

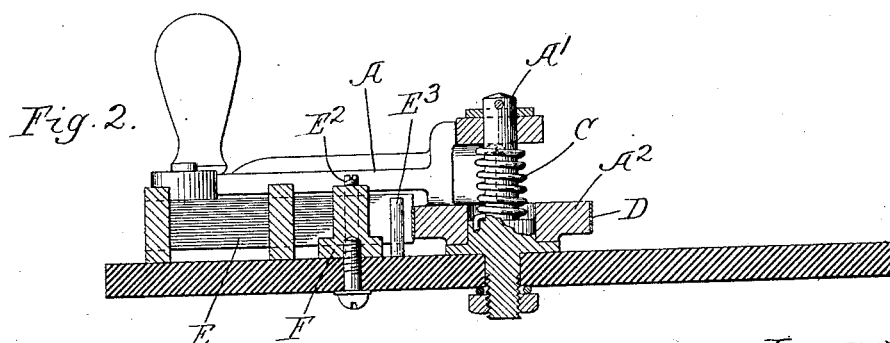
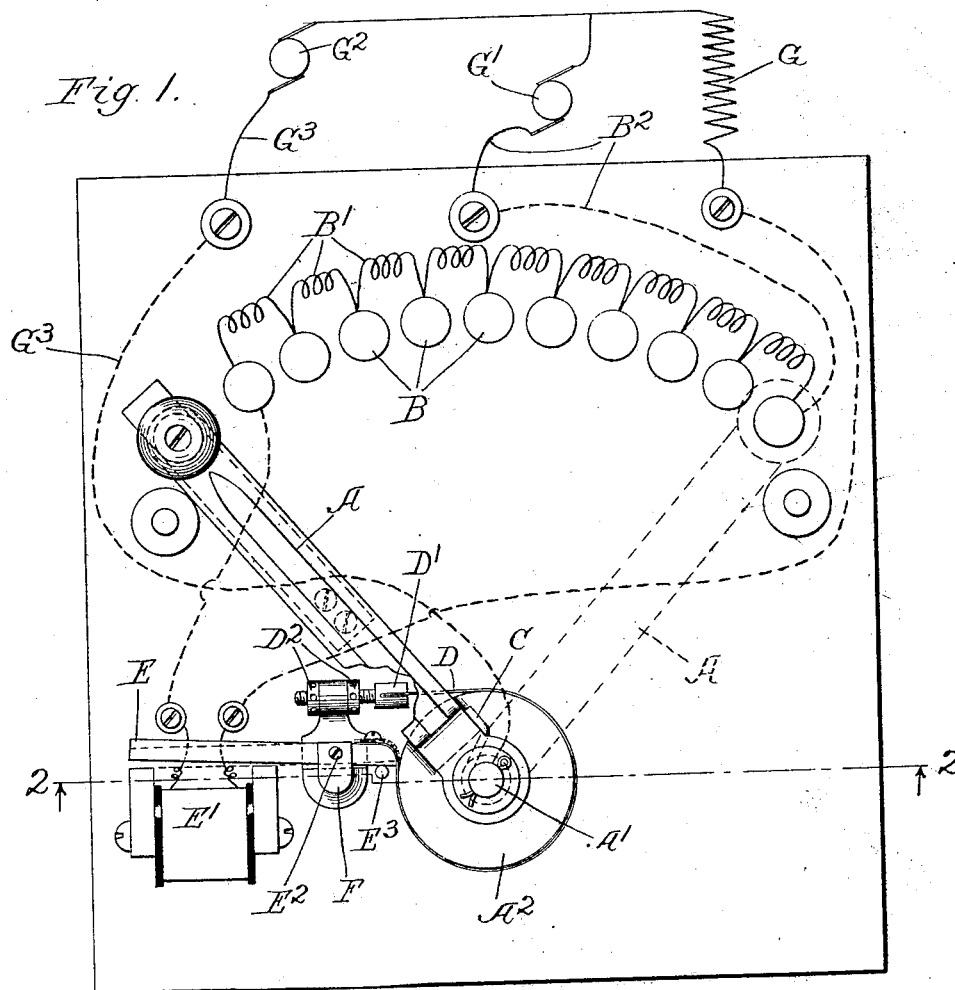
No. 645,809.

Patented Mar. 20, 1900.

E. W. HAMMER.  
CONTROLLING DEVICE FOR ELECTRIC SWITCHES.

(Application filed Aug. 31, 1899.)

(No Model.)



Witnesses.

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# UNITED STATES PATENT OFFICE.

EDWARD W. HAMMER, OF CHICAGO, ILLINOIS.

## CONTROLLING DEVICE FOR ELECTRIC SWITCHES.

SPECIFICATION forming part of Letters Patent No. 645,809, dated March 20, 1900.

Application filed August 31, 1899. Serial No. 729,023. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD W. HAMMER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Controlling Devices for Electric Switches, of which the following is a specification.

My invention relates to controlling devices for switches and the like, and has for its object to provide a new and improved controlling device of this description.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view showing a device embodying my invention. Fig. 2 is a section on line 2 2, Fig. 1.

Like letters refer to like parts throughout both figures.

In Figs. 1 and 2 for purposes of illustration I have shown my invention in connection with a controlling-switch for electric motors; but it is of course evident that the invention may be used in various other constructions.

Referring now to the drawings, I have shown a movable arm A pivoted at A' and adapted to be moved across the contacts B, between which are located a series of resistance-coils B'. The arm A is provided with some suitable retracting device—as, for example, the spring C. A friction-strap D is attached at one end to an adjustable piece D' and is opposed to a part A<sup>2</sup> on the arm A. The friction-strap may be of any desired material and is attached to the armature E of an electromagnet E' or some part associated therewith, the attachment being such that the strap is controlled by the armature. I have shown the strap in the drawings connected directly with the armature prolonged; but it is of course evident that intermediate parts may be used, and when I speak of the strap being connected with the armature I include all such connections by means of which the strap is controlled by the movement of the armature. The armature E in the drawings is pivoted at E<sup>2</sup> to the support F, while the adjustable piece D' is also connected with the support F, said piece being adjusted by means of the adjusting-nuts D<sup>2</sup>, as shown. A stop E<sup>3</sup> limits the movement of the armature E. In the device shown in Fig. 1 the magnet E' is connected

in circuit with the field-coils G of the motor and with the left-hand contact B. The right-hand contact B is connected by conductor B<sup>2</sup> with the armature G' of the motor, said armature and field-magnets being connected with the generator G<sup>2</sup>.

I have described in detail a particular construction embodying my invention in order that its application may be clear; but it is of course evident that the construction may be varied in many particulars without in any manner departing from the spirit of my invention, and I therefore do not wish to be limited to the construction shown.

The use and operation of my invention are as follows: When the invention is applied to a switch for controlling motors, the parts are in the position shown in full lines, Fig. 1. If now it is desired to start the motor, the arm A is moved in the direction of the arrow, so as to make contact with the first contact B. A circuit is then completed through the motor, which will be traced as follows: from the generator G<sup>2</sup> to the arm A and contact B. The current here divides, the main current going through the resistance-coils B' and conductor B<sup>2</sup>, through the armature G' of the motor, and back to the generator, the remaining portion passing through the magnet E' and the field-magnets G of the motor and thence back to the generator. Since the circuit is completed through the magnet E', it attracts its armature E and tightens the friction-strap D about the fixed part A<sup>2</sup>. The parts are so adjusted that when the armature is attracted the friction between the strap D and part A<sup>2</sup> will hold the arm A in any of its various positions, but will still permit it to be moved. It will thus be seen that the arm A may be moved upon any of the contacts B and will remain on said contact when released. In starting up the motor the arm A is moved along the contacts B, so as to successively cut out the resistance-coils B'. Said arm will be held in any of its various positions so long as a normal current passes through the magnet E'. If now the motor-current ceases or is decreased for any reason, so that the magnet E' becomes sufficiently deenergized to release the armature E, the movement of said armature then releases the strap D from the part A<sup>2</sup>, and the

retracting device immediately moves the arm A back to its initial position. It will be seen that when the parts are arranged as shown in Fig. 1 and the arm is being moved toward the position where the maximum resistance is cut out of circuit the pressure on the strap due to this movement is in such a direction as to tend to loosen up the strap, so as to release the pressure tending to pull the armature from the poles of the magnet. It will further be seen that when the arm is in any other than its initial position the spring tending to move it back to its initial position reverses the force applied to the strap and tends to pull the armature away from the poles of the magnet. When the pull on the strap is in this direction, it tends to overcome the effect of any residual magnetism which might prevent the immediate release of the armature when the current in the field-magnets falls below a predetermined amount.

I claim—

1. A switch, comprising a movable arm, a part thereon, a friction-strap associated with said part, an electromagnet provided with an armature to which said strap is connected, the parts so arranged that the strap is moved to an operative position by the movement of said armature.

2. An electric switch, comprising a movable arm, a retracting device therefor, a part on said arm, a flexible strap associated with said part so as to engage the same, said strap connected with a suitable support, an electromagnet provided with an armature to which said strap is also connected, the parts so arranged that when the armature is attracted the strap will be moved so as to operatively engage the part on the arm and hold said arm in any desired position.

3. An electric switch, comprising a movable arm, a retracting device therefor, a part on said arm, a flexible strap associated with said part so as to engage the same, said strap

connected with a suitable support, an electromagnet provided with an armature to which said strap is also connected, the parts so arranged that when the armature is attracted the strap will be moved so as to operatively engage the part on the arm and hold said arm in any desired position, and an adjusting device for adjusting the strap with relation to said part.

4. The combination with an electric motor of a movable arm for controlling the motor-circuit, having a frictional part connected therewith, a retracting device for said arm, an electromagnet associated with said arm, a strap associated with said frictional part and attached at or near one end to a suitable support, said strap being attached at or near the other end to the armature of said magnet, so that when the armature is attracted the strap will be moved to engage the frictional part on the arm and hold said arm in any desired position, the parts so arranged that, when the current in the magnet-circuit falls below a predetermined amount, the armature and strap are released so as to permit the retracting device to move said arm to its initial position.

5. A switch, comprising a movable arm, a retracting device therefor, a frictional part connected with said movable arm, a flexible strap associated with said frictional part and adapted to engage the same so as to hold the arm in any of its various positions, a fixed support to which said strap is attached, an electromagnet associated with said arm and provided with an armature movably connected with said support, one end of said strap connected with said armature so as to be controlled thereby.

EDWARD W. HAMMER.

Witnesses:

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H. E. HUNT.