

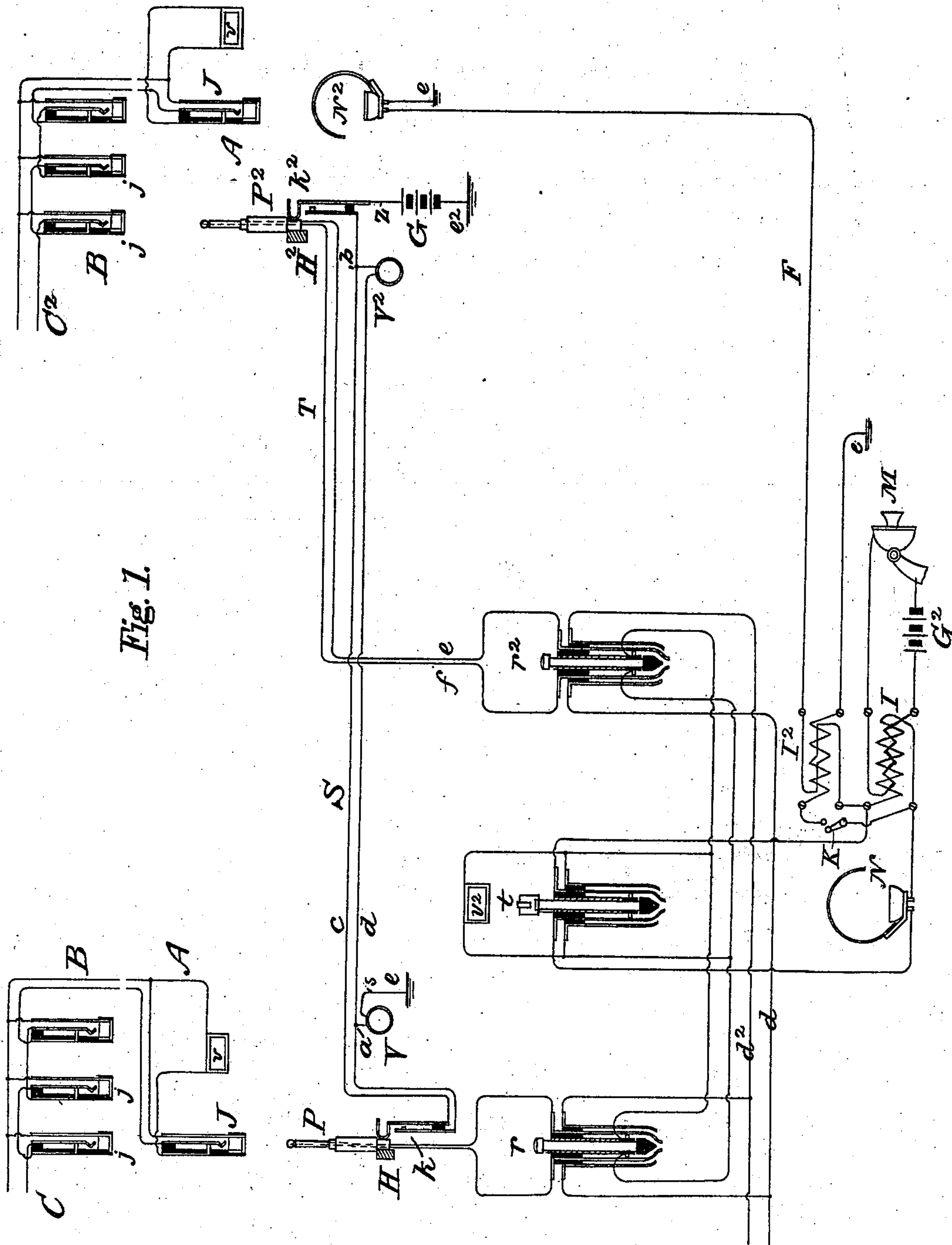
(No Model.)

2 Sheets—Sheet 1.

F. W. DUNBAR.  
ELECTRIC SWITCHBOARD SIGNAL.

No. 502,660.

Patented Aug. 1, 1893.



Attest.  
*Rever Lewis*  
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Inventor.  
*Francis W. Dunbar,*  
by *J. J. O'Donnell,*  
his attorney.

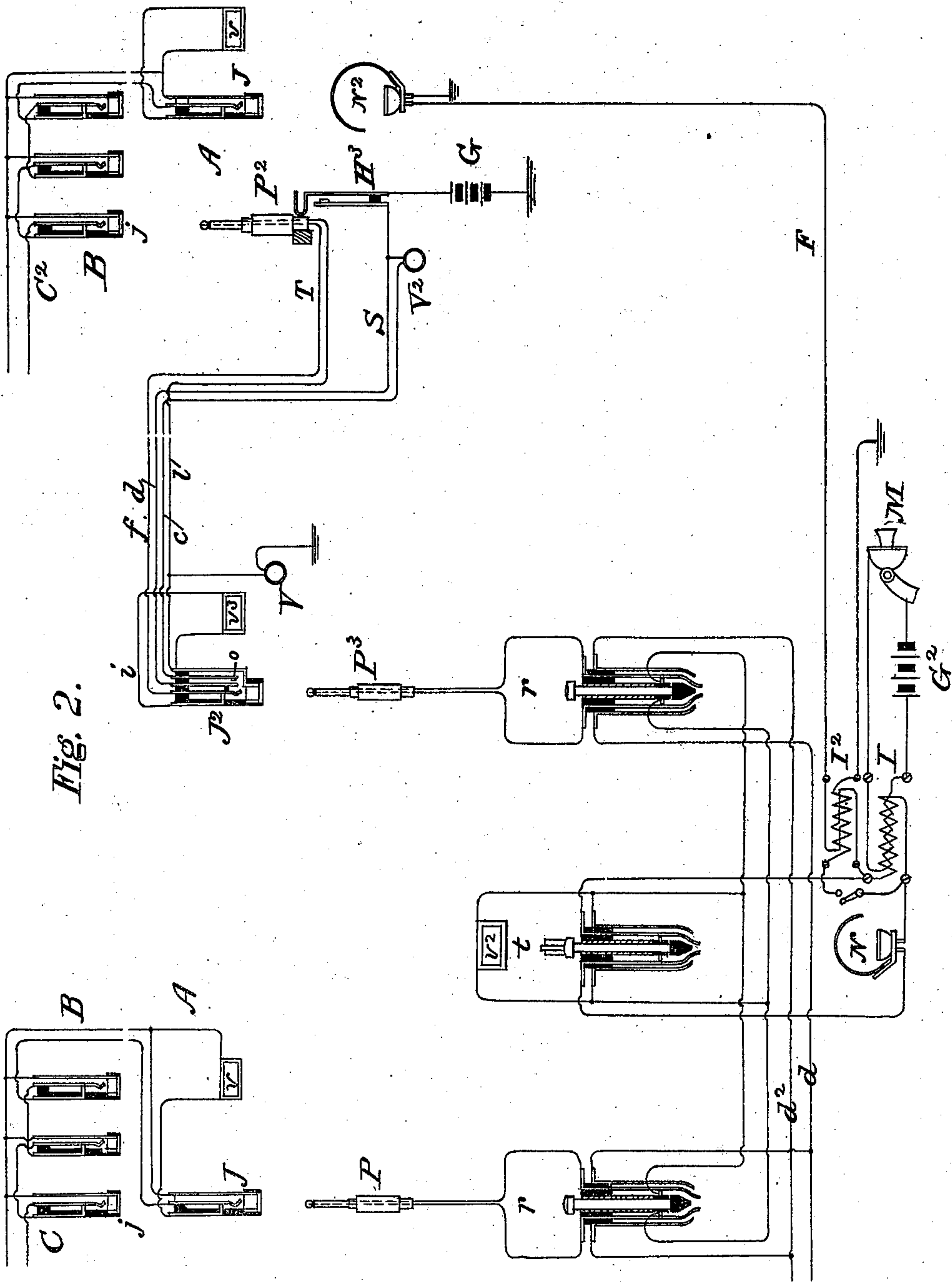
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Inventor.  
*Francis W. Dunbar,*  
by *W. H. Mauro,*  
his attorney.



# UNITED STATES PATENT OFFICE.

FRANCIS W. DUNBAR, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY, OF NEW YORK.

## ELECTRIC SWITCHBOARD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 502,660, dated August 1, 1893.

Application filed May 15, 1893. Serial No. 474,348. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS W. DUNBAR, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Electric Switchboard-Signals, of which the following is a specification.

This invention relates to automatic electric signals and particularly to their operation in connection with different switchboards or with different parts of the same switchboard whereby a perfect understanding tending to prompt operation may be maintained between operators.

It comprises a telephonic circuit or trunk conductor extending between two points and provided terminally with plug and spring jack switch devices; and associated therewith is a normally open signaling circuit extending to the same points, consisting of main and shunt conductors, and including an electric generator. At each of the said points in the main conductor or in a ground branch of the said signaling circuit is a self setting annunciator both of which are actuated by the manipulation of the terminal plugs and switches in making circuit connections and disconnections between substations. At each of said points of the signaling circuit is an automatic circuit controller or circuit changer, which normally maintains the said circuit open; but which are adapted to automatically close the said circuit when connections are made. By the association of such a signaling circuit with a trunk line or conductor extending between two co-ordinate telephone switchboards the signals may of course conveniently aid in the intelligent co-operative manipulation of such switchboards. This is especially the case when calls are received on one switchboard which may be called the "answering or terminal board" and connections made on the other, which may therefore be entitled the "connection board." The circuit controllers of the signaling circuit are preferably placed, in a manner well understood, in such mechanical relation to the terminal plugs of the trunk telephone conductor that they are automatically actuated, and the requisite signals automatically transmitted, by the manipulation of the said plugs in making con-

nections and disconnections; and to this end the circuit breaker is so mounted in the resting socket of the plugs that the withdrawal of the plugs from said sockets actuates the same to close while the replacement of the plugs actuates to open, the two conductors at the terminal board, and the first conductor with its earthed battery branch at the connecting board. Instead of placing these circuit changers in the resting sockets they may of course be placed in the working sockets or spring jacks of the plugs as shown in Letters Patent of the United States granted to Edward J. Hall, April 11, 1893, and numbered 495,087. The main application of the invention is to provide automatically operated visual signals between two distant operators, whereby the first operator may know that a connection ordered has been made at the switchboard of the other; whereby the second operator may promptly be instructed to disconnect; and whereby a disconnection made may at once announce itself to both operators.

The drawings which accompany this specification consist of two conventional diagrams, Figures 1 and 2, and show symbolically the electrical connections and apparatus herein described and claimed. Fig. 1 represents the preferred arrangement of circuits and Fig. 2 represents a modification thereof.

A and B are two switchboards which may be any distance apart, or more specifically, A may represent a terminal or answering switchboard, and B a connecting switchboard in the same office.

At A is the answering jack J, and the call annunciator  $v$ , of the several incoming circuits; and at B are the multiple connecting jacks  $j$ , of such circuits; two circuits alone C and C<sup>2</sup> being represented.

In Fig. 1, T is a double wire trunk conductor extending between the said switchboards, and provided at A with flexible extension cords, (not shown) and with a terminal plug P placed when not in use in a resting socket H—but adapted to be withdrawn therefrom and inserted in the answering jack J for the purpose of answering a call, and of establishing the initial portion of a connection desired. The other end of the trunk line



is similarly provided with a plug  $P^2$ , which rests when not in use in the socket  $H^2$  and which is adapted to complete a connection called for, by being inserted in the nearest  
5 connecting jack  $j$  of the circuit wanted.

$S$  is a signaling circuit associated with such trunk and extending between the said two switchboards, and provided at  $A$  with the visual signal  $V$ , preferably some one of the  
10 many forms of self-setting annunciator; and at  $B$  with a signal  $V^2$  of like character.

$F$  represents an instruction circuit extending between the two switchboards and connecting at  $B$  with the operator's telephone  $N^2$ ,  
15 while at  $A$  it has a connection by means of the repeating induction coil  $I^2$  and controlled by the key or button  $K$  with the telephone circuit of the operator.

The trunk conductor is provided at  $A$  with  
20 the usual and ordinary call keys  $r$  and  $r^2$ , whereby the circuit in either direction may be connected with call generator mains  $d$  and  $d^2$ ; and also with the regular disconnecting annunciator  $v^2$  and the telephone key  $t$ , where-  
25 by the operator's telephones  $M$  and  $N$  may be bridged across the circuit for purposes of supervision.

The signaling circuit  $S$  is composed of a main conductor  $d$  and a shunt conductor  $c$   
30 connecting the points  $a$  and  $b$  of the main circuit, the annunciator  $V$  being in an earth branch  $s$  connected to the signaling circuit at the point  $a$ . The shunt conductor  $c$  includes a circuit controller  $k$  preferably mounted in  
35 the seat or resting socket of plug  $P$  at switchboard  $A$ , and so constructed that its points are held apart, the shunt being thus maintained open when the said plug is in place. When, however, the plug  $P$  is removed, the  
40 shunt is made continuous from the earth at  $e$  through annunciator  $V$ , circuit controller  $k$ , and conductor  $c$  to the point  $b$ .

Mounted in the seat or resting socket of the plug  $P^2$  at the board  $B$  is the other key or circuit controller  $k^2$  to one side of which the conductor  $d$  is attached, while the spring thereof is connected to earth by the branch  $z$  which includes a source of electricity  $G$ .

The operation of such a signal circuit in  
50 connection with two such switchboards as are shown, is as follows: A current is sent in from a substation generator which drops the shutter  $v$  at the answering board  $A$ ; the operator there lifts the plug  $P$  from its socket  $H$ , and  
55 in so doing automatically closes the spring of the circuit changer  $k$  upon its point. The plug  $P$  is inserted into the answering jack  $J$  and connection is made between the operator and the substation. The operator receiving  
60 the order closes the instruction circuit by means of the switch  $K$  between his telephones and the telephone  $N^2$  of the connecting board operator, and instructs the said operator to connect the circuit called for with a given trunk  
65 terminal the trunk named being of course that whose plug  $P$  has already been connected with the calling line. The operator at the connect-

ing board  $B$  takes up the plug  $P^2$  forming the remaining terminal of said trunk from its socket, thereby closing the contact of the circuit  
70 changer  $k^2$ , and inserts it into the jack  $j$  of the circuit called for. The act of taking up the plug  $P^2$  and thereby automatically closing the key  $k^2$  operates the signal  $V$ , and thus notifies the first operator that his order is carried out, so  
75 that he may proceed to ring up the station desired and put the two stations into communication by means of the ringing keys  $r, r^2$  and the telephone key  $t$ . Both plugs being now up, the circuit of the generator  $G$  is  
80 closed from earth  $e^2$ , via shunt conductor  $c$ , circuit controller  $k$ , to point  $a$ , annunciator  $V$  in branch  $s$ , to earth  $e$ , the signal of annunciator  $V$  is consequently displayed; but the annunciator  $V^2$  is not operated as it is short  
85 circuited by the shunt conductor  $c$  extending between the points  $a$  and  $b$ . When the two substations concerned have concluded their conversation, one or both ring off, and operate the disconnecting signal  $v^2$ . The operator at  
90 board  $A$  disconnects by withdrawing the plug  $P$  from the jack  $J$  and by returning it to its socket. In doing this the points of the circuit controller,  $k$ , are separated which opens the circuit of the shunt conductor,  $c$ , and  
95 thereby effects a transference of current from conductor,  $c$ , to conductor,  $d$ , whereby the annunciator  $V^2$  also is displayed to inform the operator at the connecting board  $B$  that the conversation is over and that he should dis-  
100 connect. This signal remains in view until its instructions are complied with. The circuit in this instance is from earth  $e^2$ , battery  $G$ , circuit controller  $k^2$ , conductor  $c$ , to point  
105  $b$ , annunciator  $V^2$ , conductor  $d$  to point  $a$ , branch  $s$ , annunciator  $V$  and earth  $e$ . The plug  $P^2$  is then removed from the jack  $j$  effecting completely the disconnection, and being replaced in its socket actuates the circuit  
110 changer  $k^2$  to open the circuit and restore the normal condition of the signal circuit. This being done, both signals  $V$  and  $V^2$  (which remain in view until plug  $P^2$  is restored to its socket) return to their passive  
115 position thereby indicating to the operators at both switchboards that the disconnection has been made.

In Fig. 2 a modification of the circuit useful under some circumstances is shown, in which the signaling circuit  $S$ , and the trunk  
120 conductor circuit  $T$  are independent circuits; a combination jack  $J^2$  receives the terminals of both circuits  $S$  and  $T$ , and by means of the contact  $o$  performs all the functions of the circuit controller  $k$  in Fig. 1 when the plug  $P^3$   
125 is inserted. The arrangements of the circuits  $S$  and  $T$  at the connecting board  $B$  are the same as in Fig. 1. In this case the operation is as follows: When the call is received by the operator at the terminal board  $A$ , he raises  
130 the plug  $P$  and inserts it into the answering jack  $J$  as in Fig. 1: and when he receives the order he raises the plug  $P^3$  and inserts it into the jack  $J^2$  and then instructs the operator at



the connection board what connection is wanted. The plug P<sup>2</sup> is then inserted into the jack *j* of the required line, and the connection is completed. The insertion of the  
5 plug P<sup>3</sup> into the jack J<sup>2</sup> automatically closes the contact *o* therein, and the withdrawal of the plug automatically opens the contact, the operations being in other respects precisely the same as described of Fig. 1.

10 Having now fully described my invention, I claim—

15 The combination with a telephone circuit or trunk conductor extending between two points and provided terminally with plug and springjack switch devices; of a normally open associated main signaling circuit including an electric generator; a self setting annunciator in said signaling circuit at each terminal point; a normally open shunt circuit round

one of the said annunciators; and two auto- 20 matic circuit controllers governing the continuity of the said main and shunt circuits respectively, and actuated by connections and disconnections made by means of said terminal plugs respectively; whereby one of the  
25 said annunciators is made to display its signal when both main and shunt signal circuits are closed, and whereby both of said annunciators are made to display their signals when the main circuit only is closed. 30

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 9th day of May, 1893.

FRANCIS W. DUNBAR.

Witnesses:

ALFRED E. HOLCOMB,  
F. STANTON PERRIN.