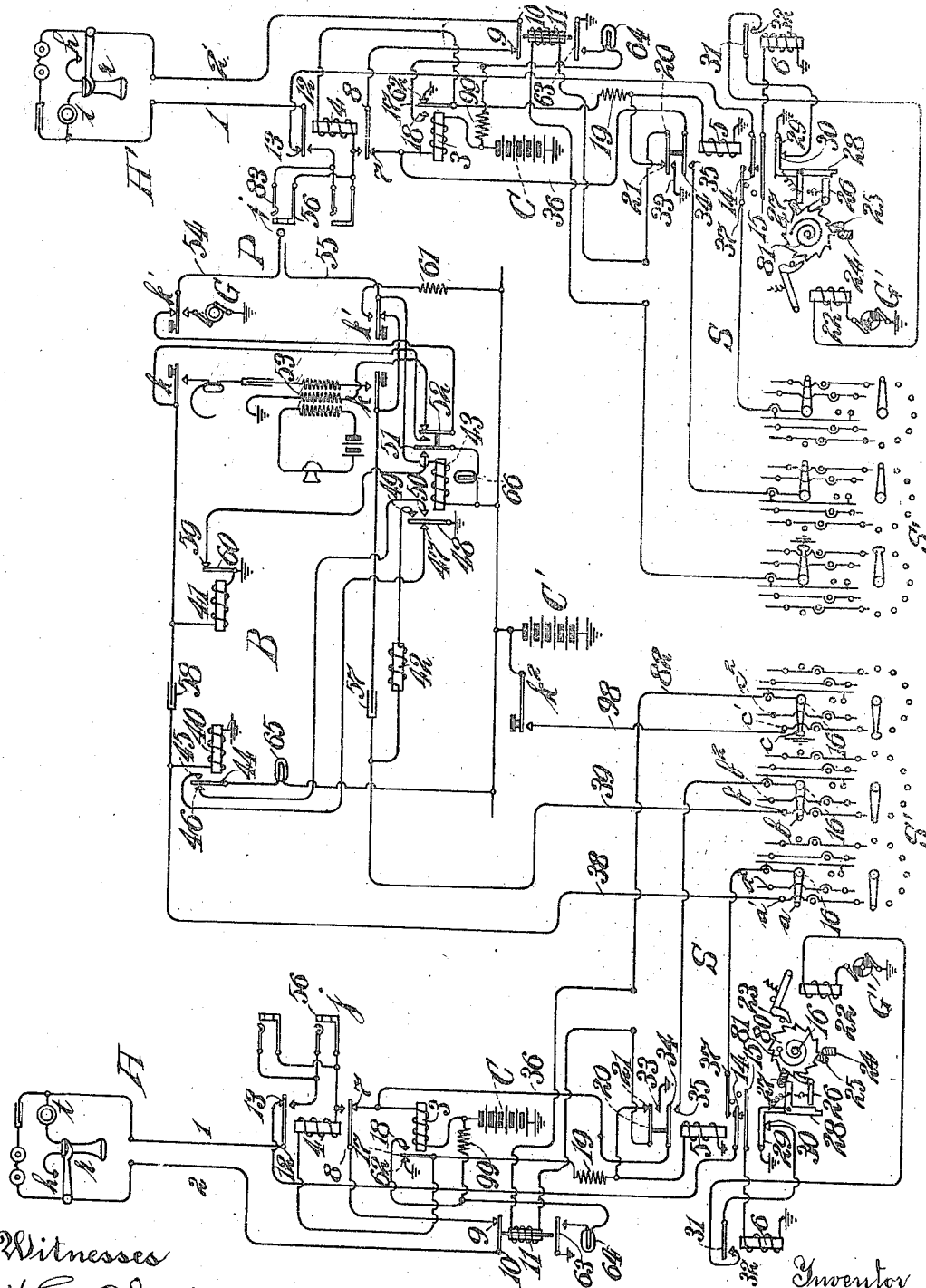


H. G. WEBSTER.
TELEPHONE SYSTEM.
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TELEPHONE SYSTEM.

1,123,826.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY G. WEBSTER, a citizen of the United States, and residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephone exchange systems and particularly to that type in which link-conductors are interchangeably associated with the subscribers' lines, mechanism being provided for each subscriber's line which is automatically actuated, when the receiver is taken for use, to connect the subscriber's line to an idle link-circuit.

In the embodiment of the invention disclosed in the present application, each link-circuit is provided with a manually controlled terminal, and the connection of a subscriber's line to the link-circuit displays a calling signal located before an operator, who may then, upon learning the wishes of the calling party, complete the connection to the desired called line.

The principal object of the present invention is to provide improved means for securing the connection of the subscriber's line to an idle link-circuit in a structure characterized by simplicity and positiveness of operation and economy of manufacture.

Other objects of my invention are to provide means in structures of this particular character for preventing the disconnection of the link-circuit when the subscriber replaces his receiver after connection is established; to provide means for preventing the operation of the automatic mechanism through an accidental ground on the outside limbs of the line; to provide automatic means for disconnecting such grounded line limbs; and to provide means for giving an indication of such disconnection.

Still other objects of my invention will be apparent from the following description.

In accordance with my invention, I provide for each subscriber's line a traveling switch which is preferably adapted to carry movable contacts in a rotary direction when a link-circuit is to be selected, and to restore them in the reverse direction at the time of disconnection. This switch is operated by step-by-step mechanism, preferably actuated by current from a pulsating generator. The switch is provided with three moving contacts or wipers which constitute the termi-

nals individual to the line, and with fixed contacts adapted to be engaged thereby, which constitute terminals of the circuits individual to various link-conductors. These link-conductors terminate preferably in cords and plugs at various operators' positions of a multiple switchboard, and the subscribers' lines are provided with multiple jacks at the multiple sections.

I do not wish, however, to be limited to this means of connecting the link-circuits to other lines.

The two moving contacts or wipers of the switch, which correspond to the line limbs, have a normal position in which they do not engage any of the fixed contacts of the switch, and the third or private wiper normally engages a contact directly connected to earth or the return side of the central battery. When rotated, the wipers will engage preferably, first, the contacts connected to a link-circuit terminating at the first operator's position; then, contacts connected with a link-circuit at the second operator's position; then, those leading to a third operator's position, and so on; and these fixed contacts are multiply connected on the similar switches individual to other subscribers' lines in a group. The other link-circuits, terminating at the first, second, third and other operators' positions, may be similarly connected to the switches of lines in other similar groups. The arrangement is such that if the link-conductors, connected to the first contacts of a particular group of switches, be in use, the switch will step ahead to the second contacts, and so on until an idle link-circuit is reached; when it will come to rest and the operation of associated mechanism will connect the line limbs to the talking conductors of the link-circuit and cause the display of a calling signal associated therewith. The operator, after ascertaining what connection is desired, tests the multiple jack of the desired line, makes connection by the insertion of the plug, and rings the subscriber in the usual way. When the plug is inserted into the jack of the desired line, the operation of a cut-off relay associated with that line disconnects its traveling switch and associated mechanism. When the receivers have been replaced at the termination of conversation, the removal of the connecting plug causes the deenergization of a magnet, and the retraction of the arma-

ture of this magnet releases the mechanism of the switch and allows the wipers to return to their normal position by spring tension. The organization is such that if that line limb, associated with the active terminal of the battery, become accidentally grounded, the switch will not start to move, and a heat-coil or other protective device will be operated to disconnect the grounded line limb and cause the display of a lamp or other signal, indicating such disconnection. If the opposite limb of the line become grounded, the switch will not start when the subscriber attempts to call and the heat-coil will likewise be operated to disconnect the first line limb unless the receiver is immediately replaced. The heat-coil can likewise be operated by means of an operator's key, should the two limbs become directly connected together. Should the circuit of the limbs be momentarily closed, as if the receiver were raised and immediately replaced, the switch would stop with its wipers engaging the contacts of a busy or an idle link-circuit, but the line limbs would not be then connected to the wipers, nor would the link-circuit be excluded from use by other lines.

To secure the proper operation of the apparatus, I provide a relay connected between one line limb and the active terminal of the battery, which serves, when operated, to complete a circuit of a local relay magnet controlling the connections of the line wipers, which are normally disconnected from the line limbs. This relay is normally short circuited through the direct earth connection of a normal contact with a private wiper. I provide a second relay normally connected between the return side of the battery and the opposite line limb, which serves, when energized, to cause the operation of the driving-magnet of the switch. The operation of both line relays is therefore required to cause the connection of the line to an idle link-circuit; and if the first-mentioned line relay alone operate, as through the presence of an accidental ground, it will include the previously mentioned heat-coil in circuit with the direct earth connection of the private wiper and cause its operation within any desired time. The local relay is energized when connection is established to the link-circuit; and is deenergized at the time of disconnection to disconnect the line wipers, and to release the mechanism of the switch, allowing them to return to normal. When the connecting plug of the link-circuit is inserted into the jack of the desired line, a circuit is then established for the first-mentioned line relay, which maintains its energization independently of the circuit through the substation and thus prevents the deenergization of the local relay until the plug is removed.

My invention will be more fully understood

from the accompanying drawing which represents two subscribers' lines with their traveling switches, and a suitable link-circuit apparatus, all organized in accordance with a preferred form of my invention.

Like characters refer to corresponding parts in the drawing.

Referring to the drawing, lines A and A' are each provided with the usual bell and condenser in permanent bridge of the line, and with a receiver *r* and transmitter *t* adapted to be included in circuit by the elevation of the switch-hook *h*.

The limbs 1 and 2 extend to the central office and are there connected to the central battery C.

A rotary switch S is provided for each line, which is diagrammatically indicated as having a ratchet-wheel 80 and wipers *a*, *b*, *c*, carried on a shaft 16, the switch being driven with a step-by-step motion by the motor-magnet 22 when circuit is closed through the pulsating generator G'.

The driving pawl 23 is normally out of engagement with the wheel 80.

The wipers *a* and *b* are associated with limbs 1 and 2 of the line respectively; and when the shaft is rotated by the action of the magnet 22, they engage the contact pieces or fixed contacts *a'*, *a''* and *b'*, *b''* respectively, moving out of engagement with one contact-piece before engaging the next.

Wiper *c* is indicated as having a broad terminal and is associated with the local circuits of the structure. It normally rests upon the contact-piece connected to the return side of the battery C as indicated; and when rotated, it engages contact *c'*; and in stepping from *c'* to *c''*, engages *c''* before disengaging *c'*, and likewise with the other contacts over which it wiper.

The fixed contacts are diagrammatically indicated as multiply connected to corresponding contacts of other switches in the same group of lines, such other switches being indicated at S'.

The first contact-pieces are to be understood as connected to the wires of a link-circuit terminating in a cord and plug at the first operator's position; the second contact-pieces to a similar circuit at a second operator's position; and so on through all of the contacts of the switch.

The ratchet-wheel is provided with a retaining pawl 26 controlled by the attraction and release of armature 29 of the local relay 5. When the shaft 16 is rotated by the action of magnet 22, the retaining pawl 26 prevents the restoring spring 81 from returning the shaft to its normal position. After the switch has made one step, the energization of relay 5 will cause the moving member 28, carried by armature 29, to engage the projecting arm of the retaining pawl 26. When relay 5 is subsequently de-

energized, the release of armature 29 causes member 28 to throw the retaining pawl 23 out of engagement with the ratchet-wheel; and the spring 81 restores the shaft and wheel to the normal position indicated, with the projection 25 in engagement with the stop 24. As this position is reached, the projection 27 of the ratchet-wheel engages the horizontal arm of the moving member 28, thus throwing the vertical arm of the same member out of engagement with the retaining pawl which again engages the ratchet wheel. A suitable link-circuit arrangement is indicated at B. When a subscriber desires to initiate a call, the removal of his receiver closes a circuit which may be traced as follows: from the upper terminal of the battery C, through line relay 3, contacts 7—8 of the cut-off relay 4, contact 9 and spring 10 associated with the heat-coil 11, limb 2, receiver *r* and transmitter *t*, limb 1, contacts 12—13 of the cut-off relay, contacts 14—15 of the local relay 5 and to the return side of the battery through the winding of relay 6. This current energizes relays 3 and 6 and operates their contacts.

Contact 17 of relay 3 disengages contact 62 and engages contact 18, thus disconnecting the cut-off relay 4 from its normal ground connection and connecting it to the active terminal of the battery through the protective resistance 99, thus providing a potential at the contact 56 of jack *j* to give a busy indication at this time. The operation of these contacts of relay 3 also provides a path for battery from the upper terminal of battery C, through protective resistance 99, contacts 18—17, resistance 19, contacts 21—20, the winding of heat-coil 11, and to the return side of the battery through wiper *c* and the contact-piece upon which it normally rests. This circuit is of but momentary duration normally; but if it be maintained for an abnormal length of time, will cause the operation of the heat-coil 11. The energization of relay 6, however, has caused the engagement of its contacts 31—32, thus completing the circuit of the pulsating generator *G'* through magnet 22, and this starts the rotation of the switch. As will be subsequently shown, the contacts of all busy link-conductors are normally connected to the return side of the battery through wire 82 of the connected switch. As long, therefore, as wiper *c* passes over such contacts, relay 5 is shunted by the connection from resistance 19, through contacts 21—20, heat-coil 11 and wiper *c*, and will not be energized. When, however, an unoccupied link-circuit is reached, the corresponding contact is not so connected. In the diagram, the first one reached is *c'* associated with the link-circuit B. Assume, therefore, that this link-circuit be idle; as wiper *c* disengages its normal contact, the

shunt circuit of relay 5 is broken and the relay energized. The operation of its contact 20 disconnects the wiper *c* and heat-coil 11 from the circuit of relay 5 and connects them directly to the return side of the battery at contact 33.

The operation of the contact controlled by armature 29 interrupts the circuit of magnet 22 at contact 30. The operation of contact 14, which engages contact 37 and subsequently disengages contact 15, disconnects relay 6 and connects limb 1 of the line to the line wiper *a* which is now resting on contact *a'*, and the operation of contact 34 connects relay 3 and limb 2 to wiper *b* at contact 35. It will be understood that the heat-coil will not be operated during the short time while the wiper *c* is passing over busy contacts.

Circuit may now be traced from battery C, through relay 3, contacts 7—8, limbs 2 and 1, wiper *a*, contact *a'*, wire 38 and relay 40 to the return side of the battery. This circuit energizes relay 40 and the operation of contact 44 completes a circuit for illuminating lamp 65 through contact 45 and contacts 47—48 of relay 43. Upon observing the illumination of the lamp, the operator actuates her listening-key levers *h* and ascertains the wishes of the subscriber A. Assuming A' to be the one desired, the operator tests in the usual way by applying the tip of her connecting plug P to the contact of the jack *j* of that line. If the line be busy, the potential of contact 56 will be raised either through the presence of another connecting plug in a corresponding jack, or through the operation of relay 3 of that line, as already pointed out. In either case, current will then flow from contact 56, through strand 54, contact 52 and thence through test winding 53 of the operator's induction coil, giving her the usual test indication. If the line be idle, the plug is inserted and current will then flow from battery C', through relay 43, strand 55, contact 56, relay 4, contact 17 and contact 62 of relay 3 to return side of the battery. Relays 43 and 4 are thus energized and the operation of relay 4 disconnects the line limbs from relay 3 and relay 6 and connects them to the talking terminals of the springjack. Relay 43 being also energized, the operation of contact 48, disengaging contact 47 and engaging contacts 49 and 50, interrupts the circuit of lamp 66 and connects the impedance coil 42 to the return side of the battery. A second energizing circuit is thus provided for relay 3 of the calling line A, which may be traced from the upper terminal of the battery C, through the winding of relay 3, wire 36, contacts 34—35, wiper *b*, contact *b'*, wire 39, impedance 42, contact 49 and contact 48 to the return side of the battery. This energizing circuit is main-

tained as long as the plug P remains in the springjack, thus preventing the deenergization of relay 3 and the restoration of the wipers, when subscriber A replaces his receiver.

The operation of contact 51 of relay 43 completes the circuit of lamp 66 through the contacts 59—60 of relay 41; and the operation of contact 52 of relay 43 disconnects test winding 53 from strand 54 and completes the circuit of the strand through the winding of relay 41. The operator then rings the subscriber in the usual manner, a non-inductive resistance 61 being provided to prevent the vibration of relay 43 by current from the alternating generator G during ringing. When the subscriber answers, current will flow from battery C', through relay 43, strand 55, contact 56, contact 8, limbs 1 and 2, contact 12, contact 83 of the springjack, strand 54 and relay 41 to the return side of the battery. The operation of contact 60 of relay 41 extinguishes the lamp 66 and the two subscribers are united for conversation through condensers 57 and 58. When either subscriber hangs up his receiver, the deenergization of relay 40 or 41 causes the illumination of its associated lamp. When both lamps are illuminated, the operator removes the connecting plug and the circuits of line A' return to their normal condition.

Relay 43 being thus deenergized, contacts 48—49 are disengaged, interrupting the circuit through relay 3 of line A. The consequent operation of its contact 17 restores the circuit of the cut-off relay 4 and interrupts the circuit of relay 5. At the energization of relay 5 at the time of selection, the vertical arm of the moving member 28, carried by the armature 29, engaged the retaining pawl 26. As the relay is deenergized, the retraction of this armature therefore throws pawl 26 out of engagement with ratchet-wheel 80, and the restoring spring 81 carries the shaft and wipers to their normal position as the projecting piece 25 engages pawl 24. As this position is reached, projection 27, also moving with the wheel, throws member 28 out of engagement with pawl 26, allowing the pawl to return into engagement with the ratchet-wheel. If limb 2 of the line become accidentally connected to ground through any resistance which will cause the operation of relay 3, relay 6 is then unenergized; and the circuit closed through contacts 18—17, resistance 19, heat-coil 11 and wiper c, is thus maintained until the heat-coil operates, at which time spring 63 engages its contact, causing the illumination of lamp 64 to indicate such operation, and the disengagement of spring 10 from contact 9 interrupts limb 2, thus allowing relay 3 to be deenergized. If limb 1 of the line similarly become accidentally

grounded, a similar action will take place when the subscriber attempts to call, if his switch-hook be then lifted for the length of time necessary to cause the operation of the heat-coil.

If the subscriber operate his switch-hook intermittently, the switch will step ahead each time circuit is closed. If the hook be depressed after the idle link-circuit has been selected, the switch will immediately release by the means previously described. If the hook, however, be depressed before such idle circuit has been selected, the switch will stop with its wipers in engagement with the contacts of an occupied cord-circuit.

The resistance 19 is so proportioned to the resistance of heat-coil 11, and to that of relay 5, that the relay of the connected line will not be released at this time; and wipers a and b of the line being disconnected at contacts 37 and 35, no interference with the occupied circuit will result. When the connected line is released, the wipers of line A will still remain upon the contacts of the cord-circuit, but the link-circuit may be selected by another calling line, by reason of resistance 19 being so proportioned as to allow the relay 5 of the calling line to be energized at this time. Relay 5 of line A does not at this time get sufficient current to operate it. When subscriber A subsequently elevates his switch-hook, if the link-conductor at that instant be busy his switch will step ahead and select another idle link-circuit. If the link-circuit at that instant be idle, however, his relay 5 will be immediately energized, thus maintaining his connection with the cord-circuit and causing the illumination of the calling signal 65. Should the two line limbs become accidentally connected together, the cord would be selected and the signal displayed as if the subscriber were calling. When the operator attempted to answer and received no response, she would understand the nature of the condition and depress her key k^2 , thus completing a circuit from battery C', through key k^2 , wire 98, contact c', wiper c, wire 82, heat-coil 11, and contacts 20—33 to the return side of the battery. The heat-coil is thus operated, opening the circuit of line A at contacts 10—9, deenergizing relay 3 and restoring the wipers to normal. The same method may be followed in case a subscriber fail to replace his receiver. Means are thus provided whereby certain abnormal conditions shall not cause the switch to operate, but shall cause the line to be disconnected from the central battery and an indicator displayed. Means are thus likewise provided whereby, if a line become connected to a link-circuit under other abnormal conditions, the operator may cause the line to be disconnected from the central bat-

tory and an indicator to be displayed, and may restore the wipers to rest in their normal position.

I find that satisfactory operation can be secured if the central battery have a potential of forty volts, resistance 19 be of two hundred ohms, relay 5 be wound to two hundred ohms, and heat-coil 11 have a resistance of ten ohms; but I do not wish to be limited to this relation of values, as it is obvious that many other values may equally well be employed.

It is to be understood that the batteries C and C' may be the same, and that the several grounds indicated may be a common return. It is obvious that many modifications may be made in my invention without departing from its spirit and I do not wish to be limited to the precise structure illustrated and rescribed.

That which I consider new and novel and desire to secure by Letters Patent of the United States is:—

1. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for said switch, restoring means for said switch, and means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected.

2. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, a local circuit, a heat responsive device included in said local circuit, and means responsive to an abnormal current flow in said line to actuate said device to permanently disconnect said active limb from said source.

3. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and locally controlled heat responsive means to disconnect said active limb from said source.

4. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and locally controlled means to disconnect said active limb from said source, said means being automatically operated in response to current in said active limb but not in response to current in both limbs.

5. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, locally controlled means to disconnect said active limb from said source, and means whereby current in the active limb will operate said locally controlled means and current in both limbs will not operate said locally controlled means.

6. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, locally controlled means to disconnect said active limb from said source, and manual means associated with a link-circuit for causing the operation of said locally controlled means.

7. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, locally controlled means to disconnect said active limb from said source, means whereby current in the active limb will operate said locally controlled means and current in both limbs will not operate said locally controlled means, and manual means associated with a link-circuit for causing the operation of said locally controlled means.

8. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active

- terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for said switch, restoring means for said switch, means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected, and controlling means for said switch restoring means under the control of the substation upon the selection of said link-circuit.
9. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for said switch, restoring means for said switch, means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected, and a relay responsive to current changes in the line, after the line is connected to a link-circuit, for causing the operation of the restoring means.
10. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and means whereby an abnormal earth connection to the active limb does not cause the operation of said driving means.
11. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, and means whereby an abnormal earth connection to the line does not cause said operation of said switch.
12. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and means whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.
13. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and means for preventing a short circuit of the line from causing a link-circuit to be permanently occupied to the exclusion of normal similar lines.
14. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected.
15. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and an electrically operated switch in a local circuit operating to disconnect said active limb from said source, said switch being automatically operated in response to current in said active limb but not in response to current in both limbs.
16. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable con-

tacts operating to select an idle link-circuit and connect the line thereto, an electrically operated switch in a local circuit operating to disconnect said active limb from said source, said switch being automatically operated in response to current in said active limb but not in response to current in both limbs, and a switch under the control of the operator for causing the operation of said electrically operated switch.

17. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and a controlling line relay for said switch so connected that an abnormal earth connection to the active limb does not cause the operation of said driving means.

18. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and a line relay and a local relay for controlling said switch so connected that an abnormal earth connection to the active limb will not cause said operation of said switch.

19. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for said switch, and a relay for each line limb for controlling said switch and circuit connections whereby an abnormal earth connection to the active limb does not cause the operation of said driving means.

20. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts

operating to select an idle link-circuit and connect the line thereto, and a relay for each line limb to control said switch and circuit connections whereby an abnormal earth connection to the active limb does not cause said operation of said switch.

21. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and an electrically operated switch for disconnecting the active line limb from said source whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.

22. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, and an electrically operated switch for disconnecting the active line limb from said source and an operator's key for controlling said electrically operated switch whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.

23. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, driving means for moving said contacts in one direction to connect said line to a link-circuit, restoring means for moving said contacts in the reverse direction to disconnect said line, and a line relay, a local relay and circuit connections whereby a short circuit of the line is prevented from causing a link-circuit to be permanently occupied to the exclusion of normal similar lines.

24. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit

- and connect the line thereto, other telephone lines and manual means for connecting a selected link-circuit to one of said other telephone lines, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause the active limb of the line to be disconnected from said central source.
25. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, other telephone lines and manual means for connecting a selected link-circuit to one of said other telephone lines, driving means for said switch, restoring means for said switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause the operation of said restoring means.
26. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch for said line having movable contacts operating to select an idle link-circuit and connect the line thereto, other telephone lines, and manual means for connecting a selected link-circuit to one of said other telephone lines, driving means for said switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause said switch contacts to move to their normal position and come to rest.
27. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch for the line having movable contacts operating to select an idle link-circuit and connect the line thereto, other telephone lines and manual means for connecting a selected link-circuit to one of said other telephone lines, driving means for said switch, restoring means for said switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause the operation of said restoring means and the disconnection of the line from the active terminal of said source.
28. A telephone system including a telephone line, a selective switch therefor, a manually operated switchboard, link-circuits extending from said switch to said switch-board, a line relay for said line for initiating travel of said switch to select an idle link circuit responsive to current over said line, operator's means for closing a branch circuit through said line relay whereby during conversation said relay is energized in part over a circuit including said line and in part over a local circuit controlled by the operator, a retaining pawl to prevent return movement of said switch, and means effective upon deenergization of said relay to release said pawl.
29. A telephone system including a telephone line, an operator's switching station, a selective switch, a link-circuit connecting said line and station including contacts of said switch, an electromagnet controlling restoration of said selective switch, an energizing circuit therefor having two simultaneously closed branches, the continuity of one branch being controlled at the station of said telephone line, the other branch being controlled at said switching station, and means whereby the deenergization of said relay restores said switch.
30. A telephone system including a telephone line, a line relay therefor, a substation switch for causing a flow of current therethrough, an operator's switch controlling means for establishing a branch of said circuit whereby said relay receives current over two simultaneously closed and independently controlled branches, and a selective switch associated with said relay, a retaining pawl preventing return movement of said switch, and means controlled by the deenergization of said relay for withdrawing said pawl from its retaining position.
31. A telephone exchange system comprising a grounded source of current, a telephone line having a limb normally connected with the active terminal of said source and an opposite limb normally connected with the grounded terminal of said source, a plurality of link-circuits, a selective switch and controlling means for causing connection of an idle link-circuit with said telephone line, and means responsive to current in both limbs, but not to current in the active limb alone, for operating mechanism of the said switch whereby said line is connected to an idle link-circuit.
32. A telephone system comprising a grounded source of current, a plurality of link-circuits, a telephone line having a limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch associated with the line and controlling means to cause connection of said line with an idle link-circuit, a local circuit, a heat responsive device included in said local circuit, and means responsive to an abnormal current flow in said line to actuate said device.

33. A telephone system comprising a grounded source of current, a plurality of link-circuits, a telephone line having a limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch associated with the line and controlling means to cause connection of said line with an idle link-circuit, and a locally controlled heat responsive device serving to disconnect said active limb from said source.

34. A telephone system comprising a grounded source of current, a plurality of link-circuits, a telephone line having a limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch associated with the line and controlling means to cause connection of said line with an idle link-circuit, a locally controlled heat responsive device serving to disconnect said active limb from said source, and means for automatically operating said device in response to current in said active limb.

35. A telephone system comprising a grounded source of current, a plurality of link-circuits, a telephone line having a limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch associated with the line and controlling means to cause connection of said line with an idle link-circuit, locally controlled heat responsive means to permanently disconnect the active limb from said source, and manual means associated with the link-circuit for causing the operation of said heat responsive means.

36. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected with the active terminal of said source and an opposite limb normally connected with the grounded terminal of said source, a traveling switch and controlling means for causing the connection of said line to an idle link-circuit, means responsive to current in both limbs, but not to current in the active limb alone, for controlling the circuit connections of said switch whereby said line is connected, and a relay responsive to current changes in the line, after the line is connected to a link-circuit, for disuniting said link-circuit and line.

37. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a selective switch associated with said line having means controlling the connection of said line with an idle link-circuit, said switch being sensitive to

current over said telephone line, and means whereby an abnormal earth connection to the line does not cause the response of the mechanism of said switch.

38. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a selective switch associated with said line and controlling means for causing the connection of said line with an idle link-circuit, the mechanism of said switch being sensitive to current over said line, and a line relay and a local relay for controlling said mechanism so connected that an abnormal earth connection to the active limb will not cause the response of the mechanism of said switch.

39. A telephone exchange system comprising a telephone line extending in two line limbs to an exchange, a grounded source of current at the exchange, an active limb of said line connected to the active pole of said source and an opposite limb of said line connected with the grounded pole of said source, means for producing a flow of current in normal quantity over said line, a signal adapted for actuation responsive to a prolonged flow of current in normal quantity over one only of said line limbs, and switch mechanism set in operation by a flow of current in normal quantity over the other line limb.

40. A telephone exchange system comprising a telephone line extending in two limbs to an exchange, a central source of current in bridge of said line limbs at the exchange, a signal common to said line limbs adapted for operation responsive to a prolonged flow of current of normal quantity over one of said line limbs or over said limb and the other line limb when conductively united, and switch mechanism set in operation by a flow of current in normal quantity over said other line limb.

41. The combination with a telephone line, of a signal for said line, means responsive to the initiation of a call at the substation of said line to cause a flow of current over a limb of said line, heat actuated means responsive to a prolonged normal current flow over said line, a signal controlled by said means, and switch mechanism set in operation by current over said line.

42. A telephone exchange system comprising a telephone line extending to an exchange, an electromagnet and a source of current at the exchange, a substation switch for causing a normal flow of current from said source through said magnet a signal individual to said line, means for

displaying said signal only after a prolonged energization of said magnet, switch mechanism associated with said line, and means normally operative to start said switch mechanism upon initiation of a call and to prevent a prolonged energization of said magnet.

43. A telephone system comprising a telephone line extending to an exchange, a battery having normal connections to said line, means for causing a flow of current over said line, automatic means at the exchange operable responsive to said current flow to alter the normal battery connections of said line, and a heat controlled device effective if said means fails to alter said normal battery connections.

44. A telephone exchange system comprising a telephone line extending to an exchange, a grounded source of current at the exchange, an electromagnet included in circuit between one pole of said source and one line limb, an electromagnet similarly included between the other pole of said source and the other line limb, a trouble-indicating signal, means for actuating said signal in response to a prolonged flow of current in normal quantity from said source to said line through one of said magnets only and means normally responsive to a flow of current through the other of said magnets to prevent the actuation of said signal.

45. A telephone exchange system comprising a telephone line extending to an exchange, a grounded source of current at the exchange having its live pole normally connected to said line, a control electromagnetic relay included in circuit between the live pole of said source of current and said line, an alarm signal, means for actuating said signal in response to the prolonged energization of said control relay, and means operative under normal conditions to prevent such prolonged energization.

46. A telephone exchange system comprising a telephone line extending in two line limbs to an exchange, a grounded source of current at the exchange, a control electromagnetic relay included in circuit between the grounded pole of said source of current and one line limb, electrical switching mechanism controlled by said relay, a normal connection between the live pole of said source of current and the other line limb, means for actuating a signal in response to a prolonged flow of current from said source over said other line limb, and means operative under normal conditions to prevent such prolonged flow of current.

47. A telephone exchange system comprising a telephone line extending in two line limbs to an exchange, a grounded source of current at the exchange, a control

relay included in circuit between the grounded pole of said source of current and one line limb, a second control relay included in circuit between the live pole of said source of current and the other line limb, means for actuating a signal in response to the prolonged energization of said second control relay, and means normally operative in response to the energization of said first relay to prevent the actuation of said signal.

48. A telephone exchange system comprising a telephone line extending in two line limbs to an exchange, a grounded source of current at the exchange, a control relay included in circuit between the grounded pole of said source of current and one line limb, a second control relay included in circuit between the live pole of said source of current and the other line limb, a heat coil included in a circuit controlled by said second control relay, a signal actuated in response to the operation of said heat coil, and means normally operative in response to the energization of said first relay to prevent the actuation of said signal.

49. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, locally controlled means to disconnect said active limb from said source, and manual means associated with a link-circuit for causing the operation of said locally controlled means.

50. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, locally controlled means to disconnect said active limb from said source, means whereby current in the active limb will operate said locally controlled means and current in both limbs will not operate said locally controlled means, and manual means associated with a link-circuit for causing the operation of said locally controlled means.

51. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and

associated driving and controlling means for establishing connection between said line and an idle link-circuit, restoring means for said switch, means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected, and controlling means for said switch restoring means under the control of the substation upon the selection of said link-circuit.

52. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, restoring means for said switch, means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected, and a relay responsive to current changes in the line, after the line is connected to a link-circuit, for causing the operation of the restoring means.

53. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection; restoring means for moving said contacts in the reverse direction to disconnect said line, and means whereby an abnormal earth connection to the active limb does not cause the operation of said driving means.

54. A telephone exchange system comprising a telephone line including two limbs extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit automatically upon initiation of a call over said line, and means whereby an abnormal earth connection to either limb of the line does not cause said operation of said switch.

55. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, restoring means for moving

said contacts in the reverse direction to disconnect said line, and means whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.

56. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, restoring means for moving said contacts in the reverse direction to disconnect said line, and means for preventing a short-circuit of the line from causing a link-circuit to be permanently occupied to the exclusion of normal similar lines.

57. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, restoring means for moving said contacts in the reverse direction to disconnect said line, and means responsive to current in both limbs but not to current in the active limb alone for causing the operation of said switch whereby said line is connected.

58. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, and an electrically operated switch in a local circuit operating to disconnect said active limb from said source, said switch being automatically operated in response to current in said active limb but not in response to current in both limbs.

59. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, an electrically operated switch in a local

circuit operating to disconnect said active limb from said source, said switch being automatically operated in response to current in said active limb but not in response to current in both limbs, and a switch under the control of the operator for causing the operation of said electrically operated switch.

60. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, restoring means for moving said contacts in the reverse direction to disconnect said line, and a controlling line relay for said switch so connected that an abnormal earth connection to the active limb does not cause the operation of said driving means.

61. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and an associated driving and controlling means for establishing connection between said line and an idle link-circuit, and a line relay and a local relay for controlling said switch so connected that an abnormal earth connection to the active limb will not cause said operation of said switch.

62. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, and a relay for each line limb for controlling said switch and circuit connections whereby an abnormal earth connection to the active limb does not cause the operation of said driving means.

63. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a travel-

ing switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, and a relay for each line limb to control said switch and circuit connections whereby an abnormal earth connection to the active limb does not cause said operation of said switch.

64. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, and an electrically operated switch for disconnecting the active line limb from said source whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.

65. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling switch and associated driving and controlling means for establishing connections between said line and an idle link-circuit, and an electrically operated switch for disconnecting the active line limb from said source and an operator's key for controlling said electrically operated switch whereby an abnormal circuit for the line limbs does not cause a link-circuit to be permanently excluded from selection by the switches of other normal lines.

66. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of associated link-circuits, a traveling switch having movable contacts operating to establish connection between said line and an idle link-circuit, driving means for advancing said contacts in one direction to bring about such connection, restoring means for moving said contacts in the reverse direction to disconnect said line, and a line relay, a local relay and circuit connections whereby a short circuit of the line is prevented from causing a link-circuit to be permanently occupied to the exclusion of normal similar lines.

67. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb normally connected to the grounded terminal of said source, a traveling

switch and associated driving and controlling means for establishing connection between said line and an idle link-circuit, other telephone lines and manual means for
 5 connecting a selected link-circuit to one of said other telephone lines, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause the active limb
 10 of the line to be disconnected from said central source.

68. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of
 15 associated link-circuits, a traveling switch having movable contacts operating to connect an idle link-circuit and said line, other telephone lines and manual means for connecting a selected link-circuit to one of said
 20 other telephone lines, driving means for said switch, restoring means for said switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may
 25 cause the operation of said restoring means.

69. A telephone exchange system comprising a telephone line extending from a substation to an exchange, a plurality of
 30 associated link-circuits, a traveling switch having movable contacts operating to connect an idle link-circuit and said line, other telephone lines, and manual means for connecting a selected link-circuit to one of said
 other telephone lines, driving means for said
 35 switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line limbs an operator may cause said switch contacts to move to their normal position and come to rest.

70. A telephone exchange system comprising a grounded source of current, a plurality of link-circuits, a telephone line having an active limb normally connected to the active terminal of said source and an opposite limb
 45 normally connected to the grounded terminal of said source, a traveling switch having movable contacts operating to connect an idle link-circuit and said line, other telephone lines and manual means for connecting a
 50 selected link-circuit to one of said other telephone lines, driving means for said switch, restoring means for said switch, and means whereby when the line is connected to a link-circuit and circuit is closed through the line
 55 limbs an operator may cause the operation of said restoring means and the disconnection of the line from the active terminal of said source.

71. A telephone system comprising a telephone line, link-circuits, a traveling switch
 60 for uniting said line and an idle one of said link-circuits, two electromagnets normally under line-circuit control, a source of current connecting the windings of said electro-

magnets in series with each other and with
 the line, driving mechanism for the moving
 contacts of said switch controlled by one of
 said electromagnets, and a test circuit for determining the selection of an idle link-circuit controlled by said second electromagnet.
 70

72. A telephone system comprising a telephone line, link-circuits, a traveling switch having line and local contacts for uniting
 said line and an idle one of said link-circuits, two electromagnets normally under
 75 line-circuit control, driving mechanism for the moving switch-contacts controlled by one of said magnets, a test circuit extending to the movable local contact of said switch and controlled by said second magnet, and a
 80 third electromagnet actuated upon the connection of said line and an idle link-circuit to stop said driving means.

73. A telephone system comprising a telephone line, link-circuits, a traveling switch
 85 having line and local contacts for uniting said line and an idle one of said link-circuits, two electromagnets normally under line-circuit control, driving mechanism for the moving switch-contacts controlled by
 90 one of said magnets, a test circuit extending to the movable local contact of said switch and controlled by said second magnet, and a relay having normally open contacts through which the limbs of said telephone
 95 line extend to said switch line-contacts, and means for actuating said relay to close said contacts and to stop said driving means upon the connection of said line and idle link-circuit.
 100

74. A telephone system comprising a telephone line, link-circuits, a traveling switch
 for uniting said line and an idle one of said
 link-circuits, two control electromagnets normally under line-circuit control, driving
 105 mechanism for the moving contacts of said switch controlled by one of said magnets, a manual connection terminal for said line, and a test circuit for determining the selecting operation of said switch and a test connection for said terminal both controlled by
 110 said second magnet.

75. A telephone system comprising a telephone line, link-circuits, a traveling switch
 for uniting said line and an idle one of said
 115 link-circuits, two control electromagnets normally under line-circuit control, driving mechanism for the moving contacts of said switch controlled by one of said magnets, a manual connection terminal for said line,
 120 a test circuit for determining the selecting operation of said switch and a test connection for said terminal both controlled by said second magnet, and a cut-off relay associated with said terminal and operative to
 125 disconnect said magnets from said line.

76. A telephone system comprising a telephone line, link-circuits, a traveling switch.

for uniting said line and an idle one of said link-circuits, two control electromagnets normally under line-circuit control, driving mechanism for the moving contacts of said switch controlled by one of said magnets, a manual connection terminal for said line, a cut-off relay associated with said terminal, and test connections for said switch and for said terminal both controlled by said second magnet and by said cut-off relay. 10

In witness whereof, I hereunto subscribe my name this 17 day of September, 1906.

HARRY G. WEBSTER.

Witnesses:

H. C. OLMSTEAD,
Geo. E. MUELLER.