

(Model.)

G. L. ANDERS.

SWITCH BOARD FOR TELEPHONE CIRCUITS.

No. 249,445.

Patented Nov. 15, 1881.

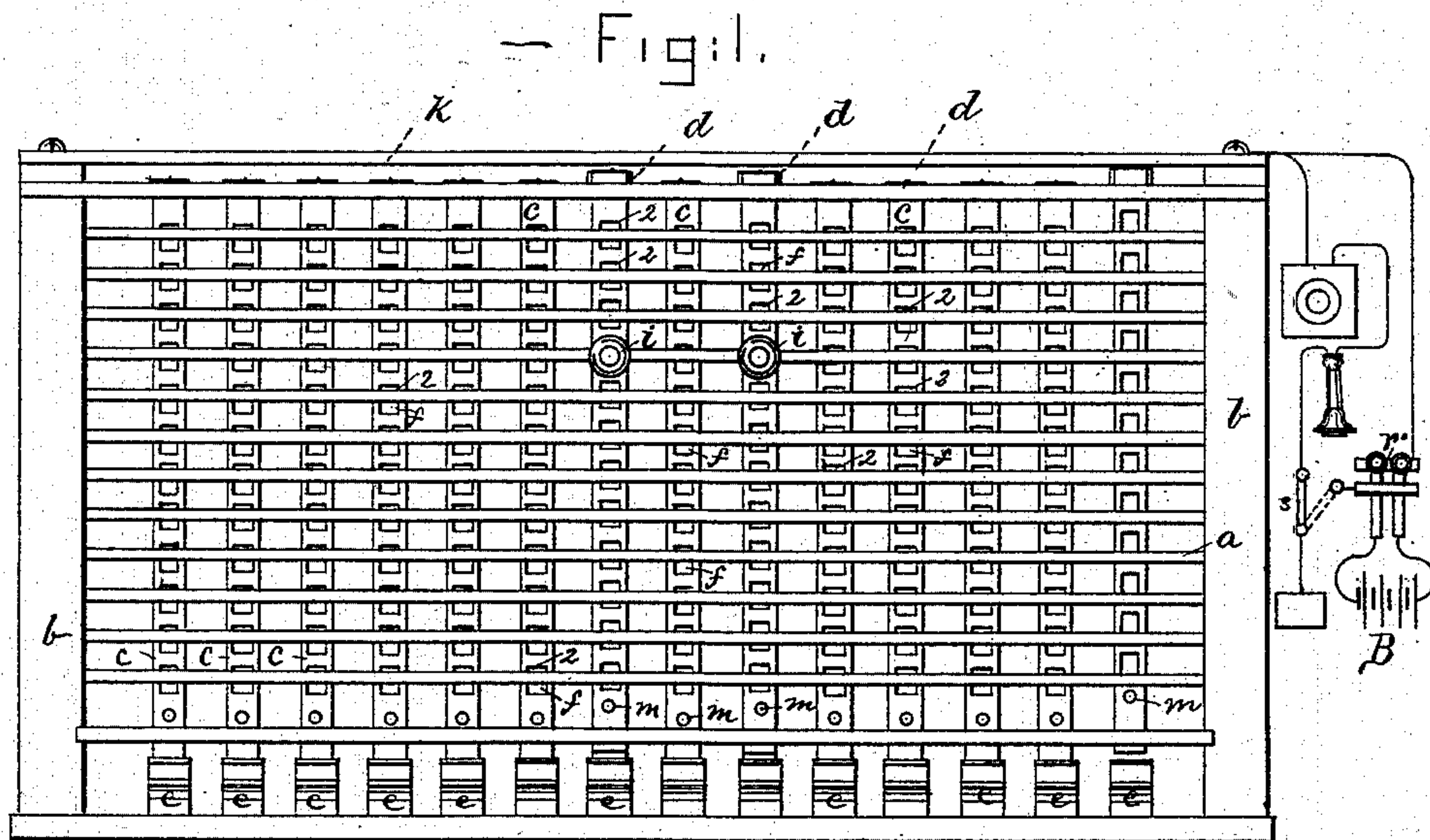


Fig. 2.

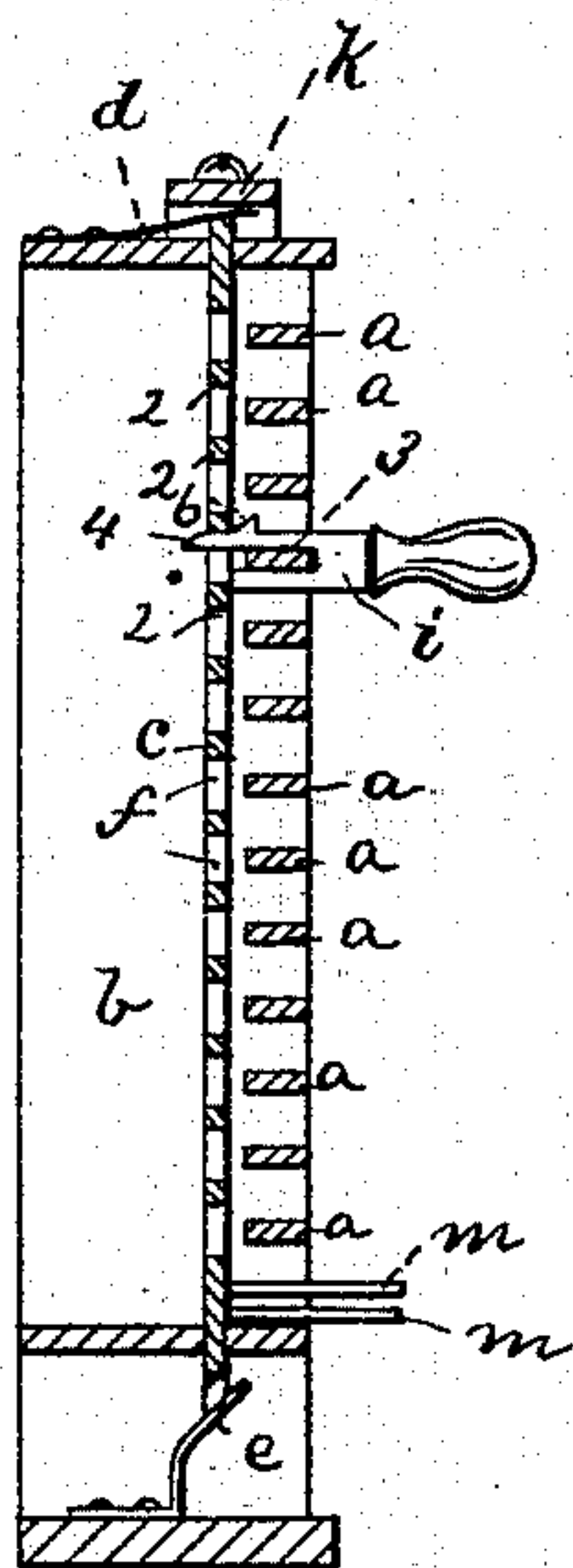
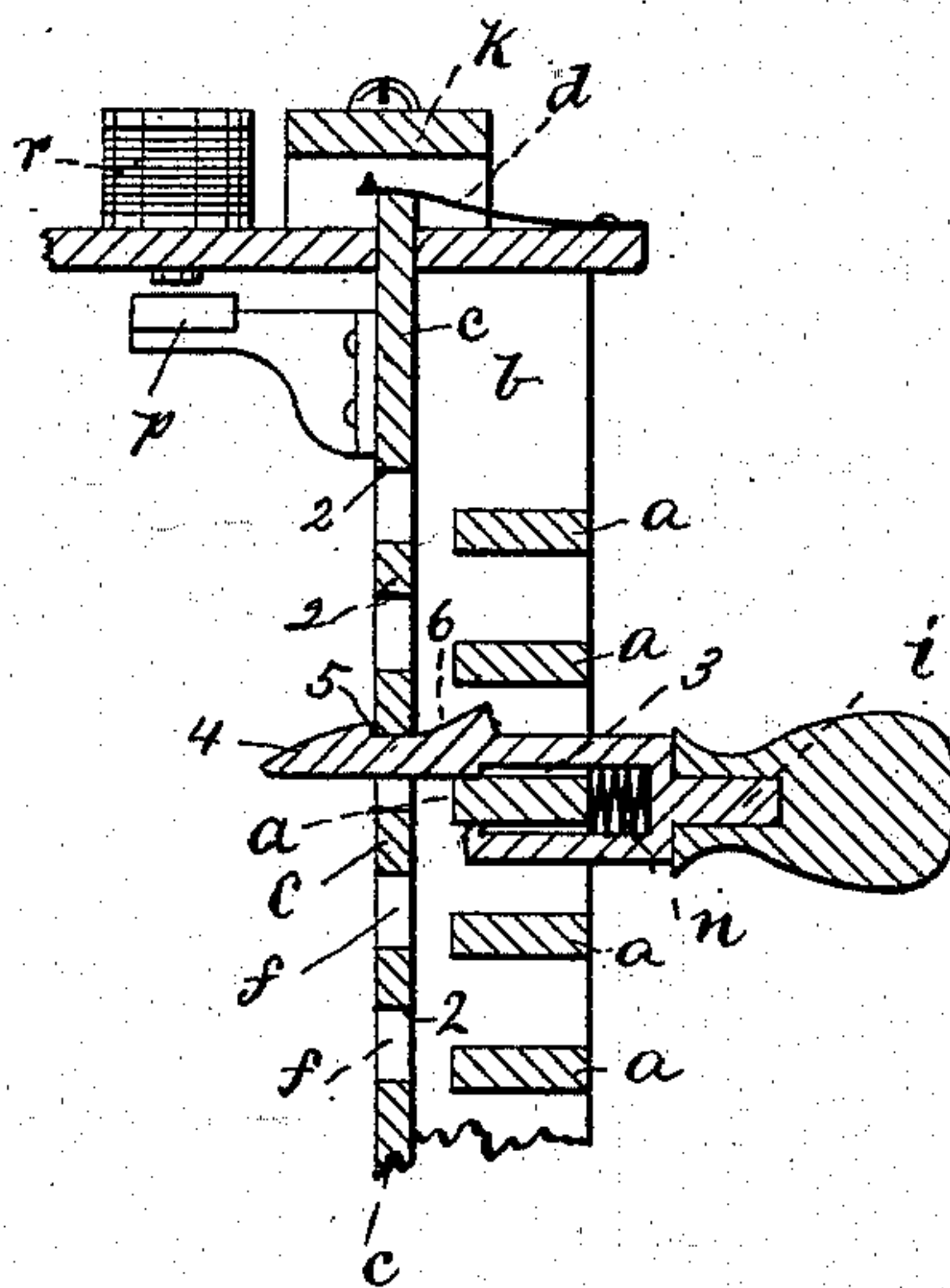


Fig. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN BELL TELEPHONE COMPANY, OF SAME PLACE.

SWITCH-BOARD FOR TELEPHONE-CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 249,445, dated November 15, 1881.

Application filed November 9, 1880. (Model.)

To all whom it may concern:

Be it known that I, GEO. L. ANDERS, of Boston, county of Suffolk, and State of Massachusetts, have invented a new and useful Improvement in Switch-Boards; of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to switch-boards, and has for its object to facilitate the operations of a telephone-exchange system.

The invention is shown embodied in a central-office switch-board of a telephone-exchange in which vertical metal strips are connected with the different radiating subscribers' circuits, and are traversed by horizontal connecting-strips insulated therefrom, but adapted to be connected with any of the said vertical or line strips by the insertion of a suitable connecting-plug, so that by the employment of two such plugs between two given vertical strips and a horizontal strip the said vertical strips will be connected for the communication of subscribers thereon. The circuits connected with the vertical strips normally each pass through indicating-instruments to the ground, and it is, of course, necessary to disconnect them from the ground when connecting them with one another for intercommunication.

My invention consists, partly, in arranging and constructing the parts of the switch-board so that the operation of inserting the plug to make a connection between a vertical and horizontal strip will also cause the connection of the vertical strip with the ground to be broken. As herein shown, the vertical strips are placed behind the horizontal ones, and are made movable longitudinally up and down, and normally rest in their lower position in electrical contact with spring anvil-pieces connected with the ground, and the plugs employed to make the connection are provided with inclined or cam-shaped surfaces, which, when they are inserted or placed in position in the switch-board, engage a corresponding part of the vertical strip and raise it out of contact with the grounded anvil. The lines or subscribers' circuits are connected with the vertical strips by flexible connections, so that their electrical continuity is not broken when the strips are thus moved,

the said connection being shown as spring-arms resting at their ends upon the tops of the said vertical strips. A horizontal strip of metal is extended across above the tops of all the vertical strips, just above the point to which they are raised by the connecting-plugs, so that the central operator, by raising any of the said strips by a handle applied for that purpose, can bring the strip into connection with the said horizontal strip, which may be connected to ground through telephonic instruments, so that by thus raising a vertical strip the central operator will be placed in direct communication with a subscriber thereon without any further switching or circuit-connecting operation. The connecting-plugs may be so arranged as to latch or be automatically fastened to the vertical strips when inserted, they being provided with a spring having a tendency to throw them out when unlatched, which may be done by further raising the vertical strip a short distance. This raising of the vertical strip to unlatch the plug may be performed by a strong electromagnet, which may operate on any armature connected with the said strip. The said magnet may be charged by a strong local battery, the circuit of which may be closed by a relay in the subscribers' circuit, so that the subscribers, by applying a suitable current on their circuits, can themselves operate the switch-board to disconnect their circuits from one another, and by the same operation restore their connection to the ground.

Figure 1 is a front view of a switch-board embodying my invention; Fig. 2, a vertical section thereof; and Fig. 3, an enlarged section, illustrating the arrangement by which the subscribers are enabled to automatically disconnect their circuit from one another.

The horizontal connecting-strips *a* are supported in the end frame-work, *b*, of the switch-board, and are separated by a considerable space from the vertical strips *c*, as shown in the sectional views, Figs. 2 and 3. The vertical strips *c* are each to be connected with subscribers' circuits, the wires of which may be attached by suitable binding-screws to the spring-arm *d*, bearing down upon the upper ends of the said strips, which are movable up

and down in their sockets and normally rest on springs *e* at their lower ends, the said springs forming continuations of said circuits and being connected with the ground.

5 The vertical strips *c* are provided with a series of lifting-shoulders, 2, (shown as the upper edges of holes or openings *f* for the insertion of the plugs,) the said shoulders being normally just above the upper surfaces of the
10 horizontal strips *a*.

The connecting-plugs *i* are each provided with a deep slot, 3, of suitable shape to fit over the horizontal strips *a*, to thereby guide and hold the plug steady as it is inserted, and the
15 end of the upper portion of the plug is made inclined, as shown at 4, to engage the lifting-shoulder 2 of the vertical strip *c*, which it is desired to electrically connect with the horizontal strip *a*, upon which the plug is placed, so
20 that when the plug is inserted it raises the said vertical strip out of contact with the corresponding spring *e*, and thus removes the ground at that point from the circuit connected with the said vertical strip at the same time that it
25 makes an electrical connection between the horizontal and vertical strips, as shown in Fig. 1, where two vertical strips are connected with the same horizontal strip by the plugs *i*, so that the subscribers on the connected circuits
30 are in communication with one another.

A horizontal strip, *k*, insulated from the other portions of the switch-board, is extended across above the upper ends of the vertical or line strips *c*, which are provided with lifting-
35 handles *m* at their lower ends, to enable the operator to raise them until they are brought into electrical contact with the said horizontal strip *k*, which may be called a "telephone-strip," as it is intended to be connected to the
40 ground through telephonic instruments of any usual kind. By this arrangement the central-office operator, when a signal is received from a subscriber's circuit, by merely raising the handle *m* and strip *c*, connected with the said
45 circuit, into contact with the telephone-strip *k*, is at once placed in telephonic communication with the subscriber who has signaled, the said circuit being by this operation switched from its ground-connection through the spring *e* to
50 a ground through the telephonic instrument connected with the strip *k*, as shown at the right hand in Fig. 1. The telephone-strip *k* is placed at such a height above the ends of the strips *c* that the strips are not raised a sufficient distance by the insertion of the plugs *i*
55 to come in contact with the said strip *k*, as clearly shown in the drawings.

In Fig. 3 the plug is shown as provided with a latch or hook, 5, and with a withdrawing-
60 spring, *n*, having a tendency to throw the plug off the strips, except when held therein by the engagement of the lifting-shoulder 2 of the vertical strip *c* with the latch 5, the said strip being lifted, as before described, by the inclined ends 4 of the plug, and, after the latch
65 5 thereof has passed, falling into engagement

therewith, to thus hold the plug inserted and the vertical strip itself connected with the horizontal one and broken from its ground-connection at *e*. If the strip *c* be raised sufficiently to
70 disengage the latch 5, the plug *i* will be thrown out by the spring *n*, to thus disconnect the said strip *c* from the horizontal connecting-strip *a* and allow it to fall to its normal position in connection with the grounded spring *e*. This
75 may be done automatically by the subscribers when they have finished their communication, the strips *c* being provided for this purpose with armatures *p*, to be attracted by electro-
80 magnets *r*, (shown in Fig. 3,) the said magnets being either placed in the subscribers' circuits and magnetized by currents thrown on or generated by the subscribers for that purpose, or preferably being in a local circuit controlled by
85 a relay in the subscribers' circuit. In the latter plan one battery could be used to actuate all the strips *c*, to release the plugs *i*, the magnets *r* being in normally-open branches of the said battery-circuit, any of which would be
90 closed by the operation of the relays before mentioned.

It is obvious that the shape of the strips and plugs may be greatly varied without departing from my invention—as, for example, the lifting-shoulders, instead of being the upper
95 edges of holes formed in the vertical strips, may be pins or other projections extended from the main portion of the said strips, or both sets of strips may be provided with corresponding
100 holes, preferably circular, and cylindrical plugs may be used having conical points to bring the holes of the vertical strips which are normally below up into line with those of the horizontal strips when the said plugs are inserted.

By making one of the sets of strips movable
105 in the frame-work relative to the other the plugs are more readily inserted and form a more certain electrical contact than if both sets of strips are rigid, in which case the plug-sockets have to be placed in exact relative po-
110 sition, or the plugs will not operate satisfactorily.

The plugs *i* are shown as also adapted to enable the central operator to throw his telephonic instrument into communication with
115 two subscribers, who may be connected together without breaking their connection, for the purpose of listening to see if their communication has ended. For this purpose an additional incline or cam, 6, is made in this
120 plug, so that by merely pushing the plug farther in toward the board the vertical or line strip is raised into connection with the telephone-strip *k* without breaking the connection through the plug between the horizontal or
125 connecting strip and the line-strip.

It is obvious that when the automatic disengaging device shown in Fig. 3 is employed the central operator will not have to listen, except when the subscriber may have neglected
130 to operate the said disengaging device on completing their communication, in which case it

might be desirable for the central operator, when it was observed that the connection was continued for too long a time, to listen or speak before breaking the connection.

5 The telephone-strip k may also have connected with it an apparatus for operating the signals on the subscribers' circuit, shown as a battery, B , and suitable keys, r' , so that by raising any of the line-strips c into connection
10 with the said telephone-strip, and by causing the circuit to pass therefrom through the said battery and keys, the subscribers' station on the circuit connected with the said raised line-strip may be signaled by properly manipulating
15 the said keys r' . A switch, s , is used to bring the telephonic instrument or signaling battery and keys into circuit with the strip k , as desired.

20 I do not herein broadly claim the combination of a series of movable line-strips with a telephone-strip common to all of them, and adapted to be connected with any of the said line-strips by the proper movement thereof, as this was not invented by me.

25 I claim—

1. In a switch-board, the connecting-strips combined with line-strips crossing said connecting-strips, but insulated therefrom, and conductors to ground normally in contact, as
30 explained, with said line-strips, and plugs, as indicated, operating by the same movement to connect the desired line-strips and connecting-strips with each other, and to break the connection of the line-strips to ground, substantially as described.

35 2. In a switch-board, a series of line-strips connected with the subscribers' circuits, and a series of connecting-strips to form an electrical connection between any two of the said
40 line-strips, combined with a connector to electrically connect the said line and connecting strips, and means, controlled by an electric current, to automatically remove the said connector, and thereby disconnect the horizontal
45 and line strips, substantially as and for the purpose described.

3. In a switch-board, a series of line-strips

to be connected with subscribers' circuits, and a series of connecting-strips crossing the said line-strips, the strips of one series being made
50 movable in the frame-work, in combination with connecting-plugs adapted to be shifted to different parts of the board independently of said strips, for establishing electrical communication between the strips of the two series,
55 substantially as described.

4. The connecting-strips and a telephone-strip combined with line-strips and plugs or connectors, constructed and operating substantially as described, so that the line-strips
60 can be electrically connected with the telephone-strip by moving the plugs or connectors which make the connections between the line and connecting strips, and without altering or reversing such connections, substantially as de-
65 scribed.

5. In a switch-board, a series of horizontal connecting-strips and a series of vertical line-strips, movable longitudinally and normally resting in contact with grounded anvils, combined with connecting-plugs, provided with
70 withdrawing-springs and with latches to be engaged by the vertical strips when the said plugs are inserted, and electro-magnets to operate on armatures connected with said strips
75 to move them out of engagement with the said latches, and allow the plugs to be thrown out from the switch-board by their withdrawing-springs, substantially as and for the purpose
80 described.

6. In a switch-board, the combination of connecting-plugs, a series of strips movable under the action of said plugs in inserting the same, and a second series of strips crossing the movable strips at right angles, substantially as de-
85 scribed.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE LEE ANDERS.

Witnesses:

JOS. P. LIVERMORE,
L. F. CONNOR.