J. H. LEVIS, JR

MANUAL CALL DISTRIBUTING SYSTEM.

APPLICATION FILED DEC. 29, 1913.

1,100,749.

Patented June 23, 1914.

2 SHEETS—SHEET 1.

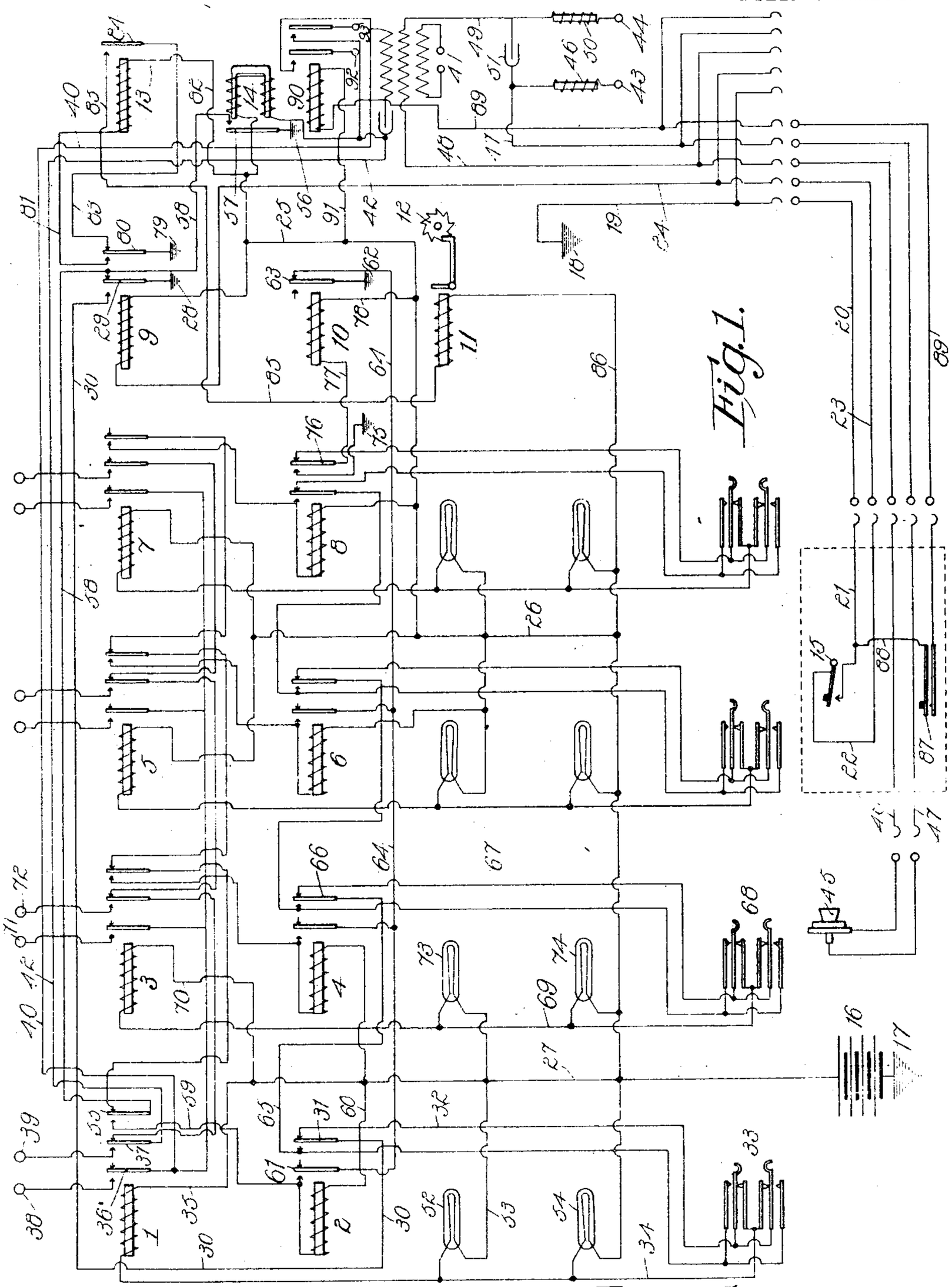

Fig. 1.

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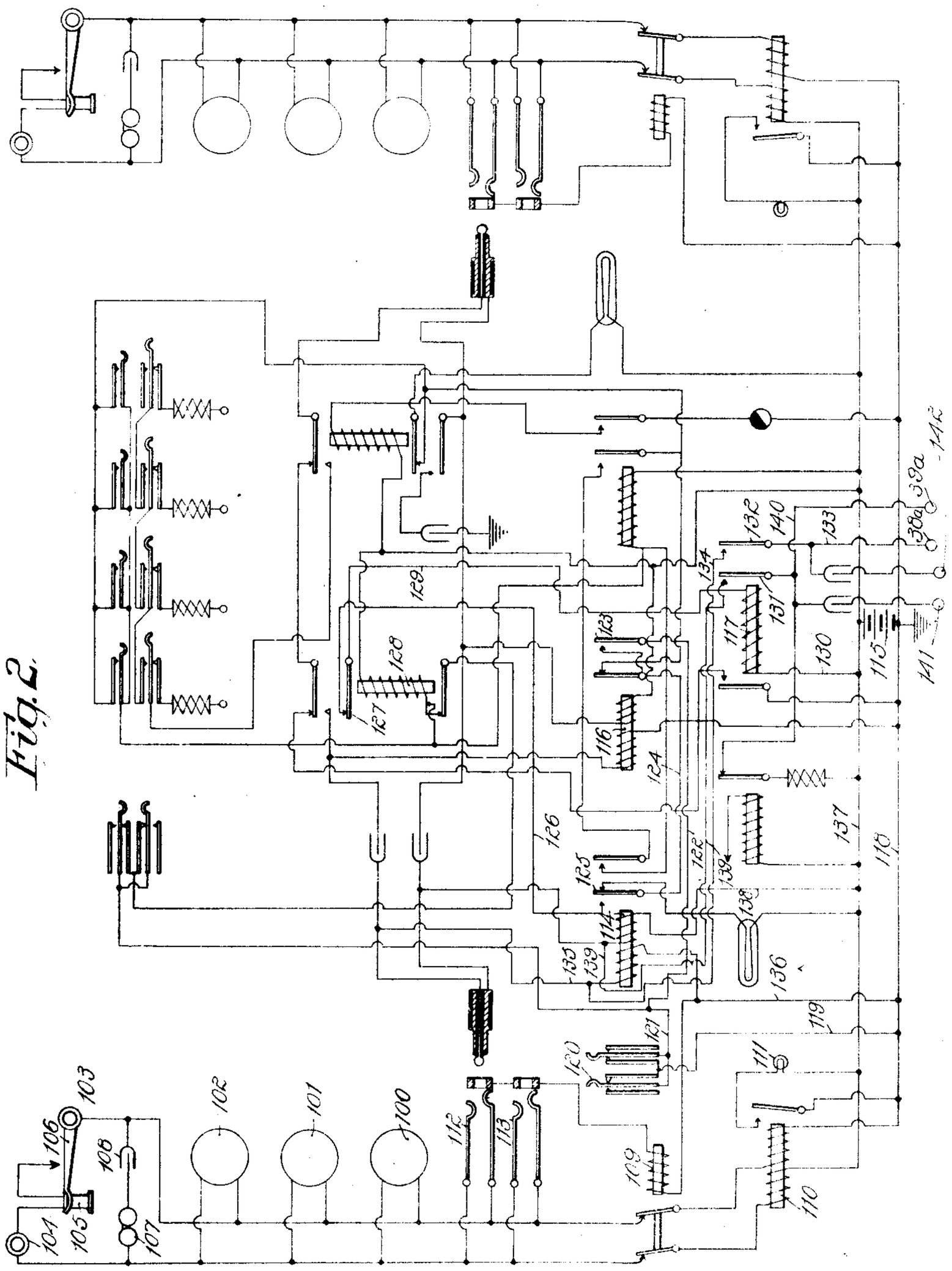
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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MANUAL-CALL-DISTRIBUTING SYSTEM.

1,100,749. Specification of Letters Patent. Patented June 23, 1914.

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To all whom it may concern:

Be it known that I, JOHN H. LEVIS, Jr., 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 Manual-Call-Distributing 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 system for use in telephone exchanges by which a call operator may answer all incoming calls at an exchange and distribute the calls manually to idle operators without requiring the operators to answer any signals thus given by the call operator. The connection extended by call operator is picked up by the connecting operator, who connects her operator's set and asks for the connection desired, the connection of the connecting operator's cord pair being made in multiple, both at the answering and calling ends of the cord pair involved. The calling of the desired subscriber is effected in the same way as is done commonly in connection with the practice in manual exchanges.

The several drawings illustrating my invention are as follows:

Figure 1 shows in a diagrammatic circuit drawing the apparatus and connections employed for permitting the call distributing operator to control the calling of the connecting operators. Fig. 2 shows in a similar diagrammatic drawing two line circuits and a cord circuit employed in connection with the call distributing system.

Similar numerals refer to similar parts throughout the several views.

As shown in Fig. 1, a plurality of relays 1, 3, 5 and 7 are employed for controlling, by their actuation, the connection of the call distributing operator's telephone set with desired ones of the operator's sets of the connecting operators. The relays 1, 3, 5 and 7 have associated with them, respectively, the relays 2, 4, 6 and 8, which, when actuated as described, serve to bar the corresponding connecting operators from connection by the call distributing apparatus.

It will be understood that the signaling mechanism usually employed in connection with the line circuits of a manually operated telephone system are employed in carrying on my invention with the difference that these line signals, instead of being placed before the connecting operators are all grouped before the call distributing operator, but that the call distributing operator has nothing whatever to do with the circuit connections extending to these signals, as the result of which the signals are not particularly shown in Fig. 1, it being understood that these signals, which are described in Fig. 2, are grouped as described, instead of in front of the connecting operator's positions.

In addition to the relays referred to in Fig. 1, a master-selecting relay 9 is employed and a common release relay 10. There are also shown in connection with Fig. 1; a counter or meter magnet 11 for actuating the counter or meter 12 to show the number of calls, and a meter release relay 13. An automatic barring relay 14 is also employed for a purpose to be described.

The apparatus referred to above may be operated in the following manner: The call distributing operator is provided with an ordinary circuit closing key 15, which she depresses when a line signal in front of her position is operated. The actuation of the key 15 closes a circuit as follows: battery 16, ground 17 to ground 18, wire 19, wire 20, wire 21, key 15, wire 22, wire 23, wire 24, energizing winding of the relay 9, wire 25, wire 26, wire 27, back to battery 16. This relay by its operation closes the energizing circuit of relay 1 as follows: battery 16, ground 17, ground 28, armature 29 of relay 9, wire 30, armature 31 of relay 2, wire 32, barring switch 33, wire 34, energizing winding of relay 1, wire 35, wire 27, back to battery 16. The energization of the relay 1 attracts its armatures 36 and 37 and closes a circuit between the terminals 38 and 39, as follows: terminal 38, armature 36, wire 40, to operator's induction coil 41 and returning by wire 42 to armature 37 to terminal 39. The terminals 38 and 39 are connected with the operator's telephone set at the first position to be controlled by the key 15. The operator's induction coil 41 is connected in circuit with the terminals 43 and 44, as indicated, through the operator's transmitter

45, by the following circuit: terminal 43, impedance coil 46, wire 47, transmitter 45, wire 48, secondary winding of operator's induction coil 41, wire 49, impedance coil 50, to terminal 44. Thus, as the condenser 51 is connected across the terminals of the impedance coils 46 and 50, the operator's telephone receiver may be connected across the terminals 43 and 44 and the distributing operator is thus placed in communication with the terminals 38 and 39 and, therefore, in talking communication with the operator's set at the position selected by the operation of the relay 1. At the same time, the signal lamp 52, located at the call distributing board, is lighted over the following circuit: Current is supplied to the wire 34 over the path above traced and flows in parallel with the energizing winding of the relay 1 through the signal lamp 52 to wire 53 to wire 27 and thus back to battery 16. This indicates to the call distributing operator the position selected. A similar lamp 54 is similarly connected, the only difference being that this lamp is preferably located at the chief operator's desk to indicate to him the operation of the distribution of the calls by the call distributing operator. The energization of the relay 1 also attracts its armature 55, energizing the relay 2 over the following circuit: battery 16, ground 17, ground 56, armature 57 of relay 14, wire 58, armature 55, wire 59, energizing winding of relay 2, wire 60, wire 27, battery 16, to ground 17. This circuit serves to retain the barring relay 2 in its energizing position as long as the armature 63 is in its deënergized position. For the energized condition of the relay 2, the armature 31 is moved to its front contact, which serves to connect the wire 30 with the energizing winding of the relay 3 instead of with the energizing winding of the relay 1, at the same time interrupting connection between the wire 30 and the wire 32, as a result of which the relay 1 cannot again be energized as long as the relay 2 is energized. The connection of the energizing winding 3 at this time may be traced over the following circuit, which becomes operative for a subsequent actuation of the key 15: battery 16, ground 17, ground 28, armature 29, wire 30, armature 31, wire 65, armature 66, of relay 4, wire 67, barring switch 68, wire 69, energizing winding of relay 3, wire 70, wire 27, back to battery 16. In the same manner, the energization of each one of the relays 2, 4 and 6 prevents the energizing of the corresponding selecting relay 1, 3 and 5 and causes the next selecting impulse sent by the key 15 to energize the relay 3, 5, or 7, as the case may be.

In actuating the relay 1 to select the corresponding connecting operator the selecting operator retains the key 15 in depressed position long enough to instruct the connecting operator as to the subscriber that is calling. The lamp signal 52 at this time is illuminated and stays in this condition until the relay 2 is energized. The relay 2 is energized by the insertion of the answering plug by the connecting operator into the designated jack in her multiple switchboard, which, as will be described, energizes the relay 14 and thus completes the energizing circuit of the relay 2. When the relay 2 is energized and pulls up its armature 31, the energizing circuit through the relay 1 is broken, thereby extinguishing the lamp 52 and indicating to the selecting operator that the connecting operator has responded to her order. The key 15 is thus released, which deënergizes the relay 9. The deënergization of the relay 1 also deënergizes the relay 14, as its operating circuit is completed through the wire 42, as traced above, and the armature 37 of said relay winding, to the selected connecting operator's circuit. When the next call comes in on the board in front of the selecting operator, she again depresses her key 15 and the relay 9 is operated as before, with the same results, except that on account of the change of the energizing circuit by the barring relay 2, the selecting relay 3 is energized instead of the selecting relay 1. The energization of the selecting relay 3 connects the terminals 71 and 72 of the second connecting operator's telephone set with the telephone set of the selecting operator in the same manner as described above for the terminals 38 and 39, since the aramtures controlled by the relay 3 which connect with the terminals 71 and 72 are connected with the wires 40 and 42, as will at once appear. The energization of the relay 3 actuates the associated barring relay 4 with the same results, as far as the relay 3 is concerned, as described above for the relay 1, when its barring relay 2 is energized. The selecting relay 3 has associated with it signal lamps 73 and 74, operating in the same manner as the signal lamps 52 and 54 above described. Similar circuit connections are employed for the selecting relays 5 and 7, each of which serves to connect its own pair of terminals of connecting operator's telephone circuit with the operator's set of the connecting operator in the manner above described.

The energization of the relay 7 operates its barring relay 8 in the manner above described for the other selecting relays, the energization of the relay 8, in addition to opening the energizing circuit of the relay 7 and thus temporarily barring said relay from operation, closes the energizing circuit of the common release relay 10 as follows: battery 16, ground 17, ground 75, armature 76 of relay 8, wire 77, energizing winding of release relay 10, wire 78, wire 25, wire 26, wire 27, back to battery 16. This energiza-

tion of the relay 10 moves the armature 63 from connection with the wire 64, thus opening the energizing circuits of all of the barring relays 2, 4 and 6, as a result of which the next operation of the key 15 will energize the relay 1 in the manner above described.

Each energization of the relay 9 energizes the meter actuating relay 13, which preferably is of a construction such as to produce a sluggish operation of the armature of said relay. The energizing circuit is closed as follows: battery 16, ground 17, ground 79, armature 80 of relay 9, wire 81, energizing winding of relay 13, wire 82, wire 25, wire 26, wire 27, back to battery 16. When the relay 9 is subsequently deënergized, its armature 29 will rest against its back contact before the armature of the relay 13 has left its front contact, owing to the sluggish operation of the latter relay. The energizing circuit of the meter magnet 11 will thus be closed as follows: ground 79, armature 80, wire 83, armature 84 of relay 13, wire 85, energizing winding of meter magnet 11, wire 86, wire 27, back to battery 16. Thus, the meter 12 is actuated once for each energization and deënergization of the relay 9 or, in other words, for each completed connection made by one of the connecting operators.

In connection with the mechanism before the selecting operator, a key 87 is provided which when depressed serves to signal an additional operator that help is wanted, the actuation of this key serving to close the energizing circuit of a relay as follows: battery 16, ground 17, ground 18, wire 19, wire 20, wire 88, key 87, wire 89, energizing winding of relay 90, wire 91, wire 25, wire 26, wire 86, wire 27, back to battery 16. The armatures of the relay 90 are thus attracted and connect the terminals 92 and 93 of an extra operator's telephone set with the telephone set of the selecting operator.

Referring to Fig. 2, it will be noted that two subscribers' lines are indicated which, in the embodiment shown consist each of a four-party line having substations 100, 101, 102 and 103. The apparatus for one substation only is shown consisting of the usual transmitter 104, receiver 105, hook switch 106, ringer 107 and condenser 108. These are connected by line wires in the usual manner with the armatures of a cut-off relay 109, and the line is also provided with a line signal relay 110, serving to actuate in a manner well-known in the art the line signal 111. Multiple jacks 112 and 113 are also shown connected to the line. The other line shown in Fig. 2 is identical with that described in detail above and particular reference thereto is not necessary. The cord circuit shown for coöperation with the line circuits to connect them for conversation is of a kind well-known in the art in which four-party selective machine ringing is employed.

The cord circuit shown in the present application contains an addition to the features usually found in such a cord circuit in devices for automatically connecting the connecting operator with the selecting operator referred to in connection with Fig. 1.

In the cord circuit shown in Fig. 2, the signaling relay 114 is provided with two windings, one terminal of each being connected with one of the cord strands of the operator's cord pair shown in the drawings, the other terminals of these windings being connected with the positive and negative sides of the battery 115 used to supply current to the cord pair and through the cord pair to the connected telephone lines for conversation purposes. While the battery 115 is shown as a battery separate from the battery 16 of Fig. 1, it will be understood that these two may be the same battery if desired, since the selecting operator's circuits are located invariably in close proximity to the circuits of the connectng operators controlled by the selecting operator. The cord pair shown in Fig. 2 is also provided with a signaling relay 116, having two windings, the terminals of which are connected with the cord strands of the calling end of the cord pair, the other terminals of these windings being connected with the opposite terminals of the battery 115, as indicated. When the connection between the calling subscriber and the called subscriber is completed by means of the cord pair shown in Fig. 2, it will be understood that the cut-off relays connecting with the calling and called lines are operated and that the lines are supplied with current through the relays 114 and 116, since the switch hooks at the calling and called substations are at this time closed, affording a conductive path over the line for the current flow. The energization of the relays 114 and 116 closes the energizing circuit of the barring controlling relay 117, as follows: battery 115, wire 118, wire 119, plug switch 120, wire 121, wire 122, armature 123 of relay 116, wire 124, armature 125 of relay 114, wire 126, armature 127 of relay 128, wire 129, energizing winding of relay 117, wire 130, back to battery 115. The armatures 131 and 132 are thus attracted and include the terminals 38^a and 39^a in a closed circuit through the battery 115 as follows: terminal 38^a, wire 133, armature 132, wire 134, wire 135, energizing winding of relay 114, wire 136, wire 118, battery 115, wire 137, wire 138, the second energizing winding of relay 114, wire 139, armature 131 wire 140, terminal 39^a. The terminals 38^a and 39^a are in connection with the terminals 38 and 39, respectively, shown in Fig. 1, as a result of which, when the armature 1 is energized and the relay 117 is energized, the barring

relay 14 is energized over the circuit traced above.

From the circuit connections above traced, it will be observed that the energization of the relay 117 depends upon the energization of the relays 114 and 116 and also upon the relay 128 being in its deënergized condition, which is the case during the talking condition of the cord pair. Furthermore, this energizing circuit depends also upon the plug switch 120 being in the condition indicated in the drawings, which is the one as a result of which, by operating the plug switch, the control of the barring relay 14 by the operation of the relays 114 and 116 is interrupted.

The terminals 141 and 142 connect with the operator's telephone set of the cord pair shown in Fig. 2 and, thus, the connecting operator is in communication with the selecting operator as soon as the relay 1 is energized. It will be understood that the connections shown in Fig. 2 extend to all of the cord pairs of that position, so that the operator in charge of that position is connected with by the energization of the relay 1 and that the operation of any one of the relays 117 connected with these cord pair will control the actuation of the barring relay 14. Furthermore, it will be understood that the other terminals controlled by the relays 3, 5 and 7 are similarly connected with different groups of cord pair, each group being in charge of a different operator, so that the operators may be signaled successively by the selecting operator as the calls come in on the signal-board at the selecting operator's position. It will further be understood that the barring switches associated with the relays 1, 3, 5 and 7 provide a means by which any operator's position may be permanently barred from operation by the selecting operator, as, for example, when the operator is not at her position.

While I have shown my invention in the particular embodiments above described, I do not, however, limit myself to these constructions as I may employ equivalent devices for carrying out my invention.

What I claim is:

1. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an operating switch for the selecting relays, and devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch.

2. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, and circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay to prevent a second actuation of said selecting relay until the deënergization of said barring relay.

3. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, and circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay, and the actuation of said barring relay causing the next actuation of the operating key to actuate the next selecting relay.

4. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, and an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays.

5. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent the actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays, and switching mechanism for removing a desired one of the series of selecting relays from its series without interfering with the operation of the remaining selecting relays.

6. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an operating switch for the selecting relay, devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch, an operator's telephone associated with the operating switch, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay.

7. In a telephone system, the combination

of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay to prevent a second actuation of said selecting relay until the deënergization of said bearing relay, an operator's telephone associated with the operating switch, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay.

8. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay, the actuation of said barring relay causing the next actuation of the operating key to actuate the next selecting relay, an operator's telephone associated with the operating switch, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay.

9. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays, an operator's telephone associated with the operating switch, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay.

10. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays, switching mechanism for removing a desired one of the series of selecting relays from its series without interfering with the operation of the remaining selecting relays, an operator's telephone associated with the operating switch, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay.

11. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an operating switch for the selecting relays, devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch, and signal mechanism for indicating the operation of the selecting relays.

12. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay to prevent a second actuation of said selecting relay until the deënergization of said barring relay, and signaling mechanism for indicating the operation of the selecting and barring relays.

13. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay, the actuation of said barring relay causing the next actuation of the operating key to actuate the next selecting relay, and signaling mechanism for indicating the operation of the selecting and barring relays.

14. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting

relays, and signaling mechanism for indicating the operation of the selecting and barring relays.

15. In a telephone system, the combination of a plurality of operator's positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays, switching mechanism for removing a desired one of the series of selecting relays from its series without interfering with the operation of the remaining selecting relays, and signaling mechanism for indicating the operation of the selecting and barring relays.

16. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, and an operating switch at the selecting operator's position for successively actuating the selecting relays, the actuation of each selecting relay causing the operation of the associated barring relay to prevent subsequent actuation of said selecting relay during the actuated condition of said barring relay.

17. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, a master selecting relay, an operating switch associated with the selecting operator's position for actuating said master relay, the successive actuations of said master relay serving to successively operate said selecting relays, actuation of each selecting relay operating the associated barring relay to prevent subsequent operation of said selecting relay while the barring relay is actuated.

18. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, an operating switch associated with the selecting operator's position for successively actuating the selecting relays, a common barring relay, circuit connections extending from said common barring relay to each of the connecting operator's positions, switching mechanism at each connecting operator's position actuated by the connection of lines at said position by one of said cord circuits, an operating switch associated with the selecting operator's position for successively operating the selecting relays, and circuit connections extending from the common barring relay and the selecting relays to the associated barring relays for actuating the barring relay associated with an actuated selecting relay to prevent the subsequent actuation of said selecting relay while the corresponding barring relay is in operated condition.

19. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, an operating switch associated with the selecting operator's position for successively actuating the selecting relays, a common barring relay, circuit connections extending from said common barring relay to each of the connecting operator's positions, switching mechanism at each connecting operator's position actuated by the connection of lines at said position by one of said cord circuits, a master selecting relay, an operating switch associated with the selecting operator's position for repeatedly actuating said master relay, the successive actuation of said master relay serving to successively energize said selecting relays, and circuit connections extending from said selecting relays to said barring relays for actuating a barring relay by the actuation of the corresponding selecting relay to prevent the subsequent operation of said selecting relay while the corresponding barring relay is in operated condition.

20. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an op-

erating switch for the selecting relays, devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch, and a counter for registering the number of selections effected.

21. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an operating switch for the selecting relay, devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch, an operator's telephone associated with the operating switch, devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay, and a counter for registering the number of selections effected.

22. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, an operating switch at the selecting operator's position for successively actuating the selecting relays, the actuation of each selecting relay causing the operation of the associated barring relay to prevent subsequent actuation of said selecting relay during the actuated condition of said barring relay, and a counter for registering the number of selections effected.

23. In a telephone system, a selecting operator's position, a plurality of line signals associated with said selecting operator's position, a plurality of connecting operators' positions, multiple line jacks associated with each connecting operator's position, cord circuits at each connecting operator's position for connecting desired ones of the line jacks for conversation, a selecting relay for each connecting operator's position, a barring relay for each connecting operator's position, a master selecting relay, an operating switch associated with the selecting operator's position for actuating said master relay, the successive actuations of said master relay serving to successively operate said selecting relays, actuation of each selecting relay operating the associated barring relay to prevent subsequent operation of said selecting relay while the barring relay is actuated, a slow-acting relay having an energizing circuit controlled by the operation of said master relay, and an electromagnetic counter controlled by the joint operation of said master relay and said slow-acting relay to indicate the number of selections effected.

24. In a telephone system, the combination of a plurality of connecting operators' positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, and switching mechanism associated with each operator's position for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position.

25. In a telephone system, the combination of a plurality of connecting operators' positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, and electromagnetic switching mechanism associated with each operator's position for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position.

26. In a telephone system, the combination of a plurality of connecting operators' positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, and relay mechanism connected with the circuits at each of said positions for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position.

27. In a telephone system, the combination of a plurality of connecting operators' positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, switching mechanism associated with each operator's position for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position, an operator's telephone set at each connecting operator's position, a selecting operator's position, a switching mechanism associated with the selecting operator's position for actuating the selecting mechanism, and circuit connections extending from the selecting mechanism to the connecting operators' telephone sets and the selecting operator's telephone set for selectively connecting the connecting operators' telephone sets with the selecting operator's telephone set.

28. In a telephone system, the combination of a plurality of connecting operators'

positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, electromagnetic switching mechanism associated with each operator's position for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position, an operator's telephone set at each connecting operator's position, a selecting operator's position, a switching mechanism associated with the selecting operator's position for actuating the selecting mechanism, and circuit connections extending from the selecting mechanism to the connecting operators' telephone sets and the selecting operator's telephone set for selectively connecting the connecting operators' telephone sets with the selecting operator's telephone set.

29. In a telephone system, the combination of a plurality of connecting operators' positions, cord circuits associated with each position, selecting mechanism for successively selecting said positions, barring mechanism for each position for preventing the operation of the selecting mechanism for the corresponding position, relay mechanism connected with the circuits at each of said positions for controlling the operation of the corresponding barring mechanism by the connection of one of the cord circuits at said position, an operator's telephone set at each connecting operator's position, a selecting operator's position, a switching mechanism associated with the selecting operator's position for actuating the selecting mechanism, and circuit connections extending from the selecting mechanism to the connecting operators' telephone sets and the selecting operator's telephone set for selectively connecting the connecting operators' telephone sets with the selecting operator's telephone set.

30. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, an operating switch for the selecting relays, devices actuated by the operating switch for successively actuating said relays for successive actuations of said switch, an operator's telephone associated with the operating switch, devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay, an auxiliary switch associated with the operating switch, and circuit connections extending from said auxiliary switch to an additional operator's telephone set to connect the said additional telephone set with the telephone set associated with the operating switch when desired.

31. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay to prevent a second actuation of said selecting relay until the deënergization of said barring relay, an operator's telephone associated with the actuating key, devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay, an auxiliary switch associated with the actuating key, and circuit connections extending from said auxiliary switch to an additional operator's telephone set to connect the said additional telephone set with the telephone set associated with the actuating key when desired.

32. In a telephone system the combination of a plurality of operators positions, an operator's telephone set at each position, a selecting relay for each position, a barring relay for each position, an actuating key, circuit connections controlled by the actuating key for successively actuating the selecting relays, the actuation of a selecting relay serving to actuate the corresponding barring relay, the actuation of said barring relay causing the next actuation of the actuating key to actuate the next selecting relay, an operator's telephone associated with the actuating key, and devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay, an auxiliary switch associated with the actuating key, and circuit connections extending from said auxiliary switch to an additional operator's telephone set to connect the said additional telephone set with the telephone set associated with the actuating key when desired.

33. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays an operator's telephone associated with the operating key, devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated se-

lecting relay, an auxiliary switch associated with the operating key, and circuit connections extending from said auxiliary switch to an additional operator's telephone set to connect the said additional telephone set with the telephone set associated with the operating key when desired.

34. In a telephone system, the combination of a plurality of operators' positions, an operator's telephone set at each position, a series of selecting relays one for each operator's position, a series of barring relays one for each selecting relay, an operating key for actuating the selecting relays, the actuation of a selecting relay causing the operation of the corresponding barring relay to prevent actuation of said selecting relay during the operative condition of the barring relay and to cause the next actuation of the operating key to actuate the next one in the series of selecting relays, switching mechanism for removing a desired one of the series of selecting relays from its series without interfering with the operation of the remaining selecting relays, an operator's telephone associated with the operating key, devices for connecting the last-named operator's telephone with the telephone at the position corresponding to the operated selecting relay, an auxiliary switch associated with the operating key, and circuit connections extending from said auxiliary switch to an additional operator's telephone set to connect the said additional telephone set with the telephone set associated with the operating key when desired.

In witness whereof, I hereunto subscribe my name this 24th day of December, A. D. 1913.

JOHN H. LEVIS, JR.

Witnesses:
E. A. REINKE,
W. T. EASTWOOD.