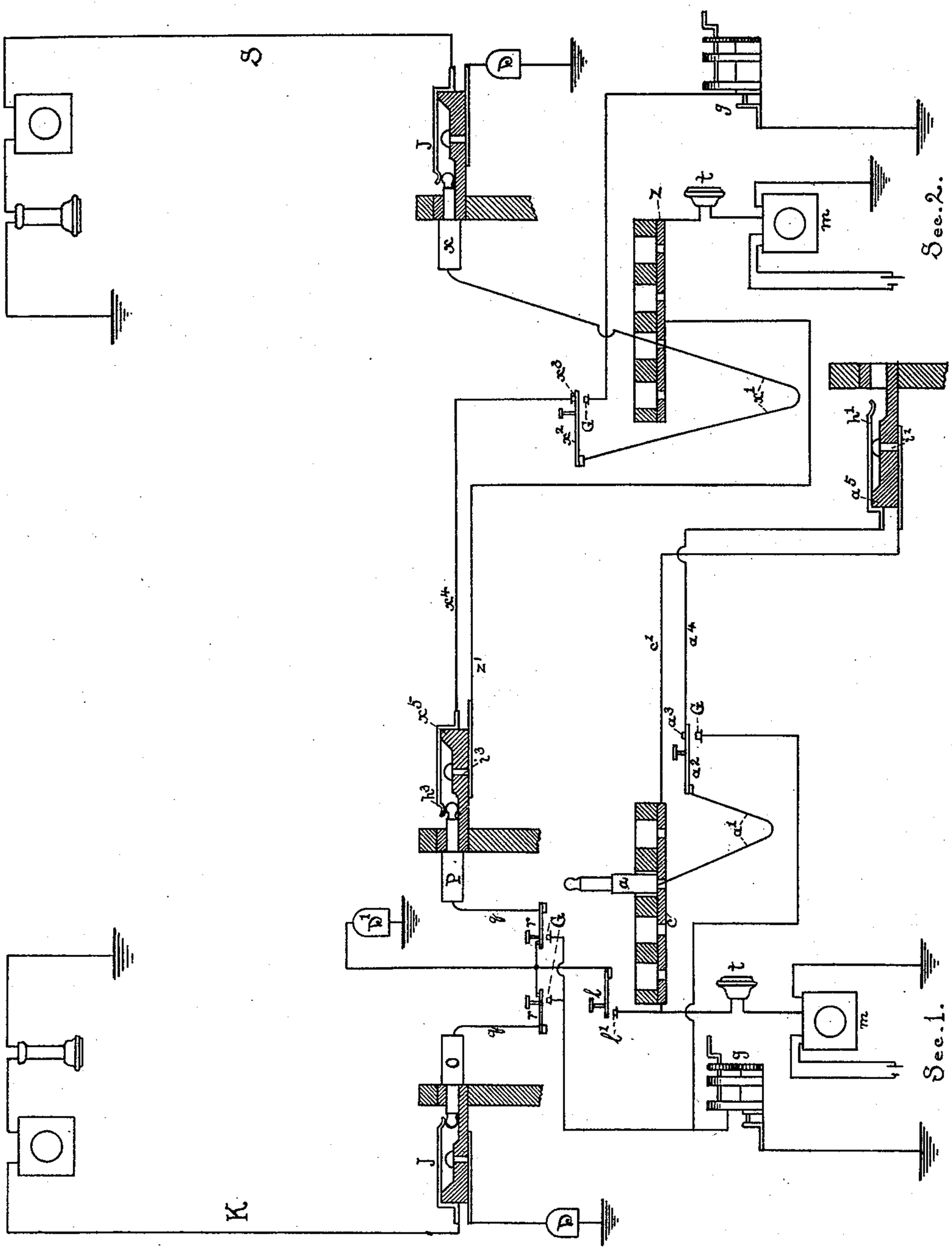
(No Model.)

E. A. CLARK.

TRANSFER SYSTEM FOR TELEPHONE SWITCHBOARDS.

No. 496,859. Patented May 9, 1893.



Witnesses:
J. Bryginsky.
Ernest J. Lees.

Inventor:
Emery A. Clark.
per J. H. Quick
Attorney

UNITED STATES PATENT OFFICE.

EMERY A. CLARK, OF SIOUX CITY, IOWA.

TRANSFER SYSTEM FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 496,859, dated May 9, 1893.

Application filed June 24, 1892. Serial No. 437,927. (No model.)

To all whom it may concern:

Be it known that I, EMERY A. CLARK, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented a new and useful Transfer System for Telephone-Switchboards and between Telephone Sub-Stations, of which the following is a specification.

My invention relates to those telephone exchange systems in which the terminals of the service wires are grouped in a central office upon a large switch-board, which for convenience is divided into sections, each section containing as many service-wire terminals as can be conveniently controlled by one operator; or in which the service wire terminals are grouped in two or more sub-offices in different parts of the exchange.

My invention is an improved system of transferring connections from one section of a switch-board to another or from one sub-office to another, and consists of a system of plugs, conducting cords, ringing keys, spring jacks, metallic strips, and wires.

In my invention, in addition to the ordinary appliances used by telephone operators in making connections which are within his reach, each operator is provided with two or more transfer plugs which normally rest upon a metallic plug strip which is connected by wire with operator's head telephone and transmitter, and also by wire with a side contact of one or more spring jacks on each of the other sections or sub-offices of the system. Each of the transfer plugs is also connected through a flexible cord, a ringing key and wire to the body of the same spring-jacks on other sections to which the plug-strips are connected as above mentioned. By this system connections between the different sections may be made quickly, quietly and correctly and it is rendered impossible for a subscriber to be "hung up;" *i. e.*, to be disconnected from the connection desired and unable to inform operator what his desires are. I attain these objects by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a diagram showing my system with two subscribers' circuits, their connections at central, the operator's complete apparatus and its connections, and spring-jacks and plugs in longitudinal section showing their connections.

Similar letters and figures refer to similar parts throughout the several views.

The metallic plug a normally rests upon and in contact with the metallic plug strip c as shown in the drawings. This plug strip c is the ordinary plug-strip in common use, which in my invention, as in other systems, is connected in any suitable manner, as by wires as shown to the head-telephone t and transmitter m worn and used by the operator on that section of the switch-board. Plug a is also connected by means of conducting cord a' to ringing-key a^2, which at its base is movable between metallic back-contact-point a^3, and metallic generator-strip G. Ringing-key a^2, normally rests against back-contact-point a^3, completing circuit from spring-jack a^5 to plug a, but the operator may at will, by pressing down on ringing-key a^2, break the circuit by separating the base of the key pressed from the back-contact-point against which it rests; and by pressing the key down form a contact with the generator-strip G thus causing the alternating or ringing current, with which G is charged, to pass over any wire with which the plug a coupled with the key pressed may be connected.

G is the ordinary generator-strip in common use, and in my invention as in other systems, is used for operating the bells or annunciators of the system by means of an alternating current from a suitable generator, as g. Contact-point a^3, is connected in any suitable manner, preferably by the wire a^4, with body of spring-jack a^5, in section 2.

In Fig. 1 spring-jacks x^5 and a^5 are shown in longitudinal section, and are ordinary spring-jacks in common use, and in my invention, as in other systems, each spring-jack has a metallic body, tubular, for the insertion of plugs in making connections, and carries a side-contact-point i' or i^3 which is insulated from all parts of the body of the spring-jack except a spring (h' or h^3) with which it is in contact when no plug is in the spring-jack as shown at a^5.

When a suitable plug is inserted in a spring-jack, the spring (h' or h^3) which is in contact with the body is so moved by the plug, that

the contact and connection between the spring and the body of the spring-jack, and the contact point i' or i^3 is broken and terminated as shown on spring-jack x^5 and the contact-point fully insulated therefrom.

The plugs P and O are a pair of the ordinary connecting plugs of the system, and are provided in the usual manner with the conducting cords q, the ringing-keys r, the "listening-key" l and the "listening-strip" l'.

In Fig. 1 one of the ordinary connecting plugs P is shown inserted in the transfer spring-jack x^5, raising the spring h^3 and cutting off the side-contact i^3. In a similar manner transfer plug x on section 2 is shown inserted in the ordinary spring-jack j. It will be noticed that the transfer plugs are never inserted in the transfer spring-jack, but are always used in connection with the terminal spring-jacks while the transfer spring-jacks are used by inserting in them the ordinary connecting plugs.

The side-contact i' of spring-jack a^5 is connected in any suitable manner, preferably by wire c' to plug-strip c. Wire c' is a common wire from all side-contacts on transfer spring-jacks on section 2 which connect with section 1 to plug-strip c on section 1.

The circuits and connections from section 2 to section 1 are similar to those from section 1 to section 2 and the above description, with a change of lettering, is a description of the connection of section 2 to section 1. Plug x normally rests upon plug-strip z which is connected by any suitable means with the head-telephone t and transmitter m of the operator on that section, (section 2.)

Cord x' connects the plug with ringing-key x^2 which is movable at will of operator between generator-strip G and back-contact x^3 which is connected by wire x^4, with body of spring-jack x^5 on section 1. Insulated side-contact i^3 carried by spring-jack x^5, is connected by wire z' to plug-strip z. The plugs, strips, ringing-keys, cords and spring-jacks used in my invention, are arranged and disposed within reach of the operator in any suitable manner or in the same manner as are the ordinary plugs, strips, ringing-keys, cords and spring-jacks of the telephone switch-board upon which my invention is used.

In practice it will probably be found necessary to provide each operator with more than one or two of the transfer plugs with their connections and spring-jacks, and the number can easily be varied to meet the requirements of the exchange. But nothing will be required in the largest exchange except a multiplication of the appliances shown in the drawings. I prefer, in practice, to allow each operator two transfer-plugs and two transfer spring-jacks for every section or sub-office with which he makes connections.

Each section of the switch-board is, by means of my invention connected with every other section in exactly the same manner as section 1 above described is connected with section 2 and as section 2 is connected with section 1. In practice the plugs a and x (and as many similar plugs as is necessary) are known and designated in any suitable manner, preferably by lettering, and the spring-jacks (with which they are connected in other sections of switch-board) are known by corresponding designations or letters.

The manner of using my invention is shown in the following paragraph:—The operator in control of a section on learning in the usual manner, as by action of the annunciator or drop, as D, that a subscriber desires connection with another subscriber, by means of one as O of a pair of ordinary connecting-plugs of the switch-board, places himself in communication with the calling subscriber and receives from him the order for a connection with some certain other subscriber. If the number of the subscriber called for is on section 2 he presses his ordinary "listening-key" lifts the remaining plug as P of the pair of ordinary connecting plugs above mentioned, and touches it to the lettered spring-jack x^5 but does not push it in so as to displace spring h^3. By thus touching the spring-jack aforesaid he places himself in communication with operator on section 2 through spring h^3, side-contact i^3, wire z' and plug-strip z to the head-telephone of the operator on section 2; and also through wire x^4 and its connecting key, cord, and plug to the same head telephone. He then vocally through the connection thus established informs the operator on section 2, what connection is desired, and gives him the letter of the spring-jack x^5 on section 1 and plug x on section 2 (they being lettered alike), through which connection is desired to be made. He then pushes home the ordinary plug P aforesaid into spring-jack x^5, thus displacing spring h^3 and breaking connection through side-contact i^3 and leaves the calling subscriber connected through wire x^4 and its connecting cords and plug with operator on section 2 through plug-strip z to head-telephone. Operator on section 2 lifts the plug x which corresponds in letter or designation with the spring-jack named by the operator in section 1 and pushes it into the ordinary spring-jack in the switch-board as J necessary to complete the connection called for. He then by pressing down the ringing-key x^2, signals to the called subscriber. Upon the ordinary signal to disconnect as by action of clearing out drop D' operator on section disconnects from calling subscriber, pulls the connecting plug P out of spring-jack used, x^5, far enough to restore the side-contact connection through side-contact i^3, and wire z' by means of spring h^3 and vocally signals to operator on section 2 to disconnect; whereupon all plugs used in making the connections are restored to their usual places. In the same manner connections may be made or broken from any section on the switch-board to any other section.

It is obvious that the different sections of the switch-board on which my invention is or

may be used, may be grouped into one central office when desired, or if considered best, as in a large city, the different sections may be distributed about the city in sub-central offices. In the latter case the different sections would be virtually separate switch-boards and my invention a trunk line system between them; but its application would be in no wise different from the manner above set forth.

I am aware that prior to my invention, transfer systems for telephone switch-boards and trunk line systems have been invented in which similar appliances to those used by me have been made use of. I do not therefore claim such a system broadly and to the exclusion of all others; but,

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In transfer systems between different sections of telephone switch-boards, on each section (in addition to the ordinary appliances thereof) one or more transmitting spring-jacks for each of the other sections for the purpose of transmitting or sending calls thereto; one or more receiving plugs for each of the other sections for the purpose of receiving calls therefrom and extending the same to the desired connection; one or more wires running to each other section for the purpose of transmitting or sending calls thereto; two or more wires from each other section for the purpose of receiving calls therefrom; a metallic plug-strip connected to operator's head-telephone and transmitter, on which plug-strip the receiving plugs normally rest making an electrical contact therewith: The arrangement being such that each transmitting spring-jack has one wire running from its side-contact-point uninterruptedly to the plug-strip on distant section, and one wire running from its body to receiving-plug on distant section; in combination with a metallic generator-strip, suitably connected with a suitable generator, and a ringing-key in the circuit from each receiving-plug to distant spring-jack whereby said circuit may be broken, and by a contact made for that purpose between ringing-key and generator-strip, a ringing current may be sent to the bell of the subscriber called, all in combination substantially as above set forth and for the purposes specified.

2. In transfer systems between sections of telephone-switch-boards, on each section, one or more transmitting spring-jacks for each other section, for the purpose of transmitting or sending calls, each of such spring-jacks having two wires running to its distant section, one of said wires running from the spring-jack's insulated side-contact uninterruptedly to a metallic plug-strip on its distant section, the other of said wires running from the body of the spring-jack to the back-contact-point against which the metallic base of a ringing-key normally rests, through which back-contact-point and metallic base the circuit of said wire is continued through a flexible cord to a metallic receiving-plug on its distant section; also, on each section one or more metallic receiving-plugs for each other section for the purpose of receiving calls from such other section and extending said calls to desired connection, a metallic plug-strip on and in contact with which said receiving plugs normally rest, suitable connections between said plug-strip and the head-telephone and transmitter of the operator; the flexible cord, ringing-key, back-contact-point and wire connecting each receiving-plug with body of spring-jack on distant-section, as aforesaid, suitable means, as the said ringing-key for breaking said connections and forming a connection with a suitable generator, as by said ringing-key being pressed down into contact with a metallic generator-strip as G all in combination substantially as set forth and for the purposes specified.

3. In trunk line systems between different sections of telephone-switch-boards, or between sub-offices; on each section, one or more spring-jacks for each other section, for the purpose of being charged (as by the ordinary cord-and-plug device) with circuits to be transmitted or sent to a distant section, there to be extended as desired; each of said spring-jacks having for such transmission two wires running to its distant section, one from insulated side-contact of spring-jack terminating on distant section in a metallic plug-strip through which its circuit is continued by suitable connection to the head-telephone and transmitter of the operator on said distant section, the other running (through the connections of a ringing-key and flexible cord) to a metallic receiving plug normally resting upon and in contact with said plug-strip; also, on each section, one or more of the metallic receiving plugs above mentioned, which by means of the flexible cord with which it is provided, enables the operator to extend any call received through its wire to any desired connection; all in combination substantially as set forth and for the purposes specified.

4. In transfer or trunk line systems, on each section one or more spring-jacks for each other section for the purpose of transmitting calls to such other section; each such spring-jack having for that purpose a wire running from its insulated side-contact to a metallic plug-strip on each other section, and having also another wire running from its body through suitable connection to receiving-plug on such other section: all sections or sub-sections being in like manner reciprocally interconnected; in combination with metallic plug-strips on the various sections, on which the metallic bases of the receiving-plugs normally rest; suitable wires connecting said plug-strips to the head-telephones and transmitters worn by the operators on said sections; flexible cords allowing said plugs to be manipulated in making connections; a generator-strip charged with a ringing current, and suitable means, as the ringing-keys, a^2 and x^2

for breaking the circuit, when formed between subscribers and ringing up called subscribers. All in combination substantially as above set forth, and for purposes specified.

5. In transfer or trunk line systems in telephone exchanges, on each section or at each sub-office, one or more transmitting spring-jacks, as a^5 or x^5 each having a tubular metallic body for the insertion of the ordinary plugs of the switch-board as O or P and having a side-contact as i' or i^3 normally connected with body of spring-jack but cut off and insulated therefrom when a spring as h' or h^3 is pressed aside and from contact with said side contact by the insertion of one of said plugs; wires as c' and z' running from one or more of said spring-jacks, and from said side-contacts thereof, to every other section, and on said other section terminating in a metallic plug-strip, as c or z, also wires running from the body of each of the same spring-jacks, through a ringing-key device, as a^2 or x^2 (adapted to interrupt said circuit when desired), through flexible cord, as a' or x' to metallic plug, as a or x which normally rests on said plug-strip with its metallic base in contact therewith, but adapted in making connections transmitted from other section or board to be inserted in ordinary spring-jack of switch-board, as J a metallic generator-strip, as G, which when the said ringing-key device is operated so as to interrupt the circuit in which it is placed, makes a contact with the base of the key and thereby sends a ringing current over the wire still connected therewith; suitable connections, as wires, connecting the said plug-strip on each section with the head-telephone, as t and transmitter as m worn and used by the operator on each section. All in combination substantially as above set forth, and for the purposes specified.

EMERY A. CLARK.

Witnesses:
ERNEST J. LEES,
J. H. QUICK.