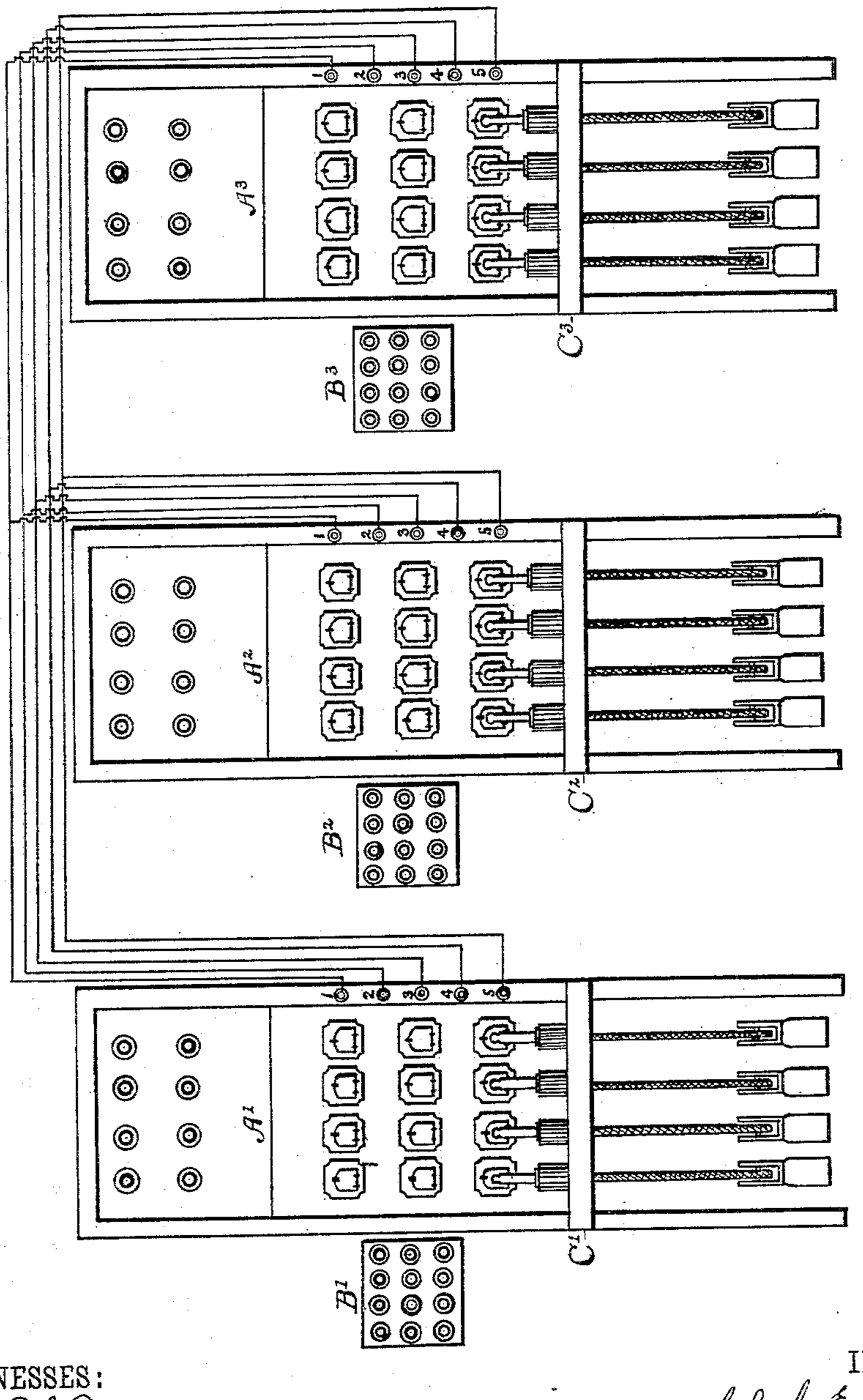
(No Model.) 3 Sheets—Sheet 1.

C. E. SCRIBNER.

SWITCH BOARD FOR TELEPHONE EXCHANGES.

No. 388,791. Patented Aug. 28, 1888.

FIG. 1



WITNESSES:
C. C. Shepherd
M. L. Raftree.

INVENTOR.
Charles E. Scribner.
BY
George P. Barton
ATTORNEY.

(No Model.) 3 Sheets—Sheet 2.

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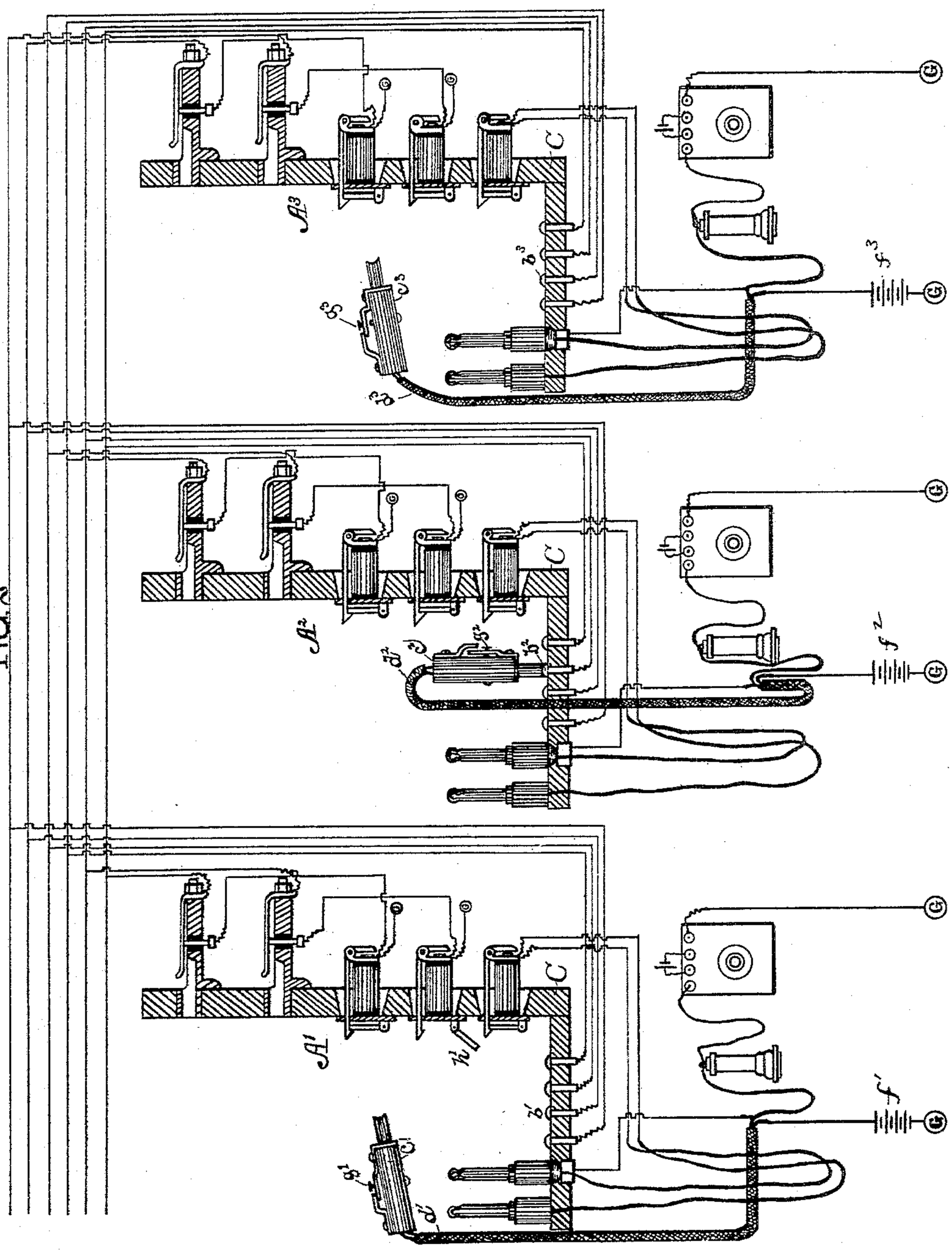
FIG. 2.



Attest:
C. C. Shepherd.
M. L. Raftree.

By his Attorney.

Inventor:
Charles E. Scribner.
George P. Barton

(No Model.) 3 Sheets—Sheet 3.

C. E. SCRIBNER.

SWITCH BOARD FOR TELEPHONE EXCHANGES.

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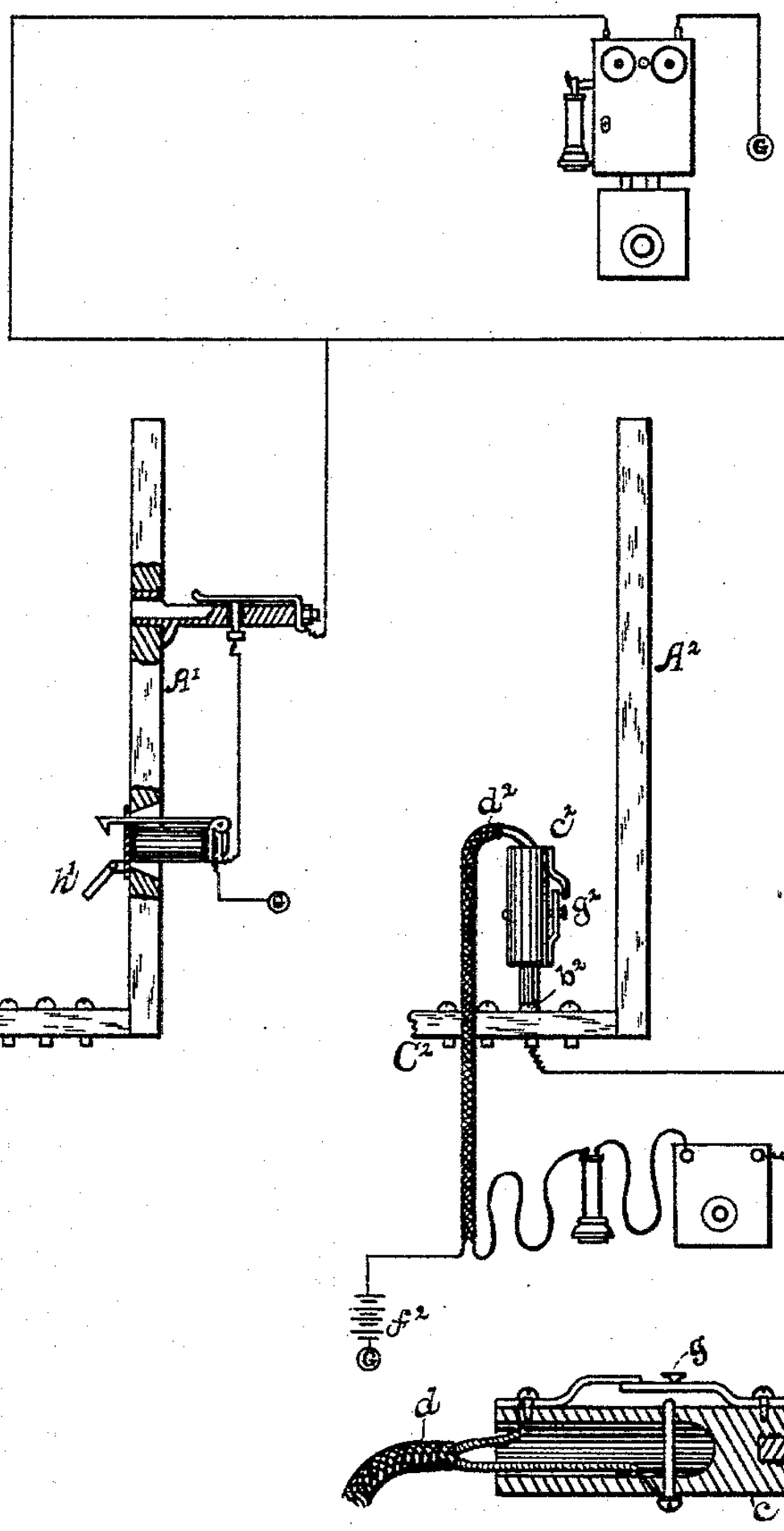

FIG. 3.

FIG. 4.

WITNESSES:
C. C. Shepherd
M. L. Rafford.

INVENTOR:
By his Attorney 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.

SWITCH-BOARD FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 388,791, dated August 28, 1888.

Application filed March 22, 1884. Serial No. 125,222. (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 Branch-Circuit Switch-Boards for Telephone-Exchanges, 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-exchanges in which the subscriber's lines are grouped upon different switch-boards, and the connections between lines of different boards made over trunk-lines or transfer-connections. In this system it is well known that local connections—that is, connections between lines on the same board—are made rapidly, while trunk or transfer connections are always subject to delay and confusion, since a switchman at one board wishing for a connection with a line of any other board must find out whether the line wanted is busy, and if not, have it switched to a trunk-line under his control before the connection can be completed. In order to do this, he must send a ticket or speak directly to the switchman in charge of the line called for. He must give his order, stating the number of the line wanted, and get his answer as to whether the line is free before he can proceed to make the transfer-connection.

My invention consists in providing branch or half connections for each of the the lines, the said branch or half connections extending to terminals placed within reach of the switchmen at the different boards, so that each switchman, in addition to the usual switches for lines assigned to his board, may have within easy reach a bolt or terminal of each of all the other lines of the exchange.

My invention also consists in the means for making the tests and receiving and answering the calls, as hereinafter described and claimed.

By the use of my invention the switchman at any given board is enabled to ascertain directly whether any line of the exchange is busy. Any switchman may also ring the bell at the subscriber's station of any line and at the same time drop the shutter of said line at the switch-board where said line terminates.

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

Figure 1 is a front elevation of three switch-boards, showing the terminals of the half-connections of all the lines placed near each board and the trunk or transfer wires. Fig. 2 shows, partly in section, three switch-boards, with the branch wires or half-connections illustrated in detail. Fig. 3 is a diagram of a single telephone-line with its branches and connections at the subscriber's station and the central office. Fig. 4 is a detailed view of the contact-plug and key.

Like parts are indicated by similar letters of reference in the different figures.

I have marked the letters of reference as a', a^2, &c., to distinguish apparatus used at one board from apparatus of the same kind used at another board, the designating-numbers, however, of the letters being omitted in the description when speaking generally of the apparatus.

The switch-boards A' A^2 A^3, as shown in Fig. 1, are provided with the usual transfer-connections terminating at the bolts 1 2 3 4 5 on each of the boards, as shown in Fig. 1. The telephone-line connections are, for clearness in illustration, omitted from Fig. 1. The half-connection terminals may be placed upon a disk near each board or upon the cord-shelf.

In Fig. 1 I have shown the disks B', B^2, and B^3, each of which is provided with a terminal for a half-connection from each of the lines, excepting those upon the board near which the disk is placed. In Fig. 2 these half-connection terminals are shown upon the cord-shelves C', C^2, and C^3. Each of the telephone-line circuits, as shown in Figs. 2 and 3, extends from its subscriber's station to its switch upon its switch-board, and through an annunciator to ground, in the usual manner. By adding the branch connections a^2 a^3, as shown in Fig. 3, all lines are brought within reach of each of the switchmen at the different boards. The terminals b at the different boards, as shown in the drawings, are arranged upon a board or otherwise insulated and given numbers corresponding to the lines with which they are respectively connected. These terminals may be bolts or screws, and a large number may be conveniently placed within a small area and within easy reach of the switchmen. The contact-plug c (shown at each of the boards in Fig. 2) is connected with

a double cord, *d*, consisting of two strands or conductors, one strand connecting through the telephone-outfit and the other strand through a calling battery or generator, *f*. The telephone is normally connected to the point of the contact-plug *c*. The contact-plugs are provided with keys *g*, so that either of the strands of the cord may be connected with or disconnected from the point of the plug at the will of the switchman.

Suppose, now, the operator at board A^2 receives a call for a line of board A'. He will first touch the point of his contact-plug c^2 to the terminal b^2 of the line wanted. He listens to see if the line is busy. On finding that it is free, he presses the key g^2, and thus switches the battery or generator f^2 to the point of the contact-plug and to line, thus sending current to the line wanted. This current rings the bell at the subscriber's station, notifying the subscriber of the call, while at the same time the shutter *h'* of the line is thrown down. The switchman at the board A', seeing the shutter fall, at once answers the call, not knowing whether the shutter was thrown down by the subscriber or by some one of the switchmen at another board. The switchman who sent in the call now instructs the switchman at board A' to connect the line over which they are talking with the trunk-line over which the connection between the calling and called subscribers is to be completed. The subscriber wanted, as before described, has been already notified of the call by the ringing of his bell. He will therefore be ready to communicate with the calling subscriber as soon as the connection is completed. A switchman at any board by dropping the shutter of a line wanted at another board not only indicates that a connection is wanted but by the same act indicates the particular line with which the connection is desired. The same current which operates the shutter also rings the bell.

As to the state of the art prior to my invention, reference is made to Letters Patent No. 252,576, granted Leroy B. Firman, January 17, 1882.

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

1. The switch-boards, each having the usual switching apparatus and its group of telephone-lines, and trunk-lines between said boards, in combination with half-connection or branch terminals *b*, placed within reach of the switchmen at the different boards, whereby any switchman may test to determine whether any line of another group called for at his own board is busy.

2. The combination, substantially as hereinbefore set forth, with an electric circuit of a telephone-exchange, of a switch and an annunciator placed in said circuit at the central office, and one or more branch or half connections permanently connected with said electric circuit before the line of said circuit reaches the said switch, a half-connection terminal of said electric circuit being placed near each of the switch-boards of the lines of other groups, and means at each of said switch-boards of other groups, whereby a telephone and battery, respectively, may be alternatively connected with and disconnected from the said electric circuit.

3. In a telephone-exchange, the contact-plug *c*, provided with a key, *g*, in combination with a battery, *f*, and a telephone, and a terminal, *b*, of a branch or half connection, *a*, substantially as and for the purpose specified.

4. In a telephone exchange system, two or more switch-boards and telephone-lines grouped upon the different switch-boards, each line being provided with a spring-jack switch and annunciator upon one of the switch-boards and extending from the annunciator to ground, each line being provided with an open branch or half connection extending to a stud or contact-piece, *b*, upon each of the other boards, a telephone and battery in different ground-circuits at each of the boards, said circuits being connected with different strands of the same cord, said cord terminating in a switching device for connecting battery or telephone at will with the contact-terminal of the said switching device, whereby an operator at one board may throw down the annunciator of any line except of the lines grouped upon his own board.

5. A telephone-line grounded at the subscriber's station and at the central office, annunciators or signal devices included in said line, one at the subscriber's station and one at the central office, and a branch or half connection from said line at a point between the signal-instruments, said branch extending to a contact or terminal, *b*, in combination with a contact-plug, *c*, and its double cord, one cord including in its circuit a telephone and the other cord including in its circuit a battery, whereby an operator at will may connect the telephone or battery with the line, substantially as and for the purpose specified.

6. The combination, with telephone-lines, each including a spring-jack switch and an annunciator, of switch-boards, upon which the spring-jack switches and annunciators are arranged in groups, a branch or half connection extending from each line to a terminal stud upon each of the boards, except the board upon which its spring jack switch and annunciator is placed, said terminals being arranged at the different boards in groups, and numbered to correspond with their lines, respectively, a contact-plug connected with a double-stranded cord at each of the boards, one strand containing a battery and the other a telephone, said connecting-plug being provided with a key, *g*, whereby the operator at any board may, by applying the contact-plug to the terminal of any line, determine by listening at the telephone whether the line is in use, and by closing the key *g* send current to line, substantially as and for the purpose specified.

7. The combination, with telephone-lines,

of their individual spring-jack switches and annunciators grouped upon different switch-boards, a branch connection from each line on the line side of its spring-jack extending to a different terminal at each of the other boards, trunk-wires between the boards, a telephone and source of electricity at each of the boards, and switching apparatus, whereby an operator at any given board may test a line grouped at any other of the boards, and, having tested, throw down the shutter of said line and direct the operator answering the signal to connect said line with a particular trunk-wire, substantially as and for the purpose specified.

8. In a telephone exchange system, the combination, with two or more switch-boards, of telephone-lines, each telephone-line being provided with a spring-jack switch and an annunciator on one of the boards only, and each line being provided with a terminal or stud upon each of the other boards, trunk-lines between the different boards, a telephone and battery connections at each of the boards, the terminal of said battery and the terminal of said telephone being each upon the same movable switch or contact plug, and switching apparatus at each of the boards, whereby an operator at one of the boards may throw down the shutter of any line located at another board, and whereby any two lines of the exchange may be connected together, substantially as described.

9. The combination, with telephone-lines from the different subscriber's stations terminating in spring-jacks and annunciators at their respective boards, of branches from all of the lines terminating in studs upon the other switch-boards, trunk-lines connecting the different switch-boards together, connecting cords and plugs with which the lines of the different boards may be connected together through the medium of the trunk-lines, switching devices in connection with the operator's telephone and calling generator to connect with the studs or terminals of the said branch connection, whereby an operator at one board may signal an operator at another board over the line wanted, to complete the connection.

In witness whereof I hereunto subscribe my name this 11th day of March, A. D. 1884.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,

C. C. SHEPHERD.