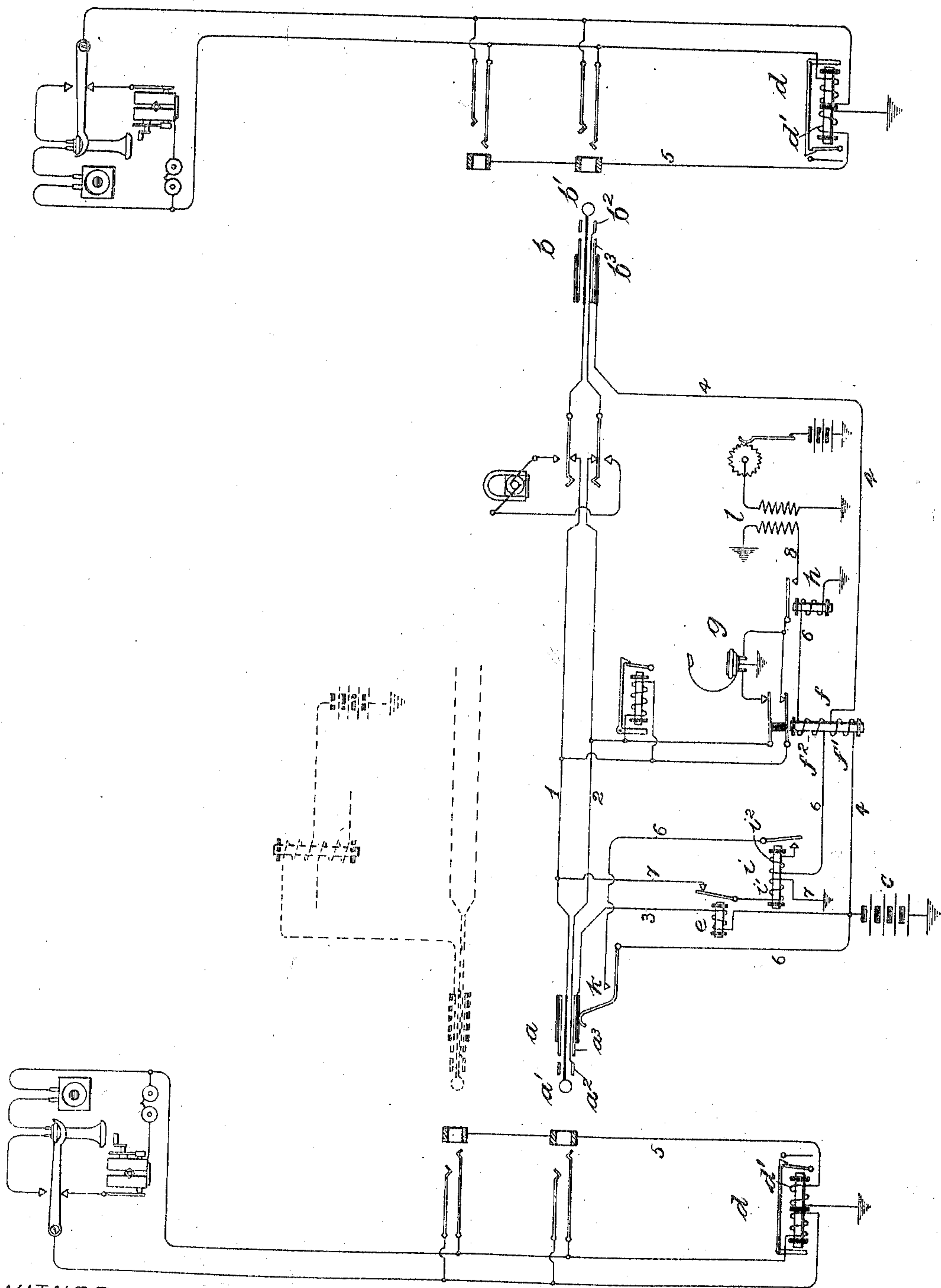


No. 816,894.

PATENTED APR. 3, 1906.

H. E. A. ANDRÉ.
APPARATUS FOR TELEPHONE SWITCHBOARDS.
APPLICATION FILED APR. 27, 1904.



WITNESSES:

J. H. Skinkle,
W. H. Leach

INVENTOR:
Henri Emile Alphonse André
BY Barton & Panner,
ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRI EMILE ALPHONSE ANDRÉ, OF PARIS, FRANCE, ASSIGNOR TO
WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPO-
RATION OF ILLINOIS.

APPARATUS FOR TELEPHONE-SWITCHBOARDS.

No. 816,894.

Specification of Letters Patent.

Patented April 3, 1906.

Application filed April 27, 1904. Serial No. 205,089.

To all whom it may concern:

Be it known that I, HENRI EMILE ALPHONSE ANDRÉ, a citizen of France, residing at Paris, France, have invented a certain new and useful Improvement in Apparatus for Telephone-Switchboards, of which the following is a full, clear, concise, and exact description.

My invention relates to a central-office apparatus for telephone-exchanges; and its object is to insure secrecy in telephonic communication between subscribers by preventing the operator from "listening in" on a busy circuit.

The principal feature of the invention is a blocking device adapted to render the central-office telephone apparatus inoperative—as, for example, a cut-off switch or a switch to apply a characteristic tone-producing current, or both—and means actuated in the act of making connection with a busy line for operating the aforesaid blocking device. The telephone may also be cut off by the act of completing a connection from a calling to a called line.

I will describe the invention particularly by reference to the accompanying drawing, which is a diagram illustrating two subscribers' lines extending from substations to a central office with the operator's plug-circuit apparatus for connecting lines together, the system being equipped with my improved blocking mechanism for insuring secrecy.

In accordance with the multiple-switch-board system each line is provided with several multiple connection terminals or spring-jacks, at any one of which connection may be made with the line. A pair of plugs *a b*, united by the link conductors 1 2 of a plug-circuit, is illustrated, whereby any two lines may be looped together for conversation. The plugs illustrated are ordinary three-part plugs, each of which has tip, ring, and sleeve contacts *a' a² a³ b' b² b³*, these three contacts being adapted to engage the short and long line-springs and the test-ring, respectively, of any spring-jack into which the plug may be inserted. The tip and ring contacts of each plug form the terminals of the link conductors 1 and 2, respectively, and the third contact of each plug forms the terminal of a portion of a local circuit from a grounded battery *c*, which is adapted to be closed by the insertion of the plug in any spring-jack, the

circuit being completed by a conductor 5, associated with the central-office apparatus of the line to which connection is made. The conductor 5 of any line extends from the test-rings of the several multiple spring-jacks of such line through a "restoring-winding" *d'* of the electromagnetic line-signal *d* to earth. Such conductors 5 from the test-rings of the jacks for completing a local circuit when any jack is plugged into are well known in the art.

The portion of the local circuit from battery *c*, which is adapted to be completed by the answering-plug *a*, is designated in the drawing by the reference-figure 3, and the portion of the other local circuit to the calling-plug is designated as 4. The conductor 3 includes the helix of a relay-magnet *e*, and the conductor 4 includes one of the two helices *f'* of an electromagnetic switch *f*, which controls the connection of the central-office telephone *g* with the plug-circuit. The switch *f* constitutes a blocking device for rendering the telephone apparatus inoperative by cutting it off from the plug-circuit. The switch has two levers connected, respectively, with the limbs 1 2 of the plug-circuit and normally resting against back-contact anvils which form the terminals of the operator's telephone apparatus. When either of the windings *f' f²* receives current, these two switch-levers will be lifted from their back contacts, thus cutting off the telephone. The winding *f²* is included in a local circuit 6 from the battery *c*, which circuit also includes the magnet-winding of a relay *h* and one winding *i²* of a relay *i* and is controlled by the armature and front contact of the said relay *i* and also by the spring and its resting contact-anvil of a plug-seat switch *k*. The switch *k* is normally opened by the presence of the answering-plug *a* in its socket, but automatically closes itself when the plug is removed. The other winding *i'* of the relay *i* is included in a ground branch 7 from the tip-strand 1 of the plug-circuit and is controlled by the relay *e*. This ground branch 7 is normally closed at the armature and back contact of the relay *e*, but is broken when said relay is excited.

The middle point of the winding of the central-office operator's telephone is connected to earth, and a local branch 8 to earth from the telephone-circuit, including the secondary

winding of an induction-coil *l*, is adapted to be closed by the relay *h* when excited, whereby a characteristic signal produced at the induction-coil may be applied to the operator's telephone. To produce such a signal, the primary winding of the induction-coil may be included in a circuit with a source of current and an interrupter, as shown. When the relay *h* is excited, therefore, a buzz or hum is produced in the telephone. The plugs and jacks are so constructed that it will be impossible to insert a plug in a jack without establishing at least for a moment a contact between the ring of the jack and the tip of the plug. This may be accomplished by making the tip of the plug of a size so that it will barely slip through the test-ring. The distance between the tip and third contact of the plug should also be sufficient to prevent the test-ring from short-circuiting the two as the plug is being inserted.

The operation of the system may be traced as follows: When a call is received at the central office, the operator responds by inserting her answering-plug *a* in the spring-jack of the calling-line. The circuit 3 is completed and relay *e* draws up its armature, thus cutting off the branch 7, which includes the winding *i* of relay *i*. Circuit 6 being open at the contacts of relay *i*, the electromagnetic switch or blocking device *f* remains inert, so that the telephone *g* may be used to ascertain the number of the subscriber with whom connection is desired. When this information is obtained, the operator may then test the spring-jack of the line wanted with the tip of the calling-plug in the usual manner, and if the line is free she may complete the connection by inserting the calling-plug into the spring-jack. The insertion of the calling-plug completes the circuit 4 and excites the magnet *f*, thus cutting off the operator's telephone. It is understood, of course, that each operator at each section of the multiple switchboard is provided with a number of pairs of plugs with their associated apparatus and circuits, such as shown in the drawing, a single pair only being illustrated for clearness. Whenever a plug is inserted in any of the multiple spring-jacks of a line, the test-rings of all the spring-jacks, being united by the conductor 5, are electrified or given a "test-potential," the battery being applied to the test-ring of the jack in which the plug is inserted by way of the conductor, which terminates in the third contact or sleeve of the plug. If the operator should attempt to listen in on a busy line with the answering-plug of an idle pair in inserting the plug into the spring-jack of the line, the tip of the plug would touch the ring-contact of the jack as it was being inserted. Since a connection already existed at another of the multiple jacks, there would be a difference of potential between the ring of the jack and the plug-tip,

and current would flow through conductor 7, energizing the relay *i*. In drawing up its armature the relay *i* closes the circuit 6, which includes the windings of relays *f* and *h*, and also a locking-winding *i*² of its own magnet. Relays *f* and *h* thus become excited, cutting off the operator's telephone *g* from the cord-circuit and at the same time applying to said telephone the current from the induction-coil *l*, which produces a disagreeable buzz or hum. Since the circuit 6 includes the locking-winding *i*², the answering-plug must be replaced in its socket in order to break the circuit and stop the noise in the telephone.

It is evident that my invention is capable of modification and I do not desire to be understood as limiting myself to the precise circuits and apparatus shown; but,

Having described one embodiment of my invention, I claim—

1. The combination with a number of telephone-lines each provided with multiple connection-terminals at a central switchboard, of an answering and a calling plug, a link conductor connecting said plugs for uniting any two of said lines at the connection-terminals thereof, a central-office telephone apparatus adapted to be connected with said link conductor, a local circuit established in the act of making connection from either plug to the terminal of any busy line, a relay in said local circuit, blocking mechanism controlled by said relay for rendering the central-office telephone apparatus inoperative for communication over said link conductor, and means actuated in making connection with any line for establishing at the several multiple terminals of such line a peculiar electrical condition to which the said relay is responsive when the circuit of said relay is established at another multiple terminal of the same line, whereby the central-office telephone apparatus is automatically blocked when it is attempted to make connection with a busy line.

2. The combination with a number of telephone-lines each provided with multiple connection-terminals at a central switchboard, of a link conductor for uniting any two of said lines at the connection-terminals thereof, a central-office telephone adapted to be connected with said link conductor, a local circuit established in making connection from the link conductor to the terminal of any busy line, a relay in said local circuit, a source of signal-current adapted to produce a characteristic sound in the telephone, switching mechanism controlled by said relay adapted to apply said source of signal-current to the central-office telephone, blocking mechanism controlled by said relay for rendering the central-office telephone inoperative for communication over said link conductor, and means actuated in making connection with a multiple terminal of any line for establishing at the other multiple terminals a peculiar electrical

condition to which the aforesaid relay is responsive when the circuit of said relay is established at one of such other multiple terminals, whereby the characteristic signal is produced in the central-office telephone and the same rendered inoperative when it is attempted to make connection with a busy line.

3. The combination with a pair of plugs and link conductors uniting them, of an operator's telephone adapted for connection with the link conductors, an electromagnetic blocking device adapted when actuated to render the telephone apparatus inoperative, a local circuit for said blocking device, a relay controlling said local circuit, a locking-winding for the relay included in said local circuit, a branch 7 from one of the conductors including a winding of said relay, telephone-lines and multiple spring-jacks thereof, a source of current, and means actuated in making connection with a spring-jack of any line for connecting said source of current to contacts of the several multiple spring-jacks of such line, with which the plug-contact forming the terminal of the branch 7 is adapted to engage, whereby the blocking device is automatically actuated when connection is made with a busy line.

4. The combination with telephone-lines each having multiple spring-jacks and a test-conductor extending to all such spring-jacks, of means for making connection with a line at any of the multiple spring-jacks thereof, and for maintaining a peculiar electrical condition of the test-conductor of such line during such connection, a plug and a circuit containing telephone apparatus adapted to be connected with the terminals of said plug, an electromagnetic switch controlling said circuit, a relay i in a branch conductor 7 connected with a contact-piece of the plug, said relay being brought into circuit with the test-conductor of a line when the plug is inserted in a spring-jack of such line, said relay being responsive to the electrical condition of the test-conductor, according to the busy or idle condition of the line whose spring-jack is plugged into; a local circuit including a source of current and said electromagnetic switch, and adapted to be controlled by said relay i , and a switch k actuated in the use of the plug for establishing said local circuit and bringing the same under the control of said relay i , whereby the connection of the circuit containing the telephone apparatus with the line into whose spring-jack the plug is inserted, is dependent upon the busy or idle condition of said line.

5. The combination with telephone-lines each having multiple spring-jacks, and a test-conductor extending to all such spring-jacks, of means for making connection with a line at any of the multiple spring-jacks thereof and for establishing a peculiar electrical condition of the test-conductor of such line during such

connection, a pair of plugs a b and link conductors uniting them, for connecting lines together, a telephone adapted for connection with the link conductors, an electromagnetic blocking-switch adapted to render the telephone inoperative, two magnet-windings f' f'' for independently actuating said blocking-switch, a relay i in a branch conductor 7 connected with a contact-piece of the answering-plug of the pair aforesaid, said relay being brought into circuit with the test-conductor 5 of a line when the said answering-plug is inserted in a spring-jack of such line, the relay being responsive to the electrical condition of the test-conductor according to the busy or idle condition of the line, a local circuit controlled by said relay, including a source of current and the winding f'' of said electromagnetic blocking-switch, and a local circuit for the other winding f' controlled in registering contacts of the calling-plug of the pair aforesaid and the spring-jack of the line into which said calling-plug may be inserted, whereby the use of the telephone in association with the plugs is blocked while two lines are united by said plugs, or when connection is made with a busy line.

6. The combination with multiple spring-jack line-terminals at a telephone-switchboard, and a test-conductor uniting the respective test-contacts of said spring-jacks, plugs and plug-circuits, means adapted to establish a peculiar electrical condition of said test-conductor, telephone apparatus associated with each plug-circuit, a branch from one of the talking-strands of each plug-circuit, said branch being momentarily brought into connection with said test-conductor during the insertion of the plug associated therewith into a spring-jack, a relay in each branch adapted to respond to such changed electrical condition of said test-conductor, and means controlled thereby adapted to render the telephone apparatus associated with such plug inoperative.

7. The combination with multiple spring-jack line-terminals at a telephone-switchboard, and a test-conductor uniting the respective test-contacts of said spring-jacks, plugs and plug-circuits, means associated with each plug adapted to establish a peculiar electrical condition of said test-conductor when a plug is inserted in any of said spring-jacks, telephone apparatus associated with each plug-circuit, a branch from one of the talking-strands of each plug-circuit, said branch being momentarily brought into connection with said test-conductor during the insertion of the plug associated therewith into a spring-jack, a relay in each branch adapted to respond to such changed electrical condition of said test-conductor, and means controlled thereby adapted to render the telephone apparatus associated with such plug inoperative.

8. The combination with multiple spring-jack line-terminals at a telephone-switch-board, and a test-conductor uniting the respective test-contacts of said spring-jacks, plugs and plug-circuits, means associated with each plug adapted to establish a peculiar electrical condition of said test-conductor when a plug is inserted in any of said spring-jacks, a telephone normally associated with each plug-circuit, a branch from one of the talking-strands of each plug-circuit, said branch being adapted to be momentarily brought into connection with the said test-conductor during the insertion of the plug associated therewith into a spring-jack, a relay in each branch adapted to respond to such changed electrical condition of said test-conductor, a source of signal-current adapted to produce a characteristic tone in said telephone, and switching mechanism controlled by said relay adapted to sever the connection of said telephone with the plug-circuit and connect the same with said source of signal-current.

9. The combination with a plug and plug-circuit, of telephone apparatus adapted for connection with said plug-circuit, an electromagnetic switch adapted to render said telephone apparatus inoperative during connection, an actuating-circuit for said switch ter-

minating on a test-contact of the answering-plug, a telephone-line, a spring-jack terminal therefor, a part of said spring-jack adapted to be engaged momentarily by the test-contact of the plug as the plug is inserted in making connection with the line, and a source of current adapted to be applied to said part in the use of the telephone-line, whereby said electromagnetic switch is actuated to render the telephone inoperative when connection is made with a line which is in use.

10. The combination with a number of telephone-lines extending from substations to multiple terminals at a central office, of an answering and a calling plug, and a plug-circuit therefor for uniting said lines, telephonic apparatus associated with said plug-circuit, blocking mechanism for rendering said telephonic apparatus inert, a relay for operating said blocking mechanism, and a circuit for said relay completed as said answering-plug engages the terminal of a busy line.

In witness whereof I hereunto subscribe my name this 7th day of March, A. D. 1904.

HENRI EMILE ALPHONSE ANDRÉ.

Witnesses:

HANSON C. COXE,
JOHN BAKER.