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## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 517,582, dated April 3, 1894.

Application filed August 7, 1893. Serial No. 482,508. (No model.)

### *To all whom it may concern:*

Be it known that I, ROBB MACKIE, of the city, county, and State of New York, have invented a new and useful Improvement in Electric Switches, of which the following is a full description.

Of the drawings which illustrate the device Figure 1 is a view of the apparatus with the switch bar at its starting point and ready to be turned on. It also shows the mechanical clutch lifted so as not to catch the bar. Fig. 2 shows the switch bar on the first contact. Fig. 3 shows it on the last contact and caught by the mechanical clutch. Fig. 4 is a cross-section of the device taken on line  $x-x$  of Fig. 1.

A is a switch bar provided with the conducting bridges  $a'$ . It is pivoted at  $a^2$  to the shaft  $a^3$  and is turned gradually over the resistance terminals by the handle  $a^4$ . The spring  $a^5$  holds the switch bar at starting point and is wound up in turning the bar so that the latter will be thrown back to normal position when released, by the re-coil of the spring.

B, (Figs. 2 and 3,) is a stop or rest for one end of the switch bar when the bar is in normal position.

$b^1-b^2-b^3-b^4-b^5-b^6$  are contact stops or resistance terminals joined together by the resistance coils  $b^7-b^8$ , &c., so that the resistance to the current is at its greatest when the bridge  $a'$  is resting upon the contact  $b^1$ , and at its minimum when resting upon contact  $b^6$ .

The device also shows the contact segments C,  $c^1$ ,  $c^2$ . The operation of this switch bar with the varying resistance terminals, as shown, is not new and therefore needs no further explanation.

Suitably pivoted to a part of the standard is a mechanical clutch lever D somewhat in the form of a bell-crank and having a movement limited by the pins  $d^1$ ,  $d^2$ . Its lower arm is held in contact with the pin  $d^3$  by the spring  $d^4$ . The clutch on the end of its upper arm is intended to hold the contact bar A by catching the pin  $a^6$  on the end of said bar. E is a magnet provided with an armature lever  $e^1$  and the usual retractile spring  $e^2$ . The tension of this spring is stronger than that of the spring  $d^4$  so that when it is retracted from its magnet it will strike the lower

arm of the clutch lever D and hold up the clutch as shown in Fig. 1, which is drawn down again by the spring  $d^4$  when the armature lever  $e^1$  is attracted to the pole of its magnet as shown in Figs. 2 and 3.

The switch is intended to be used upon any device wherein it is desired that the current shall not at once be turned on at full force but allowed to enter gradually, and in this instance it is represented as in use with a motor marked M in the drawings. When the switch bar is resting upon the stop B the current is off, and the device practically begins its operation when the bridge  $a'$  is resting upon resistance terminal  $b^1$  as shown in Fig. 2. The current from main line entering at binding post F proceeds thence to contact segment C, thence through bridge  $a'$ , to contact  $b^1$ , at which point the current divides, a part of it passing by wire  $h^1$ , through coils of magnet E, thence through field of motor M, thence to contact segment  $c^2$ , thence by lower bridge  $a'$  to contact segment  $c^1$ , and thence out to line through binding post F'. The remaining current from contact  $b^1$  passes through the resistance coils  $b^7$ ,  $b^8$ , &c., to and through the armature of the motor, thence to contact segment  $c^2$ , lower bridge  $a'$ , contact segment  $c^1$ , and out through binding post F' to line; thus when the switch bar is resting upon contact  $b^1$  the current passing through the magnet E draws its armature  $e^1$  to its pole and allows the spring  $d^4$  to draw down the clutch D and hold it in position to catch the pin  $a^6$  on the bar A, and when so caught will hold the same in position until the current is thrown off, when the armature  $e^1$  is retracted by the spring  $e^2$  and striking against the lower arm of the clutch lever D releases the bar A which is thrown back to its starting point by the re-coil of the spring  $a^5$ .

The above description illustrates the operation of the device when the switch bar A is constructed with two legs: the lower leg of this bar may, however, be dispensed with, and also the contact segments  $c^1$  and  $c^2$ , by simply running a connecting wire from contact post F' and joining the same with the wire leading to binding post F' as shown in dotted lines at  $h^2$  in Fig. 1. This arrangement of the device has many advantages. The clutch D cannot be operated when there is no current

on the line and insures security from accidents against any mistake which may be made by the operator. For example, when the current is off the line the clutch D is held up, and although the bar A may be turned, the clutch will not operate to catch and hold it.

The operation of the device is as follows: When it is desired to start the motor the handle  $a'$  is turned and the bar A brought upon the contact stop  $b'$ . The current then passing through the coils of the magnet E releases the clutch D, which is brought into position by its spring to catch the pin  $a'$  on the end of the bar A. The motor moves slowly as all of the resistances  $b'$ ,  $b^2$ , &c., are in circuit. The bar is then moved to the contact  $b^2$  and gradually to  $b^3$ , &c., until it arrives at the contact  $b^4$  when it has passed off the resistance terminals and the current is on in full; the clutch D at the same time has caught and held the bar A. When an accident occurs in the line or the current is cut off, the armature lever  $e'$  is immediately drawn back releasing the clutch D and restoring the bar A to its starting point. It will also be seen that the bar may be released by hand whenever the operator so desires by simply throwing the clutch D out of contact.

What I claim, and desire to secure by Letters Patent, is—

1. In an electric switch a contact bar and means for moving the same from its starting point to its final contact, the bar provided with a spring to return it to starting point, in combination with an independent mechanical spring clutch for holding said bar at its final contact, and means for releasing the clutch actuated by shutting off the current.

2. In an electric switch a contact bar turned against the tension of a spring through and over a series of contact terminals, in combination with an independent mechanical spring-clutch for holding said bar at the end of its course, an electro-magnet and armature

lever provided with a retractile spring and means actuated by the recoil of the armature lever to trip the independent mechanical clutch and thereby restore the contact bar to starting point.

3. In an electric switch a contact bar and means for turning the same against the tension of a spring through and over a series of contact terminals, in combination with an independent mechanical spring clutch for holding said bar when the current is on, and means for preventing the clutch from catching when the current is off.

4. In an electric switch a contact bar turned against the tension of a spring through and over a series of contact terminals in combination with an independent mechanical spring clutch for holding said bar at the end of its course, an electro magnet and an armature lever provided with a retractile spring and arranged so that the mechanical clutch will lay in the path of the armature lever and be tripped thereby when the armature lever is retracted.

5. In an electric switch a contact bar turned against the tension of the spring through and over a series of contact terminals in combination with an independent mechanical spring clutch for holding said bar at the end of its course, an electro magnet and armature lever provided with a retractile spring, means actuated by the recoil of the armature lever to trip the independent mechanical spring clutch when the current is off, and means for releasing the independent mechanical clutch when the current is on without disturbing the armature lever.

Signed at New York city, in the county of New York and State of New York, this 15th day of July, A. D. 1893.

ROBB MACKIE.

Witnesses:

C. P. MACKIE,  
WILLIAM SUTPHEN.