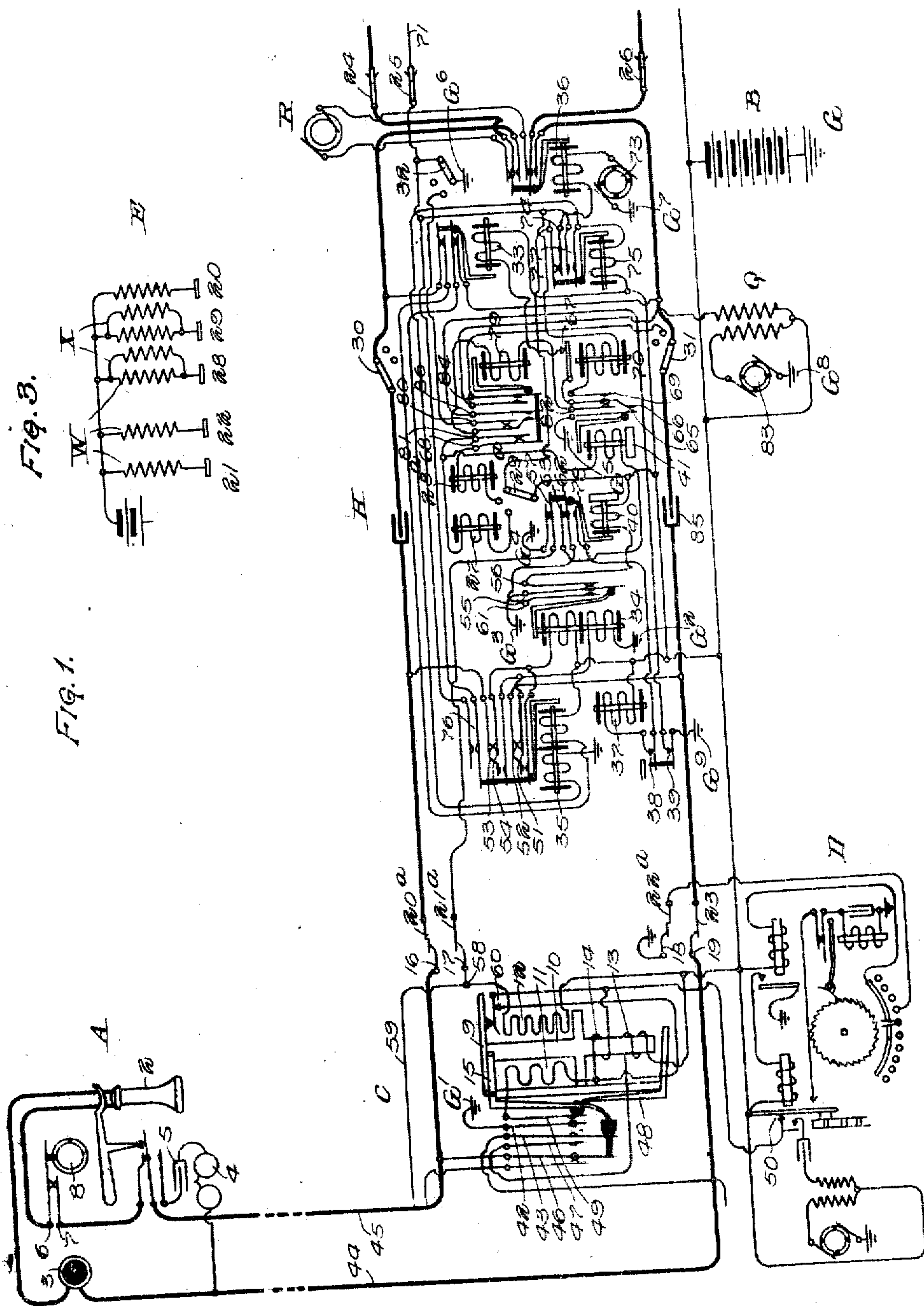


1,295,185.

T. E. MEYER.  
 ROTARY CONNECTOR.  
 APPLICATION FILED FEB. 18, 1914.

Patented Feb. 25, 1919.  
 2 SHEETS—SHEET 1.



WITNESSES  
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 W. R. Bull

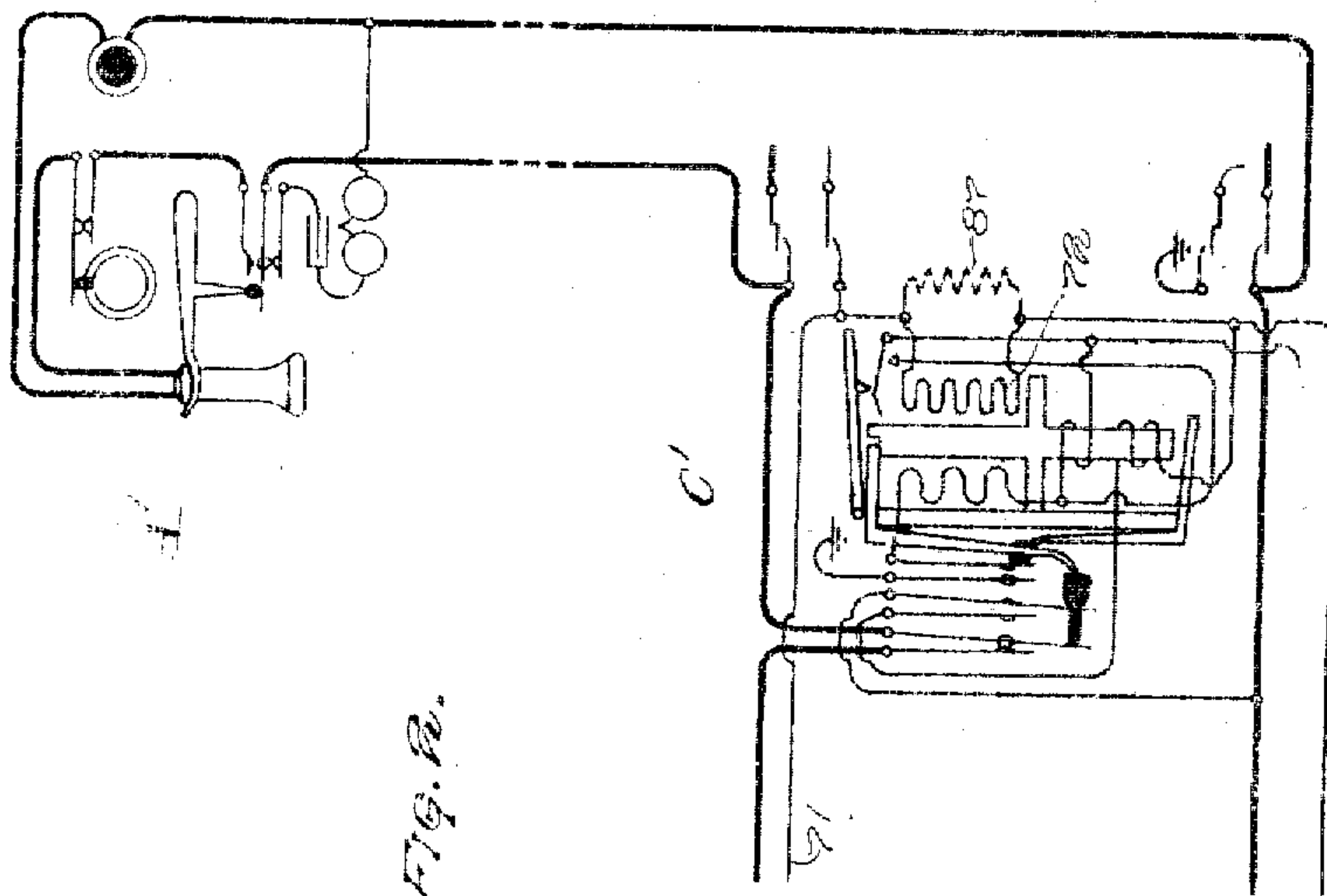
INVENTOR:  
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WITNESSES

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# UNITED STATES PATENT OFFICE.

TRYGVE E. MEYER, OF LOMBARD, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## ROTARY CONNECTOR.

1,295,185.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed February 18, 1914. Serial No. 819,383.

*To all whom it may concern:*

Be it known that I, TRYGVE E. MEYER, a citizen of the United States of America, and resident of Lombard, Dupage county, Illinois, have invented certain new and useful Improvements in Rotary Connectors, of which the following is a specification.

My invention relates to improvements in rotary connectors and more particularly to connectors which can be employed for connecting either with single subscribers' lines or for connecting with a group of lines any one of which can be employed for extending connection to a called subscriber's line.

The object of my invention is to simplify the construction of such rotary connectors.

By my invention, where there is a group of lines extending to a single subscriber's station, the connector is operated by a suitable series of impulses capable of moving said connector over this group of lines into contact with the last line of the group. Means are then provided for stopping the connector on the first one of these lines which is idle and rendering the remaining impulses of the series ineffective for further operating the connector. In order to insure that a subscriber will properly operate the connector, the number corresponding to this last line of a group would be the only number appearing in the directory for the desired called subscriber. By my invention it is necessary to add but a single relay to each connector and to make a slight change in the line switches of certain of the called lines in order to provide for this trunk-selecting operation of the connector. In this manner I greatly simplify the construction of these rotary connector switches.

These and other objects of my invention will be more readily understood by reference to the accompanying drawings, in which I have illustrated my invention in connection with automatic switches of well-known types and in which a connection is shown between a calling and a called line, such connection being established by a line switch and a rotary connector embodying the features of my invention. It will, of course, be understood that in larger exchanges the connection to the rotary connector can be extended from the calling line in any well-known manner, as through the usual selector switches, or a manual operator's board could be interposed between the

line switch and the connector. These forms of systems are well known and the disclosure in the accompanying drawings is merely for the purpose of more fully illustrating the operation of the rotary connector switch.

Figures 1 and 2 show a complete connection between a calling substation and a called substation in an automatic telephone system embodying the principles of my invention.

Fig. 3 is a diagrammatic view of certain circuits.

The automatic substation A (Fig. 1) comprises the usual receiver 2, transmitter 3, ringer 4 and condenser 5. It is also provided with a suitable call-sending mechanism for controlling the automatic switches, which mechanism is represented diagrammatically by a pair of impulse springs 6 and 7 and an impulse wheel 8, which latter may be controlled by a dial (not shown) provided with finger holes in such a way that the impulse springs may be momentarily separated a number of times corresponding to the respective digits of the number of the called subscriber.

The subscriber's individual switch C (Fig. 1) is of the general type of subscriber's switch shown in British patent to R. W. James No. 26,301 of 1906, being, however, of the particular type of switch disclosed in British patent to T. G. Martin No. 1419 of 1910.

The master switch D (Fig. 1) is of the same general type as that disclosed in the above mentioned British Patent No. 26,301 of 1906, being, however, of the particular type disclosed in British Patent No. 1419 of 1910, also referred to above. The function of the master switch, as is well known, is to maintain the plungers of all the idle line switches in position to engage the terminals of an idle trunk line.

The connector switch H (Fig. 1) is of the same general type as that disclosed in United States Letters Patent No. 815,176, granted March 13, 1906, to Keith, Erickson and Erickson, the circuits, however, being modified to adapt the switch to operate in a system in which the central office apparatus is controlled by impulses delivered over the two sides of the line in series, and being further modified to enable the switch to operate in accordance with the principles of



my invention. Among other details, the connector H comprises a bank of contacts arranged in horizontal rows or levels, which contacts are adapted to be engaged by a set of wipers 24, 25 and 26 carried upon a shaft (not shown) which has a vertical motion controlled by the vertical magnet 27 and a rotary movement controlled by the rotary magnet 28. The operations of various parts of the switch are controlled through the medium of the double-wound line relay 34, said relay being connected with the line through the reversing springs of a so-called back-bridge relay 35, through the windings of which latter relay the called line is provided with talking current. The line relay 34 controls the circuit for the slow acting relay 40, which in turn controls a circuit for a second slow acting relay 41 adapted to be connected in series with the operating magnets 27 and 28. This relay 41 controls the circuit of the private magnet 33, which magnet controls the usual side switch comprising the wipers 29<sup>a</sup>, 30, 31 and 32. The circuit of this private magnet 33 is likewise controlled by a relay 70, the circuit of which is closed at one point by the relay 41, the circuit of this relay 70 being completed in a manner hereinafter set forth over the private wiper 25. The release of the switch is controlled by means of the release magnet 37, which is connected through the springs 38. The springs 38 are adapted to be closed only when the switch shaft has been raised one or more steps from its lowermost position. A second pair of similar contacts 39 is likewise provided, through which a locking circuit for a relay 79 is completed. The ringer relay 36 is connected in series with an interrupter 73 for connecting the ringing generator R with the line for supplying ringing current to the same in the well-known manner. This ringer relay 36 is cut off by means of the ringing cut-off relay 75. The circuit connections and the manner of operation of these various relays and magnets will be more fully pointed out in the description of the operation of the connector.

The usual busy signaling machine Q is provided for the purpose of giving a busy signal to the calling subscriber when the called line is busy.

Associated with the called line is a line switch similar to the line switch C which is associated with the calling line. Where the line, however, constitutes one of a group of lines any one of which can be employed for establishing a connection with a called subscriber's station, the cut-off winding 72 of each of the line switches associated with this group of lines, with the exception of the switch associated with the last line of the group, is provided with a resistance 87 which is connected in shunt of this cut-off winding.

Referring to Fig. 3, there is represented a row of contacts which will be assumed to represent the second row or level of bank contacts in the private bank of the connector H. It will be seen that each of the contacts is connected to the battery through a winding W, which is the customary cut-off or holding winding and is similar to the winding 72 of the line switch C'. In addition, the contacts 28 and 29, the lines associated with which are assumed to belong to the same subscriber as does the line associated with the contact 20, are connected through a resistance X in multiple with their cut-off or holding winding.

A general description of the apparatus having been given, it will now be explained how a connection can be established between the line of a substation A and the line of a called substation A'. It will first be assumed that the substation A' belongs to a subscriber with a single line, the number of which is 22. Since the automatic switching apparatus disclosed herein is in general well known in the art, and is described in the patents herein referred to, its operations will be explained in a more or less general manner.

When the subscriber at substation A removes the receiver 2 preliminary to making a call, an energizing circuit is closed through the line winding 13 of the line switch C. This causes this line switch to operate in the well-known manner to connect the wipers 16, 17, 18 and 19 of the calling line to the trunk contacts 20<sup>a</sup>, 21<sup>a</sup>, 22<sup>a</sup> and 23 of a trunk extending to the connector H. As this line switch does not form part of my present invention, and as any other suitable means can be employed for extending the connection to the connector H, and as the operation of the line switch is fully described in the patents referred to, it is thought unnecessary to further describe the same. The engagement of the springs 16 and 19 with the springs 20<sup>a</sup> and 23, respectively, closes a circuit through the line relay 34 of the connector H. This circuit extends from ground G<sup>2</sup> through the lower winding of the relay 34, springs 51 and 52, springs 23 and 19, conductor 44, substation A, conductor 45, springs 16 and 20<sup>a</sup>, springs 53 and 54 and the upper winding of the relay 34 to battery B. The relay 34, upon energizing, closes a circuit from ground G<sup>2</sup> through the springs 55 and 56 and the relay 40 to battery B. The energization of the relay 40 closes a circuit extending from ground G<sup>4</sup> through the springs 57 and the springs 21<sup>a</sup> and 17 to the point 58, from which point one branch extends over the conductor 59 to the connector private bank contact associated with the calling line and multiples of the same. This guarding potential prevents any subscriber from connecting with the substation



A when said substation is calling. Another branch extends from the point 58 through the holding winding 12 to battery B. This circuit through the holding winding 12 is closed before the armature 48 falls back after the circuit through the line winding 13 is broken by the attraction of the armature 15. The armature 48 does not fall back immediately upon the pulling up of the armature 15, due to the fact that simultaneous with the attraction of the armature 15 the plunger arm 9 is pulled up, which short-circuits the auxiliary winding 14 by closing the springs 60. This short-circuiting of the winding 14 tends to retard the deenergization of the core, and thus the armature 48 is held in an operated position until enough time has elapsed for the circuit through the winding 12 to be closed, whereby the plunger arm 9 is held in an operated position.

The calling subscriber now operates his calling device for the first digit 2 of the called number, whereby the substation impulse springs 6 and 7 are separated twice momentarily, each time breaking the circuit of the line relay 34 of the connector H. The relay 40 of the connector being slow acting does not deenergize during the momentary interruptions of its circuit by the relay 34, and consequently, each time that the line relay 34 deenergizes, an impulse is transmitted over the circuit extending from ground  $G^3$  through the springs 55 and 61, springs 62 and 63, relay 41, vertical magnet 27 and the side switch wiper 29<sup>a</sup> (in first position) to battery B. The vertical magnet receives two impulses over this circuit and operates to raise the switch shaft and wipers two steps to a position opposite the second row or level of bank contacts, and at the same time the shaft-controlled springs 38 and 39 are closed. The slow acting relay 41 is maintained in its energized position continuously while impulses are being transmitted through it to the vertical magnet, and in its energized position closes a circuit from ground  $G^5$  through the springs 65 and 66, springs 67 and the private magnet 33 to battery B. This circuit is broken when the relay 41 deenergizes after the last impulse has been delivered to the vertical magnet. The breaking of this circuit causes the private magnet 33 to deenergize, thus permitting the side switch to pass to second position. In passing from first to second position, the side switch wiper 29<sup>a</sup> transfers the battery connection from the vertical magnet 27 to the rotary magnet 28<sup>a</sup>.

The calling subscriber now operates his calling device for the last digit 2, in response to which the connector line relay operates to transmit two impulses through the rotary magnet 28<sup>a</sup>, whereby the shaft wipers are rotated onto the contacts of the desired line. The circuit of the rotary magnet extends

from ground  $G^3$  through the springs 55 and 61 through the springs 62 and 63, relay 41, springs 68, rotary magnet 28<sup>a</sup> and the side switch wiper 29<sup>a</sup> (in second position) to battery B. The relay 41 operates in response to the first impulse and remains energized during the transmission of the impulses in the same manner as for the previous digit. During the rotary motion, each time the private wiper 25 passes over a non-grounded private bank contact, a circuit may be traced from ground  $G^5$  through the springs 65, 66 and 69, relay 70, private wiper 25 and the cut-off or holding winding of the line switch associated with that contact to battery B. The resistance of the relay 70 and the cut-off or holding winding is such that neither will be operatively energized over this circuit. Since the private wiper 25 is of a width sufficient to engage two private bank contacts while passing between them, it will be seen that at that time the relay 70 will be in series with two cut-off or holding windings in parallel, but the resistances of these cut-off windings are sufficiently high to prevent either the relay 70 or the cut-off windings being operatively energized over this circuit.

After the last impulse is transmitted, the relay 41 deenergizes, thus deenergizing the private magnet 33 and causing the side switch to trip to third position. By the engagement of the side switch wipers 30 and 31 with their third-position contact points, the line connection is completed with the called line. Upon the engagement of the side switch wiper 32 with its third-position contact point, a circuit is completed through the cut-off winding of the line switch  $C'$ , the circuit extending from ground  $G^6$  through the side switch wiper 32 (in third position), private wiper 25, conductor 71 and the cut-off winding 72 to battery B. The cut-off winding of the line switch  $C'$  upon energizing, disconnects the line relay from the called substation. The connection of ground  $G^6$  with the connector private bank contact associated with the called line prevents the called line from being seized by some other connector switch. By the engagement of the side switch wiper 29<sup>a</sup> with its third-position contact point, the circuit of the ringer relay 36 is closed. This circuit extends from ground  $G^7$  through the interrupter 73, ringer relay 36, springs 74 and the side switch wiper 29<sup>a</sup> (in third position) to battery B. The ringer relay is energized intermittently, due to the interrupter 73, and operates to disconnect the calling line from the called line and to bridge the ringing current generator R across the called line to signal the called subscriber. Upon the response of the called subscriber, his line is provided with talking current through the windings of the back-



bridge relay 35, which relay, upon energizing, closes the circuit through the ringer cut-off relay 75. The said circuit extends from ground  $G^6$  through the side switch wiper 32 (in third position), springs 76 and the relay 75 to battery B. The relay 75, upon energizing, interrupts the circuit of the ringer relay 36 at the springs 74 and closes a locking circuit for itself through the springs 77 independent of the springs 76. Furthermore, the back-bridge relay 35, upon energizing, operates to reverse the direction of the flow of current in the calling line.

Upon the completion of the conversation, the hanging up of the receiver at the calling substation causes the circuit of the line relay 34 of the connector H to be opened. The relay 34, upon deenergizing, opens the circuit of the relay 40, which in turn, upon deenergizing, opens the circuit of the holding winding 12 of the line switch C at the springs 57 and closes the release circuit of the connector H as follows: from ground  $G^7$  through the springs 55 and 51, springs 62 and 78, off-normal springs 28 and the release magnet 37 to battery B. The release magnet, upon energizing, operates to remove the retaining pawls from the shaft and its own circuit is opened at the springs 38 when said shaft reaches its lowest position. Upon the deenergization of the holding winding 12, the plunger arm 9 withdraws the plunger from the bank, thus restoring the line switch C to normal.

The operation of the connector will now be described when connection is made with a line which forms one of a group of lines any one of which can be employed for completing the call. It will be assumed that there are three lines in this group and that they are connected to the eighth, ninth and tenth contacts of the second level of bank contacts of the connector. As before stated, the line switches associated with all except the last of this group of trunks are provided with a resistance 87 in shunt of the cut-off winding 72. In order to make this call, the subscriber operates his calling device in accordance with the number of the last trunk in the group, which is 20, and which would be the number appearing in the directory. Upon calling the digit 2, the connector is stepped up to the second level in the manner hereinbefore described. Upon calling the digit 0, which causes ten impulses to be transmitted to the connector, its wipers are rotated over the contacts of the second level and when the private wiper 25 engages the bank contact 28, a circuit may be traced from ground  $G^5$  through the springs 65, 66 and 69, relay 70, private wiper 25, conductor 71 and the cut-off winding 72 in parallel with the resistance 87 (shown dotted) to battery B. The resistances in this circuit are such that the relay 70 immediately be-

comes operatively energized and opens the circuit of the private magnet 33. The private magnet, upon deenergizing, allows the side switch to pass to third position, thus removing battery from the rotary magnet 28<sup>a</sup>, so that the remaining impulses of the digit 0 are lost. Upon passing to third position, the connector H completes the connection in the same manner as previously explained. Should the trunk connected to the eighth contact of this second level be busy, there will be a guarding potential on the private bank contact 28. Therefore, the relay 70 would not be operatively energized until the private wiper 25 has engaged the contact 29. Should both the private contacts 28 and 29 be busy, the relay 70 will not be energized and the shaft wipers will be carried to the contacts of the line 20, and if the line connected with this contact is idle, the magnet 41 will deenergize after the last impulse has been transmitted, thus causing the side switch to trip to third position and cut the connection through to the line in the usual manner. If this contact is busy, the switch will then lock on this line in the manner well understood in the art, and the busy signaling machine Q will be connected so as to transmit a busy signal back to the calling subscriber. Upon the calling subscriber hanging up his receiver, the connector will then be released, as heretofore described.

It will thus be seen that I have devised a very simple and efficient rotary connector, and one in which connection can be established with either single lines, or with an idle one of a group of lines. Furthermore, this operation is accomplished by the addition of but a single relay to the connector, together with a resistance in certain of the lines switches.

While I have illustrated my invention in connection with a particular type of system, it will, of course, be understood that I do not wish to be so limited, but that various changes and modifications will readily suggest themselves to those skilled in the art. Likewise, it will be understood that the groups of lines extending from the connector switch, instead of being connected directly to the substation set of the called subscriber, as are the single lines, will usually be connected thereto through a suitable private branch exchange.

What I claim as my invention is:—

1. In a telephone system, a subscriber's line, an impulse sender for said line, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means responsive to impulses from said sender for moving said connector into engagement with any one of said single lines, and responsive to another series of impulses from the same



sender to move said connector to the last one of any one of said groups of lines, and means for automatically stopping said connector on the first one of the lines of said group which is idle.

2. In a telephone system, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means for moving said connector into engagement with any one of said single lines, means for transmitting a series of impulses to said connector of such character as to move said connector to the last one of a group of lines, a relay in said connector, means for energizing said relay when said connector comes in contact with a contact in said group which is idle, and means controlled by the energization of said relay to stop said connector on said idle contact.

3. In a telephone system, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means for moving said connector into engagement with any one of said single lines, means for transmitting a series of impulses to said connector of such character as to move said connector to the last one of a group of lines, a magnet associated with each of said lines, a shunt circuit around the magnet of all except the last line in said group, and means controlled by a circuit through one of said shunts when the corresponding line is idle for automatically stopping the connector on that line.

4. In a telephone system, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means for moving said connector into engagement with any one of said single lines, means for transmitting a series of impulses to said connector of such character as to move said connector to the last one of a group of lines, a magnet associated with each of said lines, a shunt circuit around the magnet of all except the last line in said group, a relay in said connector adapted to be connected in series with one of said magnets when said connector connects with the corresponding line, means for energizing said relay only when it is connected in series with one of said magnets provided with a shunt, and means controlled by the energization of said relay to stop said connector on said idle contact.

5. In a telephone system, a subscriber's line, an impulse sender for said line, a plurality of single lines, a connector switch adapted to connect with any one of said lines, in response to impulses from said sender, a group of lines, means for transmitting a series of impulses from said sender

to said connector to move said connector to the last one of said group of lines, and means associated with the lines of said group for causing said connector to stop on the first line of said group which is idle.

6. In a telephone system, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means for moving said connector into engagement with any one of said single lines, means for transmitting a series of impulses to said connector of such character as to move said connector to the last one of a group of lines, a line switch associated with each of said lines, a cut-off magnet in each of said line switches, a shunt circuit around the cut-off magnets of the line switches of said groups of lines except the last one in each group, and means controlled by a current through one of said shunts when the corresponding line is idle for automatically stopping the connector on that line.

7. In a telephone system, a rotary connector, single lines and groups of lines any one of which can be employed for extending a connection to a called station terminating in said connector, means for moving said connector into engagement with any one of said single lines, means for transmitting a series of impulses to said connector of such character as to move said connector to the last one of a group of lines, a magnet associated with each of said lines, a shunt circuit around the magnet of all except the last line in said group, a relay in said connector adapted to be connected in series with one of said magnets when said connector connects with the corresponding line, means for energizing said relay only when it is connected in series with one of said magnets provided with a shunt, an operating magnet for said connector, a side switch for controlling the circuit therefor, means controlled by the energization of said relay to trip said side switch to thereby break the circuit of said operating magnet to cause the connector to stop on said idle contact.

8. In a telephone system, a subscriber's line, an impulse sender for said line, an automatic progressively movable trunking switch for said line, a plurality of line terminals accessible to said switch, a line for each one of said terminals, a busy test circuit associated with each terminal, means for applying a busy test potential to a busy circuit to one of said terminals to make the corresponding line busy, means for operating said switch in response to impulses from said sender to find said busy terminal, and means responsive to said potential for giving said first line a busy signal, means for applying a busy test potential to the busy test circuit of another one of said terminals to make a



corresponding line busy, means for operating said switch to find said busy terminal in response to impulses from said sender, and means responsive to said potential for preventing said switch from stopping on said last terminal, and to maintain the switch responsive to the control of the line whereby the switch can be moved to the next terminal.

9. In a telephone system, a subscriber's line, an impulse sender for said line, an automatic progressively movable trunking switch for said line, a plurality of line terminals accessible to said switch, a line for each one of said terminals, a busy test circuit associated with each terminal, means for applying a busy test potential to a busy circuit of one of said terminals to make the corresponding line busy, means for operating said switch responsive to said impulse sender to find said busy terminal, and means responsive to said potential for giving said first line a busy signal, means for applying a busy test potential to the busy test circuit of another one of said terminals to make a corresponding line busy, means for operating said switch responsive to said impulse sender to find said busy terminal, and means responsive to said potential for preventing said switch from stopping on said last terminal, and to maintain the switch responsive to the control of the impulse sender whereby the switch can be moved to the next terminal.

10. In a telephone system, a subscriber's line, an impulse sender for said line, an automatic progressively movable trunking switch for said line, a plurality of line terminals accessible to said switch, a line for each one of said terminals, a busy test circuit associated with each terminal, means for applying a busy test potential to a busy circuit to one of said terminals to make the corresponding line busy, means for operating said switch responsive to said impulse sender over two sides of the line in series to find said busy terminal, and means responsive to said potential for giving said first line a busy signal, means for applying a busy test potential to the busy test circuit of another one of said terminals to make a corresponding line busy, means for operating said switch responsive to said impulse sender to find said busy terminal, and means responsive to said potential for preventing said switch from stopping on said last terminal, and to maintain the switch responsive to the control of the impulse sender whereby the switch can be moved to the next terminal.

11. In a telephone system, a plurality of lines, a trunking switch for each line, each trunking switch provided with a controlling magnet, a cut-off relay for each switch for rendering the controlling magnet thereof inoperative, a connector switch, terminals for

said lines in said connector switch, a circuit for each cut-off relay comprising the terminal of the corresponding line in said connector, and comprising a relay in the connector, means for operating said connector to close any one of said circuits to operate any one of said cut-off relays, each cut-off relay designed to prevent said relay in the connector from energizing, a shunt around some of said cut-off relays for permitting said relay to energize when the connector closes the circuit of the shunted relay.

12. In a telephone system, a plurality of lines, a trunking switch for each line, each trunking switch provided with a controlling magnet, a cut-off relay for each switch for rendering the controlling magnet thereof inoperative, a connector switch, terminals for said lines in said connector switch, a circuit for each cut-off relay comprising the terminal of the corresponding line in said connector, and comprising a relay in the connector, means for operating said connector to close any one of said circuits to operate any one of said cut-off relays, each cut-off relay designed to prevent said relay in the connector from energizing, a shunt around some of said cut-off relays for permitting said relay to energize when the connector closes the circuit of the shunted relay, a talking circuit extending to said connector comprising a conductor on one side and another on the other, said means for operating said connector comprising both sides of said talking circuit in series.

13. In a telephone system, an automatic connector switch, a subscriber's line accessible to said switch at a certain stage in the movement thereof, a second subscriber's line accessible to said switch at an earlier stage in the movement thereof, means for transmitting directive controlling impulses to said switch in accordance with the number of said first line, automatic means in said switch for causing the same to stop before reaching said first line to establish connection with said second line if the said second line is idle, and means in said switch for signaling the subscriber on a connected line.

14. In a telephone system, an automatic connector switch, a subscriber's line accessible to said switch at a certain stage in the movement thereof, a second subscriber's line accessible to said switch at an earlier stage in the movement thereof, means for transmitting directive controlling impulses to said switch in accordance with the number of said first line, a test relay in said switch for causing the same to stop before reaching said first line to establish connection with said second line if the said second line is idle, and means in said switch for signaling the subscriber on a connected line.

15. In a telephone system, a final con-



necter switch provided with signaling equipment and means for supplying talking current to connected telephone lines, a line accessible to said switch at a certain stage in the movement thereof, a second line accessible to said switch at an earlier stage in the movement thereof, means for transmitting directive controlling impulses to said switch in accordance with the number of said first line and automatic means in said switch for causing the same to stop before reaching said first line to establish connection with said second line if the said second line is idle.

15 16. In a telephone system, an automatic connector switch at the exchange, a group of lines provided with terminals in said switch and extending to a distant point, a telephone number common to said lines and in accordance with the location of the terminal associated with the last line of said group, means for operating said switch in accordance with the final digits of said number when a connection to said distant point is desired,

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and automatic means in said connector for stopping the same to establish connection with the first trunk line of the group which is idle.

17. In a telephone system, an automatic connector switch at the exchange, a group of lines provided with terminals in said switch and extending to a distant point, a telephone number common to said lines and in accordance with the location of the terminal associated with the last line of said group, means for operating said switch in accordance with the last digits of said number when a connection to said distant point is desired, and a test relay in said connector for stopping the same to establish connection with the first trunk line of the group which is idle.

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Signed by me at Chicago, Illinois, this tenth day of February, 1914.

TRYGVE E. MEYER.

Witnesses:

GILBERT SORBER,  
C. W. BUELL.