

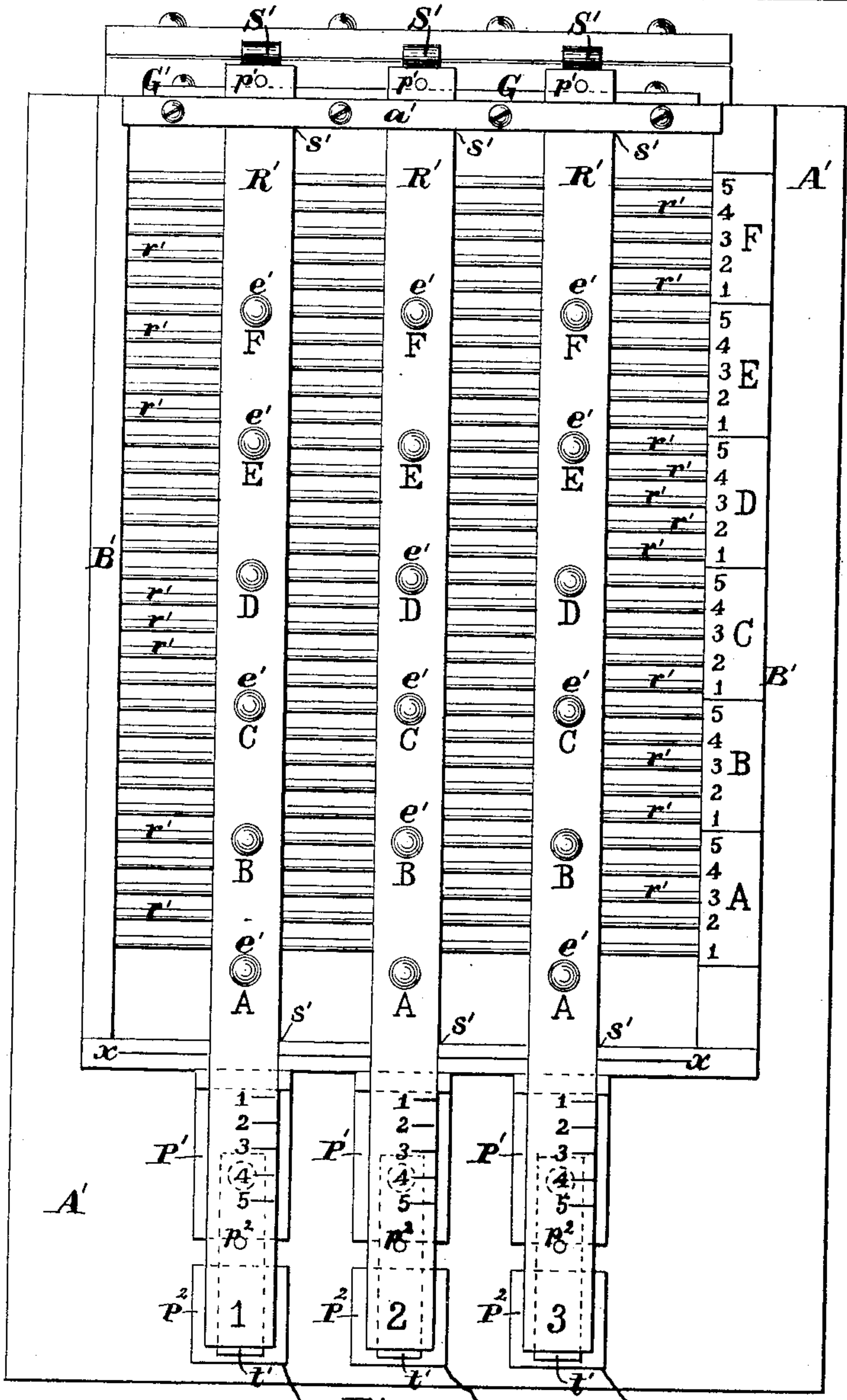
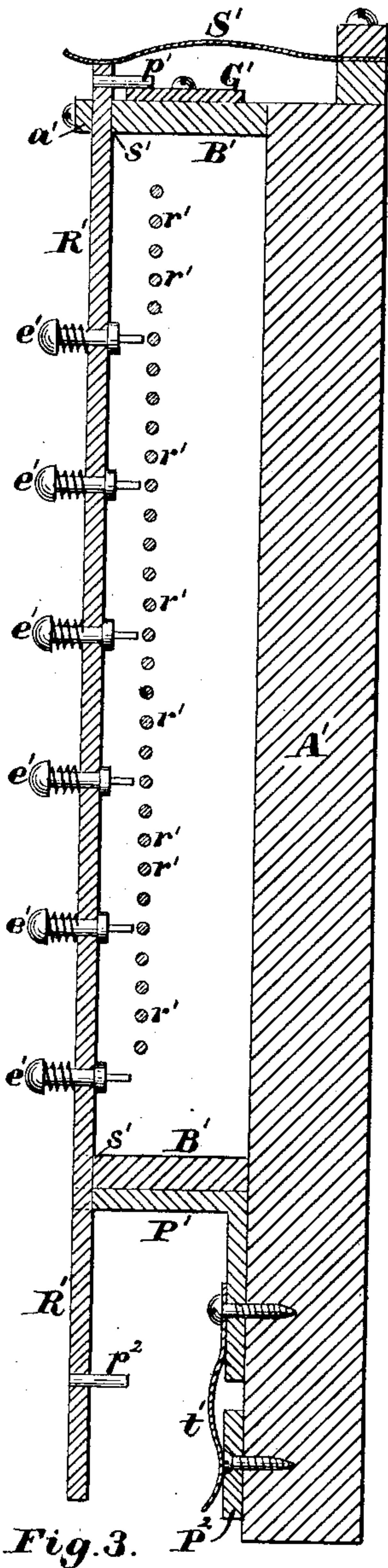
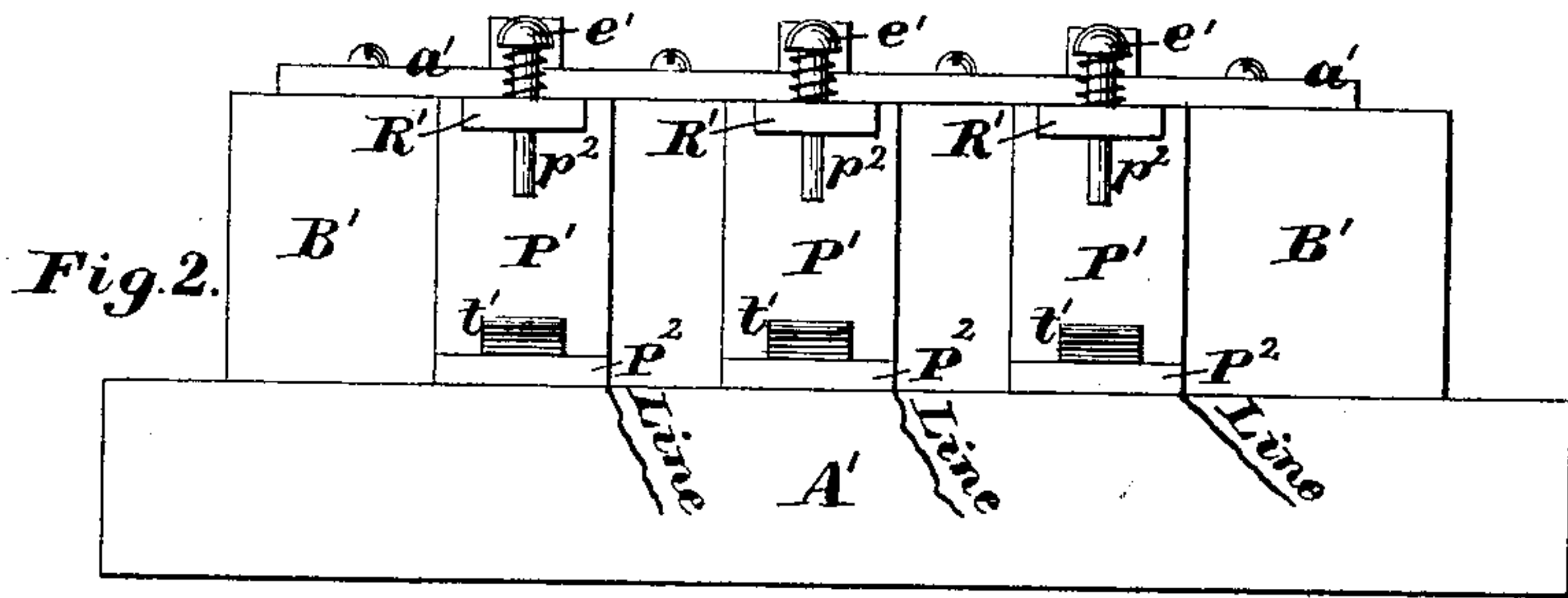
(Model.)

F. BLAKE.

SWITCH BOARD FOR ELECTRIC CIRCUITS.

No. 244,731.

Patented July 26, 1881.



Witnesses:

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SWITCH-BOARD FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 244,731, dated July 26, 1881.

Application filed March 18, 1881. (Model.)

To all whom it may concern:

Be it known that I, FRANCIS BLAKE, of Weston, State of Massachusetts, have invented a new and useful Improvement in Switch-Boards for Electric Circuits, of which the following is a specification.

The principal object of the invention is to establish more readily and speedily than heretofore a connection between two lines which are respectively under the control of different switch-board operators at the central office; and the invention consists, primarily, in the use of several series of movable rods crossing several series of fixed rods, each movable rod having an independent movement over all the fixed rods, and provided with a number of contact-pins, one for each series of fixed rods, for making metallic connection with any rod thereof.

It consists, further, in providing each movable rod with an index and scale, whereby the operator may determine the position of any contact-pin in the movable rod relatively to the fixed rods of the series to which the contact-pin belongs.

The invention consists, further, in the use of a spring with each movable rod, to maintain the contact between the movable rod and a selected fixed rod, and to automatically return the movable rod to its normal position when released from the fixed rod.

It consists, further, in certain details of construction.

The movable rods may be termed "operating arms or rods," and the fixed rods may be termed "switch-rods."

In the drawings, Figure 1 is a plan of a switch-board constructed according to my invention; Fig. 2, an end elevation of the same, and Fig. 3 a central longitudinal section on one of the movable rods.

A is a table, and B' a frame rigidly secured thereto, both being of insulating material.

R' R' R' are square metallic rods or bars having a longitudinal sliding motion in slots s' s', &c., in the upper and lower ends of the frame, while r' r' r', &c., are small wire rods fixed in the sides of the frame. A cap-bar, a', of insulating material, screwed to the frame holds the movable rods R' in their respective slots s'.

G' is a ground-plate, common to all the movable rods R' by means of pins p', with one of which each movable rod R' is furnished, every pin p' being normally in contact with the said ground-plate G', through the force of one of several springs, S', which, attached to the frame, works against the end of the rod R', as shown. Each movable rod R' is also furnished with a stop-pin, p², by which its motion in its slot s' in opposition to the spring S' is limited. Each movable or R' rod is connected with an independent electric circuit. The device shown for making this connection is a spring-jack, consisting of a yoke-shaped bracket, P', a spring, t', and a metallic plate, P², the yoke of the bracket P' embracing the movable rod, as shown, while the line-wire is attached to plate P².

The small fixed rods r' r', &c., are divided into several series, which in practice are designated by letters A B C D E F, conveniently arranged upon the frame, as shown. The movable rods R' of each series are numbered 1 2 3 upon the ends near the operator. I have shown but three of them, that number being sufficient to properly illustrate the invention, for in the explanation of the mode of operation it will appear that the three may be taken as belonging to one series, or each to a separate series, or that either two may be taken as belonging to one series and the remaining rod as belonging to any other series. Each movable rod R' is provided with a number of contact-pins, e', equal to the number of series of fixed rods r', one contact-pin for each series, and near each of these contact-pins is stamped on the movable rod a letter corresponding to the letter of the series of fixed rods lying next beyond, each contact-pin e', in the normal position of its movable bar R', being just below or on the operator's side of the first of the fixed rods r' of the series having the corresponding letter. Each contact-pin e' has a head above its bar R' and a collar below, and also a coiled spring, as shown, by which it is normally thrown out so that the collar rests against the bar; but each pin is of such length that when pushed in by the hand of the operator against the force of the coiled spring it may pass between two of the small fixed rods r'. In the

normal position of each pin e' it is wholly above the plane of the rods r' . Each movable rod R' has near it, upon the frame, an index, or, as shown, one index-line, $x x$, serves for all the movable rods. And each movable rod is furnished with a scale graduated to the distances between the centers of the fixed rods r' , the latter being of uniform diameter and at uniform distances apart.

Connection is made between any two electric circuits represented upon the switch-board as follows: The operator moves the movable or R' rod belonging to one of the two circuits against its spring S' until one of its contact-pins e' is a little beyond one of the fixed or switch rods which does not happen to be in use, and there holds it with one hand, while with the other he pushes this e' pin in until its lower end is between the said switch-rod and the next switch-rod beyond. Keeping his hand on this e' pin, he then takes the other from the movable rod, when the S' spring belonging to that rod forces it back toward its normal position, so as to lock or hold the said e' pin against the switch-rod selected. He then performs a similar operation with the R' rod of the other circuit, locking the e' pin which is in line with the e' pin of the first circuit against the same selected switch-rod, when the two electric circuits will be found to be connected in one grand circuit. It is obvious that the operator, before or during this operation, will insert his hand telephone or telegraph instrument in the spring-jacks to communicate, as far as necessary, with the parties for whom connection is made on the switch-board, as above.

In the operation above described it may be assumed that both the circuits between which connection was to be made belonged to one and the same series—that is, that they primarily belonged to the same switch-board; but in a central office it is found that very few connecting-rods are required in comparison to the number of line-rods, or the number of independent lines between which connections are to be made; and, usually, that there are many more lines than can be controlled by one operator.

Now, as before stated, my invention has especial reference to making the most speedy connection between any two lines which are respectively under the control of different operators. I therefore divide both the movable and the fixed rods into several series, appropriating a series of fixed rods to each series of movable rods, and giving to each movable rod a separate pin for each series of fixed rods, as shown in the drawings, where series A of the fixed rods, as marked upon the side of the frame, may be considered as belonging to a series of movable rods, or a division of the switch-board known as "board A," while fixed rods marked B in the frame may be considered as belonging to a series of movable rods or division of the table known as "board B;" and

on each movable rod I place as many contact-pins e' as there are series of fixed rods, one for each series of fixed rods, as shown. I give exclusively to each operator as many movable rods as he can control, while each series of fixed rods is common to all the operators. Connection can obviously be made between any line-rod of one series or table and any line-rod of any other series or table by means of any one of the connecting-rods, and in practice, as in other boards, each operator makes connections between line-rods under his exclusive control by means of connecting-rods primarily appropriated to him; but when line-rods under the control of different operators are to be connected it becomes necessary for one or the other of the operators to use a connecting-rod belonging, primarily, not to himself, but to the other; and it will greatly assist the operator who leaves his own connecting-rods and goes to the other set, if he finds with that other set a special connecting-pin on the line-rod.

The index and scale will obviously be of greatest use when making connections in the series of switch-rods most difficult to reach; and it is obvious that by covering portions of the switch-rods with insulating material they may be so twisted and bent that the series particularly appropriated to each operator shall be most easily within his reach.

The stop-pins p^2 may be made movable, and each movable rod may have a series of holes therefor, one for each mark on the scale.

It is obvious that when the board is placed in a vertical position gravity will perform the function of the springs S' .

To break a connection with a fixed rod and restore a movable rod to its normal grounded position the operator slightly pushes the movable rod against the grounding and locking spring S' , when the coiled spring upon the contact-pin by which the connection has been made causes that pin to fly up. The operator then taking his hand from the movable rod it returns to its normal position by force of the grounding and locking spring S' .

I claim—

1. Several series of fixed rods insulated upon a switch-board, in combination with movable rods or other suitable shifting devices, each of which is in an independent line, and is provided with several contact-pins, one for each series of fixed rods, and an index and scale, substantially as described.

2. The movable bars R' , each provided with one or more contact-pins, e' , and a fixed pin, p' , in combination with fixed bars r' , ground-plate G' , and springs S' , substantially as described, for the purpose specified.

3. The movable bars R' , each provided with one or more contact-pins, e' , and a fixed pin p' , in combination with fixed bars r' , and ground-plate G' , the whole so arranged that the bars R' act by gravity to bring the pins p' normally in contact with ground-plate G' to lock

the contact-pins e' against the bars r' , substantially as described.

4. A series of fixed and movable rods crossing each other upon a switch-board, in combination with movable contact-pins, one or more
5 attached to each movable rod, and each provided with a spring by which it is restored to

its normal position upon a movement of its movable bar, substantially as described.

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