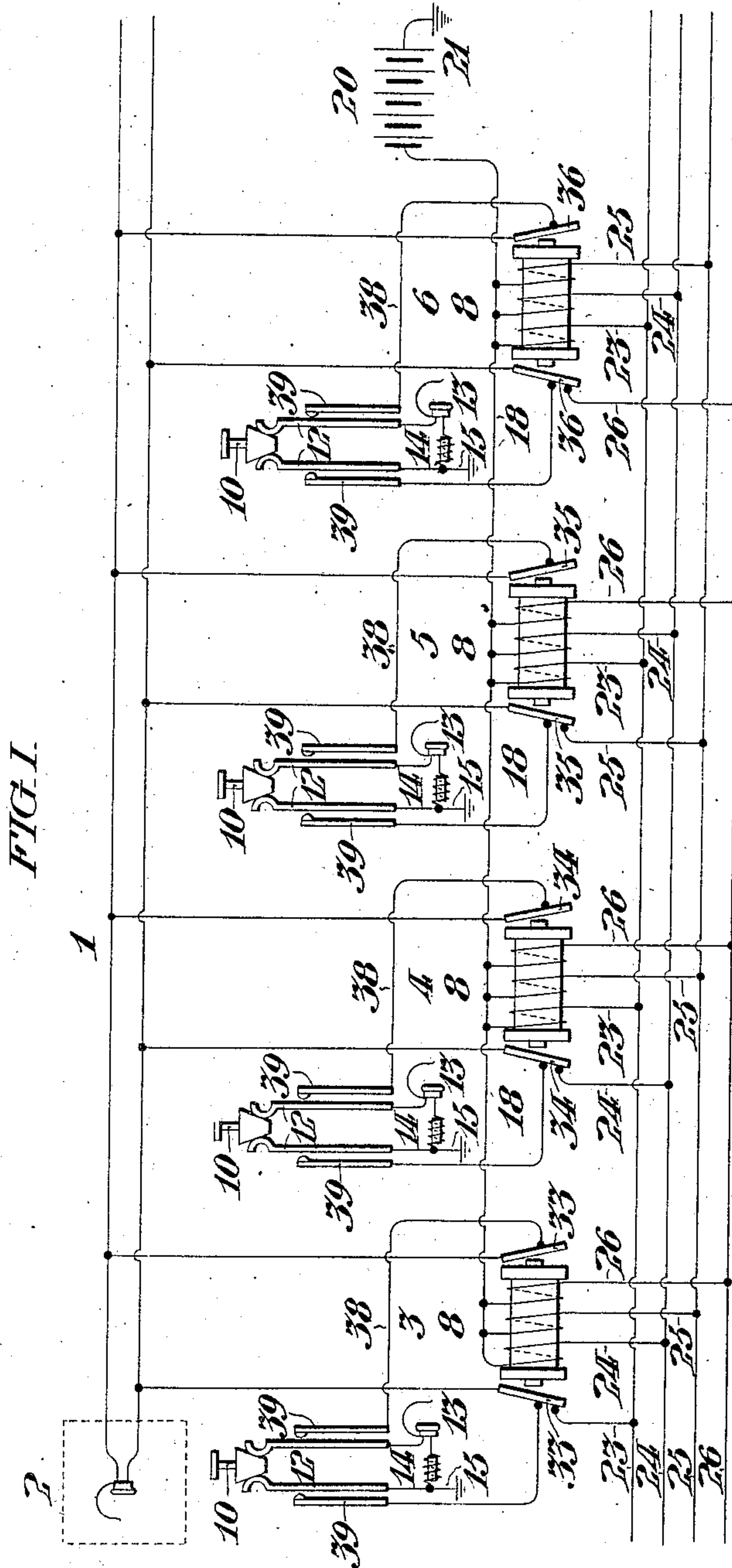


No. 843,078.

PATENTED FEB. 5, 1907.

R. M. EATON.
TELEPHONE SYSTEM.
APPLICATION FILED MAR. 30, 1904.

2 SHEETS—SHEET 1.



WITNESSES:

Clifton C. Hallowell
John C. Berger.

INVENTOR:

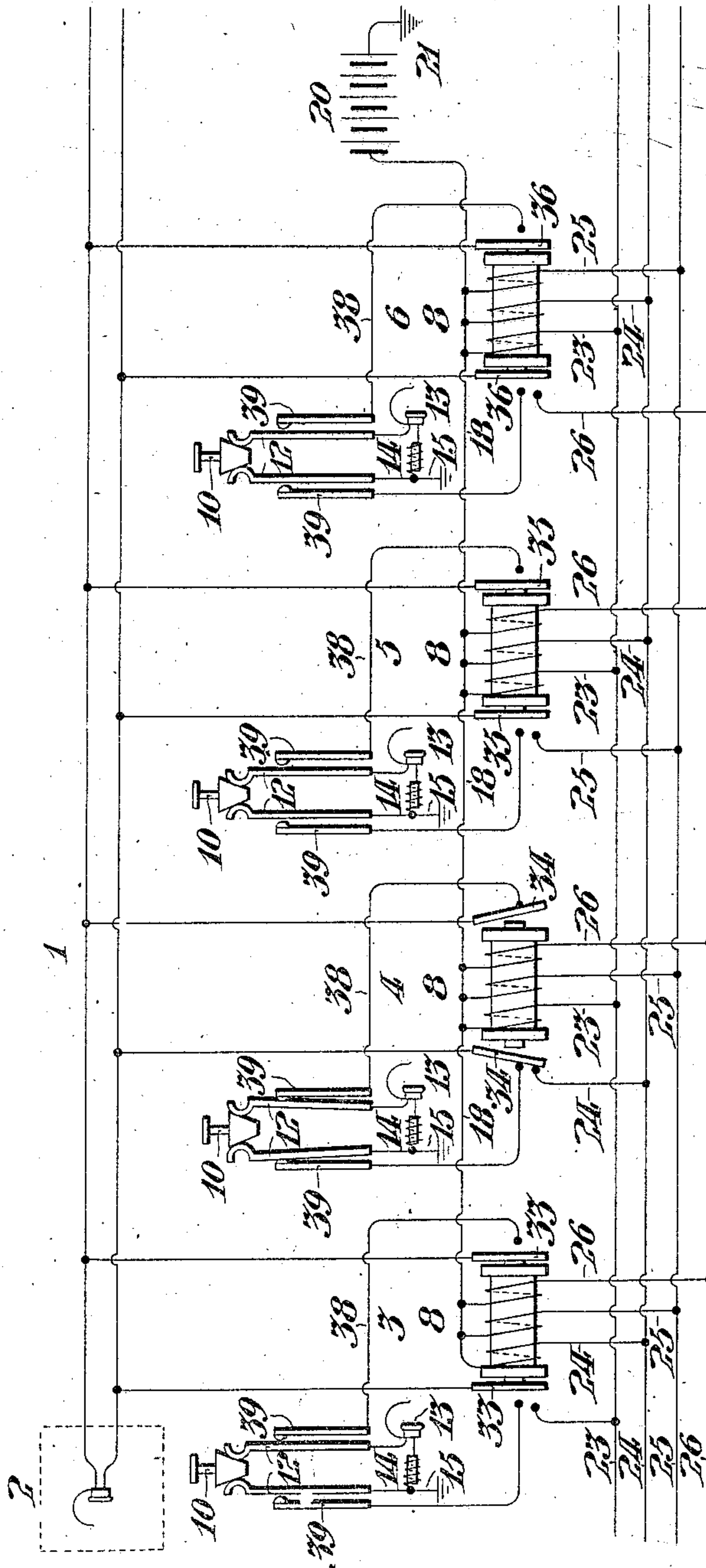
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TELEPHONE SYSTEM.

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2 SHEETS—SHEET 2.

FIG. II.



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UNITED STATES PATENT OFFICE.

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KEYSTONE TELEPHONE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

TELEPHONE SYSTEM.

No. 843,078.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed March 30, 1904. Serial No. 200,705.

To all whom it may concern:

Be it known that I, RICHARD M. EATON, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Telephone Systems, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to an electric wiring system comprising a line-circuit and a plurality of groups of apparatus or stations common to said line-circuit, each station being provided with means whereby it may be operatively connected with the line-circuit and the remaining stations be contemporaneously excluded from communication with said line-circuit.

My improvements may be advantageously applied to a divided central telephone-exchange system comprising distinct switchboards which are interconnected by line-circuits, through which the calls or orders are transmitted from one exchange operator to another, with the result that an exchange operator is enabled to secure operative connection with a selected idle line to the exclusion of other operators to whom that line is common. The delay and confusion incident to the attempts of several operators to secure possession of a line which is busy is thus avoided, the fact that a line is busy being manifested to the operator seeking possession of it by failure to make connection therewith and without disturbance of the busy line.

The form of my invention, hereinafter described, is particularly designed for embodiment in a divided central telephone-exchange arranged in accordance with what is known as the "express" system and characterized by the arrangement of the subscriber's-line terminals in independent groups respectively local to distinct switchboards between which communication is established through an auxiliary board by means of order or call line circuits which extend from the other boards and terminate in said auxiliary switchboard, where they may be connected by cord-circuits. It is to be understood, however, that I do not desire to limit myself to such embodiment of my invention.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified and claimed.

In the accompanying drawings, Figure I is a diagram of a telephone system showing one order or call line circuit, which is common to four exchange-operators' stations, the apparatus being in the normally idle position. Fig. II is a diagram similar to Fig. I, but showing the position of the apparatus with one operator's station in connection with the line-circuit and the other stations excluded therefrom.

In said figures, 1 is a call or order line circuit, which extends from the switchboard 2 to another switchboard distinct therefrom and comprising the four groups of apparatus constituting the operator's stations 3, 4, 5, and 6, which stations are common to said line-circuit. In the particular embodiment specified the board 2 is one of a series at which independent groups of subscribers' lines, respectively, terminate, and the other board is an auxiliary board where the interconnections between subscribers' terminals of different groups are made. It is to be understood that the number of said stations is merely typical, and that more or less may be employed. Each of said stations is provided with an automatically-operative electromagnetic relay-switch 8 and a manually-operative switch 10. Each of said manual switches 10 is operatively related to the pair of switch-terminals 12 of its local-station-instrument circuit, which circuit includes the operator's receiver or hear telephone 13, the secondary of the operator's induction coil 14, and the shunt 15 to ground. The automatic switch 8 at each of said four stations 3, 4, 5, and 6 comprises three distinct windings or coils, one for each of the other stations, and the circuit 18 connects all of said coils with the source of current 20, which latter is connected to ground at 21. Said stations are respectively provided with switch return-circuits 23, 24, 25, and 26, and the return-circuit for each station independently connects the corresponding coils of the switches 8 at all the other stations in parallel relation—that is to say, the return-circuit 23 for the station 3 includes the corresponding coils of the switches 8 at the stations 4, 5, and 6, the return-circuit 24 for the station 4 includes the corresponding coils of the switches 8 at the stations 3, 5, and 6; the return-circuit 25 for the station 5 includes the corresponding coils

of the switches 8 at stations 3, 4, and 6, and the return-circuit 26 for the station 6 includes the corresponding coils of the switches 8 at stations 3, 4, and 5.

The switches 8 are operatively related to the respective pairs of movable switch members 33, 34, 35, and 36, which are connected to the opposite sides of the line-circuit 1 at the respective stations 3, 4, 5, and 6. In the normal position of the apparatus (shown in Fig. 1) said switch members 33, &c., are maintained (by springs or other convenient means) in connection with their respective switch return-circuits 23, 24, 25, and 26 and in connection with their respective bridge-circuits 38. Each of said bridge-circuits 38 comprises a pair of switch-terminals 39, disposed in position to connect with the terminals 12 of their respective local-instrument circuits upon operation of the respective manual switches 10.

The apparatus is operated as follows: The line 1 being idle and the apparatus in the normal position (shown in Fig. 1) the operator at station 4 may secure exclusive control of said line for communication with the operator stationed at the switchboard 2 by depressing the switch 10 of station 4, as indicated in Fig. II. The aforesaid manipulation of the switch 10 bridges the local-instrument circuit at station 4 across the line 1, through the contacts of the switch-terminals 12 with the switch-terminals 39, and contemporaneously establishes connection from the switch return-circuit 24 to the ground through the shunt 15, extending from the local-instrument circuit of station 4. The effect of the latter connection is to establish a current from the source 20, through the corresponding coils of the switches 8, at each of the stations 3, 5, and 6, which coils the return-wire 24 of station 4 connects in parallel relation, the automatic switches 8 of stations 3, 5, and 6 being thus energized in operative relation with the switch members 33, 35, and 36. Said members are each withdrawn to the position shown in Fig. II, thus breaking their normal connection with the respective bridge-circuits 38 and excluding said stations 3, 5, and 6 from communication with the line 1. The shifted position of the switches 8 (shown in Fig. II) is maintained by the current from the source 20 until the switch 10 of station 4 is restored to its normal position, (shown in Fig. I,) whereupon the circuit including the return-wire 24 and the corresponding coils of the respective automatic switches 8 is broken by the separation of the switch-terminals 12 and 39, and the switch members 33, 35, and 36 are restored to their normal position. It is to be understood that any one of the other operators' stations which are common to the line-circuit 1 may obtain exclusive control of said line when it is idle by manipulation of the respec-

tive switch 10, and consequent automatic operation of the respective switch 8 in the manner above described. It is to be noted that when said line-circuit 1 is busy, in connection with any one station of the series which is common to it, the operators at the remaining stations cannot interfere with the established connection; but a busy test is manifested to any operator attempting to make connection with said line-circuit by failure to effect such connection.

Although I have shown my improvements as applied to a telephone-exchange system of a particular type, it is to be understood that I do not desire to limit myself to such an embodiment of my invention, as my improvements are applicable to any electric-wiring system comprising a line-circuit and a plurality of stations common to said line-circuit. Moreover, it is to be understood that I do not desire to limit myself to the precise details of construction herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim—

1. In a telephone system, the combination with a line-circuit; of a plurality of stations common to said line-circuit; each station being provided with an automatic switch, each comprising a distinct coil for each of the other stations; a circuit connecting all of said switch-coils with a source of electric current; and a manual switch at each of said stations arranged to bridge its station across the line-circuit and close the circuit including said automatic switches at the other stations, to exclude the latter from connection with said line-circuit, substantially as set forth.

2. In a telephone system, the combination with a line-circuit; of a plurality of stations common to said line-circuit; a local-instrument circuit at each station, comprising a receiver, an induction-coil, and a shunt to ground; an automatic switch-coil at each station, operatively related to distinct switch members respectively connected to the opposite sides of said line-circuit; and, a manual switch at each station, arranged to connect its local-instrument circuit in a bridge across said line-circuit and contemporaneously operate the automatic switches at the other stations; whereby, the selected station is operatively connected with said line-circuit, and the remaining stations are contemporaneously excluded from connection with said line-circuit, substantially as set forth.

3. In a telephone system, the combination with a line-circuit; of a plurality of stations common to said line-circuit; a local-instrument circuit at each station, comprising a receiver, an induction-coil, and a shunt to ground; an automatic relay switch-coil at each station, operatively related to dis-

10 tinct relay switch members respectively connected to the opposite sides of said line-circuit; a source of electric energy common to all of said automatic switch-coils; and, a
5 manual switch at each station, arranged to connect its local-instrument circuit in a bridge across said line-circuit and contemporaneously operate the relay-switch members at the other stations; whereby the selected station is operatively connected with
10 said line-circuit and the remaining stations are contemporaneously excluded from connection with said line-circuit, substantially as set forth.

15 4. In a telephone system, the combination with a line-circuit; of a plurality of stations common to said line-circuit, each comprising an induction-coil; automatic relay-switches respectively located at said stations; each comprising a magnet-coil; a circuit
20 connecting all of said switch-coils with a source of electric current; return-circuits equal in number to said switches, the return-circuit for each switch independently connecting the corresponding coils of all of the
25 other switches in operative relation; and, a

manual switch at each of said stations operatively related to the automatic switches at the other stations, substantially as set forth.

5. In a telephone system, the combination 30 with a line-circuit; of a plurality of stations common to said line-circuit; counterpart automatic switches respectively located at said stations; each comprising a distinct coil for each of the other stations; a circuit connecting all of said switch-coils with a source of
35 electric current; return-circuits equal in number to said switches, the return-circuit for each switch independently connecting the corresponding coils of all of the
40 other switches in parallel relation; and, a manual switch at each of said stations operatively related to the automatic switches at the other stations, substantially as set forth.

In testimony whereof I have hereunto
45 signed my name, at Philadelphia, Pennsylvania, this 28th day of March, 1904.

RICHARD M. EATON.

Witnesses:

JAMES H. BELL,
E. L. FULLERTON.