T. A. EDISON.

AUTOMATIC ELECTRICAL SWITCH FOR TELEGRAPH APPARATUS.

No. 96,681. Patented Nov. 9, 1869.

Fig: 1.

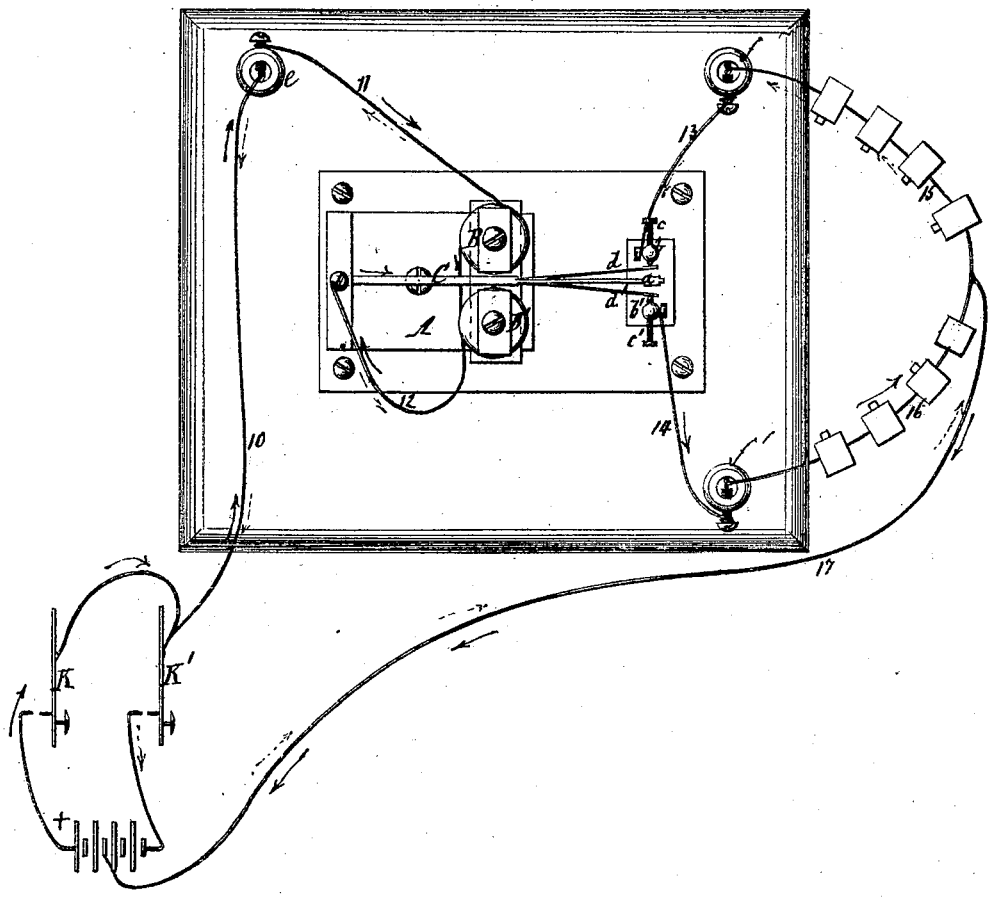
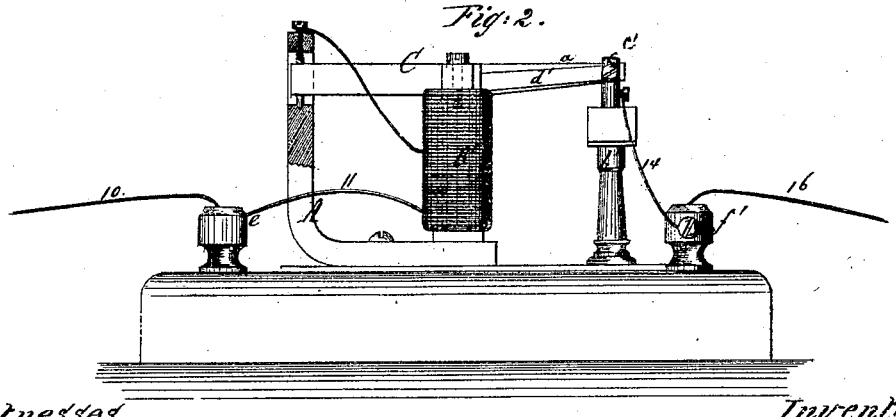


Fig: 2.



Witnesses

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AUTOMATIC ELECTRICAL SWITCH FOR TELEGRAPH APPARATUS.

Specification forming part of Letters Patent No. **96,681**, dated November 9, 1869.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of the city, county, and State of New York, have invented a new and useful Improvement in Automatic Electrical Switches; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 represents a plan or top view of this invention. Fig. 2 is a longitudinal section of the same.

Similar letters indicate corresponding parts.

This invention relates to a certain novel arrangement of branches of one line of wire, in combination with a vibratory armature and its polarized switch-magnet, in such a manner that by passing a current through the coils of the switch-magnet in either direction, *i. e.*, positive or negative, the polarity of one of the poles thereof is neutralized, and the other is augmented and attracts and holds the vibratory armature, so that one of the branch wires, or sets of branch wires, is automatically switched out of the circuit, and the whole current is made to pass with undivided and undiminished force through the other branch wire or wires, whose connection is formed and maintained by the armature, and thus one single current, by reversal, can be made to pass, without any diversion or loss, indifferently through one branch wire, or set of branch wires, and another, at the will of the operator. For instance, one branch may be used for operating a type-wheel, and the other for printing therefrom in a printer, or for operating two different machines, or for effecting advance and retrograde movements in the same machine, and in a great variety of other ways, so that one circuit has, in many useful respects, the power of two ordinary ones.

The "polarized switch-magnet," which I use in carrying out my present invention, is similar to the "polarized relay," described in Letters Patent for a printing-telegraph, granted to me June 22, 1869, and numbered 91,527.

The polarized switch-magnet consists of a permanent magnet, A, bent in the form of the letter L. On the horizontal shank of this L-shaped magnet are secured the cores of two electro-magnets, B B′, while the upright shank of the permanent magnet forms the bearing for the vibrating armature C, which extends through between the ends of the electro-magnets B B′, and is so arranged that it can freely vibrate between said ends or poles and be attracted by either one or the other, as will be presently explained.

From the armature C extends an arm, *a*, through between the posts *b b′*, which carry adjusting-screws *c c′*, and to the sides of the arm *a* are secured weak springs *d d′*, so that if the armature is in a central position said springs will be in contact with the points of both the screws *c c′*; but as soon as the armature, attracted by either core of the electro-magnet, passes this central point in its transition, the contact between one of the springs *d* or *d′* and the corresponding screw *c* or *c′* will be broken.

It is obvious that if the upright shank of the permanent magnet represents the north pole, and the horizontal shank the south pole, the polarity of both soft-iron cores of the electro-magnet will also be south, while the polarity of the soft-iron vibratory armature will be north; but if an electric current is passed through the electro-magnet B B′, which, by its own action, would convert the core of B into the north pole, and the core of B′ into the south pole, the polarity of the core B received from the permanent magnet will thereby be neutralized and the polarity of the core B′ increased, and the armature C will be attracted by the core B′, and the spring *d* will be thrown and kept out of contact with its screw *c*, as long as the current operated with continues to be of the same polarity.

The polarized switch-magnet connects, by a wire, 10, with two keys, K K′, one of which will throw upon the line a positive and the other a negative current from the battery. The wire 10 is secured in the post *e* from which a wire, 11, extends to one end of the helix of the electro-magnet B B′. The other end, 12, of this helix is connected with and continues the circuit through the vibrating armature.

The posts *b b′*, which carry the adjusting-screws *c c′*, connect, by wires 13 and 14, with posts *f f′*, and from these posts extend the branch wires 15 and 16, which unite into one wire, 17, that leads back to the battery.

Instead of only two branches, 13 and 14, of the line 17, the currents at the points *c c'*, respectively, may be divided into a number of branches by arranging the contact-points and springs therefor.

Suppose the armature C so placed that the springs *d d'* will rest against both the points *c c'*, then a positive current (represented by full-line-arrows) from the battery will pass through the wires 10 and 11 to the electro-magnet B B'; thence through the wire 12 and the armature C, posts *b b'*, wires 13, 14, 15, 16, and 17 back to the battery. The armature will immediately be attracted by the core B', the contact between the spring *d* and screw *c* will be broken, and the whole current passes from the armature through wires 14, 16, and 17 back to the battery. The branch wire 15 is thus entirely switched out of the circuit. In actual working under battery the armature C will always rest and remain against the pole to which it is last attracted till the current is reversed, when it will instantly pass to the opposite pole. The design of the springs *d d'* is to preserve the continuity of the circuit in the transition of the armature C from one pole to the other of the switch-magnet B B' on reversal of the circuit. In such transition, as the double contact is only momentary, no effect will follow from it in the branch being switched out.

By depressing the key K' the armature is attracted by the core B, the current (represented by the dotted arrows) is made to pass through the wires 13, 15, and 17, and the branch wire 16 is switched out of the circuit.

I distinctly disclaim in this present application for a patent everything shown and described in my Patent No. 91,527; but I will here remark that by my new arrangement I am enabled to cut either of the branch wires entirely out of the circuit, so that the current passes with undivided and undiminished force through the other branch wire or wires.

In the former case the current is taken from either magnet by a simple cut-off or shortened circuit. The magnet is left inactive by virtue of presenting greater resistance than the cut-off; but there is more or less flow of current-power through the continuous circuit of the magnet thus cut out.

In the present case the effect is produced, not by a cut-off, but by an absolute break of that branch of the circuit to be left out. The current is automatically absolutely switched from one branch or set of branches to another by simply reversing the poles of the battery. Besides, if, in the former case, the tongue or armature should strike between the points out of contact with either, the magnets, all being in the same circuit, would all act simultaneously. If the spring *d d'* be held in connection with both points *c c'*, the current of the line would divide between the branches and their magnets. In the former case, if both switch-points were connected at the same time, all the magnets would be entirely cut out.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electro-mechanical switch, constructed substantially as described, in combination with two or more electro-magnets, placed in two or more distinct branches, 15 and 16, of the circuit containing said switch, all connected and operated substantially as described.

2. The springs *d d'*, in combination with the vibrating armature and the points *c c'*, for maintaining the continuity of the same circuit, substantially as set forth.

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Witnesses:
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