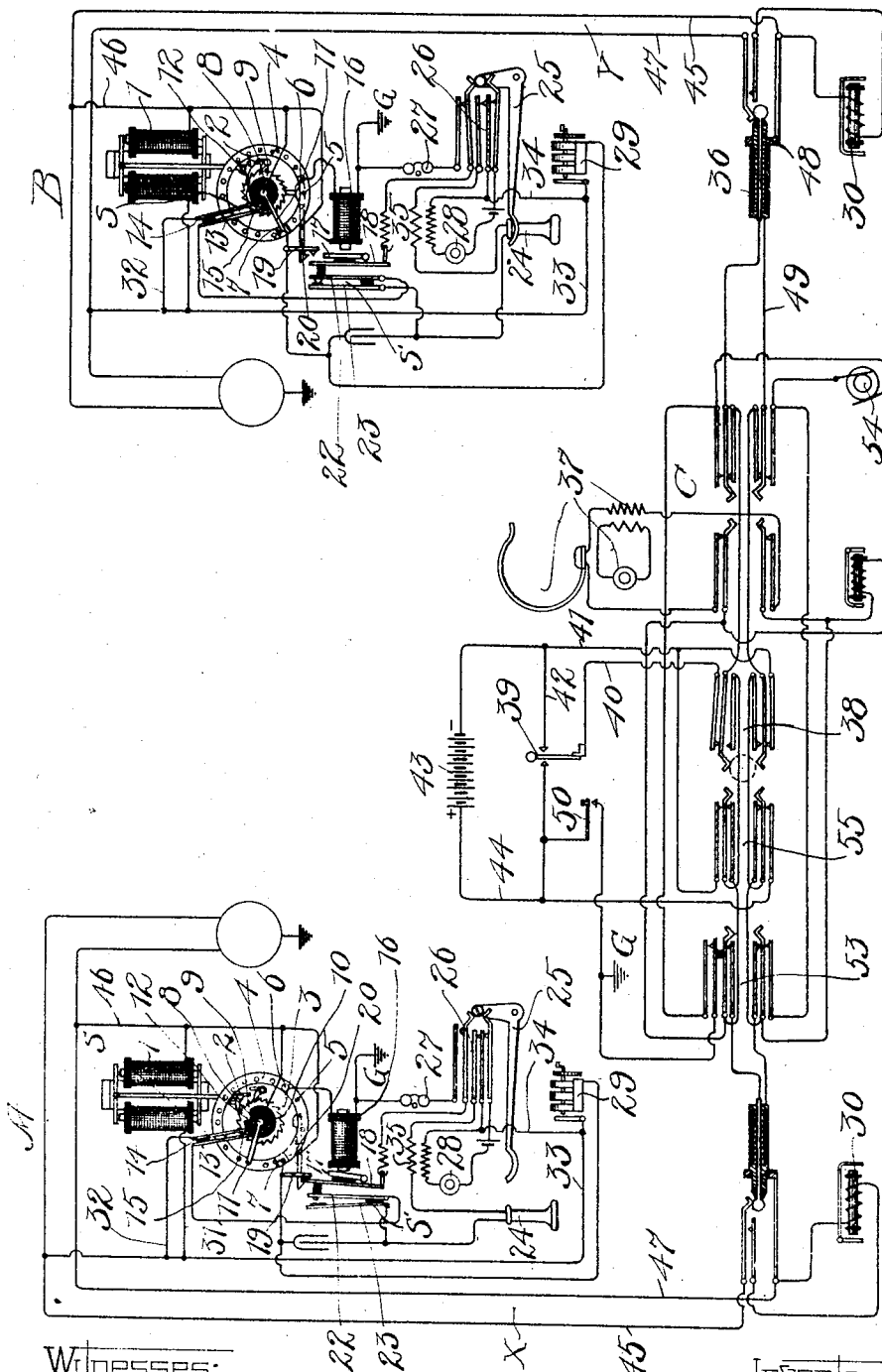


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G. BABCOCK.
MULTIPARTY LINE LOCKING OUT SYSTEM.
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MULTIPARTY-LINE LOCKING-OUT SYSTEM.

SPECIFICATION forming part of Letters Patent No. 782,944, dated February 21, 1905.

Application filed November 19, 1903. Serial No. 181,750.

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 Multiparty-Line Locking-Out Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to multiparty-line systems; and its object is to provide more certain and absolute means for locking out subscribers which are not connected up for conversation.

In party-line systems the talking apparatus is usually connected in branch of the line-limbs, and the usual method for locking out this apparatus at substations not connected for conversation has been to interrupt the circuit containing this apparatus. As an abundance of apparatus comprising electromagnets and windings is employed in substations connected with a party-line, there are sufficient stray currents and leakage to influence the receiver, whereby the subscriber at the substation intended to be locked from the circuit can hear conversation carried on over the line, even though the circuit containing the receiver is open. This has been one of the greatest deficiencies in party-lines heretofore employed, and the main object of my invention is to provide means for certainly and absolutely preventing any conversation from being overheard by subscribers on the line otherwise than those connected for conversation. I therefore provide a shunt-circuit directly about the receiver, which circuit may be closed to entirely short-circuit the receiver at all the substations not desired to be connected with the line. This improved locking-out feature is adaptable to any telephone-line; but in order to show its application I shall describe it in connection with a multiparty-line, such as is described in my Patent No. 763,351, issued June 28, 1904, in which is described a step-by-step system for selecting subscribers for conversation.

In the accompanying drawing I have shown party-lines X and Y, to each of which may be connected a plurality of substations, the apparatus and connections at which are all alike and in the drawing are illustrated at substation A connected with line X and at substation B connected with line Y. At the central station I provide a cord-circuit C, which includes the necessary apparatus. At each substation I provide the polarized electromagnet 1, adapted, by means of ratchet mechanism 2, to operate switching mechanism 3. A ring 4 is provided with equally-spaced holes 5 5, and a contact-point 6 is adapted for insertion in any of these holes. This point 6 is inserted in a different hole at each substation. A contact-piece 7 is disposed above the ring, but insulated therefrom. A shaft 8 at the center of the ring supports a ratchet-wheel 9, a disk of insulating material 10, and a switch-arm 11, adapted in its travel about the said shaft to engage the contact 7 and the pin 6. A notch 12 is cut in the disk 10, and when the arm 11 engages the contact-piece 7 this notch will be disposed to receive the ends of switch-springs 13 and 14, allowing these springs to become disengaged at their contact-point 15, as shown at substation B. These springs 13 and 14 constitute a switch s. An electromagnet also forms part of the substation apparatus and serves to control an armature 17, connected with but insulated from a switch-lever 18, which lever normally does not engage the contact 19, as shown, at substation B. Upon energization of said electromagnet, however, its armature is attracted to draw the lever 18 to engage the contact 19, and a detent-lever 20 engages the arm 18 at its top to lock it in such engagement, as shown at substation A.

A switch-spring 22 is pivoted at its lower end, and its upper end is connected with but insulated from the upper end of the switch-lever 18. As shown at substation B, this spring 22 is normally in contact with its associate spring 23, but upon attraction of the armature 17 contact between these two springs is broken, as shown at substation A. Switch-

springs 22 and 23 constitute a switch s' . A receiver 24 normally rests on the receiver-hook 25 to actuate the associated springs 26 to include only the substation-signal 27 in circuit and upon the removal of the receiver from the hook the switch mechanism 26 is actuated to disconnect the signal from circuit, but serves to close a local transmitter-circuit 28 and to close a circuit connecting the receiver 24 with the line. By means of a generator 29 the subscriber may actuate the central-station-indicating device 30.

The circuit conditions at the substations are normally as shown at substation B, the switch-arm 11 engaging the contact 7 and the switch s being open while the switch s' is closed. It will be noticed that the switches s and s' are included in a shunt-circuit about the receiver, which may be traced as follows: from the receiver to switch-spring 23, switch-spring 22, conductor 31, switch-spring 13, switch-spring 14, conductor 32, conductor 33, conductor 34, through the switch hook-springs and through the secondary winding 35 back to the receiver. A subscriber desiring connection actuates the generator 29 whereupon to actuate the central indicator 30 and thereupon removes the receiver from the hook. The operator in response inserts the calling-plug 36 in the jack connected with a line to which is connected the calling subscriber and by connecting the operator's set 37 in circuit she ascertains the connection desired. She must now actuate all the substations on the calling party-line in order to lock therefrom all subscribers except the one calling for connection. This she does by depressing the calling-key 38 and by actuating a key 39 to send current impulses over the line to step the switch-arm 11 about the ring 4. When the key 39 is depressed toward the right, the cord-strands will be short-circuited through conductors 40 41 42 and the switch 39, thereby short-circuiting the line to free it from static charges. When the key 39 is pushed to the left, a current impulse will be sent over the line through the following circuit: from the plus side of the battery 43 to the conductor 44, switch 39, conductor 40, through the calling-key 38 to the top of the calling-plug 36, (which is now supposed to be inserted in the jack connected with the calling-line X, for instance,) to the limb 45 of the telephone-line X, to the conductor 33, electromagnet 1, to conductor 46, line-limb 47, through the jack and sleeve 48 of the calling-plug 36 to the cord-strand 49, through the calling-key 38, and through conductor 41 back to the negative side of the battery. Thus alternately the line is short-circuited and a positive impulse sent thereover, the switch-arm 11 being stepped forward one hole upon each impulse until the lever engages the pin 6 at the substation A, (which is supposed as being the calling-substation.) The operator now stops the actuation of switch 39 and depresses

a key 50, whereby the following circuit may be traced: from the positive side of the battery 43 to the conductor 44, key 50, to the ground G, thence to the ground connection G at the substation A, through the electromagnet 16, to the pin 6, switch-arm 11, which now is in contact with pin 6, to conductor 46, line-limb 47, to the sleeve 48 of the calling-plug, cord-strand 49, through the calling-key 38, and through conductor 41 back to the negative side of the battery.

As the switch-arm 11 is stepped about by the current impulses the switch s leaves the notch 12 and the periphery of the disk or cam 10 engages the spring 14 and presses it into contact with its associate spring 13, the shunt-circuit about the receiver being thus closed. Upon the attraction of the armature 17 by its electromagnet 16, however, upon actuation of key 50 at the central exchange the switch-lever 18 is drawn into engagement with contact 19 and the detent-lever 20 drops to maintain this connection. At the same time spring 22 is drawn away from spring 23 to again open the shunt-circuit about the receiver. The talking-circuit when the operator conversed with central to ask for the desired connection included the contact 7 and the arm 11; but upon rotation of arm 11 this circuit was broken, but the talking-circuit becomes again closed through the contact 19, switch-lever 18, and detent-lever 20, which detent-lever also connects with the conductor 46, as does the switch-arm 11. After central has actuated the key 50 to thus change the talking-circuit at the substation she again actuates the key 39 to step forward the arm 11 to the end of its revolution, the arm at each substation connected with the same line rotating in unison with the arm at substation A. Thus the talking-circuit at all the other substations on the line is interrupted as the switch-arm at the substations has been rotated from the associated contact 7. Such open-circuit condition or one similar thereto has been depended upon heretofore for locking out the other subscribers on the line; but, as before stated, owing to the abundance of influencing apparatus at the substation the leakage occasioned thereby was sufficient to allow a listening-in subscriber to detect conversation carried on over the line. However, the electromagnet 16 at all the other substations besides A has not been energized by actuation of key 50, as this was only done when all the switch-arms 11 were in position over hole No. 6, and as this hole was provided with a pin only at substation A the electromagnet 16 at substation A was the only one actuated to close its associated receiver-circuit, the shunt-circuits at all the other substations being closed at both the switches s and s' , there being thus a dead short-circuit about the receiver, the detection of conversation by a listening-in subscriber being absolutely prevented. After having thus

locked out the other subscribers connected with the party-line X central removes the calling-plug from said line and connects it with the line Y, for instance, with which line is connected the desired subscriber, and she connects the other plug of the cord-circuit with the line X. If the desired subscriber be No. 4, the central operator actuates the key 39 four times to bring the switch-arm 11 at substation B into contact with the pin 6 inserted in hole No. 4 and then actuates the key 50, whereupon by actuation of the ringing-key 53, connected with the ringing-generator 54, she may send current into the line which actuates the signal 27 at the substation B. Energization of electromagnet 16 upon actuation of key 50 opens the switch s' , and when subscriber B removes the receiver from the hook the shunt-circuit about his receiver will be opened to allow conversation to be heard by him, and central, after having actuated the key 50, manipulates the key 39 to rotate the arm 11 to lock out all the other subscribers connected with the line Y. Upon the termination of the conversation central releases the calling-key 38 and actuates the restoring-key 55, which connects the battery 43, directly crossing the cord-strands connecting with the calling-plug, and this restoring-current being of opposite polarity to the setting-up current the polarized electromagnets 1 at all the substations on the line X are energized to withdraw the pawl mechanism 2 to allow the arm 11 to rotate back into engagement with the contact 7, this backward rotation being usually accomplished by means of a spring. After having restored the apparatus at the substations connected in line Y she inserts the calling-plug 36 into connection with the line X, and actuation of the restoring-key 55 will restore all the substation apparatus connected with line X in a similar manner.

It thus provide simple and efficient means for absolutely preventing an undesired subscriber from listening-in and from hearing conversation carried on by connected subscribers, and my invention may be applied with equal adaptability to any party-line system whatever in which the talking apparatus is connected in bridge of the line-limbs. I do not, therefore, wish to be limited to the application and the construction thereof as described and illustrated.

I desire to secure by Letters Patent the following claims:

1. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit for said receiving apparatus, means at each substation operable from the central exchange over one circuit for closing said shunt-circuit at one point, and additional means at each substation operable from the central exchange

over another circuit for subsequently opening said shunt-circuit at another point.

2. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit about said receiving apparatus, a switch included in said shunt-circuit, said switch serving normally to open the shunt-circuit, an additional normally closed switch for said shunt-circuit, means operable from the central exchange for closing said normally open switch whereby said receiving apparatus is short-circuited, and additional means operable from the central exchange for opening said additional switch whereby said shunt-circuit is opened.

3. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit about said receiving apparatus, a switch for normally opening said shunt-circuit, an additional normally closed switch for said shunt-circuit, cam mechanism at each substation operable from the central exchange for closing said normally open switch to short-circuit the receiving apparatus, and electromagnetic means operable from the central exchange for opening said normally closed switch.

4. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation adapted for connection in bridge of the telephone-line, a shunt-circuit about said receiving apparatus, a normally open switch included in said circuit, cam mechanism operable from the central exchange for closing said switch whereby said receiving apparatus is short-circuited, an additional normally closed switch included in said shunt-circuit, and electromagnetic means operable from the central exchange for opening said switch to open the shunt-circuit.

5. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a rotatable switch-arm at each substation and a normal contact therefor, said receiving apparatus being normally connected with the line through a circuit including said switch-arm and its contact, a shunt-circuit about said receiving apparatus, a normally open switch adapted for serial inclusion in said shunt-circuit, a cam rotatable with said switch-arm, means at each substation operable from the central exchange for rotating said switch-arm and the cam whereby said arm is moved away from its contact to disconnect each receiving apparatus from the telephone-line and whereby said nor-

normally open switch is closed to close the shunt-circuit about each receiving apparatus, an additional normally closed switch also included serially in said shunt-circuit, and additional means operable from the central exchange for opening said additional switch to open said shunt-circuit.

6. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said telephone-line, receiving apparatus at each substation, a rotatable switch-arm and a normal contact therefor, said receiving apparatus being normally connected with the telephone-line through a circuit including said arm and its contact, a cam adapted to rotate with said arm, a shunt-circuit for said receiving apparatus, a normally open switch included serially in said shunt-circuit and associated with said cam, means at each substation operable from the central exchange for causing a step-by-step rotatory advancement of said switch-arm and said cam whereby each arm leaves its contact to open the receiving-circuit associated therewith and whereby said normally open switch is operated to close the shunt-circuit, an additional normally closed switch also included serially in said shunt-circuit, electromagnetic means for controlling said additional switch, means whereby after a predetermined number of advancements of said switch-arm a circuit is closed through said electromagnetic means, and switching mechanism also controlled by said electromagnetic means, actuation of said electromagnetic means from the central exchange causing said electromagnetic means to actuate said normally closed switch to open said shunt-circuit and to actuate said switching mechanism to again close the receiving-circuit.

7. In a multiparty-line telephone system, the combination with a central exchange, of a bimetallic telephone-line leading therefrom, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit for said receiving apparatus, means at each substation operable from the central exchange over a circuit serially including the metallic limbs of the line for closing said shunt-circuit at one point, and additional means at each substation operable from

one line-limb and a third conductor for subsequently opening said shunt-circuit at another point.

8. In a multiparty-line telephone system, the combination with a central exchange, of a bimetallic telephone-line leading therefrom, a plurality of substations connected with said line, telephonic apparatus at each substation connected in bridge of the metallic line-limbs, a shunt-circuit for said telephonic apparatus, means at each substation operable from the central exchange over a circuit including only the metallic line-limbs for closing said shunt at one point to prevent effective use of said telephonic apparatus, and additional means at each substation operable from the central exchange over a circuit including one line-limb and a third conductor for subsequently opening said shunt-circuit at another point to restore the telephonic apparatus to service.

9. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading therefrom to a plurality of substations, selective apparatus at each substation, means at the central exchange for sending current impulses into the line to simultaneously actuate the various selective apparatus, additional circuit-controlling mechanism at each substation, a shunt-circuit at each substation for the telephonic apparatus thereat, a normally open switch included in said shunt-circuit and associated with the selective apparatus, a normally closed switch included in said shunt-circuit and controlled by said circuit-controlling apparatus, means immediately upon actuation of the selective apparatus for causing the switch associated therewith to be closed whereby the telephonic apparatus is short-circuited and rendered unserviceable, means after a predetermined number of current impulses for connecting the circuit-controlling mechanism at one substation in circuit to cause actuation thereof, said normally closed switch in said shunt-circuit upon actuation of said controlling mechanism being opened to again render the telephonic apparatus serviceable.

In witness whereof I hereunto subscribe my name this 4th day of November, A. D. 1903.

GARRISON BABCOCK.

Witnesses:

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