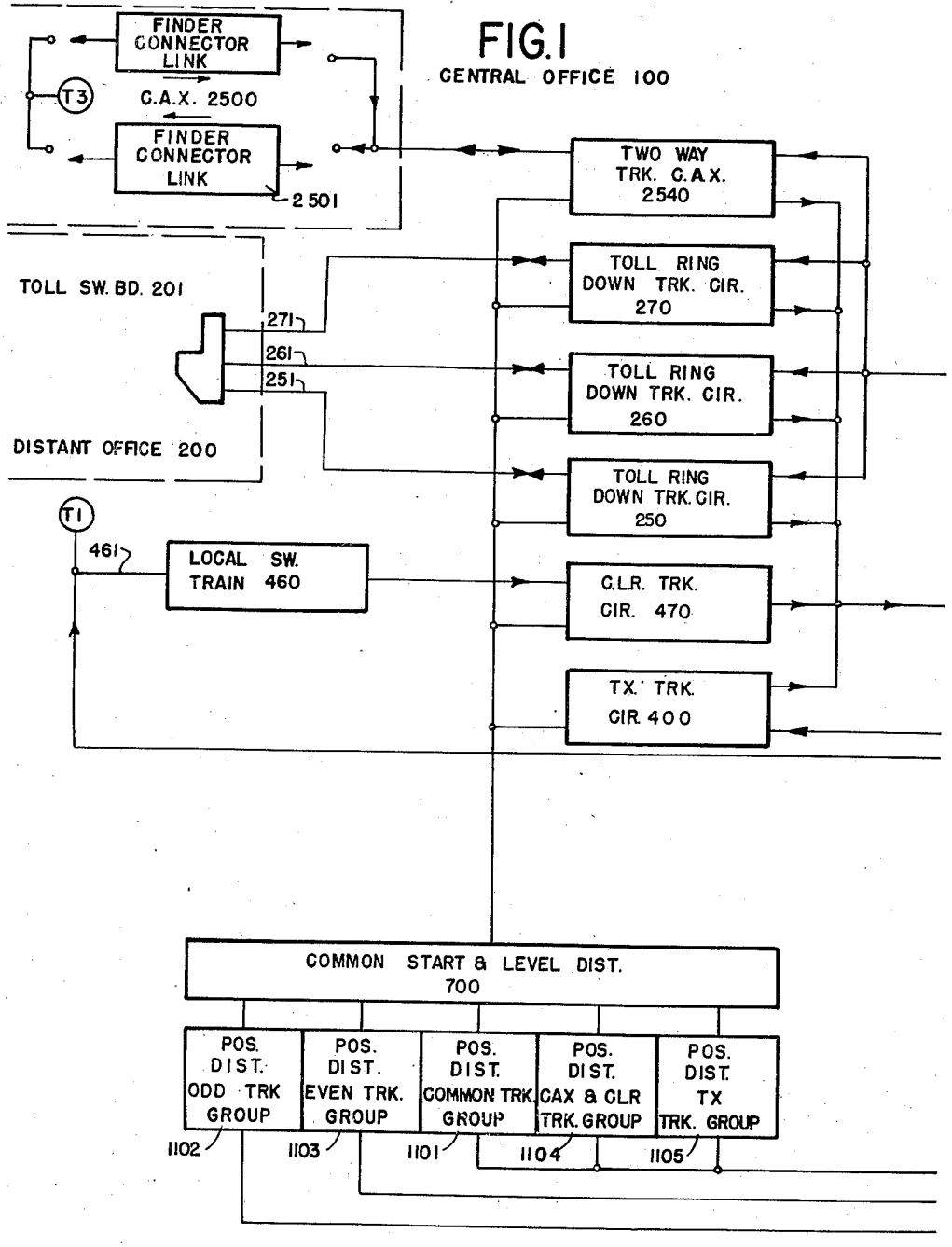
Oct. 24, 1944. I. MOLNAR 2,361,314

TELEPHONE SYSTEM

Filed April 1, 1943 6 Sheets-Sheet 1

FIG. 1



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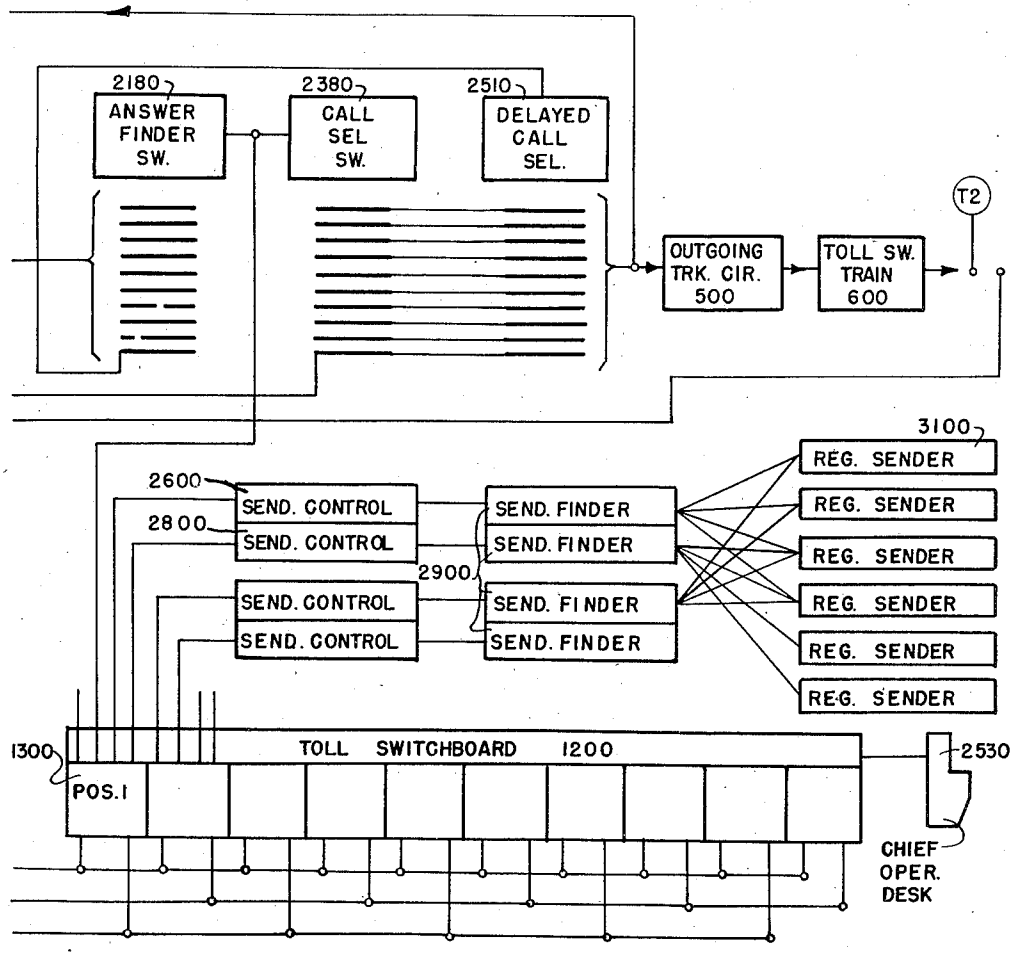
BY
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TELEPHONE SYSTEM

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FIG. 1A



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TELEPHONE SYSTEM

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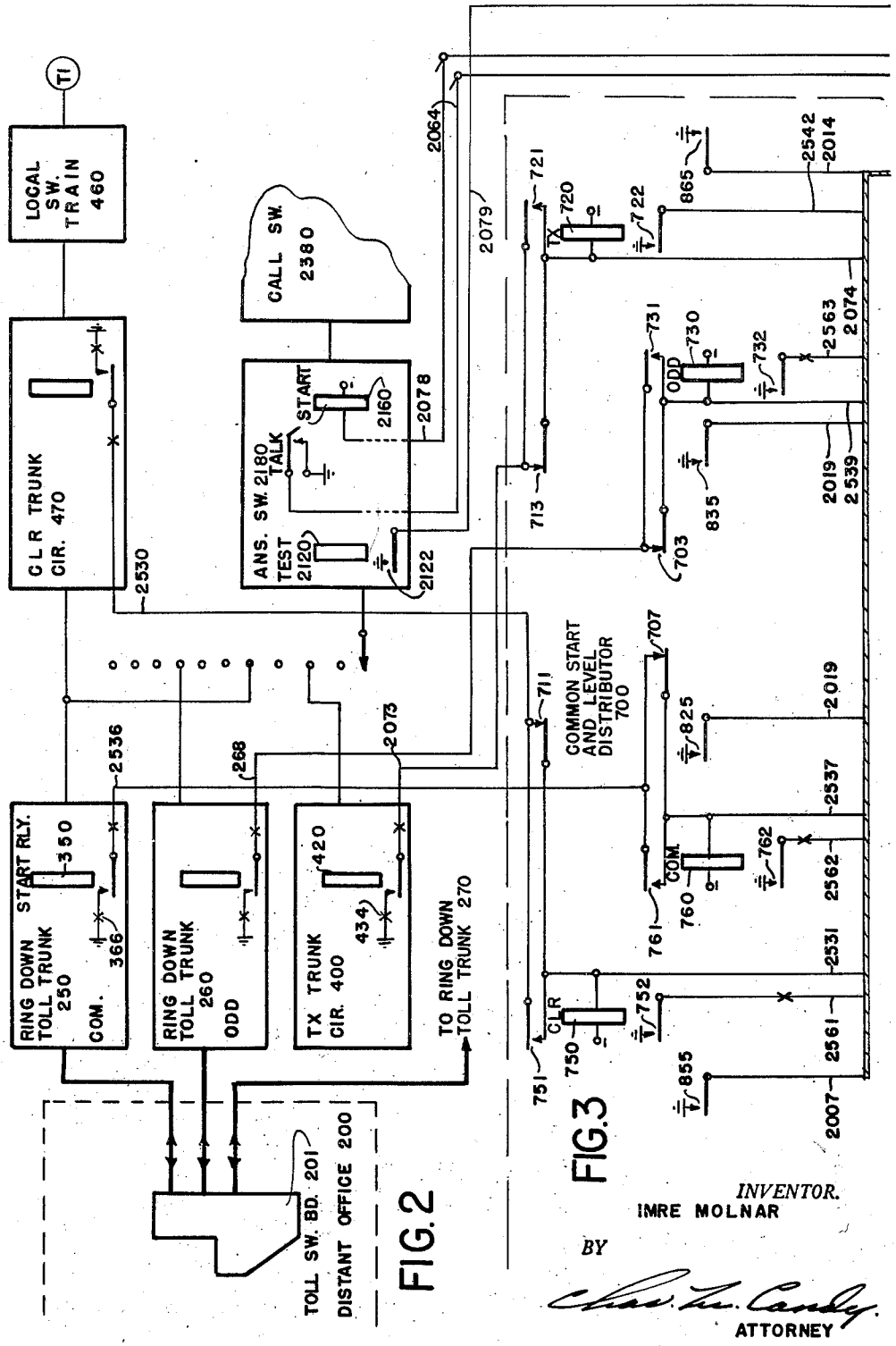


FIG. 2

FIG. 3

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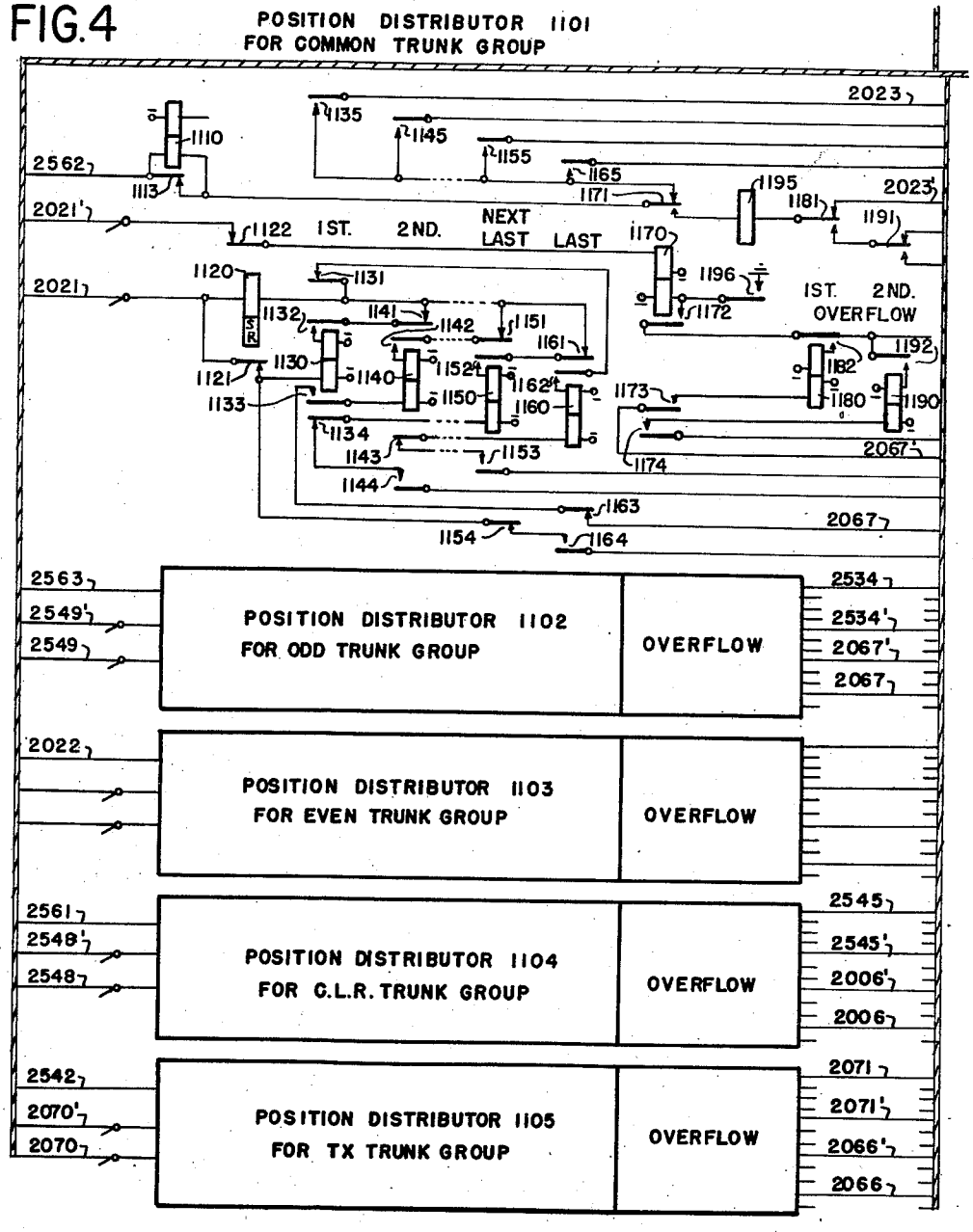
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TELEPHONE SYSTEM

Filed April 1, 1943 6 Sheets-Sheet 4

FIG.4



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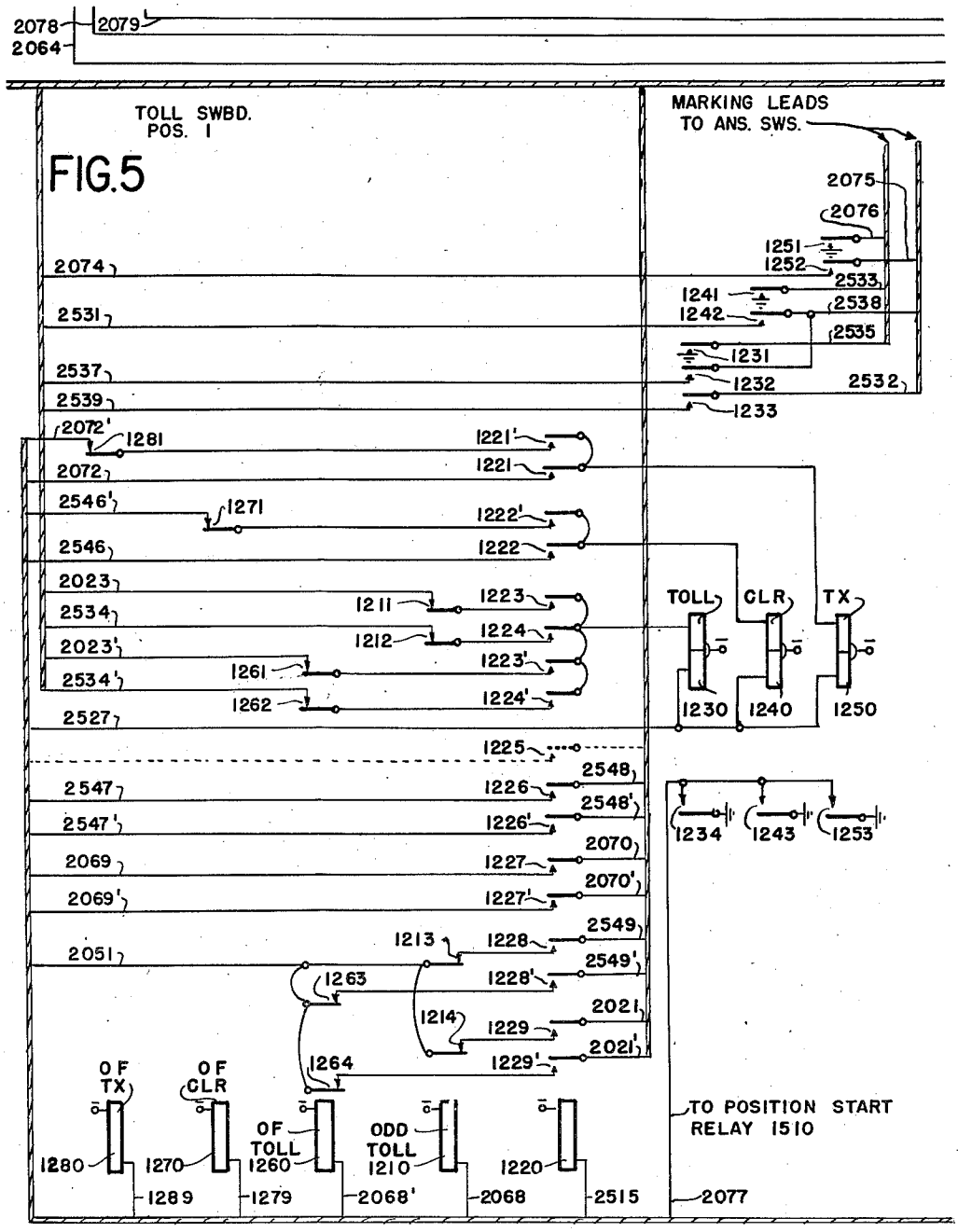
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TELEPHONE SYSTEM

Filed April 1, 1943 6 Sheets-Sheet 5



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TELEPHONE SYSTEM

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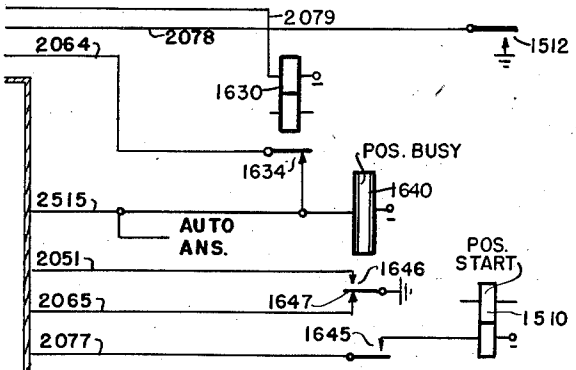


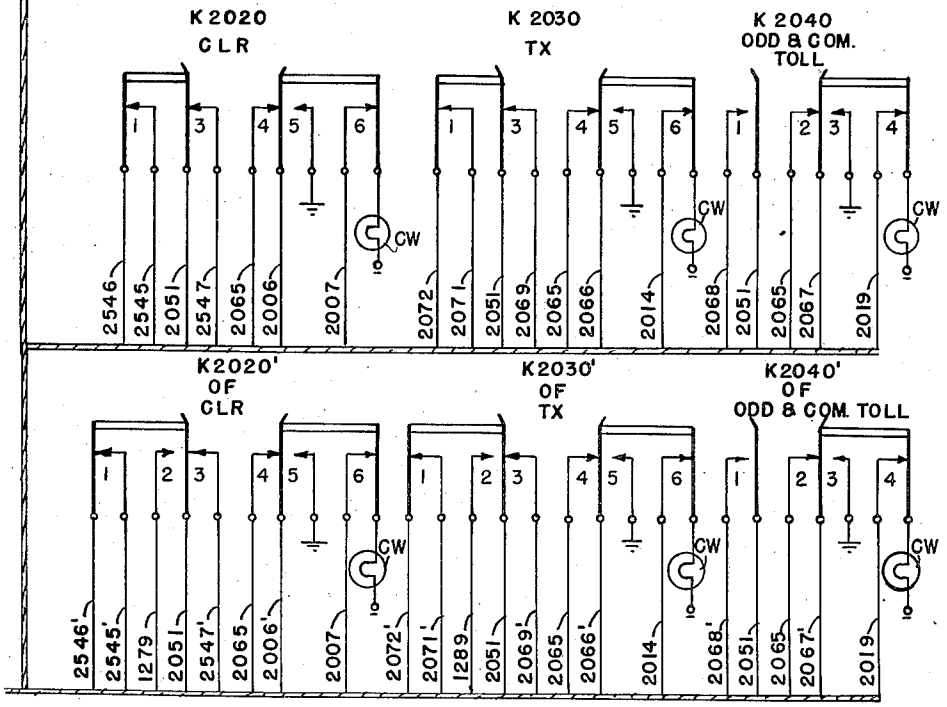
FIG.6

TOLL SWBD. POS. 1

FIG.7

CLASS OF SERVICE KEYS

Keys at normal bring in calls of their class



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Patented Oct. 24, 1944 2,361,314

UNITED STATES PATENT OFFICE

2,361,314

TELEPHONE SYSTEM

Imre Molnar, Chicago, Ill., assignor to Automatic Electric Laboratories, Inc., a corporation of Delaware

Application April 1, 1943, Serial No. 481,413

25 Claims. (Cl. 179—27)

The present invention relates to telephone systems of the general character disclosed and claimed in United States Patent No. 2,167,710 issued August 1, 1939, to Thomas F. Crocker and more particularly to a direct improvement over my copending application Serial No. 481,412, filed April 1, 1943.

General description

The accepted practice for handling toll switching at a centralized toll switchboard in an exchange area having several local exchanges, ordinarily consists in dividing the toll board into three distinct groups such as toll or inward, CLR or recording, and TX or delay or point-to-point positions. Incoming calls to toll lines from other exchange areas are answered by switching operators at the toll or inward positions and are either completed directly or transferred to the TX position for completion. Thru calls, that is, calls in which the switchboard service is a tandem switching point, are handled at the toll positions in much the same manner as incoming calls. Outgoing calls in either local automatic or local manual exchanges and destined to be trunked over toll lines leading to other exchanges, are answered by the switching operators at the CLR or recording positions. The CLR operators make out the toll tickets for calls and may either complete the call directly or pass the ticket to a delay or TX operator's position for completion. The TX operator later on sets up the connections from her position to both the calling and called parties.

It is customary also to arrange all if not most of the operators' positions so as to be a universal position in which case the operator at such position may convert her position to either a toll, a CLR or a TX position.

In my copending application the various operators' positions are universal in character and have keys for selectively conditioning such positions to receive a desired class of service such as toll, CLR or TX service.

In addition my copending application shows means for simultaneously distributing incoming calls to the various operators' positions which have been selectively conditioned to receive such classes of the incoming calls. For example, it will be assumed that a certain number of operator positions are assigned to handle only incoming toll calls from the toll trunk groups. Another number of positions have been assigned to handle only incoming calls from CLR trunks while the remaining positions are assigned as TX positions to take care of the delay calls. Since the incoming toll line group comprises a large group of trunks and the total number of trunk lines to be answered at the operators' positions is greater than the answering capacity at any one position, the incoming toll trunk group has been divided into three groups (1) a common group, (2) an even group, and (3) an odd group. The CLR trunks, the TX trunks and the common toll trunks all terminate in all of the various operators' positions. The odd group of toll trunks terminates in only the first, third and each odd operator positions while the even toll trunk group terminates in the second, fourth, and each even operator positions. Each of these trunk groups is provided with an individual position distributor for distributing incoming trunk calls from their respective trunk groups to operators' positions which have been selectively conditioned to receive such type of trunk calls by the selective operation of the class of service keys provided at each of the operator's positions.

Since there are three toll trunk groups such as common, odd and even there are three corresponding distributors, such as the odd, even and common position distributors for such toll trunk groups. There is also a CLR position distributor for the CLR group of trunks and the TX position distributor for the TX trunks. It is therefore possible with these five separate position distributors to simultaneously route a call from each of said respective trunk groups to the respective operators' positions which have been selectively conditioned by the operation of their class of service keys to receive such class of trunk calls.

The principal object of the present invention is to provide an overflow arrangement for permitting certain of the operators' positions to act as overflow positions for the different classes of incoming trunk calls at a time when the operators' positions normally assigned to take care of these classes of incoming trunk calls are not available for use. For example, it will be assumed that certain of the operators' positions have been assigned to take care of incoming trunk calls from only the CLR trunk group and that other positions are assigned to take care of incoming trunk calls from the CLR group only in case the normally assigned operators' positions are not available for handling an incoming CLR trunk call. In the particular case illustrated the CLR distributor would normally handle all of the incoming CLR calls providing any one of the operator's positions assigned to handle CLR service were idle. The CLR distributor cyclically assigns the avail-

able CLR positions in a predetermined order. At a time when none of the normally assigned CLR positions are available, the CLR overflow means in the CLR distributor operates to assign one of the positions which has been selected to act as an overflow CLR position.

In accordance with the present invention each of the operators' positions has been provided with overflow keys for assigning the positions to act as overflow positions for the various types of services such as CLR, toll and TX services.

The foregoing features together with others not specifically mentioned will be better understood from the following detailed description of the drawings.

Referring now to the accompanying drawings comprising Figs. 1 and 1*a*, and 2 to 7 inclusive, these drawings show by means of the usual circuit diagram a sufficient amount of apparatus in the toll switching system to enable the invention to be understood.

Figs. 1 and 1*a* show a trunking diagram illustrating the local and toll trunking arrangements of a central office exchange area. Figs. 1 and 1*a* are identical in circuit diagram and reference characters to corresponding Figs. 1 and 1*a* in my previously mentioned copending application. It will be possible therefore to refer to my copending application for any of the detailed circuits not shown in full in the remaining drawings of this application.

Fig. 2 discloses a distant office **200** having a toll switchboard **201** with ring-down toll trunks extending to this exchange area and in which these toll trunks are divided into three groups of trunks such as the common ring-down toll trunk **250**, the odd ring-down toll trunk **260** and the even ring-down toll trunk **270**. The CLR trunk circuit **470** illustrates a group of CLR trunks for handling calls from the local switch train **460** from local subscribers. The CLR trunk group and the toll trunk group are shown as terminating diagrammatically in the banks of the answer switch **2180**. The answer switch **2180** and the call switch **2380** comprises one of the link circuits associated with the first operator's position. Full detail circuits for the ring-down toll trunk **250**, the TX trunk **400** and the answer and call switches **2180** and **2380** may be secured from my copending application wherein similar apparatus and circuits have been given corresponding reference characters or numbers.

Fig. 3 discloses in part the common start and level distributor **700** having reference characters similar to the common start and level distributor **700** shown in my copending application. Fig. 3 discloses only that part of the circuits which are necessary for a full understanding of the present invention.

Fig. 4 discloses five position distributors **1101**, **1102**, **1103**, **1104**, and **1105**. The upper or common position distributor **1101** is shown in detail and it will be understood that the remaining position distributors diagrammatically shown are similar in all respects to the upper position distributor. These position distributors are somewhat similar to the position distributors disclosed in my copending application with exceptions that each distributor is provided with additional relays to enable the operators' positions to be utilized as overflow positions.

Fig. 5 discloses the marking relays individual to operator's position number 1 and the detailed circuits for controlling these marking relays.

Fig. 6 discloses only part of the operator's position circuit for position number 1.

Fig. 7 shows the class of service keys individual to operator's position number 1. These keys comprise the CLR, the TX, and toll keys and the corresponding overflow keys for the corresponding classes of service.

Having previously described the drawings, a detailed description will now be given. It will now be assumed that the first four operators' positions in the toll switchboard **1200** are normally assigned exclusively for use in answering incoming toll calls on toll trunks and therefore all of the class of service keys except the class of service keys corresponding to the class to be answered are operated in these four operators' positions. For example, in operator's position 1 the CLR key **K2020**, the TX key **K2030**, the overflow CLR key **K2020'**, the overflow TX key **K2030'** and the overflow toll key **K2040'** are operated. Toll key **K2040** is left in normal position to enable this position to normally answer incoming calls from both the common and the odd toll trunk groups. In response to opening the CLR key **K2020** conductor **2546** is separated from conductor **2545** thereby opening one of the circuits from the distributor to the CLR marking relay **1240** at spring contacts **1**; at spring contacts **3** the conductor **2051** is disconnected from conductor **2547** extending to the CLR distributor to thereby open one of the distributor start circuits for this position to the CLR distributor. At spring contacts **4** conductor **2065** is disconnected from conductor **2006** which extends to an individual distributor relay in the CLR distributor. At spring contacts **5** the CLR key grounds the conductor **2006** to busy this position in the CLR distributor and at spring contacts **6** the CLR call waiting lamp CW is disconnected from conductor **2007** to prevent the lighting of this call waiting lamp when a CLR call is waiting to be answered.

The operation of the TX key **K2030** at spring contacts **1** disconnects conductor **2072** from conductor **2071** to thereby open one of the circuits to the TX marking relay **1250**. At spring contacts **3** the TX key separates conductor **2051** and **2069** to open a point in the distributor circuit for the TX position distributor. At spring contacts **4** disconnects conductor **2065** from conductor **2066** extending to an individual distributor relay. At contact springs **6** the TX key **K2030** separates the conductor **2014** from the TX call waiting lamp CW to thereby open the circuit to the TX call waiting lamp at this position. In response to the operation of the CLR overflow key **K2020'** contact springs **1** disconnects conductor **2546'** from conductor **2545'** thereby opening another circuit to the CLR marking relay **1240**, at contact springs **2** prepares a circuit for CLR overflow relay **1270**; at contact springs **3** disconnects conductor **2051** from the overflow distributor start lead **2547'**, at contact springs **4** disconnects conductor **2065** from conductor **2006'** extending to the overflow distributor relays, at spring contacts **5** grounds conductor **2006'** for controlling the overflow CLR distributor relay to prevent CLR overflow calls being extended to this position, and at spring contacts **6** disconnects the CLR call waiting lamp CW from the conductor **2007** to prevent the lighting of this lamp at this position.

In response to the operation of the overflow key TX key **K2030'**, at spring contacts **1** opens another point in the circuit to the TX marking re-

lay 1250, at spring contacts 2 prepares a circuit for operating the TX overflow relay 1280, at spring contacts 3 opens a point in the distributor start circuit to the overflow relays in the TX distributor, at spring contacts 5 grounds conductor 2066' to mark this position busy in the overflow section of the TX distributor, and at spring contacts 6 opens the circuit to the TX call waiting lamp CW.

In response to the operation of the overflow odd and common toll key K2040', at contact springs 1 prepares a circuit for operating the overflow toll relay 1260, at contacts 3 grounds conductor 2067' to prepare a circuit for the overflow relay 1180, and at contact springs 4 opens the circuit to the toll call waiting lamp CW.

Since the toll key K2040 was not operated no circuit was therefore completed for the odd toll relay 1210 at contact springs 1 and at contact springs 2 the conductor 2067 is grounded to prepare a circuit for operating the distributor relay 1140 in the common position distributor.

As soon as the operators at these four positions are ready to receive incoming toll trunk calls each operator will operate the talk key associated with the answer switch in one of her links to cause the operation of position busy relay 1640 and relay 1220. This circuit may be traced from the talk key shown in the answer switch 2180 and thence by way of conductor 2064 contacts 1634 thru the winding of the slow-to-release relay position busy relay 1640 to negative battery. A branch of this circuit extends from contacts 1634 by way of conductor 2515 to the winding of relay 1220 to negative battery.

Busy position relay 1640, upon energizing, at contacts 1647 disconnects ground from conductor 2065 thereby disconnecting ground from conductor 2067 extending to the position distributor by way of the toll key K2040. At contacts 1646 busy position relay 1640 grounds conductor 2051 to operate the overflow CLR relay 1270, the overflow TX relay 1280 and the overflow toll relay 1260. At contact 1645 relay 1640 prepares a circuit for position start relay 1510. The circuit for energizing the overflow TX relay 1280 may be traced from the grounded conductor 2051 thru contact springs 2 of the overflow TX key K2030' conductor 1289 and thru the winding of overflow TX relay 1280 to battery. The circuit for energizing the overflow CLR relay 1270 may be traced from the grounded conductor 2051 thru contact springs 2 of the operated overflow CLR key K2020' conductor 1279 and thru the winding of overflow CLR relay 1270 to the negative battery. The circuit for energizing the overflow toll relay 1260 may be traced from grounded conductor 2051 to the contact springs 1 of the overflow odd and common toll key K2040', conductor 2068' and thru the winding of the overflow toll relay 1260 to battery. Relay 1220 is operated in response to the operation of talk key in the link and by ground extending over conductor 2515 to prepare thru its uppermost sets of contacts various circuits to the marking relays 1230, 1240, and 1250. At its lower contacts relay 1220 prepares circuits extending to the distributor start leads of the various position distributors shown in Fig. 4. The operation of the overflow relays opens several circiuts extending to the marking relays while the overflow toll relay 1260 opens several points in the circuit extending to the common and odd position distributor. At this time a circuit may be traced from grounded conductor 2051, contacts 1214 and 1229, distributor start lead 2021, contacts 1121 of relay 1120 of Fig. 4 and thru the lower winding of distributor relay 1130 to battery. A similar circuit may also be traced from grounded conductor 2051 by way of contact 1213 and 1228 over the distributor start conductor 2549 extending to the odd position distributor for energizing a distributor relay corresponding to the distributor relay 1130 shown in the common position distributor.

Similar operations take place in the other three operator's positions in response to the operation of the CLR, and TX keys and the operation of the overflow CLR, TX and toll keys. In these three positions the overflow relays 1280, 1270 and 1260 and the relays corresponding to relay 1220 are operated to condition the circuits in the same manner as described for position 1. The distributor start conductor 2021 is multipled to each of the operators' positions and therefore any one of these operators' positions having a talk key in one of their links operated will complete the circuit by way of conductor such as conductor 2051 over contacts of a relay, similar to relay 1220, to the common distributor start conductor 2021.

Relay 1130, upon energizing over the above traced circuit, at contacts 1135 prepares a circuit for operating the toll marking relay 1230, at contacts 1131 opens the locking circuit of 1160 in case the latter relay is energized, at contacts 1132 completes a locking circuit thru its upper winding by way of contacts 1141 and the winding of relay 1120 to grounded start conductor 2021, at contacts 1133 prepares a circuit for relay 1140 which at this time is not completed because of the operation of relay 1640 which at contacts 1647 has disconnected the ground from conductor 2065, and at contacts 1134 opens a point in the circuit of relay 1150. Relay 1120 energizes in series with the upper winding of relay 1130 and at contacts 1121 opens the original energizing circuit of relay 1130 but the latter relay is held in operated position over its upper winding in series with relay 1120. It will be noted that only relay 1130 is energized because in this case the first operator's position is ready to receive an incoming toll trunk call. In case this first position was not assigned to handle an incoming toll call, then the toll key K2040 would have been operated and the conductor 2067 would have been grounded to complete a circuit for the second distributor relay 1140 by way of contacts 1163 and 1133. Assuming that this first position is assigned to handle incoming toll calls, and, at this time the position busy relay 1640 is in its deenergized position because she has no talking key in any of her links operated and therefore this position is not ready to receive a trunk call, then under these conditions the conductor 2065 is grounded with result that the conductor 2067 is likewise grounded to complete the circuit for relay 1140. In a manner similar to that just described the unnumbered conductors extending to the remaining distributor relays may be grounded. Assuming now that the first position is available for use and has a talk key and her position busy relay 1640 operated in readiness to receive an incoming trunk call, then only relays 1120 and 1130 are operated.

It will now be assumed that an incoming toll trunk call has been extended from the distant office 200 by the toll switchboard 201. In response to the extension of the toll call to ringdown toll trunk 250 the start relay 350 in this trunk circuit is operated in the manner described

in my copending application. Start relay 350, upon energizing, at its contact completes a circuit for grounding conductor 2536 extending to the common start and level distributor 700 shown in Fig. 3. In response to grounding of conductor 2536, a circuit is completed by way of lockout contacts 707 and thru the winding of relay 760 to battery.

The operation of relay 760 causes another relay (not shown) to be operated in the common start and level distributor 700 to close contacts 825 and ground conductor 2019 to thereby complete a circuit for lighting the toll call waiting lamp CW thru to the contact springs 4 of the odd and common toll key K2040. The operators at the various positions having their toll keys in normal positions are thus informed by the lighting of the toll call waiting lamp CW that a toll call is waiting to be answered. In addition a lockout relay (not shown) in the common start and level distributor 700 is operated, in response to the operation of relay 760, to open the original energizing circuit of relay 760 to prevent other incoming toll trunk calls from other subgroups of toll trunks from maintaining the relay 760 operated until this particular call and other simultaneous calls in this subgroup are answered. Conductor 2537 is grounded by the operation of relay 760 to prepare circuits to contacts on the marking relays for the purpose of marking the bank contacts in the answer switches associated with this operator's position to enable the answer switch to find the calling trunk line in accordance with the markings in its bank. Relay 760, upon energizing, at contacts 761 shunts the lockout contacts 707 to maintain relays 760 operated as long as conductor 2536 is grounded. At contacts 762 relay 760 grounds conductor 2562 to complete a circuit for operating the toll marking relay 1230 as follows: from the grounded conductor 2562 contacts 1113, back contacts 1171, contacts 1135, conductor 2023, contacts 1211 and 1223 and thru the upper winding of toll marking relay 1230 to battery. At contacts 1231 relay 1230, grounds conductor 2535 to mark all of the toll trunks in the banks of the answer switch, at contacts 1232 connects grounded conductor 2537 to conductor 2538 to mark the particular level in which this toll trunk terminates in the banks of the answer switch, and at contacts 1234 grounds conductor 2077 to complete the energizing circuit for the position start relay 1510 by way of contacts 1645. It should be noted at this time that since only one of the position distributor relays, such as 1130, is in energized position that only one of the toll marking relays is energized at one of the four operators' positions. Therefore the toll marking relay 1230 at position 1, in this case, is the only toll marking relay which is operated and therefore the toll trunk is only marked in the banks of the answer switches associated with this first operator's positions.

In response to the operation of the position start relay 1510 conductor 2078 is grounded by way of contacts 1512 to operate the start relay 2160 in the answer switch 2180. In response to the operation of the start relay 2160 the answer switch is operated in the manner described in my copending application to find the incoming toll trunk which has been marked by the toll marking relay 1230 and by the toll trunk in its banks. When the answer switch 2180 finds this calling toll trunk the test relay 2120 is operated to ground conductor 2079 at contacts 2122 to complete a circuit thru the upper windings of relay 1630 to battery. Relay 1630 disconnects the grounded conductor 2064 from conductor 2515 to cause the deenergization of relay 1220 in Fig. 5 and to open the circuit of slow-to-release relay 1640. In response to the answer switch 2180 engaging with the calling trunk line, the start relay 350 in the ring-down toll trunk 250 deenergizes to disconnect ground from conductor 2536. Relays 350 and 1220 deenergize before slow-to-release relay 1640 deenergizes. In response to the removal of ground from conductor 2536 the circuit to relay 760 is interrupted thereby causing the release of the latter relay. In addition the removal of ground from conductor 2536 likewise removes ground from conductor 2537 to thereby remove one of the markings in the banks of the answer switch. Relay 760 at contacts 762 disconnects ground from conductor 2562 thereby opening a point in the circuit to the toll marking relay 1230. Relay 1220, upon deenergizing, at contacts 1223 opens another point in the energizing circuit of toll marking relay 1230 and at contacts 1229 removes ground from the distributor start conductor 2021 in case none of the remaining three operators' positions are available for use at this time. Relay 1230 deenergizes to disconnect the markings from the answer switch banks. In case the second operator's position is available for use the start conductor 2021 will be maintained grounded with the result that relays 1120 and 1130 are maintained in operated positions until the slow-to-release relay 1640 in position 1 deenergizes.

After an interval slow-to-release relay 1640 deenergizes to disconnect ground from conductor 2051 at contacts 1646 and at contacts 1647 grounds the mark busy conductor 2065 to thereby complete a circuit thru the toll key K2040 at spring contacts 2, conductor 2067, contacts 1163 and 1133, to the lower winding of relay 1140. The second distributor relay 1140 therefore is energized from grounded conductor 2065 in response to the deenergization of the slow-to-release relay 1640 to cause the distributor to select the next operator's position which has been conditioned to receive incoming toll trunk calls. Relay 1140, upon energizing, at contacts 1145 prepares a circuit for controlling toll marking relay at the second operator's position, at contacts 1141 opens the locking circuit of relay 1130 to cause the latter relay to deenergize, at contacts 1142 completes a locking circuit for itself by way of contacts 1151 and the winding of relay 1120, at contacts 1143 opens a point in the circuit to relay 1160, and at contacts 1144 prepares a point in the circuit to relay 1150. Relay 1130 deenergizes and at contacts 1135 opens a further point in the previously described circuit for the toll marking relay 1230 at the position 1, at contacts 1131 prepares a locking circuit for the last distributor relay 1160, at contacts 1133 opens the original energizing circuit of relay 1140 which is now locked energized in series with relay 1120, and at contacts 1134 prepares a point in a circuit in the next to last distributor relay 1150. In case the second position is not in readiness to receive a trunk call the conductor corresponding to the conductor 2065 will be grounded to complete a circuit by way of the second position toll key and contacts 1144 and 1134 for the lower winding of relay 1150. The relay 1150, under these conditions, would be operated to lock itself in series with relay 1120 and to cause the deenergization of relay 1140 in the same manner

as previously described. Relay 1150, under these conditions, would prepare a circuit for energizing the last distributor relay at contacts 1153 and if the third position was unavailable for use then the last distributor relay 1160 would be operated over this previously mentioned prepared circuit to lock itself in series with relay 1120 and to cause the deenergization of relay 1150. In case this last or fourth position is also unavailable for use the conductor corresponding to conductor 2065 is grounded to complete a circuit by way of contacts 1164 and 1154 and thru the lower winding of distributor relay 1130 to battery. This latter relay at contacts 1131 opens a locking circuit of the last distributor relay 1160 and locks itself in the same manner as previously described. From the foregoing description it will be seen that the distributor relays are cyclically operated in accordance with whether or not the assigned operator's positions are available for use. It can also be seen that when the position busy relay 1640 is in deenergized position that this corresponding position is marked busy or unavailable for use. These positions are rendered idle and available for use when busy position relay 1640 is in energized position and when the conductor 2515 is grounded and the corresponding relay 1220 is operated.

Returning now to the time when an answer switch in the first operator's position has found and connected with the incoming toll trunk call, it should be mentioned that the relay 760 is deenergized, in case no other trunk calls have been made in this particular subgroup, to remove ground from conductor 2562, and to cause the removal of ground from conductor 2019 to extinguish toll call waiting lamps CW at these four operators' positions.

The foregoing operations just described are fully disclosed in my previously mentioned copending application and have been described herein to enable the invention to be more clearly understood. For the purpose of describing this invention it will be assumed that the operators' positions which have been selectively conditioned to answer incoming toll calls are busy or unavailable for use. Under these conditions none of the relays corresponding to relay 1220 will be in operated position with the result that the distributor start lead 2021 is not grounded and therefore relay 1120 and none of the distributor relays are in operated position. It will be further assumed that another position has been selectively conditioned by the operation of all of the class of service keys except the overflow class of service key K2040' for the odd and common toll service. Since the key K2040' is not operated, the overflow toll relay 1260 in Fig. 5 is likewise not operated. Now when this first overflow position operated a talk key in one of her links, the corresponding position busy relay, corresponding to relay 1640, and the relay, corresponding to relay 1220, in her position are operated in the same manner as described for the first position. In order to clearly describe the operation of this operator's position when assigned for overflow service, it will be assumed that drawings shown in Figs. 5, 6, and 7 are the drawings of this overflow position. Under these conditions the odd toll relay 1210 is prepared for operation when conductor 2051 is grounded so that at contacts 1213 and 1214 the distributor start leads, comprising conductors 2549 and 2021, will not be grounded. In this overflow position the overflow relays 1280 and 1270 are operated in the same manner as previously described. Now therefore, when the overflow operator operates one of her talk keys in one of her links the relay 1220 is operated and conductor 2051 is grounded to complete a circuit for grounding the distributor start conductors 2549' and 2021' extending respectively to the overflow distributor means in the common and odd position distributors 1101 and 1102 respectively. A circuit may now be traced for energizing the overflow relay 1170 from from grounded conductor 2051 by way of contacts 1264 and 1229', conductor 2021', contacts 1122 of relay 1120, which is now in the deenergized position because the distributor start conductor 2021 is not grounded, and thru the winding of overflow relay 1170 to battery. A similar relay in the odd position distributor is energized from grounded conductor 2051 by way of contacts 1263 and 1228' and conductor 2549' extending to the odd distributor overflow relay corresponding to relay 1170. Relay 1170, upon energizing, at bank contacts 1171 opens the circuit extending to the marking relays at the operator's positions which are normally assigned to answer toll calls and at front contacts at 1171 prepares a circuit for energizing the series relay 1195 in series with the toll marking relay of the first operator's position which has been conditioned to act as an overflow toll position. At contacts 1172 relay 1170 prepares locking circuits for the overflow relays 1180 and 1190. At contacts 1173 relay 1170 completes a circuit for first overflow relay 1180 if this first overflow position is unavailable for use or not conditioned to receive incoming toll trunk calls. At contacts 1174, relay 1170 completes a circuit for the second overflow relay 1190 if the second overflow position is not available for use or not conditioned to receive incoming toll trunk calls. In case additional positions are to act as overflow positions then additional relays, such as relays 1180 and 1190, would be provided for such positions and these relays would operate in the same manner as described for relays 1180 and 1190.

In case the first overflow position is assigned to answer incoming toll calls and has been marked available for use by the throwing of the talk key in any one of the links at her position, then ground is removed from conductor 2065 and contacts 1173 only prepares a circuit for the first overflow relay 1180 instead of operating the same.

Assuming now that a start relay such as start relay 350 in Fig. 2 is operated to ground conductor 2536 then relay 760 operates as previously described and conductor 2537 is grounded. Contacts 825 are also closed to ground conductor 2019 to light the toll call waiting lamp CW at the operators' positions. At contacts 762 relay 760 grounds conductor 2562 to complete a circuit for relays 1195 and toll marking relay 1230 as follows: ground by way of armature 762, conductor 2562, contacts 1113, front contacts 1171, winding of relay 1195, back contacts 1181, conductor 2023', contacts 1261 and 1223' and thru the upper winding of toll marking relay 1230 to battery. Relay 1195 at contacts 1196 completes a circuit for maintaining relay 1170 energized thru its lower winding and likewise prepares a locking circuit for the upper windings of the first and second overflow relays 1180 and 1190. Toll marking relay 1230, upon energizing, at contact 1231 grounds conductor 2535 to mark this group of toll trunks as calling in the bank accessible to answer switch 2180. At contacts 1232

relay 1230 connects the grounded conductor 2537 to conductor 2538 to mark the level of bank contacts in which the calling trunk line terminates in the bank of the answer switches in this position. At contacts 1234 toll marking relay 1230 grounds conductor 2077 to complete a circuit for energizing the position start relay 1510. Position start relay 1510, upon energizing, at contact 1512 grounds conductor 2078 to energize the start relay 2160 in the answer switch having its talk key operated to cause this particular answer switch to hunt and find the calling toll trunk line in its banks. The calling trunk line is individually marked in one section of its banks by operation of the relays in the ring-down toll trunk 250 while the other sections of the answer switch banks are marked by the operation of the toll marking relay 1230. When the calling trunk line is found test relay 2120 operates to ground conductor 2079 to operate relay 1630 ground is removed from conductor 2515 extending to relay 1220, and ground is disconnected from the position busy relay 1640 to cause the deenergization of these two relays. Relay 1640 being a slow-to-release relay deenergizes an interval after relay 1220 deenergizes. In response to the deenergization of relay 1220 the previously traced circuit for energizing relays 1195 and 1230 are interrupted at contact 1223' with the result that relays 1195 and 1230 now deenergize. In case the second overflow position is available for use then ground will be maintained on the overflow start conductor 2021' with the result that relay 1170 will be maintained energized from the second overflow position when the original energizing circuit from the first overflow position is opened at contact 1229'. It is necessary that relay 1195 deenergize and permit the deenergization of relay 1170 in case one of the previously mentioned operators' positions, which have been normally assigned to take care of incoming toll lines, has become idle in the meantime. In this case one of the distributor relays 1130 to 1160 inclusive will be operated in series with the common distributor busy relay 1120 in the manner previously described. Relay 1120 at contacts 1122 opens the circuit extending thru the upper winding of overflow relay 1170 so that relay 1170 at this time may be deenergized to permit the operators' positions, normally assigned to handle such calls, to be selected for use in place of the overflow positions. However, assuming that these normally assigned operators' positions are still busy and unavailable, a circuit will be completed for the first overflow relay 1180 when the slow-to-release relay 1640 finally deenergizes. This circuit may be traced from ground by way of contacts 1647, conductor 2065, thru the overflow toll key contacts 2 of key K2040', conductor 2067', contacts 1173 and thru the lower winding of the first overflow relay 1180 to the battery. Relay 1180 at bank contacts 1181 opens the previously traced circuit for toll marking relay 1230 and at front contacts 1181 prepares a circuit by way of back contact 1191 for operating the toll marking relay in the second overflow position corresponding to toll marking relay 1230. At contacts 1182 relay 1180 prepares a locking circuit for its upper winding. Assuming that the second overflow position is available for use and ready to receive an incoming trunk call, its relay, corresponding to relay 1220, is operated and has grounded conductor 2021' to maintain relay 1170 in operated position dependent upon the operated condition of contacts 1122 of the busy relay 1120. Now a second call from an incoming toll trunk in the common group will ground conductor 2536 to operate relay 760, or maintain it operated in case it is in the same subgroup. Conductor 2562 is grounded to complete the circuit for energizing relay 1195, this time in series with the toll marking relay in the second overflow position, corresponding to relay 1230. Relay 1195 again operates and at contacts 1196 maintains the overflow relay 1170 operated to prevent interference should a normally assigned operator's position become available for use at this time. Contact 1196 also completes the locking circuit by way of contact 1172 for the upper winding of relay 1180. The position start relay in the second overflow position is then operated to cause its associated answer switch at that position to find the second incoming trunk call as marked by the toll marking relay in the second overflow position. After this trunk call is found the relay, corresponding to relay 1220, is deenergized to open the circuit of the toll marking relay at the second overflow position and the circuit of relay 1195 to cause the deenergization of these relays.

In the above description, it was assumed that the second incoming toll call occurred before the operator at the first overflow position had completed the first toll call to the desired called destination and therefore before the operator at the first overflow position had operated another talk key in an idle link at her position. However, if the second incoming toll call occurred after the first overflow position was ready to receive another toll call on another link in her position, then the second incoming toll call would be again routed to the first overflow position because the overflow positions are always selected in a predetermined order. That is, an overflow call is always routed to the first overflow position if it is idle and available for use and subsequent overflow calls are only routed to a second overflow position in case the first overflow position is busy and unavailable for use. This overflow distribution is different from the normal distribution of incoming toll calls to the operator's positions normally assigned to handle such toll calls because the normally assigned positions are taken into use, if idle, in a cyclically operable chain as long as any one of the normally assigned positions are available.

As soon as any one of the normally assigned operator's positions, such as the first four operator's positions previously mentioned, has operated a talk key at her position thereby marking it idle and available for use, the relay corresponding to relay 1220 at such position is operated to ground conductor 2021 from grounded conductor 2051 as previously described. In response to the grounding of conductor 2021 at any one of the positions, relays 1120 and 1130 are operated. Relay 1120 at contacts 1122 opens the circuit to the upper winding of overflow relay 1170 to prevent the energization of such relay. In case relays 1170 and 1195 are both operated at this time, then ground at contacts 1196 prevents the release of relay 1170 until the overflow position has answered the call which was routed to this overflow position. Relay 1170 is held operated by relay 1195 to prevent the stealing of this call from the overflow position after it has started to answer such a call After this call is answered by the overflow position relay 1195 releases relay 1170 and the latter relay cannot reoperate as long as contacts 1122 are open. At front contacts 1171

relay 1170 opens a point in the circuit to relay 1195 and to the toll marking relays at the overflow positions. At back contacts 1171 relay 1170 prepares the circuits to the toll marking relays, such as relay 1230, of the normally assigned operator's positions which have been selectively conditioned to normally answer incoming toll calls.

In the odd position distributor the relays, corresponding to distributor busy relay 1120 and distributor relay 1130, are operated in case the first normally assigned operator's position is marked idle and is selectable for use. Its relay 1220 is operated and grounded conductor 2051 completes circuits for these distributor relays over contacts 1213 and 1228 and distributor start conductor 2549. Assuming now that there is an incoming toll trunk call in the odd toll trunk group 260 in which case the start relay in the odd ring-down toll trunk 260 grounds conductor 268 to energize relay 730 over contacts 703 and to ground conductor 2539. Relay 730, upon energizing, at contacts 732 grounds conductor 2563 and causes a relay (not shown) to close contacts 835 to ground conductor 2019 to light the toll call waiting lamp CW. Relay 730 also causes the lockout relay (not shown) in the common start and level distributor 700 to open contacts 703 to prevent other incoming toll calls in other subgroups of the odd group from interfering with the operations of relay 730. At contacts 731 relay 730 maintains its own operating circuit and conductor 2539 grounded as long as conductor 268 is grounded.

When conductor 2563 is grounded a circuit may be traced thru the operated distributor relay, corresponding to relay 1130, for grounding conductor 2534 to complete a circuit for the toll marking relay 1230 by way of contacts 1212 and 1224. Relay 1230, upon operation, operates contacts 1231 and 1233 to mark the toll trunk group and level of bank contacts accessible to the answer switch and operates the position start relay 1510, in the same manner as previously described, to cause the answer switch to find the odd calling trunk line. When the trunk line is found by the answer switch, ground is removed from the conductor 268 and the answer switch test relay 2120 causes the operation of relay 1630 as previously described. Relay 1630 causes the release of relay 1220 and after a predetermined interval, the slow-to-release relay 1640 deenergizes to ground conductor 2067 to operate the second distributor relay such as 1140 in both the common and odd position distributors 1101 and 1102. The operation of the distributor relays such as 1140 in both distributors causes the deenergization of relay 1130 while maintaining the distributor busy relay 1120 energized. Relay 1220, upon releasing, opens circuits to the toll marking relay 1230 and removes ground from the distributor start conductors 2021 and 2549 only in case no other normally assigned operator's positions are marked idle and selectable for use. Relay 730 deenergizes and removes ground from conductor 2539 and causes the disconnection of ground from conductor 2019 to extinguish the toll call waiting lamp CW. In case the second normally assigned operator's position is marked ready to receive a trunk call then the distributor start conductors 2021 and 2549 are grounded thru the operated contacts on the relay in the second position corresponding to relay 1220 to maintain relays such as relays 1120 and 1140 operated. Further incoming toll calls from the common and odd toll trunks are answered by the normally assigned operators' positions in a cyclical order as long as any one of these positions are marked idle and available for use.

The overflow relays in the common and odd distributor are only used when none of the normally assigned operator's positions are available for use. Under these circumstances the distributor busy relays such as relay 1120 are no longer operated and therefore at contacts such as contacts 1122 completes circuits for the overflow relays such as relay 1170 when any one of the positions assigned to act as overflow positions are marked idle and available for use. The overflow position relays such as relays 1180 and 1190 are operated to prepare the circuits to the toll marking relays in the same manner as previously described. If one of the normally assigned operator's positions should again be marked idle and selectable for use before another incoming toll call is received, then relays such as relay 1120 will be operated in series with one of the distributor relays to open the circuit to the overflow relays such as relay 1170 to cause these relays to deenergize. In case the overflow distributor is in use on a call the relays such as relay 1195 maintains the relays such as relay 1170 operated thru their lower windings to prevent the stealing of this call from the overflow position and then when relay 1195 deenergizes after the overflow position answer switch has found this call, the relays such as relay 1170 are deenergized to disconnect the overflow relays of the distributor and to permit the regular distributor relays to function and handle the incoming toll calls.

Having described the first operator's position as being used as a regularly assigned position for answering incoming toll calls and then used as an overflow position for answering incoming toll calls when all the regularly assigned positions are busy or available, a brief description will now be given of the use of this position as a CLR position for answering only CLR trunk calls. In this case all of the keys except the CLR key K2020 are operated. The overflow position relays 1280, 1270 and 1260 are operated in response to the operation to the corresponding overflow keys to prevent the use of this position as an overflow position. The operation of the TX key K2030 busies this position to incoming TX calls and the operation of the toll key K2040 likewise busies this position to incoming toll calls from the common and odd incoming toll trunk groups by controlling the distributor relays in their respective position distributors to pass over this position when selecting their next marked idle position for use on such class of calls in the manner previously described.

As long as this position is unavailable for use conductor 2065 will be grounded to complete a circuit by way of the CLR key spring contacts 4 for grounding conductor 2006 to prepare or operate the CLR distributor relay, corresponding to relay 1140, to prevent the CLR distributor from selecting this position. In order to render this position available for use the operator will operate one of the talk keys in one of her idle links. Assuming that the talk key in the answer switch 2180 is the key operated then the operation of this key operates relays 1640 and 1220 as previously described. Relay 1640 at contacts 1647 disconnects ground from conductor 2065 to thereby disconnect ground from conductor 2006 extending from the CLR key to the CLR distributor. At contacts 1646 relay 1640 grounds conductor 2051 to operate the odd toll relay 1210

by way of the toll key contact springs 1 and conductor 2068, and at contacts 1645 prepares a circuit for the position start relay 1510.

Relay 1210, upon energizing, at contacts 1211 and 1212 opens points in the circuit to the toll marking relay 1230 to prevent its operation. At contacts 1213 and 1214 relay 1210 opens circuits to prevent grounding of the distributor start leads 2549 and 2021. The operation of the overflow toll relay 1260 at contacts 1263 and 1264 prevents grounding of the overflow distributor start leads 2549' and 2021' when conductor 2051 is grounded and at contacts 1261 and 1262 opens further circuits to the toll marking relay 1230. At contacts 1271 the CLR overflow relay 1270 opens one of the circuits to the CLR marking relay 1240. At contacts 1281 the overflow TX relay 1280 opens one of the circuits to the TX marking relay 1250 while the other circuit for the TX marking relay 1250 is opened at the contacts spring 1 of the TX key K2030. Therefore at the time relay 1220 is operated there is only one circuit remaining for operation of a position marking relay and this circuit extends from the CLR marking relay 1240 over contacts 1222, conductor 2546 to spring contacts 1 of the CLR key K2020 to conductor 2545 which extends to the CLR position distributor where it terminates in the contacts corresponding to contacts 1135. In a similar manner only one other of the operated contacts of relay 1220 is now effective for grounding one of the distributor start leads. This is distributor start lead 2548 extending to the CLR distributor to cause the operation of the distributor busy relay and the first distributor relay corresponding to relays 1120 and 1130. This circuit may be traced from grounded conductor 2051, spring contacts 3 of the CLR key K2020 to conductor 2547, over contacts 1226 to the CLR distributor start lead 2548. The circuits for grounding the distributor start leads 2548', 2070 and 2070' are opened at the operated keys at contacts springs 3 at the operator's position and the circuits to the distributor start leads 2549, 2549', 2021 and 2021' are opened by the operation of relays 1260 and 1210.

When a local subscriber such as T1 operates the local switch train 460 to seize a CLR trunk, such as 470, a start relay in this trunk circuit is operated to ground conductor 2530 to complete a circuit by way of contacts 711 for operating relay 750 and grounding conductor 2531 for marking purposes. Relay 750 at contacts 751 locks itself to ground conductor 2530 and at contacts 752 grounds conductor 2561. Relay 750 causes the operation of a relay (not shown) to operate contacts 855 to ground conductor 2007 to thereby light the CLR call waiting lamp CW. A lockout relay (not shown) in the common start and level distributor 700 also operates contacts 711 to prevent a CLR trunk call in another subgroup from interfering with this trunk call. When relay 750 grounds conductor 2561 a circuit is completed thru the CLR position distributor operating the CLR marking relay 1240. This circuit extends from grounded conductor 2561 thru back contacts of the CLR overflow relay, similar to contacts 1171, to operated contacts on the operated CLR distributor relay, similar to contacts 1135, to conductor 2545 and thence by way of contact springs 1 of the CLR key K2020 to conductor 2546, contacts 1222, and then thru the upper winding of CLR marking relay 1240 to battery. Relay 1240 at contacts 1241 grounds conductor 2533 to mark the CLR trunk group in the banks of the answer switch associated with this position, at contact 1242 connects grounded conductor 2531 to conductor 2538 to mark the level in the banks of the answer switch in which this trunk line terminates, and at contacts 1243 completes the circuit for operating the position start relay 1510 over conductor 2077 and contacts 1645. Relay 1510 operates the start relay 2160 to cause the answer switch to find the marked CLR trunk line whereupon the test relay 2120 operates to cause the operation of relay 1630 and the release of the CLR start relay in the CLR trunk circuit to disconnect ground from conductor 2530 in case no other CLR trunk in this subgroup is calling. Relays 1220 and 1240 deenergize in response to the operation of relay 1630 and after an interval relay 1640 deenergizes to advance the CLR distributor in the same manner as described for the toll common position distributor. When ground is disconnected from conductor 2530 relay 750 releases and ground is disconnected from the conductor 2531. Relay 750 also disconnects ground from conductor 2561 and causes ground to be disconnected from conductor 2007 to extinguish the CLR call waiting lamp CW. The lockout contacts 711 are likewise closed to again prepare the original energizing circuit of relay 750. A subsequent call from a CLR trunk line is routed by the CLR distributor to the next marked idle one of the operator's positions which has been selectively conditioned by the class of service keys to answer incoming CLR trunk calls.

Having described how the first operator position may be used as a regularly assigned position for answering incoming CLR trunk calls it will be assumed that this position is assigned to act as an overflow position to answer only incoming CLR trunk calls. In this case all of the keys except the overflow CLR key K2020' are operated and therefore relays 1280 and 1260 are operated and relays 1210 and 1220 will be operated when this position is marked idle and available for use by the operation of one of the talk keys in an idle link. In this case the only remaining circuit which may now be completed for a marking relay is the CLR marking relay 1240, and this circuit may be completed over contacts 1271 since the overflow CLR relay is not operated. All other circuits for marking relays are opened at the keys or by the operation of the relays 1260 or 1210 in the manner previously described.

This overflow position is never taken into use unless all of the normally assigned CLR positions are unavailable at which time the CLR busy distributor relay corresponding to relay 1120 will be deenergized. When this CLR busy position relay is deenergized and an overflow position is marked idle and available for use the CLR overflow distributor start lead 2548' is grounded by the operation of relay 1220 to operate the CLR overflow relay corresponding to relay 1170. If an incoming trunk call is received at this time a circuit may be traced for the CLR marking relay 1240 as follows: from grounded conductor 2561 thru operated contacts on the CLR overflow relay, corresponding to contacts 1171, winding of the overflow series relay, corresponding to relay 1195, back contacts on the first overflow distributor relay (if the first position is marked idle) and thence over conductor 2545' thru contacts springs 1 of K2020' and over conductor 2546', contacts 1271 and 1222' and thru the upper winding of CLR marking relay 1240 to battery. In the same manner as previously described the CLR marking relay 1240 marks the calling CLR trunk call

in the banks of the answer switch in this position and operates the position start relay 1515 to cause the preselected answer switch to operate and find this calling trunk line. Since the remaining operations are the same as previously described for the overflow circuits of the common position distributor no further description will be given other than to state that as soon as one of the regularly assigned positions become available for use, the CLR trunk calls are then routed to such positions instead of the overflow positions.

In a similar manner any one of the operator's positions may be selectively conditioned by the operation of the proper class of service keys to answer only the TX trunk calls or may be conditioned to act as an overflow position for the TX calls. A description of the operation of the position for use on TX calls is believed unnecessary as it is substantially the same as that described for CLR calls. In addition there is no reason why any one or more of the positions may not be used to answer all or only a limited number of the services. That is a position may answer toll. CLR, and TX, or toll and CLR, or CLR and TX, or only one service. Also any one or more positions could be conditioned to act as overflow positions for all such services or only a limited number. In cases where a position is simultaneously taking care of two or more services and if such a position should simultaneously receive incoming calls from two different classes of trunks then the call which would be answered at this position would be the trunk line which terminates in the lowermost bank level of the answer switch while the second of the calls would later on be answered by another operator's positions.

Having described the invention and what is considered to be new and patentable is set forth in the following claims.

What is claimed is:

1. In a telephone system, a first group of trunk lines of one class, a second group of trunk lines of a different class, a plurality of operators' positions, means for marking each of said positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, a class of service key for each of said trunk groups at each of said positions, a corresponding overflow key for each of said trunk groups at each of said positions, means including said class of service keys at certain of said operators' positions for selectively conditioning said certain positions to receive incoming trunk calls from only said first trunk group, means including said class of service keys at other of said operators' positions for selectively conditioning said other positions to receive incoming trunk calls from only said second trunk group, means including said overflow keys at predetermined ones of said operators' positions for selectively conditioning said predetermined positions to receive incoming trunk calls from both said first and second trunk groups, and means for routing incoming trunk calls from said first trunk group to said predetermined positions only in case none of said certain operators' positions are idle and selectable for use and for routing incoming trunk calls from said second trunk group to said predetermined positions only in case none of said other operators' positions are idle and selectable for use.

2. In a telephone system, a first group of trunk lines of one class, a second group of trunk lines of a different class, a plurality of operators' positions, means for marking each of said positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, a class of service key for each of said trunk groups at each of said positions, a corresponding overflow key for each of said trunk groups at each of said positions, means including said class of service keys at certain of said operators' positions for selectively conditioning said certain positions to receive incoming trunk calls from only said first trunk group, means including said class of service keys at other of said operators' positions for selectively conditioning said other positions to receive incoming trunk calls from only said second trunk group, means including said overflow keys at certain predetermined ones of said operators' positions for selectively conditioning said certain predetermined positions to receive incoming trunk calls from only said first trunk group, means including said overflow keys at other predetermined ones of said operators' positions for selectively conditioning said other predetermined positions to receive incoming trunk calls from only said second trunk group, means for routing incoming trunk calls from said first trunk group to said certain predetermined operators' positions only in case none of said certain operators' positions are idle and selectable for use, and means for routing incoming trunk calls from said second trunk group to said other predetermined operators' positions only in case none of said other operators' positions are idle and selectable for use.

3. In a telephone system, a first group of trunk lines of one class, a second group of trunk lines of a different class, a plurality of operators' positions, means for marking each of said positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, a class of service key for each of said trunk groups at each of said operators' positions, a corresponding overflow key for each of said trunk groups at each of said operators' positions, means including said class of service keys at certain of said operators' positions for selectively conditioning said certain operators' positions to receive incoming trunk calls from only said first trunk groups, means including said corresponding overflow keys at other of said operators' positions for selectively conditioning said other operators' positions to receive incoming trunk calls from only said first trunk group, and means for routing incoming trunk calls from said first trunk group to said other operators' positions only in case none of said certain operators' positions are idle and selectable for use.

4. In a telephone system, a group of incoming toll trunk lines, a plurality of operators' positions, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, a class of service key corresponding to said trunk group at each of said operators' positions, a corresponding overflow key corresponding to said trunk group at each of said operators' positions, means including said class of service keys at certain of said operators' positions for selectively conditioning said certain operators' positions to receive incoming trunk calls from said trunk group, means including said corresponding overflow keys at other of said operators' positions for selectively conditioning said other operators' positions to receive incoming trunk calls from said trunk group, and means for routing incoming trunk calls from said trunk group to said other operators' positions

only in case none of said certain operators' positions are idle and selectable for use.

5. In a telephone system, a group of incoming toll trunk lines, a plurality of operators' positions means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, means for selectively conditioning only certain of said operators' positions in one manner to receive incoming trunk calls from said trunk group, means for selectively conditioning other of said operators' positions in a different manner to receive incoming trunk calls from said trunk group, a position distributor individual to said trunk group, means in said distributor for selecting only a marked one of said certain operators' positions in accordance with said first selective conditioning means, additional means in said distributor for selecting only a marked one of said other operators' positions in accordance with said different selective conditioning means, and said additional distributor means effective only in case none of said certain operators' positions are marked idle and selectable for use.

6. In a telephone system, a plurality of groups of incoming trunk lines, a plurality of operators' positions, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, selective means in each of said positions rendering said positions capable of answering a trunk call from any of said trunk line groups, overflow selective means in each of said positions rendering said positions capable of answering a trunk call from any of said trunk line groups, and means responsive to an incoming trunk call for routing such call to an idle operator's position which has been rendered capable of answering such a trunk call.

7. In a telephone system, a plurality of groups of trunk lines, a plurality of operators' positions, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive incoming trunk calls, means for selectively conditioning certain of said positions in one manner to receive incoming trunk calls from only a limited number of said trunk groups, means for selectively conditioning other of said positions in a different manner to receive incoming trunk calls from said limited number of trunk groups, means for routing trunk calls from said limited number of trunk groups to said certain operators' positions in accordance with said first selective conditioning means in case any one of said certain operators' positions is idle and selectable for use, and means for routing trunk calls from said limited number of trunk groups to said other operators' positions in accordance with said different selective conditioning means only in case none of said certain operators' positions are idle and selectable for use.

8. In a telephone system, a group of incoming toll trunk lines, a plurality of operators' positions, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, means for selectively conditioning only certain of said operators' positions in one manner to receive incoming trunk calls from said trunk group, means for selectively conditioning other of said operators' positions in a different manner to receive incoming trunk calls from said trunk group, means for routing trunk calls from said trunk group to said certain operators' positions in accordance with said one manner of selective conditioning means in case any one of said certain operators' positions is idle and selectable for use, and means for routing trunk calls from said trunk group to said other operators' positions in accordance with said different manner of selective conditioning means only in case none of said certain operators' positions are idle and selectable for use.

9. In a telephone system, a group of incoming toll trunk lines, a plurality of operators' positions, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, means for selectively conditioning only certain of said operators' positions in one manner to receive incoming trunk calls from said trunk group, means for selectively conditioning other of said operators' positions in a different manner to receive incoming trunk calls from said trunk group, and means for routing trunk calls from said trunk group to said other operators' positions in accordance with said different selective conditioning means only in case none of said certain operators' positions are idle and selectable for use.

10. In a telephone system, a plurality of groups of incoming trunk lines, a plurality of operators' positions, selective key means for each trunk group in each of said operators' positions, each said selective key means having a normal and an operated position, each said selective key means in operated position preventing its operator's position from receiving trunk calls from its corresponding trunk group and in normal position assigning its operator's position to receive trunk calls from its corresponding trunk group, overflow selective key means for each trunk group in each of said operators' positions, each said overflow selective key means having a normal position and an operated position, each said overflow selective key means in operated position preventing its operator's position from receiving trunk calls from its corresponding trunk group in case its corresponding selective key means is operated and each said overflow selective key means in normal position assigning its operator's position to receive trunk calls from its corresponding trunk group even though its corresponding selective key means is operated, and means for routing incoming trunk calls from said trunk groups to said operators' positions in accordance with the operated condition of said selective key means and in accordance with the operated condition of said overflow selective key means.

11. In a telephone system, a plurality of groups of incoming trunk lines, a plurality of operators' positions, selective key means for each trunk group in each of said operators' positions, each said selective key means having a normal and an operated position, each said selective key means in operated position preventing its operator's position from receiving trunk calls from its corresponding trunk group and in normal position assigning its operator's position to receive trunk calls from its corresponding trunk group, overflow selective key means for each trunk group in each of said operators' positions, each said overflow selective key means having a normal position and an operated position, each said overflow selective key means in operated position preventing its operator's position from receiving trunk calls from its correspond-

ing trunk group in case its corresponding selective key means is operated and each said overflow selective key means in normal position assigning its operator's position to receive trunk calls from its corresponding trunk group even though its corresponding selective key means is operated, means for marking each of said operators' positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, means for routing incoming trunk calls from said trunk groups to marked idle ones of said operators' positions in accordance with the operated condition of said selective key means, and means for routing incoming trunk calls from said trunk groups to marked idle ones of said operators' positions in accordance with the operated condition of said overflow selective key means only in case none of the operators' positions assigned for use on such trunk calls by said selective key means are idle and selectable.

12. In a telephone system, a plurality of groups of incoming trunk lines, a plurality of operators' positions, selective means for each trunk group in each of said operators' positions, each said selective means operative to prevent its said position receiving trunk calls from its corresponding trunk groups, corresponding overflow selective means for each trunk group in each of said operators' positions, each said corresponding overflow selective means capable of assigning its position to receive trunk calls from its corresponding trunk group when its corresponding selective means is operated, and means for routing incoming trunk calls from said trunk groups to said operators' positions in accordance with the operated condition of said corresponding overflow selective means.

13. In a telephone system, an operator's position, a trunk group terminating in said position, a marking relay at said position individual to said trunk group for marking said trunk group at said position, a key at said position individual to said trunk group, a first circuit for said marking relay including said key, an overflow key at said position individual to said trunk group, an overflow relay at said position individual to said overflow key and operatively controlled thereby, a second circuit for said marking relay including said overflow key in series with contacts on said overflow relay, means responsive to a trunk call in said group for operating said marking relay over said first circuit in the event said first key is non-operated, and means responsive to a trunk call in said group for operating said marking relay over said second circuit only in the event said first key is operated to open said first circuit and said overflow key is non-operated.

14. In a telephone system, a plurality of operators' positions, a plurality of trunk groups terminating in said operators' positions, a marking means for each trunk group in each operator's position, each marking means operative to mark its corresponding trunk group in its operator's position, a class of service key for each trunk group at each operator's position, said class of service keys at said operators' positions operated by the operators thereat to selectively assign their positions to answer incoming trunk calls from only desired ones of said trunk groups, an overflow class of service key for each trunk group at each operator's position, said overflow class of service keys at said positions operated by the operators thereat to selectively assign their positions to answer incoming trunk calls from only desired ones of said trunk groups, and means responsive to a trunk call in one of said trunk groups for operating the corresponding marking means at one of said operators' positions which is assigned by only said overflow class of service keys to answer trunk calls from such a group.

15. In a telephone system, a group of trunk lines, an operator's position terminating said trunk lines, marking means in said operator's position for marking said group of trunk lines in said position in response to a call in said trunk group, a class of service key for said trunk group at said operator's position, means including said class of service key for controlling the operation of said marking means, an overflow class of service key for said trunk group at said operator's position, and means including said overflow class of service key for controlling the operation of said marking means independently of said class of service key.

16. In a telephone system, an operator's position, a trunk group terminating in said position, a marking relay at said position individual to said trunk group for marking said trunk group at said position, a first circuit for said marking relay, a second circuit for said marking relay, means at said position for controlling the open or closed condition of said first circuit, other means at said position for controlling the open or closed condition of said second circuit, means responsive to a trunk call in said group for operating said marking relay over said first circuit in the event said first circuit is in closed condition under control of said first means, and means responsive to a trunk call in said group for operating said marking relay over said second circuit only in the event said first circuit is in open condition and said second circuit is in closed condition under control of said other means.

17. In a telephone system, an operator's position, a plurality of trunk groups terminating in said operator's position, a key for each trunk group at said operator's position, said keys selectively operable by the operator thereat to assign her position to answer incoming trunk calls from only desired ones of said trunk groups, and an overflow key for each trunk group at said operator's position, said overflow keys also selectively operable by the operator thereat to assign her position to answer incoming trunk calls from only desired ones of said trunk groups and then only in the event the corresponding ones of said first mentioned keys have been operated by the operator at such positions.

18. In a telephone system, a plurality of operators' positions, a group of trunk lines terminating in said positions, means for marking each of said positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, means for selectively conditioning only certain of said operators' positions to receive incoming trunk calls from said trunk group, a position distributor individual to said trunk group for distributing incoming trunk calls from said trunk group to said certain operators' positions in accordance with said selective conditioning means, means in said distributor for sequentially assigning said certain positions if marked idle and selectable in a predetermined order and rotation for successive trunk calls from said trunk group, overflow means for selectively conditioning other of said operators' positions to receive incoming trunk calls from said trunk group, overflow distributor means in said distributor for distributing incoming trunk

calls from said trunk group to said other operators' positions in accordance with said overflow selective conditioning means, and said overflow distributor means being operative in response to a trunk call only in the event none of said certain operators' positions are idle and selectable for use.

19. In a telephone system, a plurality of operators' positions, a plurality of groups of trunk lines terminating in said positions, means for selectively conditioning only certain of said operators' positions to receive incoming trunk calls from only a certain one of said trunk groups, a position distributor individual to said certain trunk group for selecting in a continuous cycle and in a predetermined order said certain operators' positions which are available for use for successive incoming trunk calls from said certain trunk group, other operators' positions in which said plurality of trunk groups terminate, means for selectively conditioning only certain of said other operators' positions to receive incoming trunk calls from only said certain trunk group, overflow means in said distributor for selecting said certain other operators' positions which are available for use for incoming trunk calls from said certain trunk group, and said overflow means being effective only in the event none of said first mentioned certain operators' positions are available for use.

20. In a telephone system, a plurality of operators' positions, a plurality of groups of trunk lines terminating in said positions, a position distributor individual to each trunk group, each distributor selecting in a continuous cycle and in a predetermined order said operators' positions which are available for use for successive incoming trunk calls from its corresponding trunk group, other operators' positions in which said plurality of trunk groups terminate, overflow means in each of said distributors, each said overflow means selecting said other operators' positions which are available for use for incoming trunk calls from its corresponding trunk group, and each of said overflow means being effective only in the event none of said first mentioned plurality of operators' positions are available for use.

21. In a telephone system, a plurality of operators' positions, a group of trunk lines terminating in said positions, a position distributor for selecting in a continuous cycle and in a predetermined order said operators' positions which are available for use for successive incoming trunk calls from said trunk group, other operators' positions in which said group of trunk lines terminate, overflow means in said distributor for selecting said other operators' positions which are available for use for incoming trunk calls from said trunk group, and said overflow means being effective only in the event none of said first mentioned plurality of operators' positions are available for use.

22. In a telephone system, a plurality of operators' positions, a group of trunk lines terminating in said positions, means for marking each of said positions idle and selectable for use only when the operators at such positions are ready to receive an incoming trunk call, a position distributor for selecting in a continuous cycle and in a predetermined order said operators' positions which are marked idle and selectable for use for successive incoming trunk calls from said trunk group, other operators' positions in which said group of trunk lines terminate, overflow means in said distributor for selecting said other operators' positions for use for incoming trunk calls from said trunk group, and said overflow means being effective only in the event none of said first mentioned plurality of operators' positions are idle and selectable for use.

23. In a telephone system, a plurality of trunks, a plurality of operator positions, means for allotting calls received over said trunks to said operator positions, means at each of said positions effective when the operator thereat is busy handling a call allotted thereto for preventing additional calls from being allotted to said busy position, means at one of said positions for artificially busying said one position to prevent the allotment of calls thereto, and means included in said allotting means for overriding the said artificial busy at said one position and extending a call thereto only in the event all of the remaining operator positions are busy.

24. In a telephone system, a plurality of operator positions, a distributor for distributing calls to said positions in a predetermined order, means for automatically busying positions to which calls have been distributed by said distributor whereby subsequent calls are distributed to the remaining non-busy positions in a predetermined order, means operated at will at one of said positions for preventing said distributor from distributing calls thereto, and means including said distributor for overriding said preventing means and distributing calls to said one position only in the event all of said remaining positions are busy.

25. In a telephone system, a plurality of operator positions, a distributor for distributing calls to said positions in a predetermined order, means for automatically busying positions to which calls have been distributed by said distributor whereby subsequent calls are distributed to the remaining non-busy positions in a predetermined order, means operated at will at one of said positions for preventing said distributor from distributing calls thereto, and means in said distributor effective when a call can not be distributed to any of said positions for overriding said preventing means and distributing said call to said one position.

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