

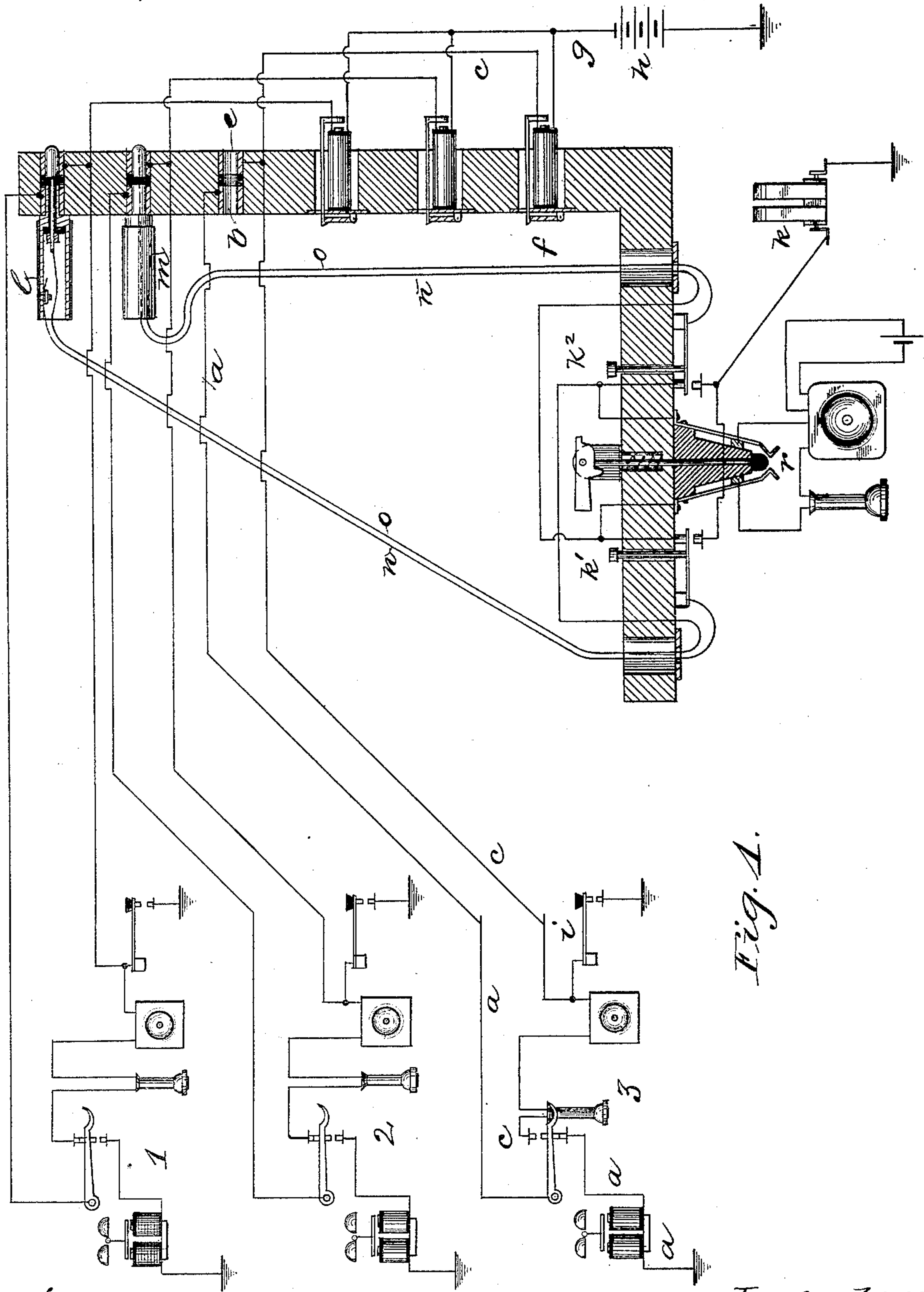
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.  
TELEPHONE EXCHANGE APPARATUS.

No. 442,146.

Patented Dec. 9, 1890.



Witnesses:  
Chas. G. Hawley.  
Ella Edler

Inventor:  
Charles E. Scribner  
By George P. Barton  
Attorney.

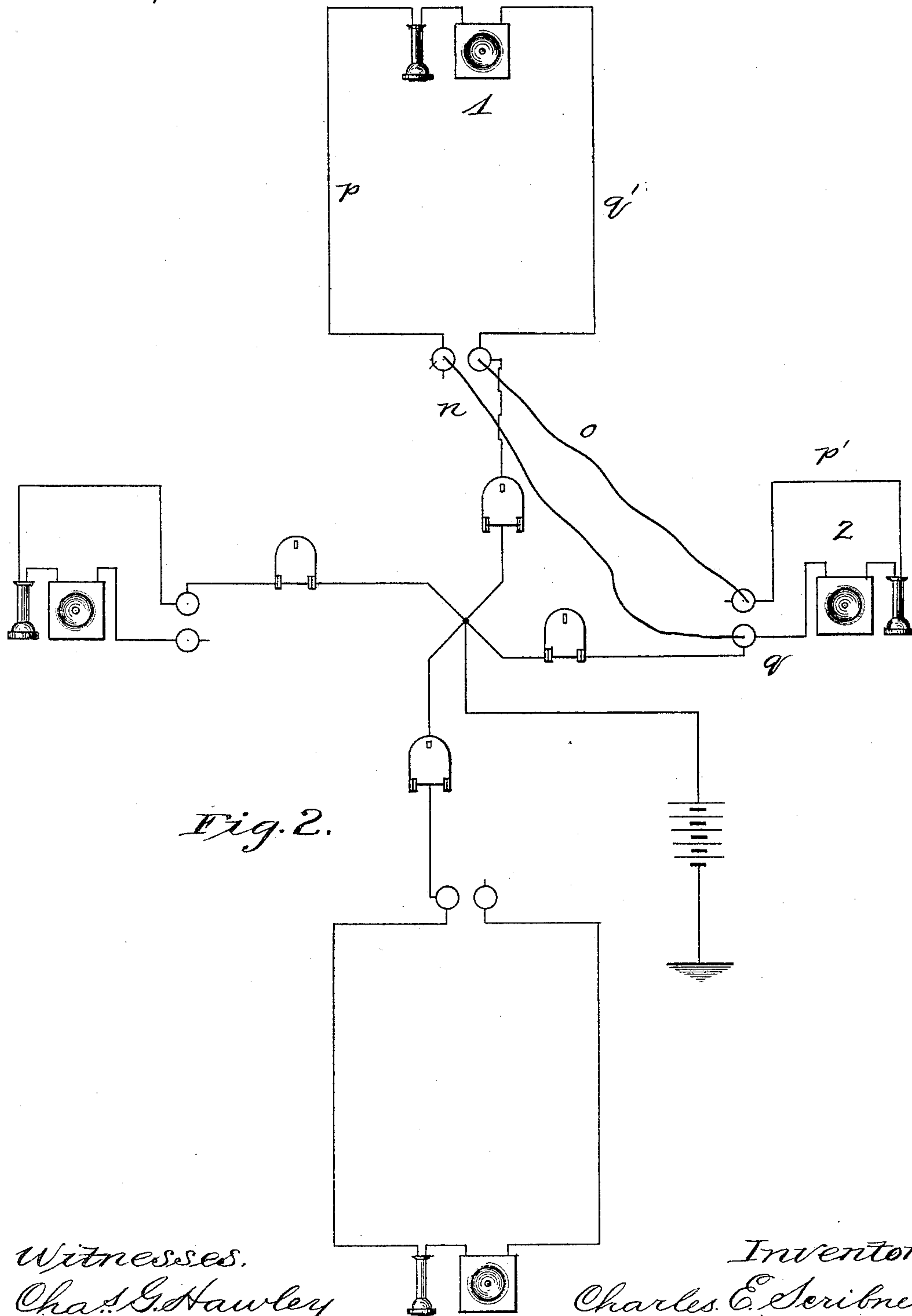
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*Fig. 2.*

*Witnesses.*  
*Chas. G. Hawley*  
*Ella Edder*

*Inventor:*  
*Charles E. Scribner.*  
*By George P. Boston*  
*Attorney.*



# UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

## TELEPHONE-EXCHANGE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 442,146, dated December 9, 1890.

Application filed December 10, 1888. Serial No. 293,165. (No model.)

*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 Telephone-Exchange Apparatus, (Case 181,) 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 relates to telephone-exchanges in which metallic circuits are employed; and its object is to provide apparatus which shall admit of looping the different lines together without including any unnecessary resistance in the talking-circuit.

My invention as herein described is especially adapted for use in exchanges having only a moderate number of subscribers—say less than one thousand—in which multiple switch-boards are not required. Certain features of my invention shown herein have been heretofore described and claimed in my application, Serial No. 291,658, filed November 23, 1888, executed November 17, 1888, for multiple-switch-board system. In said application one feature consists of the use of condensers, one being placed in one of the connecting-cords and the other in circuit with the operator's telephone to prevent a false-test signal.

In my application, Serial No. 291,658, filed November 23, 1888, for telephone-exchange apparatus I have described and claimed a metallic telephone-line circuit consisting of two branches, one branch being normally connected with ground at the subscriber's station and thence through the subscriber's bell to the telephone-switch, and thence to the central office, said branch being connected with the test portion of a socket on each of two or more switch-boards and being normally open, while the other branch, being normally open at the subscriber's station, extends to the other terminals of the same sockets on said switch-boards, and thence through an annunciator and a battery to ground, in combination with the telephone-switch and a ground-key at the subscriber's station, where, by on depressing the grounding-key current

from the battery is sent through the individual annunciator, while on operating the telephone-switch the two branches are united in metallic circuit; the combination, with the telephone-line extending from ground at the central office through a battery to terminals, one on each switch-board, and thence to the subscriber's station, and thence back to test-terminals, one on each switch-board, of switching apparatus at the subscriber's station for forming a ground connection for the battery, or uniting the telephone-line through the subscriber's station in metallic circuit to connect the battery to the said test-terminals; the combination, with the telephone-line extending from ground at the central office through a battery to terminals, one on each switch-board, and thence to the subscriber's station, and thence back to test-terminals, one on each switch-board, of switching apparatus at the subscriber's station for forming a ground connection for the battery, or uniting the telephone-line through the subscriber's station in metallic circuit to connect the battery to the said test-terminals, and testing apparatus for determining the presence or absence of battery-current at said test-terminals at the different boards to determine whether the line is in use. Such specific matter is therefore disclaimed as to this application.

My invention as described herein requires no test-circuits, and hence the condensers are dispensed with. My invention herein consists of metallic telephone-circuits, each provided with two branches, one branch being normally closed at the subscriber's station and open at a contact or terminal of the switch or connecting device upon the switch-board, while the other branch is normally open at the subscriber's station and connects with another terminal of the switch or connecting device upon the switch-board, and extends from said terminal through an annunciator, preferably constructed to operate as a self-induction coil, and thence through a battery to ground at the central office, a key being provided in this branch at the subscriber's station for closing the same to ground to operate the individual annunciator.



My invention consists, also, in a pair of loop-plugs and their cords, the cords being connected diagonally with the different terminals of the plugs, so that when the two plugs are inserted in terminals of two different lines only the telephone outfits will be included in the talking-circuit, the different sides of this talking-circuit being branched each through an individual annunciator and a battery to ground, the said individual annunciators being constructed to act as self-induction coils.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagram showing three subscribers' stations, each connected with the switch-board at the central office with a pair of loop-plugs and their cords, and the operator's telephone and calling apparatus upon the switch-board, the metallic circuits of two of said stations being looped together by means of plugs and cords. Fig. 2 is an illustrative diagram of the circuits of four subscribers' stations, each connected through its individual annunciator at the central office and through a common ground-wire containing a battery, two of said stations being shown looped together.

Like parts are indicated by similar letters of reference throughout the different figures.

In Fig. 1 the circuits of station 3 are shown in their normal condition, the telephone resting upon the switch. The circuit of branch *a* may be traced from ground through the bell to the telephone-switch and thence to socket or terminal *b* of the switch-board, the branch *a* being shown open at terminal *b*. Branch *c* is shown open at the upper contact of the switch and may be traced through the telephone and transmitter to terminal *e* upon the switch-board, and thence through the annunciator *f*, and thence to the ground-wire *g*, including the battery *h*. By means of a key *i* at station 3 branch *c* may be closed to ground, thus closing battery *h* through the annunciator *f* to operate said annunciator, thus notifying the central office of the call.

The operator may call up any subscriber by inserting one of the loop-plugs in the socket of the subscriber wanted and connecting the generator *k* with the branch, which is normally closed at the subscriber's station—that is to say, in case of station 3 the operator, by inserting a plug in the socket consisting of terminals *b e*, would close the sleeve of the plug to terminal *b*, and thus by depressing key *k'* or *k''*, as the case might be, would send current through the bell at station 3. Stations 1 and 2 are shown connected together for conversation by means of the loop-plugs *l m* and the cords connecting said plugs together. It will be observed that the strand *n* is connected with the sleeve of plug *l* and with the tip of plug *m*, while the strand *o*, which connects with the tip of plug *l*, extends to the sleeve of plug *m*. Each plug is provided, as before stated, with two terminals, one terminal being upon the sleeve or shank

of the plug and the other terminal being the tip of the plug. This is shown in detail in the sectional view of plug *l*. The sleeve of the plug when inserted, as shown, in a socket of any line makes connection with the normally-open terminal of the socket, while the tip is closed to the terminal of the socket, which is provided with a branch connection through the annunciator and battery to ground. Thus, as more clearly shown in Fig. 2, the normally-open branch *p* of the line of station 1 is connected with the normally-closed branch *q* of station 2 through strand *n*, while the normally-closed branch *q'* of the line of station 1 is connected through strand *o* with the normally-open branch *p'* of the line of station 2—that is to say, the open branches of any two lines are reciprocally connected, respectively, with the closed branches or limbs of said lines—that is to say, as before stated, open branch *p* is connected with closed branch *q* and closed branch *q'* is connected with open branch *p'*. The talking-circuit thus formed includes only the telephones of the respective subscribers. Moreover, the two sides of the metallic circuit thus formed will be found branched each through a different coil to a common line including battery, and thence to ground at the central office. By means of a loop-switch *r* the operator's telephone may be bridged into the circuit between the strands *n o*, when desired. When the subscribers are through talking, each one on hanging up his telephone operates the individual annunciator of the other, thus indicating that the conversation is finished.

My invention admits of various modifications, which would readily suggest themselves to those skilled in the art, and I therefore do not limit myself to the constructions shown.

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

1. The combination, with two subscribers' stations, of their metallic-circuit telephone-lines looped together to form a single metallic circuit for conversation free of resistance, except the telephones, the different sides of said metallic circuit being provided with a branch circuit, each such branch circuit containing the individual annunciator of its line, each annunciator constructed to operate as a self-induction coil, and each of said branch circuits being connected to a ground branch, including a battery.

2. The combination, with a switch-board, of telephone-lines connected therewith, said telephone-lines each consisting of two branches, one branch being normally closed at the subscriber's station and connected through the bell and switch of the station and extending to one terminal of the line upon the switch-board, while the other branch is normally open at the subscriber's station and extends through the telephone at said station to the corresponding terminal upon the switch-board, from which terminal it is connected



through an annunciator and a battery to ground, and switching apparatus at the central office adapted to loop together any two of said telephone-lines, the open terminals of the two lines being reciprocally connected with the grounded terminals of the other, whereby a talking-circuit is formed which includes the resistance of no electro-magnet coils except those of the telephone, while the different sides of said circuits are balanced through ground branches, including, respectively, the individual annunciators of the lines.

3. The loop-plugs connected with flexible cords, the two strands of said cords being each connected diagonally with the different terminals of said plugs, a switching device, and a telephone adapted to be bridged across said strands, substantially as and for the purpose specified.

4. A telephone-line consisting of two branches, one branch, as branch *a*, extending through the signal-bell and telephone-switch of the subscriber's station, and thence to a normally-open terminal, as terminal *b*, upon the switch-board, the other branch, as branch *c*, being normally open at the subscriber's station and extending through the telephone to a terminal *e*, corresponding with terminal *b*, said terminal *e* being connected through an individual annunciator *f* to a ground branch *g*, including battery, and a key *i*, connected

with branch *c* at the subscriber's station, and switching and signaling apparatus at the central office, whereby the subscriber may call the central office or the central office the subscriber at will, substantially as and for the purpose specified.

5. A metallic-circuit telephone-line consisting of two branches, one branch being grounded at the subscriber's station through the subscriber's bell and the other branch being normally open at the subscriber's switch, the said grounded branch being normally open at the central office and the other branch being connected through a switch and an annunciator at the central office to a wire containing a battery, in combination with a circuit-closing device between the bell and the bell contact of a telephone-switch for closing the branch containing the bell to the side of the circuit including the individual annunciator and battery, whereby the subscriber on operating said circuit-closing device may throw down the individual annunciator, substantially as described.

In witness whereof I hereunto subscribe my name this 1st day of December, A. D. 1888.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,  
ELLA EDLER.