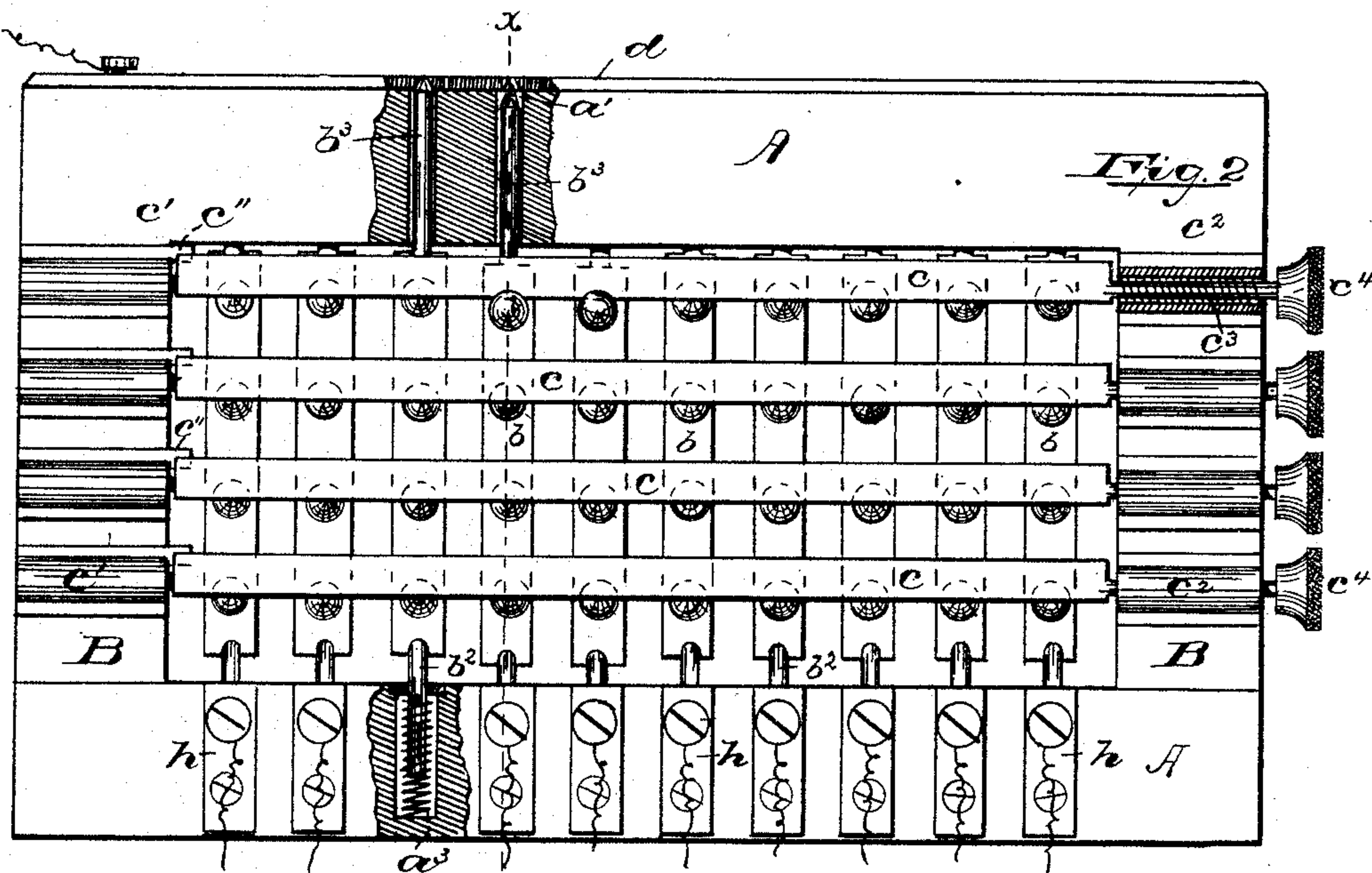


2 Sheets—Sheet 1.

ELECTRIC SWITCH BOARD.

Patented Nov. 23, 1886.



Inventor:

Joseph H. Wehrle,
By Drake & Co.
attys.

J. H. WEHRLE.
ELECTRIC SWITCH BOARD.

No. 353,184.

Patented Nov. 23, 1886.

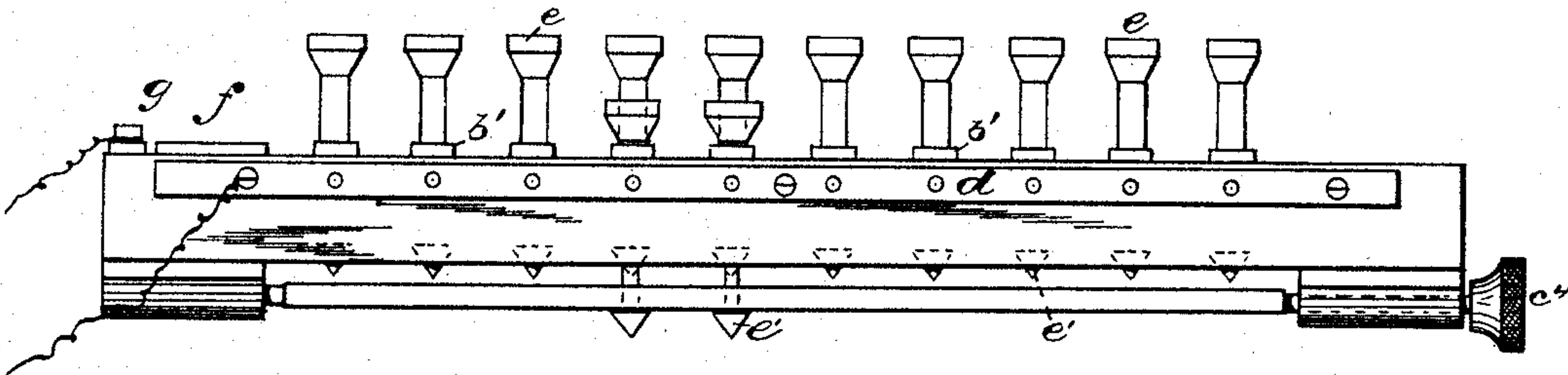


Fig. 3.

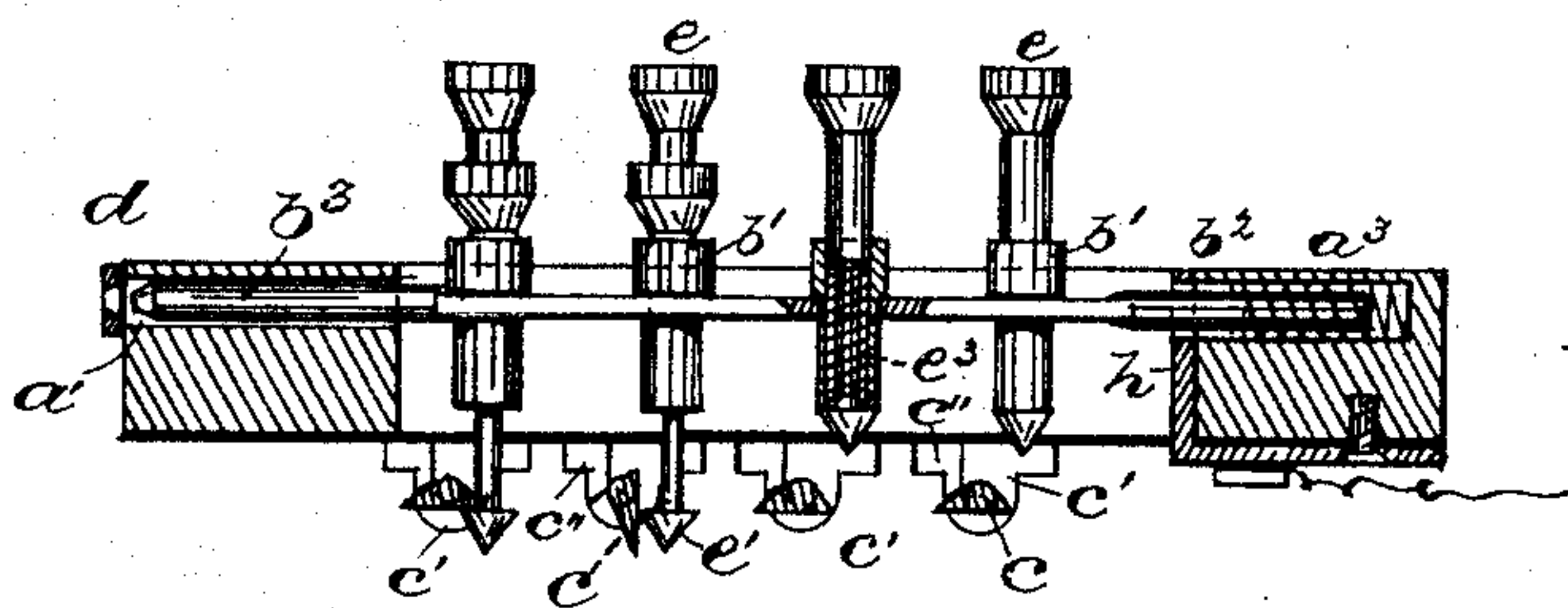


Fig. 4.

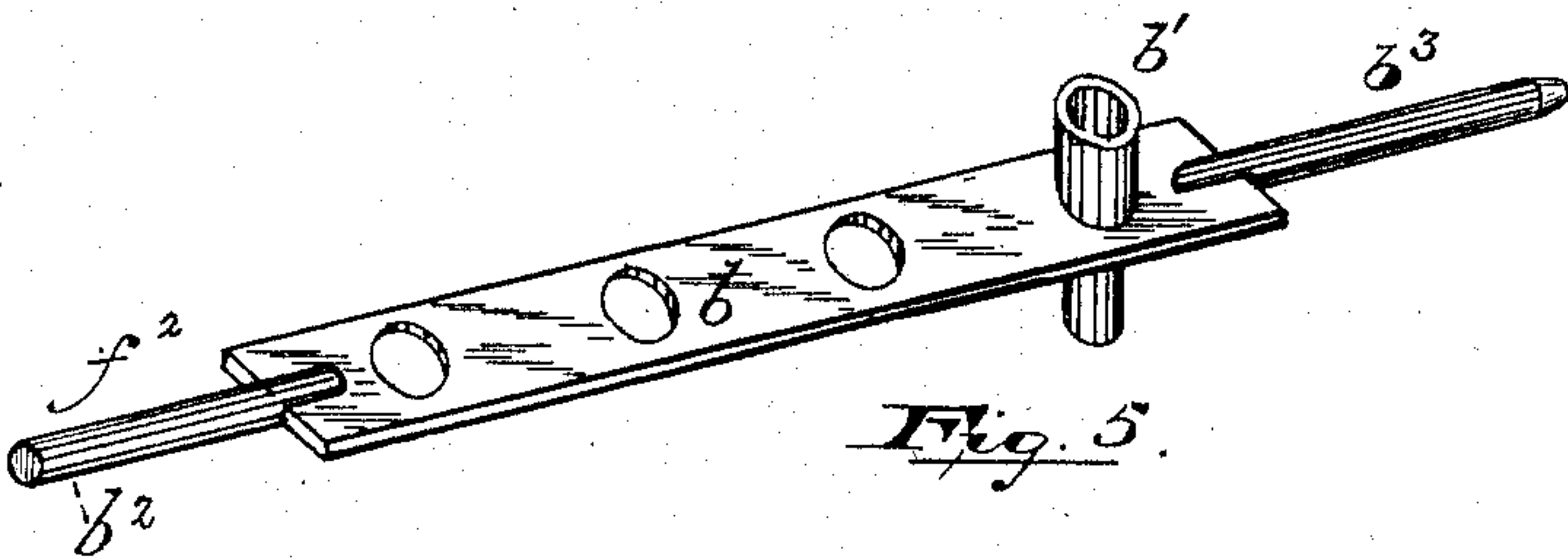


Fig. 5.

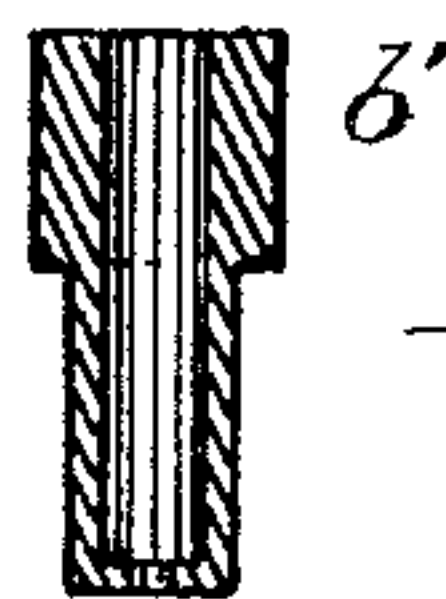


Fig. 7.

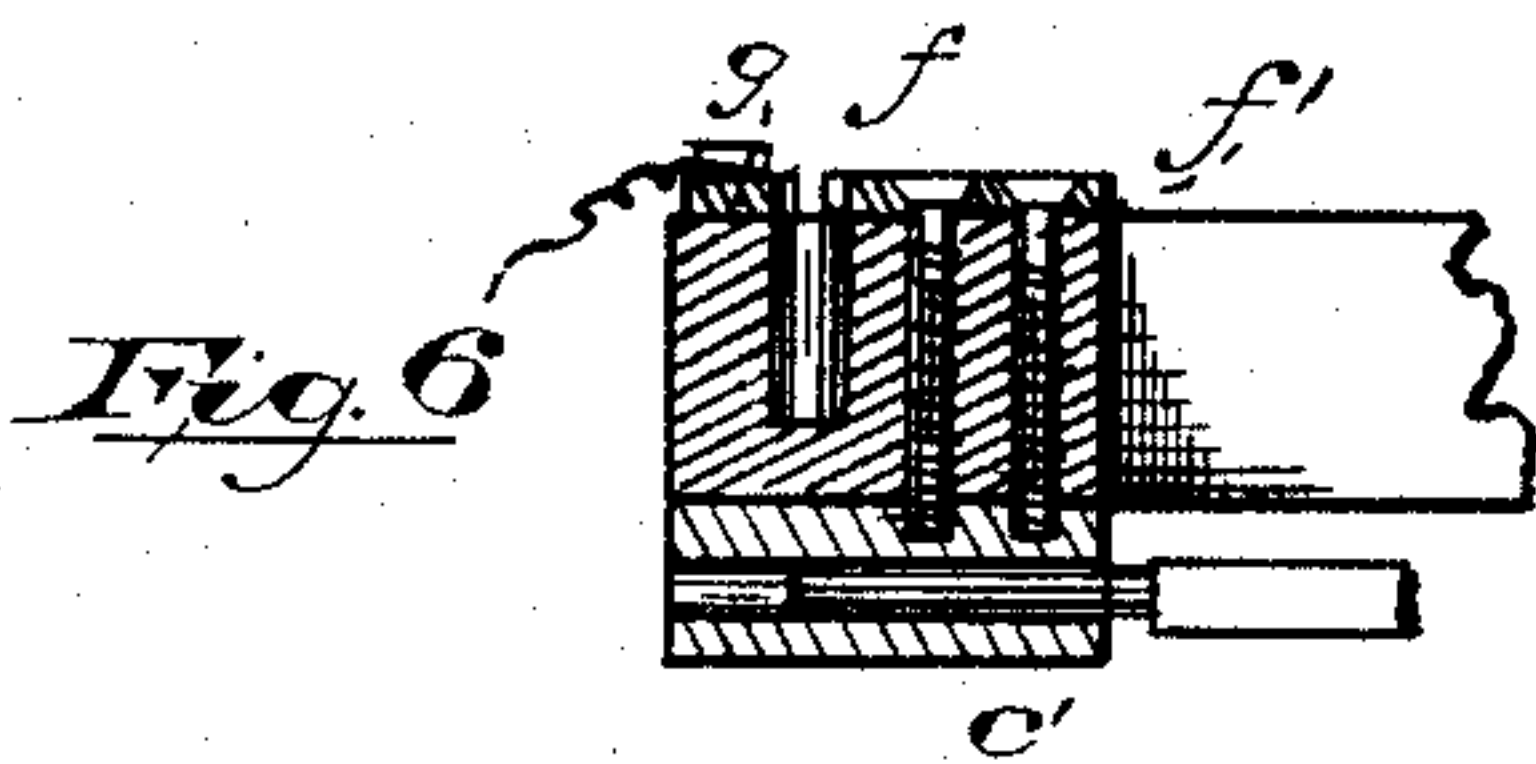


Fig. 6.

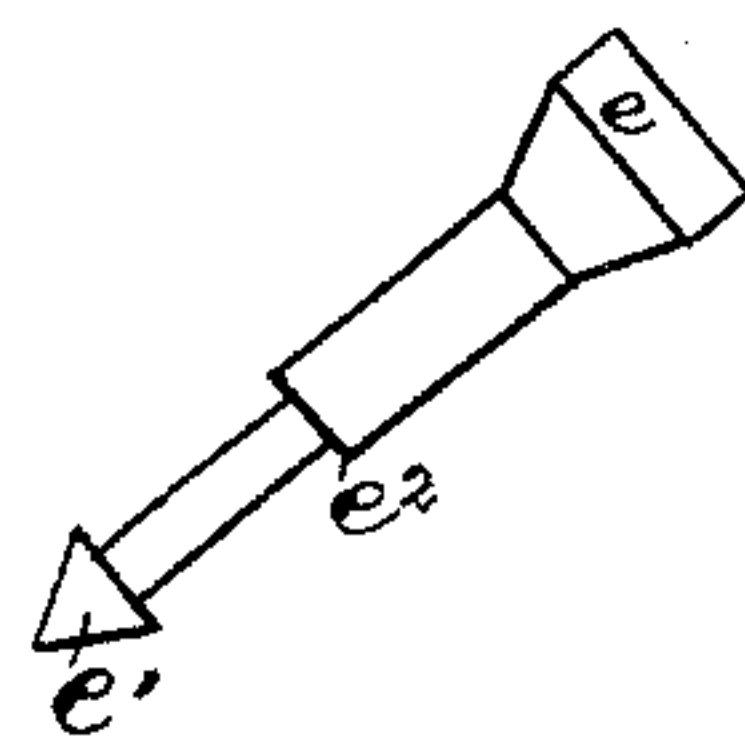


Fig. 8.

Attest:

Inventor:

André F. Campbell
Wm. F. Zimmermann

Joseph H. Wehrle.
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UNITED STATES PATENT OFFICE.

JOSEPH H. WEHRLE, OF NEWARK, NEW JERSEY.

ELECTRIC SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 353,184, dated November 23, 1886.

Application filed November 30, 1885. Serial No. 184,266. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. WEHRLE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric Switch-Boards; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in switch-boards for either telephonic or telegraphic systems, and is designed to simplify and facilitate the manipulation of the switch-board, so that the lines can be more rapidly connected and disconnected than has been possible under the systems and contrivances heretofore used.

The form of apparatus which is considered the most practical and is employed to carry the conception into practical effect is illustrated in the accompanying drawings, embodied in two sheets, in which—

Figure 1 is a plan of the improved switch-board. Fig. 2 is a plan of the bottom of the same, both of which views are found on Sheet 1. Fig. 3 on Sheet 2 is a side elevation of the board. Fig. 4 is a section of Fig. 1 through line *x*. Fig. 5 is a perspective view of an individual line-plate from which some of the plug-cylinders are removed. Fig. 6 is a section of a portion of the device, taken in the direction of *y*, Fig. 1; and Figs. 7 and 8 are respectively a vertical section of a plug-cylinder and a view of a connecting-plug.

Similar reference-letters indicate corresponding parts in each of the above described views.

Among the several objects sought for in switch-boards, rapidity of manipulation is the most desirable and necessary, aside from the indispensable qualities of perfect insulation and perfect conductivity in making the requisite changes.

Switch-boards have been made combining perfectness of insulation and conductivity with a certain ease and facility of manipulation, but not rapid enough to meet all demands to which they are subjected. One cause of the

want of rapidity is, that it has heretofore been necessary to remove a plug or operate some other connection in breaking the ground-circuit before the lines are connected, which must be repeated when the lines are disconnected and the ground-circuit restored. This necessarily consumes time and seriously interferes with the proper management of the switch-board.

In the switch-board herein shown and described the one and the same movement on the part of the operator breaks the ground-circuit and completes the line-circuit.

The said switch-board consists of a frame composed of longitudinal strips *A* and transverse or vertical strips *B*. Within and secured to said frame are the line-connecting devices, of which *b* are the individual line plates or strips, beneath which and transversely thereto are arranged line-connecting bars *c*. The plates *b* and bars *c* are both movably arranged in the frame, one, *b*, having a longitudinal motion, the other, *c*, turning on its axis, being pivotally secured to the frame.

In Fig. 5 is shown a perspective view of an individual line-plate, which consists of a widened portion, *b*, with plug-cylinders *b'* inserted therethrough at intervals, and rods *b²b³* at each end thereof, which extend into and move in orifices or openings *a a'* in the strips *A* of the frame.

The plugs shown in Figs. 4 and 6 are provided with an insulating-head, *e*, a tapering or barbed end or point, *e'*, and are reduced in diameter, forming a shoulder, *e²*. When the plugs are inserted in the cylinders *b'*, a spring, *e³*, is arranged around the reduced portion of the plug, being held between the shoulder *e²* and the bottom of the cylinder *b'*, as indicated in Fig. 4. The perforations or openings *a'* in the frame, in which the rods *b³* move, extend entirely through the frame; and the rods are normally in contact with a ground-plate, *d*, secured to the strip *A* and covering the ends of the perforations *a'*. A spiral spring, *a³*, is arranged around the rod *b²* in the opening *a²*, as indicated in Fig. 4. The object of this spring is to maintain the contact between the rod *b³* and the ground-plate, and to repress the said rod when the contact between the same and the plate is broken. The spring is necessary only when the switch-board is arranged

in a horizontal plane; but when arranged vertically, or approximately so, which is the usual position, the line-plates drop by their own weight. The contact between the rods b^3 and the ground-plate may be made by the flat end of the rod touching the said plate; or the end of said rod may be made tapering and a perforation made in the plate d to receive it, as indicated in Figs. 3 and 4.

Beneath and transversely to the individual line-plates are arranged the line-connecting bars c , which are placed directly underneath a line of plugs, and are beveled on the upper side, the bevel being so formed and the bars so placed that the conical or tapering ends of the plugs will strike one of the beveled sides when they are depressed. The ends of the connecting-bars c are journaled in boxes c' c^2 , in one of which, as c^2 , a spiral spring, c^3 , encircles the journal, and is so secured that as the bars are turned by means of the finger-pieces c^4 the said spring returns the bar to its normal position, which is shown in Fig. 2 and at the left of Fig. 4. On the box c' is formed a stop, c'' , with which the bar engages as it turns to its usual position and prevents the energy of the spring from being exhausted by the rotation of the bar. The said stops c'' also act to hold the beveled line-connecting strips or bars rigid, so that when the connecting-plugs are depressed they meet with a firm resistance and must slide down the inclined side, thereby causing the longitudinal movement of the superimposed line-plates and catch under the edge of the strip, maintaining the contact. While the connecting-strips are thus held firm and prevented from turning away from the line-plates, still they are free to turn up toward the said line-plates, as shown in Fig. 4, to release the connecting-plugs, the simple turning of the strips releasing both plugs simultaneously. The strips are returned to their normal rigid position by the springs c^3 , as hereinbefore mentioned.

Plates f are secured to the frame at the sides by screws f' , which extend through the frame and into the boxes c' , thereby holding the said boxes upon the under side of the frame, and make an electrical connection between the bars c and the plates f . The strip g connects with the operator's telephone and is arranged contiguous to the plates f , both of which are oppositely recessed to receive a plug, as indicated in Fig. 1.

Angle-plates h are countersunk in the upper strips, A , of the frame, and are perforated to receive the rod b^2 of the line-plates, which, coming in contact with said angle-plates, makes a connection at that point. The line-wires are attached to the angle-plates or posts secured thereon, as indicated in Figs. 1 and 2. Annunciators may be interposed in the line-circuit, as ordinarily used.

As before intimated, the primary object of the switch-board is to save time and labor in breaking and making the ground-circuit and in connecting and disconnecting the lines.

The mechanism which is adapted to accomplish this result has been hereinbefore described, and operates as follows: When any two subscribers wish to be connected, a plug in each line-plate over the same connecting-bar is depressed, and as the tapering or barb-shaped end of each plug strikes the beveled side of the connecting-bar it slides down on the same until it catches beneath the edge of the said bar and is held in engagement therewith, as indicated in Fig. 4. The barb-like end of the plug enables the same to automatically catch under the connecting-bar. As the tapering end of the plug moves down the beveled side of the bar it produces a longitudinal movement in the line-plate and breaks the contact of the rod b^3 and the ground-plate d . To break the line-circuit and disconnect the subscribers' lines, the connecting-bar c is turned, as indicated in Fig. 4. The plugs, being thereby released, return to their normal position by the action of the spring c^3 in the plug-cylinder, and simultaneously therewith the contact between the line-plates and the ground-plate by the pressure of the spring a^3 or by the weight of said line-plates themselves is restored. Hence it will be seen that one movement of the operator—viz., that of depressing the plug—breaks the ground-circuit and makes the connection between the lines; also, the simple turning of the connecting-bar releases the plugs, breaks the line-circuit, and restores the ground-circuit.

The various minor details of constructing the switch-board, while they form a part of the invention and are considered to be best of the many ways which I have devised to accomplish the same result, may be formed in several different ways; hence I do not wish to limit the device to the identical form illustrated in the drawings.

As will appear from the drawings, the heads of the connecting-plugs are numbered, so that no mistake may be made in connecting the lines, and to insure further certainty all of the plugs over the same connecting-bar are colored alike and differently from those over each of the other connecting-bars. By this arrangement, when one connecting-plug is depressed, the operator will know which plug to use in the line-plate of the number called by selecting the one colored like the depressed plug.

While I am desirous of claiming all that is novel in my improved switch-board, it is not my intention to lay claim to those features in my board which are found in devices for a similar purpose hitherto made, and hence hereby disclaim the broad idea of breaking the ground-circuit and making the line-circuit simultaneously by means of a plug and moving plate; but in thus disclaiming the broad idea I do not wish to be understood as relinquishing my right to the complete and advantageous method in carrying out this feature of the invention in my improved board.

By reference to the figures of the drawings it will be seen that at the crossing-point of

each line-plate and connecting-bar a connecting-plug is so secured in the line-plates that, while perfectly free to move sufficiently to make a holding contact with the connecting-bars, they cannot be removed or lifted from the said line-plates, and thus be misplaced and lost. Moreover, the arrangement of the movable line-plates above the connecting-bars enables the operator to more certainly connect the proper subscribers' lines than when the line-plates are beneath and concealed by the connecting-bars, as found in some switch-boards.

Having thus described my invention, I desire to claim the following:

1. The combination, in a switch board, with movable individual line-plates normally in contact with a ground-plate, a ground-plate, and line-connecting bars arranged beneath and transverse to said line-plates, said bars being beveled on the upper side and pivotally arranged to release the connecting-plugs simultaneously when turned, of connecting-plugs having barbed ends or points arranged and operating in relation to the line-plates to cause said plates to move, for the purpose set forth, when brought into engagement with the beveled side of the subtending connecting-bars, and adapted to catch upon said connecting-bars, as set forth.

2. In a switch-board, the combination, with movable line-plates normally in contact with the ground, and spring-actuated connecting-plugs having barbed ends arranged in said movable line-plates, of line-connecting strips arranged transversely to and beneath said line-plates, and having the upper sides thereof next to the line-plates beveled or inclined, said strips being rigidly held when the beveled sides are uppermost, to cause the longitudinal movement of the line-plates when the plugs are depressed, substantially as described, but free to turn pivotally toward the overlying line-plates to release the connecting-plugs, substantially as herein set forth.

3. In a switch-board, the combination of movable line-plates normally in connection with the ground, spring-actuated connecting-plugs having barbed ends arranged in said line-plates, pivotally-arranged line-connecting

strips or bars placed beneath and transversely to said line-plates, and having beveled or inclined sides and a finger-piece, a stop engaging with the side of said strips opposite to the bevel thereon, whereby the said bevel is held uppermost and the strips held rigidly, and a spring operating to hold said strips and stops in engagement and to return said strips to said engagement, for the purposes set forth.

4. In combination, in a switch-board, a ground-plate, longitudinally-moving individual line-plates normally in connection with said ground-plate, spring-actuated connecting-plugs having barbed ends or points arranged in said individual line-plates, plug-cylinders secured in said line-plates, within which the connecting-plugs are arranged and move, pivoted spring-actuated line-connecting bars arranged beneath and transverse to said line-plates, said connecting-bars being beveled on the upper side, and plates in the circuit of the subscriber's wire, with which the individual line-plates are in permanent contact, all of said parts being arranged and operating for the purposes set forth.

5. In combination, in a switch-board, a ground-plate, longitudinally-moving individual line-plates normally in connection with said ground-plate, spring-actuated connecting-plugs having barbed ends, plug-cylinders secured in said line-plates, and within which the connecting-plugs are arranged and move, pivoted spring-actuated line-connecting bars arranged beneath and transverse to said line-plates, said connecting-bars being beveled on the upper side, plates with which the individual line-plates are in permanent contact in the circuit of the subscribers' wires, and a strip connected with the operator's telephone and brought into the circuit of the line-connecting bars by means of a removable plug, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of September, 1885.

JOSEPH H. WEHRLE.

Witnesses:

FREDERICK F. CAMPBELL,
CHARLES H. PELL.