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SECRECY SYSTEM FOR TELEPHONE SWITCHBOARDS.

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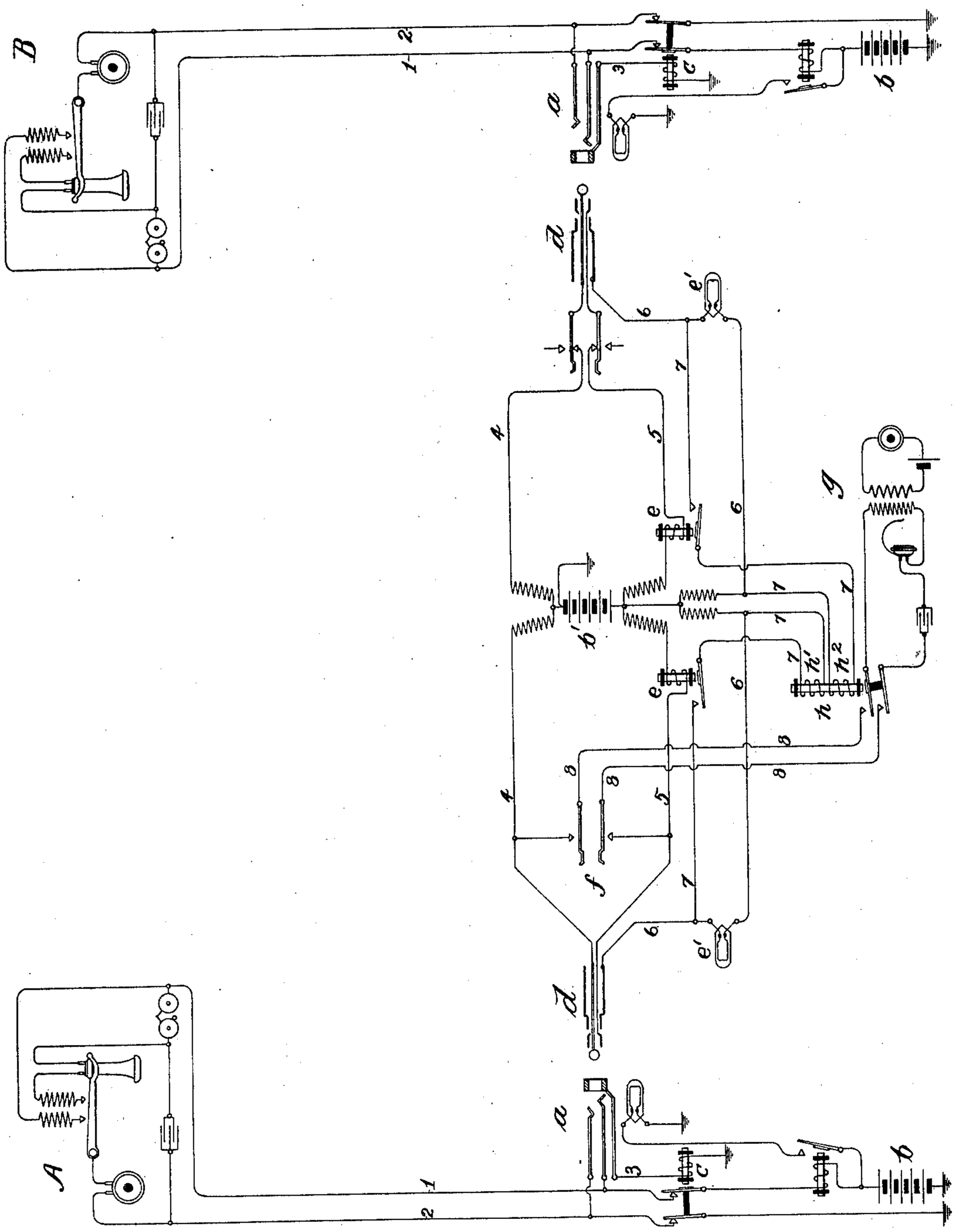
NO MODEL.



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UNITED STATES PATENT OFFICE.

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SECRECY SYSTEM FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 756,424, dated April 5, 1904.

Application filed December 14, 1901. Serial No. 85,861. (No model.)

To all whom it may concern:

Be it known that I, EDWIN H. SMYTHE, a citizen of the United States, residing at Freeport, in the county of Stephenson and State of Illinois, have invented a certain new and useful Improvement in Secrecy Systems for Telephone-Switchboards, of which the following is a full, clear, concise, and exact description.

My invention relates to a secrecy sytem for telephone-exchanges; and its object is where two telephones are temporarily connected for conversation to provide means for automatically excluding during the connections a third telephone, such as the switchboard-operator's telephone, which may be connected with either one of the other telephones before or at the termination of the connection.

I will describe my invention particularly by reference to the accompanying drawing, and the features which I regard as novel will be pointed out in the appended claims.

The drawing is a diagram illustrating by conventional symbols two telephone-lines extending from substations to a central office, with the central-office apparatus which is involved in making connections, the system being organized and equipped in accordance with my invention to prevent the central-office operator from listening in while conversation is going on over two connected lines.

The two lines illustrated are identical, each extending in two limbs 1 2 from the substation A or B, as the case may be, to a spring-jack terminal *a* at the central office and through the usual line signaling apparatus, which is well known in the art, to the central battery *b*. Each substation is equipped with the usual telephone apparatus in a normally open bridge of the line-circuit controlled by a gravity-telephone switch-hook of the ordinary type, adapted automatically to complete the bridge-circuit through the telephone apparatus when the telephone-receiver is lifted from the hook for use. A pair of plugs *d d*, with their plug-circuit, is shown at the central office, whereby any two lines may be united by inserting one plug of the pair into the spring-jack of a calling-line and the other plug into the spring-jack of the called line. Each plug has the usual tip, ring, and sleeve contacts adapted to register with 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 are united with the corresponding contacts of its mate by the link-conductors 4 5 of the plug-circuit, each of which contains two windings of a repeating-coil. A central battery *b'* is connected in a bridge of the plug-circuit between the windings of the repeating-coil, the pole which is connected to the tip-strand 4 being grounded. A conductor 3 extends from the test-ring of each spring-jack to earth through the magnet-winding of the cut-off relay *c* of each line. The contacts of this relay control the connection of the line signaling apparatus and line-battery *b* with the line. The third contacts or sleeves of the plugs *d d* are connected by conductors 6 6 with the free pole of battery *b'*, so that when any spring-jack is plugged into, a local circuit 6 3 from this battery is established in the registering contacts of the plug and spring-jack, this circuit including the magnet of the cut-off relay, so that the line signaling apparatus and line-battery of any line will be automatically disconnected by the act of plugging into the spring-jack of that line. A supervisory-signal lamp *e* is associated with each plug, being included in the conductor 6, which leads to the sleeve-contact of that plug, and supervisory relays *e e* for controlling the signal-lamps are provided, the magnet-windings of said relays being included in the strand 5 of the plug-circuit between the free pole of battery *b'* and the ring-contacts of the respective plugs, thus being in the path of current which flows from said battery out to the substations of the lines with which the plugs are respectively connected. Each supervisory relay controls a shunt-circuit 7 about its associated lamp, which shunt is normally open, but is closed at the switch-contacts of the relay when said relay is excited. When connection is made with any line by inserting one of the plugs *d* into the spring-jack of such line, the supervisory relay associated with the

plug with which the connection is made is controlled by the telephone-switch at the substation of the line, and the shunt-circuit about the controlled supervisory signal is therefore open or closed and the signal correspondingly displayed or inert, according to whether the line-circuit is open or closed at the substation-telephone switch.

The apparatus and circuits so far described are such as are well known in the art, being the standard equipment for central-battery automatic-signal switchboards.

In the system shown the improvement of my invention lies in the means for automatically controlling the connection of the central-office operator's telephone set with the plug-circuit. I have shown the usual listening-key *f* in the plug-circuit, which key is adapted when depressed to connect a pair of conductors 8 8, leading to the operator's telephone set *g* in a bridge between the conductors 4 5 of the plug-circuit, so that when said bridge 8 8 is otherwise complete the operator may at any time connect her telephone in circuit or "listen in" by depressing the listening-key. The bridge-circuit 8 8 containing the operator's telephone apparatus is, however, in accordance with my invention, also controlled at the contacts of an electromagnetic switch or relay *h*, which has two armatures included, together with their respective front contacts, in the two limbs of said bridge-circuit. When the relay *h* is excited, therefore, the operator's telephone set may be brought into connection with the plug-circuit by depressing the listening-key; but when the relay is inert the circuit 8 8 is broken and the telephone apparatus cut off. The magnet of the electromagnetic switch or relay *h* is provided with differential windings h' h^2, which are included one in each of the shunt-circuits 7 7, controlled by the supervisory relays *e e*. When one only of said windings receives current, the armatures are drawn up and the telephone apparatus *g* is connected to the listening-key; but when both windings receive current the effects of the two windings neutralize one another and the armatures are not attracted, the telephone apparatus being cut off at the switch-contacts controlled by said armatures.

The operation of the system is, briefly, as follows: The subscriber transmits a call to the central office in the usual way by removing his telephone from its hook, thus closing the line-circuit and bringing about the display of the line-signal. The operator in response to the call inserts the answering-plug of the pair into the spring-jack of the line whose signal is displayed, and bringing her telephone into circuit by depressing her listening-key *f* inquires the number of the subscriber wanted. When the answering-plug is inserted, the local circuit 6 3 is completed, and since the telephone at the substation is off the hook the line-circuit is closed and the relay *e* associated with the answering-plug receives current and draws up its armature, closing the shunt 7, which includes the winding h' of the electromagnetic switch *h*. The circuit through the other differential winding h^2 being still open, the magnet of the switch *h* is excited, so that the circuit 8 8 is completed when the listening-key *f* is depressed, bringing the operator's telephone set *g* into a bridge of the cord-circuit in condition to communicate with the calling party. After having learned the number of the subscriber wanted the operator after making the usual "busy test" if the line tested is free inserts the other or calling plug of the pair into the corresponding spring-jack and transmits a call-signal by depressing her ringing-key, at the same time restoring her listening-key to the normal position. Until the called subscriber responds the operator may, if she wishes, connect her telephone in circuit with the calling-line by means of her listening-key; but when the called party answers the signal and takes his telephone from its hook the circuit of the line is thus closed and the supervisory relay *e* associated with the calling-plug is excited by current flowing in the called line, so that it draws up its armature and closes the shunt 7, which includes the differential or neutralizing winding h^2 of the electromagnetic switch *h*. The armatures of said switch are therefore released and the operator's telephone-circuit 8 8 broken, so that the listening-key *f* is no longer effective to bring the telephone into circuit. The operator's telephone is thus automatically excluded upon the response of the called party, making it impossible for the operator to listen in while the subscribers are in conversation. If, as sometimes happens, one of the subscribers should want another connection, he may keep his telephone to his ear after the other subscriber has replaced his telephone upon its hook. Only one of the supervisory relays—namely, the one associated with the line which is still closed—will be excited, so that only one of the differential windings h' h^2 will receive current. The magnet of switch *h* will therefore attract its armatures, closing the circuit 8 8 and making it possible for the operator to bring her telephone into circuit to place herself in communication with the subscriber.

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

1. The combination with two telephone-stations with their telephone instruments, and line conductors adapted to unite them in circuit for conversation, of a telephone-switch at each station controlling the line-circuit, a third telephone adapted to be brought into the circuit to communicate with the telephone at one of the stations, electromagnetic switch mechanism controlling the connection of said third telephone with the circuit, and means controlled through the joint agency of the said

telephone-switches at the other stations for operating said electromagnetic switch mechanism.

2. The combination with two telephone-lines extending from substations to a central office, and switching apparatus at the central office for uniting the lines, of a source of current connected with the united lines, a telephone-switch at the substation of each line, controlling the flow of current therein, an operator's telephone at the central office, a switch controlling the connection of said telephone with the circuit, and means controlled jointly by the telephone-switches at the two substations, for operating said switch, the operator's telephone being thereby automatically disconnected when the telephones are in use at both stations.

3. The combination with a calling and a called line and central-office switching apparatus for uniting them in circuit, of a source of current in the circuit of the united lines, a telephone-switch at the substation of the called line, controlling the flow of current therein, a relay in the path of current so controlled, an operator's telephone, and a switch controlled by said relay, controlling the connection of the operator's telephone with the circuit, said switch being responsive to said relay at all times during a connection, whereby said telephone is automatically connected or disconnected according to the position of the telephone-switch at the called station.

4. The combination with two telephone-lines extending from substations to a central office, of switching apparatus at the central office for uniting the lines in a circuit, a telephone-switch at each substation controlling the line-circuit, a source of current in a bridge of the circuit, relays, one in the path of current to each substation, an operator's telephone, an electromagnetic switch controlling the connection of said telephone with the circuit, differential magnet-windings for said switch, and local circuits including said windings, controlled respectively by said relays.

5. The combination with telephone-lines extending from substations to spring-jack terminals at a central-office switchboard, each line having a switch controlling the circuit, closed in the use of the substation-telephone, of a pair of plugs and their plug-circuit for uniting any two lines, an operator's telephone, a listening-key adapted to connect said telephone with the plug-circuit, two magnet-windings h' h^2, means controlled by the telephone-switches at the substations of the lines which are united by the plug-circuit for energizing said magnet-windings respectively, and blocking mechanism controlled by the simultaneous excitation of both of said windings, for rendering the listening-key ineffective to connect the operator's telephone in circuit, whereby the operator is prevented from listening in while the two subscribers are in conversation.

In witness whereof I hereunto subscribe my name this 27th day of November, A. D. 1901.

EDWIN H. SMYTHE.

Witnesses:

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W. W. LEACH.