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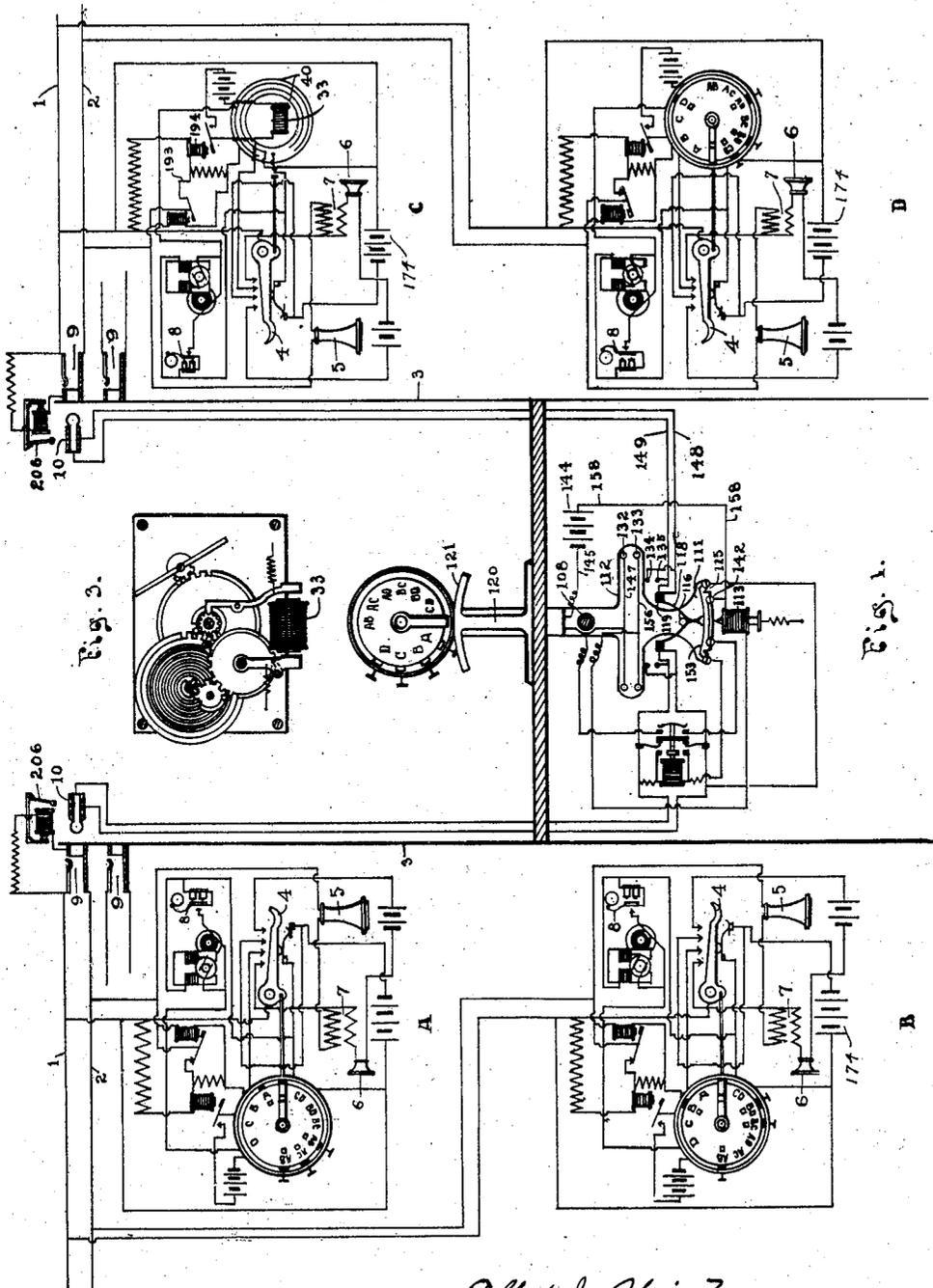
PATENTED MAY 31, 1904.

A. J. SPRINGBORN.  
SELECTIVE PARTY LINE TELEPHONE SYSTEM.

APPLICATION FILED JUNE 27, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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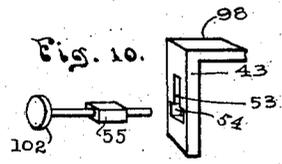
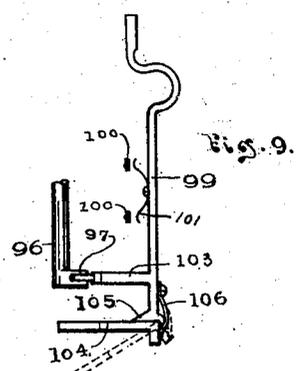
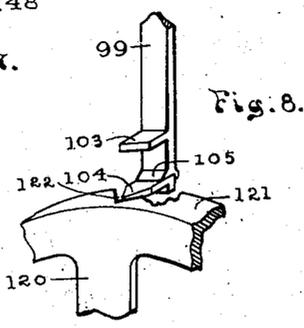
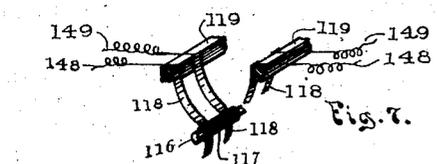
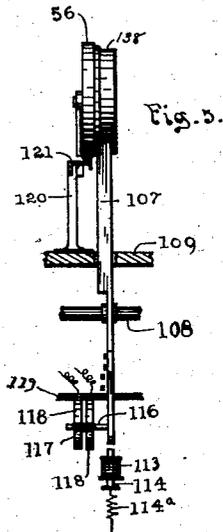
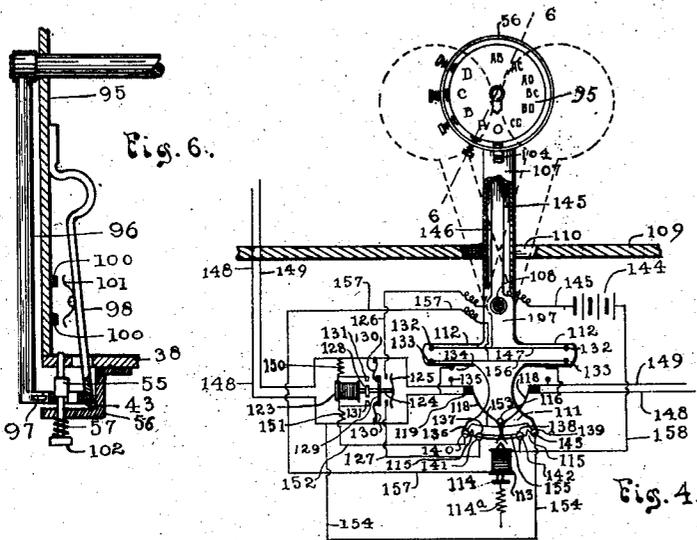
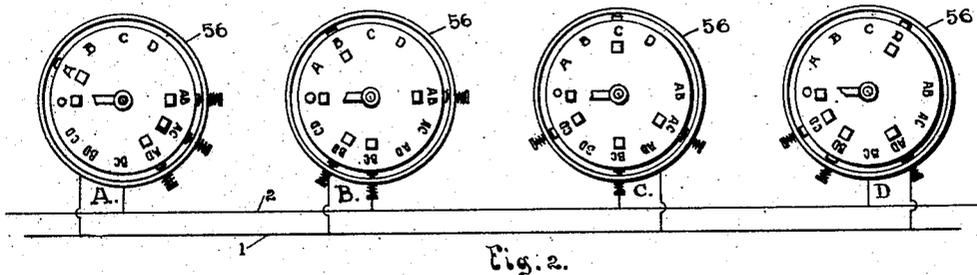
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2 SHEETS—SHEET 2.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

ALBERT J. SPRINGBORN, OF CLEVELAND, OHIO.

## SELECTIVE PARTY-LINE TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 761,616, dated May 31, 1904.

Original application filed April 3, 1903, Serial No. 150,999, Divided and this application filed June 27, 1903. Serial No. 163,304. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT J. SPRINGBORN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Selective Party-Line Telephone Systems, of which the following is a specification.

This application relates to an invention in party-line telephone systems, the same being a division of my former application, filed April 3, 1903, Serial No. 150,999. As was stated in said application, this invention is an improvement on the system shown and described in my pending application, filed June 12, 1901, Serial No. 64,302; and its objects are to render said system more automatic in its operation and to make the apparatus simpler in its construction and its electrical connections. These objects I attain in the system illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view of two party-lines, each being provided with two substations and each extending to the central station, the connections and apparatus in which are shown. Fig. 2 is a diagrammatic view of a party-line which is provided with four telephones or substations in parallel, showing the dials for the selecting devices. Fig. 3 is a view of the clockwork for operating the selecting devices at both the central and substations. Fig. 4 is an enlarged front view of the central selecting device and its electrical connections. Fig. 5 is a side view of the selecting device shown in Fig. 4. Fig. 6 is a sectional view of the same, taken on line 6-6 of Fig. 4; and Figs. 7, 8, 9, and 10 are detail views of portions of the central selecting apparatus.

In the telephone system herein described I have sought to make the operation entirely automatic and to relieve the operator at the central station of as much labor as possible.

In the drawings, in which similar reference characters designate corresponding parts throughout the several views, 1 and 2 represent the main wires of party-line telephones, one set of said wires in Fig. 1 being connected

with substations A and B and another set being connected with substations C and D. All of said sets of wires lead to a switchboard 3 at the central station, which board is shown divided, so as to more clearly illustrate the electrical connections.

In each of the telephones shown 4 designates the hook upon which the receiver 5 is adapted to hang in the usual manner. 6 is the transmitter, the circuit from which leads through the primary of the induction-coil 7. 8 designates the call-bell, which is preferably of the ordinary make-and-break circuit form.

At the central station 9 represents the ordinary jacks of the switchboard, and 10 the plugs for the same.

This system depends for its operation upon a series of selecting devices, one for each substation, and also upon one or more of a somewhat different form of selecting device at the central station. In order for these devices to always select the particular party with whom connection is desired to the exclusion of all other parties on the line, it is necessary for them to move synchronously. To accomplish this result, I provide each selecting device with clockwork mechanism. This mechanism is shown and described in my said pending applications, and it is thought to be unnecessary to repeat the description here, further than to state that it is wound up and its movements are controlled from an electromagnet 33. Each selecting device has a dial face, as appears from substations A, B, and D of Fig. 1, and back of this face are a pair of concentrically-arranged conducting-rings 40. A hand 45, that is driven by the clockwork, turns in front of the dial and controls certain of the electric circuits therein by depressing contact-fingers that when released bridge across the conducting-rings. These contact-fingers are so arranged in the various selecting devices on the same line that, except when two parties on that line desire to talk, the dial-hands will depress but one finger on the line at a time, (see Fig. 2,) which operation will result in stopping all the dial-hands at the position occupied by that finger. Certain mechanisms

(not herein shown) lock and unlock the telephone receiver-hooks, the construction being such that when a spring-finger is depressed by a dial-hand the current will be broken, the dial-hands stopped, and the receiver-hook on the telephone having that spring-finger will be unlocked, while all other hooks will remain locked and their telephones inoperative. When the dial-hands are on zero position, the rings 40 are connected and all receiver-hooks are unlocked; but when one party lifts his receiver a current from his battery 174 controls circuits that simultaneously start all the selecting devices on the line. At the same time a signaling device 206 at central station is operated, which indicates to the operator there that some one on the party-line is calling. She accordingly inserts plug 10 into jack 9 and ascertains what connection is desired.

The selecting device at the central station is similar in many respects to those at the substations, the construction of which has thus been briefly outlined. It has a dial 95, upon which are the letters "A," "B," "C," "D," "AB," "AC," "AD," "BC," "BD," and "CD," as well as the zero (O,) and over the face of the dial turns the dial-hand 96.

Mounted on the inner face of the outer dial 95 are a pair of conducting-rings 100, which are bridged under conditions presently set forth by spring contact-plates 101. The outer rim 38 of the selecting device is surrounded by an annular flange 56, and in this rim and flange are guided radial keys 102. These keys, which are shown in detail in Fig. 10, have a central stem, midway the length of which is a rectangular-shaped enlargement 55. The forwardly-bent portion 43 of the spring-finger 98 is provided with a slot that has a narrow part 53 and a wide part 54. The enlargement 55 of the key 102 normally rests in the wide part of the slot, as shown in Fig. 6, at which times the arm is depressed. The key is normally held in an outer position by a spring 57, that is coiled about the central stem. The operation of a key 102 releases the corresponding spring-arm 98, which snaps forward and closes the circuit between the conducting-rings 100. The special arm 99 (see Figs. 8 and 9) is provided with a forward projection 103, upon which the roller 97 of the dial-hand 96 rests when it is in its zero position, at which time its spring-plate 101 is out of contact with the conducting-rings. The arm 99 is extended beyond the projection 103, and on its extreme outer end it has a finger 104 pivoted thereto. A flange 105 just inside the finger prevents an inward movement beyond the position shown, while the finger can be readily depressed, as indicated in dotted lines. A spring 106 tends to hold the finger in its inner position.

The central selecting device is in my improved system mounted upon the upper end of a hollow standard 107, that is pivoted on

a rod 108, preferably below a table or board 109, through which the standard projects and through a slot 110, in which it can swing back and forth, as indicated in dotted lines in Fig. 4. Below the pivot the standard is preferably flattened and is of a shape resembling somewhat an inverted cross, having the lower depending part 111 and the outstretched arms 112. 113 is a solenoid through which extends a plunger 114, the upper end of which is wedge-shaped. The lower end of the depending part 111 is formed on an arc concentric with the pivot 108, and near each of its outer edges it is provided with notches 115, into which the end of the plunger 114 engages when the standard 107 is swung, so that the latter will be temporarily held against return. A spring 114<sup>a</sup> normally holds the plunger retracted. A pin 116, covered with insulating material, as indicated at 117, projects from the face of the depending part of the standard between fixedly-mounted conducting-springs 118, (see Fig. 7.) said springs returning the standard to and holding it in vertical position when it is released by the plunger. These springs are mounted upon bars 119 and are insulated from one another, the bars being preferably formed of insulating material. They and the rod 108 will also preferably be made of considerable length, so as to accommodate a series of selecting devices arranged in alinement. The construction and connections will be the same in all selecting devices, however, so that such a series is not illustrated.

120 is a stationary arm that is mounted upon the table 109 opposite the slot 110, the same extending upwardly to a point almost opposite the hinged finger 104 of the arm 99, where it is provided with a cam-flange 121, said flange being curved, so as to be coaxial with the rod 108. At the center of the flange is a notch 122, into which the finger 104 projects when the standard is in vertical position and the dial-hand is returned to zero. When the selecting device is swung to either side, the finger moves opposite the flange 121, which prevents the arm from moving forwardly to bridge the conducting-rings 100. In order to permit the same to move, however, it is only necessary to depress the end of the finger 104 below the plane of the flange, when contact will be made.

123, Fig. 4, is a solenoid into which extends a plunger 124. This plunger carries at its end opposite the solenoid a spring contact-plate 125, that is adapted to bridge across the space between the wires 126 and 127 and connect them electrically when the solenoid is energized. The plunger also carries, beside its armature 128, a plate 129, to the ends of which are secured blocks of insulating material, as shown. Pressing against these blocks and normally retracting the plunger are spring-contacts 130, which are secured to stationary parts of the apparatus and which are

adapted to be pressed against stationary contacts 131 when the plunger is drawn back by the solenoid.

The outer ends of the arms 112 of the standard 107 are each provided with a pair of contact-points 132 and 133, which when the standard is moved are adapted to contact with a pair of stationary contacts 134 and 135, respectively. The lower end of the standard is provided with contacts 136, 137, 138, and 139, which when the standard is in a vertical position contact with stationary points 140, 141, 142, and 143, respectively.

144 is a battery or other source of electric power at the central station that furnishes the necessary current for setting the lines in condition. Connected with the positive side of the battery is a wire 145, that is passed up the hollow of the standard 107, so as to control an electromagnet. (Not shown, but just like the magnets 33 illustrated in Figs. 1 and 3.) Below this magnet on the return-circuit I shall designate the wire 146. At its lower end it is connected to the middle of a wire 147, that is carried by the arms 112 and terminates at each end in a contact-point 132. The wire 126, above referred to, is connected with wire 146 just opposite the rod 108. 148 and 149 are the conductors in the cables that lead to the plugs 10, (see Fig. 1,) and these conductors are connected to the spring-contacts 118. (See Fig. 7.) They are also connected with the contact-points 134 and 135, respectively. The spring-contacts 130 are connected with the conductors 148 and 149, and said conductors are short-circuited through them when the solenoid 123 is energized. This solenoid is connected, through a resistance 150, with the conductor 149 and through another resistance 151 and wire 152 with the terminal 140, which is normally in contact with terminal 136. The contact 136 is connected with contact 139 by means of a wire 153, that is carried by the lower part of the standard 107. The contact 139 normally has electrical connection with the terminal 143, and this is connected, through the wire 154, with the conductor 148. From this it will be seen that when the standard is in a vertical position the conductors 148 and 149 are connected through the solenoid 123 and resistances 150 and 151.

The wire 127 is connected with the contact 141, and the contacts 137 and 138 are connected by a wire 155. The contacts 133 are connected by a wire 156, and with this wire is connected a wire 157, that leads to the solenoid 113. Beyond this solenoid I shall designate this wire 158, said wire leading to the negative side of the battery 144. The wire 158 is also connected with the contact-point 142.

In describing the operation of my system I will first assume that A on one party-line desires to talk with D on another line (see Fig.

1) and that D answers his call. All the dial-hands are at their zero positions when A takes his receiver off his hook. As has heretofore been briefly explained and as is fully described in my pending application, No. 150,199, the release of A's hook causes the closing of circuits at his telephone which control other circuits that include the winding and releasing magnets 33, so that all the selecting devices start and continue running until A's dial-hand reaches the letter "A" on his dial, when the current is broken and all selecting devices are stopped. The signal 206 at the central station being actuated, the operator there plugs into the line in the usual way and ascertains that A wishes to talk with D on the other line. She accordingly depresses the D pin on the central selecting device, which releases the spring-arm 98 at that point and connects the conducting-rings 100, and then she inserts the other plug 10 on the same cable into D's jack 9. She then swings the standard 107 toward D's jack, (the right in Fig. 1,) when a current will be established that flows from battery 144 through the following circuit: line 145, ring 100, contact-plate 101 at the D position, other ring 100, wires 146 and 147, contacts 132 and 134, wire 148 to plug and jack, wire 2 to D's telephone, wire 1 to the jack and plug, wire 149, contacts 135 and 133, wires 156 and 157 to the solenoid 113, and wire 158 to the battery again. This current controls the operation of the dial-hand 96 on the central selecting device and also the means for establishing the local circuits for operating the sub-station dial-hands, and as soon as the hand 96 reaches the D position it depresses the arm 98 and breaks the circuit, so that all the devices on D's line are stopped with the hands at "D." When the standard 107 was swung to establish the above-described circuit, the pin 116 separated the spring-contacts 118, Fig. 7, so that the current could not flow back and disturb A's line, and the standard was held in this position by the plunger 114, which was drawn into the notches 115 by the solenoid 113. When the current is broken, however, the plunger disengages the notches, and the standard is returned by the contacts 118, which close together below the pin 116. A is now in talking-circuit with D.

In the system described in my prior application, No. 150,999, of which this is a division, means are provided whereby each party who has been talking automatically closes circuits for returning the lines to zero. Thus A starts a current that returns all of the selecting devices on his line to zero, and D does the same for his line. This takes place while the plugs 10 are inserted, and as the currents run out on the main lines 1 and 2 the cable-lines 148 and 149 and the conducting-springs 118 are in the circuit or at least have a difference of potential.

In the case above selected, in which A was

talking with D, the dial-hands on D's line having a shorter distance to travel will reach zero sooner than those on A's line, and as a result the current from A's line might disturb the substations on D's line. To prevent this result, I short-circuit the conductors 148 and 149 at the central station through the following connections: wire 154, contacts 143 and 139, wire 153, contacts 136 and 140, wire 152, resistance 151, solenoid 123, and resistance 150. A sufficient amount of current will flow through this circuit to cause the solenoid to close the contacts 130 and 131, which will establish a circuit between the conductors that cuts out the resistance 150 and 151. This short circuit will carry practically all the current and prevent it from flowing through central to the other line to disturb the selecting devices there. Inasmuch as this short circuit is at the central station, where it is removed as far as possible from the substations, the resistance in the main wires leading to the central station will ordinarily be sufficient to force currents through the local circuits at the substations of sufficient strength to operate the delicately-poised circuit-closers there. If, however, it should be found that the current flows too freely through this short circuit, more resistance will be placed therein, this short circuit being merely intended to keep a current from passing to the other line of sufficient strength to disturb the selecting devices thereon.

As was previously stated, when the circuit was broken in the central selecting device the standard 107, carrying the said device, returned to its vertical position. As the clockwork mechanism in this device is the same as that at the substations, the dial-hand 96 must have been stopped at "D." While mechanical means could easily be adapted to return this hand to zero, I prefer to have this done automatically, however, when the lines are being reset, and for this purpose I provide the solenoid-plunger 124 with the contact-piece 125, which is adapted to connect the wires 126 and 127. When, therefore, A and D hang up their receivers, the return to zero-currents energizes the solenoid 123, as above described, and draws the contact-piece into position to bridge across the wires 126 and 127, so that a current can flow from battery 144 through the following connections: wire 145 to the central selecting device where it releases the clockwork mechanism as in the other devices, wires 146 and 126, contact-piece 125, wire 127, contacts 141 and 137, wire 155, contacts 138, and 142, and wire 158 to the battery. The dial-hand 96 presses back the special spring-arm 99 (see Fig. 9) when it reaches the zero position and breaks the connection between the conducting-rings 100, so that the current will be broken and the dial-hand stopped, although the current in A's line may keep the contact-piece 125 bridged for a short time longer.

When the central selecting device is swung for the purpose above described, the pivoted finger 104 rides over the flange 121, which depresses the spring-arm 99 and breaks the bridge between the conducting-rings 100 at the zero-point; otherwise the dial-hand would not stop at "D," but would come entirely around to zero. It will also be remembered that when the dial-hand passed "D" the spring-arm at that point was pressed inwardly until the squared part 55 of the key 102 engaged in the slot in the spring-arm and held it depressed after the dial-hand moved on. I will assume now that D does not answer A's call, in which case it is necessary to return his line to zero from the central station. When this line was turned to "D," the current was broken from the central station and the standard 107 rose into vertical position, as previously described, with the dial-hand at "D" and the conducting-rings 100 bridged at zero. When the central operator becomes satisfied that D will not answer his call, she again swings the standard 197, as before, and at the same time depresses the pivoted finger 104, so as to bring it below the flange 121. The arm 99 is not depressed, therefore, as was previously the case, and as soon as the circuit is established at the contacts 132, 133, 134, and 135 the current will again flow from the central battery through D's line and will continue until the dial-hand 96 reaches zero, when it will depress the special arm 99 and break the circuit, after which the standard 107 and finger 104 return to their normal positions.

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

1. In a telephone system, a movable selecting device, a cable having a pair of plugs, said cable being separable intermediate its length, conductors in said selecting device, means for connecting said conductors within the selecting device, a source of electric power, and connections whereby the movement of the selecting device opens the cable and places the source of power in a circuit with one of the plugs and with the selecting device.

2. In a telephone system, a movable selecting device, a cable having a pair of plugs, said cable being separable intermediate its length, a pair of conductors in the selecting device, means within said device for connecting said conductors, a source of electric power, connections whereby the movement of the selecting device opens the cable and places the source of power in a circuit with one of the plugs and the selecting device, and means within the said selecting device for breaking the connections therein after a predetermined time.

3. In a telephone system, a central station, a selecting device at the central station, said device being mounted upon a pivoted standard, a cable having a pair of plugs, said cable being

separable at a point opposite the standard, a plurality of contact-points on the standard, a battery or other source of electric power and means whereby the swinging of the standard opens the cable and places the battery in a circuit with one of the plugs.

4. In a telephone system, a central station, a selecting device at the central station, said device being mounted upon a pivoted standard, a cable having a pair of plugs, said cable being separated at a point opposite the standard, a plurality of contact-points on the standard, a battery, and means whereby the swinging of the standard in one direction opens the cable and places the battery in a circuit with one of the plugs, and the swinging of the standard in the other direction opens the cable and places the battery in a circuit with the other plug.

5. In a telephone system, a central station, a selecting device at the central station, said device being mounted upon a pivoted standard, a plurality of main lines extending from said central station, a cable at said station through which a plurality of said lines may be connected, said cable being separable intermediate its length, a source of electric power, as a battery, at the said station, means whereby the movement of the selecting device standard

opens the cable and places the battery in circuit with one of the lines, means in said device for completing said circuit, a solenoid and plunger for holding the standard in its shifted position said solenoid being in the circuit with the cable, and means for disengaging the plunger when the circuit is broken.

6. In a telephone system, a movable selecting device, a cable having a pair of plugs, said cable being separable intermediate its length, a pair of conductors within the selecting device, means for connecting the said conductors with the said device, a source of electric power, connections whereby the movement of the selecting device in one direction opens the cable and places the source of power in a circuit with the other plug and the selecting device and means within the selecting device for breaking the connections between the conductors therein after the current has flowed for a predetermined time.

In testimony whereof I affix my signature in the presence of two witnesses.

ALBERT J. SPRINGBORN.

Witnesses:  
S. E. FOUTS,  
C. N. FISCUS.