

(No Model.)

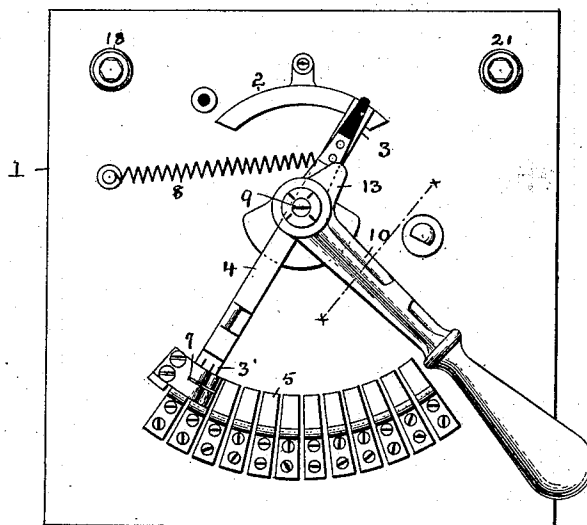
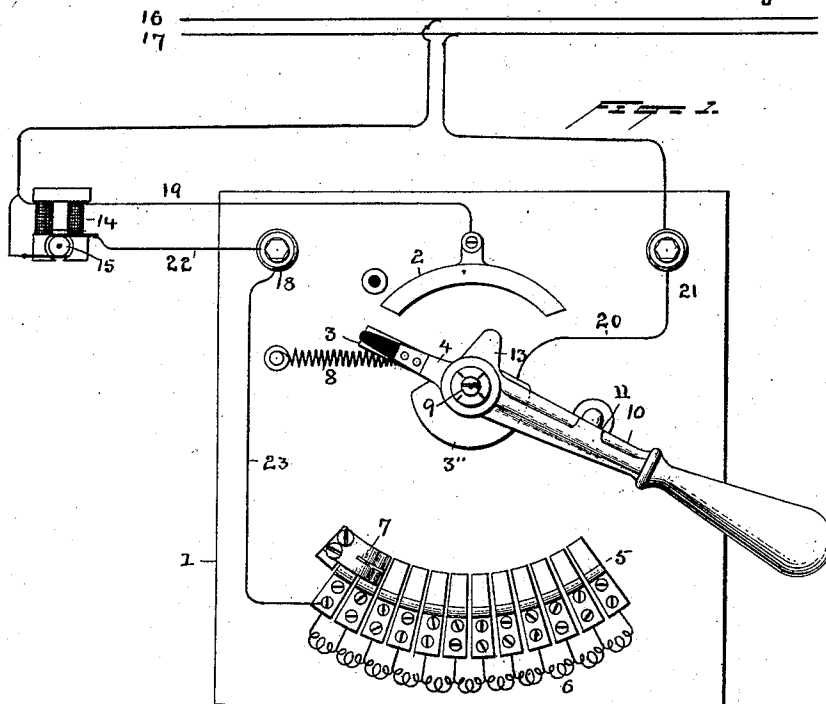
2 Sheets—Sheet 1.

W. S. ANDREWS.

CIRCUIT CONTROLLER FOR ELECTRIC MOTORS.

No. 474,623.

Patented May 10, 1892.



Witnesses
Norris S. Clark,
A. F. Chert,

Inventor
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(No Model.)

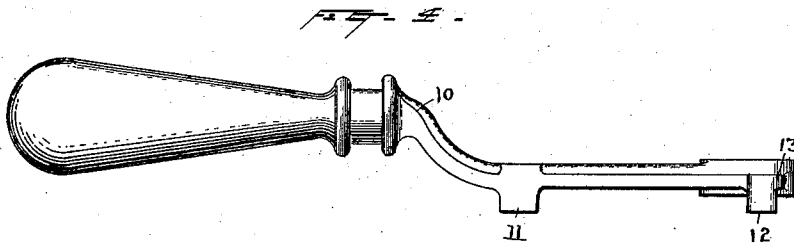
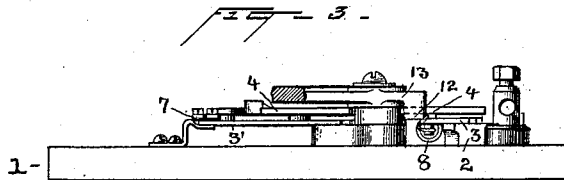
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UNITED STATES PATENT OFFICE.

WILLIAM S. ANDREWS, OF NEW YORK, N. Y., ASSIGNOR TO THE EDISON
GENERAL ELECTRIC COMPANY, OF SAME PLACE.

CIRCUIT-CONTROLLER FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 474,623, dated May 10, 1892.

Application filed May 27, 1891. Serial No. 394,266. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. ANDREWS, a citizen of the United States, residing at New York, in the county and State of New York, have invented a certain new and useful Improvement in Circuit-Controllers for Electric Motors, of which the following is a specification.

The present invention relates to means for making and breaking the circuit of electrical instruments or devices, and especially electrical motors.

The main object of the invention is to provide a controller for the motor or other apparatus which shall make and break the circuit in such manner as to fully protect the apparatus from injury and which shall be strong and simple; and the invention consists in the apparatus and in the several combinations hereinafter described.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the switch in the open position, showing, also, in diagram the circuit connections. Fig. 2 is also a plan view of the switch, the switch being closed and the handle moved back nearly to its open position. Fig. 3 is a side view of the switch, the handle being broken away on the line *x* of Fig. 2. Fig. 4 is a side view of the handle detached.

The contacts and switching devices are mounted on an insulating-base 1. The contacts consist of one long contact 2, in position to co-operate with the spring 3, carried by the pivoted switch-arm 4, and several smaller contacts 5, in position to co-operate with the spring 3' at the opposite end of the switch-arm. These latter contacts are connected through resistances 6, as usual in rheostats. The opposite end of spring 3' rests on the block 3'', through which the pivot-pin passes. The contacts 2 and 5 are so arranged that the switch-arm strikes the contact 2 before it strikes the first contact 5. At one end of the series of contacts 5 is a spring-clip 7, so arranged that when the switch-arm approaches the limit of its movement the lower end is forced under the spring-clip and is held thereby from returning under the influence of the spring 8, which is connected to the switch-arm

at the opposite side of the pivot 9. The handle 10 is provided with a lug 11, which bears against the switch-arm in the position shown in Fig. 1, so that when the handle is moved toward the left the switch-arm is pushed along by it. The handle also has a lug 12, carried by an extending arm 13. The latter lug is adapted to strike the switch-arm when the handle has been moved back to the position shown in Fig. 2, so that any further movement of the handle must positively move the switch-arm in the direction to break the circuit, and as soon as the arm is so far withdrawn from the spring-clip 7 that the tension thereof is overcome by the spring 8 the switch-arm is instantly thrown back to its open position and the circuit is broken. While the switch-handle is moving from its position parallel with the switch-arm back to the position in which it is shown in Fig. 2 it moves entirely independent of the switch-arm and of the spring 8.

In Fig. 1, 14 indicates the field-magnet of a motor, and 15 the armature of the same motor. 16 17 are the positive and negative wires of the supply-circuit. The former is connected to the field-magnet, thence by wire 19 to the long contact 2. The pivot of the switch is connected by wire 20 to the binding-post 21, which is connected to the negative wire. The post 18 is connected by wire 22 to the armature and by wire 23 to the last contact 5.

With the circuit connections as above described the operation of the switch would be as follows: When the handle is moved toward the left, the switch-arm 3 will first touch the long contact 2, closing the field-magnet circuit and energizing the field-magnet, while the armature-circuit is open. The armature-circuit will next be closed by the contact between the switch-arm and the first contact 5, but all of the resistances 6 will be in series in the armature-circuit. As the handle is moved still farther the resistance-coils are successively cut out of circuit, and finally when a complete movement of the handle has been made all of the resistance is out of the armature-circuit. When the handle is reversed, it moves freely from its position in line with the switch-arm to the position shown in Fig. 2 without affecting the switch-arm or the

spring 8. The action already described then takes place, breaking the circuit instantaneously.

The main advantages of the switch described are that it is impossible to leave the switch-arm on any intermediate resistance-contact accidentally either in making or breaking the circuit, since the arm will be thrown to open position by the spring 8 as soon as it is released by the operator. The handle moves freely through the larger part of its movement and then positively engages with the switch-arm to open the switch. The switch also gives a long break when in its open position. In large switches I prefer to employ a dash-pot or similar retarding device, so as to prevent cutting out the resistance too quickly in closing the motor-circuit.

What I claim is—

1. The combination of a pivoted switch-arm, a spring connected thereto and tending to move the arm to its open position, a separately-movable handle having a lug engaging the arm when moved toward the closed position and having a lug engaging the arm when the handle is near the end of its return movement, but not engaging said arm during the first part of such movement, and two contacts or sets of contacts in the path of said arm, one at one end and one at the other end, the contacts being so arranged that one end of the switch-arm makes contact therewith before the other, substantially as described.

2. The combination, in a switch, of a single switch-arm, an operating-spring therefor, con-

tacts co-operating with said switch-arm and connected to different circuits or branches, said contacts being arranged so that one of the circuits will be closed before the other and said single switch-arm having two switch plates or faces, resistances thrown into the second circuit and then removed therefrom, and a handle movable through a part of its range independently of the switch-arm and of the spring, substantially as described.

3. The combination, in a switch, of a switch-arm having two switch plates or faces connected to one side of a circuit, a long contact in the path of movement of said switch-arm and connected to the opposite side of the circuit through one branch, and a series of contacts connected by resistances also in position to co-operate with the switch-arm after contact has been made with the long contact, said resistances being connected to the circuit through a second branch, substantially as described.

4. The combination of a switch-arm, a contact spring or plate at one end thereof, a contact co-operating with said spring or plate, and a contact spring or plate at the opposite end of the switch-arm, the latter spring bearing on a contact at each end, substantially as described.

This specification signed and witnessed this 11th day of May, 1891.

W. S. ANDREWS.

Witnesses:

HENRY PRICE BALL,
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