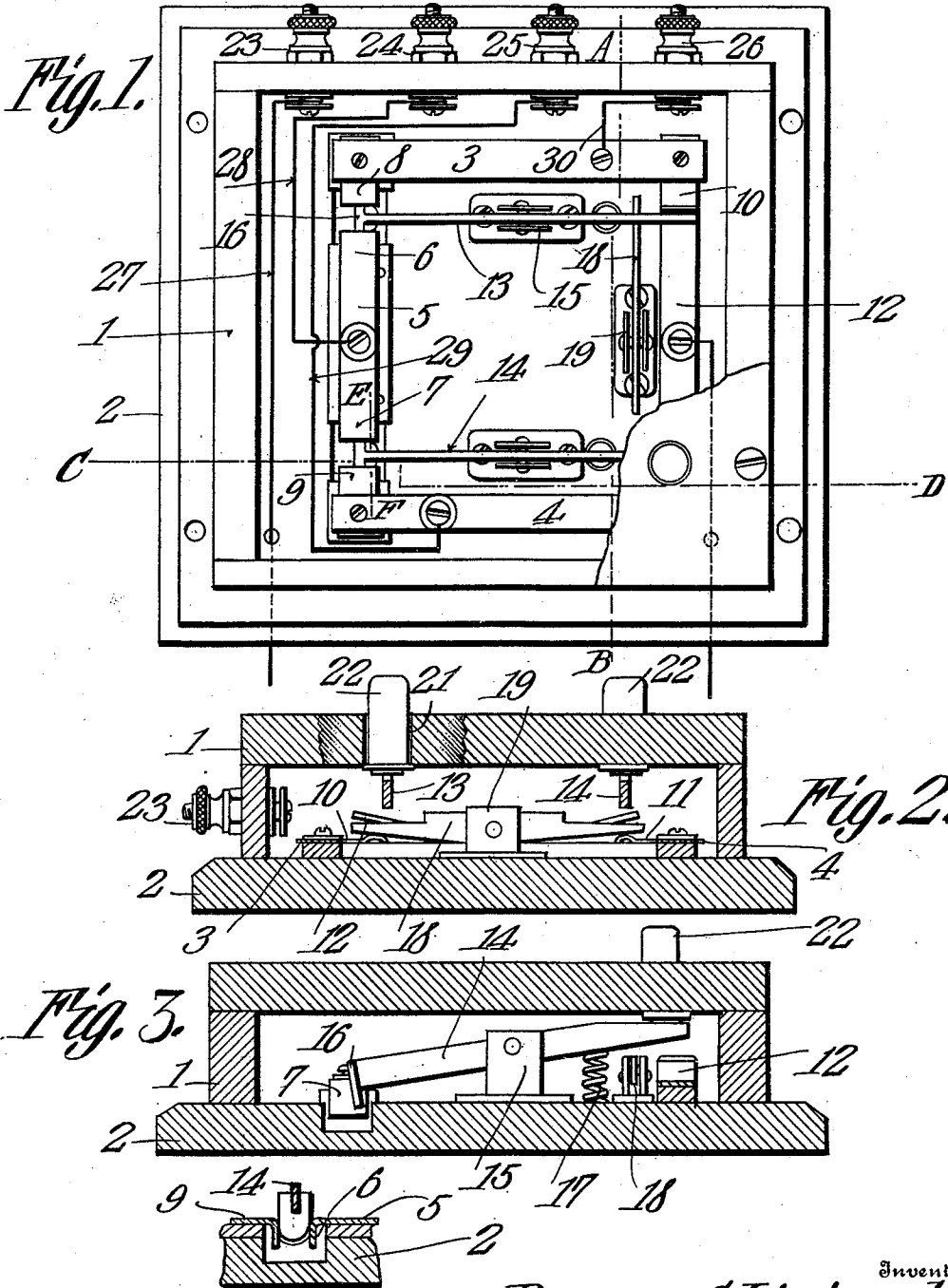


R. C. LIVINGSTON.
SWITCHBOARD.
APPLICATION FILED NOV. 20, 1908.

933,716.

Patented Sept. 7, 1909.

2 SHEETS—SHEET 1.



Witnesses
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Fig. 4. Reason C. Livingston.
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2 SHEETS—SHEET 2.

Fig. 5.

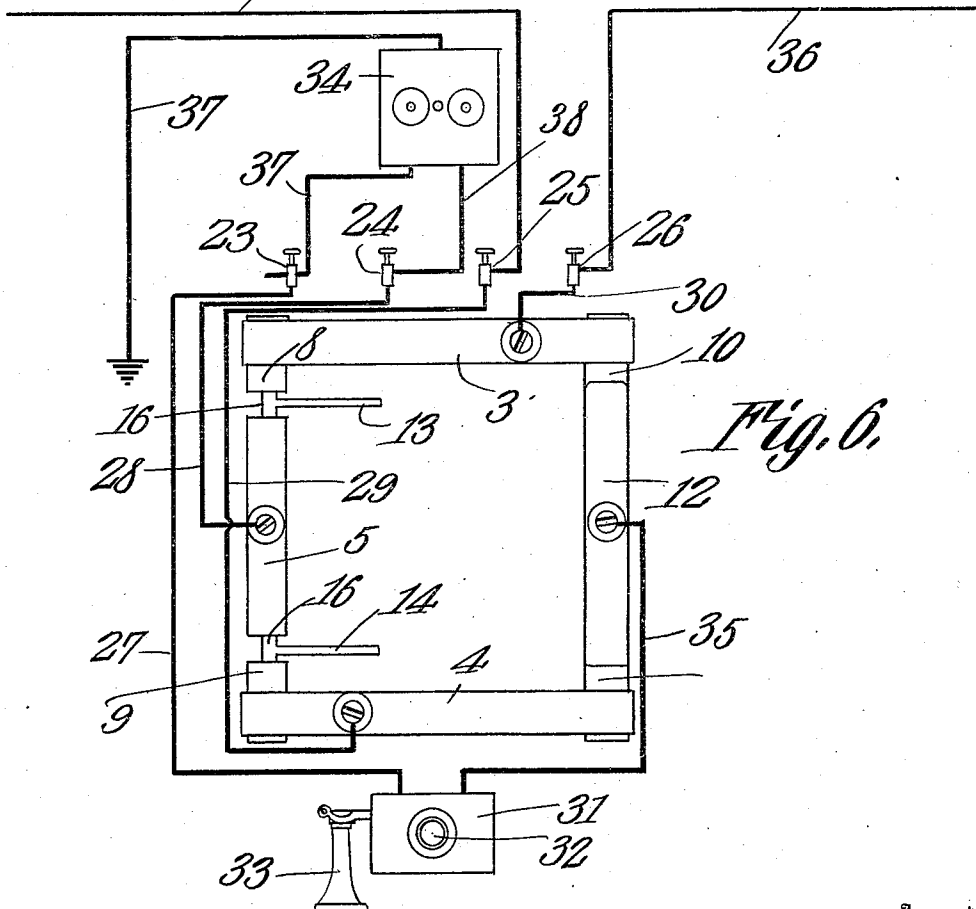
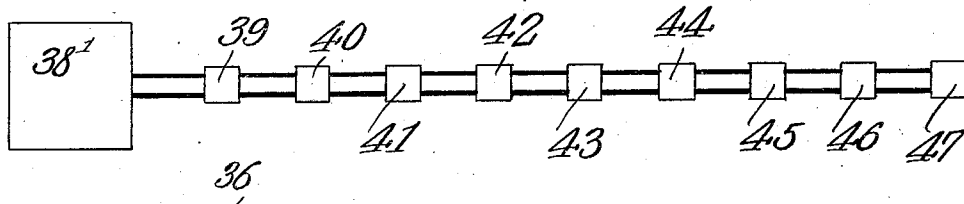


Fig. 6.

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UNITED STATES PATENT OFFICE

REASON C. LIVINGSTON, OF SPRING VALLEY, MINNESOTA.

SWITCHBOARD.

933,716.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Original application filed May 21, 1908, Serial No. 434,170. Divided and this application filed November 20, 1908. Serial No. 463,689.

To all whom it may concern:

Be it known that I, REASON C. LIVINGSTON, a citizen of the United States, residing at Spring Valley, in the county of Fillmore and State of Minnesota, have invented a new and useful Switchboard, of which the following is a specification.

This invention has reference to improvements in switch boards for telephone systems and is designed for use more particularly in connection with party lines.

The object of the invention is to provide means whereby conversation may be carried on between two parties on a party line without being interfered with by other parties and without interfering with conversation by other parties on either side of the two parties conversing, and any party can ring all of the telephone signals on the line in either direction.

The invention comprises a switching mechanism which, under normal conditions, does not interfere in any manner with the transmission of signals over the line in either direction. Should, however, the subscriber desire to call up any other subscriber on the same line without the necessity of going through the central office or exchange, the improved switch provides means whereby a call may be sent in either direction and then conversation may be carried on in the desired direction without danger of interference from any other party on the line. Furthermore, the act of removing the receiver from the switch hook does not weaken the line because the transmitter and receiver and other parts co-acting therewith are never on the main line and only on the private line by means of the switch mechanism forming the subject of the present invention.

With a party line including a number of subscribers, it is possible for two subscribers to talk together without other subscribers being able to hear the conversation or to break in thereon. At the same time other subscribers on either side of the two subscribers then using the line may connect between themselves and hold conversation without interfering, although a party on the one side of the connected telephone cannot talk to a party on the other side of the connected telephones. By this means the capacity of a multi-party line is greatly in-

creased, since several conversations may be taking place at the same time on the same party line without interference.

The subject matter of the invention designed to be covered by this application is confined to the switch board or circuit controlling means, which latter, together with the telephone system are shown and described in my application for Letters Patent, Serial No. 431,170, filed May 21, 1908, for telephone systems, of which this application is a division.

The invention, however, will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, in which drawings:—

Figure 1 is a plan view of the improved switching device with the major portion of the cover removed. Fig. 2 is a section on the line A—B of Fig. 1. Fig. 3 is a section on the line C—D of Fig. 1 with some of the remote parts omitted. Fig. 4 is a detail section on the line E—F of Fig. 1. Fig. 5 is a diagram of a central station and the multi-party line emanating therefrom. Fig. 6 is a diagram illustrating the circuit connection at a party station on a multi-party line.

Referring to the drawings, there is shown a box or casing 1 mounted upon a suitable base 2. Within the box 1 on opposite sides thereof are two conducting bars 3, 4. Extending between two adjacent ends of the strips 3, 4 is another strip or bar 5 having downward turned ends 6, 7, the said down turned ends 6, 7 being unsupported so as to render them elastic. Secured to the end adjacent to the strip or bar 5 are short strips 8 and 9 having downturned ends matching the ends 6 and 7 of the bar 5 and spaced a short distance therefrom. Projecting from the ends of the bars 3 and 4 remote from the plate or bar 5 and toward each other are two contact plates 10 and 11 extending a short distance from the corresponding edges of the said bars 3 and 4. In operative relation to the two contact plates 10 and 11 are the spring ends of a spring plate 12 secured centrally to a fixed portion of the bottom of the box. The spring ends of the plate 12 are normally out of engagement with the contact plates 10 and 11 but may be forced into engagement therewith as will hereinafter

appear. Between the two bars 3 and 4 and parallel therewith and adjacent thereto are levers 13 and 14 mounted in suitable brackets 15 fast on the bottom of the box 1. One end of each lever 13 and 14 is formed with a bridging block or head 16 adapted to enter between the spring members 6 and 8 or 7 and 9, as the case may be. The other end of each lever extends over and into operative relation to a corresponding end of the spring plate or strip 12. The end of each lever 13 and 14 remote from the head 16 is constantly urged away from the spring plate or strip 12 by a helical spring 17 between the outer edge of the lever and the bottom of the box or casing 1. Extending between those ends of the levers 13 and 14 adjacent the spring 17 is a rock arm 18 centrally supported and there pivoted in a suitable bracket 19 fast on the bottom of the casing. This rocker arm 18 is so located as to be engaged by either lever 13 or 14 when the latter is moved against the action of the spring 17. Thus when one of the levers is depressed, the corresponding end of the arm 18 is depressed and the other arm raised into engagement with the other lever, so that the second lever cannot at the same time be moved against the action of its spring 17. By this means while either lever may be moved freely against the action of its spring, both levers cannot be so moved at the same time.

The casing 1 is provided with a top member 20 and through this top member are passages or perforations 21 matching the ends of the levers 13 and 14 and adjacent to the spring 17. Extending through each perforation 21 is a push button 22 engaging the corresponding end of the lever 13 or 14 as the case may be.

The casing 1 carries a number of binding posts which for convenience of description are referred to by the numerals 23, 24, 25 and 26 respectively. The binding post 23 is connected to a conductor 27 to which reference will hereinafter be made. The binding post 24 is connected by a conductor 28 to the strip or bar 5. The binding post 25 is connected by a conductor 29 to the bar 4 and the binding post 26 is connected by a conductor 30 to the bar 3.

Mounted upon the main board or in any other suitable location with reference to the switch mechanism so far described, is a telephone set or unit 31 comprising the usual transmitter 32 and receiver 33. The battery connections for the transmitter have been omitted. At the subscriber's station where the telephone unit 31 and the switch mechanism so far described is located, is also located a call bell unit 34 which may be of the ordinary magneto type. The conductor 27 before referred to as coming from the binding post 23, is connected with one side of the telephone unit 31. To the other side of

the telephone unit is connected a conductor 35 leading to the elastic strip or plate 12.

One of the main line conductors 36 is broken and one end is connected to the binding post 25 and the other end to the binding post 26. The binding post 23 is connected by a conductor 37 to ground and this conductor may, for convenience, go through the box containing the call unit 34. The signal bell mechanism of the magneto signal unit 34 is coupled up by a conductor 38 to the binding post 24 and on the other side may be carried to ground through the conductor 37. Of course, it will be understood that instead of carrying the conductor 37 to ground it may be carried throughout the system as one of the main conductors, as would be the case on an all metal circuit.

When a call is sent over the line, say to the right, as viewed in Fig. 6, the call impulses go in that direction for the entire length of the immediate part of the line not then in use. Assuming that the impulses start from the call bell unit 34, they pass out through the conductor 38 to binding post 24, thence by conductor 28 to the strip 5 thence through the approximate bridging head 16 (the other bridging head 16 having been moved to the inactive position) to the strip 3 and by the conductor 30 and binding post 26 to the line conductor 36 leading to the right as viewed in Fig. 6. At the next and succeeding stations where the line is not busy, the current enters by the binding post 25 and traverses conductor 29 to strip 4, thence through the adjacent bridging head 16 to the strip 5, thence, dividing, one path is through the conductor 28 to the binding post 24 and through the call-bell unit 34 and by conductor 37 to ground (or, to the other main conductor in an all metal circuit). The other path for the current is through the other bridging head 16 to the strip 3, thence by conductor 30 and binding post 26 to the main line conductor 36 to the right as viewed in Fig. 6. The return circuit to the sending bell unit 34 is by way of the ground and ground conductor 37, or the all metal return where such is used.

It will be seen that the call bell units are bridged across the lines, one side being connected to the looped main conductor by the branch conductor 38 to binding post 24 and conductor 28 to center of loop at the middle of strip 5, while the other side of the bell unit is connected to the ground conductor 37, thus providing a return circuit for each call bell unit from the starting point to the end of the call or ringing circuit.

In Fig. 5 there is indicated a central station which is designated by the numeral 38', and branching from this station is a party line including by way of example nine private party line stations or subscribers' stations numbered, respectively, from 39 to 47

for convenience of description. Suppose that No. 43 desires to call up No. 45, which is to the right of No. 43, as viewed in the drawing. Under normal or quiet conditions, the circuit from one branch of the conductor 36 to the other is as hereinbefore traced, while the circuit out through the talking members of the telephone circuit is broken by the plate 12. Now by depressing the lever 14 against its spring 17 by a proper manipulation of the push button 22 the circuit between the strip 4 and the strip 5 is broken, thus cutting out that branch of the main circuit 36 extending toward the left from the binding post 25. There is maintained, however, a circuit from the main conductor or ground conductor 37 through the signal unit 34, conductor 38, binding post 24, conductor 28, to the strip 5, and thence through the head 16 of the lever 13 to the strip 3 and conductor 30 to the binding post 26, out through the conductor member 36 extending toward the right as viewed in Fig. 6. The subscriber at station 43 may now ring up No. 45 and then releases the push button previously pressed and presses the other push button and removes the receiver 33 from its hook. There is now established a circuit through the main or ground wire circuit by the conductor 37 to the telephone circuit 31 thence by the conductor 35, to the strip 12. The depression of the lever 13 against the action of the spring 17 has caused the strip 12 to be brought into contact with the contact strip 10 thus completing the circuit from the strip 12 to the bar 3 and out through the conductor 30 to the main conductor 36 leading toward the right as viewed in Fig. 6. Under these conditions the circuit between the strip 3 and the other side of the conductor 36 leading toward the left is broken by the removal of the bridging head 16 from between the bar 5 and conducting strip 8. Conversation may now continue between stations 43 and 45 so long as desired, it being understood that at station 45 the proper lever 13 or 14 has been depressed to couple up the telephone toward the left in order that the subscriber at station 45 may converse with station 43.

While the conversation is taking place between the stations 43 and 45, stations 46 and 47 may converse together without interference, or any of the stations from 39 to 42 inclusive may converse without interference from the other stations, but while the conversation is continuing between the stations 43 and 45, no station to the left of 43 can converse with a station to the right thereof, nor can conversation take place in the contrary direction.

When it is desired to ring up another station, in another direction, the push button manipulated for this purpose is opposite to

that used when conversation is taking place in the first named direction.

It is to be noted that the lifting of the telephone receiver from the hook or the leaving off of the receiver from its hook through carelessness can not in any manner affect the main line 36, 37, since the telephone set is never included in the main line except when the proper lever is depressed, nor can listening occur, since the main lines are entirely cut out on either side of the station using the line at any particular time. It is possible, also, by the device forming the subject matter of the present invention to locate breaks or grounds on the line, and those breaks or grounds do not interfere with the line for inter-party communication on either side of the break or ground.

What is claimed is:—

1. In a telephone system, a circuit controlling means comprising two conducting bars each terminating in a circuit terminal and having means for the individual connection thereto of the respective ends of a divided main conductor, a conducting bar between the contiguous ends of the first named bars, and terminating adjacent thereto but spaced from the ends of the said first named bars, bridging means normally completing the circuit across the spaces between the ends of the several named bars, means for controlling said bridging means, and a spring plate in operative relation at its ends to the other contiguous ends of the first named bars, and in the path of the controlling means of the bridging means.

2. In a telephone system, a circuit controlling means comprising two conducting bars each terminating in a circuit terminal and having means for the individual connection thereto of the respective ends of a divided main conductor, a conducting bar between the contiguous ends of the first named bars and terminating adjacent to but spaced from the said ends of the first named bars, bridging blocks normally completing the circuit across the spaces between the ends of the several named bars, means for controlling said bridging blocks, a spring plate in operative relation at its ends to the other contiguous ends of the first named bars, and in the path of the controlling means for the bridging means, and means for preventing simultaneous movement of the bridging block controlling means in the same direction.

3. In a telephone system a circuit controlling means comprising two conducting bars each terminating in a circuit terminal and having means for the individual connection thereto of the respective ends of a divided main conductor, a conducting bar between the contiguous ends of the first named bars and terminating adjacent to but spaced from the said ends of the first named bars, bridging

ing blocks normally completing the circuit across the ends of the several named bars, two levers, each controlling the bridging blocks, a spring plate in operative relation at its ends to the other contiguous ends of the first named bars, and having its ends in the path of the controlling levers for the bridging blocks, and a rock arm in the path of both levers for preventing simultaneous movement of the said levers in the same direction.

4. In a telephone system, a circuit controlling means comprising a contact on normally open circuit, a central contact and end contacts, switches for coupling the end contacts to the central contact and electrically inactive means for moving either switch to open circuit between the respective one of the end contacts and the central contact, and to then engage and move the normally open circuit contact to the closed circuit position.

5. In a telephone system, a circuit controlling means comprising a contact on normally open circuit, a central contact and end contacts, the end contacts being in open circuit but operative relation to the normally open circuit contact, switches for coupling the end contacts to the central contact, and electrically inactive means for moving either switch to open the circuit between the respective ones of the end contacts and the central contact and to then engage and move

the normally open circuit contact to the closed circuit position.

6. In a telephone system, a circuit closing means comprising a contact on normally open-circuit, a central contact and end contacts, switches for bridging the end contacts onto the central contact, and electrically inactive means for opening the circuit between either end contact and the central contact and to subsequently engage and move the normally open-circuit contact into closed circuit relation to the end contact upcoupled by the switch from the central contact.

7. In a telephone system, a circuit controlling means comprising a contact on normally open-circuit, a central and end contacts, switches for coupling the end contacts to the central contact, means for moving either switch to open the circuit between the respective one of the end contacts and the central contact and then completing the circuit to the normally open-circuit contact, and means for preventing the operation of but one switch at a time.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

REASON C. LIVINGSTON.

Witnesses:

W. L. KELLOGG,
L. D. HAMLIN.