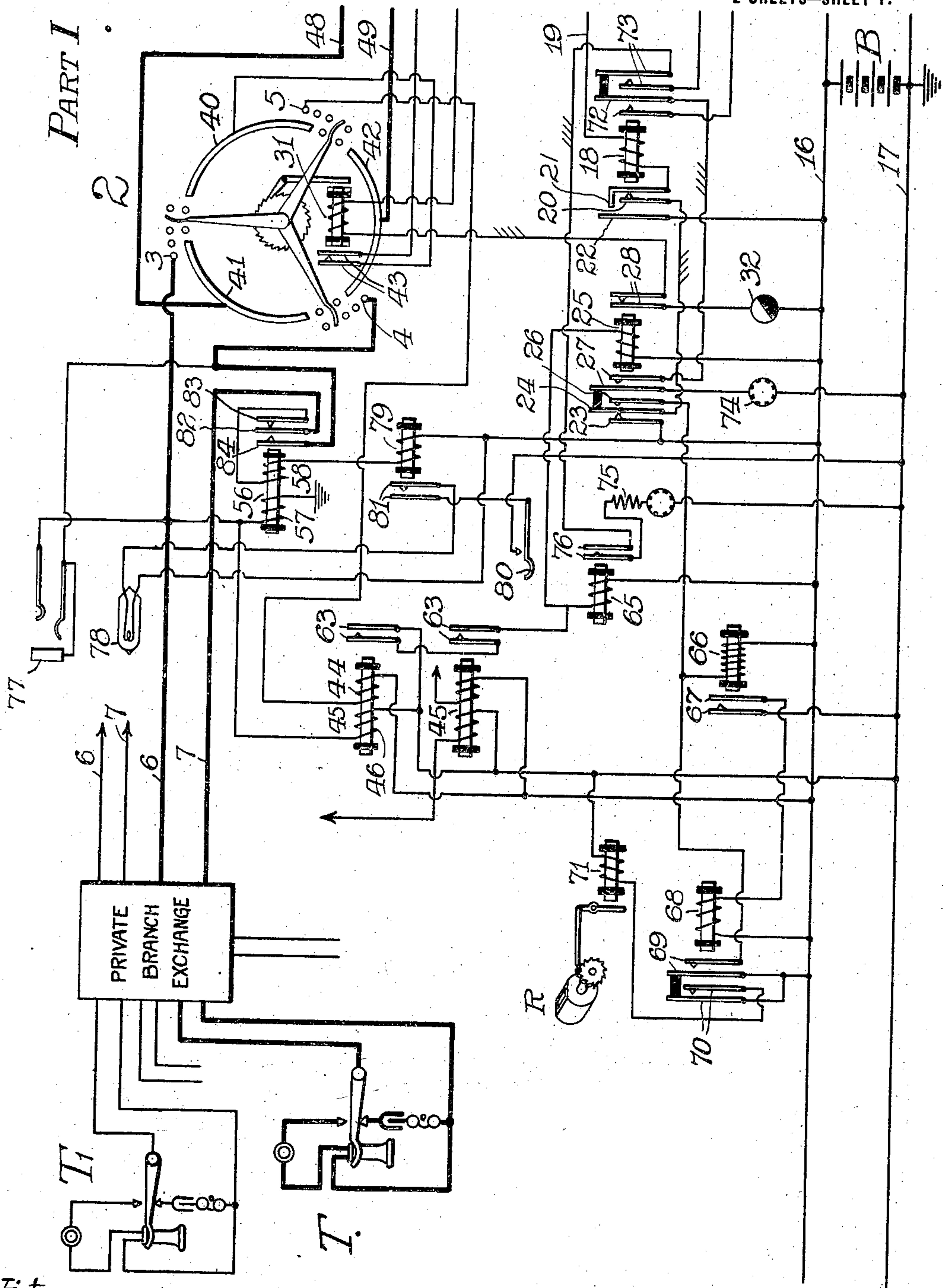


E. A. REINKE.
 AUTOMATIC TRUNKING SYSTEM.
 APPLICATION FILED NOV. 18, 1914.

1,242,374.

Patented Oct. 9, 1917.

2 SHEETS—SHEET 1.



Witnesses:

Leonard W. Novander,
 John A. ...

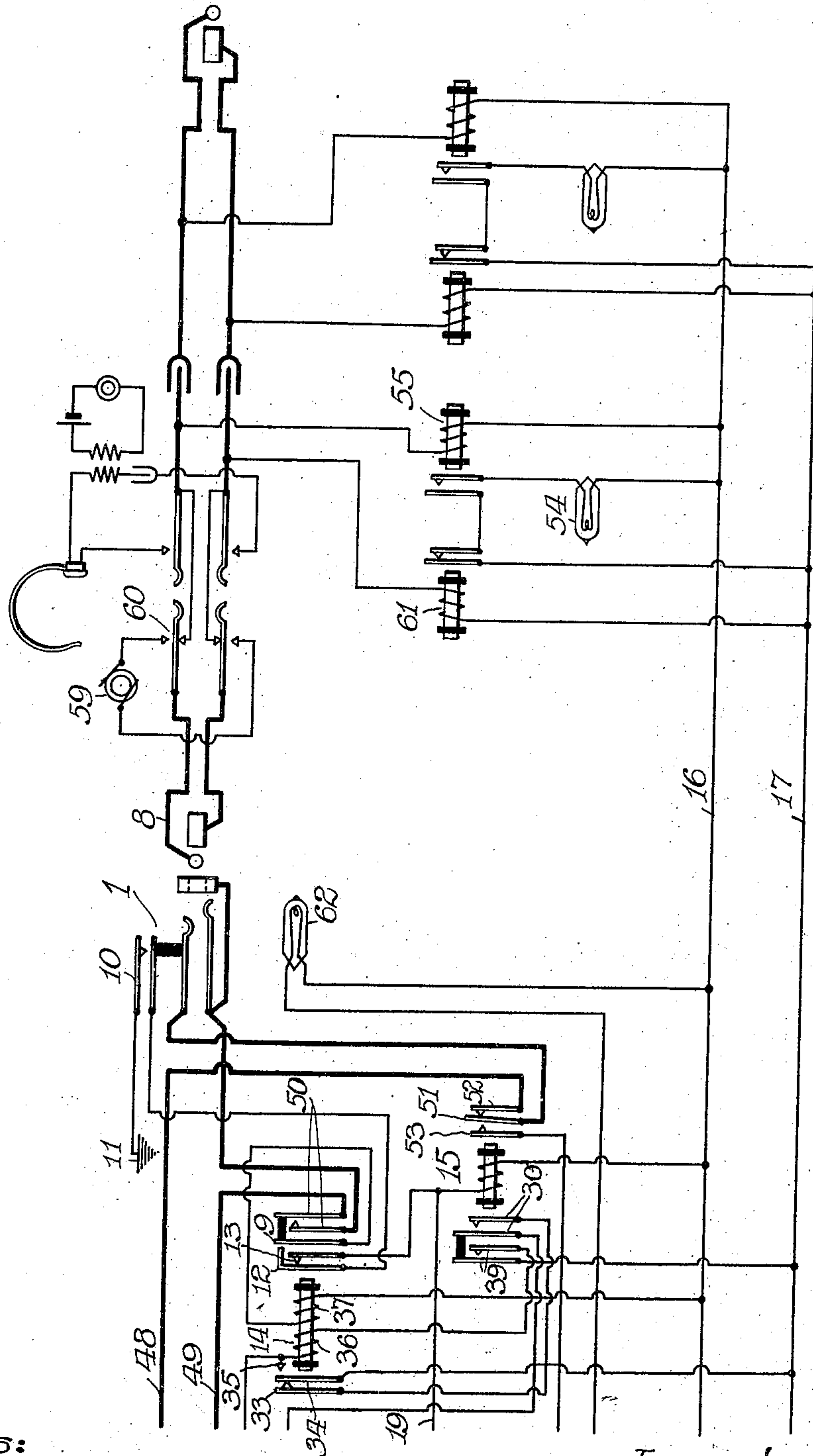
Inventor
 Eugene A. Reinke
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 Att'ys

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2 SHEETS—SHEET 2.

PART II



Witnesses:
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UNITED STATES PATENT OFFICE.

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AUTOMATIC TRUNKING SYSTEM.

1,242,374.

Specification of Letters Patent.

Patented Oct. 9, 1917.

Application filed November 18, 1914. Serial No. 872,689.

To all whom it may concern:

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

The subject matter of this invention is an automatic trunking system.

The invention is especially applicable to trunk lines running between central switchboards and private branch exchanges.

In manual systems, the practice heretofore has been to provide a certain number of lines having the usual directory and switchboard numbers, these lines being assigned to the private branch exchange. Hence, it has been necessary to furnish the operators at the central switchboard with a list of the number of lines which are connected to a given private branch exchange. In making a connection with a private branch exchange it has been necessary for the operator to select a line from the available list and test the same to ascertain if it were busy. Inasmuch as a number of the lines to a private branch exchange are often added after a considerable period, it is impossible to select consecutive numbers and, as a result, the lines leading to a private branch exchange are often scattered throughout the entire board.

The object of the present invention is to provide a trunking system for private branch exchange service which will automatically select an idle trunk from a number of trunks leading from the central switchboard to the private branch exchange.

Another object of the invention is to provide an improved busy test which will relieve the operator of the duty of manually testing the trunks to ascertain their busy or idle condition.

A still further object is to provide a meter for registering the number of times that a call to the private branch exchange was initiated but could not be completed, due to the busy condition of all the trunks.

In the accompanying drawings, the single figure, comprising parts 1 and 2 placed on

Sheets 1 and 2, respectively, illustrates diagrammatically a system embodying my invention.

A number of jacks 1 are located at various positions on the main switchboard corresponding to their directory numbers and are each connected to selecting switches 2, which have access to contacts 3, 4 and 5 forming the line and private terminals of the trunks 6, 7, leading to the private branch exchange. Each line jack 1, by means of its switch 2, has access to all of the line terminals of the group of lines or trunks leading to a given private branch exchange, so that the operator is enabled to make connection with a non-busy trunk by inserting a plug 8, of a cord circuit into jack 1, which, in effect, forms a single terminal for a number of lines. The jack 1 is provided with an extra pair of contacts 10, one of which is connected to the grounded side of battery, as indicated at 11, the other contact being connected through the springs 12, 13, of the double wound testing relay 14, through the selecting relay 15, to battery B, over the bus-bar 16.

The contact springs 10 also close a circuit for the low wound relay 18 by way of the wire 19, through the windings of the relay 18, springs 20, 21 and through the normally closed springs 23, 24 of the busy group relay 25, to battery by way of bus-bar 16.

The selecting relay 15, by closing a pair of contacts 30, closes a circuit for the stepping magnet 31 to start the selecting switch in its search for a set of idle trunk contacts, the circuit for the stepping magnet 31 being formed from the battery B, through the interrupter 32, through the normally closed contacts 28 of the relay 25, winding of stepping magnet 31, through the contacts 30 of the relay 15, these contacts being closed by the energization of said relay, and through the normally closed contacts 33, 34 to the grounded side of battery.

The energization of the selecting relay 15 closes a pair of contacts 39 which places the winding 36 of the double wound relay 14 in contact with the private segment 40 of the selecting switch, a circuit being formed from the grounded side of battery, through the contacts 39, winding 36 of relay 14, normally closed contact springs 43 of the stepping magnet 31 to the private segment 40.

As soon as one of the switch arms connects the private segment 40 with an idle private terminal 5, the winding 36 will be energized to break the circuit of the stepping magnet.

Let it be assumed that the idle trunk 6, 7, having the terminals 3, 4 and the private contact 5, is selected by such operation:—the winding 36 of relay 14 will then be energized over the following circuit: grounded side of battery B, contacts 39 which are held closed by the energization of relay 15, winding 36 of relay 14, contacts 43, private segment 40, private contact 5, winding 44 of the private relay 45 to battery over the bus-bar 16. The relay 14 is thereby energized opening the contacts 33, 34, and closing the front contacts 34, 35, to form a shunt for the winding 36, and, at the same time, placing direct ground upon the private contact 5 so that the trunk corresponding thereto will be non-selectable by any other switch 2 corresponding to a different jack 1 on the main switchboard. As the automatic switch is now inactive, the line segments 41, 42, are in contact with the terminals 3, 4, of the trunk 6, 7, leading to the private branch exchange. Energization of the relay 14 breaks the contact at springs 12, 13, and makes contact between springs 9 and 12, this set of springs being a make-before-break device. As a consequence, the winding 37 will be energized by current flowing from battery B, through the winding 37, make-before-break contacts 9 and 12, through the contact pair 10, to grounded side of battery 11 to form a locking circuit. The circuit for relays 15 and 18 is thereby broken and these relays are deenergized. The winding 36 of the testing relay 14 is at this time deprived of current, but the grounded contact 34 is held against contact 35 to maintain a test potential upon the private terminal 5.

The private relay 45 is also held energized during the busy condition by current flowing over the grounded contact 34 for a purpose to be described later. The testing relay 14, in addition to closing its own locking circuit, closes the sleeve contacts 50 in the line 49 connecting the sleeve spring of the jack 1 with the segment 42 of the selecting switch. The deenergization of the selecting relay 15 closes the tip contacts 51 52 in the line 48 connecting the tip spring of the jack 1 with the segment 41 of the selecting switch. Connection is thereby established from the plug 8 of the operator's cord circuit, through the selecting switch, to the private branch exchange. The operator is apprised of the completion of the connection by lighting of the supervisory lamp 54, when the line circuit is completed, the circuit of lamp 54 being closed by energization of the tip relay 55 over the tip side of line, through

the contacts 41—3 of the automatic switch, and through the winding 57 of the cut-off relay 56 to the grounded side of battery.

The operator then applies ringing current from the generator 59 to the line by means of the ringing key 60. As soon as the call is answered at the private branch exchange, the sleeve supervisory relay 61 will be energized and the supervisory signal 54 obliterated.

In case the lines 6 and 7 had been busy, the terminal 5 would have been subject to a test potential from a grounded contact 34 of some other switch, thus short-circuiting the winding 36 and preventing energization.

If all the trunks leading to the private branch exchange are busy, and a call is initiated at the central station, the operator and the calling subscriber will be apprised of the busy condition of all of the trunks in the following manner: A busy signal 62 may be installed on the main switchboard adjacent the jack 1 connected to the selecting switch 2. Lighting of this lamp 62 indicates that all of the trunks are selected and are busy. A meter or register R is provided for recording each such occurrence, in order that the central station may be apprised of the adequacy of the number of trunk lines to a given private exchange. In case all of the trunks are busy and a call is initiated, the switch 2 will not be caused to rotate uselessly, but will fail to start, inasmuch as the stepping circuit will be open at the contacts 28. The relay 14 of each busy jack 1 is energized at this time, and the grounded contact 34 closes the circuit for the winding 44 of the relay 45 to maintain the same in energized condition. Inasmuch as each one of the relays 45 associated with their respective lines is energized, the normally open contacts 63 thereof will be held closed. The contacts 63 are all connected in series so that a circuit will not be completed through them until all of the trunk lines are busy, but upon such occurrence a circuit is formed for the busy group relays 25 and 65 in parallel. The energization of the relay 25 has opened the contacts 28 so that no movement of the switch 2 will be caused. The jack switch 10 closes the circuit through the relay 15 to cause it to operate its contacts, but, as above explained, the relay 14 cannot be energized, due to the short-circuited or open condition of its winding 36. The circuit for the relay 18, which was previously closed at the contacts 23, 24, is now closed through the contacts 24, 26, in series with the register controlling relay 66. The relay 66 is wound to a high resistance, approximately 2000 ohms, while the relay 18 is wound only to about 200 ohms resistance. In consequence of this the relay 66 energizes before the relay 18 is

energized and closes the contacts 67, which control the circuit of the relay 68. Relay 68 connects the terminal of relay 18 to battery directly by way of the spring 69, so that relay 18 is operated. This results in a closing of the make-before-break contact 22 at the relay 18 to lock the circuit of the relay 18 for the purpose of giving a busy signal, as will be described later.

The energization of the relay 68, which was caused by an insertion of the plug 8 in the jack 1 at the time that all of the trunk lines were busy, causes a registration to be made on the register R shown at the left of the diagram, the contact 70, controlling the magnet 71 being closed at the time that the relay 68 is energized. The energization of the relay 68 is of momentary duration only, since the closing of its contacts 69 short-circuits the high resistance magnet 66, causing it to open its contact 67 and deenergize the relay 68.

Energization of the relay 18, as above explained, closes the contact pairs 72, 73, the first pair controlling the circuit of the lamp flasher 74 connected to the busy signal 62. The circuit of this signal is formed from grounded side of battery, through the interrupter 74, through the contacts 27 of the relay 25, through the contact 72 of the relay 18, through the signal 62 to battery B.

If desired, a busy signal may be automatically given directly to the calling subscriber to inform him of the condition of the private branch exchange circuits. This is accomplished by the connection of the busy test machine 75 to the tip side of the line over the following circuit: grounded side of battery, interrupter 75, contacts 76, which are held closed at this time by the energization of relay 65, contact 73 of the relay 18, contacts 51, 53 of the relay 15 to the tip side of the line, through the tip relay of the cord circuit to the battery B. As the circuit is opened and closed at the busy machine 75, the lamp 54 will be flashed and a busy tone may be given over the calling line.

When these special trunk circuits are to be used on lines at private branch exchanges for night service, a regular line equipment is placed at the main exchange, as indicated in the drawings. This comprises a spring jack 77 and line signal 78. A switch 80, controlling the circuit for the signal lamp 78 may be closed when it is desired to use the trunk 6, 7, as a line for calling the central station. A relay 79 is connected in circuit with the winding 58 of the cut-off relay 56 in series with the contacts 82, 83, and the sleeve side 7 of the trunk line, the other winding 57 of the relay 56 being connected from the grounded side of battery to the tip side of the trunk 6, 7, and it can be seen that a circuit will be closed through the relay 79 and 56 when the terminals of the trunk 6, 7,

are closed at the private branch exchange as by the connection of the telephone set T, when a trunk line is used for calling purposes. The line relay 79 closes the contacts 81 for the line signal lamp 78, and the call is answered by a central operator in the usual manner by the insertion of the answering plug in the jack 77. Battery flowing over the tip side of the cord circuit energizes the winding 57 of the relay 56 to cut off the line relay 79 in a manner well known in the art. Due to the fact that the relay 45 is connected in parallel with the relay 56, manual selection of a trunk line will render the same busy in the same manner as a connection of an automatic switch thereto, the contact 63 being closed at this time, so that if part of the lines are used for calling the central exchange, and the remainder are busy, due to incoming calls over automatic switches 2, the fact of an incoming call being initiated during the time when all of the lines are thus busy will be recorded on the register R.

A brief description of the operation is as follows: Insertion of a plug 8 in the jack 1 energizes the relay 15 to start the automatic switch in a search for an idle set of trunk terminals. This switch continues until a set of idle contacts is found, at which time the relay 14 will be energized to place busy potential on the private contact on the selected trunk, the corresponding relay 45 being energized to close the series contact 63. Connection being made through the automatic switch with an idle trunk is indicated to the operator by the lighting of her supervisory lamp on account of current flowing over the tip side of the line through the relay 56. Ringing current is applied to the trunk line, and the private branch exchange responds in the usual manner. As soon as all the trunks are rendered busy by being selected or by serving as calling lines, the series of contacts 63 will be closed to energize the busy group relays 65 and 25 which are common to the group of trunks corresponding to each one of the jacks 1. If, at this time, the incoming call is initiated by insertion of a plug 8 in idle jack 1, a switch 2 corresponding thereto will not be operated, but instead a connection will be made through the busy signal 62 to apprise the operator of the busy condition of all the trunks to the private branch exchange. At the same time, a busy tone is projected over the calling line and a registration of the fact that a call was unsuccessful, due to the busy condition of all the trunks is made. It is to be understood that the trunks need not terminate on the private branch exchange but may be independent lines, each terminating in a separate telephone instrument.

For night service, the switch 80 is closed and the trunk line operates as any other line

on the central switchboard, the controlling relay 45, however, being operated in order to record the failure of an incoming call, due to the busy condition of all the trunks.

5 It is to be understood that any number of telephones may be connected at the private branch exchanges in the well-known manner. It can be seen from the above that I have provided a system in which only a
10 limited number of jacks need to be provided throughout a multiple switchboard for a plurality of trunk connections at a private branch exchange. As the selection of the trunks is automatic it obviates the making
15 of busy tests by the operator. The means for recording the fact of an unsuccessful call for a private branch exchange, due to busy condition, is especially valuable in furnishing statistics upon the adequacy of ex-
20 isting connections between a private branch exchange and the central office. The automatic selecting arrangement does not prevent the trunk lines from being used as calling lines, thus securing a maximum effi-
25 ciency of the apparatus employed.

It will be apparent to those skilled in the art that my invention is not to be construed as being dependent upon any of the details which I have set forth above, but
30 that the invention may be practised in various forms, and may be subject to numerous modifications, all of which I consider to come within the spirit and scope of my invention.

35 What I claim is:

1. In combination, a central exchange switchboard, a plurality of telephone lines terminating in multiple jacks on said switchboard, said jacks being arranged in
40 regular predetermined numerical order, cord circuits for interconnecting said lines, a private branch exchange, said exchange being designated by a regular directory number, a plurality of lines between the cen-
45 tral and said private exchange switchboard, multiple jacks corresponding in numerical position on said switchboard to the directory number of said private branch exchange, automatic line selecting switches connected
50 to said jacks, each switch being set into action to select one of the idle lines between the exchanges when a plug is inserted in the corresponding jack, and means controlled by the busy condition of all of said
55 trunks for preventing movement of said switch.

2. In combination a central exchange switchboard, a plurality of telephone lines terminating in multiple jacks on said
60 switchboard, said jacks being arranged in regular predetermined numerical order, cord circuits for interconnecting said lines, a subscriber's station being designated by a regular directory number, a plurality of
65 lines between the central switchboard and

said subscriber's station, multiple jacks corresponding in numerical position on said switchboard to the directory number of said subscriber's station, automatic line selecting
70 switches connected to said jacks, each switch being set into action to select one of the idle lines between the exchange and the subscriber's station when a plug is inserted in the corresponding jack, a controlling circuit
75 closed upon the insertion of a plug in said jack for causing said switch to select an idle line, and means controlled by the busy condition of all of said lines for opening said controlling circuit.

3. In combination a central exchange
80 switchboard, a plurality of telephone lines terminating in multiple jacks on said switchboard, said jacks being arranged in regular predetermined numerical order, cord
85 circuits for interconnecting said lines, a private branch exchange, said exchange being designated by a regular directory number, a plurality of lines between the central and said private exchange, multiple jacks corresponding
90 in numerical position on said switchboard to the directory number of said private branch exchange, automatic line selecting switches connected to said jacks, means controlled by the insertion of a plug
95 in each jack for moving the corresponding switch to select an idle line, a private relay for each line, said relay being energized by the connection of a jack with the corresponding line, an interrupter circuit for advancing
100 said automatic switch, a series circuit having contacts controlled by said private relay, a relay in said circuit for opening said interrupter circuit when all of said private re-
lays are energized.

4. In combination, a plurality of tele-
105 phone lines, a private relay for each of said lines, a central exchange switchboard, a plurality of jacks mounted on said switchboard, operators' cord circuits therefor, automatic
110 switches connected to said jacks, said switches having contacts connected to said telephone lines, a circuit controlled by said private relay, a busy relay in said circuit, a signal, and means controlled by said last
115 relay upon the insertion of a plug in one of said jacks when all of said telephone lines are busy to display said signal.

5. In combination, a plurality of tele-
120 phone lines, automatic switches having banks of contacts at which said lines are connected, a central exchange switchboard, jacks mounted on said switchboard, opera-
tors' cord circuits therefor, a circuit controlled by the insertion of a plug in one of
125 said jacks, a selecting relay in said circuit, a stepping magnet for said switch, an interrupter in circuit with said stepping magnet, contacts in said interrupter circuit controlled by said selecting relay, a busy relay
130 having contacts in said interrupter circuit,

private relays connected to each of said lines, said relays being energized when the corresponding line is busy, a series circuit closed by energization of all of said relays for energizing said busy relay to open the contacts in the interrupter circuit.

6. In combination, a plurality of telephone lines, automatic switches having banks of contacts at which said lines are connected, a central exchange switchboard, jacks mounted on said switchboard, operators' cord circuits therefor, a circuit controlled by the insertion of a plug in one of said jacks, a selecting relay in said circuit, a stepping magnet for said switch, an interrupter in circuit with said stepping magnet, contacts in said interrupter circuit controlled by said selecting relay, a busy relay having contacts in said interrupter circuit, private relays connected to each of said lines, said relays being energized when the corresponding line is busy, a series circuit closed by energization of all of said relays for energizing said busy relay to open the contacts in the interrupter circuit, busy signals mounted on said switchboard adjacent each of said jacks, a circuit for said signal, contacts in said circuit controlled by said busy relay.

7. In combination, a plurality of telephone lines, a central exchange switchboard, jacks mounted on said switchboard, a plurality of automatic switches each connected to one of said jacks, said switches having selectable contacts connected to said lines, a relay connected to each line, said relay energized when the corresponding line is busy, a stepping magnet for said switch, an interrupter circuit for said stepping magnet, a selecting relay to close said interrupter circuit to move said switch, a contact controlled by the insertion of a plug in the corresponding jack to energize said selecting relay, a busy relay having a circuit controlled in series by the relays connected to said lines, a busy test machine, a circuit for said machine, a contact in said circuit closed by the energization of said busy relay, a contact connected to each of said jacks, said contact controlled by the corresponding selecting relay to close the circuit of said busy test machine to the cord circuit of the connected plug to apprise the calling subscriber that all of said selectable lines are busy.

8. In combination, a plurality of telephone lines, a central exchange switchboard, a plurality of jacks mounted on said switchboard, a plurality of calling lines, a cord circuit to connect said calling lines with said jacks, automatic selecting switches connected to said jacks, said switches having banks of contacts connected to each of said telephone lines, a stepping magnet for said switch, a selecting magnet controlling the

circuit of said stepping magnet, private relays connected to the contacts corresponding to each of said lines, a testing relay, a contact for said testing relay controlled by said selecting relay, said testing relay and said private relay being connected in series by said automatic switch and means controlled by said testing relay for placing a test potential upon said private contact corresponding to the selected line, a busy relay, a circuit for said busy relay controlled by said private relay, a busy signal, a circuit for said signal, said busy relay controlling the circuit of said signal and said interrupter circuit.

9. In combination, a plurality of telephone lines, a central exchange switchboard, a plurality of jacks mounted on said switchboard, automatic selecting switches connected to said jacks, said switches having selectable contacts connected to said telephone lines, a stepping magnet, a circuit for said magnet, a private magnet for each telephone line, a private relay for each telephone line, a selecting relay for each jack, said relay being energized by the insertion of a plug in said jack, a busy relay controlled by said private relay and contacts in said interrupter circuit controlled by said busy relay and said selecting relay respectively.

10. In combination, a plurality of telephone lines, a central exchange switchboard, a plurality of jacks mounted on said switchboard, automatic switches connected to said jacks, said switches having selectable contacts corresponding to each of said lines, said contacts including private contacts for each line, a selecting relay having a circuit controlled by the insertion of a plug in the corresponding jack, each of said lines having a private relay connected to the corresponding private circuit, a circuit having a plurality of normally open contacts in series, a busy relay in said circuit, a meter controlling relay having a circuit controlled by said busy relay, a meter, and means controlled by the energization of said meter controlling relay for operating said meter.

11. In combination, a group of telephone lines, a central exchange switchboard, jacks mounted on said switchboard, operators' connecting plugs, automatic switches connected to said jacks, said switches having selectable contacts connected to each of said lines, a private relay for each line, said relay being energized upon the selection of said line by an automatic switch, a busy relay, a circuit for said relay, contacts in said circuit controlled by said relay, other contacts in said circuit controlled by the insertion of a plug in one of said jacks, a meter for said group of lines, and means for actuating said meter upon operation of said meter controlling relay.

12. In combination, a group of telephone

lines, a busy relay for said group of lines, a private relay for each of said lines, a circuit for said busy relay controlled by each of said private relays to cause operation of
 5 said busy relay when all of said private relays are energized, a meter controlling relay having a circuit controlled by said busy relay, a meter for said group of lines and operating means for said meter, said means
 10 controlled by said last named relay.

13. In combination, a group of telephone lines, a central exchange switchboard, jacks for said telephone lines, operators' connecting circuits for said jacks, private relays
 15 for each of said lines, said relays being energized upon the connection of an operator's connecting circuit with the corresponding line, a busy group relay, said relay having a circuit controlled by each of said pri-
 20 vate relays, a meter, and means to operate said meter upon the actuation of said busy group relay.

14. In combination, a group of telephone lines, a central exchange switchboard, jacks
 25 on said switchboard for said telephone lines, private relays for each of said lines, a busy group relay having a circuit controlled by said private relays, a meter controlling magnet having a circuit controlled jointly
 30 by said busy group relay, and by the insertion of a plug in one of said jacks, and a group meter operated upon the actuation of said meter controlling relay.

15. In combination, a group of telephone
 35 lines, a central exchange switchboard, a plurality of jacks for said lines, private magnets for each line, said magnets being energized when the corresponding lines are busy, a busy group relay, a circuit for said relay
 40 controlled by each of said private relays, a meter controlling relay, a low-wound relay, a circuit connecting said meter controlling relay and said low-wound relay in series, a normally open contact in said circuit, said
 45 contact controlled by said busy relay, means to close said circuit, said means being operated by the insertion of a plug in one of said jacks, a busy meter for said group of lines, means controlled by the operation of said
 50 meter controlling relay to operate said meter and to short-circuit said meter-controlling relay to cause energization of said low-wound relay, said low-wound relay closing a locking circuit and breaking the circuit of
 55 said meter-controlling relay.

16. In combination, a group of telephone lines, a central exchange multiple switchboard, a plurality of selecting jacks mounted in regular numerical order according to
 60 their directory numbers among the multiples on said switchboard, automatic line selecting switches connected to said jacks, said switches having selectable contacts connected to said group of lines, line relays connect-
 65 ed to said lines, answering jacks mounted on

said central exchange switchboard connected to said lines, a line signal, a cut-off relay, said relay being energized by the insertion of a plug in said answering jack or by the connection of a plug with said line through
 70 the selecting jack and automatic selecting switch.

17. In combination, a private branch exchange switchboard, a central exchange multiple switchboard, a plurality of lines lead-
 75 ing from said private branch board to said central exchange board, and having answering jacks in regular answering position in said central switchboard, selecting jacks mounted among the multiples in regular
 80 numerical order according to the given directory number, automatic selecting switches connected to said selecting jacks and multiple terminals for said lines in said switches, said terminals being selectable by
 85 said switches.

18. In combination, a private branch exchange switchboard, a central exchange multiple switchboard, a plurality of lines lead-
 90 ing from said private branch exchange board to said central exchange board and having answering jacks in regular answering position in said central switchboard, selecting jacks mounted among the multiples in regular numerical order according to the
 95 given directory number, automatic selecting switches connected to said selecting jacks, multiple terminals for said lines terminating in said automatic switches and means to record the number of times that a selection
 100 was attempted and all the lines were busy.

19. In combination, a private branch exchange switchboard, a central exchange multiple switchboard, a plurality of lines be-
 105 tween said exchanges terminating in said switchboard, answering terminals normally connected to said lines and multiple jacks normally disconnected from said lines and an automatic switch for each jack to allow selection of an idle line and connection of
 110 the jack therewith.

20. In combination, a private branch exchange switchboard, a central exchange multiple switchboard, a plurality of lines ex-
 115 tending between said exchanges and having answering terminals at the central exchange switchboard normally connected to said lines, multiple jacks normally disconnected from said lines and from each other, and automatic switches for each jack to allow
 120 selection of an idle line and connection of the corresponding jack therewith, said jacks being all similarly numbered and located in the multiples.

21. In combination, a private branch ex-
 125 change switchboard, a central exchange multiple switchboard, a plurality of lines between said switchboards, a plurality of multiple jacks all corresponding in position in the multiples to a single exchange or direc-
 130

tory number, said jacks being normally disconnected from said lines, automatic selecting switches at the central exchange for making connection between said jacks and
5 idle ones of said lines and means for registering the number of times when a selection was attempted and all of the lines were busy.

In witness whereof, I hereunto subscribe my name this 14th day of November, A. D. 1914.

EUGENE A. REINKE.

Witnesses:

GEO. V. LENNON,
C. H. McCONNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."