

June 21, 1927.

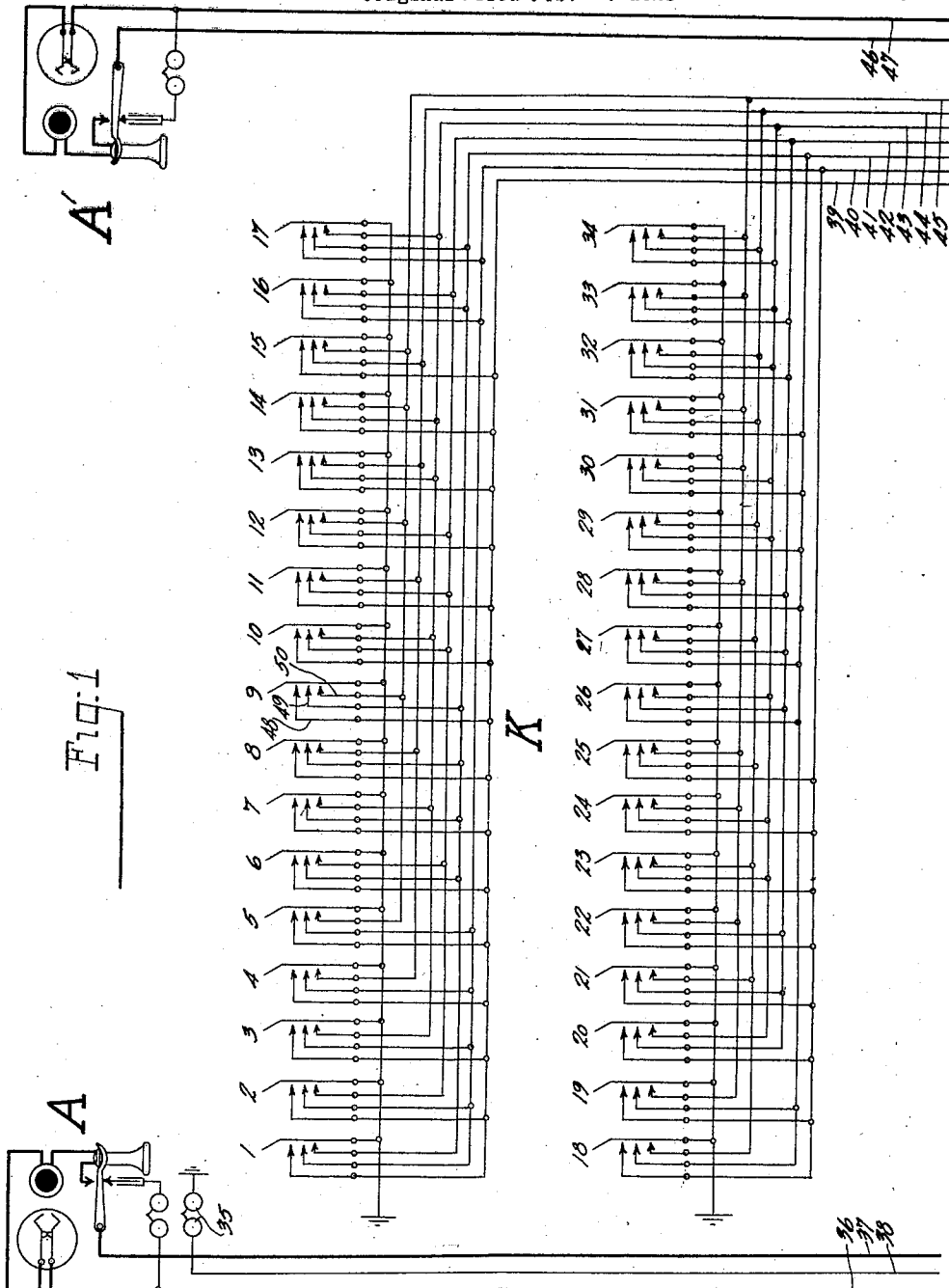
1,633,116

C. E. LOMAX

TELEPHONE SYSTEM

Original Filed Feb. 16, 1923

3 Sheets-Sheet 1



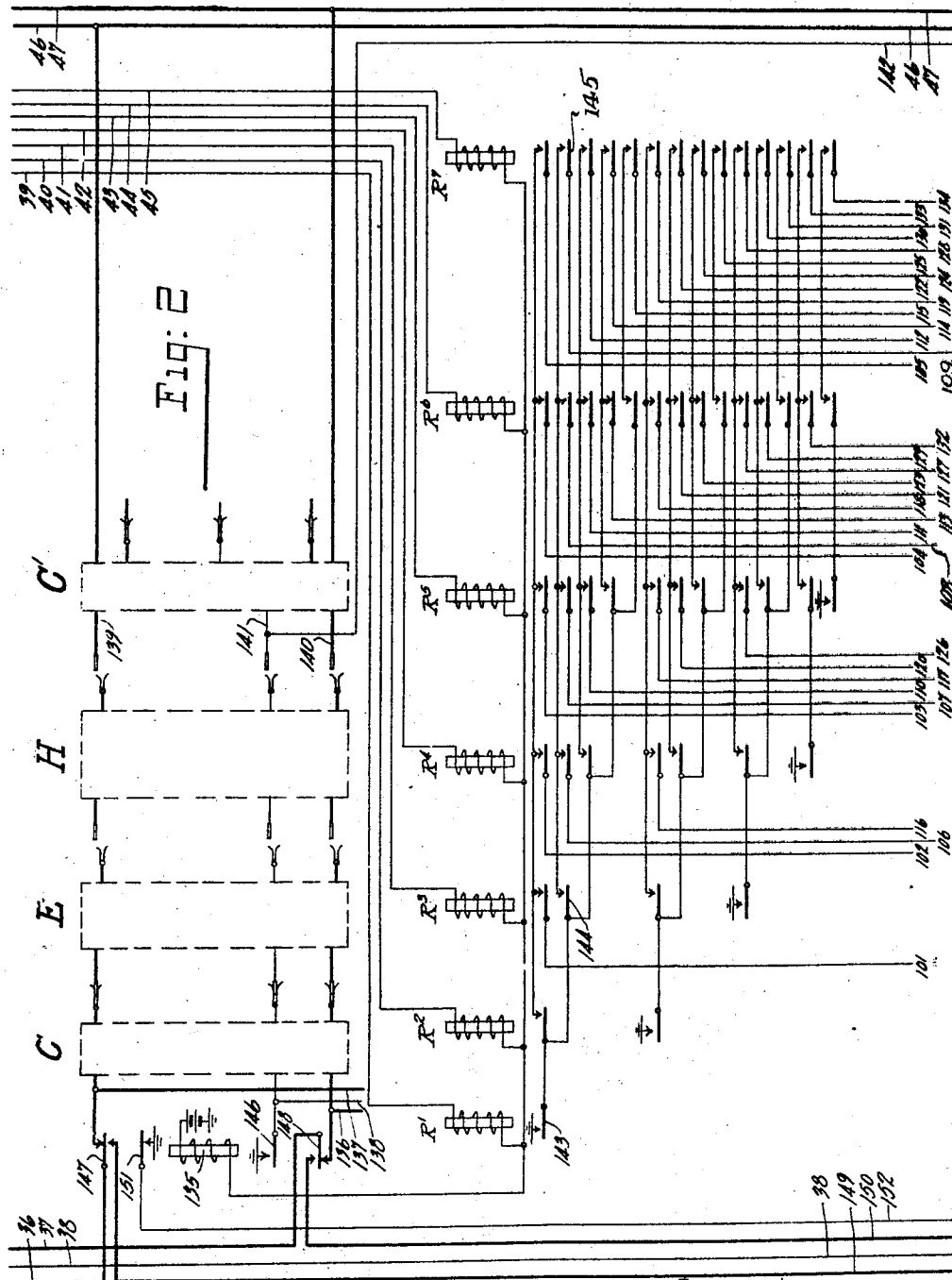
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3 Sheets-Sheet 3

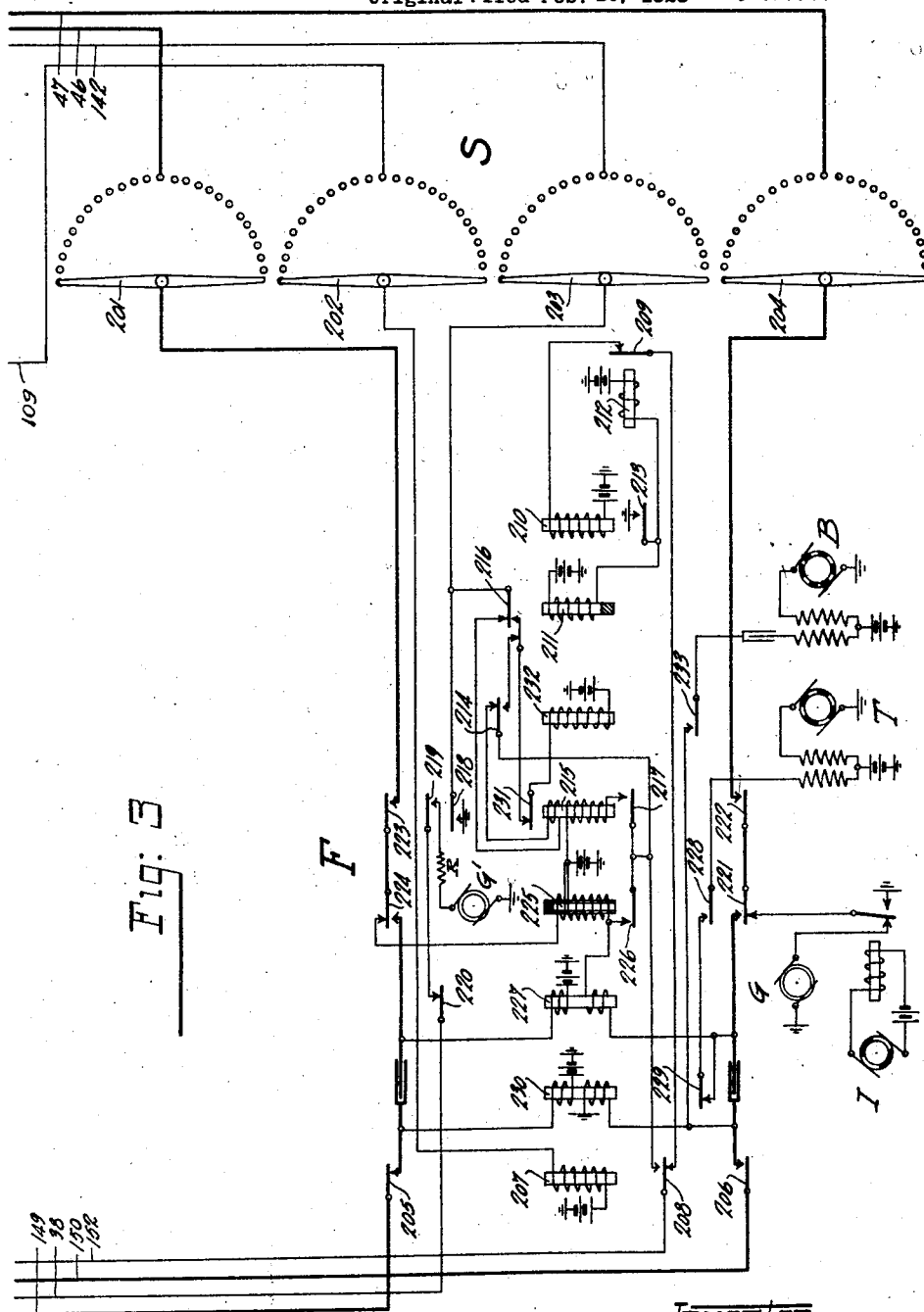


Fig. 3

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UNITED STATES PATENT OFFICE.

CLARENCE E. LOMAX, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO AUTOMATIC ELECTRIC INC., OF CHICAGO, ILLINOIS, A CORPORATION OF DELA-
WARE.

TELEPHONE SYSTEM.

Application filed February 16, 1923, Serial No. 619,377. Renewed November 26, 1926.

The present invention relates in general to telephone systems and particularly to a new and improved method of obtaining connection between a calling and a called line.

It sometimes occurs that a subscriber at a given substation may have occasion to call a certain list of telephones at very frequent intervals. When this is the case, the delay incident to the operation in manual systems, or the labor occasioned by the calling device in automatic systems, may prove burdensome. The object of the present invention is to provide means, preferably an automatic progressively movable switch, whereby the subscriber at a special substation may obtain connection with any one of a limited number of other stations as the result of merely depressing a single key, the switch in no manner interfering with the ordinary operation of the telephone.

The above object could be accomplished simply by providing an operating conductor from the exchange to the special substation for each line to which special service was desired, were it not for the fact that the large number of conductors required would render the system commercially impracticable. The present invention utilizes the well-known fact that a plurality of units taken in combination will afford a number of combinations greatly in excess of the number of units. For instance, the units A, B, C, and D taken in pairs afford six combinations as follows: AB, AC, AD, BC, BD, and CD. This fact is made use of by providing a plurality of operating conductors between the exchange and the special substation. At the exchange each conductor is connected through a relay to main battery. By grounding the operating conductors in combination, the associated relays can be utilized to set up as many distinct circuits as there are combinations in the particular scheme used. The circuits so set up can be utilized to control the special switch in the establishment of connections from the special substation to the substation to which the switch has access.

The invention is disclosed in connection with an automatic telephone system, but it is to be understood that it is equally applicable to other systems as well.

The object of the invention will be more

fully pointed out hereinafter, reference being had to the accompanying drawings, Figs. 1, 2, and 3, which, when placed in order, show by means of the usual circuit diagrams sufficient of the apparatus employed in a system embodying the principles of the invention to enable the same to be understood.

Figure 1 shows the special substation A and a called substation A', together with the keys associated with the special substation.

Figure 2 shows by diagrammatical indication the automatic switches which are normally used when establishing a connection from station A to station A', together with the relays R' to R', inclusive, each of which is associated with an operating conductor leading to substation A.

Figure 3 shows a switch S which operates to extend the talking conductors of station A into engagement with the talking conductors of certain stations, together with the relay equipment F which serves to control the switch S.

Referring to Fig. 1, the automatic substations A and A' are ordinary automatic substations having the usual talking, signaling, and impulse sending instrumentalities. Substation A is a special substation and has mounted in close proximity thereto the keys K. Each key represents a certain substation, connection to which can be obtained by the simple act of depressing the key. The keys are of the locking type, and are not restored until the conversation is completed. A special ringer 35 is provided at substation A which gives notification when the called party answers a connection set up by means of one of the keys K. When the conversation is completed and the receiver restored at the called substation, the ringer 35 will again operate until the key K has been restored. Conductors 36 and 37 are the usual talking conductors associated with substation A. Conductor 38 connects the ringer 35 with the central office apparatus. Conductors 39 to 45, inclusive, are the operating conductors connecting the keys K with the central office apparatus. Conductors 46 and 47 are the usual talking conductors associated with substation A'.

Referring to Fig. 2, the line switches C and C', which are denoted by dotted rec-

tangles, may be assumed to be of the well-known rotary type. The selector E and the connector H, which are denoted by dotted rectangles, may be assumed to be of the well-known vertical and rotary type.

The operating conductors 39 to 45, inclusive, are shown as terminating in the relays R' to R', respectively. The invention is illustrated by the use of seven conductors working in combinations of three; it is to be understood, however, that other numbers and combinations are equally applicable. The seven conductors working in triplets afford a total of thirty-four combinations, therefore, thirty-four keys are provided at substation A. The keys K control the operation of the relays R' to R', inclusive, in such a way that any conductor in the group 101 to 134, inclusive, may be grounded.

The talking conductors 36 and 37 are normally connected to line switch C through the resting contacts of relay 135. Conductors 136 and 137 extend the talking conductors from substation A to the connector line bank in the usual manner. Conductor 138 is connected to the contact in the connector test bank associated with substation A.

Talking conductors 46 and 47 of substation A' are connected to the line switch C'. Conductors 139 and 140 extend the talking conductors to the connector line bank in the usual manner. Conductor 141 connects the contact in the connector test bank associated with substation A' with the cut-off relay of line switch C.

Referring to Fig. 3, the finder switch S is a step by step rotary switch of the type in which the wipers move in a forward direction only. In further explanation, it should be stated that this switch is of the type in which the wipers are advanced when the stepping magnet retracts its armature, rather than when the stepping magnet is energized.

To the contacts in the bank accessible to wiper 201, and in the bank accessible to wiper 204 are connected, respectively, multiples of the positive and negative talking conductors of those substations to which direct service is desired. The contacts in the bank to which wiper 203 has access are connected to the test contacts in the connector bank associated with those substations to which direct service is desired. The contacts in the bank to which wiper 202 has access are extended to certain of the conductors 101 to 134, inclusive, Fig. 2.

The relay equipment F controls the finder switch S, and serves to complete the connection. The generator G and the interrupter I together constitute the usual ringing means found in an automatic office. The generator G' is provided to actuate the ringer 35 at substation A. The usual busy machine is indicated. The interrupter T produces a

tone which advises the called subscriber that he is being called from a special substation.

The normal operation of extending a connection to substation A' from substation A may be described as follows: it being assumed that the call number of substation A' is 876. When the receiver at substation A is removed, the line switch C operates to extend the connection to an idle first selector, such as the selector E. The operation of the calling device for the first digit 8 will cause the selector E to raise its wipers opposite the eighth level of bank contacts, whereupon the selector will automatically rotate in search of an idle trunk line leading to a connector. It may be assumed that the connector H is the first found to be idle. The operation of the calling device for the second digit 7 will cause the connector H to raise its wipers opposite the seventh level of bank contacts. The operation of the calling device for the third digit 6 will cause the connector H to rotate its wipers into engagement with the bank contacts associated with the called substation A'.

The operation of calling substation A' from substation A by means of the special apparatus will be described in a general way; it being assumed that substation A' is one of the group of substations to which direct service is rendered.

The calling subscriber at substation A first operates the locking key associated with station A'. As a result of this operation, three relays of the R'-R' group operate to ground a certain contact in the bank to which wiper 202 of switch S has access. The finder switch S thereupon advances its wiper 202 into engagement with that contact. The relay equipment F then tests the called line and, if idle, closes a circuit through wiper 203 to operate the cut-off relay of the line switch associated with substation A'. Relay equipment F then rings the called line over wipers 201 and 204. When the connection is established, current from generator G' causes the ringer 35 at substation A to sound, when the called party answers, the ring ceases as an indication that the called party has answered. At the same time an identity tone is placed on the called line to indicate that the call is from a special substation. When the conversation is completed, the subscribers will restore their receivers, whereupon the ringer 35 will again operate as a reminder that the key K must be restored. When the key K is restored, certain relays in the relay group F deenergize and open the circuit to wipers 201, 203, and 204, whereupon the cut-off relay of the called line switch deenergizes and restores the called line to normal.

The system having been described in general, a detailed description will now be given of its operation. For this purpose, it will

be assumed that key K^9 is associated with the called station A' . When key K^9 is depressed, three circuits are closed, the first circuit extends from ground at the lever of key K^9 , spring 48, conductor 39, relay R' , through relay 135 to negative battery. The second circuit may be traced from ground at the lever of key K^9 , spring 49, conductor 41, relay R^3 , through relay 135 to negative battery. The third circuit may be traced from ground at the lever of key K^9 , spring 50, conductor 45, relay R^7 , through relay 135 to battery.

Relays R' , R^3 , R^7 , and 135 will energize over the above traced circuits. The operation of relays R' , R^3 , and R^7 causes a ground to be placed upon the thirteenth contact in the bank accessible to wiper 202 of switch S. The above circuit is traceable from ground at working contact and armature 143 of relay R' , armature 144 and working contact of relay R^3 , working contact and armature 145 of relay R^7 , conductor 109 to the thirteenth contact in the bank accessible to wiper 202.

Relay 135, upon energizing, places ground upon the test contact associated with substation A in the connector test bank by way of armature 146 and conductor 138, thus protecting the calling line in the usual manner. Relay 135 at the same time disconnects the talking conductors 36 and 37 from the line switch C and extends them by way of armatures 147 and 148, conductors 149 and 150 to armatures 205 and 206, respectively, of relay 207 of relay equipment F. A further result of the energization of relay 135 is the closure of a circuit traceable from ground, working contact and armature 151, conductor 152, armature 208 and its resting contact, armature 209, and its resting contact, relay 210, to battery. Relay 210 will now energize and close a circuit through slow acting relay 211 in parallel with the stepping magnet 212 by way of armature 213. The stepping magnet now energizes and opens the circuit of relay 210 at armature 209, whereupon relay 210 will deenergize and open the circuit of the stepping magnet. The stepping magnet, upon deenergizing, advances the wipers one step and again closes the circuit of relay 210. The alternate operation of relay 210 and the stepping magnet will continue until the wiper 202 engages a grounded bank contact. As the relay 211 is slow acting, it will not deenergize during the momentary deenergization of relay 210.

When wiper 202 engages the thirteenth bank contact, a circuit is established from grounded conductor 109, thirteenth bank contact, wiper 202, relay 207 to battery. Relay 207 will now operate and permanently open the circuit to relay 210 at armature 208. It may be assumed that the called

line is idle and, when relay 211 deenergizes shortly after the last deenergization of relay 210, a circuit may be traced from grounded conductor 152, armature 208 and its working contact, armature 214 and its resting contact, upper winding of relay 215, resting contact and armature 216, wiper 203 and the bank contact with which it is now in engagement, conductor 142, conductor 141, through cut-off relay of the called line switch (not shown) to battery. The cut-off relay of the called line switch will operate over this circuit to clear the called line, and at the same time relay 215 will operate to close the springs 217. The closure of springs 217 will cause the complete energization of relay 215, the lower winding of the said relay locking up to the grounded conductor 152. The complete energization of relay 215 places direct ground on conductor 142 at armature 218, thus maintaining the bridge cut-off relay of the called line switch, and grounding the associated contact in the test bank of the connector. Relay 215 also closes a circuit traceable from ground through generator G' , resistance R, working contact and armature 219, resting contact and armature 220, conductor 38, ringer 35 to ground. The ringer 35 will operate as an indication that the desired connection has been established.

A further result of the energization of relay 215 is the closure of a ringing circuit traceable from ground, generator G, ring interrupter contacts resting contact and armature 221, armature 222 and working contact, wiper 204 and the contact upon which it is now resting, line conductor 47, substation A' , line conductor 46, bank contact upon which wiper 201 is now standing and said wiper, working contact and armature 223, armature 224 and its resting contact, upper winding of relay 225 to battery. The ringer at the called substation will operate periodically. The ringing current will have no effect upon relay 225 as the said relay is slow acting. When the called party answers, a path for direct current will be established at substation A' and the relay 225 will operate to close the springs 226. A holding circuit is thus completed for the lower winding of relay 225, whereupon the said relay becomes fully energized and operates to remove generator and relay 225 from the called line and to connect the same through to the battery feed relay 227.

The subscriber at the called substation now receives talking battery over the following circuit: From grounded conductor 152, armature 208 and its working contact, armature 226 and its working contact, lower winding relay 227, working contact and armature 221, over the previously traced circuit to substation A' and back to armature 224 and its working contact, upper winding

of relay 227 to battery. An identity tone is now audible to the called party, it being placed upon the called line by way of the secondary of the interrupter T, armature 228 and its working contact, and armature 229 and its resting contact. This tone advises the called party that the call is from a special substation and that he must remain upon the line until the calling party answers. A further result of the energization of relay 227 is the opening of the circuit of ringer 35 at armature 220. The stopping of the ring is an indication to the calling subscriber that the called subscriber has answered. The calling subscriber will now remove his receiver and draw talking battery through the upper and lower windings of relay 230 by way of armatures 205 and 206. The relay 230 energizes and removes the identity tone at armature 229. The conversation will now proceed as desired.

When the conversation is completed, both parties will restore their receivers to the switch-hook, whereupon relay 227 will deenergize and again close the circuit to ringer 35. Ringer 35 will now operate as a reminder that the key K^0 must be restored.

When the key K^0 is restored the circuits to relays R' , R^3 , R^7 , and 135 are opened. Relay 135, upon deenergizing, will again connect line conductors 36 and 37 to line switch C, at the same time removing the protecting ground in the test bank of the connector. Relay 135, will also open the locking circuits of relays 215 and 225. Relay 215, upon deenergizing opens the circuit to the cut-off relay of the called line switch, at the same time removing the busying ground from the test contact associated with line A' in the test bank of the connector. Relay 215, also, opens the circuit to wipers 201 and 204, therefore, they will not interfere with the circuit upon which they are standing. The deenergization of relays R' , R^3 , and R^7 will remove ground from the thirteenth contact in the bank accessible to wiper 202. All of the apparatus is now in normal position.

If the wipers of the finder switch S chances to be standing on the bank contacts associated with a certain called substation when the corresponding key K is operated, a circuit will be closed through relay 207 at the same time that a circuit is closed through relay 210. Relay 207 will operate to open the circuit of relay 210 before the latter has closed a circuit through to the stepping magnet.

An explanation will now be given of the operation should an attempt be made to extend a connection by means of a key K to a called line that is busy. In this connection, it will be assumed that the called substation is busy, therefore, there will be a ground upon the thirteenth contact in the bank accessible to wiper 203. When the key

K^0 is operated, the finder switch S will function as previously explained to advance its wipers into engagement with the thirteenth set of bank contacts. As the called line is busy a circuit is now traceable from ground on the thirteenth contact in the bank accessible to wiper 203, wiper 203, armature 216 and its working contact, (relay 211 not yet having deenergized), resting contact and armature 231, busy relay 232 to battery. Relay 232, upon energizing, forms a locking circuit for itself independent of the ground upon wiper 203. This locking circuit may be traced from grounded conductor 152, armature 208 and its working contact, armature 214 and its working contact, resting contact of springs controlled by armature 216 (relay 211 having now deenergized), resting contact and armature 231, relay 232 to battery. A further result of the operation of relay 232 is the placing of busy tone on the calling line by way of armature 233 and its working contact, working contact and armature 206, conductor 150, working contact and armature 148 to talking conductor 37.

Since relay 215 does not energize at this time, there will be no operation of ringer 35. The calling subscriber will eventually remove his receiver, whereupon he will receive the busy tone as an indication that the called line is busy. He then replaces his receiver and restores the key K^0 , the release of the apparatus taking place in the usual manner.

While only one specially equipped substation has been shown, it is to be understood that others may be provided if desired.

The object and scope of the invention having been described, what is considered to be new and what it is desired to have protected by Letters Patent will be pointed out more specifically in the appended claims.

What is claimed is:

1. In a telephone system, a subscriber's line extending from a substation to the exchange and having two branches, switching arrangements for extending one of said branches to any desired line in the exchange, a switching device in which the other branch terminates, circuit connections by means of which a limited number of said lines are made accessible to said switching device, and means by which the subscriber on said first mentioned line controls said switching device.

2. In a telephone system, a calling substation, a switch at the exchange individual to said station, a train of switches at the exchange common to said calling station and other stations, called stations accessible to said calling station by way of said switch train only, connections to such called stations being established independent of said individual switch, and a plurality of preferred called stations which are accessible to said

calling station either by way of said switch train or by way of said individual switch.

3. In a telephone system, a special substation, a switch at the exchange individual to said special station, other switches at the exchange common to said special station and other stations and accessible to said special station independent of said individual switch, lines accessible only to said common switches, other lines accessible both to the common switches and to said individual switch, and controlling devices by means of which the subscriber at said special station can operate said switches to establish connections with desired lines.

4. In a telephone system, a special substation, a switch at the exchange individual to said special station, other switches at the exchange common to said special station and other stations, means excluding said individual switch for connecting said special station with said common switches, lines accessible only to said common switches, other lines accessible both to the common switches and to said individual switch, a controlling device by means of which the subscriber at said special station can operate idle common switches to connect any desired lines, and a separate controlling device by means of which said subscriber can operate said individual switch to connect with any one of said second mentioned lines.

5. In a telephone system, a special substation, a plurality of other substations, means including a train of automatic switches for extending connections from said special substation to said other substations, a special switch individual to said special substation and having access to a limited number of said other substations, a group of control conductors extending from said special substation to the exchange, and a set of relays energized in combinations over said control conductors to control said special switch for the purpose of connecting the special substation to any station to which the switch has access.

6. In a telephone system, a special substation, a plurality of other substations, means including a train of automatic switches for extending connections from said special substation to said other substations, a special switch individual to said special substation and having access to a limited number of said other substations, talking conductors and a group of control conductors extending from said special substation to the exchange, means for controlling said first mentioned switches over the said talking conductors, and means for controlling said special switch over said control conductors independent of the talking conductors.

7. In a telephone system, a special substation, a plurality of other substations, means including a train of automatic switches for

extending connections from said special substation to said other substations, a special switch individual to said special substation and having access to a limited number of said other substations, conductors extending from said special substation to the exchange, means for transmitting impulses over a pair of said conductors in series to control said first mentioned switches, and means for establishing ground return circuits over other of said conductors to start said special switch and cause the same to connect with any line to which it has access.

8. In a telephone system, a special substation, a plurality of other substations, means including a train of automatic switches for extending connections from said special substation to said other substations, a special switch individual to said special substation and having access to a limited number of said other substations, a calling device at the said special station for generating series of impulses to control said first mentioned switches, and a set of keys at said special station, one key for each station to which said special switch has access, for controlling said special switch.

9. A switch control system comprising a series of test conductors, a group of relays less in number than said conductors, and means for energizing said relays in combinations to close test circuits over said conductors.

10. A switch control system comprising a series of test conductors, a group of relays less in number than said conductors, and means for energizing said relays in combinations to close test circuits over said conductors, each circuit including contacts on a plurality of energized relays and excluding any contacts on relays not energized.

11. A switch control system comprising a group of relays, means for energizing said relays in combinations, a series of test conductors greater in number than the number of said relays, and a series of test contacts upon which test potentials are placed by way of said test conductors.

12. A switch control system comprising a group of relays, means for energizing said relays in combinations, a series of test conductors greater in number than the number of said relays, and a series of test contacts upon which test potentials are placed by way of said test conductors, the circuit by which a test potential is placed on any contact passing through contacts on a plurality of energized relays and excluding contacts on any of said relays which are deenergized.

13. In a telephone system, a calling subscriber's line and a called subscriber's line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, a bell at the station on the calling line, and means for auto-

matically operating said bell when the connection is established and before the called party answers.

14. In a telephone system, a calling subscriber's line and a called subscribers' line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, a bell at the station on the calling line, means for automatically operating said bell when the connection is established, and means for rendering said first means ineffective when the called party answers.

15. In a telephone system, a calling and a called line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, the connection being established while the switchhook at the calling station remains in normal position, and means for automatically signalling the calling subscriber when the connection is completed.

16. In a telephone system, a calling and a called line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, the connection being established while the switchhook at the calling station remains in normal position, and means for automatically signalling the calling subscriber when the called subscriber answers.

17. In a telephone system, a calling and a called line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, the connection being established while the receiver at the calling station remains on the hook, means for ringing the calling and called stations and for automatically stopping the ringing operations when the called subscriber answers, and means for automatically signalling the called subscriber after he removes his receiver in order to notify him to wait until the calling subscriber removes his receiver.

18. In a telephone system, a calling and a called line, automatic switching mechanism at the exchange controlled from the calling station for connecting said lines, the connection being established while the receiver at the calling station remains on the hook, means for automatically signalling the calling subscriber when the connection is established by ringing the bell at the calling station, means for automatically signalling the called subscriber when said called subscriber answers and for stopping the first signalling operation at the same time, and means for stopping the second signalling operation when the calling party answers.

19. In a telephone system, a calling subscriber's line and a called subscriber's line, automatic switching mechanism at the exchange controlled from the calling station to connect said lines, a signal at the calling

station, and means for operating said signal when the called party hangs up his receiver.

20. In a telephone system, a calling subscriber's line and a called subscriber's line, automatic switching mechanism at the exchange controlled from the calling station to connect said lines, a signal at the calling station, means effective as soon as the connection is established for automatically operating said signal before the called party answers, and means for re-operating said signal when the called party hangs up his receiver.

21. In a telephone system, a calling and a called line, automatic switching mechanism at the exchange controlled from the calling station to connect said lines, a set of keys at the calling station constituting the means by which the control of said mechanism is effected, a signal at the calling station, and means responsive when the called party hangs up for operating said signal until all operated keys are restored to normal.

22. In a telephone system, a subscriber's line, two automatic switches at the exchange individual to said line, means for operating either of said switches separately at the option of the subscriber, connector switches accessible to one of said individual switches, and other subscribers' lines multiplied in the banks of said connector switches and the other one of said individual switches.

23. In a telephone system, a subscriber's line, an automatic switch at the exchange individual to said line and controllable thereover, connector switches, switching mechanism controlled over said line for connecting said line with any one of said connectors while said individual switch remains in normal position, and other subscribers' lines multiplied in the banks of said connector switches and said individual switch.

24. In a telephone system, a calling and a called line, two separate routes over which talking connections may be completed between said lines, automatic switches at the exchange by means of which such connections are established all connections over each route being exclusive of any switch used in any connection established over the other route, and means whereby the subscriber on the calling line can control said switches as desired to set up connections over either route as set forth.

25. In a telephone system, a calling and a called line, two separate routes over which talking connections may be completed between said lines, automatic switches at the exchange by means of which such connections are established all connections over each route being exclusive of any switch used in any connection established over the other route, and there being a greater number of switches involved in a connection set up

over one route than there is in a connection set up over the other route, and means whereby the subscriber on the calling line can control said switches as desired to set up connections over either route as set forth.

26. In a telephone system, a calling and a called line, two separate routes over which talking connections may be completed between said lines, automatic switches at the exchange by means of which such connections are established, a ringing tone, a signal at the station on the calling line, automatic means for giving said tone to the calling subscriber over one route when a connection is established, and means for automatically operating said signal over the other route when the connection is established.

27. In a telephone system, a substation, a plurality of other substations, a switch individual to said first substation and having access to said other substations, a group of control conductors extending from said first substation to the exchange, and a set of relays energized in combinations over said conductors to control said individual switch to hunt for and connect a desired one of said other substations to said first substation.

28. In a telephone system, a substation, a plurality of other substations, a switch individual to said first substation and having access to said other substations, and a set of keys at said first substation, one key for each substation to which said switch has access, for controlling said switch to hunt for and connect a desired one of said other substations with said first substation.

29. A switch control system comprising a series of test conductors, a group of relays less in number than said conductors, an individual conductor for each of said relays, and a set of keys equivalent in number to said test conductors for energizing said relays over their individual conductors in combinations to close test circuits over said test conductors.

30. A switch control system comprising a series of test conductors, a group of relays less in number than said conductors, a set of keys equivalent in number to the number of said test conductors, a set of control conductors equivalent in number to the number of relays and each control conductor being individual to one of said relays, and circuit connections whereby when any one of said keys is operated a certain combination of

said relays energize over their individual control conductors to place a test potential on the test conductor corresponding to the operated key.

31. In a telephone system, a subscriber's line, two automatic progressively movable switches at the exchange individual to said line, and means at the station on said line for operating either of said switches separately at the option of the subscriber.

32. In a telephone system, a subscriber's line, two single level automatic hunting switches at the exchange individual to said line, and means for starting either of said switches separately at the option of the subscriber.

33. In a telephone system, a calling subscriber's line, two single level automatic hunting switches at the exchange individual to said line, called subscribers' lines, the first of said switches adapted when operated to extend connection in the direction of any one of said called lines and the second switch adapted when operated to complete a connection to any one of said called lines, and means for operating either of said switches separately at the option of the subscriber on the calling line.

34. In a telephone system, a calling and a called line, two separate routes over which talking connections may be completed between said lines, automatic switches at the exchange by means of which such connections are established, there being a plurality of switches involved in one route and only a single switch in the other route, and means whereby the subscriber on the calling line can control said switches as desired to set up connections over either route as set forth.

35. In a telephone system, a calling and a called line, two separate routes over which talking connections may be completed between said lines, automatic switches at the exchange by means of which such connections are established, there being a greater number of switches involved in a connection set up over one route than there is in a connection set up over the other route, and means whereby the subscriber on the calling line can control said switches as desired to set up connections over either route as set forth.

In witness whereof, I hereunto subscribe my name this 12th day of February, A. D., 1923.

CLARENCE E. LOMAX.