

(No Model.)

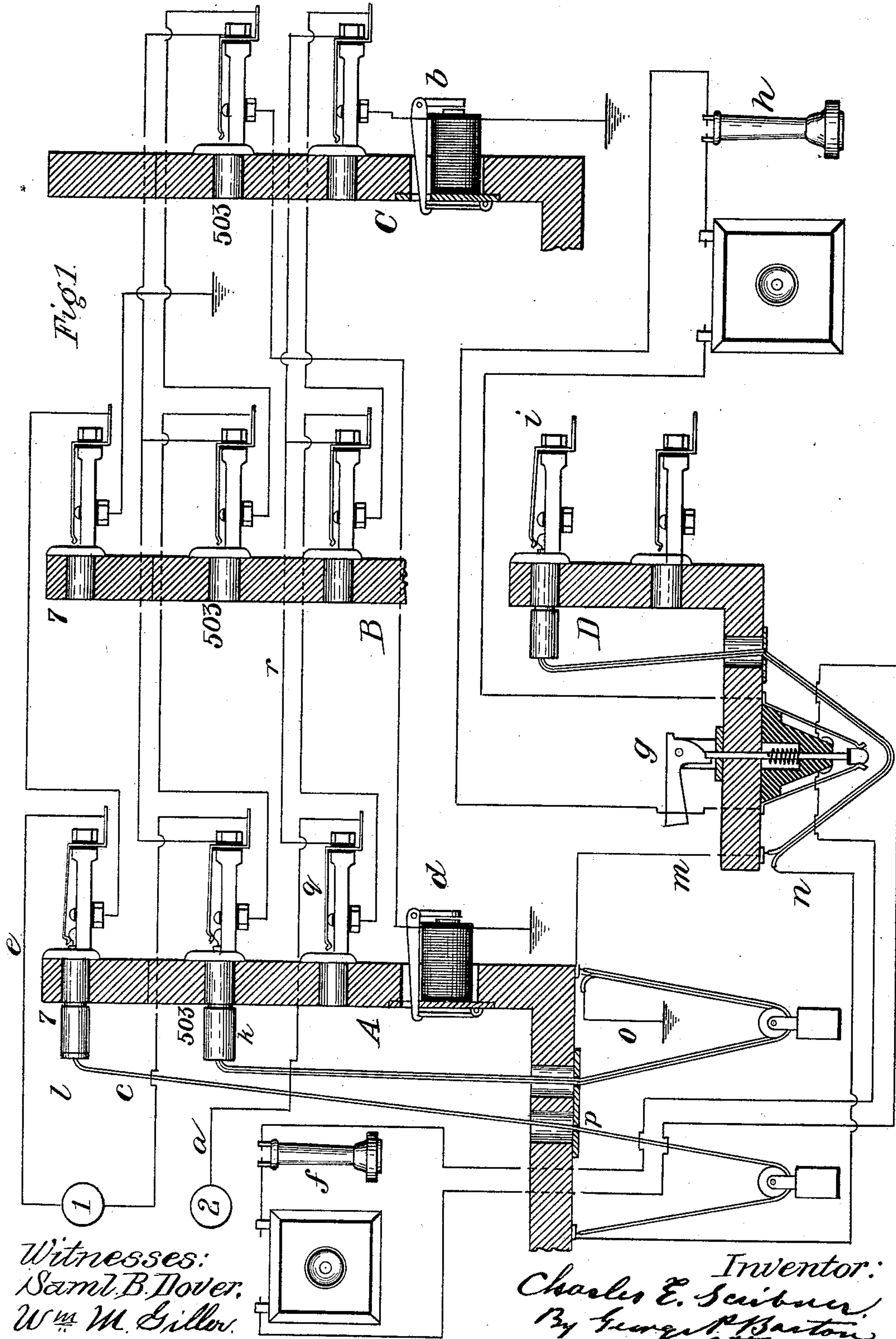
2 Sheets—Sheet 1.

C. E. SCRIBNER.

LONG DISTANCE CONNECTION FOR MULTIPLE SWITCH BOARDS.

No. 381,431.

Patented Apr. 17, 1888.



Witnesses:
Saml B. Dover,
W^m M. Giller.

Inventor:
Charles E. Scribner,
By George P. Barton,
Attorney.

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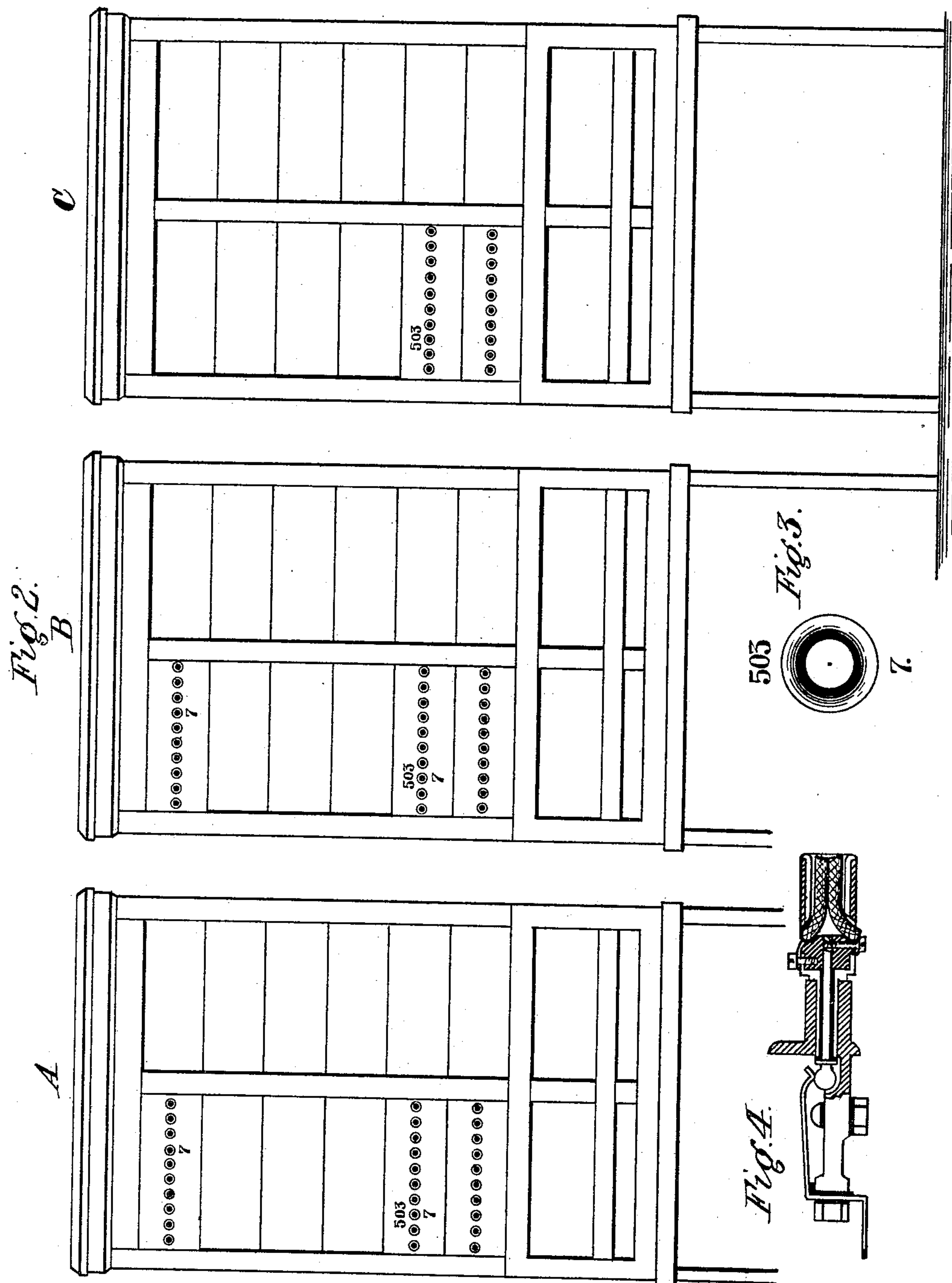
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UNITED STATES PATENT OFFICE.

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

LONG-DISTANCE CONNECTION FOR MULTIPLE SWITCH-BOARDS.

SPECIFICATION forming part of Letters Patent No. 381,431, dated April 17, 1888.

Application filed January 3, 1887. Renewed November 21, 1887. Serial No. 255,774. (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 Long-Distance Connections for Multiple Switch-Boards, (Case 131,) 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 multiple switch-board systems of a telephone-exchange, and its object, briefly stated, is to provide facilities for connecting any of the lines of a local telephone-exchange, whether single circuits or metallic circuits, with the long-distance telephone-lines. For example, in the Cortlandt Street Telephone-Exchange in New York, we will say, there are thirty-nine (39) multiple switch-boards, with five thousand (5,000) telephone-lines connected with these boards according to the multiple system. A portion of these lines are metallic circuits. In the same exchange there is a room which we will call the "long-distance room," in which is placed the apparatus for making and receiving the signals of the long-distance lines—for example, lines to Boston, Philadelphia, Washington, and Chicago. These long-distance lines are necessarily metallic circuits. In the long-distance room also is provided switching apparatus for uniting any of these metallic circuits together, as may be desired, and in case connection is desired between any of the long-distance lines and a line of the New York Exchange, the necessary switching apparatus must be provided for this purpose.

My invention relates to making the connections between the lines of the local exchange and the long-distance room.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagram of the circuits and switch-board apparatus illustrative of my invention. Fig. 2 is a front elevation of three multiple switch-boards. Fig. 3 is a front elevation of a switch provided with two numbers, one being the general number of the line and the other the special number of the me-

tallic circuit connected therewith. Fig. 4 is a sectional view showing a loop-plug inserted in a spring-jack switch.

Like parts are indicated by similar letters throughout the different figures.

We will consider switch-boards A and B as the long-distance multiple switch-boards. Board C is one of the ordinary multiple switch-boards. Board D, Fig. 1, is preferably placed in a separate room from the other multiple switch-boards, and is designed for connecting the long-distance lines with one another or with any of the lines of the local exchange by means of the apparatus which I have invented.

The telephone-lines, whether double or single, may be each provided with a different connection on each of the switch-boards, so that any two of the lines may be connected on either of the boards, according to the multiple system. The annunciators of the metallic or double-line telephone-circuits are preferably placed together upon a single board, or, if the number of metallic lines is large, upon two or more boards, so that the calls of the metallic circuits may be received and answered and their connections made as far as possible together upon the same board or boards. As the metallic circuits are added to the exchange from time to time, their spring-jack switches will not come in order upon the boards, but will be distributed at random throughout the different boards.

In Fig. 1 telephone-line *a* may be considered as beginning at subscriber's station 2 and extending thence through a switch on each of the multiple switch-boards A B C, and from the switch on the last board through an annunciator, *b*, to ground. The other single or grounded telephone-lines may be connected in like manner, the annunciators being distributed in groups on the different boards in such manner that the operators at the different boards will have a different group of lines whose calls will be answered at their boards respectively.

I have shown a double-wired or metallic circuit connected with station 1. One branch limb or side, *c*, of this circuit passes, as shown, through spring-jacks 503, one on each of the boards, and through an annunciator, *d*,

upon board A to ground. The other branch or limb *e* of said metallic circuit extends from subscriber's station 1 to the central office, and is there connected with switches 7 7, one on each of the boards A B, and from switch 7 on board B to ground. It will thus be seen that the return portion of each metallic circuit is provided with a switch or connection 7 on each of the boards A B.

10 In order that the operator in the long-distance room at board D may readily connect with the operator at long-distance board A, I have provided a connection from the operator's listening-telephone *f* to the loop-key *g* in the long-distance room. The operator at board A is supposed to be constantly listening at telephone *f*, while the operator in the long-distance room, by throwing up the cam-lever of his loop-key, may readily bring his telephone *h* into the circuit of telephone *f*. He may thus readily communicate any order he may have to the operator at board A. We will suppose the operator in the long-distance room at board D desires to connect long-distance circuit *i* with the metallic circuit No. 503. In order to do this he will first switch his telephone-line *h* into the circuit of the operator's listening-telephone *f* and give his order. The operator at board A having received the order, will at once insert one of his plugs *k* in the switch 503 of the line, as shown. As he inserts the plug he must notice whether or not there is another number below the spring-jack. If it is a metallic circuit, it will be numbered to correspond to the spring-jack in the return portion of the metallic circuit, which spring-jack will be placed upon his board, preferably upon the upper portion thereof. In this case he will note the number 7 below the spring-jack. This will not only indicate to him that the line called for is a metallic circuit, but also will indicate the particular spring-jack upon the upper portion of the board in which he must insert the other plug, *l*, of his pair, which plug he will then insert, as shown, in spring-jack 7. The two ends of the metallic circuit will thus be carried, as shown, by the wires *m n* to the long-distance room. These two wires *m n* form the different strands of a conducting-cord, which is provided with a plug having two insulated points, and the long-distance operator at board D, by simply inserting this plug into the switch of long-distance line *i*, will complete the loop between said long-distance line and the local metallic circuit, the spring of the long-distance-line switch coming against the tip of the plug, which is connected with one of the strands of the cord, and the insulating frame of said switch coming against the insulated metallic sleeve upon the shank of the plug. It will be noted that one of the plugs of the pair at board A is a loop-plug, which is provided with a connection or strand, *o*, from its insulated sleeve to ground. Thus when plug *k* is in-

serted in any switch the insulated frame of said switch, and hence the insulated frames of the other switches of the line, will be provided with a ground-connection, *o*, so that the fact that the line is in use may be found out by testing at any of the boards. The metallic heels of the plugs *k l* are connected with their tips. When either of the plugs rests upon ground-plate *p*, it is evident that the strand connecting with the tips of the plugs will be provided with a ground-connection.

In case the long-distance operator asks for a connection with a grounded circuit-line, the operator at board A will insert a plug, *k*, in the switch of the line wanted. Seeing no number under said switch he will leave the other plug, *l*, resting upon the ground-plate *p*. Thus if plug *k* were inserted in switch *q* the circuit might be traced, beginning at subscriber's station 2, by line *a* to switch 2, and thence by the spring of switch *q* to the tip of plug *k*, and thence by wire *m* to tip of the plug inserted in the switch of line *i* at board D, and thence over long-distance line *i* back to the frame of said switch and to the insulated sleeve of the plug, and by wire *n* to plug *l*, and thence from the heel of said plug *l* to ground-plate *p*, thus completing the circuit. The test-wire *r* of line *a* would be connected to ground by connection *o*, as before described with respect to test-wire of metallic circuit 503. I have thus provided for extending the circuit of any line of the exchange to the long-distance room upon the order of the long-distance operator, and whenever a line is thus given to the long-distance operator a ground is placed upon the test-wire of the line so connected. I have thus provided facilities for adding metallic circuits to the exchange from time to time, as may be desired, and apparatus for connecting the different metallic circuits one with another or with other lines of the exchange, while any line of the exchange, whether metallic or single, may be readily extended to the long-distance room, so as to be looped into the circuit of any of the long-distance lines.

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

1. In a telephone-exchange system, the combination, with the multiple switch-boards, each provided with a different connection for each of the telephone-lines, of the special connections upon one or more of said boards for the return portions or sides of the metallic circuits, the annunciators of the metallic circuits being placed upon the said one or more boards, which are provided with the extra switches in the return portions of said metallic circuits, and switching apparatus at said one or more boards, whereby any of these metallic circuits may be connected with one another, with other lines of the exchange, or extended by a loop-connection to a long-distance room, substantially as described.

2 A metallic telephone-line circuit, one limb of which is connected with a different switch

or spring-jack on each of two or more multiple switch-boards, said limb extending through a subscriber's station, and the return portion or limb of said circuit being connected with a special spring-jack on one or more of the multiple switch-boards, the individual annunciator of said circuit being placed upon a board having the special connection for the return limb of the said circuit, the special connection or spring-jack of the line having its individual number, and said number being also indicated at the other switch of the line upon the same board or boards, in combination with switching apparatus, whereby the metallic circuit may be extended by a loop to the long-distance room, substantially as described.

3. Upon one of a series of multiple switch-boards, each provided with a separate terminal for each of the different telephone-lines, the combination, with a special terminal for the return portion of a metallic circuit, said special terminal having its own number, and said number being repeated in connection with the other terminal of the same line upon the same board, whereby the operator at said board upon observing the said special number in connection with the general number of the line will know that the line is a metallic circuit, and the number of the special terminal of said line upon said switch-board.

4. In a telephone-exchange system, the combination, with multiple switch-boards, each

provided with a different connection for each of the telephone-lines, of the special connection for one or more of said boards for the return limbs of the metallic circuits, and switching apparatus, whereby any of these metallic circuits may be connected with one another or other lines of the exchange, or extended by a loop-connection to the long-distance room, substantially as described.

5. In a telephone-exchange system, the combination, with multiple switch-boards, each provided with a different connection for each of the telephone-lines, of special connections upon one or more of said boards to the return portions or limbs of the metallic circuits, said special connections having their individual numbers, as 7, which special numbers are represented upon the other or general terminals, as at terminal 503 on the same board, at said one or more boards, whereby the operator may at a glance determine whether any line is a metallic-circuit-line, and whereby any of these metallic circuits may be connected with one another, with other lines of the exchange, or extended by loop-connections to the long-distance room, substantially as described.

In witness whereof I hereunto subscribe my name this 16th day of November, A. D. 1886.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,
WM. M. GILLER.