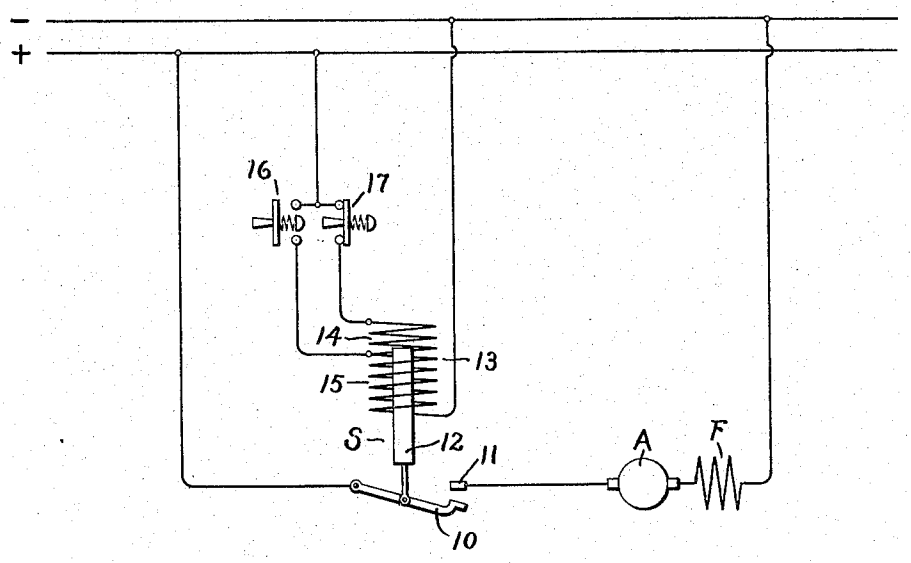
J. EATON.

ELECTROMAGNETIC SWITCH.

APPLICATION FILED NOV. 26, 1912.

1,172,962. Patented Feb. 22, 1916.



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UNITED STATES PATENT OFFICE.

JOHN EATON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTROMAGNETIC SWITCH.

1,172,962. Specification of Letters Patent. Patented Feb. 22, 1916.

Application filed November 26, 1912. Serial No. 733,693.

To all whom it may concern:

Be it known that I, JOHN EATON, a subject of the King of Great Britain, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electromagnetic Switches, of which the following is a specification.

This invention relates to the control of electromagnetic devices, such as electromagnetic switches and the like, and has for its object the provision of means whereby the operation of such a device may be controlled from a remote point in a reliable and efficient manner.

My invention relates more specifically to the control of such electromagnetic devices as are electromagnetically moved to a definite position and electromagnetically held in such position. An electromagnetic switch is a well known example of such a device. In the operation of electromagnetic switches it is well known that it takes less current to hold the switch in operated position than it takes to move it to that position. Various means have been devised for reducing the current in the winding of the switch after it has been operated. One of the common methods employed for this purpose is the inserting of a resistance in series with the actuating winding after the switch has closed. In carrying out my invention I dispense with the use of the resistance for cutting down the current and at the same time obtain the effect of the reduced current in a very simple manner. To this end I employ an energizing winding which is composed of two differentially wound coils, one of which is stronger than the other, the arrangement being such that when one of these coils is short circuited the other will operate the switch, whereas when the two windings are inserted the magnetic effect is sufficient to hold the switch in operated position. In one specific embodiment of my invention the circuit of the energizing winding is controlled by a normally closed switch, while the circuit of the coil which is to be short circuited is controlled by a normally open switch. In order, therefore, to close the switch it is only necessary to momentarily close the normally open switch and to open the switch it is only necessary to momentarily open the normally closed switch.

My invention will best be understood by reference to the accompanying drawing which shows my invention embodied in concrete form for purposes of illustration.

Referring to this drawing, which is merely diagrammatic, A represents the armature and F the series field of an electric motor to be controlled.

S represents an electromagnetic switch which is connected to close the circuit of the electric motor. It is obvious, however, that my invention is in no sense limited to a switch for closing a motor circuit nor in fact is it limited in its application to electromagnetic switches of any kind. The switch S comprises a pivoted switch arm 10 adapted to engage a stationary contact 11 to close the motor circuit and a core 12 acted upon by the energizing winding 13. This winding 13 is composed of two coils 14 and 15 which are differentially wound with respect to each other. As shown in the drawing, the upper coil 14 has less turns than the lower coil 15 and since when they are in series the current is the same through both coils the ampere turns of the upper coil 14 will be less than the ampere turns in the lower coil 15. These two coils are so proportioned that the differential effect between the coils 14 and 15 will be sufficient to hold the switch member in closed position but not sufficient to close it. In order to render the energizing winding sufficiently strong to close the switch I provide means for short circuiting one of the coils. As shown in the drawing, a normally open switch or pushbutton 16 is provided which, when closed, short circuits the coil 14. I also provide a normally closed switch or pushbutton 17 which when opened will entirely deënergize the winding 13.

The operation of the device is as follows: The parts being as shown in the drawing in order to close the switch member 10 the switch or pushbutton 16 is closed so that current will pass from the positive side of the line through the pushbutton 16, coil 15 and back to the negative side of the line. The coil 14 being now short circuited, the switch member will close since the winding 15 is so proportioned that it will lift

the core 12. When the pushbutton is released, the switch being then closed, the coil 14 will be connected in series with the coil 15 to reduce the current in the coils and the magnetic effect is reduced due to the differential winding of the two coils. This effect, while it is sufficient to hold the switch closed, will not close it. If, therefore, while the switch is closed voltage on the line should fail and cause the switch to open it will not again close upon the restoration of voltage but only upon the closing of the switch 16. To open the switch at any time the pushbutton 17 is opened.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the patent statutes it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An electromagnetic switch comprising a switch member, an energizing winding therefor comprising coils one of which has sufficient magnetizing effect to operate the switch member and the other a neutralizing effect on the first mentioned coil such that the combined effect of the coils is sufficient to hold the switch member in its actuated position but is insufficient to move it to such position, and means for temporarily de-energizing said second coil to operate the switch member.

2. An electromagnetic switch comprising a switch member, an energizing winding therefor comprising two differentially wound coils one of which has sufficient magnetizing effect to operate the switch member and the other a neutralizing effect on the first mentioned coil such that the combined effect of the coils is sufficient to hold the switch member in its actuated position but is insufficient to move it to such position, and a switch for short circuiting one of said coils to operate the switch member.

3. An electromagnetic switch comprising a switch member, an energizing winding therefor comprising two differentially wound coils one of which has sufficient magnetizing effect to operate the switch member and the other a neutralizing effect on the first mentioned coil such that the combined effect of the coils is sufficient to hold the switch member in its actuated position but is insufficient to move it to such position, a normally closed switch in the circuit of the winding and a normally open switch for temporarily short circuiting one of said coils to operate the switch member.

In witness whereof, I have hereunto set my hand this 23rd day of November, 1912.

JOHN EATON.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."