(No Model.) 2 Sheets—Sheet 1.

# C. E. SCRIBNER.

## TOLL LINE APPARATUS FOR TELEPHONE EXCHANGES.

No. 330,066. Patented Nov. 10, 1885.

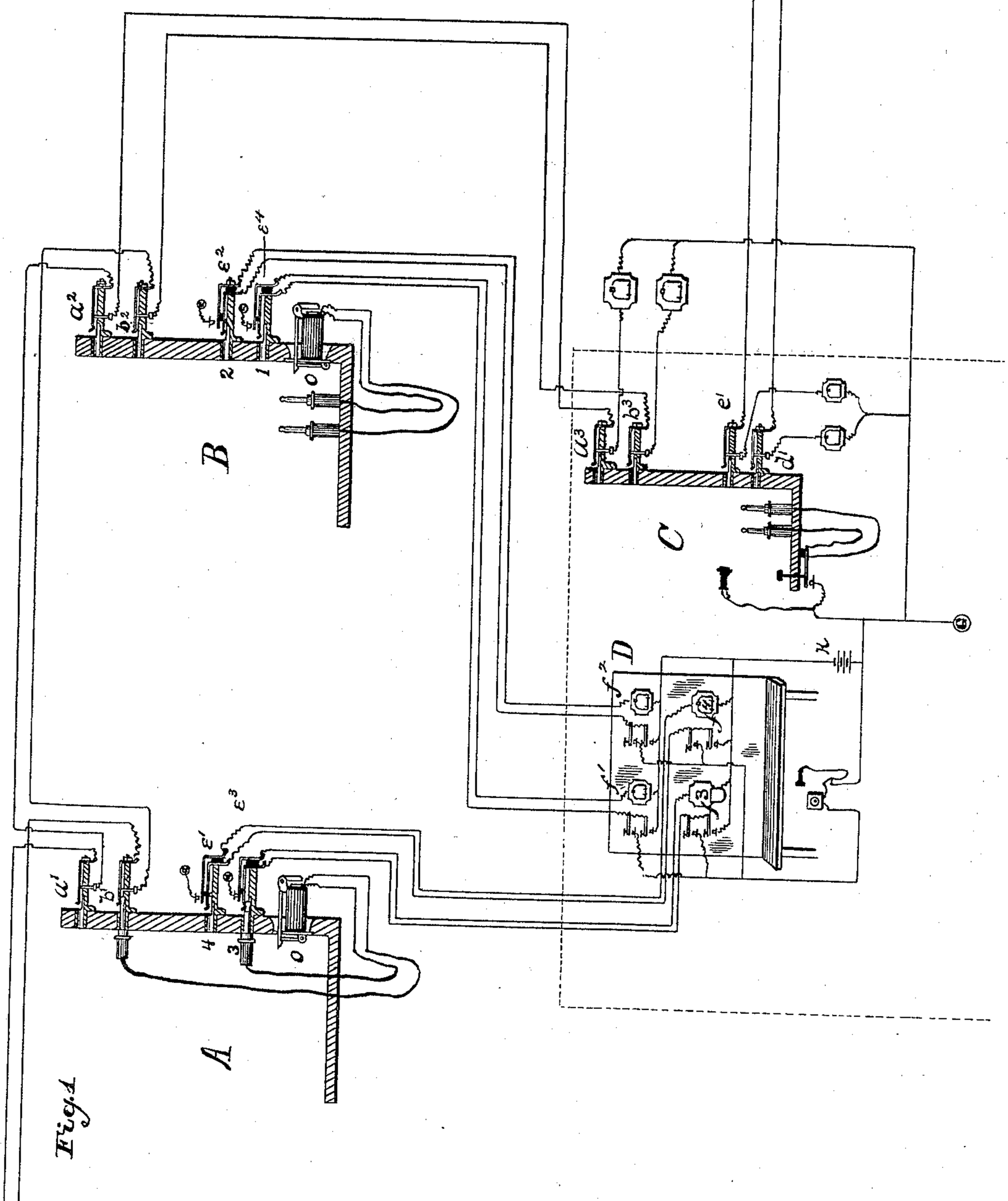


Fig. 1.

Attest
Chas. A. Staby
C. C. Shepherd.

Inventor
Charles E. Scribner.
By his Attorney George P. Barton

(No Model.)

2 Sheets—Sheet 2.

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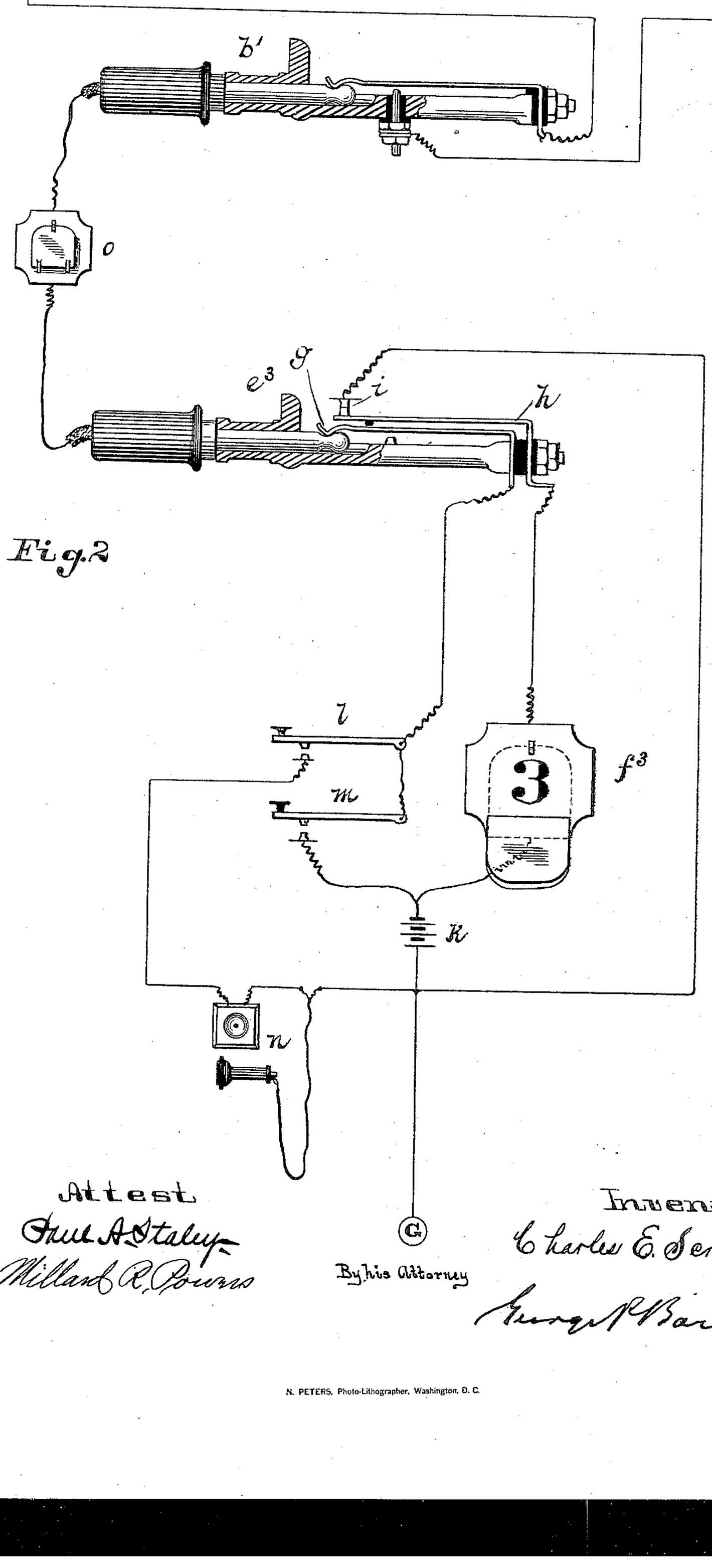


Fig. 2.

Attest
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By his Attorney

Inventor
Charles E. Scribner
George P. Barton

# UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

## TOLL-LINE APPARATUS FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 330,066, dated November 10, 1885.

Application filed March 1, 1884. Serial No. 122,657. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a 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 Toll-Line Apparatus for Multiple Switch-Boards of a Telephone-Exchange, (Case 72,) 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 toll-line apparatus at the central office of a telephone-exchange. It has become common to connect the telephone-exchanges of different cities or towns with lines which are designated "toll" or "trunk" lines. When a subscriber of one exchange wishes to talk with a subscriber of another exchange, the individual lines of the subscribers are connected to a toll-line connecting the two exchanges, said connections being made at the central offices of the respective exchanges to which the subscribers belong. For such a connection a toll is collected, the rate of toll being generally fixed at so much for a conversation of five minutes duration. When, therefore, a connection is made to a toll-line, the operator must make a note of the time when the connection is made and be ready at the expiration of the allotted time to notify the subscribers that the time has expired, and to disconnect the line or charge another toll. Heretofore it has usually been the custom to have the toll-line switches on the same switch-boards with the individual switches, the operators of the different boards thus having charge of the toll-line connections as well as the ordinary individual connections.

The object of my invention is to provide the means whereby the toll-line connections may be placed in charge of an operator whose business it is to attend to and account for all toll-line connections, such apparatus being provided as will enable an operator at one of the ordinary boards to make a connection with the apparatus of the toll-line operator in the same manner that the ordinary connections are made. The operators at the ordinary boards have thus only routine work to perform.

My invention consists in the apparatus, circuits, and combinations of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a diagram illustrative of the circuits and apparatus embodying my invention. Fig. 2 is a diagram of a single individual telephone-line connected to the apparatus of the toll-line operator.

Like parts are indicated by similar letters of reference throughout the several views.

A and B represent switch-boards of the multiple type, to which may be connected any number of telephone-lines, *a b*.

C represents the toll-line switch-board, which may be placed apart from the other boards, and preferably in another room. The telephone-lines *a b* are connected, in the usual manner, to spring jacks or switches $a'$ $a^2$ $b'$ $b^2$ on the multiple boards A B, and are also connected to switches $a^3$ $b^3$ on the toll-line board C.

*c d* represent the toll-lines, any number of which may be used. All of the toll-lines are connected, in the usual way, with switches $e'$ $d'$ on the toll-line board C. The board C thus contains a switch for each of the telephone-lines, and also a switch for each of the toll-lines. Near the toll-line board C is placed an annunciator board or table, D, to which local connections are made from each of the multiple boards A and B. The said boards A and B are provided with a suitable number of special switches, $e'$ $e^2$ $e^3$ $e^4$, each of which is adapted, when a plug is inserted, to close a local circuit and drop one of the annunciators $f'$ $f^2$ and $f^3$ $f^4$ on board D, and at the same time to establish a connection between the plug inserted in said switch and apparatus at the board D, by means of which the toll-line operator can connect his telephone in circuit with said plug or send a signal, as will hereinafter appear.

Each of the special switches *e* (see Fig. 2 for detail) is provided with the customary spring, *g*, and an additional spring or circuit-breaker, *h*, said spring being insulated from the other parts of the switch and adapted, when a plug is inserted, to close against a contact-point, *i*. The spring *h* of each special switch *e* is connected through one of the annunciators *f* on board D and through a common battery, *k*, to ground.

The contact-point *i* of each special switch is connected directly to ground. The main springs *g* of the special switches *e* are each connected to two keys, *l m*, arranged at any convenient point on board D, but preferably near the annunciator belonging to the special switch to which the said keys are connected. The key *l* of each of the switches *e* is adapted, when closed, to establish a connection from ground through the toll-line operator's telephone-outfit *n* to the spring *g* of its own switch. Each key *m* is adapted, when closed, to bring the battery *k* into circuit with the main spring *g* of the special switch to which said key is connected.

Each of the multiple switch-boards A, B, and C may be provided with any of the well-known operator's apparatus for facilitating the work of making the connections. Plugs with flexible cords arranged in pairs in the ordinary way are preferably used. Suppose, now, a call is received from a subscriber—for instance, on line *b* at board A—and said subscriber desires a connection with a toll-line. The operator at board A, having ascertained the desired connection in the usual manner by inserting one plug of a pair in the subscriber switch, informs the subscriber that a connection will be made with the toll-line room. The other plug of the pair is then inserted in one of the special switches $e^3$. Line *b* in Fig. 1 is shown thus connected with special switch $e^3$ on board A, the connection being made in the usual way through a clearing-out annunciator, *o*. When a plug is inserted in a special switch, the spring *h* is closed against the contact-point *i*, thereby closing the circuit of the battery *k* through the annunciator $f^3$ at board D, thus dropping the annunciator-shutter, as shown. A main-line connection is at the same time established between the plug so inserted and the keys *l m* on board D belonging to the special switch.

The connection made by the operator at board A, as above described, is made in precisely the same way as an ordinary connection between two subscribers, and the operator at board A is now free to proceed with other work.

The circuit of the subscriber's line *b* may now be traced as follows, (see Fig. 2:) from switch *b'* by the plugs and cords through the clearing-out drop *o* to special switch $e^3$, and thence through spring *g* and connection to keys *l m* on board D in the toll-line room. The local circuit may be traced from ground through battery *k* and annunciator $f^3$ to spring *h* of the special switch, and thence through contact-point *i* to ground. The toll-line operator, on seeing the shutter of the annunciator $f^3$ fall, immediately presses upon the key *l*, thus bringing his telephone-outfit *n*, directly into the circuit of line *b*. The subscriber now informs the toll-line operator of the connection desired, and the operator makes a ticket, and, if the toll-line is not already in use, makes the connection on board C. As soon as the ticket is made the key *m* is depressed, closing the battery *k* to line, thus dropping the shutter of clearing-out annunciator *o*. The dropping of the shutter being the usual signal for clearing out, the operator at board A removes the plugs in the usual manner, and the connection between the subscribers is made at board C, as above described.

In case the operator at board A should neglect to remove the plugs at the dropping of the shutter *o*, the local circuit through the annunciator $f^3$ will remain closed. As long as the circuit remains closod the shutter of the annunciator $f^3$ will fall if replaced. The toll-line operator is thus furnished with means for ascertaining whether the plug has been removed from switch $f^3$. It will be seen that by the system above described an operator at the multiple board has only routine work to perform, the duty of said operator in making toll-line connections being the same as in making any other connection. All the toll-line connections are made and accounted for by special operators, who have no other work to perform, and who are consequently not liable to get confused.

The toll-line connections being usually made through long lines, it is desirable that as little resistance as possible be included in the circuit of the connected lines. The connections at the toll-line board therefore are preferably made with plugs and cords which have no clearing-out annunciator in their circuit, means being provided for introducing a telephone in the circuit for listening out in the usual way.

Any of the ordinary means for testing for a line in use upon the different boards may be employed. I prefer the test system claimed in my application No. 55,791, filed March 20, 1882.

I claim—

1. In a telephone-exchange, the combination, with a switch-board to which a number of individual telephone-lines are connected, of a toll-line switch-board to which the toll-lines of the exchange are connected, said toll-line switch-board being also provided with switches for each of the individual telephone-lines, and means whereby a connection may be made at any switch-board between an individual telephone-line and the toll-line operator's apparatus.

2. In a multiple switch-board telephone-exchange system, the combination of toll-lines connected with one of the boards and local circuits from the other boards to the toll-line operator's apparatus, and means for connecting any subscriber's line from any of said other boards to the toll-line operator's said apparatus or outfit, whereby the calls for the toll-lines may be answered by said toll-line operator, and the connections with the toll-lines made upon the multiple board of the toll-line operator.

3. The combination, with multiple switch-boards to which the same telephone-lines are

connected, of toll-lines connected with their switches on one of said multiple boards, and means for switching any subscriber asking for toll-line connection to the toll-line operator's table or outfit, whereby the toll-line operator may receive and answer the calls for toll-line connections, said connections being made upon the board containing the said toll-line switches.

4. In a telephone-exchange system, the combination, with two or more switch-boards to which the same telephone-lines are connected, of receiving and signaling apparatus for the toll-line operator, and means whereby the switchmen at the different boards may connect any telephone-line to said apparatus, and means whereby the toll-line operator may signal any of the switchmen to disconnect a line thus connected with his apparatus, substantially as and for the purpose specified.

5. In a telephone-exchange central office, the combination, with the usual multiple switch-boards to which the different telephone-lines are connected, of a special multiple switch-board or toll-line multiple board provided with switches for the different telephone-lines, and with switches for the toll-lines, the toll-line operator's table or outfit for receiving calls for toll-lines, and means at each of the ordinary boards for connecting any line with said toll-line operator's outfit the same as a connection is made with another subscriber, substantially as and for the purpose specified.

6. The combination, with a subscriber's telephone-line, of the spring-jack switch upon the switch-board at the central office, the toll-line operator's outfit connected to a special switch upon the switch-board, and a pair of plugs with a flexible cord, including a clearing-out annunciator for connecting the subscriber's spring-jack switch with the said special switch, and a local-battery circuit which is closed at the special switch when a plug is inserted therein, and an annunciator in said local circuit at the toll-line operator's table or annunciators board, whereby the subscriber may be connected to the toll-line operator's table and clearing-out signals sent, substantially as and for the purpose specified.

7. In a telephone-exchange central-office system, the combination of multiple switch-boards A B with the toll-line operator's multiple board C, said boards being provided with switches, as described, the toll-line operator's annunciator-board D, and outfit and circuits, substantially as and for the purpose specified.

8. In a telephone-exchange central-office system, the combination, with the multiple switch-boards, as A B, of one or more special switches, as *e*, upon each of said boards, each of said special switches being connected to a pair of switches, as *l m*, the battery and local circuit switch including an annunciator, as *f*, and the toll-line operator's telephone-outfit, and means whereby any line may be switched to the toll-line operator's outfit and the connections and disconnections made, substantially as and for the purpose described.

9. In a telephone-exchange central-office system, the combination, with the toll-line multiple switch-board to which the different telephone and toll lines are connected, of the toll-line operator's annunciator board or table and outfit, and means for switching any line from any of the multiple boards to the said operator's outfit, whereby all calls for toll-lines may be answered and the connections made by one or more special operators.

In witness whereof I hereunto subscribe my name this 9th day of February, A. D. 1884.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,

C. C. SHEPHERD.