J. L. McQUARRIE.

TELEPHONE EXCHANGE SYSTEM.

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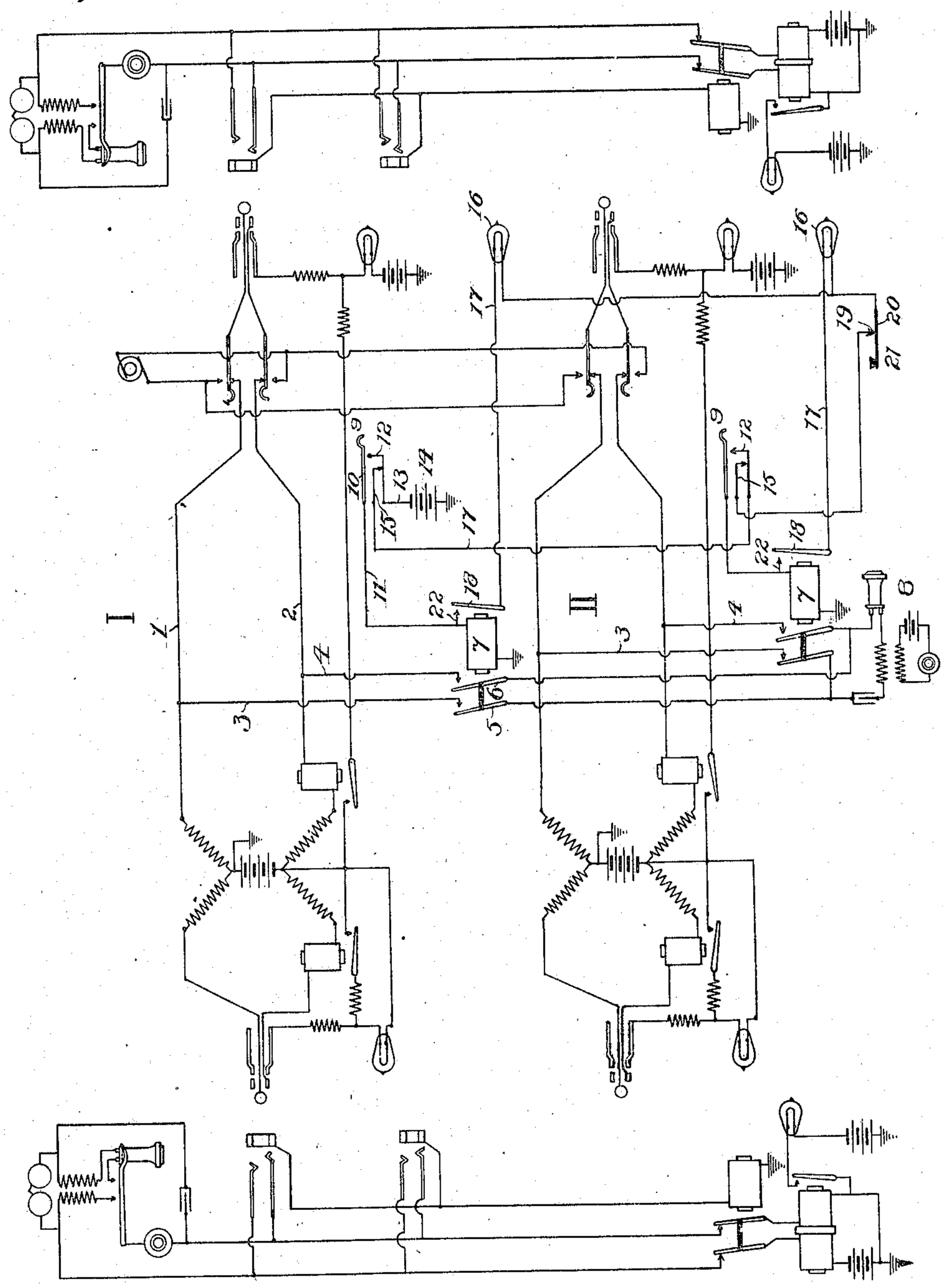
Patented June 8, 1909.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-EXCHANGE SYSTEM.

No. 923,993. Specification of Letters Patent. Patented June 8, 1909.

Application filed September 15, 1906. Serial No. 334,799.

To all whom it may concern:

Be it known that I, JAMES L. McQUARRIE, citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone-Exchange Systems, of which the following is a full, clear, concise, and exact description.

My invention relates to a telephone exchange system, and has for its object to provide an operator's key board equipment of simple and efficient character.

My invention contemplates an arrangement of circuits and apparatus in association with the operator's cord or connecting circuits, whereby the listening key of one cord circuit, when depressed, effects the connection of the operator's telephone set in locking circuit with such cord circuit, and also brings about the closure of a locking circuit for a signal associated with such cord circuit, which serves as an indication to the operator that her telephone set has been connected to the particular cord circuit desired. When the operator, after having listened in on said cord circuit, desires to connect her telephone set to another cord circuit, she operates the key of such other cord circuit, whereupon the locking circuit of the signal of the first mentioned cord circuit is broken and the signal of the said other cord circuit displayed, her telephone set being at the same time transferred into connection with such other cord circuit. A common key is provided which enables the operator to disconnect her telephone set from any cord circuit and render inert a displayed signal when desired.

I will describe my invention more particularly by reference to the accompanying drawings, which represent diagrammatically two subscribers' telephone lines and a pair of cord circuits for effecting the interconnection of such lines.

From the link conductors 1, 2, of cord circuit I, a pair of conductors 3, 4, lead through the armatures 5, 6, and their normally open front contacts of a relay 7 to the operator's telephone set 8. The relay 7 is controlled by the operator's listening key 9, which is provided with a contact spring 10 connected with conductor 11 extending to earth through the winding of relay 7, the contact spring 10 being adapted when depressed to engage the contact spring 12 connected by conductor 13 with the free pole of grounded battery 14, and to disconnect said spring 12 from its normally resting contact anvil 15. When the key 9 is operated and contact springs 10, 12, are connected, a circuit is accordingly completed for the relay 7 including battery 14, which thereupon connects at its armatures 5, 6, and their front contacts, the telephone set 8 with the connecting circuit I.

A signal 16 is associated with the connecting or cord circuit I, adapted when displayed to indicate to the operator that her telephone set has been connected with the cord circuit I. The signal 16, which is preferably an incandescent lamp, is included in a conductor 17 extending from the armature 18 of relay 7 through the contacts 19, 20, of a common key 21, through the normally connected springs 12, 15, of the operator's key 9 of link conductor I I to the contact spring 15 of the operator's key 9 of cord circuit I, said spring 15 being normally connected through spring 12 and conductor 13 with the free pole of grounded battery 14. The front contact of armature 18 of relay 7 is connected with conductor 22, which leads to conductor 11 between relay 7 and spring 10.

It will be seen that when the spring 10 of the operator's key 9 is depressed into engagement with spring 12, a momentary or initial circuit is completed for relay 7 from the free pole of grounded battery 14, conductor 13, springs 12, 10, of the listening key 9, conductor 11, to earth through the winding of relay 7. The relay 7 thereupon attracts its armatures 5, 6 and 18, the armatures 5, 6, completing the continuity of conductors 3, 4, to connect the telephone set 8 with the link conductors 1, 2, of the connecting or cord circuit I, and the armature 18 of said relay 7, when key 9 is restored to normal condition, completing a locking circuit for relay 7 and the lamp 16 from the free pole of grounded battery 14, conductor 13, contact springs 12, 15, of key 9 of cord circuit I, through the springs 12, 15, of key 9 of cord circuit I I, through common key 21, signal lamp 16 at cord circuit I, conductor 22 to earth through the winding of relay 7.

At the cord or connecting circuit I I, precisely similar apparatus to that described above is provided, and if now the operator

wishes to connect her telephone set to cord circuit I I, she operates key 9 of such cord circuit, and the springs 10 thereof in its depression separates contact springs 12, 15, to open the locking circuit 13—17—22—7 of the signal lamp 16 and relay 7 of cord circuit I, and the operation of associating the telephone set 8 with cord circuit I I and effecting the display of the signal 16 of such cord circuit is precisely that described in connection with cord circuit I. The common key 21 is in series with a lead to all the signal lamps 16 and relays 7, so that the operator may disconnect her set from a cord circuit and efface a displayed signal lamp when desired.

I claim:

1. The combination with a connecting circuit, of an operator's telephone set, means for connecting said set to said connecting circuit, a signal included in a circuit other than the circuit of the telephone set, and means for closing the circuit of said signal and thus displaying the same during the interval said telephone set is connected with said connecting circuit.

2. The combination with a connecting circuit, of a telephone set, a signal associated with said circuit, a key adapted when momentarily depressed to connect said telephone set in a locked circuit with said connecting circuit, and a locking circuit for said signal also controlled by said key.

3. The combination with a connecting circuit, of a telephone set, a relay adapted to connect said telephone set with said connecting circuit, a signal associated with said connecting circuit adapted to be displayed by said relay when energized, a key associated with said connecting circuit adapted when momentarily pressed to complete a circuit for said relay, and a locking circuit for said relay completed by itself when energized.

4. The combination with a number of connecting circuits, of an operator's telephone set adapted to be connected with any one of said connecting circuits, a separate signal for each connecting circuit, and means for displaying the signal of any connecting circuit only during the interval the telephone set is connected thereto.

5. The combination with a number of connecting circuits, of a telephone set, a signal for each circuit, means associated with one of said connecting circuits for connecting the telephone set therewith and effecting the display of the signal of such connecting circuit, and means at each of the other connecting circuits for transferring the telephone set into connection with such other cord circuit, and for effacing the signal of the first mentioned connecting circuit and displaying the signal of such other cord circuit.

6. The combination with a connecting circuit, of a telephone set, a key adapted to connect said telephone set with the connecting circuit, a signal associated with said connecting circuit, a key for said connecting circuit adapted to connect said telephone set with said connecting circuit and cause the display of said signal, a second connecting circuit, a signal therefor, and a key associated with said second connecting circuit adapted to transfer the connection of the telephone set to said second connecting circuit, and to effect the retirement of the signal of said first mentioned connecting circuit and the display of the signal of the second connecting circuit.

7. The combination with a pair of connecting circuits, of a telephone set, a key at each connecting circuit for connecting the telephone set thereto, a signal for each connecting circuit, a locking circuit for the signal of each connecting circuit closed upon the operation of the key at such connecting circuit, and means controlled by each key for opening the locking circuit of the signal of the other connecting circuit in completing the circuit of the signal of its own connecting circuit.

8. The combination with a connecting circuit, of a telephone set, a relay adapted to connect said telephone set with the connecting circuit, a signal associated with said connecting circuit, a locking circuit for said signal completed by said relay when energized, a key adapted to complete a circuit for said relay, a second connecting circuit, a signal and controlling relay therefor, and a key associated with said second connecting circuit adapted when operated to open the aforesaid locking circuit and complete a circuit for the relay of the second connecting circuit.

9. The combination with a connecting circuit, of a telephone set, a relay adapted to connect said telephone set with the connecting circuit, a signal associated with said connecting circuit, a locking circuit for said signal and relay completed by the relay when energized, an operator's key adapted when momentarily depressed to complete an initial circuit for said relay, a second connecting circuit, a relay associated with said circuit adapted to connect the telephone set therewith, a signal for said connecting circuit controlled by said relay, and a key associated with said connecting circuit adapted when operated to open the aforesaid locking circuit and complete a circuit for the relay of said second connecting circuit.

10. The combination with a number of connecting circuits, of a telephone set, a signal associated with each connecting circuit, a key for each connecting circuit adapted to connect the telephone set in locking circuit with said connecting circuit and complete a locking circuit for the signal of such connecting circuit, each key when operated opening the locking circuits of the other connecting circuits, and a common key controlling all locking circuits.

11. The combination with a number of cord circuits, of a telephone set, means associated with one of said cord circuits for connecting the telephone set therewith and means at each of the other cord circuits for disconnecting the telephone set from said first mentioned connecting circuit and transferring the telephone set into connection with said other cord circuit.

12. The combination with a connecting circuit, of a telephone set, a relay adapted to connect said telephone set with the connecting circuit, a locking circuit completed by said relay when energized, a key adapted to complete a circuit for said relay, a second connecting circuit, and a key associated with said circuit adapted when operated to open the aforesaid locking circuit and complete a circuit for the relay of the second connecting circuit.

13. The combination with a plurality of connecting circuits, of a telephone set, a key associated with each of said connecting circuits, and means controlled by the operation of each of said keys for connecting said telephone set with the connecting circuit associated with the operated key and for disconnecting said telephone set from any other of said connecting circuits.

In witness whereof, I, hereunto subscribe my name this 13th day of September A. D., 1906.

JAMES L. McQUARRIE.

Witnesses:

GEORGE E. FOLK,

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