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TELEPHONY.

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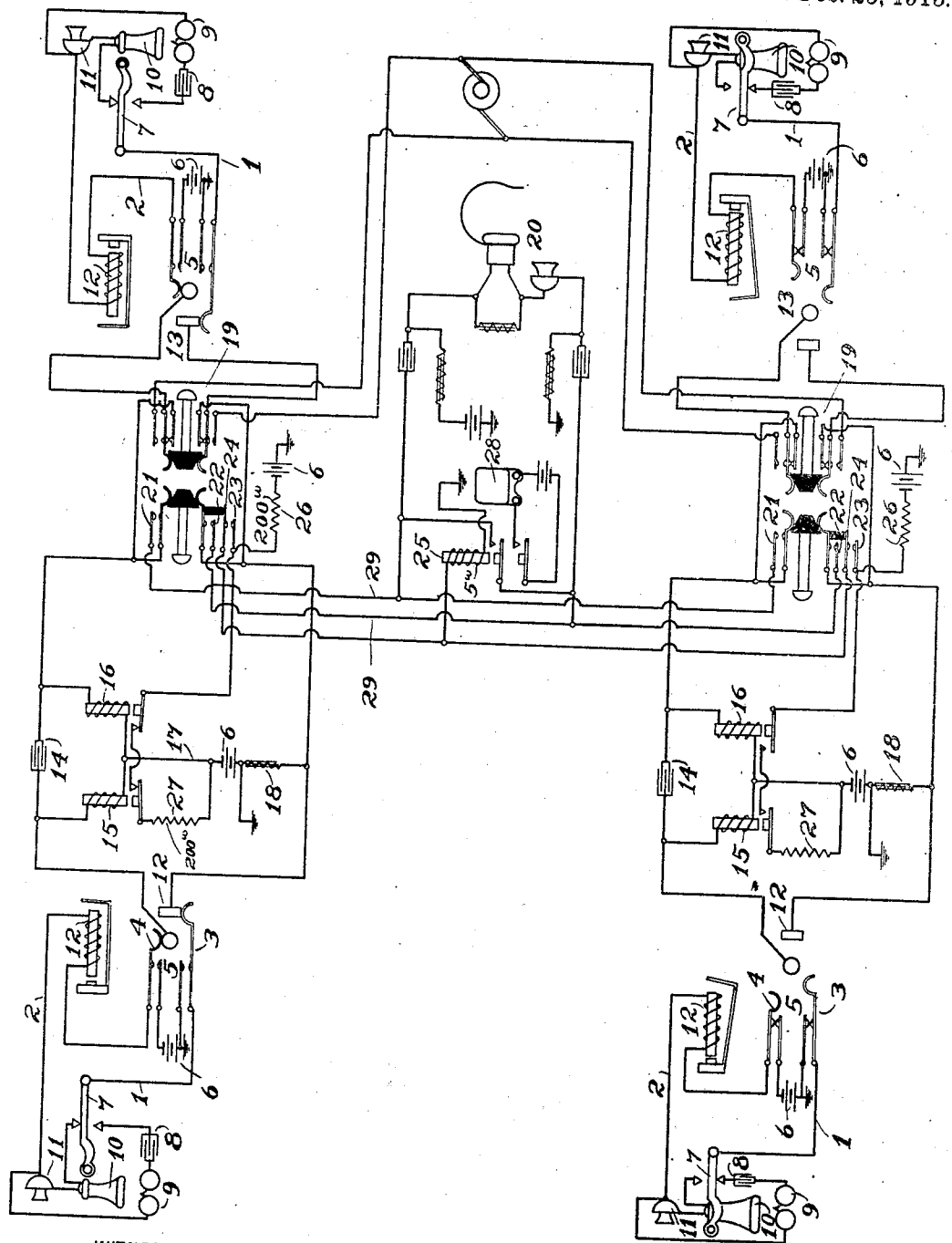

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TELEPHONY.

1,053,997. Specification of Letters Patent. Patented Feb. 25, 1913.

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To all whom it may concern:

Be it known that I, MORTON L. JOHNSON, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephony, 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.

My invention relates to telephone exchange systems and has for its object the provision of improved means for preventing operators from listening in upon established connections.

In accordance with my invention I employ a relay common to a plurality of link connectors at each operator's position and which is governed by both ends of one link connector or by two ends of different link connectors to enable its operation to exclude the operator's telephone from circuit.

I will explain my invention more fully by reference to the accompanying drawing showing one embodiment thereof and in which drawing two telephone lines are illustrated in telephonic connection, a third telephone is also illustrated, and two of a number of link connectors at an operator's position are also shown.

The parts of different line equipments and the parts of the link connector equipments which are similar in function are given similar characters of reference.

Each of the telephone lines, in the embodiment of the invention illustrated, is adapted for manual connection with link connectors, when it is a calling line as well as when it is a called line, though I do not wish to be limited to the manual connection of the answering ends of link connectors with calling lines. Each telephone line extends by its limbs 1 and 2 from its telephone station to the exchange where these limbs terminate in line springs 3, 4 of a spring jack 5. The line springs 3 and 4 are provided with back contacts that are normally engaged thereby so that a battery 6 is normally in bridge between the sides of the telephone line. The telephone line side 1 terminates at each substation in a switch hook 7 whose normal contact is connected with the line side 2 through a condenser 8 and signal receiving bell 9 and whose alternate contact is connected with the line side 2 through a telephone receiver 10 and a telephone transmitter 11. When the telephone receiver is upon its switch hook, the circuit of the battery 6 is opened at the substation and when the telephone receiver is removed from its switch hook the circuit of this battery is closed at the substation by way of the telephone receiver and transmitter. The line side 2 includes a line indicator 12 whose circuit is closed when the telephone receiver is removed from its switch hook, in the manner described. There is desirably but one battery at the exchange, each battery illustrated being understood to be this one battery, a similar character of reference being applied to this illustration in its different locations, though I do not limit myself to a common battery system.

I have shown two of a number of link connectors at the exchange, and as the system illustrated is a pure manual system each of the link connectors is equipped with the usual cord ending plug, the answering plug 12 and the connecting plug 13. The plugs of each link connector are provided with connected tips and connected sleeves. The tip strand of each link connector includes a condenser 14 for the purpose of dividing this strand so far as direct current is concerned without, however, destroying the continuity of this strand with respect to telephonic currents. A relay 15 is in bridge of the strands of each link connector, the connection of this relay with the tip strand being upon the answering side of the condenser 14. A relay 16 is also in bridge of the strands of each link connector, the connection of the relay 16 with the tip strand being upon the connecting side of the condenser 14.

A common conductor 17 including an impedance 18 serves to connect the terminals of relays 15 and 16 with the sleeve strand of the associate link connector. The battery 6 is included in the conductor 17 so that the relay 15 will respond when the telephone receiver at the calling station is free of its hook, assuming that the answering plug 12 is in connection with the calling line, while relay 16 will respond when the telephone receiver at the called station is free of its hook, assuming that the connecting plug is in connection with the called line. As illustrated, the line signals 12 are permanently in the line so that they will be energized

when the receivers at the associate telephone stations are removed from their switch hooks, whereby these line signals constitute clearing out signals, though I do not limit myself to this characteristic.

Each link connector is shown as including a well recognized form of manually operated ringing key 19 which forms no particular part of my invention and which need not be further mentioned.

An operator's telephone set 20 is common to the link connectors at her position, one terminal of this telephone set being connected with listening switch contacts 21 at each of the link connectors, the remaining terminal of this telephone set being connected with contacts 22 of said listening switches. The contacts that are engageable with the contacts 21 and 22 of each link connector are connected with the tip and sleeve sides of such link connector so that when the listening switch of a link connector is operated the operator's telephone set is included in bridge of the strands of such link connector. The listening switches which I have shown are desirably manually operated by means of a plunger though I do not limit myself to the way in which these switches are operated. The listening switch at each link connector is provided with a pair of contacts 23, 24 that are engaged each time such listening switch is operated to include the operator's telephone in circuit. The contacts 24 of all of the listening switches are in permanent electrical connection with each other and in permanent connection with a relay 25 that is common to the link connectors of the operator's position. Each listening switch contact 23 is individually grounded through the battery 6 and a resistance 26, say of 200 ohms, the resistance of the relay 25 being of say five ohms. The armature of relay 15 is connected to ground through the battery 6 and a resistance 27 of say 200 ohms. Contacts 23 of the listening switches are in individual connection with the armatures of the relays 16. The armatures of the relays 15 and 16 of each link connector are provided with electrically connected contacts that are engaged by the armatures when attracted.

I will now describe the manner in which the operator is prevented from including her telephone in circuit with any established connection. When the answering end of the link connector is connected with the calling line the relay 15 at the answering end of such connector is energized to cause its armature to engage its contact, which contact thus becomes connected with ground through the resistance 27 and the battery 6. When the called subscriber responds the armature of relay 16 engages its contact which is then similarly connected to ground. Assuming that the listening switch is in the position that it is caused to assume in order to bring the operator's telephone in bridge of the link connector, the volume of current flowing from the battery 6, which was insufficient when the resistance 26 was alone included in circuit to energize the relay 25, becomes sufficient to energize the relay 25 when such relay becomes connected with ground to the battery 6 owing to the operation of the armature of relay 16, assuming that the relay 15 is still energized. The relay 25, thus responding when the called party answers, assuming that the associate listening switch is depressed, operates its armature switches, the upper armature switch of the relay 25 establishing a shunt across the terminals of the operator's telephone that will be clearly apparent. The lower armature switch of the relay 25 when operated establishes a local circuit that includes a signaling device 28 to warn some one in authority that the operator is not making proper use of her facilities.

If the operator should wish to use two different link connectors to enable her to listen in she would withdraw either the answering or connecting plug of the link connector employed for establishing a circuit and substitute for this withdrawn plug a plug of another link connector, the talking conductors 29 that make the operator's telephone common to the link connectors being relied upon by the operator to maintain the continuity of the connection between the calling and called parties (assuming that the listening switches of the two link connectors which the operator is to use for the purpose of listening in are actuated to listening position) these conductors 29 obviously permitting the operator to listen in were it not for the presence of the relay 25 and the mechanism that governs its operation. When the operator attempts to listen in by the method just described the resistance 26 that is thrown into circuit with the relay 25 at one link connector is paralleled by the resistance 26 also thrown into circuit with said relay 25 at another link connector whereby the current from battery 6 is sufficiently increased in volume to cause the relay 25 to be energized and thereby establish the shunt across the operator's telephone to exclude this telephone from the circuit. A shunt between the operator's telephone terminals constitutes a short circuit across the sides of the composite telephone line that unites the subscribers so that the operator not only fails to connect herself in circuit, but is also unable to permit the connection of a third telephone line with an established connection. The connected parties are also warned, by the establishment of the short circuit, that the secrecy of their connection is being interfered with.

While I have herein shown and particu-

larly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction and circuit arrangement as changes may readily be made without departing from the spirit of the invention.

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A telephone exchange system including telephone lines extending from telephone stations to an exchange; a group of link connectors at the exchange for uniting telephone lines in conversation; an operator's telephone common to the link connectors of said group; listening switch mechanism individual to each link connector for connecting the operator's telephone in circuit with the link connector to which it is individual; electro-magnetic mechanism common to the link connectors for excluding the operator's telephone from circuit; and means individual to each link connector for partially governing the operation of said electro-magnetic mechanism and coöperating with similar means associated with any other of said link connectors to effect the operation of said electro-magnetic mechanism to exclude the operator's telephone from circuit.

2. A telephone exchange system including telephone lines extending from telephone stations to an exchange; a group of link connectors at the exchange for uniting telephone lines in conversation; an operator's telephone common to the link connectors of said group; listening switch mechanism individual to each link connector for connecting the operator's telephone in circuit with the connector to which it is individual; electro-magnetic mechanism common to the link connectors for excluding the operator's telephone from circuit; means individual to each link connector governed by the associate listening switch mechanism for partially governing the operation of said electro-magnetic mechanism; and line controlled means individual to each link connector and coöperating with the latter means to exclude the operator's telephone from connection with an established circuit.

3. A telephone exchange system including telephone lines extending from telephone stations to an exchange; link connectors at the exchange for uniting telephone lines in conversation; an operator's telephone; listening switch mechanism for connecting the operator's telephone in circuit with the link connectors; electro-magnetic mechanism common to such link connectors for excluding the operator's telephone from circuit; means governed by the listening switch mechanism for partially governing the operation of said electro-magnetic mechanism; and line controlled means coöperating with the latter means to exclude the operator's telephone from connection with an established circuit.

In witness whereof, I hereunto subscribe my name this 24th day of July A. D., 1911.

MORTON L. JOHNSON.

Witnesses:
E. L. WHITE,
G. L. CRAGG.