

Dec. 7, 1937.

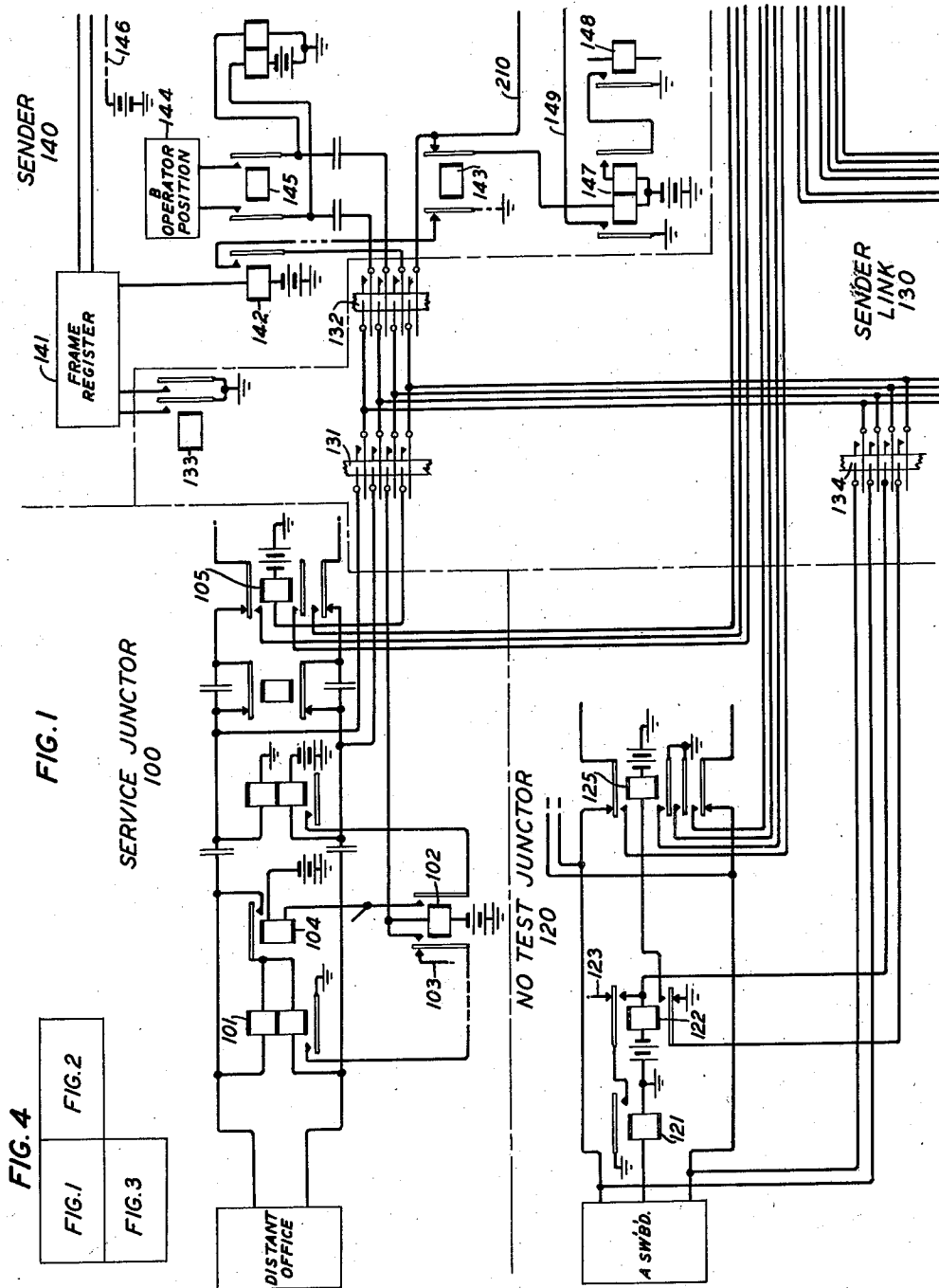
F. A. KORN

2,101,258

TELEPHONE SYSTEM

Filed March 11, 1936

3 Sheets-Sheet 1



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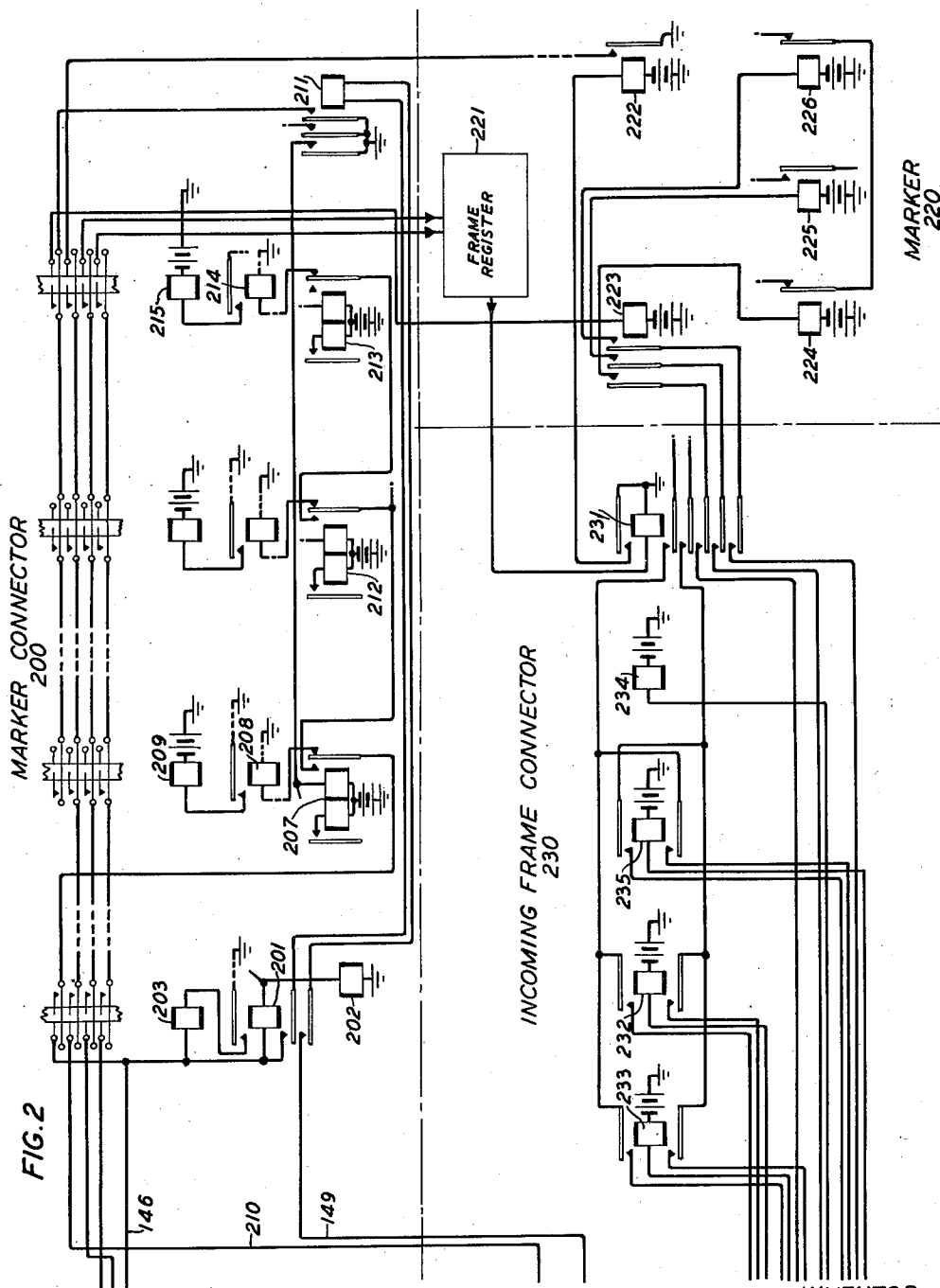
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3 Sheets-Sheet 2



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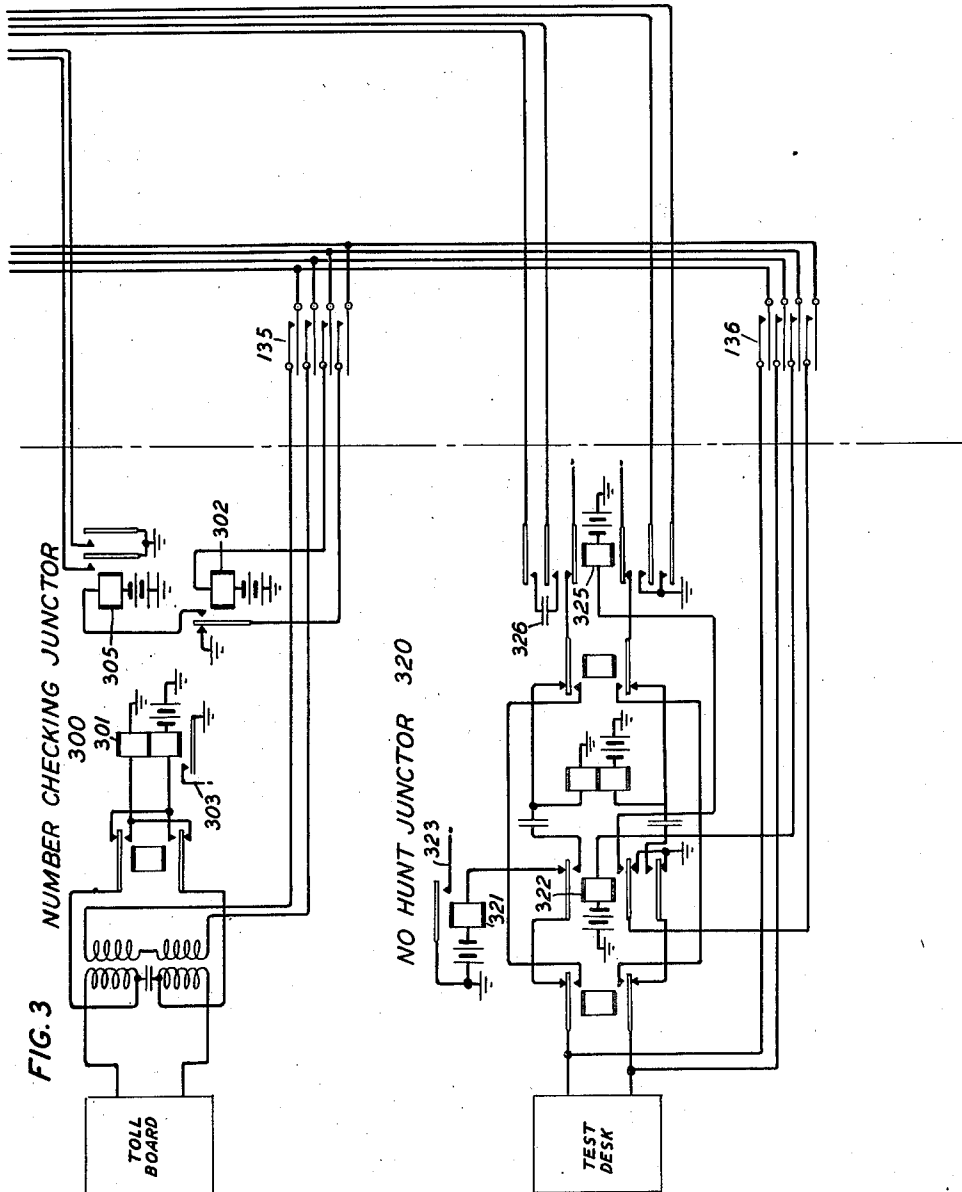
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3 Sheets-Sheet 3



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2,101,258

TELEPHONE SYSTEM

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Application March 11, 1936, Serial No. 68,255

9 Claims. (Cl. 179—175.2)

This invention relates to telephone systems and has for its object to facilitate the control of special service calls in such systems.

In telephone systems there are a number of conditions under which an operator desires access to a subscriber's line but does not need to signal or converse with the subscriber himself. For example, in the extension of toll calls, the operator wishes to check the accuracy of the calling line number as given her by the calling subscriber. Likewise an operator may wish to verify a busy condition, or the test desk may wish to connect with an apparently busy line to determine the cause of trouble.

In the cross-bar system such calls require a considerable amount of additional apparatus in the control equipment or marker and it is desirable to add this apparatus to only a limited number of markers. However, the registering equipment or senders and the connectors for connecting them with the trunks and markers are common to service trunks as well as to the special trunks used in the calls above discussed. Therefore, in accordance with the present invention, means is provided whereby the seizure of registering and connecting equipment by a special trunk permits them to be connected to specially equipped control equipment only. More specifically, the special trunks are arranged to indicate to the sender that a special trunk is calling, which in turn relays the signal to the marker connector. The marker connector places an artificial busy condition on all markers except those equipped for special service, which busy condition appears only to the marker connector applying it. It then tests for an idle special marker and connects with the latter. The selected marker, in controlling connections establishes a second connection with the incoming trunk, independent of the sender and receives over this connection a signal which discriminates between the various special trunks.

For a complete disclosure of a cross-bar system for establishing regular as well as these special calls, reference is made to the application of W. W. Carpenter, Serial No. 68,262, filed March 11, 1936.

The invention will be more clearly understood from a consideration of the following description, read in connection with the drawings in which:

Fig. 1 shows portions of a service junctor, a no-test junctor, a sender link, a "B" sender, and a "B" operator's position;

Fig. 2 shows portions of a marker connector, an incoming frame connector and a marker;

Fig. 3 shows portions of a number checking junctor and a no-hunt junctor; and

Fig. 4 shows the manner of arranging Figs. 1 to 3.

In the drawings, for the sake of simplicity, the four types of trunks are represented as appearing on the same frame, although such an arrangement might not be used in practice.

When any one junctor is seized, it grounds a start conductor leading toward the sender link which operates a primary and a secondary sender selector to connect the junctor with an idle sender. The sender hunts for an idle "B" operator's position and connects it through to the calling party. The designation of the wanted line is passed to the "B" operator who sets it up on her key-set, thereby recording it on sender registers. The sender then causes the marker connector to connect the sender with a marker to which the designation is transmitted. The marker translates the designation and connects with the group of lines or "choice" within which the wanted line lies. Having obtained access to the desired choice, the marker operates the incoming connector which has access to the incoming frame carrying the calling junctor and then proceeds to function to complete the desired connection.

More specifically, when the service junctor 100 is seized, relay 101 operates, closing a circuit from ground over its front contact, back contact of relay 102 to start conductor 103 which initiates the operation of the sender link 130. The link closes cross-points 131 and 132 connecting the junctor 100 to the sender 140. It also operates relay 133 which is individual to the frame on which the junctor and link are located, setting up a registration on the frame register 141 of the sender. The frame register relays operate relay 142 which closes a circuit from ground over the back contact of relay 143, front contact of relay 142, contacts of cross-points 132 and 131, to the winding of relay 102 and battery. Relay 102 locks under the control of relay 101, opens the start lead and prepares the circuit of relay 104. The circuit of relay 102 passes through equipment in the sender (not shown) which causes the operation of relay 143 and the opening of the operating circuit of relay 102.

The frame register also initiates the search for an idle operator's position and when one is found, for example position 144, relay 145 is operated connecting that position over the tip and ring contacts of cross-points 132 and 131 to the tip and ring conductors of the junctor 100. The

usual "zip" tones are transmitted, the wanted number given and recorded, after which battery is connected to start conductor 146 to summon an idle marker.

5 Battery on conductor 146 operates relays 201 and 202. Relay 201 which is individual to the sender operates multi-contact relay 203 which closes a large number of contacts, connecting the sender registers with the cross-wires of the
10 marker connector 200. The closure of these contacts extends battery from conductor 146 to the armature of relay 207. Relay 207 is operated when the associated marker is busy. Therefore, if the relay is released, indicating that the
15 marker is idle, a circuit is completed over the back contact of relay 207 to the winding of relay 208 and ground. Relay 208 in turn operates multi-contact relay 209 which completes the connection between the sender and the corresponding
20 marker. Assuming only the last marker is idle, the circuit extends over the front contacts of relays 207, 212 and intermediate relays to the back contact of relay 213, winding of relay 214 and ground. Relay 214 operates multi-contact
25 relay 215 to connect sender 140 with marker 220.

The registration set up in the sender together with the frame registration is transferred to the marker. The marker then selects the choice within which the wanted line lies and then,
30 under the control of frame register 221 operates relay 231 which is individual to the marker 220 in the incoming frame connector 230 individual to the frame on which incoming junctor 100 is located. Relay 231 in turn operates relay 222,
35 which connects ground through the marker connector to conductor 210, lower contacts of cross-points 131 and 132, winding of relay 105 and battery. Relay 105 extends the outgoing tip and ring conductors and certain other conductors
40 (not shown) to the incoming frame connector and operates relay 232 which is individual to the group of ten junctors, appearing in the same primary incoming selector, of which the junctor 100 is one. Relay 232 further extends the con-
45 ductors closed by relay 105 to the Nos. 4 and 5 contacts of relay 231 which completes their connection into the marker 220. The marker now proceeds to control the establishment of the desired connection, the operation progressing in the
50 normal manner since junctor 100 is a subscriber's or service junctor.

When a call is extended to the no-test junctor 120, the sleeve relay 121 grounds the start lead
55 123 over the back contact of relay 122. The sender link 130 connects the junctor 120 over cross-points 134 and 132 with sender 140, or any other idle sender. As soon as these cross-points close, a circuit is completed from ground over the back contact of relay 122, lower contacts of
60 cross-points 134 and 132, right back contact of relay 143, left winding of relay 147 and battery. Relay 147 locks under the control of relay 148 which operates as soon as the connection between the sender and junctor is complete. Relay
65 147 immediately grounds conductor 149. When relay 201 operates to connect the sender with the cross-wires of the marker connector, conductor 149 is extended over the outer lower contact of relay 201, winding of relay 211, inner lower con-
70 tact of relay 201 to battery on conductor 146. Relay 211 connects ground to the right winding of relay 207 and to the corresponding windings of all similar relays in this marker connector individual to markers equipped to handle only
75 service calls, thereby making all such markers

busy to this marker connector if idle and holding busy any which might become idle. The markers are multipled before other marker connectors, and an actual busy condition is recorded
5 in all marker connectors. This special busy condition, however, is applied only to this marker connector making the call. When multi-contact relay 203 extends the battery connected to con-
10 ductor 146 to the armature of relay 207, the circuit is extended over the front contact of that relay and of the intermediate relays belonging to service markers, to the armature of relay 212 associated with the first special marker. As-
15 suming that marker to be busy, the circuit extends to the winding of relay 214 and the sender is connected to marker 220.

With relay 211 operated, the operation of multi-contact relay 215 closes a circuit from ground over the inner right contact of relay 211,
20 contact of relay 215, winding of relay 223 and battery. This relay indicates to the marker that it is to handle a special type of call and the line selecting circuit is opened to delay the function-
25 ing of the marker until the exact type of call has been determined. Otherwise the marker functions in the usual manner until connected to the junctor by the frame connector.

When the sender relay 142 operates, relay 122 is operated disconnecting the special marking ground from the lower contacts of the cross-
30 points and when relay 143 operates, relay 147 is disconnected from conductor 210. As before marker relay 222 connects ground to conductor 210, operating relay 125. Relay 125 operates relay 233 in the incoming frame connector. It also
35 connects ground over its inner lower contact, No. 3 lower contact of relay 231, outer contact of special relay 223 to the winding of relay 224 which informs the marker that a no-test connection is desired. For a description of the func-
40 tioning of the marker in connection with such a call, reference may be made to Patent 2,075,527, granted March 30, 1937 to F. A. Korn et al.

In the case of a number checking call employing junctor 300, the seizure of the trunk operates
45 relay 301 which grounds conductor 303 to initiate the operation of the sender link. As soon as cross-points 135 and 132 have been closed, ground over the back contact of relay 302 operates relay
50 147 which functions as previously described to seize a special marker and operate relay 223 in the marker. When sender relay 142 operates, relay 302 operates, opening this special marking ground. When the marker has operated relay
55 231 in the incoming frame connector, relay 305 is operated over the front contact of relay 302. Relay 305 operates relay 234 which completes the connection between junctor 300 and the marker
60 220. In number checking, no talking circuit is required, and therefore relays 305 and 234 do not close through any talking conductors. Relay 305 connects ground over its inner contact, No. 2 lower contact of relay 231, middle contact of re-
65 lay 223, winding of relay 225 and battery. Relay 225 prepares the marker for handling a number checking call which takes place as described in the application of F. A. Korn, Serial No. 68,256, filed March 11, 1936.

The fourth type of junctor shown, namely, no-hunt junctor 320 is used in testing subscribers' 70 lines. When the junctor is seized relay 321 operates to ground start conductor 323 to summon an idle sender. When cross-points 136 and 132 are operated, relay 147 is operated from ground
75 at the inner lower back contact of relay 322, re-

lay 322 operating to remove this ground when relay 142 operates. A special marker is seized and relay 223 operated as above described. Relay 231 in the incoming frame connector passes ground back through the marker, marker connector, sender and sender link over the inner lower front contact of relay 322 to the winding of relay 325. Relay 325 operates relay 235 in the incoming frame connector and connects ground over its inner lower front contact, lowermost contact of relay 231, inner contact of relay 223 to the winding of relay 226 and battery. The chief function of this relay in the marker is to suspend the terminal hunting operation so that only the particular line wanted will be seized even when it is one of a terminal hunting group. Relay 325 also opens the outgoing talking conductors and connects condenser 326 across the conductors from the marker over which the talking conductors are ordinarily tested. This is done so that the connection may be established even where the line condition is faulty.

What is claimed is:

1. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means for permitting the connection of said registering means with one of said other control means only.
2. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means for preventing the connection of said registering means with one of said first control means.
3. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means for permitting the connection of said registering means with one of said other control means only, and means in said other control means to further distinguish between types of said trunk circuits.
4. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk

circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means for determining whether said registering means may be connected with any one of said control means or must be connected with one of said other control means only.

5. In a telephone system, operators' positions of a plurality of types, each position provided with trunk circuits of a plurality of types, a plurality of types of registering means each type serving one type of operator's position, means in each registering means for distinguishing between types of trunks, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting any one of said registering means with any one of said control means, and means in said connecting means operated in accordance with the distinguishing means of a connected registering means for determining whether connection must be made to one of said other control means only.

6. In a telephone system, regular trunks, special trunks, connection controlling means for serving regular trunks only, controlling means arranged to serve both said regular trunks and said special trunks, means common to said regular and special trunks for associating said controlling means with said trunks, and means in said associating means operated under the control of said special trunks to prevent said associating means from connecting a special trunk with one of said first controlling means.

7. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means to render all of said first control means artificially busy to prevent the connection of said registering means with one of said first control means.

8. In a telephone system, trunk circuits of a plurality of types, registering means, means for associating said registering means with one of said trunk circuits, means in said registering means to distinguish between types of said trunk circuits, means for controlling the establishment of connections with idle lines, other means for controlling the establishment of connections with lines whether busy or idle, means for connecting one of said control means with one of said registering means, means for normally marking said control means busy when connected with one of said registering means, and means in said connecting means, operated in accordance with said distinguishing means to render all of said first control means artificially busy to prevent the connection of said registering means with one of said first control means.

9. In a telephone system, trunk circuits of a plurality of types, registering means, means for

associating said registering means with one of
said trunk circuits, means in said registering
means to identify certain types of said trunk cir-
cuits, means for controlling the establishment of
5 connections with idle lines, other means for con-
trolling the establishment of connections with
lines whether busy or idle, a plurality of means
for connecting said control means with said reg-
istering means, means for normally marking said
10 control means busy to all of said connecting

means when connected with one of said register-
ing means, and means in said connecting means,
operated in accordance with said identifying
means to render all of said first control means
artificially busy to the corresponding connecting 5
means only, to prevent the connection of said
registering means with one of said first control
means.

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