

(No Model.)

F. BLAKE.

SWITCH BOARD FOR ELECTRIC CIRCUITS.

No. 276,216.

Patented Apr. 24, 1883.

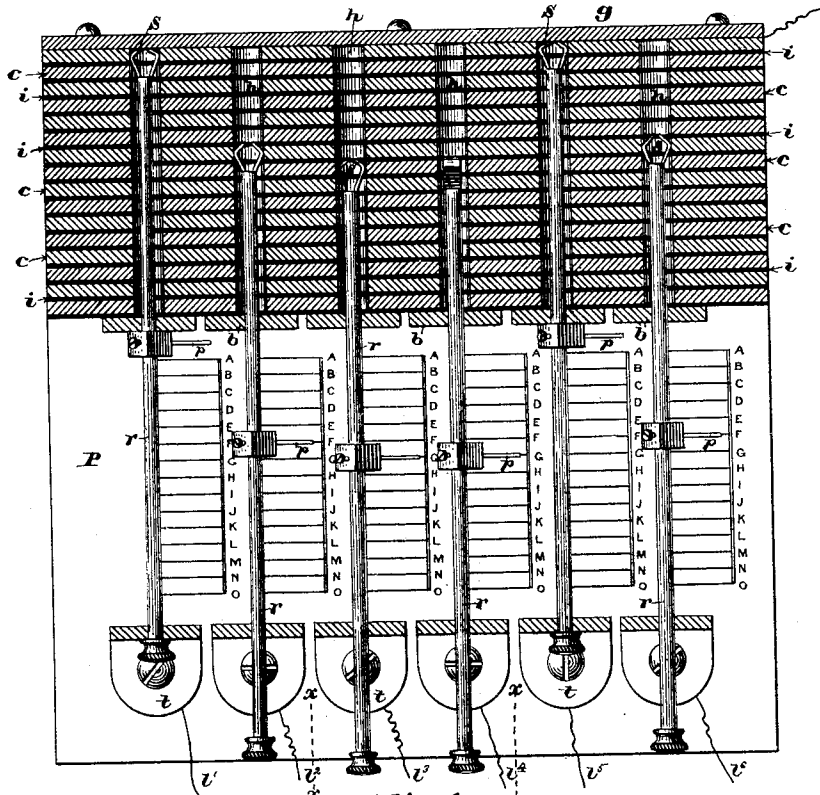


Fig. 1.

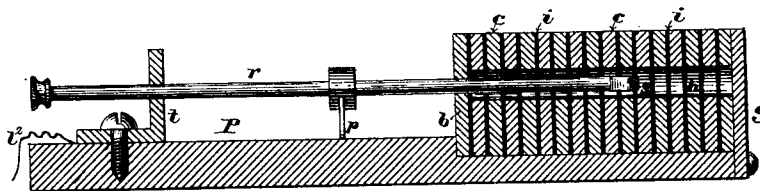


Fig. 2.

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SWITCH-BOARD FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 276,216, dated April 24, 1883.

Application filed February 3, 1883. (No model.)

To all whom it may concern:

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

The invention is an improvement upon the switch-board described and claimed in my Patent No. 249,574, dated November 15, 1881.

In carrying out the said former invention I formed the switch-board proper of alternate plates of conducting and non-conducting material, each of the full size of the board, and a number of smaller metallic plates, one for each of the electric circuits between which connections were to be made. The smaller metallic plates were secured to one of the large insulating-plates and served as line terminals. The large plates of conducting material served as connecting-plates, since any one of them could be made to make electrical connection between any two line terminals, the method of making such electrical connection being as follows: A hole bored through each terminal plate and all the large plates, both the non-conducting plates and the insulating-plates, allowed a connection to be made between any terminal plate and any connecting-plate by means of a metallic peg of the proper length having two flanges, one of which, when the peg was inserted in one of said holes, made contact with the terminal plate, while the other made contact with a connecting-plate. A pair of pegs was appropriated to each connecting-plate, and any pair of pegs would make connection between any two terminal plates by means of the connecting-plate, to which they were appropriated. The principal advantage of this former switch-board consists in the compactness and rigidity or absolutely fixed position of the connecting-plates; but its use is attended by the disadvantage of having a very limited capacity, owing to the difficulty in using pegs of more than a certain length. When pegs are used, as described in my said Patent No. 249,574, only about as many connections can be made by a single set of the connecting and insulating plates as can be superintended by, at most, two or three operators, whereas in large telephone-exchanges

it is frequently necessary to employ a large number of operators, each having in charge as many line terminals as can be placed upon the switch-board of my said former patent, and provision must be made for the use of a common set of connectors by all the operators.

The object of this improvement is to retain in a switch-board of practically unlimited capacity an advantage similar to that resulting from the use of the said large and firmly-seated connecting-plates in my said former switch-board; and the present invention consists of alternate strips or long plates of conducting and non-conducting material and a number of line terminals, one for each of the electric circuits between which connections are to be made, in combination with a number of metallic rods, one for and in constant contact with each of said line terminals, and provided with a spring device, whereby each rod may be put in electrical connection with either of said strips or long plates of conducting material.

It consists, further, in certain details of construction.

In the drawings, Figure 1 is a plan, and Figure 2 a section, of so much of an apparatus for carrying my improvement into effect as will sufficiently illustrate the same.

P is a bed of insulating material, to which are secured in any proper manner the conducting strips or plates *c* and insulating strips or plates *i*, massed together face against face, as shown.

g is a metallic plate, screwed to the edge of the bed-plate P, as shown, and forming, with one of the connecting-strips with which it is in contact, a ground-plate, the ground-wire being shown at *g*.

t t are metallic brackets, screwed to the bed, as shown, and for convenience made the line terminals, the line-wires being shown at *v p v*, &c. One arm of each bracket *t* contains a bearing for a line-rod, *r*, so that each line-rod is in constant contact with a line terminal, and one line terminal only. Another bearing for each line-rod is in one of the insulated metallic plates *b*, of which there is one for each line, and which might be made the line terminals in place of the brackets *t*. Holes *h h* are bored

through the mass of conducting and insulating plates *c c i i* as far as the plate *g*, somewhat larger in diameter than the diameter of the rods *r*, and in these holes the rods *r* are inserted and have a sliding motion while supported in the above-mentioned bearings. Each rod *r* has upon its farther end two contact-springs, *S*, (one would be sufficient,) which make contact with some one of the connecting-plates *c*, according to the position of the rod. A scale, graduated to the distances between the centers of the connecting-plates, is placed upon the bed-plate in front of the mass of connecting and insulating plates, and each rod carries a pointer, *p*, which indicates the position of the contact-spring. Thus at Fig. 1 the pointers of the rods *r* appropriated to lines *l*² and *l*⁶ indicate that the contact-springs *c* of those rods are in contact with the same connecting-plate, and consequently that the said lines are in metallic connection. The lines *l*³ and *l*⁴ are also in metallic connection, while lines *l*¹ and *l*⁵ are grounded. It is obvious that the rods *r* may themselves serve as line terminals.

For the purposes of this specification the board shown at Fig. 1 may be considered as a single board under the charge of a single operator, or as three separate boards of two lines each requiring three operators, as indicated by the dotted lines *x x*, and it is obvious that the rods *r* of the lines *l*¹ and *l*⁶ may be at any required distance apart; and, while the connecting-plates *c* may thus be of any required length, it will also be obvious that the number of connecting-plates may be practically unlimited, when it is stated that the connecting-plates need not be more than two thirty-seconds of an inch, and the insulating-plates one thirty-second of an inch in thickness. Since the contact with the conducting-plates is made by a spring, the insulating-plates may be very considerably thinner than they must be in practice when the contact is to be made by the flange of a peg. It will be observed that in the drawings the insulating-plates *i* are represented by heavy black lines. I prefer the construction shown, in which provision is made that the line-rods *r* with their spring-contact points travel back and forth in holes bored through the mass of conducting and insulating plates, since the holes are free from dust and a good contact is insured therein, and I claim this specific form of construction as a subordinate part of my invention; but without departing from my invention, broadly considered, the line-rods carrying a spring-contact device may be arranged to travel on the outside of the mass of connecting and insulating plates; or a suitable

spring-contact device may be made to travel over the mass of connecting and insulating plates on line-rods rigidly secured to the line terminals. The switch-board as a whole, including the switching apparatus, when made according to one or the other of these modifications, closely resembles the board in one or the other of its forms described and claimed in my Patent No. 243,839, but differs therefrom in the nature of the stationary conductors employed and in the method of insulating said stationary conductors. In the construction shown in Patent No. 243,839, it is exceedingly difficult to keep the fine wires in their proper slots and maintain their insulation, while in the present construction and modifications thereof above mentioned not only may the conducting strips or plates be fixed singly in any immovable position desired, but, when they are put together in a mass, as described, each helps to support every other. Indeed, it is obvious that by the use of properly-insulated bolts and other insulators the mass of conducting and non-conducting plates may be made itself to serve as a frame for the support of the remainder of the switching apparatus.

I claim—

1. Alternate strips or long plates of conducting and non-conducting material put together in a mass and a number of line terminals, in combination with a number of conducting-rods, one for and in constant contact with each of said line terminals, and each of said rods provided with a spring-contact, whereby it may be put in electrical connection with either of the said strips or plates of conducting material, substantially as described.

2. The combination, with alternate plates of conducting and non-conducting material put together in a mass and provided with holes extending through the mass, of a number of metallic rods, each secured in one of said holes, but having a longitudinal movement, substantially as described.

3. The combination, with the conducting-plates *c* and insulating-plates *i*, provided with the holes *h*, of the line terminals *t* and rods *r*, the latter provided with spring-contact *c*, substantially as described.

4. The combination, with the conducting plates *c* and insulating-plates *i*, provided with the holes *h*, of the line terminals *t* and rods *r*, the latter provided with spring-contacts *c* and pointers *p*, substantially as described.

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Witnesses:

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