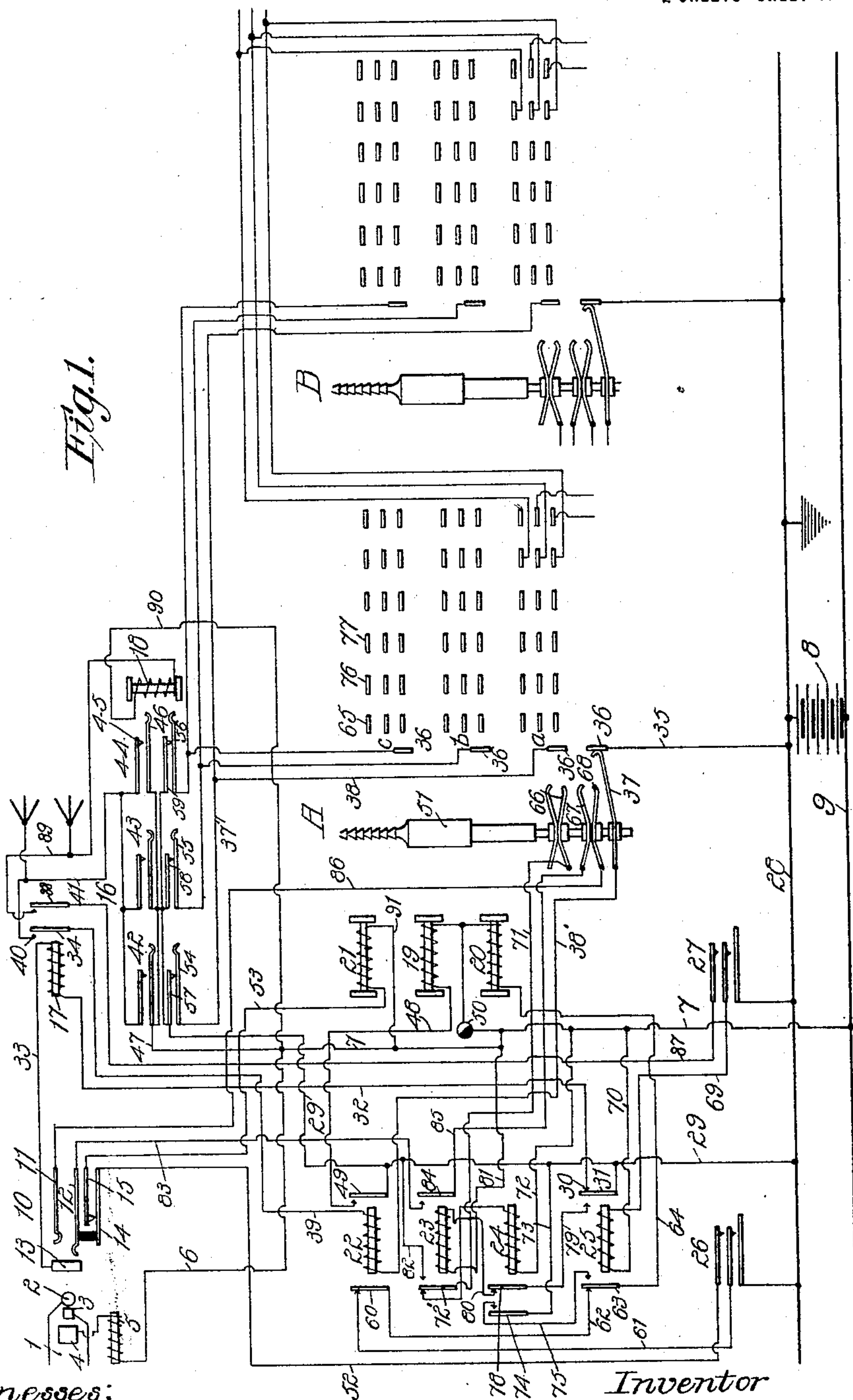


J. A. TAGGART.
SEMI-AUTOMATIC TRUNKING SYSTEM.
APPLICATION FILED DEC. 29, 1913.

1,199,317.

Patented Sept. 26, 1916.
2 SHEETS—SHEET 1.



Witnesses:

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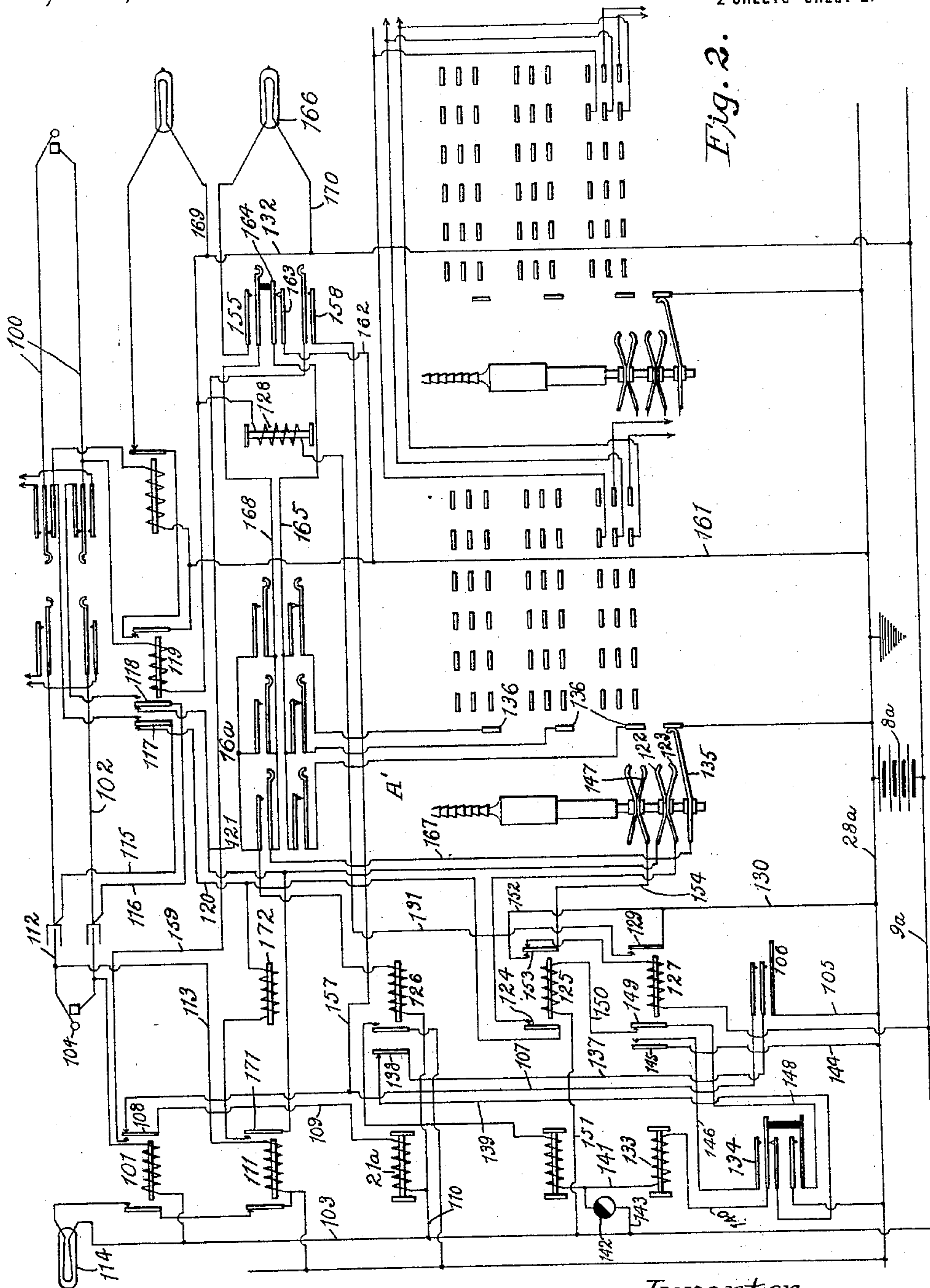


Fig. 2.

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UNITED STATES PATENT OFFICE.

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TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER,
NEW YORK, A CORPORATION OF NEW YORK, (ORGANIZED 1914.)

SEMI-AUTOMATIC TRUNKING SYSTEM.

1,199,317.

Specification of Letters Patent.

Patented Sept. 26, 1916.

Application filed December 29, 1913. Serial No. 809,148.

To all whom it may concern:

Be it known that I, JOHN A. TAGGART, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Semi-Automatic Trunking Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improved trunking system in which a portion of the connections required in establishing a free connection from one subscriber to another through different exchanges is accomplished by automatic switching mechanism for effecting the trunk connection.

In carrying out my invention, automatic switching mechanism is employed which is set in motion by the answering operator at the exchange at which the call is initiated after she inserts her answering plug into the answering jack of the calling line. The operation of the automatic switching mechanism is begun by the operator pressing a key corresponding to the exchange through which the call must be completed and, when once set in motion, the switching mechanism automatically selects the proper exchange and then connects the calling or "A" operator automatically with an idle trunk extending to the called exchange.

In carrying out my invention, the trunks extending from one exchange to several other exchanges are connected in groups, one group for each exchange, and each of the trunks of each of the groups terminates at the calling exchange in contacts connected with the automatic switching mechanism, as a result of which the actuation of the switching mechanism, by the depression of a single key, first selects the proper group of trunks corresponding to the exchange desired and, second, selects an idle trunk extending to said exchange.

In carrying out my invention, each operator answering incoming subscribers' calls may be provided with a number of trunking jacks or, if preferred, each cord pair may have an automatic switching mechanism

connected directly with its circuits so that the trunking jacks and their connections just referred to may be eliminated.

The several drawings illustrating my invention are as follows: Figure 1 shows in a diagrammatic circuit drawing my system, in which trunking jacks and automatic switching mechanisms are employed. Fig. 2 shows in a similar view the embodiment of my system in which the automatic switching mechanisms are connected directly with the conductors of the operators' cord pairs.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, the calling end of an operator's cord pair is indicated at 1, connected with the tip and ring contacts 2 and 3, respectively, of the calling plug, the sleeve contact of the plug being indicated at 4. The connection is made from the sleeve contact through an impedance coil 5 by wires 6 and 7 with the negative terminal of a battery 8 by means of a battery feed wire 9. A plurality of jacks 10 is provided, consisting of tip and ring contacts 11 and 12, and a thimble contact 13. The ring contact 12 is connected by an insulating block with an auxiliary spring 14 normally in engagement with a contact 15. An automatic switching mechanism A of any well-known type is indicated diagrammatically for completing the connection from the jack 10. A selecting switch 16 is provided for controlling the operation of the switching mechanism A and a relay 17 is connected with the jack 10 to place the switching mechanism 16 in operative condition. The switch 16 is preferably of the well-known type in which a plurality of selecting keys is provided for closing any one of a plurality of circuits, as desired, in connection with a locking member for holding any one of the keys in actuated position until subsequently reset. The key 16 shown in the drawings is of the type in which a locking magnet 18 prevents the release of the selecting key until the automatic switching mechanism A has completed its trunk connection or the controlling circuit through the relay 17 is broken by withdrawing the calling plug from the jack 10. The switching mechanism illustrated is provided with

vertical and rotary magnets 19 and 20, respectively, for controlling the vertical and rotary movements of said switching mechanism. A release magnet 21 is provided for restoring the switching mechanism to its normal or initial position. In addition to the electromagnetic mechanism referred to, relays 22, 23, 24 and 25 are provided for controlling the circuits of the actuating magnets of the switching mechanism in a manner to be described. Vertical off-normal contacts 26 and rotary off-normal contacts 27 are also provided in connection with the automatic switching mechanism. These various instrumentalities are connected in a manner to be described for accomplishing the following results: When the calling plug is inserted in the jack 10, current flows from the battery 8 through battery feed wire 28, wire 29, back contact 30 of the armature 31 of relay 25, wire 32, relay winding 17, wire 33, thimble 13, sleeve contact 4, impedance coil 5, wire 6, wire 7, wire 9, back to battery 8. Thus, the relay 17 is energized and its armature 34 is attracted, closing the following circuit: battery 8, wire 28, wire 35, contact 36, spring 37 of the automatic switch, wire 38', relay winding 22, wire 39, armature 34, contact 40, wire 41, to the selecting switch 16; this circuit requires for its completion the actuation of one of the keys 42, 43 or 44 of the switch 16 and, assuming the key 44 to have been actuated, the circuit is completed through contacts 45 and 46, wire 47, wire 7, wire 9 to battery 8, thus energizing the relay 22 and attracting its armature to close the energizing circuit of the vertical magnet 19 as follows: battery 8, wire 9, wire 7, vertical magnet winding 19, wire 48, armature 49 of relay 22, wire 29, wire 28, back to battery 8. This circuit, it will be noted, is completed through the interrupter 50, which is machine-driven so as to actuate the vertical magnet intermittently, as a result of which the vertical shaft 51 of the automatic switch A is stepped up so as to be opposite the successive banks of contacts *a*, *b* and *c*, each bank or group of which is connected with a separate exchange. For the position indicated in Fig. 1, the shaft 51 is in its normal position and when raised to the level of contact *a*, it is in position to connect with an idle trunk extending to the exchange corresponding with *a*. When further raised to the level of contacts *b*, it is in position to connect with one of the idle trunks corresponding to the exchange corresponding with small *b* and, when still further raised to the level of the contacts *c*, it is in position to connect with one of the idle trunks extending to the exchange corresponding with *c*. It will be noted that the first vertical step of the shaft 51 resulting from the operation of the vertical magnet 19 moves the vertical off-normal contacts 26 to their closed position to close circuits from the battery 8, through the release magnet 21 and the rotary magnet 20 to be described. The circuits through the release magnet may be traced as follows: battery 8, wire 28, vertical off-normal contacts 26, wire 52, spring 14, jack 15, wire 53, winding of release magnet 21, wire 7, wire 9, back to battery 8. From this it will be seen that by the insertion of a plug in the jack 10, the circuit of the release magnet is interrupted whether the shaft 51 is in its released position or not.

The operation of the vertical magnet continues until the vertical wiper 37 rests upon one of the contacts 36 which is ungrounded or, in other words, not connected with the grounded battery wire 28. It will be noted that the lowermost contact 36 is directly connected with ground through the wire 28 and that the three upper contacts 36 are connected with the lowermost springs 54, 55 and 56 of the selecting switch 16 which are normally in contact, respectively with the contacts 57, 58 and 59, which are tied together and connected by wire 29 with the grounded battery wire 28. Thus, for the normal position of the switch springs of the selecting key 16, ground is connected with each of the contacts 36 and, for the assumed operation of the key 44, the contact 59 is separated from its contact spring 56 and thus the ground upon the upper contact 36 is disconnected, from which it follows that the shaft 51 will continue to move vertically by the operation of the vertical magnet 19 until the vertical wiper 37 rests upon said uppermost contact 36. For this condition, the relay 22 will be deenergized, since its energizing circuit is broken by the interruption of its circuit through the selecting key 16 in the manner just described. This results in the armature 49 opening the circuit, through the wire 48 and vertical magnet 19, and closing a circuit by means of its second armature 60 as follows: battery 8, wire 28, vertical off-normal contacts 26, wire 61, armature 60, wire 62, armature 63 of relay 25, wire 64, energizing winding of rotary magnet 20, interrupter 50, wire 7, battery wire 9, back to battery 8. As a result, the rotary magnet 20 is operated to step the contacts into connection with the first set of contacts 65 of the group *c*, in which position the contacts 66, 67 and 68 carried by the shaft 51, rest, momentarily closing the rotary off-normal contacts 27, which contacts, do not close, however, until the contacts 66, 67 and 68 are in engagement with the contacts 65. The closing of the rotary off-normal contacts 27 results in the energization of the relay 25 by the following circuit: battery 8, wire 28, rotary off-normal contacts 27, wire 69, energizing winding of relay 25, wire 70, wire 7, wire 9, back to battery 8. This results in the attraction of the arma-

ture 63 which interrupts the energizing circuit of the rotary magnet. The contacts 66, 67 and 68 are now in connection with the terminals of one of the trunks leading to the desired exchange. If this first trunk is busy, the upper contact 65 is grounded through the connection in multiple to corresponding contacts of the several automatic switches from the fact that the contact 66 of another automatic switch rests upon one of these upper contacts 65 in a manner to be described. Assuming that a ground is found upon the upper one of the contacts 65, the relay 24 is energized by the following circuit: battery 8, grounded connection of wire 28, the ground connected with the upper contact 65; wiper 66, wire 71, armature 72' of relay 23, energizing winding of relay 24, wire 72, wire 7, wire 9, back to battery 8. The energization of the relay 24 pulls up its armatures, thus again closing the circuit of the rotary magnet as follows: battery 8, wire 28, wire 29, wire 73, armature 74 of relay 24, wire 75, armature 63 of relay 25, wire 64, energizing winding of rotary magnet 20, interrupter 50, wire 7, wire 9, back to battery 8. Thus, the shaft 51 is rotated another step, bringing the wipers 66, 67 and 68 into engagement with the second set of contacts 76 of the group of contacts *c*. If the upper one of the contacts 76 is grounded, another impulse of current flows through the same circuit just traced, including the rotary magnet, and the wipers, 66, 67 and 68, are moved into engagement with the next set of contacts 77, and so on until the wiper 66 rests upon an ungrounded contact, by which time the relay 24 is deenergized, opening the energizing circuit of the rotary magnet last traced at the armature 74. The dropping back of the armature 78 of the relay 24 energizes the relay 23 by the following circuit: battery 8, wire 28, wire 29, armature 31, wire 79, armature 78, wire 80, energizing winding of relay 23, wire 81, wire 7, wire 9, back to battery 8. This results in bringing the armature 72' against its front contact which connects the wipers 66 with ground by means of the following connections: wiper 66, wire 71, armature 72', wire 82, wire 29, wire 28, to ground, thus establishing a grounded condition of the upper contact of the set of contacts of the group *c* upon which the wiper 66 and therefore ground is placed upon the corresponding contacts in all of the automatic switches which are multiplied together. The energization of the relay 23 also closes the circuit from the spring 12 to the wiper 67, as follows: spring 12, wire 83, armature 84 of relay 23, wire 85, wiper 67. The wiper 68 is connected at all times with the tip spring 11 by means of the wire 86. Thus, the operation of the relay 23 completes talking connection from the tip and sleeve strands of the operator's con-

nected cord pair to the lower and intermediate ones of the set of contacts upon which the wipers 66, 67 and 68 happen to rest and thus current is caused to flow to the incoming end of the trunk connected therewith and signal the trunk or "B" operator by means of any of the well-known devices for accomplishing this result in a manner familiar to those skilled in the art. The energization of the relay 25, it will be observed, by the attraction of the armature deenergizes the relay 17, thus releasing the armatures of the relay 17 as a result of which the control circuit from the selecting key 16 to the relay 22 is interrupted at the armature 34 and the relay 22 cannot, therefore, be energized again during the connection. The relay 23 and the relay 25 remain energized during the connection, while the relay 24 is deenergized during said connections. The releasing magnet 18 of the selecting key 16, which magnet by its operation releases any actuated one of the keys 42, 43 and 44 is operated immediately after the selection of one of the groups of contacts *a*, *b*, and *c* by the following circuit, at which time the relay 17 is energized and the rotary off-normal contacts 27 are closed, since the rotary magnet has been given one impulse to bring the wipers into contact with the set of terminals 65, battery 8, wire 28, rotary off-normal contacts 27, wire 87, armature 88 of relay 17, wire 89, energizing winding of key releasing magnet 18, wire 90, wire 7, wire 9, back to battery 8. As a result, the key switch 16 is immediately released and is available for effecting another selection.

The condition above described is maintained until the close of the conversation, when, by suitable signaling apparatus connected to the operator's cord circuit, the disconnect signal is given and the calling plug is pulled from the jack 10 and the contact 15 is moved into engagement with the spring 14, thus actuating the release magnet 21 by the following circuit: battery 8, wire 28, vertical off-normal contacts 26, wire 52, spring 14, contact 15, wire 53, energizing winding of release magnet 21, wire 91 to wire 7, wire 9, back to battery 8. The operation of the release magnet restores the shaft 51 and wipers carried thereby to normal position, opening both the vertical and rotary off-normal switches 26 and 27, thus deenergizing the relays 23 and 25 and placing the whole apparatus in its normal initial position ready for selecting another trunk connection.

From the above, it will be understood that a single selecting key 16 is employed on each operator's position and that a plurality of automatic switches A, B is employed, one for each of the trunk jacks 10 and that each trunk jack has its series of controlling relays 17, 22, 23, 24 and 25 for controlling the

operation of the operating magnets of the automatic switch and, furthermore, that the contacts of the several automatic switches are multiplied together, not only for one position, but throughout the several operator's positions in which the various trunks terminate. While the wipers 66, 67 and 68 of each automatic switch are capable of both vertical and rotary motion, the wiper 37 moves in a vertical direction only so as to remain in contact with the one of the contacts 36 upon which it is moved by the vertical motion of the shaft 51.

In the modified arrangement of my trunking system shown in Fig. 2, the automatic switch A' is connected directly with the cord circuit 100 of an "A" or answering operator and in this modification of my system the release magnet 21^a is controlled by a relay 101 connected with the sleeve strand 102 of the answering end of the cord circuit 100, the other terminal of the relay winding being connected by wire 103 with the battery wire 9^a and thus with the battery 8^a so that when the relay 101 is deenergized the release magnet is operated through the following circuit: battery 8^a, wire 28^a, wire 105, vertical off-normal contacts 106, which at this time are closed since the automatic switch A' has been actuated, wire 107, armature 108, of relay 101, wire 109, energizing winding of release magnet 21^a, wire 110, wire 103, wire 9^a back to battery 8^a. The cord circuit is provided with a relay 111 connected with the tip strand 112 of the answering end of the cord 100 by means of wire 113 for controlling the operation of a signal lamp 114 in a manner well-known in the art to indicate to the operator when the calling subscriber has interrupted the talking circuit at his substation. The tip and sleeve strands 112 and 102 are conductively separated between the answering and calling ends by condensers, as is usual in the art, and the calling ends of these strands are connected by wires 115 and 116, respectively, with the armatures 117 and 118 of the relay 119 by which these connections are extended to the wires 120 and 121 when the relay 119 is deenergized, whereby connection is established directly between the calling end of the tip and sleeve strands 112 and 102 with the wipers 123 and 122, respectively, this connection being controlled by the armature 124 of the relay 125, which armature is inserted in the conductor 120 to control its continuity. The armatures 117 and 118 serve to establish communication between the conductors 115 and 116 and the conductors 120 and 121, respectively, when these armatures are in their retracted position, owing to the deenergization of the relay 119, which is the condition obtaining when the automatic switch A' is used to extend a trunk connection from the cord pair 100 to

another exchange, since at this time the calling plug is not inserted in a jack and, therefore, the energizing circuit extending from the relay 119 is not completed. The energization of the relay 119 serves to interrupt the connection between the conductors just referred to and to complete the connection between the conductors 115 and 116 and the tip and sleeve conductors at the calling end of the cord pair 100, and this energization of the relay 119 occurs when the calling plug is inserted in a calling jack for the purpose of establishing a talking connection by means of the cord pair 100 in the regular use of the cord pair when it is not desired to extend the call over the automatic switch A'. The relays 126, 125 and 127 correspond, respectively, with the relays 22, 23 and 24 shown in Fig. 1 and perform substantially the same functions. There is, however, no relay corresponding with the relay 25 shown in Fig. 1, as the relay 127, by means of its armature 129, controls the circuit of the key release magnet 128, as follows: battery 8^a, wire 28^a, wire 130, armature 129, wire 131, key release magnet 128, wire 132, wire 9^a, back to battery 8^a, as a result of which when the relay 127 is energized the first time after the answering plug 104 is inserted in an answering jack, the key release magnet 128 is actuated to release the selecting key 16^a.

In Fig. 2, the change of control of the rotary magnet 133 from the relay 126 to the relay 127 is effected by means of the rotary off-normal contacts 134, instead of being effected by relay mechanism as indicated in the circuit connections shown in Fig. 1. For the arrangement shown in Fig. 2, the rotary magnet 133 is energized for the first time during a connection by the operation of the relay 126 when it is deenergized by the vertical wiper 135 passing upon an ungrounded contact 136 over the following circuit: battery 8^a, wire 28^a, wire 105, vertical off-normal contacts 106, wire 137, armature 138 of relay 126, wire 139, rotary off-normal contacts 134, wire 140, energizing winding of rotary magnet 133, wire 141, interrupter 142, wire 143, wire 103, wire 9^a back to battery 8^a. This serves to rotate the automatic switch A' one step, which moves the rotary off-normal contacts 134 to their alternate position, closing a second energizing circuit for the rotary magnet 133 as follows: battery 8^a, wire 28^a, wire 144, armature 145 of relay 127, wire 146, rotary off-normal contacts 134, wire 140, rotary magnet 133, wire 141, interrupter 142, wire 143, wire 103, wire 9^a, back to battery 8^a. As a result, the rotary magnet is operated as long as the wiper 147 rests upon a grounded one of the contacts of the automatic switch and when it passes to an ungrounded or idle contact, the relay 127 is deenergized, interrupting the ener-

gizing circuit of the rotary magnet just described. This energizes the relay 125 over the following circuit: battery 8^a, wire 28^a, rotary off-normal contacts 134, wire 148, armature 149 of the relay 127, wire 150, energizing winding of relay 125, wire 151, wire 103, wire 9^a, back to battery 8^a. The energization of the relay 125 places a ground on the wiper 147, thus grounding the contact upon which it rests as follows: ground, wire 28^a, wire 130, wire 152, armature 153 of relay 125, wire 154, wiper 147. The energization of the relay 125 also establishes connection between the tip strand of the cord pair 100 through wire 120 and armature 124 with the wiper 123, thus placing the conductors of the cord pair in talking connection with the trunk terminals selected.

In the modified construction shown in Fig. 2, a special error key 155 is provided which by its operation actuates the release magnet over the following circuit: battery 8^a, wire 28^a, wire 105, vertical off-normal contacts 106, wire 107, wire 157, contact 158 of error key 155, wire 159, armature 108, wire 109, energizing winding of switch release magnet 21^a, wire 110, wire 103, wire 9^a, back to battery 8^a. This affords a means for releasing the automatic switch A' if for any reason the selecting key 16^a has been improperly actuated or if for any other reason it is desired to restore the automatic switch A' to its initial position without withdrawing the plug 104 from the answering jack. It will be understood that the withdrawal of this plug from the answering jack operates the release magnet in substantially the manner that withdrawing the plug 1 from the jack 10 operates the release magnet, this being accomplished in the present embodiment over the following circuit: battery 8^a, wire 28^a, wire 105, vertical off-normal contacts 106, wire 107, armature 108, wire 109, energizing winding of release magnet 21^a, wire 110, wire 103, wire 9^a, back to battery 8^a. The operation of the error key also interrupts the grounded condition of all of the contacts 136 except the lowermost one, since these contacts 136 are normally grounded by the selecting key 16^a over the following circuit: ground, wire 28^a, wire 161, wire 162, contacts 163 and 164 of error key 155, wire 165, through the lower contacts of the selecting key 16^a to the contacts 136. This makes possible the operation of the signal lamp 166 when the automatic switch A' has been restored to its initial position over the following circuit: battery 8^a, wire 28^a, lowermost one of the contacts 136, wiper 135, wire 167, wire 168, upper contacts of the error key 155, wire 169, signal lamp 166, wire 170, wire 132, wire 9^a back to battery 8^a. This affords the operator an indication

that the automatic switch is restored and is again in position to be actuated.

From the above description, it will appear that in connection with the circuit arrangement shown in Fig. 1, there is but one selecting switch 16 for each position and that this is connected with the different automatic switching mechanisms by means of multiple connections extending from the wires 41 and 89, as indicated, so that this signal selecting switch may be employed to operate any one of the automatic switching mechanisms, depending upon which of the jacks 10 is in connection with the calling end of the cord pair used to effect the connection. In the circuit arrangement shown in Fig. 2, on the other hand, but one switching mechanism A' is used for each cord pair, and a selecting switch 16^a is employed for each of the automatic switching mechanisms although obviously by including in the circuit of the selecting switching mechanism a control through an armature of either the relay 101 or the relay 111, not shown. The selecting switch 16^a might be employed to control all of the switching mechanisms A' used for a given operator's position.

In the construction shown in Fig. 2, the armature 171 of the relay 111 places an impedance coil 172 in bridge of the conductors 120 and 121 of the cord pair to balance the outgoing end of the cord pair 100 connected with the trunk conductors selected.

While I have shown my invention in the particular embodiments above described, it will be understood that I do not limit myself to these precise constructions as I may employ many equivalents without departing from the spirit of my invention.

What I claim is:

1. In a telephone system, the combination of an automatic selective trunking switch comprising a plurality of groups of contacts each having a plurality of sets of contacts, each set of contacts being connected to an out-going trunk the groups of contacts corresponding to groups of trunks extending to the different exchanges one exchange for each group, a key switch for starting the actuation of the automatic switch, and devices operated by the key for actuating the switch to first pick out a desired group of contacts and then to make connection with the first idle set of contacts of the group.

2. In a telephone system, the combination of an automatic selective trunking switch having contacts arranged in separate groups, each corresponding with an exchange to which connection may be made through trunk circuits, each group of contacts comprising a plurality of sets of contacts one for each of the trunks extending to the corresponding exchange, a selecting key

for starting the actuation of the automatic switch means for operating it to pick out one of the groups of contacts according to the selection effected at the key, and devices for actuating the automatic switch in the selected groups to pick out the first idle trunk circuit of said group.

3. In an automatic telephone system, a plurality of central operators' positions, a plurality of automatic selective trunking switches for each operator's position, each trunking switch having a plurality of groups of contacts one for each exchange to which connection is to be made, each group of contacts having a plurality of sets of contacts one for each trunking circuit extending to the corresponding exchange, corresponding contacts of the several automatic switches being multiplied together, and a single key for starting the actuation of a desired switch to first pick out the group of contacts desired and then the first idle set of contacts in the group to thus extend the talking connection to the desired exchange.

4. In an automatic telephone system, the combination of a plurality of automatic selective trunking switches for each operator's position, each trunking switch having a plurality of groups of contacts one for each exchange to which connection is to be made, each group of contacts having a plurality of sets of contacts one for each trunking circuit extending to the corresponding exchange, corresponding contacts of the several automatic switches being multiplied together, and a single selecting key switch for connecting a desired automatic switch with a first selected group of contacts and thus extending the connection to a selected exchange, and devices for actuating the desired automatic switch to make connection with the first idle set of contacts of said group.

5. In a telephone system, the combination of a plurality of trunk jacks, an automatic selective trunking switch for each jack, the connection with any one of said jacks selecting the corresponding automatic switch for operation, each automatic switch having a plurality of groups of contacts corresponding to exchanges to which connection is to be extended and each group of contacts comprising a plurality of sets of contacts one for each trunk circuit extending to the corresponding exchange, and a single connecting key for operating the automatic switch of a connected jack to engage a group of contacts determined by the selection of said key, and devices for moving the automatic switch in said group into contact with the first set of idle trunk contacts.

6. In a telephone system, the combination of an automatic selective trunking switch having vertical and rotary motions, said trunking switch having a plurality of

groups of contacts corresponding to exchanges to which connection is to be extended, each group comprising a plurality of sets of contacts one for each trunk extending to the corresponding exchange, a key for determining the vertical motion of said automatic switch to select a desired group of contacts, and devices for controlling the rotary motion of said automatic switch to select the first idle set of contacts of the selected group.

7. In combination groups of trunks leading to different exchanges, an automatic selective switching mechanism having contacts connected to said trunks, and a key for each exchange for directing said switching mechanism to select a desired exchange, and for causing the same to select an idle trunk extending to said exchange.

8. In a telephone system, the combination of an automatic selective switching mechanism having contacts terminating trunk circuits in a plurality of groups one for each of a plurality of exchanges, a key corresponding to each exchange for directly actuating said switching mechanism to select a desired exchange, and to select an idle trunk extending to said exchange.

9. In a telephone system comprising a plurality of exchanges, the combination of a plurality of operators' switching mechanisms comprising a key for each exchange, an automatic selective switching mechanism for each operator's switching mechanism, and devices controlled by each operator's switching mechanism for directing the corresponding automatic switching mechanism to select a group of trunks leading to a desired exchange and to select an individual idle trunk extending to said exchange.

10. In a telephone system comprising a plurality of exchanges, the combination of a plurality of operators' switching mechanisms comprising a key for each exchange, an automatic selective switching mechanism for each operator's switching mechanism, each automatic switching mechanism having contacts terminating a plurality of trunk circuits arranged in groups one for each of a plurality of exchanges, and devices actuated by each of said operator's switching mechanisms for causing the corresponding automatic switching mechanisms to select the groups of trunks leading to the desired exchange, and to select an individual idle trunk extending to said exchange.

11. In combination a plurality of switch terminals arranged in groups, a plurality of trunks connected to said terminals, each group of trunks extending to an exchange, automatic selective switching mechanism for making connection with said terminals, a plurality of keys corresponding to the groups for causing the switch mechanism

to select the desired group and means for causing the switch to select an idle trunk in the group.

12. In combination a plurality of groups of trunks, a switchbank having grouped terminals connected to said trunks, automatic selective switching mechanism for making connection to said terminals, keys corresponding to each group for directing the switch mechanism to the desired group and mechanism for causing the switch to select and connect to the first idle trunk in the corresponding group.

13. In combination a plurality of groups of trunks leading to a plurality of exchanges, a plurality of keys corresponding to said exchanges, an automatic selective switch having contacts connected to said trunks, each key operable to direct said switch to the corresponding group of contacts and means within the switch for causing the same to select the contacts of an idle trunk.

14. In combination a plurality of groups of trunks leading to a plurality of exchanges, a plurality of keys corresponding to said exchanges, an automatic selective switch having contacts connected to said trunks, each key operable to direct said switch to the corresponding group of contacts, means within the switch for causing the same to select the contacts of an idle trunk and means to lock the operated key until the selection is completed.

15. In combination an operator's connecting circuit, an automatic selective switch mechanism, a plurality of groups of trunks having contact in said switch mechanism, each group leading to a separate exchange, a plurality of keys corresponding to said exchanges, a jack contact controlled by said operator's connecting circuit to render said keys operable to direct said automatic switch to the corresponding group of trunks and to select an idle trunk from said group.

16. In a telephone system having a plurality of exchanges, one of said exchanges having a plurality of operators' positions,

a jack at each position, an automatic selective switch connected to said jack, said switch having a plurality of horizontal rows of contacts, each row of contacts comprising the terminals of a group of trunks leading to one of said exchanges, a vertical row of contacts, each vertical contact corresponding to one of said exchanges and to a horizontal row of contacts, an operator's selecting key set, comprising a key corresponding to each exchange, operation of a key placing a potential on one of said vertical contacts, means controlled by said jack and by each key for starting said switch to select the corresponding vertical contact and means for causing said switch to select an idle one of the corresponding horizontal row of contacts.

17. In a telephone system having a plurality of exchanges, one of said exchanges having a plurality of operators' positions, a jack at each position, an automatic selective switch connected to said jack, said switch having a plurality of horizontal rows of contacts, each row of contacts comprising the terminals of a group of trunks leading to one of said exchanges, a vertical row of contacts, each vertical contact corresponding to one of said exchanges and to a horizontal row of contacts, an operator's selecting key-set, comprising a key corresponding to each exchange, operation of a key placing a potential on one of said vertical contacts, means controlled by said jack and by each key for starting said switch to select the corresponding vertical contact and means for causing said switch to select an idle one of the corresponding horizontal row of contacts, and means to lock the operated key until the idle trunk is selected.

In witness whereof, I hereunto subscribe my name this 6th day of November, A. D. 1913.

JOHN A. TAGGART.

Witnesses:

W. T. EASTWOOD,
C. H. BERGMANN.