

E. LAND.
TELEPHONE SYSTEM.
APPLICATION FILED NOV. 2, 1904.

2 SHEETS—SHEET 1.

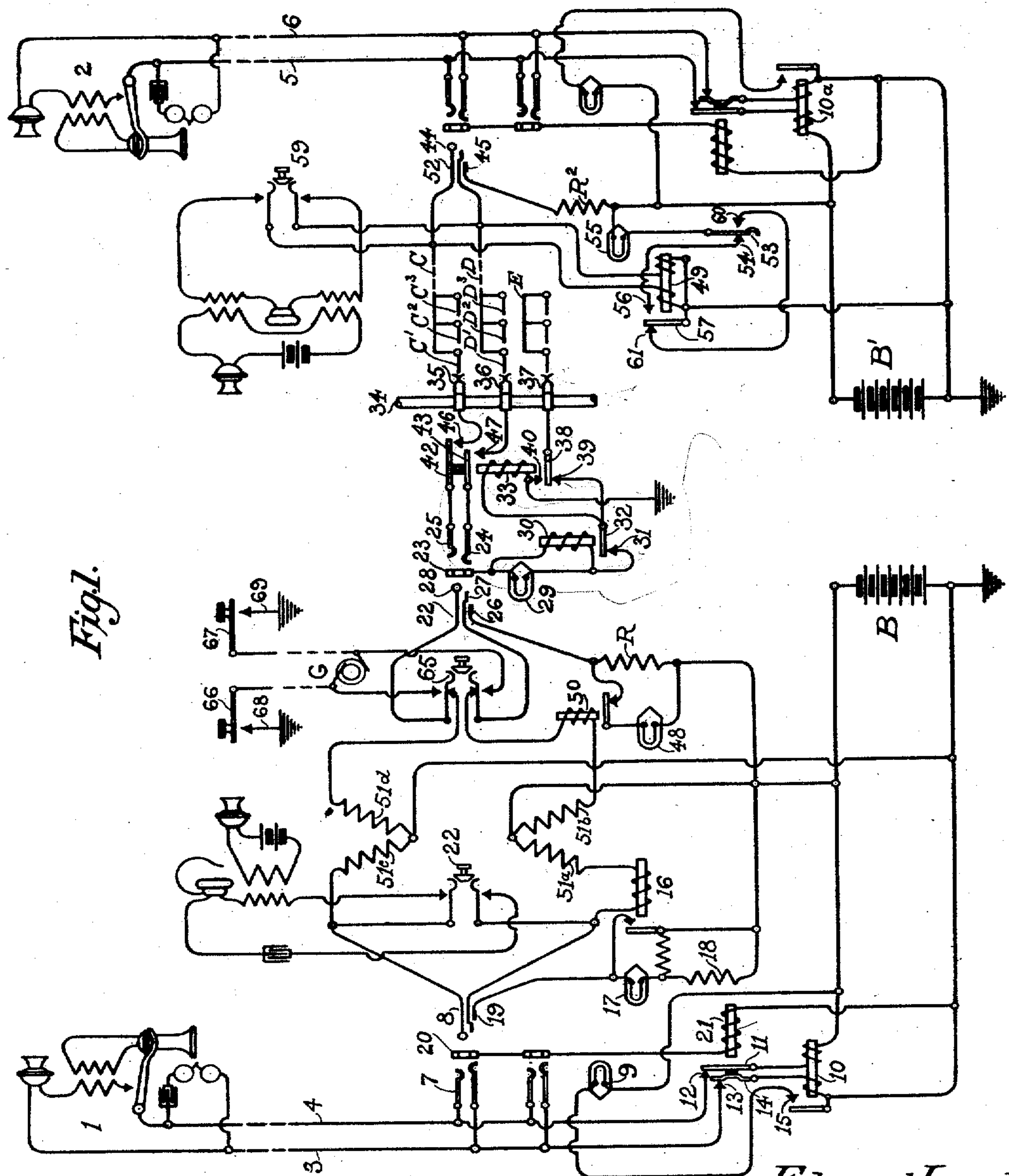


Fig. 1.

WITNESSES:

Harael C. Prado.
Eva A. Harlock.

Edmund Land.
INVENTOR.

BY Samuel G. McMeen
ATTORNEY.

E. LAND.
TELEPHONE SYSTEM.
APPLICATION FILED NOV. 2, 1904.

2 SHEETS—SHEET 2.

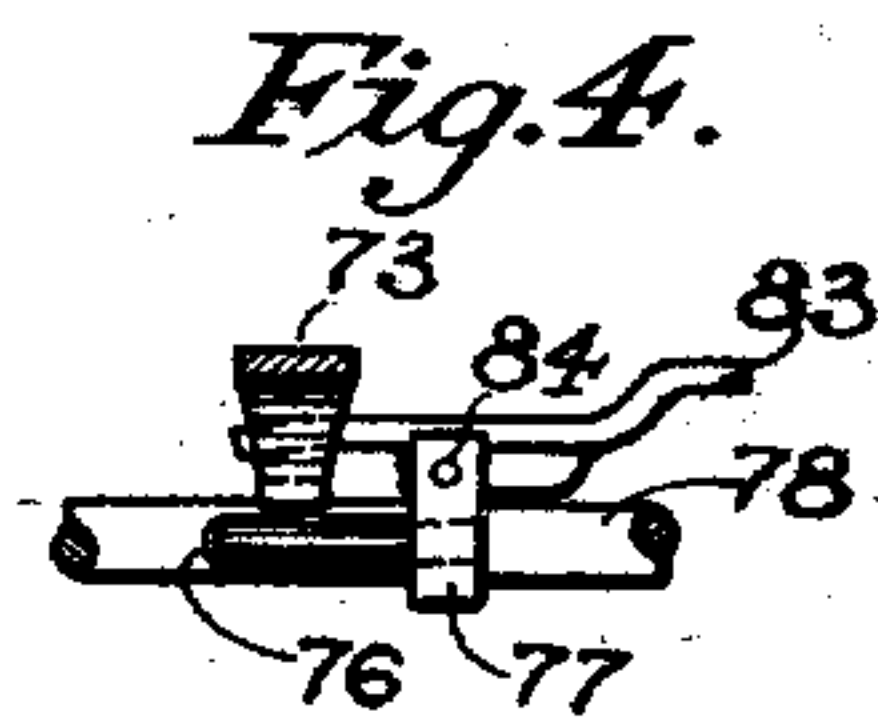
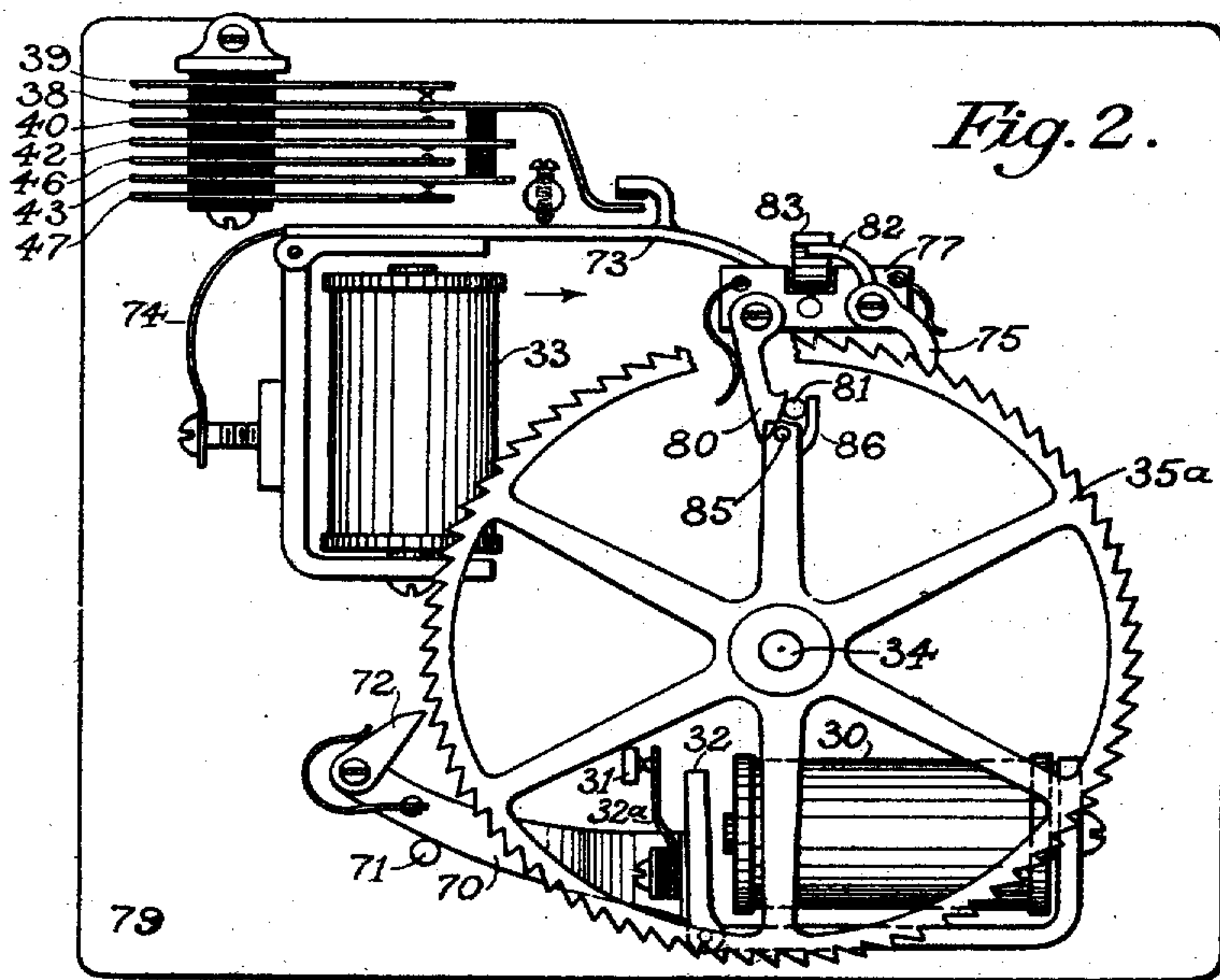
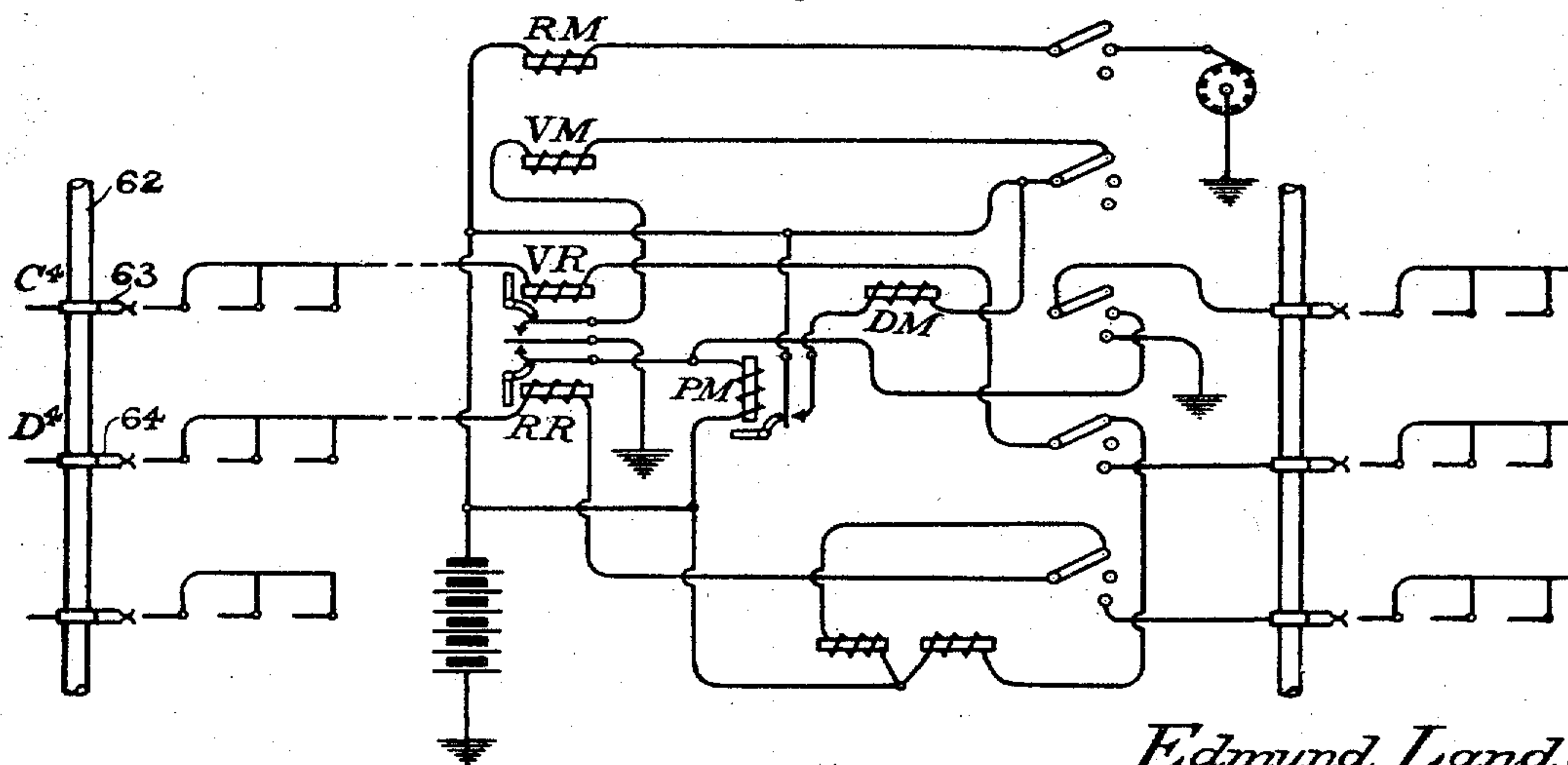


Fig. 3.



WITNESSES:

Harold C. Prado.
Eva A. Harlock.

Edmund Land,
INVENTOR.

BY Samuel G. McMeen
ATTORNEY.

UNITED STATES PATENT OFFICE.

EDMUND LAND, OF GRAND RAPIDS, MICHIGAN.

TELEPHONE SYSTEM.

No. 797,586.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed November 2, 1904. Serial No. 231,052.

To all whom it may concern:

Be it known that I, EDMUND LAND, a citizen of the Dominion of Canada, and a resident of Grand Rapids, county of Kemp, and State of Michigan, have invented a new and useful Improvement in Telephone Systems, of which the following is a specification.

My invention has for its object an improvement in the operation of trunk-lines between offices in a telephone-exchange or between parts of the same office in a telephone-exchange. The improvement effected is along the lines of rapidity of operation, economy in trunk-line investment, and the amount of operators' time occupied by the various trunking operations.

In present practice of switching telephone-lines by means of manual systems utilizing trunk-lines between operators in the same or different offices the generally-utilized method is to cause the trunk-lines to appear multiplied before each of a plurality of operators who answer the calls of subscribers, the other end of each such trunk terminating in a spring-jack or a plug under the control of an operator whose particular duty it is to connect the trunk with a called line. This last-mentioned end of the trunk appears in but one place, and its terminal is usually a plug. With this are associated signal devices, and an order for a connection usually reaches the operator in charge of the trunk end over a special telephone-circuit known as an "order-circuit" or "call-circuit." The telephone of this person, usually called an "incoming-trunk operator," is kept connected constantly to the other circuit by means of keys. The various operators having access to the multiple jacks of the trunks reaching this incoming-trunk operator may speak to her upon the call-circuit, give their orders, and receive from the incoming-trunk operator the designation of the individual number of a trunk which is not in use.

The number of trunks which may wisely and with economy be terminated upon a position of the incoming-trunk switchboard in charge of a given incoming-trunk operator is such a number as she can keep in use by her maximum effort during the busiest hours of traffic. To provide a greater number of trunks than this is to utilize investment with less than a maximum economy, and to provide fewer than such a number is to fail to utilize the services of the operator in the best way. It is a fact well known to those skilled in han-

dling telephone traffic that the efficiency of each trunk of a group of trunks connecting two parts of an exchange varies as the number of trunks in a group. For example, under certain systems of trunking, in which it is considered obligatory to provide at all times enough trunks so that no call will fail by reason of all trunks being busy, each of the trunks in a group of ten will carry, say, seventy-five completed calls in a day, while each of the trunks in a group considerably larger than ten—thirty or forty, for example—will carry very many more completed calls in a day, the number being approximately one hundred and fifty. In case the number of trunks between two offices is quite large enough to secure this very great increase in efficiency of each trunk and yet in which by an arrangement of the trunks of the group into smaller groups the smaller groups contain, say, only ten trunks each the efficiency of the entire number is kept down to approximately seventy-five completed calls in a day. It is therefore of distinct advantage to keep the trunks between two offices in as large a group as is warranted by the traffic and not to subdivide at an expense due to lower efficiency the trunks into smaller subgroups. My invention operates to this end by maintaining the efficiency of trunks and by rendering possible a method of operation which dispenses with other present disadvantages.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 illustrates a connection between two subscribers in different offices or in different divisions of the same office. Fig. 2 represents the mechanism of the rotary switch; Fig. 3, the elements of a phase of my system involving connection through another automatic switch, and Fig. 4 the elements of the release device of the rotary switch.

Similar characters refer to similar parts throughout the several views.

Referring now to Fig. 1, 1 is the telephone set of a subscriber represented to originate the call. 2 is the telephone set of a subscriber represented as receiving that call by a connection through the circuits and mechanism. 3 and 4 are the limbs of the line of the calling subscriber, and 5 and 6 the limbs of the line of the called subscriber. The line of limbs 3 and 4 enters the switchboard in the central office and is there connected to a jack or to multiple jacks, as well as to signal apparatus. I show in the drawings two jacks

connected with the line in question in a condition which would exist in a multiple switch-board of a type in general use. The jack (indicated as a whole 7) may be considered to be that with which the operator will connect the plug 8 when the lighting of the signal-lamp 9 announces the making of a call by the subscriber. This call is made by the removal of the receiver from its hook. Current from the battery B, flowing through one winding of the line-relay 10, the contact of the armature 11, with its point 12, passes over the limb 4 of the line, through the circuit of the telephone 1, to the central office over the limb 3, through the contact of point 13 with armature 14, through the other winding of the relay 10, again to the battery B. The relay 10, closing contact at 15, lights the signal-lamp 9, as mentioned. The insertion of the plug 8, as mentioned, causes current to flow from the battery B through the lamp 17 and its resistance 18 by contact of the plug-sleeve 19 with the test-bushing 20 of the jack 7, through the winding of the relay 21 to ground. The operation of this relay disconnects the limbs 3 and 4 from the relay 10 at the points 12 and 13. By inquiring from the subscriber the operator learns through the agency of her telephone set and listening-key 22 what line it is that he desires, and if the exchange in which these things are happening be one having a plurality of offices she will learn as well in what division of the exchange the called subscriber lies. This will be indicated to her by some prefix, such as "Main," "Central," &c., or some peculiarity of the called number—as, for example, the first digit of the number. The significance of this division designation is to cause the operator to choose from among the several major groups of the trunks that group which has trunks leading to the office containing the desired subscriber. As to which of the various trunks she shall use for the connection she has no concern, and this is a distinction from systems now in common use. In my invention it is not necessary that there be provided before her a large number of trunk-jacks connected with lines having their trunk-jacks before other operators in her own office, but only that she have a limited number of trunk-jacks, found sufficient by calculation or experience, to care for the largest number of connections with the distant office at the time of greatest traffic. Into one of these jacks belonging to the group of trunks leading to the desired office the operator will place the calling-plug 22 of the cord-circuit she used to answer the calling subscriber. The jack formed of parts 23, 24, and 25 represents such a one, and the parts of the plug 22 registering with the jack parts in the order named, are 26, 27, and 28. The first result of this registry is the lighting of the signal-lamp 29. This is associated with the trunk-jack, and current from the battery B

through the resistance R and also the lamp 28 in shunt will cause the lighting of the lamp 29, the path being farther by way of the contact 31, the armature 32 of the relay 30, to ground, at the grounded contact-piece engaged by the wiper 37 when at rest in normal position. It is true the winding of the relay 30 is permanently in shunt with the lamp 29; but its winding and its magnetic circuit are so related to each other that the lamp 29 may be brought to signaling brilliancy in shunt with the winding. The winding 33 is of such resistance and number of turns as not to permit the lamp 29 to be brought to signaling brilliancy in series with it and the battery B, although, as mentioned, the relay 30 is now operated, while the relay 33 is not, due to its being short-circuited by two grounds. The relay 30 is more than a mere relay. As an electromagnet it is adapted to rotate by steps the shaft 34. The means of this rotation will be more clearly described in relation to Fig. 2.

The shaft 34 carries three sets of contact-wipers insulated from each other and from the shaft and designated 35, 36, and 37. These are designed to make successive contacts by steps of the shaft 34 with contact-pieces arranged in horizontal arcs for that purpose. Each of the three arcs contains a plurality of such contact-pieces, the number being governed by the required number of trunks from which one is to be selected. Without complication one hundred sets of contacts may be provided. At any position of the shaft other than the normal one the three sets of wipers will engage three contact-points, two of which are the limbs of the trunk-line and one of which is a circuit purely local. Bearing in mind that there are several such switches as the one under description, each serving as a selecting device for a spring-jack, it is clear that the trunks which lead from the switches to the distant office may be multiplied in the circular arcs of contact-pieces quite as trunk-lines are ordinarily multiplied in jacks before operators. Considering the limbs C and D as forming the trunk leading from the switch under consideration, the contact-pieces C^1 , C^2 , and C^3 are the multiple exposures of this limb in any three switches, C^1 being its appearance in the switch under consideration, C^2 in another, and C^3 in still another switch. The limb D appears in an exactly similar manner. The conductor E differs only from the limbs C and D in that it merely leads from switch to switch of a group and does not lead away to the distant office.

When the shaft 34 is in a normal position, the wipers 37 engage a contact-piece, which is grounded and has no other connection. The current which flows through the lamp 29 under this condition is sufficient to illuminate it, because of the resistance of the relay 33 being effectively shunted out. Similarly, the current received by the relay 30 in shunt with

the lamp 29 is sufficient to rotate the shaft 34 one step by the stroke of its armature 32. A last result of this armature-stroke being the breaking of the contact between it and the point 31, the armature will fall away, and if in making the step of the shaft 34, caused by this stroke of the armature 32, the wipers 37 have engaged another contact found to be grounded, the armature 32 will execute another stroke, so continuing as long as grounded contacts are engaged by the wipers 37. The action here is similar to that of the familiar vibrating bell. During these successive strokes and steps of the shaft rotation the relay 33 will not be energized, because it remains short-circuited at all times when there is contact between 31 and 32; but should the wipers 37 engage a contact-piece upon which there is no ground an immediate result would be for the current flowing through the lamp 29 and the relay 30 to flow through the winding 33 to ground, while 31 and 32 are in contact. This current, as described, is sufficient to operate the relay 33, although the lamp 29 will not glow nor the relay 30 attract its armature. Three results follow. First, the further rotation of the shaft ceases. Second, the armature 38 breaks contact with its point 39 and makes contact with the point 40. A ground is thus placed immediately upon the wipers 37, and so upon the contact-pieces in all other switches to which the conductor, as E, is connected. Third, the springs 43 and 42, which are armatures of the relay 33 and are electrical extensions of the elements 25 and 24 of the trunk-jack, are connected; through contacts 46 and 47, to the wipers 35 and 36 and, further, by contact to the limbs C and D of the trunk-line. As these lead to the distant office, terminating in the tip 44 and the ring 45 of the distant-trunk plug, it is evident that two conductors of the cord-circuit are now extended to two plug-conductors in a distant office.

At the time the trunk has been selected, as described, and the talking-limbs of the lines extended to the conductors C and D of the trunk-line the lamp 48, associated with the calling-plug of the cord-circuit, remains lighted, and is intended to do so until the relay 50 shall be energized.

The relay 49 at the distant end of the trunk has two windings so related to each other and the limbs of the trunk that they form a path across the circuit, the middle point of this path being grounded at the junction of the two windings. An immediate result of the selection of the trunk by the rotary switch is that the relay 49 is energized by current from the battery B, through the winding 51^b of the cord-circuit repeating-coil, over the conductor D of the trunk, through the various described connections, through one winding of the relay 49, to ground. The plug 52 being in position in the keyboard or other support

and not in use actuates the plug-seat switch, of which 53 is the lever, forcing that lever into contact with the point 54 during all the time the plug is in normal condition. The lamp 55, therefore, will be lighted by the energization of the relay 49, current for the purpose flowing from the battery B' through the lamp 55, contact of the lever 53 with the point 54, contact of point 56 with the armature 57 to ground. This illumination of the lamp 55 is a signal to the incoming-trunk operator that a call is reaching her on that trunk. She operates her listening-key 59 and so connects her telephone in bridge with the limbs C and D of the trunk. At the same time, or approximately that, she lifts the plug 52, operating the plug-seat switch, breaking contact of the lever 53 and point 54, extinguishing the lamp 55. Upon connecting her telephone with the trunk, as described, she receives from the distant operator the number of the called line, tests that line in the multiple before her, and inserts the plug, if the line is not busy. If it is busy, she notifies the calling operator in some convenient manner. If the connection be made because the called line is not busy, the originating operator may ring, and upon the response of the called subscriber conversation may ensue.

The relay 49 is of many turns and high resistance, so that current from the battery B through the repeating-coil windings 51^b and 51^a may energize it while not being of sufficient volume to energize the relay 50, which is in series with one of the strands of the now-established talking-circuit. Upon the response of the called subscriber the path for current through his telephone will cause the current to increase to an amount sufficient to actuate the relay 50, which is of a supervisory nature. The lamp 48 will thus be extinguished, although it had been burning from the connection of the plug 22 with the trunk-jack. This will indicate that the called subscriber has answered, and at the close of the conversation the restoration of the receiver at station 2 will relight the lamp 48, causing the operator to disconnect the plug 22 from the trunk. This connection will release the armature 57 of the relay 49 at the incoming-trunk-operator's position, and the lamp 55 will be relighted by virtue of current from the battery B' through the lamp 55, the lever 53, contact 60, contact 61, armature 57 to ground. In obedience to this signal the incoming-trunk operator will remove the plug 52 from the jack of the subscriber's line, allowing it to return to its normal position in its seat, restoring the lever 53 to its original position in contact with 54. This position is one of readiness for a new call.

In order to secure the advantage of automatic trunk selection with its accompanying increase in trunk efficiency and decrease in trunk-jacks, it is not essential that the exact

method which I have described with reference to securing the number wanted be utilized by the incoming-trunk operator. There are many methods well known and easily to be suggested whereby the call may be passed from the originating operator to the incoming-trunk operator. The important end to be accomplished is to secure knowledge of the number of the called subscriber and an accompanying knowledge of the trunk which should be used.

Referring to Fig. 3, it may be noted that the conductors C⁴ and D⁴ lead to two wipers on a rotary shaft. Let it be understood that these conductors are extensions of the conductors C and D (shown in Fig. 1) and that a rotary switch of which 62 is the shaft serves in this consideration as the terminal of the trunk-line instead of the association of the relay 49, the plug 52, and other elements belonging to the trunk, as illustrated in Fig. 1. With this relation understood between Figs. 1 and 3 it will be seen that a call established as I have described would result in the extension of the talking-conductors of the circuit from the plug 22 in the originating-switchboard to the wipers 63 and 64 of Fig. 3 in the distant office. Fig. 3 is a representation of the circuits of one of the first selectors of the well-known Strowger system of automatic telephones, in which the actuation of the mechanism depends upon ground-contacts on one or the other of two wires of the line in proper successions. In such a system of automatic telephones there are many trunk-lines extending between various groups of switches, and the burden of operating mechanism to apply the ground-contacts necessary to set up the connection between two lines is upon the calling subscriber. With a view to retaining the object of simplification of the subscriber's duties my invention contemplates his making his call in the manner usual in manual systems, to have his call answered by an operator as described herein, and to trunk that call over a non-busy trunk to a distant office which may contain automatic switches. If it be this kind of an equipment which is trunked into, the originating operator will proceed to give such ground impulses upon the conductors 25 and 24, respectively, as will actuate the switch mechanism in the distant office to set up the desired connection. As these operations are so well known and in such general use, I will indicate them only by reference to that portion of Fig. 1 which lies adjacent the generator G. It is this generator which would be utilized to furnish ringing-current to the subscriber at station 2 in the manual system, as described. In case of switching to an automatic equipment the relation of the key 65 would not be that of a ringing-key, but that of a key adapted to connect an automatic signaling device with that cord-circuit. As the office of such a signaling device is merely to apply ground-

contacts to the trunk-conductors C and D, I illustrate the essential feature in the keys, composed of springs 66 and 67 and contacts 68 and 69. The latter are grounded, and a series of pressures upon the key 66 followed by one successive pressure upon 67 after each series will set up the automatic connection in the familiar way. At the completion of the operation of the various selectors and the connector involved in the automatic connection a further pressure upon the key 66 will cause the ringing of the called subscriber's bell. Similarly, at the close of the conversation a pressure upon both keys 66 and 67 will cause the release of all the switches in the automatic office, and the withdrawal of the plug 22 from the trunk-jack will release the rotary trunk-switch, of which 34 is the shaft and which is now more fully described with reference to Fig. 2.

Referring to Fig. 2, 34 is the shaft, and 35^a a ratchet-wheel mounted thereon. The wipers 35, 36, and 37 are carried by the shaft 34, but are not shown in this view. Neither do I show the circular arcs carrying the contact-pieces C' C² D' D², &c., as these are of a design now quite familiar as entering into automatic switching. The magnet 30 has been described with its relation to the circuit, and I have said that it has a further function in that it has the power to rotate the shaft in successive steps. The armature 32 is seen to carry the extension 70, normally bearing on the stop 71 and carrying at its tip a pawl 72. The relation between the stroke of the pawl 72, the teeth of the ratchet-wheel 35^a, and the making of contact between the point 31 and the spring 32^a, which forms another armature, is such that the contact will be broken at such a time as a step of the ratchet-wheel has been caused by a stroke of the arm 70 and will then fall back against its stop 71 before the armature 32 can recover to execute another stroke.

The magnet 33 is shown in Fig. 1 as having two distinct actions, one with reference to the moving part 38 and another with reference to the simultaneous motion of the parts 42 and 43. In the mechanical construction shown in Fig. 2 these relay functions are caused through the agency of the spring 38, which is moved by the arm 73, directly forming an armature of the magnet 33. The normal tendency of the armature is away from the core, and this is accomplished by means of the spring 74.

It will be recalled that at the time the shaft 34 in its rotation selected a trunk found to have an idle contact by the wipers 37 the magnet 33 became energized. This condition will continue during all the time the trunk is held. The arm 73 will therefore remain drawn toward the core, holding its controlled springs under tension. Further than this, the end of the arm 73 performs certain functions with reference to the pawl 75 to the end that when

the arm 73 is released at the time plug 22 is withdrawn from the jack the ratchet-wheel 35^a will be allowed to return to the normal position. This feature is best shown by reference to Fig. 4.

In Fig. 4 the end of the arm 73, viewed in the direction of the arrow in Fig. 2, may be seen engaging the pin 76. This is mounted on a rocking arm 77. The latter rocks on the stud 78, (hidden in Fig. 2 by the arm 77;) but it rises from the base-plate 79, (shown in Fig. 2,) and on the free end of which is pivoted the pawl 75. In viewing the rocking arm 77 in Fig. 2 it may therefore be understood to be pivoted upon the center of the screw which also pivots the pawl 75. The arm 77 carries the catch 80. When the arm 73, therefore, is drawn downward by the magnet 33, its engagement with the pin 76 in the rocking arm 77 will move the parts to enable the catch 80 to engage the pin 81, which also rises from the base-plate 79. This engagement of the catch will continue during the time the magnet 33 remains energized after the ratchet-wheel 35^a has been rotated and the trunk selected. Noting the extension of the pawl 75 and the existence of a link 83 in the arm 77, it will be seen that upon the release of the arm 73 by the magnet 33 the tip of that arm under the locked condition of 77 through 80 and 81 will strike the end of the link 83 and cause it to depress the part 82. This will withdraw the tip of the pawl 75 from the ratchet 35^a and allow it to return to normal position through the agency of a spiral spring, (not shown in the figures,) but which has a constant tendency in an anticlockwise direction. At the moment of return to normal position a pin 85, carried by the ratchet-wheel, engages the catch 80 and throws it out of contact with the pin 81. The latter is engaged by a dog 86, limiting the return tendency of the wheel 35^a.

It will be seen from the foregoing that it is the release of the magnet 33 which restores the ratchet-wheel to normal position through the assistance of the catch 80, which holds down the arm 77, and the action of the link 83 throwing the pawl 75 out of the teeth of the wheel 35^a.

I do not desire to limit myself to the exact construction shown and described, as it is evident that other means along the same lines may be utilized to secure quite the same results.

Having thus described my invention, what I claim is—

1. In combination in a telephone system, a trunk-line spring-jack, a plurality of trunk-lines, a signal-lamp, an automatic trunk-selector adapted to connect together said spring-jack and a non-busy one of said trunk-lines, and means adapted to illuminate said signal-lamp during the process of such connection, substantially as described.

2. In combination in a telephone system, a

trunk-line jack, a plurality of trunk-lines, a visual signal, an automatic trunk-selector adapted to establish connection by automatic means between said spring-jack and a non-busy one of said trunk-lines, and means for displaying said visual signal during the period in which said connection is being established, substantially as described.

3. In a telephone system, a subscriber's telephone-line, an operator's cord-circuit, a trunk-line spring-jack, an automatic trunk-selector adapted to extend said subscriber's line through said operator's cord-circuit to a trunk-line, said trunk-line and a signal adapted to be actuated during process of connection to said subscriber's telephone-line and said trunk-line, substantially as described.

4. In a telephone system, a trunk-line spring-jack, a trunk-line link of two limbs, a plurality of trunk-lines each of two limbs, an automatic trunk-selector adapted to connect the two limbs of said line-link to the two limbs of a non-busy one of said trunk-lines, a third conductor associated with said trunk-line link and adapted to control a signal-lamp and the operations of said automatic trunk-selector, and said signal-lamp, substantially as described.

5. In an automatic trunk-selector, a rotatable shaft, contact-wipers carried thereby, a magnet adapted to rotate said shaft, a signal-lamp in shunt with said magnet, another magnet adapted when operated to prevent further rotation of said shaft, substantially as described.

6. In an automatic switch for telephone-lines, line conductors normally open, a rotatable shaft and contact-wipers carried thereby, contact-pieces adapted to be engaged by said contact-wipers, a magnet adapted to rotate said shaft, another magnet adapted to interrupt said rotation and to close said normally open telephone-line conductors, a signal-lamp normally in shunt with said first magnet, and means adapted to illuminate said signal-lamp when said magnet is energized, and to extinguish said signal-lamp when said second magnet is energized, substantially as described.

7. In an automatic selector for telephone-lines, a rotatable shaft, contact-wipers carried thereby, contact-pieces adapted successively to be engaged by said contact-wipers, an advancing magnet adapted to rotate said shaft in successive steps, a release-magnet normally short-circuited adapted when such short circuit is broken to interrupt the rotation of said shaft by its being energized, and adapted when deenergized to cause said shaft to return to a normal position, substantially as described.

8. In an automatic selector for telephone-lines, a rotatable shaft, contact-wipers carried thereby, contact-pieces adapted successively to be engaged by said contact-wipers, a signal-lamp, a magnet in shunt therewith, a re-

lease-magnet, means adapted to maintain a short circuit about said release-magnet while one of said contact-wipers successively engages grounded contact-pieces, means adapted to energize said release-magnet when a non-grounded contact is engaged by said one of said contact-wipers, line-circuit-closing means adapted to be contacted upon the energization of said release-magnet, and means adapting said release-magnet to interrupt the rotation of said shaft upon being energized, to hold said shaft against release or further rotation while energized, and to release said shaft for return to normal position when deenergized, substantially as described.

9. In an automatic selector for telephone-lines, a signal-lamp, a rotatable shaft, a rotating magnet in shunt with said signal-lamp,

a release-magnet normally in series with said signal-lamp and rotating magnet in parallel with each other, means adapted to illuminate said signal-lamp and operate said rotating magnet while said release-magnet is held deenergized and short-circuited, means adapted to remove said short circuit from said release-magnet to extinguish said signal-lamp and to prevent a further action of said rotating magnet, substantially as described.

Signed by me at Chicago, county of Cook, State of Illinois, in the presence of two witnesses.

EDMUND LAND

Witnesses:

SAMUEL G. McMEEN,
EVA A. GARLOCK.

Corrections in Letters Patent No. 797,586.

It is hereby certified that in Letters Patent No. 797,586, granted August 22, 1905, upon the application of Edmund Land, of Grand Rapids, Michigan, for an improvement in "Telephone Systems," errors appear in the printed specification requiring correction, as follows: On page 1, lines 21-22, the word "multiplied" should read *multiplied*; line 37, the period after the word "keys" should be stricken out and a semicolon inserted instead and the following word "The" commence with a small *t*; on page 2, second column, line 1, the reference numeral "28" should read *48*; in lines 44 and 46 the word "multiplied" should read *multiplied*; and on page 3, second column, line 4, the word "condition" should read *position*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of October, A. D., 1905.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.

lease-magnet, means adapted to maintain a short circuit about said release-magnet while one of said contact-wipers successively engages grounded contact-pieces, means adapted to energize said release-magnet when a non-grounded contact is engaged by said one of said contact-wipers, line-circuit-closing means adapted to be contacted upon the energization of said release-magnet, and means adapting said release-magnet to interrupt the rotation of said shaft upon being energized, to hold said shaft against release or further rotation while energized, and to release said shaft for return to normal position when deenergized, substantially as described.

9. In an automatic selector for telephone-lines, a signal-lamp, a rotatable shaft, a rotating magnet in shunt with said signal-lamp,

a release-magnet normally in series with said signal-lamp and rotating magnet in parallel with each other, means adapted to illuminate said signal-lamp and operate said rotating magnet while said release-magnet is held deenergized and short-circuited, means adapted to remove said short circuit from said release-magnet to extinguish said signal-lamp and to prevent a further action of said rotating magnet, substantially as described.

Signed by me at Chicago, county of Cook, State of Illinois, in the presence of two witnesses.

EDMUND LAND

Witnesses:

SAMUEL G. McMEEN,
EVA A. GARLOCK.

Corrections in Letters Patent No. 797,586.

It is hereby certified that in Letters Patent No. 797,586, granted August 22, 1905, upon the application of Edmund Land, of Grand Rapids, Michigan, for an improvement in "Telephone Systems," errors appear in the printed specification requiring correction, as follows: On page 1, lines 21-22, the word "multiplied" should read *multiplied*; line 37, the period after the word "keys" should be stricken out and a semicolon inserted instead and the following word "The" commence with a small *t*; on page 2, second column, line 1, the reference numeral "28" should read *48*; in lines 44 and 46 the word "multiplied" should read *multiplied*; and on page 3, second column, line 4, the word "condition" should read *position*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of October, A. D., 1905.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.

Corrections in Letters Patent No. 797,586.

It is hereby certified that in Letters Patent No. 797,586, granted August 22, 1905, upon the application of Edmund Land, of Grand Rapids, Michigan, for an improvement in "Telephone Systems," errors appear in the printed specification requiring correction, as follows: On page 1, lines 21-22, the word "multiplied" should read *multiplied*; line 37, the period after the word "keys" should be stricken out and a semicolon inserted instead and the following word "The" commence with a small *t*; on page 2, second column, line 1, the reference numeral "28" should read 48; in lines 44 and 46 the word "multiplied" should read *multiplied*; and on page 3, second column, line 4, the word "condition" should read *position*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of October, A. D., 1905.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.