

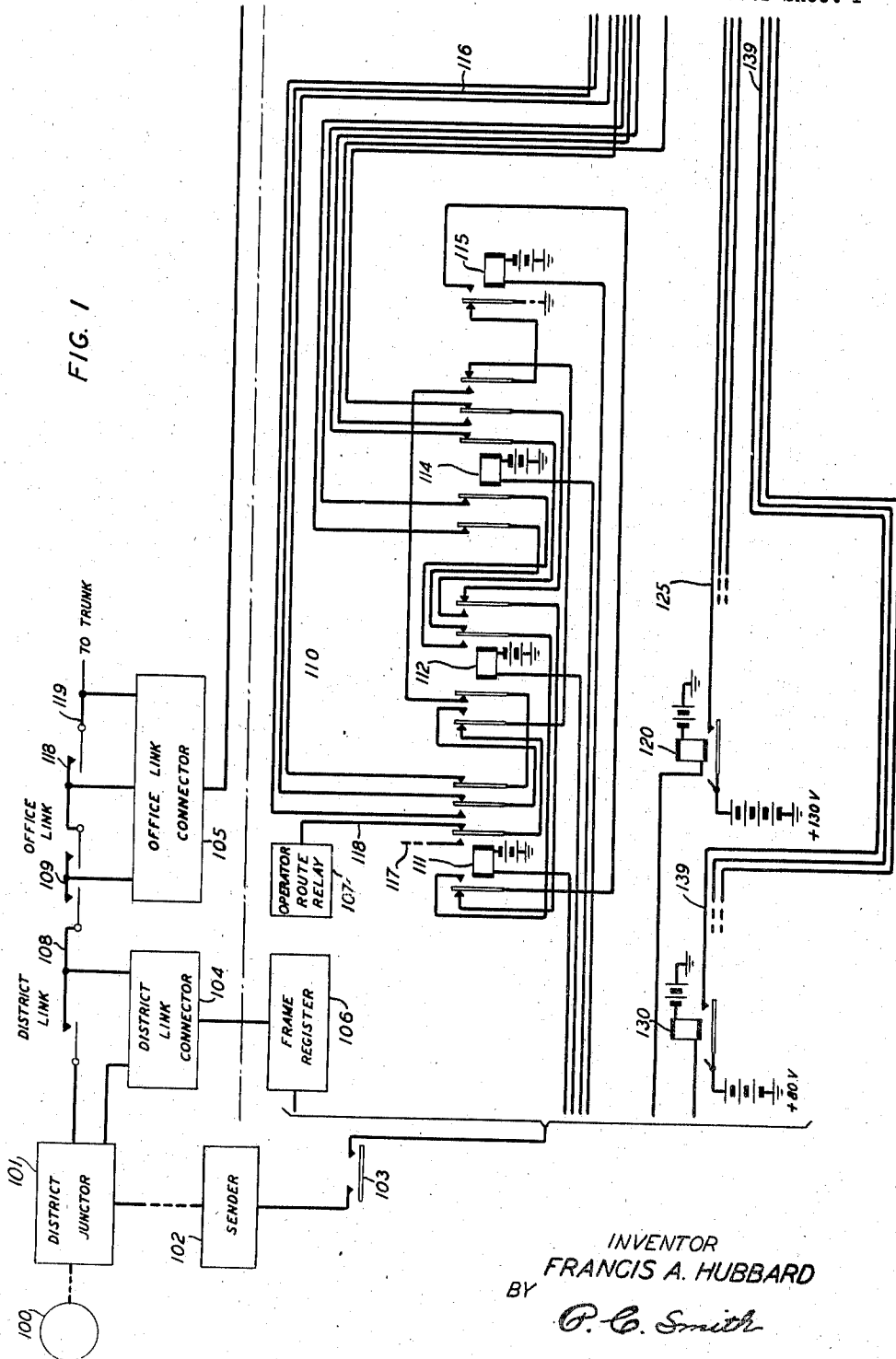
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F. A. HUBBARD
TRANSLATION DEVICES

2,298,699

Filed May 29, 1941

3 Sheets-Sheet 1



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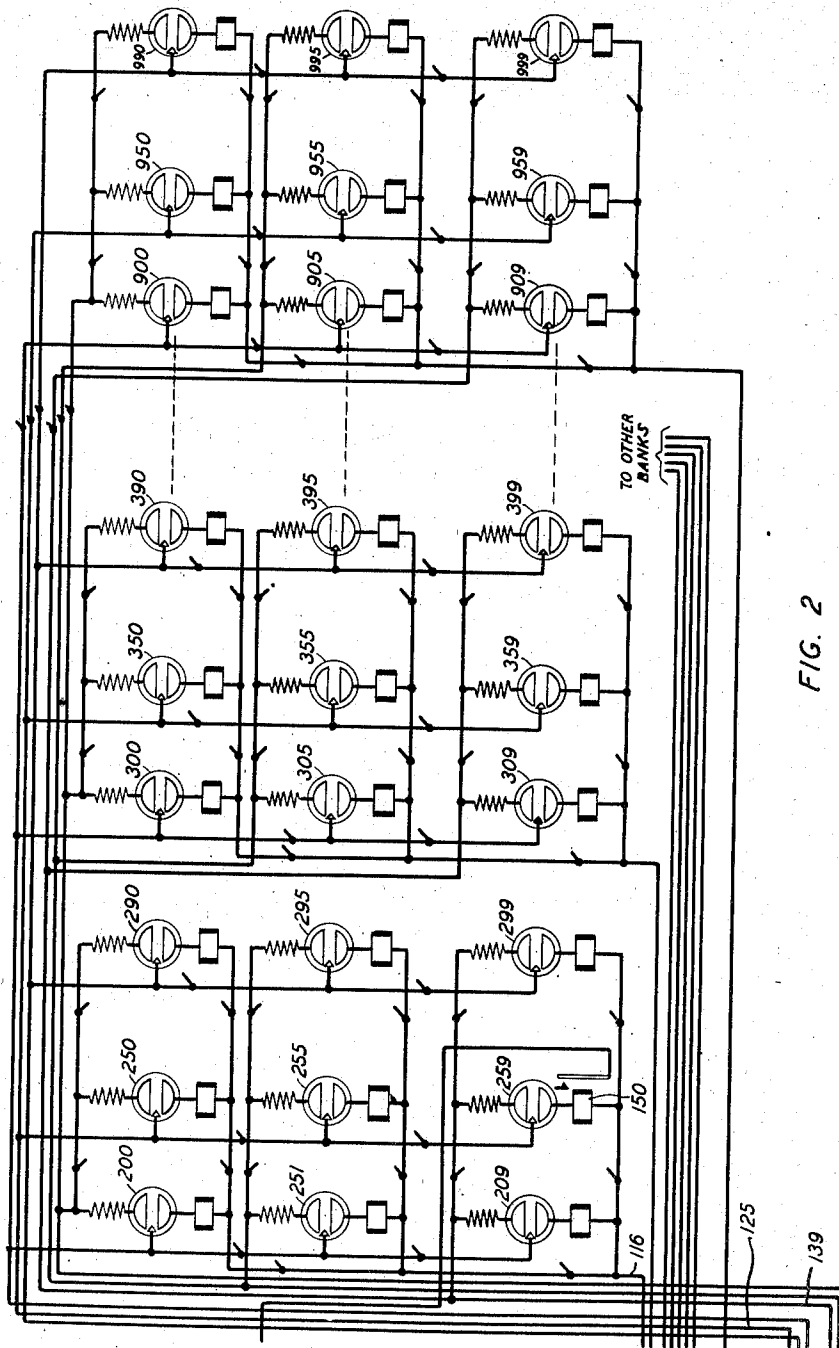
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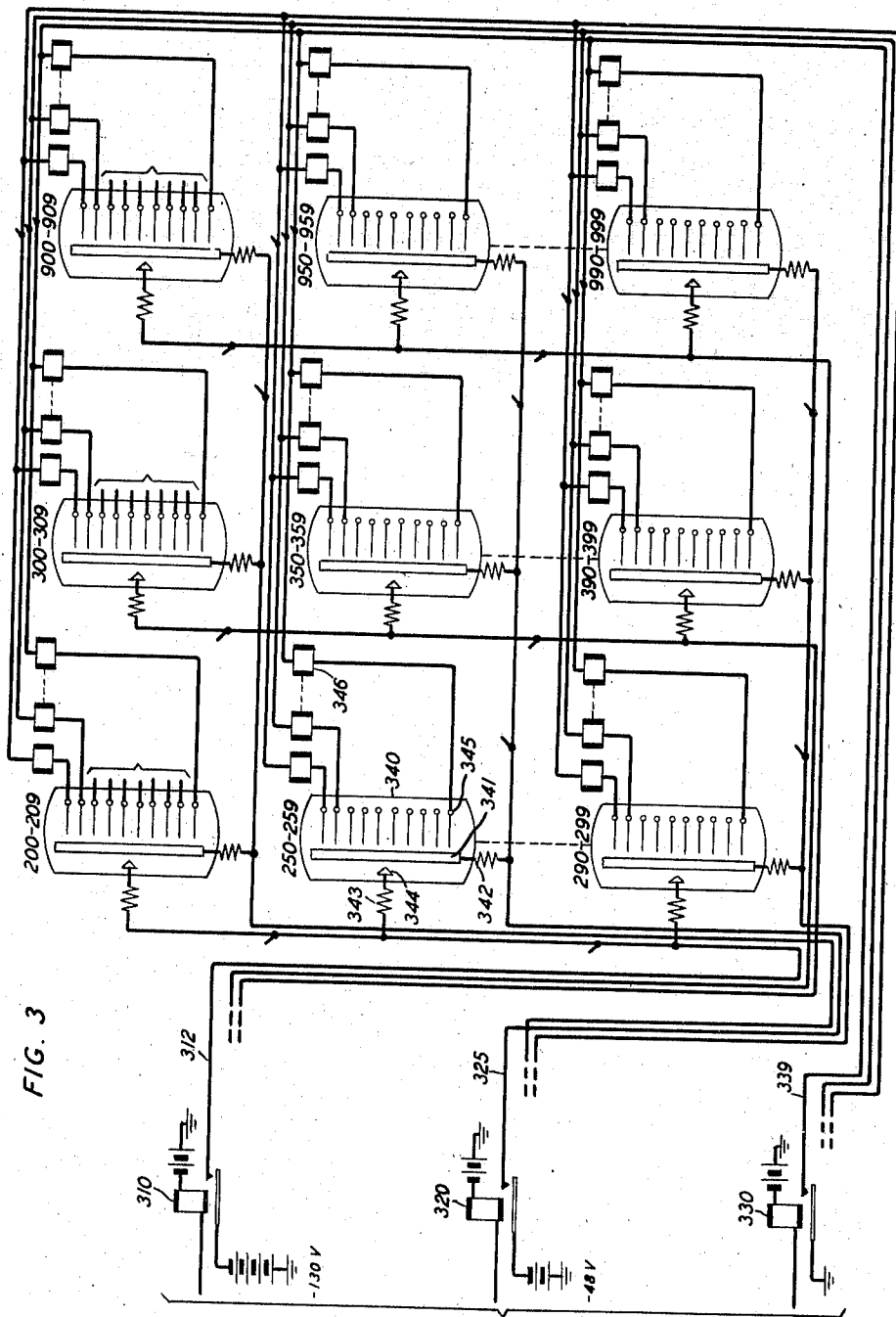
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3 Sheets-Sheet 3



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2,298,699

TRANSLATION DEVICE

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Application May 29, 1941, Serial No. 395,719

6 Claims. (Cl. 179—18)

This invention relates to telephone systems and has for its object to facilitate the handling of calls in large exchange areas.

It is customary in such large areas to establish telephone connections by means of automatic switching equipment under the control of common control equipment. In the crossbar system this control equipment includes senders and markers.

During the establishment of a telephone connection the designation of the wanted line is recorded in a sender which transfers a record of the office designation to a marker. The marker in turn translates this record into a routing by operating a route relay which controls the connection of the calling line to a trunk outgoing to the wanted office. Circuits previously used for the translation of the office designation required the use of a number of multicontact relays.

In accordance with the present invention, the office designation controls the operation of a route relay by means of a plurality of gas-filled tubes out of which one only becomes operative.

More specifically, each digit of an office designation is recorded on a register and each register controls the application of the proper potential to different electrodes of a plurality of tubes, selected in accordance with the setting of the register. The one tube, to the three electrodes of which potentials are applied, fires and operates the corresponding route relay.

According to a modified form of the invention, tubes are used, each having a plurality of anodes. Each anode is connected with a route relay so that any one of a group of route relays may be operated through one tube, means being provided to cause only one anode circuit to become conducting.

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

Fig. 1 shows, in diagrammatic form, a telephone connection from a calling line to an interoffice trunk, together with a sender and a part of a marker;

Fig. 2 shows the translating equipment; and

Fig. 3 shows a modified form of translating equipment.

A crossbar system of the type to which the present invention is applicable is disclosed in U. S. Patent No. 2,235,803, granted March 18, 1941, to W. W. Carpenter.

Assume that the subscriber at substation 100

wishes to talk with a subscriber located in an office reached over trunk 119 and that the designation of that office is Clyde which corresponds to a numerical designation of 259.

When the call is originated, the substation 100 is automatically connected to district junctor 101 and with sender 102. As soon as the office designation has been recorded, the sender is connected by marker connector 103 to the marker where the frame and office designations are recorded as described in the above-mentioned Carpenter patent. The frame register 106 operates the district link connector 104 to bring the district junctor 101 under the control of the marker.

Since the first office digit was 2, relay 112 of the first code register 110 will be operated, connecting ground over the back contact of relay 115, outer right back contact of relay 114, left front contact of relay 112, middle right back contact of relay 111 to conductor 116.

In practice 0 is used for signaling an operator and, therefore, with none of the relays 111 to 115 operated, ground is connected over conductor 118 directly to the operator route relay 107. To avoid confusion with accidental interruptions of the circuit, the digit 1 is also not employed as a first office digit and conductor 117, which would be grounded with relay 111 operated, is not connected to the translator.

The second and third code registers would be the same as register 110 except that the conductors corresponding to conductors 117 and 118 would also extend to the translator of Fig. 2. The second code digit register is represented by relay 120 and connects a battery potential of +130 volts to one of ten conductors, for example conductor 125, leading to the translator. The third code register is represented by relay 130 and connects a battery potential of +80 volts to one of ten conductors, for example conductor 139, also leading to the translator.

The translator of Fig. 2 consists of eight banks of three-element gas-filled tubes of the cold cathode type. Each bank includes one hundred tubes arranged in ten rows of ten tubes each. The ten conductors from the second code register are connected to the anodes of the tubes, each conductor being multiplied to the anodes of eighty tubes or to the anodes of the ten tubes of the corresponding vertical row of each bank of tubes. For example, conductor 125 is connected to the anodes of tubes 250 to 259, 350 to 359, 950 to 959 and of the corresponding tubes of the banks not shown, all of which have 5 for the tens digit.

The ten conductors from the third code regis-

ter are connected to the control anodes of the tubes, each conductor being multiplied to eighty control anodes through individual current limiting resistances of about 100,000 ohms each. In this case the eighty tubes are made up of one horizontal row of ten tubes in each bank. For example, conductor 139 is connected to the control anodes of tubes 209 to 299, 309 to 399, 909 to 999 and of the corresponding tubes of the banks not shown, all of which have the units digit 9.

The cathode of each tube is connected to the winding of the corresponding route relay, which operates directly from the anode-cathode current of the tube. One hundred route relay terminals, all those connected to a given bank of tubes, are multiplied together and connected to one of the conductors leading to the first code register 110. Conductor 116 is connected to the route relays of the first bank shown, all of which are identified by the hundreds digit 2.

Therefore, with the registers of Fig. 1 set for the code 259, +80 volts is connected over conductor 139 to the control anodes of tubes 209 to 299 while ground is connected over conductor 116 through the route relays to the cathodes of these tubes. Thus current will flow in the control gaps of all ten of these tubes but this current is insufficient to operate any one of the route relays. No current will flow in the tubes of this level in the other banks since the cathode circuits of such tubes are open.

Finally, conductor 125 applies +130 volts to the anodes of tubes 250 to 259, but since only in the tube 259 is control gap current flowing, therefore, in only tube 259 can there be a transfer of discharge from the control to the main gap and only route relay 150 can operate.

With the route relay operated, the marker connects with the trunk and office links through the office link connector 105, tests for an idle trunk and, having found one, for an idle channel, and completes the local connection all as described in the above-identified Carpenter patent.

Referring now to Fig. 3, relay 310 represents the first code register which in accordance with the registration applies -130 volt battery to one of eight conductors, for example conductor 312, relay 320 represents the second code register which connects -48 volt battery to one of ten conductors, for example conductor 325, while relay 330 represents the third code register which applies ground to one of ten conductors such as conductor 339.

This modified form of translator is based on the use of ten anode cold cathode tubes so that only eighty tubes are required as compared with the eight hundred tubes used in the translator of Fig. 2. A route relay is connected to each of the ten anodes of each tube, providing eight hundred routes.

In accordance with the setting of the code register 310, a negative potential of 130 volts will be applied to a conductor such as conductor 312 and thence to the cathodes of the ten tubes in one vertical row, conductor 312 being connected to the first row which corresponds to a hundreds digit 2. Similarly, the registration of the second or tens code digit will apply -48 volts to the control electrodes lying in the corresponding horizontal row. Conductor 325, for example, extends to the middle horizontal row of tubes shown.

There will thus be about 80 volts across the control gap of one tube only, the one lying at

the intersection of the vertical and horizontal rows marked by the hundreds and tens code digits respectively, that is, tube 340. The control gap in tube 340 will, therefore, break down and current will flow from -130 volt battery over the contact of code register relay 310, conductor 312, resistance 343, from control electrode 344 to cathode 341, resistance 342, conductor 325, over the contact of code register relay 320 to -48 volt battery.

The connection of ground to conductor 339 grounds the winding of the route relay connected with the correspondingly numbered anode in each of the eighty tubes. Since the control gap in tube 340 only is conducting, the main gap, from cathode 341 to anode 345, becomes conducting, operating route relay 346 to control the extension of the connection over the corresponding route.

What is claimed is:

1. In a telephone system, a plurality of registers, means for setting said registers in accordance with the designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a plurality of coordinately arranged gas-filled tubes each tube having at least three electrodes, means for applying a potential to one electrode of each tube lying along one coordinate of said arrangement in accordance with the setting of one of said registers, means for applying potential to a second electrode of the tubes lying along one of the other coordinates of said arrangement in accordance with the setting of the second of said registers, and means for preparing a circuit for a plurality of said route relays in series with a potential applied to a third electrode of a predetermined number of said tubes in accordance with the setting of a third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

2. In a telephone system, a plurality of registers, means for setting said registers in accordance with designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a plurality of banks of coordinately arranged gas-filled tubes each tube having at least three electrodes, means for applying a potential to one electrode of each tube lying along one coordinate in each bank in accordance with the setting of one of said registers, means for applying potential to a second electrode of the tubes lying along the other coordinate in each bank in accordance with the setting of the second of said registers, and means for applying potential through a route relay to the third electrode of each tube in a bank in accordance with the setting of the third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

3. In a telephone system, a plurality of registers, means for setting said registers in accordance with the designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a bank of coordinately arranged gas-filled tubes, each

tube having at least three electrodes, means for applying a potential to one electrode of each tube lying along one coordinate of said bank in accordance with the setting of one of said registers, means for applying potential to a second electrode of the tubes lying along the other coordinate of said bank in accordance with the setting of the second of said registers, means for applying potential through a route relay to one other electrode in each tube in accordance with the setting of the third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

4. In a telephone system, a plurality of registers, means for setting said registers in accordance with the designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a bank of coordinately arranged gas-filled tubes, each tube having a cathode, a control electrode and ten anodes, means for applying a potential to the control electrode of each tube lying along one coordinate of said bank in accordance with the setting of one of said registers, means for applying potential to a cathode of the tubes lying along the other coordinate of said bank in accordance with the setting of the second of said registers, means for applying potential through a route relay to one anode in each tube in accordance with the setting of the third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

5. In a telephone system, a plurality of registers, means for setting said registers in accordance with designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a plurality of banks

of coordinately arranged gas-filled tubes, each tube having a cathode, an anode and a control electrode, means for applying a potential of +130 volts to the anode of each tube lying along one coordinate of each bank in accordance with the setting of one of said registers, means for applying a potential of +80 volts to the control electrode of the tubes lying along the other coordinate in each bank in accordance with the setting of the second of said registers, and means for applying ground through a route relay to the cathode of each tube in a bank in accordance with the setting of the third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

6. In a telephone system, a plurality of registers, means for setting said registers in accordance with the designations of telephone exchanges, a plurality of route relays, means for operating said route relays in accordance with the setting of said registers comprising a plurality of coordinately arranged gas-filled tubes each tube having at least three electrodes, means for applying a potential to one electrode of each tube lying along one coordinate plane of said arrangement in accordance with the setting of one of said registers, means for applying potential to a second electrode of the tubes lying along one of the other coordinate planes of said arrangement in accordance with the setting of the second of said registers, and means for preparing a circuit for a plurality of said route relays in series with a potential applied to a third electrode of the tubes lying in the third coordinate plane in accordance with the setting of a third of said registers, one of said route relays operating in response to the simultaneous application of said potentials, and means under the control of the operated route relay to cause the establishment of a telephonic connection.

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