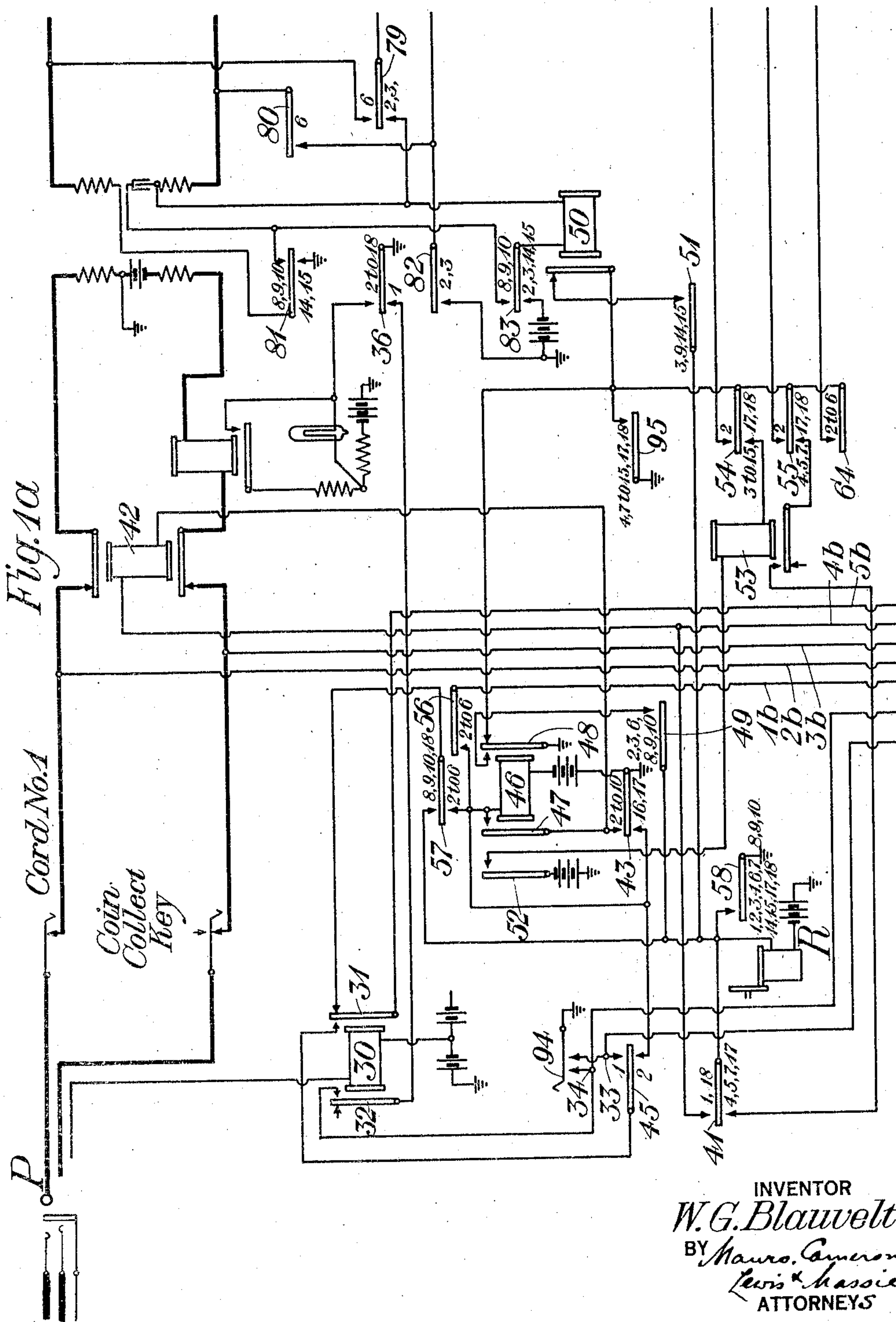


W. G. BLAUVELT.
SEMIMECHANICAL TELEPHONE SYSTEM.
APPLICATION FILED APR. 11, 1917.

1,362,596.

Patented Dec. 21, 1920.

5 SHEETS—SHEET 1.



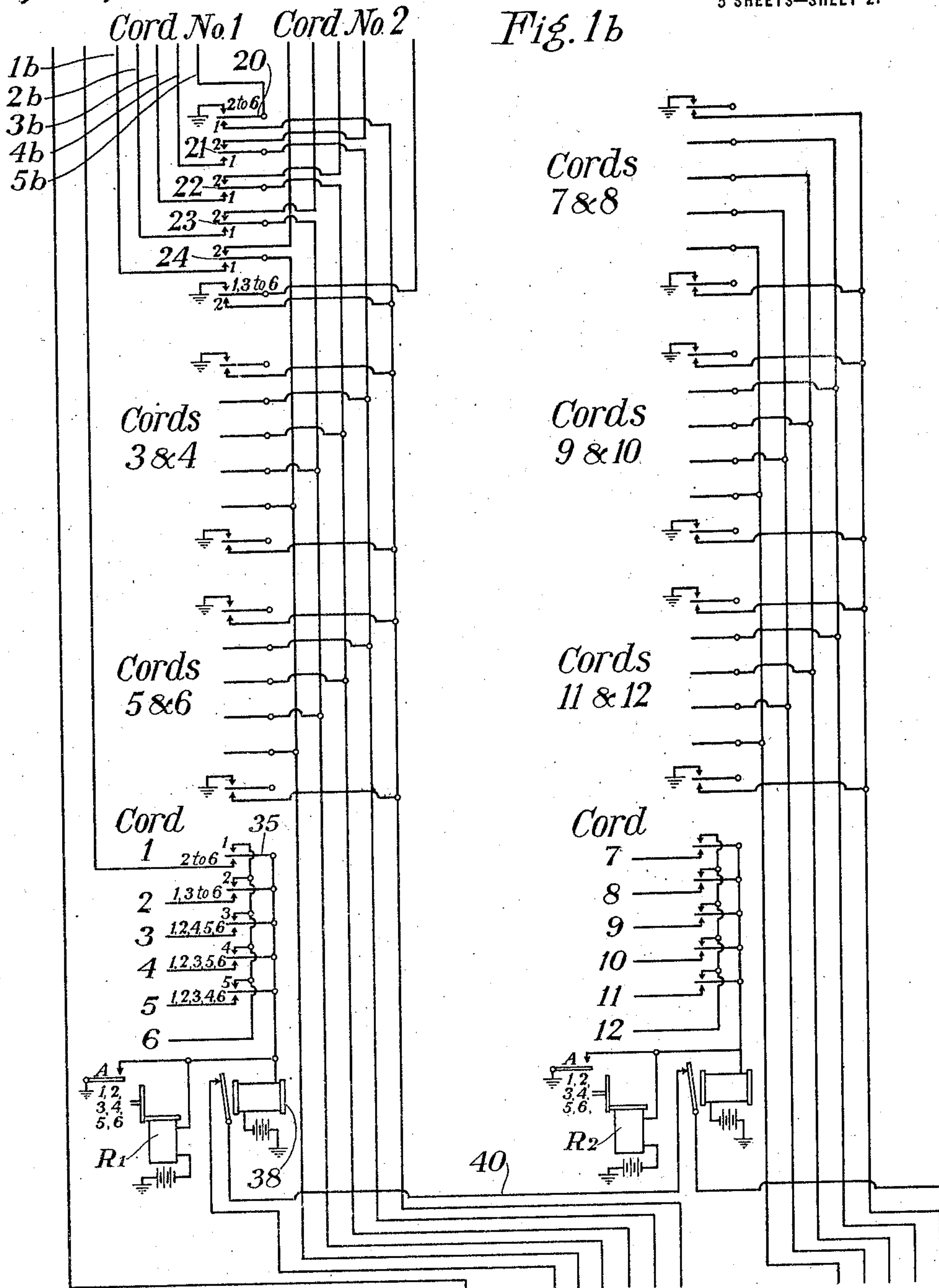
W. G. BLAUVELT.
SEMIMECHANICAL TELEPHONE SYSTEM.
APPLICATION FILED APR. 11, 1917.

Patented Dec. 21, 1920.

5 SHEETS—SHEET 2.

1,362,596.

Fig. 1b



Inventor :
W. G. Blauvelt
per Mauro. Cameron. Lewis & Hassie.
Attorneys

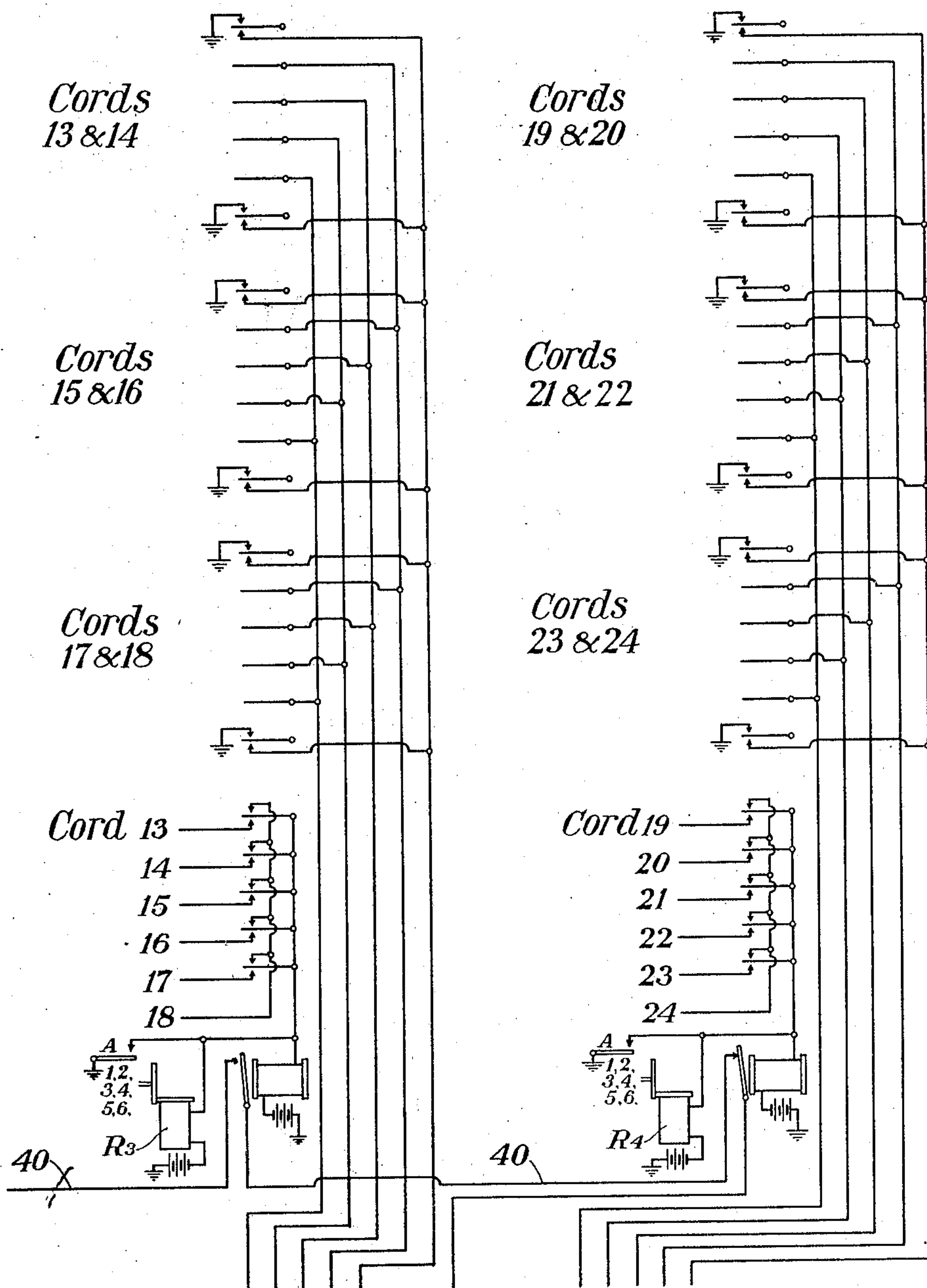
W. G. BLAUVELT.
SEMIMECHANICAL TELEPHONE SYSTEM.
APPLICATION FILED APR. 11, 1917.

1,362,596.

Patented Dec. 21, 1920.

5 SHEETS—SHEET 3.

Fig. 1c



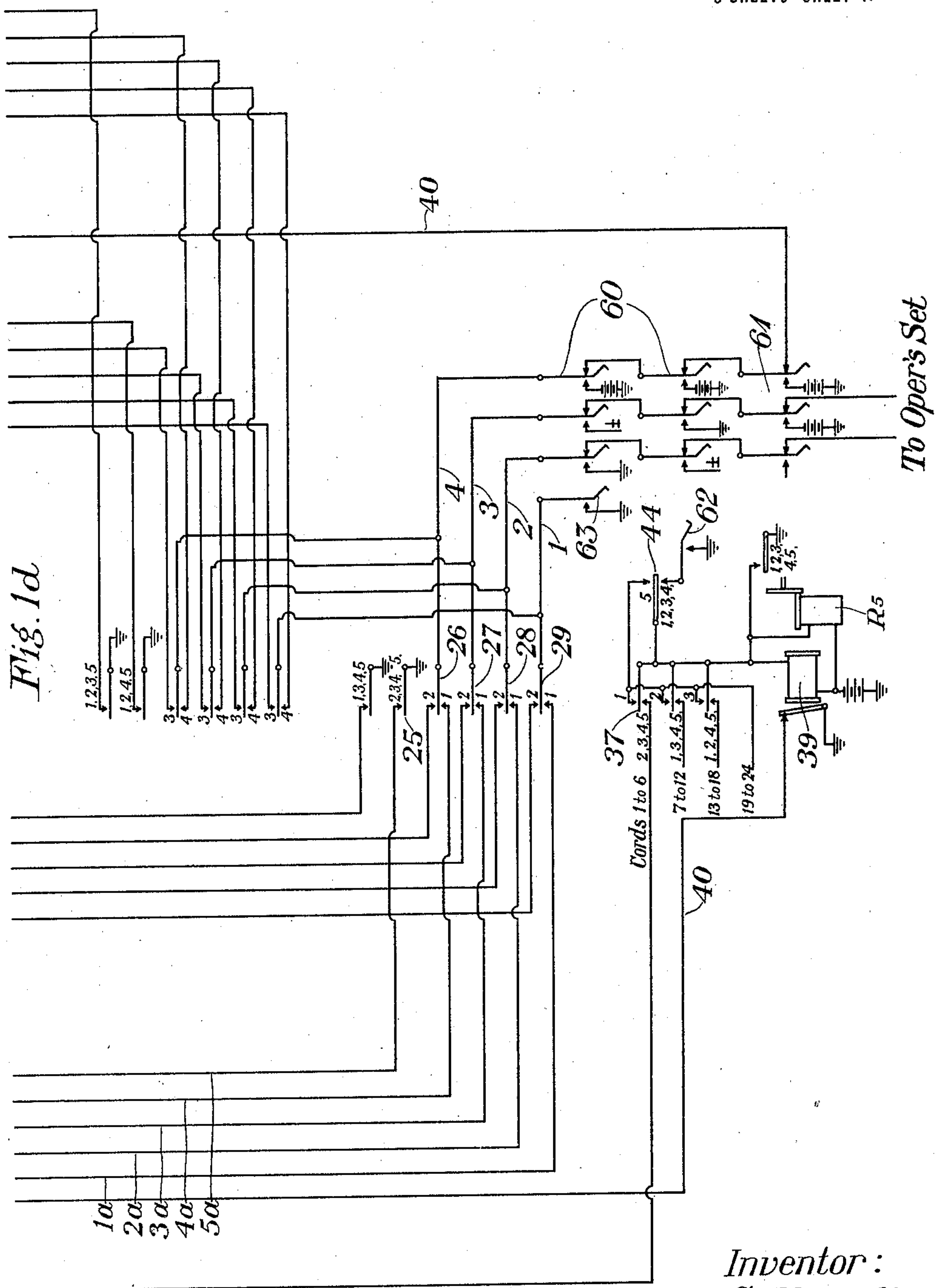
Inventor:
W. G. Blauvelt
per *hauro. Cameron Lewis*
hassie.
Attorneys

W. G. BLAUVELT.
SEMIMECHANICAL TELEPHONE SYSTEM.
APPLICATION FILED APR. 11, 1917.

Patented Dec. 21, 1920.

5 SHEETS—SHEET 4.

1,362,596.



Inventor:
W. G. Blauvelt
per Mauro, Cameron, Lewis &
Hassie
Attorneys

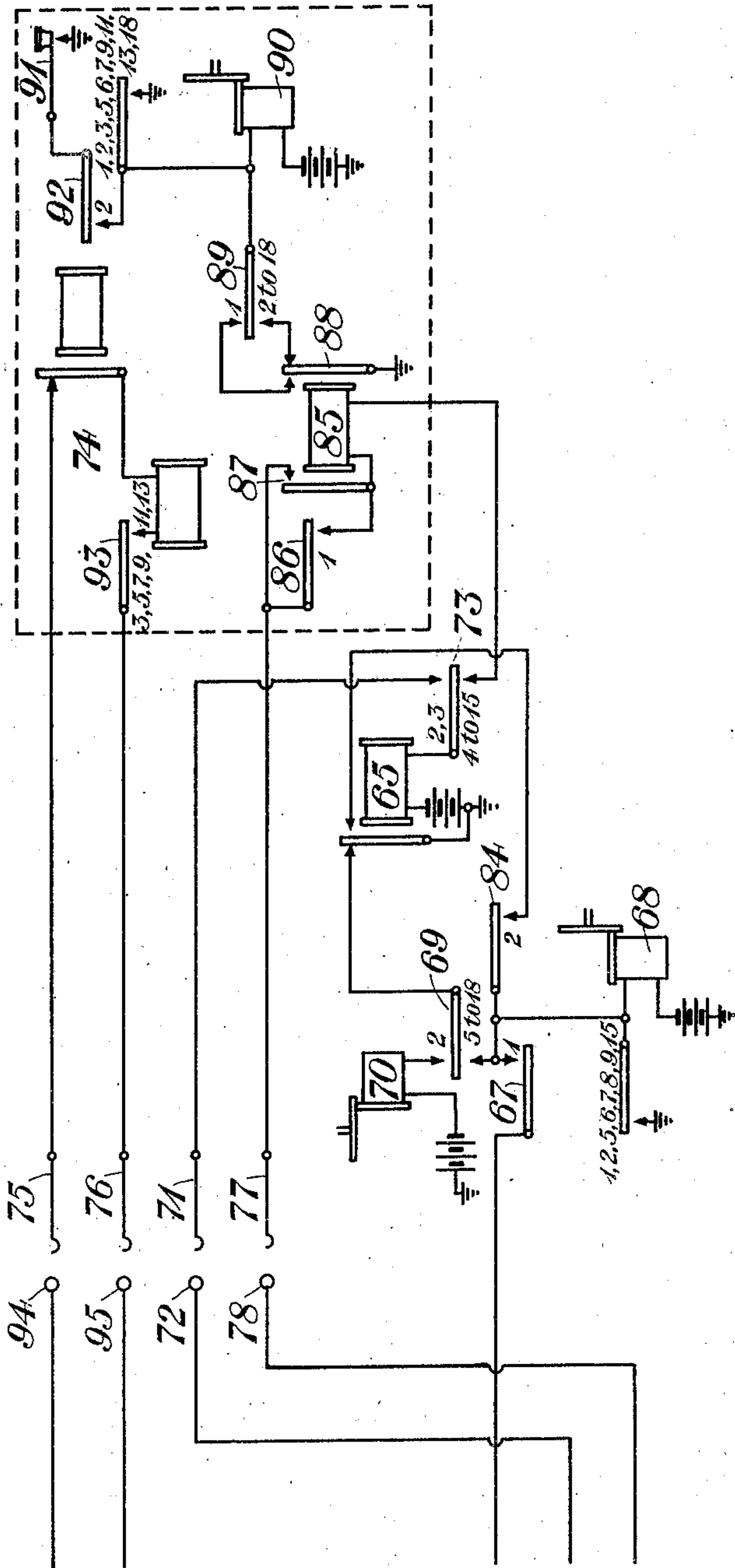
W. G. BLAUVELT.
SEMIMECHANICAL TELEPHONE SYSTEM.
APPLICATION FILED APR. 11, 1917.

1,362,596.

Patented Dec. 21, 1920.

5 SHEETS—SHEET 5.

Fig. 1e



INVENTOR
W. G. Blauvelt
BY
Lawrence Cameron Lewis & Massie
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM G. BLAUVELT, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

SEMIMECHANICAL TELEPHONE SYSTEM.

1,362,596.

Specification of Letters Patent.

Patented Dec. 21, 1920.

Application filed April 11, 1917. Serial No. 161,277.

To all whom it may concern:

Be it known that I, WILLIAM G. BLAUVELT, residing at New York, in the county of New York and State of New York, have
5 invented certain Improvements in Semi-mechanical Telephone Systems, of which the following is a specification.

This invention relates to semi-automatic telephone systems and more particularly
10 concerns the provision of means whereby when an operator answers a call by inserting the plug of an idle cord circuit into the jack of the calling subscriber, the operator's talking set and associated apparatus will be
15 automatically connected with that particular cord circuit.

It is one of the objects of this invention to provide means whereby the time necessary to effect this operation shall be reduced to a
20 minimum, and the apparatus utilized therefor shall be simple in construction and efficient in operation. In constructions heretofore used, where an operator has at her disposal a large number of cord circuits to each
25 of which she must be able to connect her listening apparatus, in order to effect such connections, it has been proposed to provide a one-motion switch which rotates the terminals of the talking set into connection with
30 the terminals leading to any one of the cord circuits which, in a given case, might necessitate the switch taking as many steps as there were cord circuits, the switch being
35 provided with positions for each cord circuit. By the present invention, the time for making the connection is reduced by arranging the cord circuits in groups of a small number, with a switch for each group to select a particular cord circuit in the group,
40 and providing a simultaneously operating switch common to the groups, to select the particular group and connect the operator's set to the terminals of the group. Suppose for instance there are twenty-four cord circuits, divided into four groups of six each. Four switches, preferably of the sequence switch type shown for instance in U. S. Patent to McBerty 1105811, August 4, 1914, or patent to Reynolds *et al.*, 1127808, February
45 9, 1915, would be provided each having six positions, one position for each cord circuit of the group to which the switch is assigned. An additional switch of the same type would be provided, common to the other four, and

having five positions, one for each of the
55 first four switches and a fifth or listening out position in which the operator's set would be connected to no cord circuit. When a cord in any group is used in answering a call, as soon as the operator plugs in, the switch of
60 that group begins to seek that particular cord, and simultaneously the common switch seeks the group switch. At the most, this operation will involve only the time necessary for one of the switches to make six
65 steps, which would be approximately one-third of a second.

The invention may be more fully understood by reference to the drawing in which
70 Figures 1^a, 1^b, 1^c, 1^d and 1^e when arranged so that Figs. 1^b and 1^c are side by side, with Fig. 1^d arranged horizontally beneath them, and Fig. 1^a and 1^e horizontally above them, illustrate such portions of the circuits as
75 are necessary to understand the invention.

The apparatus illustrated in the several sheets which taken together constitute Fig. 1 of the drawing comprises essentially four cord-selecting switch structures of the sequence switch type under the control of
80 motor magnets R_1 , R_2 , R_3 and R_4 and each comprising three sets of contacts such as 20 to 24 inclusive, whereby a set of conductors 1^a, 2^a, 3^a, 4^a and 5^a may be switched into connection with any one of six sets of leads 1^b,
85 2^b, 3^b, 4^b and 5^b corresponding to one of six cord circuits, the cord circuit selected depending upon which one of six positions the switch assumes. The switch has no normal position but may rest with its contacts in
90 position to select any one of the six cord circuits. Another switch of the same general type, and under the control of motor magnet R_5 , is provided with two sets of contacts such as 26 to 29 inclusive which operate to switch leads 1, 2, 3 and 4 from the operator's talking set into connection with one of four sets of leads 1^a, 2^a, 3^a, 4^a extending
95 to the four switches controlled by magnets R_1 , R_2 , R_3 and R_4 . This switch has five positions, four of which are utilized in selecting one of the four cord selecting switches, and the fifth of which is a listening out position in which the talking set is disconnected from all of the cord circuits. This
100 switch has no normal position, but is ordinarily in the listening out position. All of the switches are provided with additional

controlling contacts the purpose of which will be clear from a detailed statement of the operation hereinafter given.

Associated with each cord circuit such as 5 shown in Fig. 1^a is a sequence switch under control of a motor magnet R. The contacts of this switch are not shown together upon the drawing, but are variously located in order to simplify the diagram. Only the sequence switch contacts shown in Fig. 1^a 10 are under the control of this sequence switch R. The function of this switch is to control the sequence of operation whereby the sender is selected and the sending operation 15 performed, but as these features have nothing to do with the present invention only such features of the operation of the district sequence switch R as are concerned with the present invention will be herein referred to. 20 But one cord circuit is shown in the diagram, it being understood that the other cord circuits are connected to the cord selecting switches by leads similar to 1^b to 5^b inclusive which are controlled by contacts as indicated 25 in Figs. 1^b and 1^c of the drawing.

With this general description in mind, the invention will be clear from a statement of the operation of the apparatus it being understood that for any cord circuit the 30 lead corresponding to lead 5^b is always grounded except when the operator is listening in. Thus the lead 5^b of the cord shown in Fig. 1^a is grounded in positions 2 to 6 of selecting switch R₁ over upper contact 20. Cord circuit #1 is selected in position 1 of this switch, in which position 35 lead 5^b is connected over lower contact 20 to conductor 5^a which is grounded over spring 25 in positions 2 to 5 of group selecting switch R₅. In the first position of this switch, which is the position in which the operator's set is connected to leads 1^a—4^a, contact 25 is open. Thus it will be 40 seen that only when switches R₁ and R₅ are both in the first position, will lead 5^b be ungrounded, the operator's set being connected to cord circuit #1 in this position.

The operation will now be described for cord circuit #1 it being understood that the 50 operation for the other cords will be similar.

Plugging in.

Assuming that in answer to a call the operator inserts the plug P of cord circuit 55 #1 into the jack of the calling line, relay 30 will be energized over the grounded third contact of the jack (not shown) and in closing its front contacts 31 and 32 will apply ground to a pair of terminals 33 and 60 34 connected to finders controlled by motor magnets R₁ and R₅. The circuit for R₁ is as follows assuming the switch controlled thereby to be in a position other than the first: 65

From battery through motor magnet R₁ over contact 35 to terminal 34, contact 32, sequence switch contact 36 in position 1 to ground.

The circuit for R₅ assuming this finder to 70 be in any position other than the first is as follows:

From battery, winding of motor magnet R₅, lower contact 37, terminal 33, sequence switch contact 45, contact 31 of relay 30, 75 lead 5^b upper contact 20 to ground if finder R₁ is not in position 1, but if it should happen to be in position 1, the circuit would continue over lower contact 20, lead 5^a, contact 25 to ground. 80

Upon the closure of these two circuits switches R₁ and R₅ rotate simultaneously to select the used cord circuit #1. As soon as R₁ reaches its first position the former circuit will be opened at contact 35 and the 85 switch will come to rest. If R₅ has not yet reached its first position the second circuit will be continued over lower contact 20 to ground instead of upper contact 20, and R₅ will continue to rotate until it reaches first 90 position, whereupon its circuit will be opened at contact 37 and the switch will come to rest, leads 1, 2, 3 and 4 being connected over contacts 26—29 of finder R₅ in 95 first position to leads 1^a to 4^a inclusive which in turn are connected over contacts 21—24 of finder R₁ to leads 1^b to 4^b of cord circuit #1.

At the same time the circuits for motor magnets R₁ and R₅ were closed, relays 38 100 and 39 in parallel thereto were energized and by means of their contacts held open a ground lead 40. These relays being both deenergized upon switches R₁ and R₅ coming to rest, ground lead 40 is closed and a 105 circuit is completed for sequence switch motor magnet R from battery, winding of said magnet, upper contact 41, lead 4^b, lower contact 21, lead 4^a, contact 26, lead 4 through the operator's keys to lead 40 and 110 serially through normally closed contacts of the relays associated with motor magnets R₁ to R₅ inclusive to ground, driving sequence switch R from position 1 to position 2, when a sender is associated with the cord 115 circuit as follows:

With sequence switch R in position 2 a circuit is closed from ground, over back contact of armature 48 of relay 46, upper sequence switch contact 54, sequence switch 120 contact 67, winding of motor magnet 68 to battery, driving the sequence switch controlled by said magnet to position 2. In this position a circuit is closed over the back contact of test relay 65 of the cord finder, 125 contact 69 and winding of the motor magnet 70 of the cord finder to battery. The cord finder is driven by motor magnet 70, until test wiper 71 rests on contact 72, whereupon the test relay 65 is energized 130

over a circuit from ground, back contact of armature 48, contact 55, contact 72, wiper 71, contact 73, winding of relay 65 to battery. Relay 65 opens the circuit of motor magnet 70 so that the finder comes to rest and a sender, conventionally indicated at 74 is associated with the cord over wipers 75 and 76. Test relay 65 at its front contact closes a circuit over contact 84 which drives the motor magnet 68 of the sequence switch out of position 2 into position 5, whereupon the sequence switch contact 73 is shifted to its lower position and test relay 65 is maintained energized over lower contact 73, winding of relay 85, contact 86 of the sender sequence switch, wiper 77, contact 78, contact 64, back contact of armature 48 to ground. Relay 85 is now energized and locks itself over contact 87 and at the front contact of armature 88 closes a circuit over contact 89 of the sender sequence switch, through the winding of the motor magnet 90 of said switch, driving the latter into position 2. The operator in setting up the call upon her keyboard closes a contact 91 which completes the energizing circuit of motor magnet 90 over contact 92, driving the sender sequence switch to position 3, whereupon contact 93 is closed so that the sender conventionally indicated at 74 is connected to the cord, and proceeds to operate the switching machinery (not shown) in accordance with the call set up on the keyboard.

The operator's talking set is now bridged across the cord circuit over conductors 2—3, lower contacts 27 and 28, 2^a—3^a, lower contacts 22 and 23, and 2^b—3^b, so that she can ascertain the number desired by the calling subscriber, and at the same time the ring back keys 60, the coin return key 61, the master listening out key 62 and master restoring key 63 become effective. Should the operator depress one of the ring back keys, battery would be applied over its right hand spring to conductor 4 and over contact 26, lead 4^a, contact 21, lead 4^b, cord cut-off relay 42, upper sequence spring 43 in position 2 to ground, while ringing current would be applied through the other two springs of the ring back key and over conductors 2—3 to the answering end of the cord circuit. Thus the answering end of the cord is cut off and ringing current applied thereover to ring out on the calling line. The operation of the coin return key is similar.

Use of master listening out key, sequence switch R not being in Position 2.

If the operator uses the master listening out key designated 62 in the position 2 of the district sequence switch R, a special sequence of operations will result which will be described later. If this key is depressed with the district sequence switch in any other position, a circuit is closed through

motor magnet R₅ over contact 44 and spring of key 62, and the latter being held closed, finder R₅ rotates into listening out position 5, in which the operator's set is disconnected from all of the cord circuits, and the circuit being now broken at contact 44 the switch comes to rest. Should the operator fail to operate the master listening out key, upon plugging another cord into a jack the switches operate as described under heading "Plugging in" to connect the operator's set to the latter cord, thus disconnecting it from the first cord.

Listening in by use of a listening in key.

Associated with each cord circuit is a listening key 94, (see Fig. 1^a). Should the operator desire to listen in on a connection in which the district sequence switch is in a position other than position 18, which will be described later, she presses the key 94 of the cord in question. This manually grounds the terminals 33 and 34 of the cord in question and starts the group finder R₅ and the cord finder R₁, R₂, R₃ or R₄ as the case may be, over circuits similar to those described in connection with energization of relay 30 upon plugging into a calling line, and the same sequence of operations results as already described, under the heading "Plugging in."

Listening out, sequence switch R being in Position 2.

If after answering a call the operator desires to leave the plug of the cord in the jack without completing a connection, as where a subscriber has forgotten the number desired and the operator wishes in the meantime to answer other calls, it is desirable that the sender should be released from that cord in order not to keep it idle uselessly, as would be the case if the district sequence switch R of the cord were permitted to remain in position 2. Therefore, with the district sequence switch in this position, should the operator listen out as described under heading "Use of master listening out key, R not being in Position 2," either by plugging in with another cord or by pressing the master listening out key 62, a ground is applied to lead 5^b at contact 25 or contact 20 and current flows from ground over lead 5^b, front contact 31 of relay 30, lower sequence switch contact 45, winding of relay 46 and battery to ground. Relay 46 is energized and locks itself over its contact 47 and sequence switch contact 43. This locking circuit is maintained from position 2 to position 10, so that relay 46 over its contact 48 and sequence switch contact 49 closes the energizing circuit of the motor magnet R to drive the switch controlled thereby to position 4. In position 4 relay 53 is energized over a circuit from battery, contact 52

of relay 46, relay 53, contact 54 to ground, thereby closing a circuit for R from battery, winding of R, lower contact 41, contact of relay 53, contact 55 to ground. The sequence switch is then driven to position 6 through position 5 under control of master contact 58, in which position the circuit over contact 48 of relay 46 drives it to position 7. In position 7 the circuit controlled by relay 53 drives the switch controlled by motor magnet R to position 8 from which it passes to position 14 under joint control of master contact 58 and contact 48 of relay 46. In position 14 a circuit for R is closed over the back contact of a relay 50 in the calling end of the cord circuit, sequence switch contact 51, winding of motor magnet R to battery, driving R into position 17. In position 17 relay 46 is energized by a circuit over lower contact 43, and closes a circuit from battery over its contact 52, winding of relay 53, contact 54 to ground. Relay 53 is therefore energized and closes a circuit for R from battery, winding of motor magnet R, lower contact 41, contact of relay 53, sequence switch contact 55 to ground, driving R into position 18. As soon as the sequence switch left position 6 the sender was released as follows: The leads to the sender are opened at contacts 79 and 80 and the holding circuit of relays 65 and 85 is opened at contact 64. Relay 65 in deenergizing, at its back contact closes a circuit over lower contact 69 for motor magnet 68 driving the cord finder sequence switch through position 18 into position 1. Relay 85 at the same time deenergizes and at the back contact of armature 88 closes a circuit for motor magnet 90 over lower contact 89 driving the sender sequence switch through position 18 to position 1 and restoring the sender to normal. Contact 93 of the sender is now open and although the wipers 75 and 76 of the finder are allowed to rest on the contacts 94 and 95 leading to the cord circuit, until such time as another cord is taken for use and a sender associated therewith, the sender is no longer associated with the cord by reason of the fact that contacts 79 and 80 were opened as the sequence switch R passed out of position 6.

Listening in, R being in 18.

If now the operator desired to return to a connection left in the condition just described, it is desirable that a sender be picked up again in order that the operator may set up a call. If, therefore, the operator pushes the listening key 94 individual to a cord, R being in position 18, ground is applied to terminals 33 and 34, causing the finders to hunt for the cord as already described. When the finders stop and ground lead 40 is closed, thereby applying ground to lead 4, a circuit for R is closed from

ground over leads 4, 4^a, 4^b upper sequence switch contact 41 closed in position 18, winding of motor magnet R to battery, driving R through position 1 into position 2 so that the listening set is connected to the cord and a sender is associated therewith in a manner already set forth.

Use of the master restoring key.

If, with the district sequence switch between positions 2 to 6 inclusive, the operator presses the master restoring key 63, she places a ground on lead #1 and a circuit for relay 46 is closed over leads 1, 1^a, 1^b, contact 56, winding of relay 46 to battery. Relay 46 is locked up and closes a circuit which drives R to position 18 in a manner already described under heading "Listening out, R being in 2." In position 18, the operator's set being at this time connected to the cord, lead 4^b is grounded over ground connection 40, and a circuit is closed over ground lead 4^b, upper sequence switch contact 41, motor magnet R to battery, driving R through position 1 into position 2. As R passed out of position 6 on its way to 18 the sender was released in a manner already described. In position 2 a sender is again associated with the cord as described under heading "Plugging in" and the apparatus is ready for setting up a call. The restoring key 63 is only effective in positions 2—6, as contact 56 is open in all other positions.

Withdrawing the plug while the operator's set is disconnected from the cord.

If while listening out the operator withdraws the plug, relay 30 is deenergized and a circuit is closed over lead 5^b, (which is always grounded except when listening in), back contact 31 of relay 30, lower contact 57 (if the district switch is between positions 2 to 6 inclusive) relay 46 to battery. Relay 46 is locked up and closes a circuit to drive switch R to position 18 as already described. In position 18 the ground connection extends over upper contact 57 to motor magnet R, driving the switch into first position. If the district switch had been beyond position 7, the ground connection would pass over upper contact 57 to motor magnet R without energizing relay 46, thus driving the switch to position 1.

Withdrawing a plug with the operator's set connected.

If, while listening in on a cord the operator removes the plug from the jack, relay 30 is of course deenergized, but no circuit changes result because lead 5^b is ungrounded. This permits the operator to pull the plug to insert it in another jack, or for any other purpose, without disturbing the existing connections.

It will thus be seen that a very simple and

yet efficient means has been devised whereby automatic listening in is effected without appreciable loss of time, and while the invention is disclosed as embodied in a particular form, it will be understood that it is capable of a wide variation in its embodiment without departing from the spirit of the invention as defined in the appended claims.

10 What I claim is:

1. In a telephone system a plurality of answering cord circuits divided into groups, an operator's telephone set common to all of the cord circuits, means associated with the operator's telephone set to select a group, and means to simultaneously select a cord in a group, whereby said operator's telephone set is connected to a cord circuit.

2. In a telephone system, a plurality of cord circuits divided into groups, an operator's telephone set common to all of the cord circuits, group selecting means associated with the operator's telephone set, cord selecting means for each group, means associated with each cord circuit operating to cause said group selecting means and said cord selecting means to operate simultaneously to switch the operator's telephone set into connection with the cord circuit.

3. In a telephone system, a plurality of cord circuits divided into groups, an operator's set common to all of the cord circuits, a switching means for each group adapted to select any cord in its group, a switching means associated with the operator's set, and adapted to select a group of cord circuits, said switching means having a position for each group and an additional listening out position, means associated with each cord operating to cause the cord selecting means associated with the group in which a cord is located to select such cord and to simultaneously cause the group selecting means to select the group, whereby the operator may listen in on such cord, and means to move the group selecting means to its listening out position, whereby the operator is prevented from listening in on any cord.

4. In a telephone system, answering jacks, a plurality of cord circuits divided into groups, an operator's telephone set common to all of the cord circuits, group selecting means associated with the operator's telephone set, cord selecting means for each group, means operative upon plugging a cord into an answering jack to cause said group selecting means and said cord selecting means to operate simultaneously to switch the operator's telephone set into connection with the cord circuit.

5. In a telephone system, a plurality of cord circuits divided into groups, keys associated with each cord circuit, an operator's telephone set common to all of the cord circuits, group selecting means associated with

the operator's telephone set, cord selecting means for each group, and means operative upon the depression of a key associated with a cord circuit to cause said group selecting means and said cord selecting means to operate simultaneously to switch the operator's telephone set into connection with such cord circuit.

6. In a telephone system, answering jacks, a plurality of cord circuits divided into groups, an operator's telephone set common to all of the cord circuits, group selecting means associated with the operator's telephone set, cord selecting means for each group, means operative upon plugging a cord into an answering jack to cause said group selecting means and said cord selecting means to operate simultaneously to switch the operator's telephone set into connection with the cord circuit, and means operative upon plugging a second cord into a calling jack to cause said switching means to disconnect the operator's telephone set from the first cord and connect it to the second.

7. In a telephone system, a plurality of cord circuits, an operator's set common to all of the cord circuits, selective means operating to select an individual one of said cord circuits and connect the operator's set thereto, a sender, means to associate the sender with the selected cord circuit, means to disconnect the operator's set from the selected cord circuit, and means operative upon such disconnection to release the sender.

8. In a telephone system, a plurality of cord circuits, an operator's set common to all of the cord circuits, a sequence switch individual to each of the cord circuits, means operative when said switch is in normal position to select an individual one of said cord circuits and connect the operator's set thereto, means responsive to the selection of a cord to move said sequence switch into an off-normal position, a sender, means operative in such off-normal position of the sequence switch to associate the sender with the selected cord circuit, and means also operative in such off-normal position of the sequence switch to disconnect the operator's set from the selected cord circuit and simultaneously release the sender.

9. In a telephone system, a plurality of cord circuits, an operator's set common to all of the cord circuits, a sequence switch individual to each of the cord circuits, means operative when said switch is in normal position to select an individual one of said cord circuits and connect an operator's set thereto, means responsive to the selection of a cord to move said sequence switch into an off-normal position of the sequence switch to associate the sender with the selected cord circuit, means whereby the sequence switch may assume other off-normal positions, and

means operative if the sequence switch is in the first off-normal position to disconnect the operator's set from the selected cord and at the same time release the sender, said means operating if the sequence switch is in another position to disconnect the operator's set without releasing the sender.

10. In a telephone system, a plurality of cord circuits, an operator's set common to all of the cord circuits, selective means operating to select an individual one of said cord circuits and connect the operator's set thereto so that an operator may listen in on such cord circuit, a sender, means to associate the sender with the selected cord circuit, means whereby an operator while listening in may restore a set up connection and prepare the apparatus associated with a cord circuit for the setting up of a new connection.

11. In a telephone system, answering jacks, a plurality of cord circuits divided into groups, an operator's set common to all of the cord circuits, group selecting means associated with the operator's set, cord selecting means for each group, means operative upon plugging a cord into an answering jack to cause said group selecting means and said cord selecting means to operate simultaneously to switch the operator's set into connection with the cord circuit, means to disconnect the operator's set, and means operative when the plug is withdrawn while the operator's set is disconnected, to restore the cord circuit to normal, but ineffective if the plug is withdrawn while the operator's set is connected.

12. In a telephone system, a plurality of cord circuits divided into groups, an operator's ringback and coin control keys common to all of the cord circuits, means associated with the operator's keys to select a group and means to select a cord in a group, whereby said operator's keys are connected to a cord circuit.

13. In a telephone system, a plurality of cord circuits, an operator's set common to

all of the cord circuits, a sequence switch individual to each of the cord circuits, means operative when said switch is in normal position to select an individual one of said cord circuits and connect an operator's set thereto, means responsive to the selection of a cord to move said sequence switch into an off-normal position, a sender, means operative in such off-normal position of the sequence switch to associate the sender with the selected cord circuit, means whereby the sequence switch may assume other off-normal positions, means operative if the sequence switch is in the first off-normal position to disconnect the operator's set from the selected cord and at the same time release the sender, said means operating if the sequence switch is in another position to disconnect the operator's set without releasing the sender, and means under the control of the operator after the sender has been released to cause the sequence switch to assume its first off-normal position whereby a sender is again associated with the cord circuit.

14. In a telephone system, a plurality of cord circuits divided into groups, an operator's telephone set common to all of the cord circuits, group selecting means associated with the operator's telephone set, cord selecting means for each group, means controllable at will to cause said group selecting means and said cord selecting means to operate to switch the operator's telephone set into connection with a cord circuit, and means controllable at will to cause said switching means to disconnect the operator's telephone set from the first cord and connect it to the second.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this third day of April, 1917.

WILLIAM G. BLAUVELT.

Witnesses:

H. M. BASCOM,

EDWARD C. MOLINA.