taking his hand-telephone from the switch.

In the drawings, Figure 1 shows my system of circuits in connection with the American District Telegraph. In Fig. 2 my system is shown independent of the American district system.

A, Fig. 1, is a common return-wire which passes through American district call-boxes 1, 2, and 3, a single box being placed at each subscriber's office or anywhere in the circuit. A', Fig. 2, is a common return-wire, which in like manner passes through a group of terminal stations of subscribers. No American district boxes are shown. They may be used or not, as heretofore, for signaling, but are of no use in connection with my telephone-signaling circuits as such.

By the use of condensers (shown in Fig. 1 and hereinafter more particularly described) the common return-wire may be used for telephone and American district purposes at the same time.

$a$  is a trunk-line connecting the central office of two exchanges.

$a'$  is a line connecting the return-wires A and A' of the two exchanges.

$b\ c\ d$  and  $b'\ c'\ d'$  are individual telephone-lines.

The outfits of subscribers connected with lines  $b$  and  $b'$  are shown in detail.

It will be seen that subscribers connected with the system shown in Fig. 1 may be connected with those of the system in Fig. 2.

I will now describe in detail the system shown in Fig. 1. Beginning at the central office and tracing the circuit from the cut-out or connecting plate on the switch-board to the subscriber's office, the wire  $b$  is found connected to the lever  $f$  of the automatic switch, which is normally in position shown when the telephone-receiver is hung upon the hook. We trace the circuit from the lever of the switch through the points shown in contact by the line  $g$  through the call-bell, thence to a branch wire,  $h$ , and the key  $i$  to the key  $k$ , and thence by line  $l$  to the common return-wire A, and thence to battery  $m$  at central office. Now, suppose that the central office wishes to call the subscriber connected by line  $b$ . The signal is made by inserting plug  $n$  in the connecting-plate  $e$  of line  $b$ . The battery  $m$  thus has its circuit completed through the individual wire  $b$  to the call-bell of the subscriber and through the common return-wire A, thus ringing the call-bell. The subscriber connected by wire  $b$  communicates with the central office through his telephone-receiver, which he must remove from the lever  $f$ , thus changing the circuit of the individual wire  $b$  from the call-bell to his induction-coil, transmitter, and receiving-telephones, and thence to ground in the usual manner. The battery-plug  $n$  having been removed from connecting-plate  $e$ , the circuit of wire  $b$  is completed through said plate to the wire  $o$ , leading to the listening operator's telephone  $p$ , and to ground. Thus the subscriber is enabled to speak directly to the operator at the listening operator's telephone  $p$ , and thus communicate his wants. Let us suppose that the subscriber connected with the line  $b$  wishes to communicate with the subscriber connected with wire  $d$ . He first removes his receiving-telephone from the lever  $f$  and



speaks directly to the operator at the listening-telephone *p*, giving the name of the party with whom he wishes to communicate, in this case the one connected with line *d*. The listening operator repeats his order to a switchman, who calls up the desired subscriber by inserting the plug *n* in plate *q*, thus ringing the bell at subscriber's office. He then connects the lines *b* and *d* together by means of a connecting-cord, *rr*. The connecting-cord *rr* is branched through an annunciator-magnet, its shutter, and armature to ground, so that when the subscribers have finished their conversation either can signal a disconnection by means of the magneto-box or local battery at either of their stations. This annunciator-magnet, connected with the cord *rr*, will thus drop the shutter and disconnect the ground-connection from the magnet, and through the changing of the position of the shutter will connect the individual wires through a clearing-out operator's telephone, *s*, and thus bring both of the subscribers connected by cord *rr* into communication with the clearing-out operator through the medium of the telephone *s*.

I have shown in the circuit of the common return-wire *A* American district call-boxes 1, 2, and 3, and at the central office a battery, *t*, is in the circuit of a relay. The relay is in practice arranged to operate as a register by means of local connections, and a signal made at either of the boxes 1, 2, and 3 is thus recorded at the register.

When American district boxes are used in connection with my system, I place condensers *w*, *x*, *y*, and *z* at the central office, as shown. Each condenser is connected with the line, so as to leave the circuit of the individual wire open to battery-circuits, but closed to vibrating currents—such as currents induced by the voice. Thus the boxes 1, 2, and 3 are not short-circuited, as they would be in case the individual wires were connected directly to the wire *x*.

Heretofore the subscriber's individual lines have been grouped together and each group connected by a common line through the listening operator's telephone to ground. The several lines of a group were connected at their terminal stations through a call-bell and to ground. It is evident that only a limited number—say from twenty to thirty lines—could be grouped together and be operative, as the telephone of the listening operator would only receive its proportion of the current sent in by a given subscriber. The portion of the current not passing through the operator's telephone would be divided

and escape to ground at the other terminal stations of the group.

The individual lines in my system, instead of normally connecting with the ground at the terminal stations, are connected with the common return-wire, which serves for signaling, but which is never connected with the ground. Therefore the number of lines that may be connected with a single operator's telephone is not limited by the escape of the voice-current over other wires of the group.

I claim—

1. A group of individual telephone-lines, in combination with a listening operator's telephone, a common return-wire normally open at the central office, and a calling-battery in the circuit of the return-wire and a switch at each subscriber's office, substantially as and for the purpose specified.

2. The combination, with a signal-circuit, including one or more signal-boxes, of the battery *t*, the relay or receiving-instrument, and branch circuits from said signal-circuit to ground, each branch containing a condenser and a telephone included in the common ground-wire, substantially as and for the purpose specified.

3. The combination, with the signal-circuit, including the signal-boxes, of a branch circuit from said signal-circuit to ground at the central station, condensers, one in each branch circuit, the common ground wire to which the branch circuits are connected, the telephone in said common ground wire, and switching apparatus for connecting and disconnecting the different branch circuits from the signal-circuit.

4. The signal-circuit *A*, including signal-boxes 1 2 3 and battery *t*, and the signal-receiving instrument, in combination with the telephone-circuits radiating from said signal-circuit to ground, each branch circuit containing a condenser and telephonic apparatus, whereby telephonic communication may be had from one point to another over said signal-circuit without impairing the integrity of the signal-circuit.

5. A signal-circuit including signal-boxes, in combination with branch circuits from said signal-circuit through telephones and condensers to ground and switches to disconnect any branch circuit from the signal-circuit.

In witness whereof I hereunto subscribe my name this 2d day of June, A. D. 1883.

CHARLES E. SCRIBNER.

Witnesses:

PAUL A. STALEY,  
G. P. BARTON.