

(No Model.)

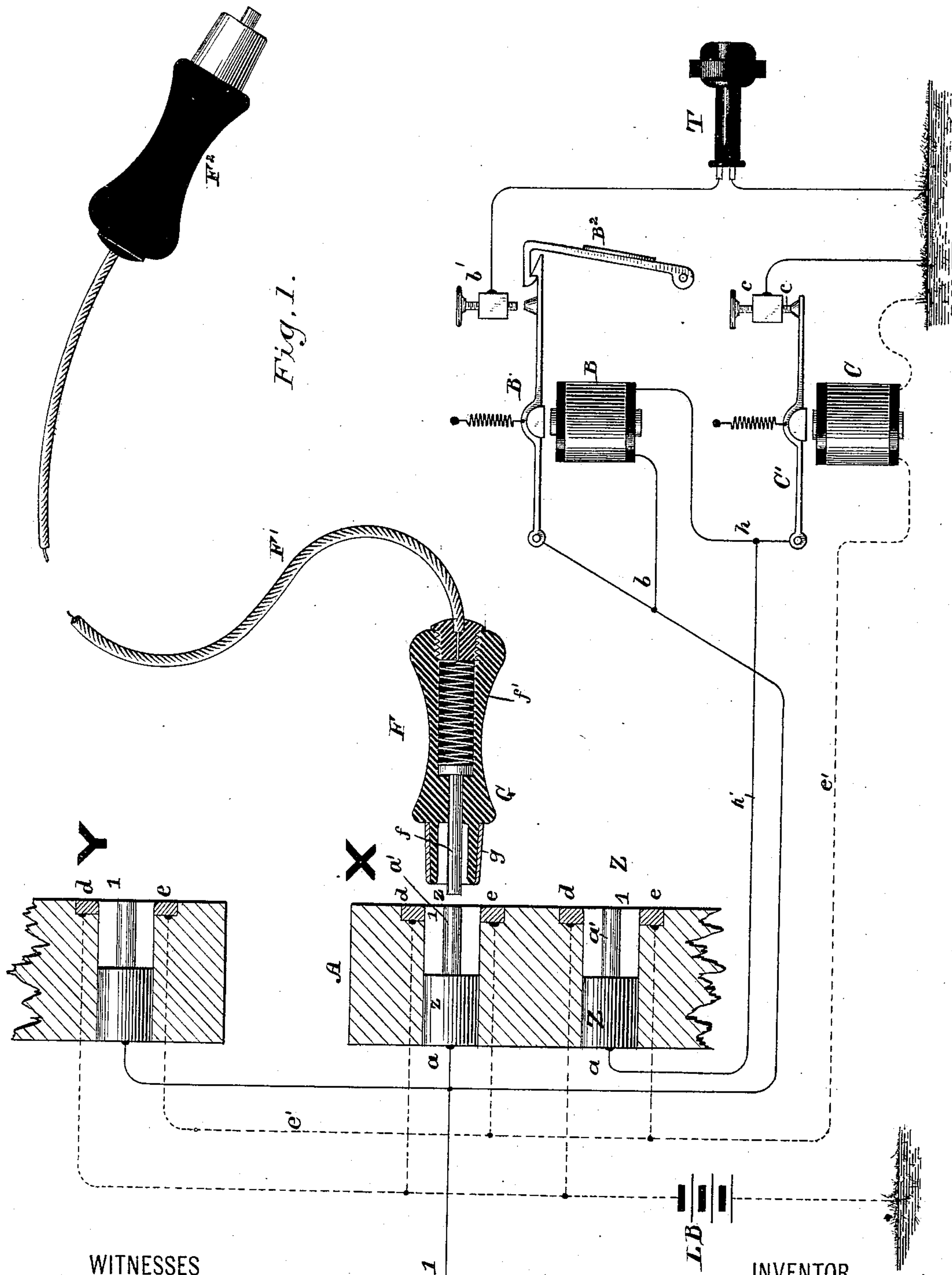
2 Sheets—Sheet 1.

T. J. PERRIN.

MULTIPLE SWITCH BOARD.

No. 316,394.

Patented Apr. 21, 1885.



WITNESSES

Wm A. Skinkle.
Geo W Young

INVENTOR

Thomas J. Perrin.

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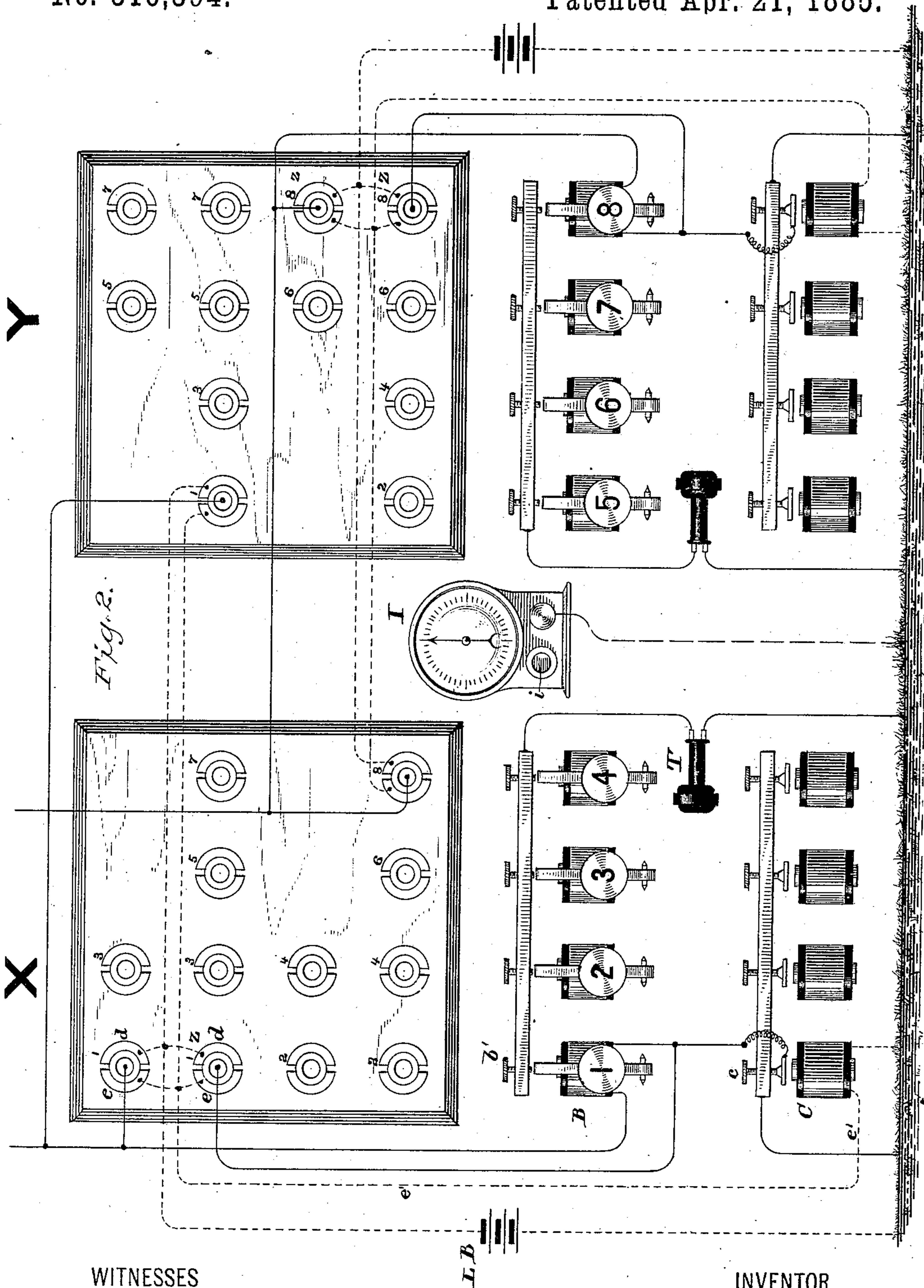
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UNITED STATES PATENT OFFICE.

THOMAS J. PERRIN, OF BROOKLYN, ASSIGNOR TO CHARLES P. HUNTINGTON,
OF NEW YORK, N. Y.

MULTIPLE SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 316,394, dated April 21, 1885.

Application filed October 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. PERRIN, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Multiple Switch-Boards, of which the following is a specification.

The object of my invention is to provide a novel arrangement whereby the operator at any one of the boards in a multiple series may readily ascertain whether any one of the main lines is in use. This part of my invention contemplates the use of an ordinary galvanometer or current-indicator.

Another object of my invention is to so organize the apparatus that the call of a subscriber will by the drop of his annunciator put the apparatus into such condition that upon the cessation of the ringing call his line will be in communication with the operator's instruments; but upon the continued ringing of the subscriber the operator's instruments will be kept disconnected from the line. The purpose of this organization and its advantages will be perceived. The fall of the annunciator-drop notifies the switchman of the call, and upon the cessation of the ringing the subscriber can at once inform the operator what line to connect him with. The serious annoyance heretofore caused by ringing through the operator's instruments is obviated, and it will be understood, therefore, that when the operator is answering the call of one subscriber he cannot be interrupted by the calling of another subscriber through his instruments. The second subscriber, when he has ceased calling, can speak to the operator over the line and can continue asking for the connection desired until the operator can give him attention. All this will appear plain from the following description.

In the accompanying drawings, Figure 1 is a detail diagrammatic view showing the terminals of a main line at two sections of a multiple switch-board, and Fig. 2 is a front view showing portions of two sections of board.

I have only illustrated several line-terminals on each section of the board, and have only shown the terminal of one main line on each board connected up for operation. The other lines are similarly connected and operated, and a description of them is unnecessary.

The boards A are bored out, as clearly indicated in the drawings, for the reception of main-line terminal plugs *a*, which are enlarged at the rear end to fit the aperture in the board, and at their front ends are turned down or reduced in size at *a'*, so as to project centrally through the hole or aperture in the board, as clearly illustrated in the drawings. The ends *a'* of the terminal plugs are preferably arranged so as to be flush with the front face of the board.

Let X represent one section of board and Y the other, and let us suppose that the operator at board X has particular charge of lines 1 to 4, inclusive, and the operator at Y charge of lines 5 to 8, inclusive. In Fig. 1, to which attention is now particularly invited, I have shown line 1 and its terminal connections with the boards X and Y. It will be observed that at board X, I have shown two terminals for the line 1—namely, terminal *z* and terminal Z. For the present let terminal *z* be ignored. Its function is hereinafter described. Line 1, as clearly shown in this figure, is connected with terminal plug 1 on board Y and terminal plug 1Z on board X. On board Y the connection is direct from the main line to the terminal plug. At board X, however, which is the board having special charge of this line, the line runs first through the coil B of the line-annunciator; thence to the armature C' of the ground-relay C, to the stop *c* of said relay, to earth. A branch of this line connected at the point *h* between the annunciator B and armature C' is connected with the terminal plug *a* of terminal 1Z. At the point *b*, before the line enters the coil of the annunciator B, a branch is run to the armature B' of the annunciator.

b' is the stop of the annunciator-armature, with which the operator's instruments T are permanently connected. The retracting-spring of the armature B' tends normally to draw the armature against the stop *b'*, but is normally prevented from doing so by the latch of the annunciator-drop B². The armature C' of the relay C is normally drawn against its contact-stop *c* by its retracting-spring.

A local battery, LB, is connected, as shown, with insulated plates *d d*, arranged on one side of the terminal openings in the board.

The opposite insulated contact-plates $e e$ are connected by a line, e' , through the coil of the relay C to earth.

The plug which I prefer to employ for connecting the subscribers for communication is shown in Fig. 1. It consists of a hollow handle, F, of some suitable insulating material, within which a contact-pin, f , normally thrust forward by a coil-spring, f' , is secured. The spring and pin are in electrical communication with the wire in the cord F', which connects with the other plug.

The nose or wedge-shaped plugging end G of the plug F is hollowed out, so that, when the terminal opening is plugged to, the end a' of the terminal plug a can enter the plug and press back the contact-pin f , so as to make firm contact with it. A ring or circuit-completing collar, g , is placed around the portion G of the plug, so that when the plug is inserted electric connection will be completed through said ring from the contact d to e , thus completing the circuit of the local battery LB through the coil of the relay C.

With this description of the construction of the apparatus its operation will be readily understood.

Suppose, now, that subscriber No. 1 sends a calling-signal over the line, the current will pass from the line through the coil of the annunciator B, armature C' of the relay C, and its contact-stop c to earth. The annunciator-magnet will be energized, and, attracting the armature B', will permit the annunciator-drop B² to fall. As long as the subscriber continues to ring, however, the armature B' will be held down upon the magnet B, thus cutting the operator's instruments out of line. When he ceases calling, however, the armature B' will be drawn by its retracting-spring against its contact b' , and the operator's instruments will be connected with the main line. The subscriber then informs the operator what subscriber he wishes to communicate with, and the operator inspects the terminal of that line to ascertain if it is in use, as is presently described. If he finds that the line is idle, he at once proceeds to connect the two subscribers, which is done by plugging to their terminals and connecting them through the cord F'. The insertion of the plug F into the terminal 1Z would make a connection from the main line 1 through the coil of annunciator B to the point h , and thence by wire h' to the terminal plug a , through its reduced end a' to the contact-pin f in the plug, spring f' , and cord F', to the terminal plug of the other subscriber. The same act of plugging to the terminal, however, completes the local circuit e' through the coil of the ground-relay C, which attracts its armature C', thus breaking the ground-connection of the line 1 at the point c , so that the line is completed as just traced. As shown at Fig. 1, line 1 is only provided with an annunciator and ground-relay at its particular board. At board Y the

line is connected directly to the terminal plug, and this is of course the case with all the other lines. If therefore in connecting line No. 1, as just described, the other plug, F², is inserted in the terminal of a line which is in particular charge of another operator at another board, the circuit will be directly through the terminal plug a of that line to the subscriber's station, and will not, of course, include another annunciator-coil. If, however, subscriber No. 1 desires to communicate with some other subscriber also in charge of the operator at board X, if the operator plugs to the terminal 1Z and to a similar terminal, Z, the annunciator-coils of both subscribers are included in the circuit. This, under some circumstances, may be disadvantageous, as introducing too large a resistance, and I obviate the difficulty by providing each line at its particular board with two terminals—one marked Z, connected through the coil of the annunciator B, as described, and the other, which is preferably placed just above it, marked z , which is connected directly with the main line. The operator in connecting two subscribers both of whose lines are in his particular charge, would therefore plug to the upper terminal, z , of the called subscriber, so that the annunciator B of the calling subscriber only would be included in the circuit. This is clearly shown in both Figs. 1 and 2.

Under the organization described it will be obvious that it is entirely impossible for any subscriber to ring through the operator's instruments, as the very act of sending a signaling-current over the line causes the annunciator B to attract its armature away from the contact of the operator's instruments. For this reason, therefore, if the operator is answering the call of one subscriber, he cannot be annoyed by some other subscriber sending a calling-signal through his instruments; but the second subscriber calling may, by speaking through his telephone, be heard by the operator, and will in turn receive proper attention.

The insertion of the plug in any main-line terminal on any board at once completes the local e' , and by means of the relay C throws off the ground of said line at its particular board. The completion of this local circuit by the insertion of the plug at any of its main-line terminals is also made a test at all the boards to indicate whether the main line is in use, and this test is made in the following manner: A galvanometer, I, is provided at each board, and whenever the operator at that board desires to know whether a given line is in use he takes a pair of plugs, F F², and, putting one plug to the galvanometer at i , touches the other plug to the contact e of the terminal. If the local circuit of that terminal has been completed on any board, as described, when the contact e is touched by the contact-pin g of the plug a a derived circuit will be established from the local e' through the cord F',

other plug, F^2 , and galvanometer to earth, thus causing a deflection of the needle, which at once indicates that the line is in use. By the use of a galvanometer in this manner the condition of the line inspected is at once indicated. The instrument is quiet, and it will respond to a weak current that would fail to actuate a bell.

When subscribers have been connected for communication, the annunciator-drop of the calling subscriber is put up into the normal position shown in Fig. 1, and when the subscribers have finished communication one of them sends a current into the line, which causes the annunciator to drop, thus indicating to the switchman that the lines may be disconnected.

It will be perceived that under my organization the annunciator serves the double purpose of an annunciator and clearing-out relay. In Fig. 1 the contacts b' of the annunciators and the contacts c of the ground-relays are arranged upon a common conducting-bar.

I am aware of the patent of Sabin, No. 249,262, of November 8, 1881, which shows a multiple switch-board in which each circuit at its particular board is provided with two electro-magnets. The coil and armature of one of the magnets is included in the main line, as is the armature of the second magnet; but the coil of the second magnet is included in a local circuit, and the operator's instruments are connected with the contact-stop toward which the armature of the local magnet is constantly drawn. In my improved arrangement the armature of the main-line magnet is also included in the main line, and is normally drawn toward a stop with which the operator's instruments are connected. Any subject-matter shown in the above patent is hereby disclaimed.

I claim as my invention—

1. The combination, in a switch-board, of a main line, its terminal on its particular board, a normal ground-connection for said main line, a magnet included in said main line, the armature of said magnet also connected with the main line, its contact-stop, toward which it is normally drawn, operator's instruments connected with said contact, and means, substantially such as described, for breaking the normal earth-connection of the line.

2. The combination of a main line, a normal ground-connection for the line, a magnet included in the line, the armature of said magnet also connected with the line, the contact-stop of the armature, toward which it is normally drawn, and operator's instruments connected with the contact-stop.

3. The combination, substantially as set forth, in a multiple switch-board, of a main line, its terminal connections on the several boards, an annunciator-coil included in said line at its particular board, the annunciator latch or drop, the annunciator-armature, and the contact of the operator's instruments, toward which said armature is normally drawn.

4. The combination, in a multiple switch-board, of a main line, its terminal connections on the several boards, an annunciator in the main line at its particular board, the operator's instruments, and line-contact, and the annunciator-armature or circuit-completing lever connected with the main line, which lever normally tends to complete the line-circuit through the operator's instruments, but is prevented from doing so whenever a calling-signal is received over the line.

5. The combination, in a multiple switch-board, of a main line, its terminal connections on the several boards, the operator's instruments at its particular board, the annunciator included in the line at said board, which annunciator prevents the circuit from being completed through the operator's instruments as long as a calling-signal is being received over the line, but permits the circuit to be completed when said calling-signal ceases, the local circuit, its contacts at the several terminals of said line, and the ground-relay.

6. The combination, in a multiple switch-board, of a main line, its terminal plugs or contact-pieces on the several boards, a local circuit which runs to the several terminals and is there merely connected with insulated local-circuit contacts, the annunciator in the main line at its particular board, the operator's instruments, and the ground-relay included in said local circuit.

7. The combination, substantially as set forth, of the several sections of a multiple switch-board, the terminal plugs Z for the main line, fixed in the boards, the reduced ends of said plugs, the local batteries, the contacts of the local batteries at each of said terminals, and the plugs formed with yielding pins f to make contact with the line-terminals Z and with collars g to complete the local circuits, whereby the main lines are connected and the local indicating-circuits completed when the terminals are plugged to.

In testimony whereof I have hereunto subscribed my name.

THOMAS J. PERRIN.

Witnesses:

L. C. YOUNG,
NELLIE L. HOLMES.