

No. 664,691.

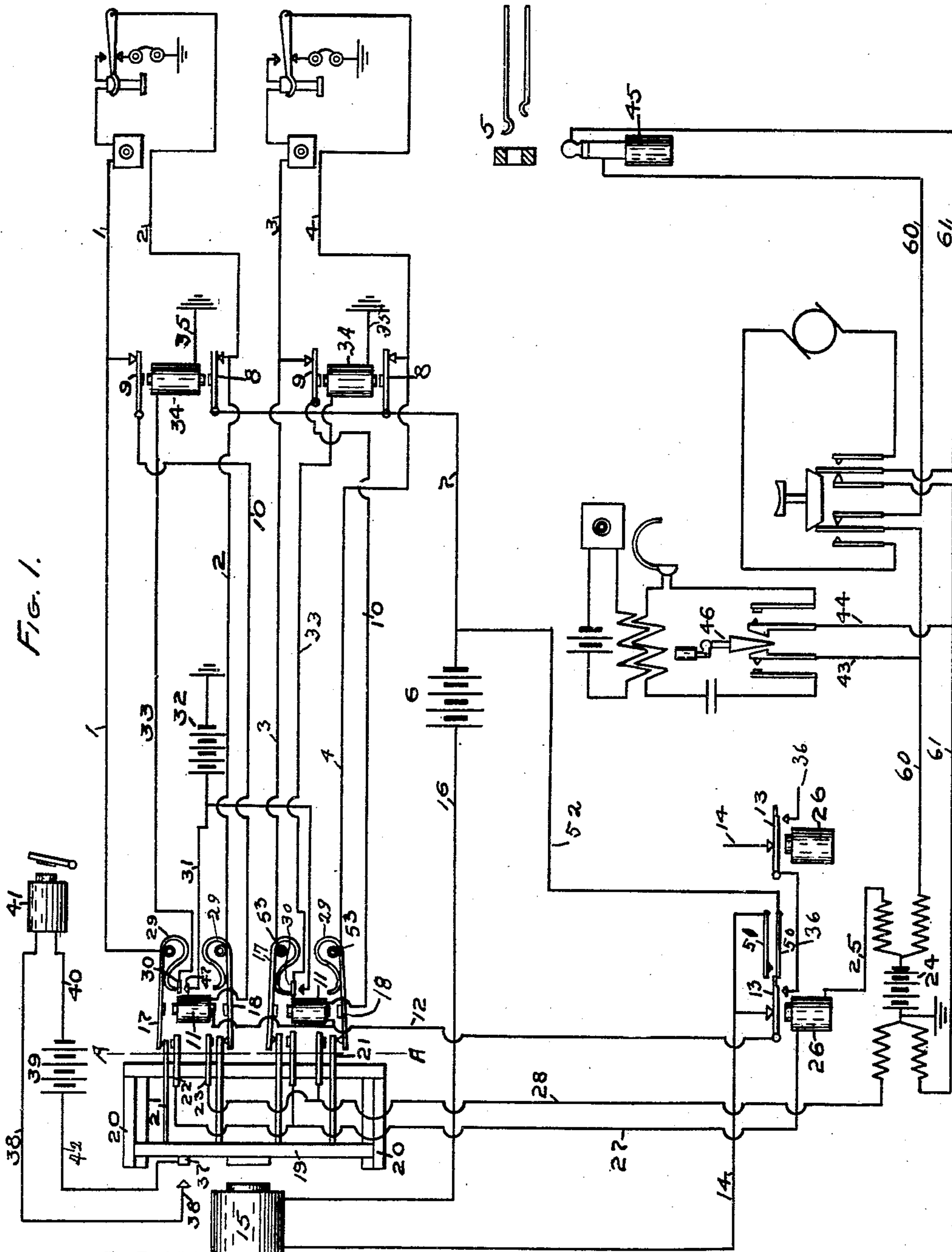
Patented Dec. 25, 1900.

C. TIMBERLAKE.
TELEPHONE EXCHANGE SYSTEM.

(Application filed Oct. 23, 1899.)

No Model.)

4 Sheets—Sheet 1.



WITNESSES:
G. H. Blaker.
M. C. Buck

INVENTOR.
Charles Timberlake.
BY *V. H. Lockwood*
His ATTORNEY.

No. 664,691.

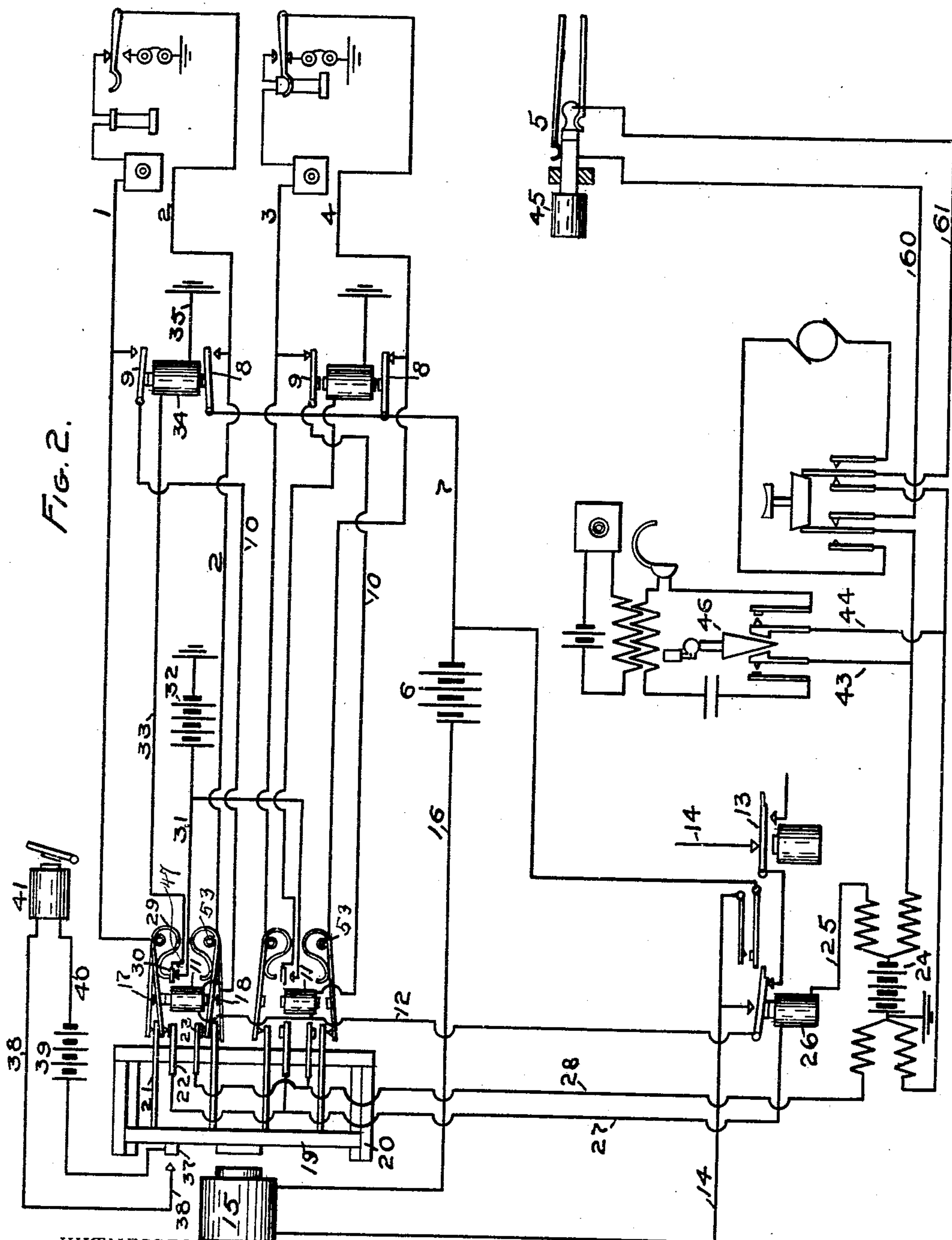
Patented Dec. 25, 1900.

C. TIMBERLAKE.
TELEPHONE EXCHANGE SYSTEM.

(No Model.)

(Application filed Oct. 23, 1899.)

4 Sheets—Sheet 2.



WITNESSES:

C. H. Blake
M. C. Buck

INVENTOR.

Charles Timberlake

BY

V. H. Lockwood

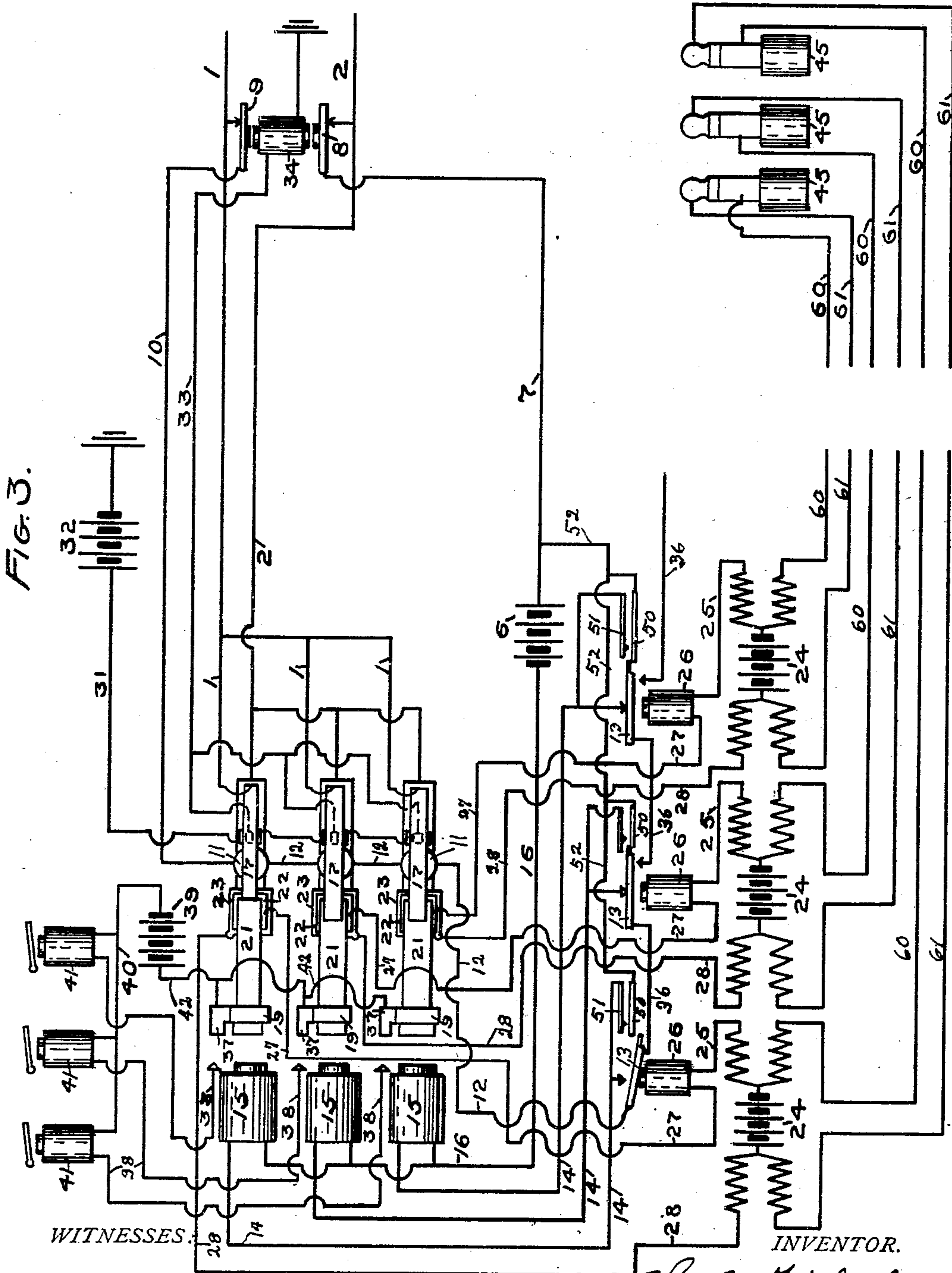
His ATTORNEY.

C. TIMBERLAKE.
TELEPHONE EXCHANGE SYSTEM.

(Application filed Oct. 23, 1899.)

(No Model.)

4 Sheets—Sheet 3.



WITNESSES:

INVENTOR.

G. H. Blaker.
M. C. Buck

Charles Timberlake
BY *V. H. Lockwood*
His ATTORNEY.

No. 664,691.

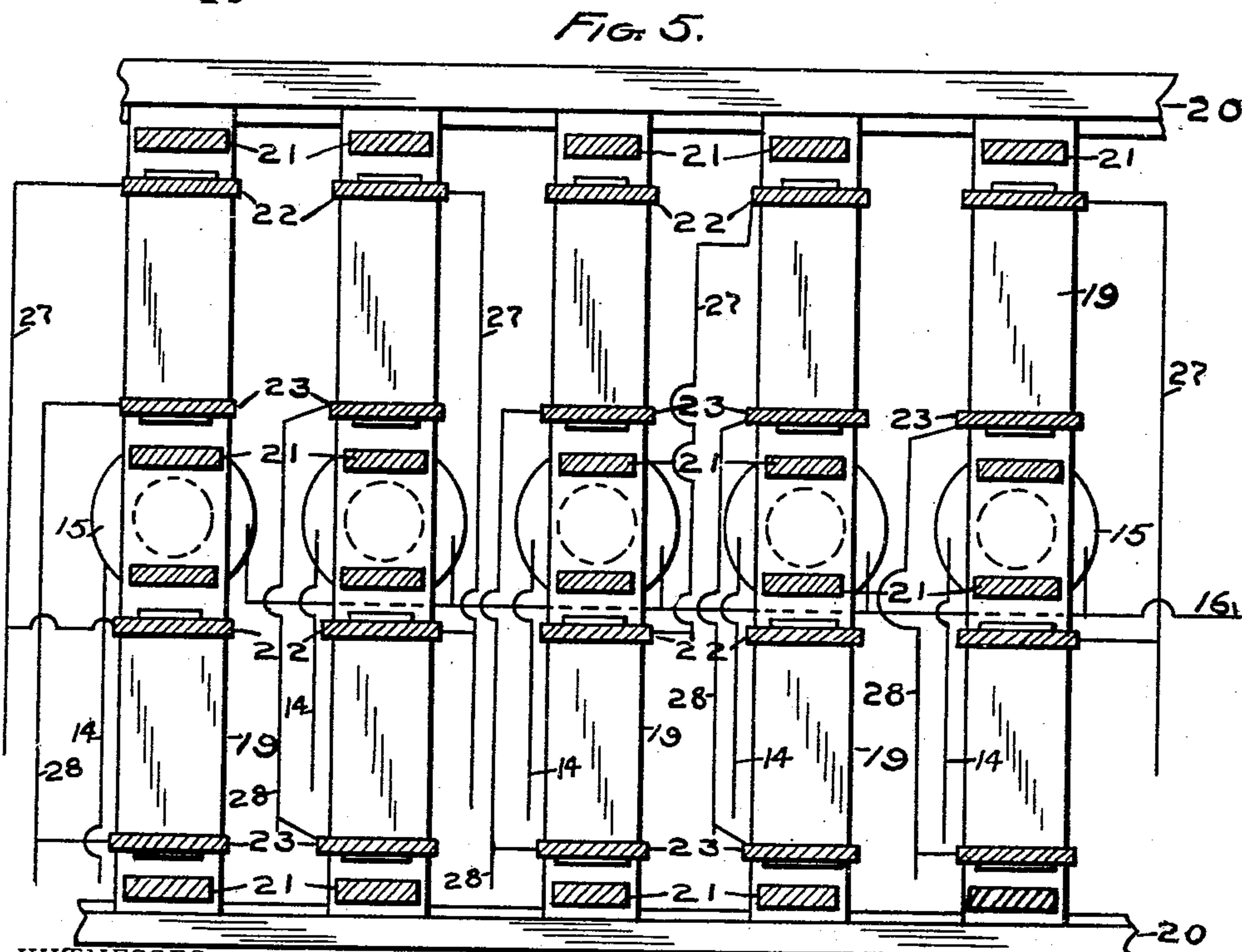
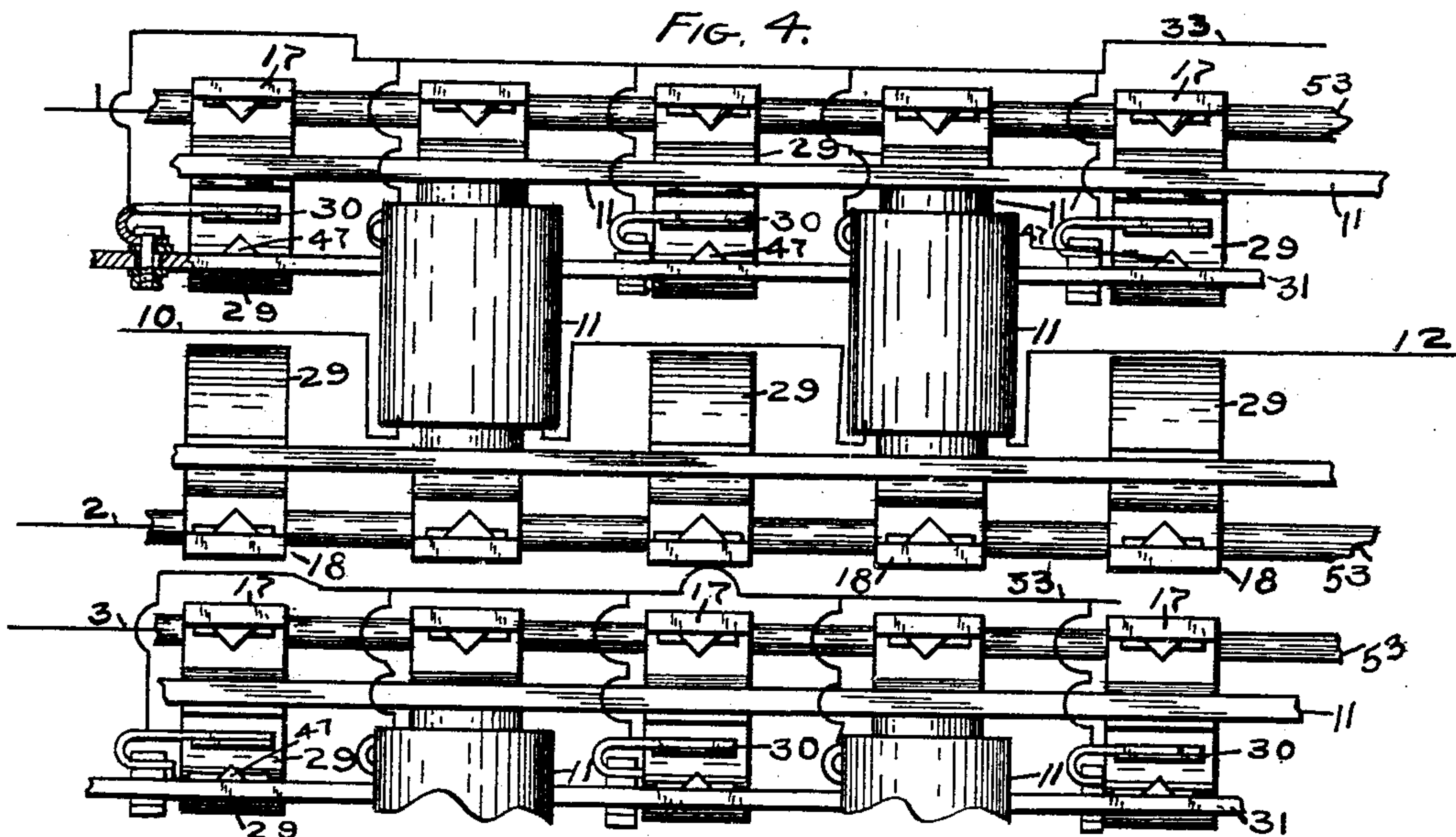
Patented Dec. 25, 1900.

C. TIMBERLAKE.
TELEPHONE EXCHANGE SYSTEM.

(No Model.)

(Application filed Oct. 23, 1899.)

4 Sheets—Sheet 4.



WITNESSES:

G. H. Blaker.
M. C. Buck.

INVENTOR.

Charles Timberlake

BY

V. H. Lockwood
His ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES TIMBERLAKE, OF INDIANAPOLIS, INDIANA.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 664,691, dated December 25, 1900.

Application filed October 23, 1899. Serial No. 734,520. (No model.)

To all whom it may concern:

Be it known that I, CHARLES TIMBERLAKE, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Telephone-Exchange System; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

10 This invention relates to improvements in the apparatus and arrangement of telephone-exchanges, whereby calling subscribers are automatically connected and disconnected to any connecting-circuit commonly called
15 "cord-circuits" without the use of a cord. This result is accomplished by a relay in each subscriber's line, in combination with switching-relays and locking in and out relays. The first subscriber calling is connected to the
20 connecting-circuit automatically through the first switching-relay in the series. When he hangs up his receiver, he is automatically disconnected and the parts automatically returned to their normal position. If another
25 subscriber calls at the same time, he is connected to the connecting-circuit through the first switching-relay in the series that is not in use, and there is no conflict between calling subscribers.

30 This invention dispenses with answering-jacks, the line-signals, and the answering cords and plugs of the cord-circuits. The cord-signals do the work of line-signals. It is apparent, therefore, that this invention
35 greatly simplifies and economizes the construction of a telephone-exchange. It also saves much time of the operators in effecting the connections and disconnections with other lines, as the operators are not required to insert or remove the answering-plugs. All subscribers are connected and disconnected from
40 the connecting-circuits automatically without conflict.

45 The full nature of my invention will be understood from the accompanying drawings and the description following of one form of device embodying my said invention, and the scope of said invention will be understood from the claims following said description.

50 In the drawings, Figure 1 is a side elevation of the apparatus, showing it in diagram while it is not being used. Fig. 2 is the same

while one connecting-circuit is in use. Fig. 3 is a plan of the apparatus; showing it in diagram with a part in use. Fig. 4 is a section on the line A A of Fig. 1 looking to the right. Fig. 5 is a section on the same line looking to the left.

Referring now to the details of the construction and arrangement of the apparatus, lines, &c., shown herein for the purpose of illustrating the nature of my invention, 1 and 2 are the lines of a calling subscriber, 3 and 4 of another calling subscriber, and 5 is the jack of a called subscriber. When the calling subscriber on lines 1 and 2 removes his receiver, the current flows from the battery 6 through the wire 7, which is common to one side of all lines of calling subscribers by means of the armatures 8. The current thus goes through said subscriber's armature 8 and out on the line 2 through the subscriber's telephone and back on wire 1 to his armature 9 of his cut-off relay and through his wire 10 and electromagnet 11 of his line-relay to the wire 12, that is common to all of the line-relays. The current then passes through the armature 13 of the switching-relay to the wire 14 and then through the electromagnet 15 of the locking in and out relay to the wire 16, which is common to all of the locking in and out relays, back to the battery 6. When the current flows through the circuit above described, it causes electromagnet 11 of the line-relay to actuate the spring-armatures 17 and 18, there being one set of said spring-armatures on the rods 53 at each end of said electromagnets. The current in said circuit at the same time acts on the electromagnet 15 of the locking in and out relay and it pulls the sliding armature 19 to it. Said sliding armature is mounted in the guide-bars 20 and carries a set of non-conducting arms 21. These non-conducting arms hold the spring-armatures 17 and 18 of the line relay out of contact with the plates 22 and 23 while the apparatus is not in use, as is shown in Fig. 1. When the armature 19 is operated by the current, as described, it and the arms 21 are moved to electromagnet 15, which permits the spring-armatures 17 and 18 to escape from the arms 21 and come in contact with the plates 22 and 23, as shown in Fig. 2. At the time the electromagnet 15 is energized and

draws to it the armature 19 the contact-piece 37 thereon makes contact with wire 38, which causes the current to flow from the battery 39 through wire 40 to the drop or signal 41 through wire 38 and 42 back to battery 39. This operates the signal 41 and informs the operator that there is a call on that circuit. When said armature 17 of the line-relay moves toward the electromagnet 11, its spring 29 causes the contact-plate 30 to close the circuit with the contact-point 47, and when this contact is made the current flows from battery 32 through wire 31, contact-point 47, contact-plate 30 and through wire 33 and the electromagnet 34 of the cut-off relay to ground through wire 35. The current energizes the electromagnet 34 of the cut-off relay and moves armatures 8 and 9, thus breaking the circuit between armatures 8 and 9 and the wires 1 and 2, being the first circuit above described. The effect of breaking said circuit is that the line-relay and the locking in and out relay are cut out and the armature 19 and arms 21 move back by gravity or springs (not shown) to the position shown in Fig. 2. The movement of the armature and arms 21 should be fast enough to intercept the springs 17 and 18 before returning to their normal position. The arms 21 then hold the spring-armatures 17 and 18 in contact with the plates 22 and 23, and the spring-armature 17 in this position holds the springs 29 against the contact-plate 30 to keep in touch with the contact-point 47, as is seen in Fig. 2. When the armature 19 moves back, as thus described, it also breaks the signal-circuit. When the armatures 17 and 18 of the line-relay engage plates 22 and 23, the current will then flow from the battery 24 through wire 25 to the electromagnet 26 of the switching-relay, then through the wire 27 to the contact-plate 22. Therefore it goes through the spring-armature 17 of the line-relay through wire 1, the telephone, back on wire 2 to spring-armature 18 of the line-relay, contact-plate 23, wire 28 to the battery 24. The current in this circuit causes the electromagnet 26 of the switching-relay to actuate armature 13 and break the connection between armature 13 and wire 14, as appears in Fig. 2. At the time armature 13 breaks contact with wire 14 it makes a contact with wire 36, leading to the next relay in the series. The operator having been informed of a call by signal 41, connects her telephone to the calling-circuit through wires 43 and 44 from the connecting circuit-wires 60 and 61 by means of listening-key 46 and gets the number of the subscriber desired. She then inserts plug 45, connecting the connecting circuit-wires 60 and 61, into the jack 5 of the subscriber called. The construction and arrangement of the operator's telephone, listening and ringing keys, generator, and the calling cord and plug herein shown are not new and form no part of this invention, but as here shown are familiar to all skilled in the art and require no detailed description. The

generator should be grounded on one side, as usual. (Not here shown.) The calling-jacks in the subscribers' lines 1 2 and 3 4, which are like the calling-jacks 5, are not here shown, as they form no part of this invention and are familiar to all skilled in the art. It is observed that there is no answering jack, plug, and cord to connect the calling subscriber to the connecting-circuit, but that this is effected automatically without any attention from the operator. To disconnect the two subscribers, the operator merely removes plug 45 from the jack 5. When the calling subscriber hangs up his receiver, the current ceases to flow through the electromagnet 26 of the switching-relay, which permits the armature 13 to return to normal position, as in Fig. 1. The armature 13 in returning to its normal position forces the spring 50 against the contact-plate 51. The spring 50 is made of resilient material and so placed that when the armature 13 is drawn to the magnet 26 it allows said armature to pass it without producing any electrical effect; but the return movement of the armature 13 forces the spring 50 against the plate 51, and then the further movement of the armature causes it to pass the end of said spring, as in Fig. 1. The contact between the spring 50 and plate 51 causes the current to flow from battery 6 through wire 52, plate 51, spring 50, wire 14, electromagnet 15 of the locking in and out relay, and then to the battery 6 through wire 16. This current will energize the electromagnet 15, withdraw the armature 19 and arms 21, and close the signal-circuit, thus operating signal 41, which in this case acts as a clearing-out signal. The withdrawal of the arms 21 allows springs 17 and 18 of the line-relay to return to the normal position. (Shown in Fig. 1.) When the armature 13 of the switching-relay has escaped the end of spring 51 and the spring rebounds to its normal position out of contact with plate 51, said circuit is broken and the armature 19 of the locking in and out relay and arms 21 regain their normal position, as seen in Fig. 1, and the signal-circuit is also broken. This automatically disconnects the calling subscriber from the connecting-circuit.

The foregoing explanation describes the operation of the exchange between one calling subscriber and a called subscriber. Explanation will now be made of its operation when a subscriber calls while another subscriber is connected. There is one line-relay for each subscriber—that is, the electromagnet 11, spring-armatures 17 and 18, springs 29, contact-plates 30, contact-points 47, and wires 10 are duplicated for each subscriber, as appears in Fig. 1; also, the cut-off relay, including the electromagnet 34 and the armatures 8 and 9, is duplicated for every subscriber, as appears in Fig. 1. There is also a series of locking in and out relays, including the electromagnets 15 and their armatures 19 and the arms 21, the contact-plates

22 and 23, the switching-relays, including the electromagnets 26, armatures 13, wires 14, 25, 27, 28, and 36, for each connecting-circuit, as appears in the plan to be seen in Fig. 3.

5 The battery 24 is shown here duplicated, one for each connecting-circuit, but that is not necessary, as one battery may be common to all connecting-circuits. The wire 16 is common to all the electromagnets 15, the wire 7 10 to all armatures 8, the wire 42 to all the contact-plates 37, the wire 40 to all signals 41, the wire 31 to all contact-points 47, the wire 52 to all contact-plates 51, the wire 27 to the contact-plates 22, the wire 28 to the contact-plates 23, and the wire 12 to the electromagnets 11 of all line-relays. Now when one calling subscriber is connected with the called subscriber and a second calling subscriber desires connection he removes the receiver, 20 which causes the current to flow from the battery 6 through wire 7, armature 8 of his relay, wire 4, through his telephone and back through wire 3, armature 9 of his cut-off relay, his wire 10, and electromagnet 11 of his line-relay to wire 12. Therefrom the current 25 passes through armature 13 of the first switching-relay, which at this time is in contact with the wire 36, as appears in Figs. 2 and 3. It then passes through the armature 13 and 30 wire 14 in the next switching-relay in the series. Through the wire 14 the current goes to the electromagnet 15 in the next locking in and out relay in the series, as shown in Fig. 3. The further operation for making the connection for the second calling subscriber 35 is the same as has been described for the first one, except that he is connected with a different called subscriber by means of a different plug 45, as appears in Fig. 3. For a third 40 or any number of calling subscribers the connection is made in the same way, the circuit being through a different switching-relay for each subscriber calling at the same time. In all cases the circuit will be initially established through the first switching-relay in the series that is not in use and will remain 45 through such relay until disconnected. The number of switching-relays and connecting-lines should be such as to accommodate the maximum number of subscribers calling at 50 the same time.

In this specification and the claims thereof a "connecting-circuit" means the contact-plates 22 and 23, wires 27 28 25 60 61, 55 battery 24, and the means for connecting wires 60 and 61 with the called subscriber's lines.

What I claim as my invention, and desire to secure by Letters Patent, is—

60 1. In a telephone-exchange system the combination with suitable calling-lines and a series of connecting-circuits, of a switching-relay in each connecting-circuit so that if the connecting-circuit be in use the relay connects a calling-line with the switching-relay 65 of the next connecting-circuit in the series.

2. In a telephone-exchange system, the com-

bination of calling-lines, a connecting-circuit, a line-relay connected with the calling-lines, a locking in and out relay connected with 70 the connecting-circuit, a switching-relay, and means for connecting the line-relay and locking in and out relay through the switching-relay.

3. In a telephone-exchange system, the combination of suitable calling-lines of the various subscribers, a number of connecting-circuits, a line-relay for each calling subscriber, a switching-relay and a locking in and out relay for each connecting-circuit, the line-relays and locking in and out relays being connected in series through the switching-relays. 80

4. In a telephone-exchange system, the combination with suitable calling-lines and connecting-circuits, of a switching-relay that 85 connects a calling-line with a connecting-circuit not in use, a locking in and out relay, and a switch operated by the armature of the switching-relay that actuates the locking in and out relay and thereby disconnects the 90 calling-line and connecting-circuit.

5. In a telephone-exchange system, the combination of the calling-lines of various subscribers, connecting-circuits, a switching-relay for each connecting-circuit that connects 95 said calling-lines with a connecting-circuit not in use, locking in and out relays for each connecting-circuit, and a switch for each circuit operated by the armature of the switching-relay for said connecting-circuit and 100 which actuates the locking in and out relay in such connecting-circuit and thus disconnects the calling-lines.

6. In a telephone-exchange system, the combination with the wires of the calling-line, a 105 cut-off relay with two armatures connected with the wires of the calling-lines, a battery, a wire from the battery to the one armature of cut-off relay, and a line-relay, of a wire from the cut-off relay to the electromagnets of the 110 line-relay, a switching-relay, a wire from the electromagnet of the line-relay to the armature of the switching-relay, a locking in and out relay, a wire from the armature of the switching-relay to the electromagnet of the 115 locking in and out relay, and a wire from the electromagnet of the locking in and out relay to the battery.

7. In a telephone-exchange system the combination with the calling-lines of the various 120 subscribers, a cut-off relay with the two armatures connected with the calling-wires of each subscriber, a common battery, a common wire from the battery to one of the armatures of the cut-off relays, and a line-relay 125 for each subscriber, of a wire from the armature of the cut-off relay to the electromagnet of the line-relay of each subscriber, switching-relays, a connection between the electromagnets of the line-relays and the armatures 130 of the switching-relays, locking in and out relays, a connection between the armatures of the switching-relays and electromagnets of the locking in and out relays, and a con-

nection between the electromagnets of the locking in and out relays and the battery.

8. In a telephone-exchange system, the combination with the calling-lines of various subscribers, a cut-off relay with two armatures connected with the calling-wires of each subscriber, a battery, a common wire from the battery to one of the armatures of all the cut-off relays, and a line-relay for each subscriber, of a wire from an armature of the cut-off relay to the electromagnets of the line-relay of each subscriber, switching-relays, a common wire from the electromagnets of the line-relays to the armatures of the switching-relays, locking in and out relays, a connection between the armatures of the switching-relays and the electromagnets of the locking in and out relays, and a connection between the electromagnets of the locking in and out relays and the battery.

9. In a telephone-exchange system, the combination with the calling-lines of various subscribers, cut-off relays with two armatures connected with the calling-wires of each subscriber, a common battery, a common wire from the battery to one of the armatures of all the cut-off relays, and a line-relay for each subscriber, of a wire from the armature of the cut-off relay to the electromagnets of the line-relay of each subscriber, switching-relays, a common wire from the electromagnets of all the line-relays to the armatures of the switching-relays, locking in and out relays, a wire from the armature of each switching-relay to the electromagnet of a locking in and out relay, and a wire from the electromagnets of all the locking in and out relays to the battery.

10. In a telephone-exchange, the combination with the calling-lines of various subscribers, of a line-relay connected with the calling-wires of each subscriber and consisting of an electromagnet and two or more spring-armatures, connecting-circuits including a pair of contact-plates for each line-relay that the armatures thereof engage when actuated, and a switching-relay for switching the connection from the calling-wires to the first connecting-circuit not in use.

11. In a telephone-exchange system, the combination with the wires of a calling-line, of a line-relay connected therewith comprising an electromagnet and two spring-armatures, connecting-circuits each with a pair of contact-plates which said armatures engage when actuated, a switching-relay for switching the connection from the calling-wires to the first connecting-circuit not in use, a battery connected with the electromagnet of the switching-relay, a wire from one of said contact-plates to the electromagnet of the switching-relay, and a wire from the other contact-plate to the battery.

12. In a telephone-exchange system, the combination with the wires of a calling-line, of a line-relay connected therewith compris-

ing an electromagnet and two spring-armatures, connecting-circuits each with a pair of contact-plates which said armatures engage when actuated, a switching-relay for switching the connection from the calling-wires to the first connecting-circuit not in use, a battery connected with the electromagnet of the switching-relay, a wire from one of said contact-plates to the electromagnet of the switching-relay, a wire from the other contact-plate to the battery, and means for temporarily locking the armatures of the line-relay in the actuated position.

13. In a telephone-exchange system, the combination with the calling-lines, a cut-off relay, and a line-relay connected with said calling-lines, of a contact-plate, a wire from said contact-plate to the electromagnet of the cut-off relay, a battery, a connection between the battery and said electromagnet, a wire from the battery to a contact-point near said contact-plate, and means for causing said plate and contact-point to engage when the armature of the line-relay is actuated.

14. In a telephone-exchange system, the combination with the calling-lines, a cut-off relay connected therewith and a line-relay connected with said calling-lines, of a movable contact-plate near said line-relay, a wire connecting said contact-plate and the electromagnet of the cut-off relay, a wire from said magnet to the ground, a battery, a contact-point near said contact-plate, a wire from said contact-plate to the battery, and a spring connected with the armature of the line-relay adapted when said armature is actuated to press the contact-plate into engagement with the contact-point.

15. In a telephone-exchange system, the combination with the calling-lines of various subscribers, and a cut-off relay connected with the calling-line of each subscriber, of a series of line-relays one connected with the calling-line of each subscriber, a spring contact-plate near each line-relay, a line from such contact-plate to the electromagnet of each cut-off relay, a battery, a connection from each of said electromagnets to the battery, a contact-point near each of said contact-plates, a common wire from the battery to each of said contact-points, and means for forcing the spring contact-plate into engagement with the contact-point near each line-relay by the action of the armature of said relay.

16. In a telephone-exchange system, the combination of the calling-wires of a telephone-circuit, a line-relay with two spring-armatures connected with said calling-wires, suitable connecting-circuits, a switching-relay for switching the connection from the calling-wires to the first connecting-circuit not in use, a battery connected with the electromagnet of said switching-relay, a connection between one armature of the line-relay when actuated and the electromagnet of the

switching-relay, and another connection between the other armature of the line-relay when actuated and the battery.

17. In a telephone-exchange system, the combination with the calling-wires of a telephone-circuit, a line-relay with two sets of armatures connected with the calling-lines, suitable connecting-circuits, a switching-relay for switching the connection from the calling-wires to the first connecting-circuit not in use, a battery connected with the electromagnet of said switching-relay, a wire from the electromagnet of the line-relay to the armature of the switching-relay, a wire from one armature of said line-relay when actuated to the electromagnet of the switching-relay, and a wire from the other armature of the line-relay when actuated to said battery.

18. In a telephone-exchange system, the combination with the calling-wires of the various subscribers, of a line-relay with two armatures connected with said calling-lines, a switching-relay, a battery connected with the electromagnet of said switching-relay, a common wire connecting the electromagnets of all of the line-relays with the armature of the switching-relay, suitable contact-plates for all of the armatures of the line-relays when actuated, a common wire connecting the contact-plates for one set of the armatures of all of the line-relays with the electromagnet of the switching-relay, and another common wire connecting the contact-plates for the other set of armatures of all the line-relays with the battery.

19. In a telephone-exchange system the combination of the calling-lines of various subscribers, two or more connecting-circuits, one switching-relay for each connecting-circuit for connecting the calling-lines to a certain connecting-circuit, a contact-point near each switching-relay where it will be engaged by the armature thereof when actuated, and a wire from such contact-point to the armature of the next switching-relay in the series.

20. In a telephone-exchange system, the combination of line-relays having two armatures, a contact-plate for each armature when actuated, a locking in and out relay having a sliding armature, a pair of arms from said sliding armature that extend between the positions that the armatures of the line-relays occupy before actuation and after actuation.

21. In a telephone-exchange system, the combination of calling-lines, a connecting-circuit, a line-relay connected with the calling-line having two armatures adapted to connect with the connecting-circuit, a switching-relay, connection between the line-relay and switching-relay, a locking in and out relay, said locking in and out relay having a sliding armature, arms on said sliding armature adapted to hold the armatures of the line-relay in or out of connection with the connecting-circuit, and a line connecting the locking in and out relay with the switching-relay.

22. In a telephone-exchange system, the combination of the calling-lines of various subscribers, suitable connecting-circuits, a line-relay for each subscriber connected with each of said calling-lines and having two armatures, a series of switching-relays, a common line connecting the line-relays to the switching-relays, a locking in and out relay for each connecting-circuit, connection between the locking in and out relays and the switching-relays, a sliding armature in each of said locking in and out relays, a series of arms on said sliding armatures each pair of which is adapted to hold the armatures of a line-relay in an inoperative or actuated position.

23. In a telephone-exchange system, the calling-wires of subscribers, suitable connecting-circuits, a locking in and out relay and a signal-circuit for each connecting-circuit with one end of the signal-circuit leading from the armature of the locking in and out relay, and a contact-point for the other end of the signal-circuit that is engaged by the armature of the locking in and out relay when actuated, whereby the signal-circuit is closed.

24. In a telephone-exchange system, the calling-wires of subscribers, suitable connecting-circuits, a series of locking in and out relays and a series of signals for said connecting-circuits, a battery, a common wire from said battery to the armatures of all the locking in and out relays, a common wire from the battery to the electromagnets of the signals, contact-points so arranged as to be engaged by the armatures of the locking in and out relays when actuated, and wires from said contact-points to the electromagnets of the respective signals.

25. In a telephone-exchange system the combination with the calling-lines of various subscribers, a cut-off relay for each subscriber with two armatures connected with said calling-lines, a line-relay for each subscriber with two armatures to which the calling-lines of each subscriber are connected, a spring contact-plate near each line-relay, means whereby said contact-plate is operated when the armature of the relay is operated, a wire from such contact-plate to the electromagnet of the cut-off relay of each subscriber, a wire from each electromagnet to the ground, a contact-point that is engaged by said contact-plate when operated, a ground-battery, a common line from said battery to all of said contact-points, suitable connecting ground-circuits, a locking in and out relay for each connecting-circuit, a second battery, a common line from said second battery to all the locking in and out relays, a common line from said second battery to one of the armatures of all of the cut-off relays, a wire from the other armature of each of the cut-off relays to the electromagnet of its corresponding line-relay, a pair of contact-plates from each line-relay that are engaged by the armatures there-

of when actuated, a series of switching-relays, a contact-point near each switching-relay that is engaged by the armature thereof when actuated, a wire from said contact-point
5 to the armature of the next switching-relay in the series, a contact-point normally engaged by the armatures of each switching-relay, a wire from such contact-point to the electromagnet of the corresponding locking
10 in and out relay, a third battery connected with the electromagnet of one of the switching-relays, a wire from the electromagnet to one of said contact-plates near each line-relay, and a wire from the other contact-plate
15 near each line-relay to said third battery.

26. In a telephone-exchange system, a subscriber's-telephone switch, calling-lines, a locking in and out relay, a battery connected with the electromagnet of the locking in and
20 out relay, connecting-circuits, a switching-relay combined with the connecting-circuits and the locking in and out relay for connecting the calling-lines with a certain connecting-circuit, and a switch connected with the
25 locking in and out relay and battery that is so placed as to be actuated by the armature

of the switching-relay when the subscriber's-telephone switch is opened.

27. In a telephone-exchange system, a subscriber's-telephone switch, calling-lines, a
30 locking in and out relay, a battery connected with the electromagnet of the locking in and out relay, connecting-circuits, a switching-relay combined with the connecting-circuits and the locking in and out relay for connect-
35 ing the calling-lines with a certain connecting-circuit, a contact-plate, a wire therefrom to the locking in and out relay, a spring so placed as to be operated by the armature of the switching-relay when it is returning from
40 the actuated position to the normal position and pushed into contact with said contact-plate, and a wire from such spring to said battery.

In witness whereof I have hereunto affixed
45 my signature in the presence of the witnesses herein named.

CHAS. TIMBERLAKE.

Witnesses:

V. H. LOCKWOOD,
M. C. BUCK.