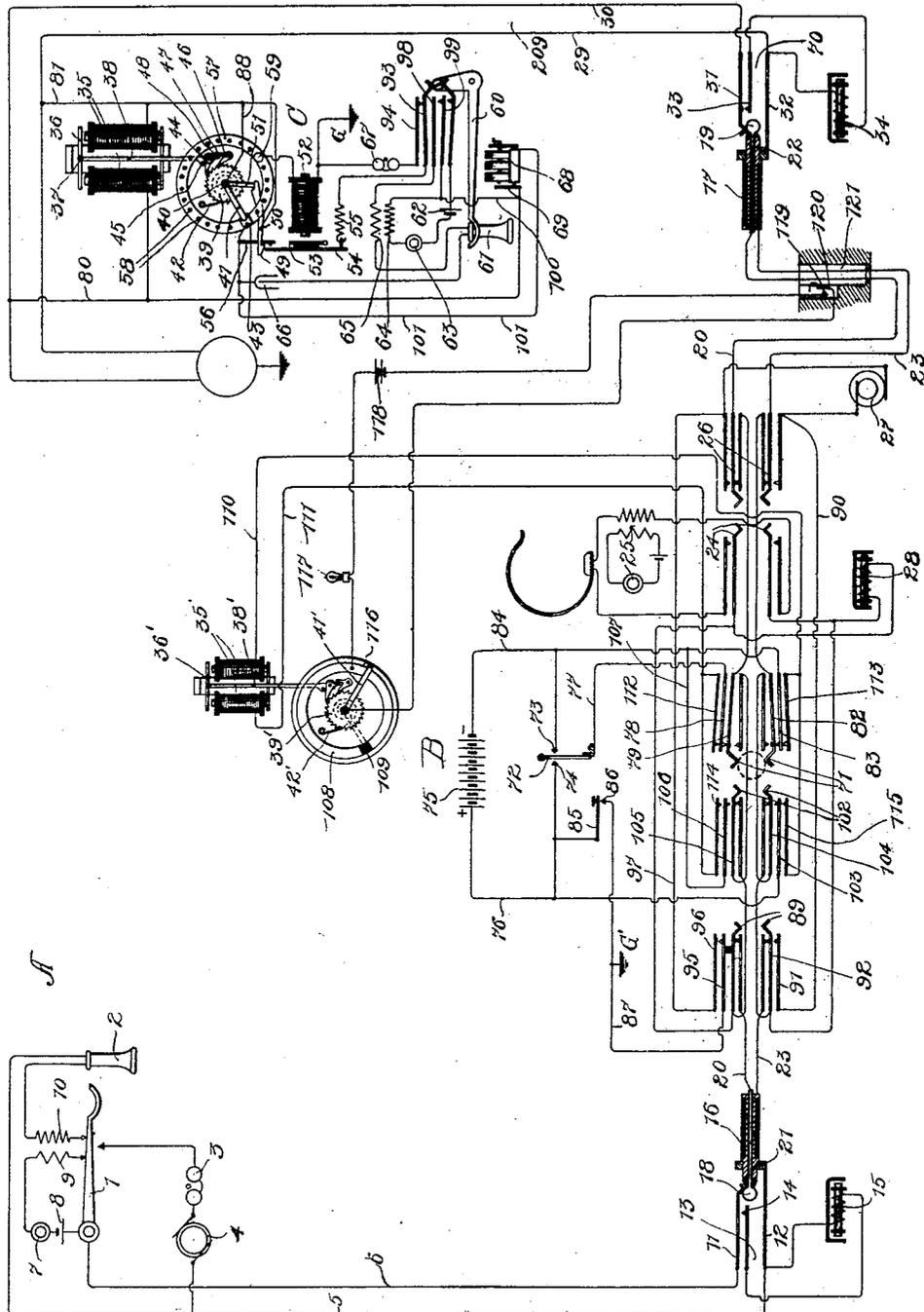


G. BABCOCK.
SELECTIVE SIGNALING SYSTEM.

APPLICATION FILED JULY 17, 1903.

NO MODEL.



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SELECTIVE SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 750,793, dated February 2, 1904.

Application filed July 17, 1903. Serial No. 166,027. (No model.)

To all whom it may concern:

Be it known that I, GARRISON BABCOCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Selective Signaling Systems, (Case No. 4,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to selective signaling systems, and is particularly useful in conjunction with telephone-exchange systems in which selective signaling apparatus is employed.

In accordance with my invention telephone-lines are provided, each line leading from a central exchange to a series of substations, at each of which selective signaling apparatus is located. Means are provided at the central exchange by means of which any one substation may be signaled without effecting the actuation of similar signaling apparatus installed at the other substations connected with the same line. Means are also provided whereby the central operator may cause the connection of telephone apparatus at any one substation with the telephone line-limbs and whereby the substation apparatus at the other substations may be locked out to prevent its use by the subscribers thereat. It is desirable in the operation of such a system that means be provided whereby a central-station operator may restore the substation selective apparatus to its normal condition when the line is not in use for conversational purposes.

In a copending application, Serial No. 157,633, Filed May 18, 1903, I have shown automatic means located at the central station adapted to give the operator a positive signal in case of her failure to restore the line to its normal condition. This restoring-signal is there shown to be associated with the line signaling device located at the central station, and it is necessary for the installation of the restoration-signal there shown to provide special or extra spring-jack contacts.

In order that a selective signaling system such as that disclosed in my said copending ap-

plication may be readily installed where switchboards having old spring-jacks with a limited number of contacts are employed, I have invented the devices and arrangements herein shown, in which the restoring signaling device is associated rather with an operator's cord-circuit than with the telephone line-circuits. If in the use of a system constructed in accordance with my present invention an operator fails to restore a telephone party-line to its normal condition before breaking the connection with her cord connecting apparatus, a positive signal is actuated to notify the operator of her failure to restore the line.

My invention will be clearly understood by reference to the accompanying drawing, in which—

At A I have illustrated a subscriber's substation of the generator call type. The switch-hook 1 when in its normal depressed condition, due to the weight of the receiver 2, serves to connect the call-bell 3 and the signaling-generator 4 in circuit with the telephone line-limbs 5 and 6, which lead to the central station B. When relieved of the weight of the receiver 2, the switch-hook 1 assumes its alternate position, whereby a local circuit is closed through the battery-transmitter 7, the battery 8, and the primary 9 of the induction-coil, whose secondary 10 is connected with the receiver 2. The removal of the receiver 2 from the switch-hook 1 also serves to connect the telephone instruments with the line-limbs. The telephone line-limbs lead to the central exchange, where they are connected one with the tip-spring 11 and the other with the sleeve-contact 12 of the spring-jack 13, this spring-jack being provided with a third contact 14, between which and the sleeve-contact 12 the visual line-signal 15 is connected.

An operator's cord-circuit is shown comprising an answering-plug 16 and a calling-plug 17, whose tip-contacts 18 and 19 are connected by means of the tip-strand 20 and whose sleeve-contacts 21 and 22 are connected by means of the sleeve cord-strand 23. Associated with the operator's cord-circuit is a listening-key

24, which when manipulated serves to connect the operator's telephone set 25 in bridge of the cord-strands. A manipulation of the ringing-key 26 serves to connect the singaling-generator 27 in bridge of the cord-strands. The clearing-out drop 28 is also connected with the cord-strands, as shown. The other features of the operator's cord connecting apparatus will be hereinafter more fully described.

At the right of the drawing I have illustrated a metallic telephone-line 209, to which any desired number of substations may be connected. The line-limbs 29 and 30, comprising this party-line, lead from the spring-jack contacts 31 and 32 to a series of substations, the instruments at the substation C being diagrammatically illustrated in detail, while the apparatus at the other substations connected with this line are not represented.

An electrical connection between the tip-jack spring 31 and the third contact 33 serves normally to connect the line-signal 34 with the telephone line-limbs. At the substation C, I have diagrammatically illustrated an electromagnet 35, whose winding is permanently connected in bridge of the line-limbs 29 and 30. This electromagnet is provided with a polarized armature 36, pivotally mounted at 37 and provided with a lever 38. A ratchet-wheel 39 is mounted upon a shaft 40, which carries at its upper end a switch-arm 41. A suitable spring 42 tends to cause a clockwise rotation of the shaft 40 and the parts mounted thereon, the clockwise rotation of the switch-arm 41 being limited, however, by the insulated normal contact 43. The lever 38 is provided at its extremity with a pivoted dog 44, a stop 45 being provided to limit the backward swing of this dog. A relatively stationary pawl 46 is mounted upon the frame of the selective instrument, this pawl being provided with a projecting pin 47, adapted to be engaged by a depending arm 48, forming a part of the dog 44.

The passage of a current through the coils of the electromagnet 35 in one direction causes a movement of the lower extremity of the lever 38 toward the shaft 40, whereby the dog 44 is made to engage a tooth of the ratchet-wheel to cause a one-step-forward advancement thereof, the pawl 46 dropping into the next successive tooth to check and prevent the backward rotation of the ratchet-wheel upon the deenergization of the electromagnet 35, suitable spring mechanism (not shown) being provided to cause the armature 36 and the lever 38 to return to their normal intermediate position.

An energization of the electromagnet 35, due to the passage of a current therethrough in a reverse direction, causes a movement of the extremity of the lever 38 away from the shaft 40, whereby the depending arm 48 of the dog 44 engages the pin 47, carried by the pawl 46, whereby the ratchet-wheel 39 is dis-

engaged from both the dog 44 and the pawl 46 to permit the clockwise rotation of the shaft 40 and the parts carried thereby due to the tension of the spring 42.

A trip-lever 49 is pivotally mounted at 50, and a trip-arm 51 is carried by the shaft 40 in such a position as to engage the end of the trip-lever 49 when the switch-arm 41 is in its normal position, as shown.

A second electromagnet 52 serves when energized by the passage of an electric current therethrough to cause an attraction of its armature 53, to which is attached the switch-arm 54, this switch-arm being normally held in its retracted position by means of a spring 55. The front contact 56 for the switch-arm 54 is connected with the normal contact 43. When the trip-lever 49 is not engaged by the trip-arm 51, the trip-lever 49 serves to engage the end of the switch-arm 54 to retain the latter in its forward attracted position after having been brought into this position due to the energization of the electromagnet 52.

Concentrically mounted with respect to the shaft 40 is a metal ring 57, this ring being provided with a series of equally-spaced holes the pitch of which is equal to that of the teeth of the ratchet-wheel 39. A contact-pin 59 is inserted in one of the holes 58. At each of the substations connected with any one line a similar pin is inserted in one of the holes of the ring 57, the pin at each substation, however, being inserted in a different hole from that in which a pin at any other substation is inserted. Thus the first substation connected with a given line may have this contact-pin 59 inserted in the first hole, the second substation may have this pin inserted in the second hole, the third substation may have this pin inserted in the third hole, and so on. The pin at substation C only is inserted in the sixth hole of the ring 57. The contact 43 is insulated from the metal ring 57, and the ring 57, as well as the contact 43, is insulated from the frame of the instrument, with which the switch-arm 41 is in electrical connection.

A switch-hook 60 serves when in its normal depressed position, due to the weight of the telephone-receiver 61, to open a local circuit through the battery 62, the transmitter 63, and the primary 64 of an induction-coil whose secondary 65 is adapted for inclusion in circuit with the receiver 61. A condenser 66 is serially connected with the receiver 61. The call-bell 67 is connected with the ground G when the switch-hook is in its normal depressed position with the switch-arm 54. A pulsating direct-current generator 68, provided with an automatic switch 69 for opening the armature-circuit when the generator is not being operated, is connected with the line-limb 30 and the normal contact 43.

The operation of a party-line telephone system constructed in accordance with my in-

vention may be described as follows: A subscriber at substation A desiring a telephone connection operates his ringing-generator 4, thereby causing a current to traverse the line-limbs to actuate the visual signal 15 at the central station. After thus manipulating the ringing-generator subscriber at substation A removes his receiver 2 from the switch-hook. The operator at the central station answers the signal given by the visual drop 15 by inserting the answering-plug 16 within the jack 13. The insertion of this plug within the jack breaks the connection through the line-signal 15, which the operator may also manually restore to its normal condition. After thus establishing a connection with the line to substation A the operator manipulates her listening-key 24 to connect her telephone set 25 with the cord-circuit, and thereupon communicates with the subscriber at substation A to learn the number of the telephone-line or substation with which connection is desired. Learning that a connection with substation C on party-line 209 is desired, the operator inserts her calling-plug 17 within the jack 70, with which the line-limbs 29 and 30 are connected. The apparatus at substation C is normally in the condition illustrated in the drawing. It is now necessary for the operator to connect the signaling instruments and the telephone instruments at substation C with the line-limbs 29 and 30 and to cause such an actuation of the selective devices at the substations connected with the line 209 that other subscribers cannot interfere with the use of the line by the subscriber at substation C. In order to accomplish this result, the operator depresses the button associated with the calling-key 71. She thereupon manipulates the calling-switch 72 to make a series of contacts or connections with the front contact 73 and alternately with the back contact 74. It will be seen that an electrical connection between the switch 72 and the contact 73 causes a short circuit of the cord-strands connected with the calling-plug 17, whereby the line-limbs 29 and 30 are short-circuited at the central exchange to cause a discharge of any static accumulation that may exist in the telephone-line or the selective instruments connected therewith. The succeeding connection with the contact 74 causes the closure of a circuit, which may be traced as follows: from the positive pole of the selecting-battery 75 through conductor 76, contact 74, switch 72, conductor 77, contact-spring 78, contact-spring 79, tip-cord strand 20, tip-contact 19, tip-spring 31, line-limb 30, conductor 80, the coils of the electromagnet 35, conductor 81, line-limb 29, sleeve-contact 32, sleeve-contact 22, sleeve-strand 23, contact-spring 82, contact-spring 83, and conductor 84, leading to the negative pole of the battery 75. The passage of current through the electromagnet 35 in the direction caused by the closure of this circuit causes an attrac-

tion of the armature 36 to produce a one-step-forward advancement of the ratchet-wheel 39 and the switch-arm 41, operatively associated therewith. The switch 72 is then brought into contact with the contact 73 to again discharge any static accumulation which may have been caused in the line-circuit. The succeeding connection with the back contact 74 causes the passage of another current impulse to cause the one-step advancement of the switch-arm at the substation C. As the selective apparatus at all of the other substations connected with line 209 is similar to that at substation C and similarly connected to the line-limbs and to the ground, the current impulses sent out over the line-limbs 29 and 30 will also cause the synchronous step-by-step advancement of the switch-arms at all of the substations on line 209. A number of impulses is sent out over the line-limbs 29 and 30, this number being at least one greater than the number of one-step advancements required to bring the switch-arm 41 into engagement with the contact-pin 59 farthest removed from the normal contact 41. After six impulses have been sent out over the line-limbs it will be apparent that the six corresponding one-step advancements of the switch-arm 41 at substation C will have brought the switch-arm 41 into contact with the pin 59 inserted in the sixth hole of the metal ring 57. After having thus established an electrical connection between the ring 57 and the switch-arm 41, which is electrically connected with the shaft 40 and other parts of the mechanism and frame of the selective instrument, and while this electrical connection is still maintained the central operator depresses the cut-in key 85 to make connection with the contact 86. It being remembered that the switch-arm 41 at substation C is now in contact with the contact-point 59 and that the switch-arms at the other substations connected with line 209 have been given six one-step advancements from their normal position and that at no other substation connected with line 209 is there a contact-point 59 in the sixth hole of the ring 57, the following circuit may be traced: from the positive pole of the battery 75, to the conductor 76, cut-in key 85, contact 86, conductor 87, ground G', ground G at substation C, the electromagnet 52, metal ring 57, contact-point 59, switch-arm 41, shaft 40, conductor 88, conductor 81, line-limb 29, sleeve-socket 32, sleeve-contact 22, sleeve-strand 23, contact-spring 82, contact-spring 83, and conductor 84, to the negative pole of the battery 75. The consequent energization of the electromagnet 52 causes the attraction of the armature 53, whereby the insulated telephone switch-arm 54 is brought into connection with the contact 56, the trip-lever 49 being disengaged by the trip-arm 51, which has advanced with the switch-arm 41, dropping into place to catch and retain the telephone switch-arm 54 in its

forward position in connection with the contact 56. The succeeding current impulses sent out over the line-limbs 29 and 30 by the succeeding manipulations of the switch 72 caused a continued forward advancement of the switch-arms 41 until none of the switch-arms is in contact with a contact-point 59. The operator then manipulates her selective ringing-key 89, thereby causing the closure of the following circuit: from one terminal of the ringing-generator 27, through conductor 90, contact-spring 91, contact-spring 92, sleeve cord-strand 23, sleeve-contact 22, sleeve-socket 32, line-limb 29, conductor 81, trip-lever 49, telephone switch-arm 54, retracting-spring 55, contact-spring 93, contact-spring 94, call-bell 67, ground G at substation C, ground G' at central station, conductor 87, contact-spring 95, contact-spring 96, and conductor 97, to the other terminal of the ringing-generator 27. The signal produced by the actuation of the call-bell 67 calls the subscriber at substation C to his phone. The call-bell at no other substation connected with line 209 will be actuated, for the reason that none of the other switch-arms 54 has been attracted by the energization of the associated electromagnet 52. The subscriber at substation C answers the call produced by the ringing of his bell 67 and removes his receiver 61 from the switch-hook 60. The telephone-circuit through his telephone instruments may be traced as follows: from line-limb 29, through conductor 81, trip-lever 49, telephone switch-arm 54, contact 56, condenser 66, receiver 61, secondary 65, contact-spring 98, contact-spring 99, conductor 100, and conductor 80, to line-limb 30. Upon the completion of the conversation of the connected subscribers either one or both manipulates his signaling-generator, causing the passage of current through the clearing-out drop 28, connected in bridge of the cord-circuit, whereby the operator is given a clearing-out signal notifying her that the subscribers have completed their conversation. Before removing the plugs of her cord-connecting apparatus from the line-jacks it is necessary that the operator should restore the selective signaling instruments to their normal condition. This is necessary, for the reason that any subscriber connected on the party-line can signal the central office only when the selective signaling instruments are in their normal condition. When the switch-arm 41 is in electrical connection with the normal contact 43, a manipulation of the pulsating-current generator 68 at any substation on line 209 can cause an actuation of the line-signal 34 at the central station, the circuit being traced as follows: from the generator-switch 69, through conductor 80, line-limb 30, tip-spring 31, third contact 33, line-signal 34, line-limb 29, conductor 81, conductor 88, shaft 40, switch-arm 41, normal contact 43, and conductor 101, to generator 68. In the same manner a talking-

circuit may be traced from the line-limbs through a connection between the switch-arm 41 and the contact 43 to the telephone instruments at any and all of the substations on line 209. This normal circuit is necessary in order that any substation may signal the central office and communicate with the operator thereat to notify her of a telephonic connection which may be desired.

In order to lock out other parties on the telephone-line in order that they may not interfere with the conversation and use of the line by a proper party, the switch-arms 41 are advanced from their normal position first to break this normal signaling-circuit and thereafter to permit the connection of the proper substation apparatus with the telephone line-limbs.

It will be apparent that if the operator after the completion of the conversation by a subscriber on the party-line should fail to restore the selective instruments to their normal condition the subscribers on the party-line would have no means of signaling the central office or of communicating therewith. In order to cause the restoration of the signaling apparatus to their normal condition, a releasing-key 102 is provided in association with the operator's cord-connecting apparatus. A manipulation of this key causes the closure of the following circuit: from the positive pole of the battery 75 through conductor 76, contact-spring 103, contact-spring 104, sleeve-strand 23, sleeve-contact 22, sleeve-socket 32, line-limb 29, conductor 81, electromagnet 35, conductor 80, line-limb 30, tip-spring 31, tip-strand 20, contact-spring 105, contact-spring 106, and conductors 107 and 84 to the negative pole of the battery 75.

It will be noted that the releasing-current caused by the closure of this circuit traverses the electromagnet 35 in the reverse direction from that of the current impulses utilized in setting up the selective apparatus. The armature 36 is therefore actuated in the reverse direction to move the lever 38 away from the shaft 40, thereby disengaging the dog 44 and the pawl 46 from the teeth of the ratchet-wheel 39, whereby the spring 42 causes the clockwise rotation of the shaft 40 and the parts mounted thereon to return the switch-arm 41 to its normal position in electrical connection with the normal contact 43.

As the electromagnets 35 at all of the substations are similarly connected in bridge of the telephone line-limbs, the selective apparatus at each of the substations will be restored to its normal condition. After having thus caused the restoration of the signaling apparatus the operator removes the plugs 16 and 17 from the line-jacks.

My present invention relates particularly to a signaling device, to be hereinafter described, for the purpose of notifying the central-station operator in case of her failure to restore

the selective signaling instruments to their normal condition before removing the plugs of her cord connecting apparatus from the line-jacks. This restoring signaling device consists of a dummy selective instrument at the central station which is in many respects similar to the selective instruments at the substations, this dummy instrument being so connected with the cord-circuit that the current impulses which are employed for setting up the party-line also actuate this dummy instrument to cause the closure of one break in a local circuit through a signaling device, such as an incandescent lamp. The local circuit for this incandescent lamp may also include switch-contacts which are controlled by the operative condition or position of some part of the cord connecting apparatus—such, for instance, as that of the calling-plug 17. Thus in the present embodiment of my invention I have shown a plug-seat switch whose contacts are controlled by the position of the calling-plug 17, the local circuit being thus jointly controlled by switch-contacts associated with the dummy selective instruments and by switch-contacts associated with a plug-seat switch for the calling-plug. The illumination of the signaling-lamp may be controlled to indicate to the operator whether or not she has restored the selective apparatus to its normal condition before the removal of the calling-plug from the line-jack.

In the drawing I have illustrated a dummy selective instrument at the central station having parts corresponding with those of the selective instrument at substation C. The electromagnet 35' is adapted to control an armature 36', upon which is mounted and carried a lever 38', to the lower extremity of which ratchet mechanism is attached similar to that described in connection with the selective instrument at substation C. This ratchet mechanism is operated in conjunction with the ratchet-wheel 39' and the spring 42' to control the movement of a switch-arm 41. In place of the metal ring 57, having the holes 58, as shown, at the substation C, the dummy selective instrument at the central station is provided with a plain metal ring 108, at one point in which there is provided a block 109, of insulating material. The switch-arm 41' is normally in the position in contact with the block 109, of insulating material, as shown in dotted lines in the drawing. Conductors 110 and 111 lead from the electromagnet 35' to contact-springs 112 and 113, associated with the calling-key 71 and to contact-springs 114 and 115, associated with the releasing-key 102. A subsequent manipulation of the switch 72 to send current impulses over the line-limbs 29 and 30 to the selective apparatus located on line 209 cause current impulses to traverse the electromagnet 35', the polarization of whose armature is such as to cause a forward step-

by-step advancement of the switch-arm 41' to correspond with that of the switch-arms 41, located at the substations on line 209. A stop-pin 116 may be provided to limit the forward movement of the switch-arm 41'. A manipulation of the releasing-key 102 to send a current impulse through the electromagnets 35 on line 209 in the reverse direction to cause the restoration of the associated selective mechanisms to their normal position also causes the passage of a current impulse through the electromagnet 35' in the reverse direction to cause the restoration of the switch-arm 41' to its normal position in contact with the block of insulating material 109. The signaling-lamp 117 is provided with a local illuminating-circuit, including the battery 118 and the contacts 119 and 120 of a plug-seat switch 121. The contacts 119 and 120 are brought into electrical connection with each other when the plug 17 is seated. The local circuit through the lamp 117 also includes a connection between the switch-arm 41' and the metal ring 108. Normally the circuit through the lamp 117 is broken only by the electrical disconnection between the switch-arm 41' and the metal ring 108, the switch-arm 41' being normally in contact with the block 109 of insulating material. The local circuit through the lamp 117 is normally closed between the contacts of the plug-seat switch, the associated plug being normally seated in its socket. Upon the removal of the plug 17 from the switch-socket when a connection is made with a party-line substation the local circuit for the lamp 117 is also broken at the plug-seat switch. The impulses sent out over the party-line for selecting and lock-out purposes cause the advancement of the switch-arm 41' of the dummy selective instrument to cause a closure of the break in the local lamp-circuit. The lamp does not glow, however, for the reason that the circuit has been broken and is broken at the plug-seat switch during the time that the calling-plug is inserted within the line-jack. If the operator removes the plug 17 from the jack and seats it in the switch-socket without having first restored the selective instruments to their normal condition, the lamp-circuit will have been closed and will be simultaneously closed both at the dummy selective instrument and at the plug-seat switch. The lamp will be caused to glow, therefore, thereby indicating to the central-station operator that she has failed to restore the selective instruments to their normal position. She thereupon inserts calling-plug 17 within the line-jack and manipulates her releasing-key 102 to send a current impulse in the reverse direction through the electromagnets of the selective instruments at the substations and also through the electromagnet 35' of the dummy selective instrument at the central station. The switch-arm 41' is thereby restored to its normal position in contact with the block 109, of insulating material, whereby

the local illuminating-circuit for the lamp 117 is broken, and the plug 17 may be restored to its seat without causing the illumination of the lamp. The common ringing-key 26 herein shown is used only when the cord connecting apparatus is used in establishing telephonic connection between telephone-lines neither of which is a party-line.

I have herein shown and described cord connecting apparatus for connecting a calling-line which is a common line with a called line which is a party-line.

It will be apparent to those skilled in the art that the embodiment of my invention herein shown and described may be so modified as to provide means for connecting lines both of which are party-lines. Furthermore, my invention may be readily applied to cord connecting-circuits adapted for connecting a calling party-line with a called line upon which but a single substation is connected.

Many other modifications of my invention will be apparent to those skilled in the art, and I do not wish to limit myself, therefore, to the precise disclosure herein set forth; but

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

1. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending current impulses in either direction over a telephone-line with which said cord connecting apparatus is connected, an electromagnetic switching device associated with said cord connecting apparatus, said switching device being actuated in one direction upon the actuation of said means to send a current impulse in one direction over said line and in the reverse direction upon the actuation of said means to send a current impulse in the reverse direction over said line, and a signaling instrument jointly controlled by said electromagnetic switching device and by the operative position of a plug of said cord connecting apparatus.

2. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending current impulses in either direction over a telephone-line with which said cord connecting apparatus is connected, an electromagnetic switching device associated with said cord connecting apparatus, said switching device being actuated in one direction upon the actuation of said means to send a current impulse in one direction over said line and in the reverse direction upon the actuation of said means to send a current impulse in the reverse direction over said line, a plug-seat switch, and a signaling instrument jointly controlled by said electromagnetic switching device and said plug-seat switch.

3. In combination, cord connecting apparatus for connecting telephone-lines for conver-

sation, means associated with said cord connecting apparatus for sending a current impulse in either direction over a telephone-line with which said cord connecting apparatus is connected, an electromagnetic switching device associated with said cord connecting apparatus, said switching device being actuated in one direction upon the actuation of said means to send a current impulse in one direction over said line and in the reverse direction upon the actuation of said means to send a current impulse in the reverse direction over said line, a plug-seat switch and a signal-lamp having a local illuminating-circuit jointly controlled by said electromagnetic switching device and said plug-seat switch.

4. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending current impulses in either direction over a telephone-line with which said cord connecting apparatus is connected, an electromagnetic switching device associated with said cord connecting apparatus, said switching device being actuated to close a circuit between switch-contacts thereof upon an actuation of said means to send a current impulse in one direction over said line and to open the circuit between said contacts upon the actuation of said means to send a current impulse in the reverse direction over said line, a plug-seat switch having contacts adapted to be brought into electrical connection when a plug of said cord connecting apparatus is seated in its socket, and a signal-lamp having a local illuminating-circuit including switch-contacts of said electromagnetic switching device and of said plug-seat switch.

5. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending a current impulse in either direction over a telephone-line with which said cord connecting apparatus is connected, an electrically-operated signaling instrument whose controlling-circuit includes switch-contacts adapted to be brought into electrical connection upon the actuation of said means to send a current impulse in one direction over said line and to be electrically disconnected upon the actuation of said means to send a current impulse in the reverse direction over said line, and additional switch-contacts also included in said controlling-circuit and controlled by the operative position of a cord-plug.

6. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending a current impulse in either direction over a telephone-line with which said cord connecting apparatus is connected, an electrically-operated signaling instrument whose controlling-circuit includes

switch-contacts adapted to be brought into electrical connection upon the actuation of said means to send a current impulse in one direction over said line and to be electrically disconnected upon the actuation of said means to send a current impulse in the reverse direction over said line, and a plug-seat switch having contacts included in the controlling-circuit for said signaling instrument.

7. In combination, cord connecting apparatus for connecting telephone-lines for conversation, means associated with said cord connecting apparatus for sending a current impulse in either direction over a telephone-line with which said cord connecting apparatus is connected, an electrically-operated signaling instrument whose controlling-circuit includes switch-contacts adapted to be brought into electrical connection upon the actuation of said means to send a current impulse in one direction over said line and to be electrically disconnected upon the actuation of said means to send a current impulse in the reverse direction over said line, and a plug-seat switch having contacts included in the controlling-circuit for said signaling instrument, the switch-contacts of said plug-seat switch being brought into electrical contact when the associated plug of the cord connecting apparatus is seated in its socket and electrically disconnected when said plug is removed from its seat for connection with the telephone-line.

8. In combination, cord connecting apparatus for connecting telephone-lines for conversation, a calling-key for connecting the terminals of a source of current in one direction with the cord-strands, a releasing-key for connecting the terminals of said source of current in the reverse direction with the cord-strands, a polarized electromagnetic switching device, means whereby the actuation of said calling-key causes an actuation of said switching device in one direction, means whereby the actuation of said releasing-key causes an actuation of said switching device in the other direction, an electrically-actuated signal whose circuit is jointly controlled by said switching device, and switching-contacts controlled by the position of a plug of said cord connecting apparatus.

9. In combination, cord connecting apparatus for connecting telephone-lines for conversation, a calling-key for connecting the terminals of a source of current in one direction with the cord-strands, a releasing-key for connecting the terminals of the source of current in the reverse direction with said cord-strands, a switching device, means whereby the actuation of said calling-key causes an actuation of said switching device in one direction, means whereby the actuation of said releasing-key causes an actuation of said switching device in the other direction, an electrically-

operated signal whose circuit is jointly controlled by said switching device, and switching-contacts controlled by the position of a plug of said cord connecting apparatus.

10. In combination, cord connecting apparatus for connecting telephone-lines for conversation, a calling-key for connecting the terminals of a source of current in one direction with the cord-strands, a releasing-key for connecting the terminals of a source of current in the reverse direction with the cord-strands, an electrically-operated signal whose controlling-circuit includes the contacts of an electromagnetic switching device, a plug-seat switch whose contacts are included in the controlling-circuit for said signal, means whereby the actuation of said calling-key causes an actuation of said switching device to close a break in the controlling-circuit for said signal, and means whereby the actuation of said releasing-key breaks the circuit through said electrically-operated signal.

11. In combination, a telephone party-line leading from a central exchange to a series of substations, selective signaling instruments at each of said substations, cord connecting apparatus at the central exchange for connecting said telephone-line for conversation, a calling-key for connecting the terminals of a source of current in one direction with the cord-strands connected with said telephone-line to actuate said selective signaling instrument in connecting the telephone instruments at one of said substations with said telephone-line for conversation, a releasing-key for connecting the terminals of said source of current in the reverse direction with said cord-strands for restoring said selective instruments to their normal condition, an electromagnetic switching device, an electrically-operated signal whose controlling-circuit includes contacts of said switching device, a plug-seat switch having contacts included in said controlling-circuit said contacts being adapted for electrical connection to close said circuit when said plug is seated in its socket and to be electrically disconnected when said plug is removed from said socket for connection with said telephone-line, means whereby the actuation of said calling-key causes an actuation of said switching device in one direction to close the break in said controlling-circuit between the contacts of said switching device, and means whereby the actuation of said releasing-key causes an actuation of said switching device in the reverse direction to break the connection between the contacts of said switching device.

In witness whereof I hereunto subscribe my name this 13th day of July, A. D. 1903.

GARRISON BABCOCK.

Witnesses:

LYNN A. WILLIAMS,
HARVEY L. HANSON.