A. C. EASTWOOD.

ELECTRIC CONTROLLER.

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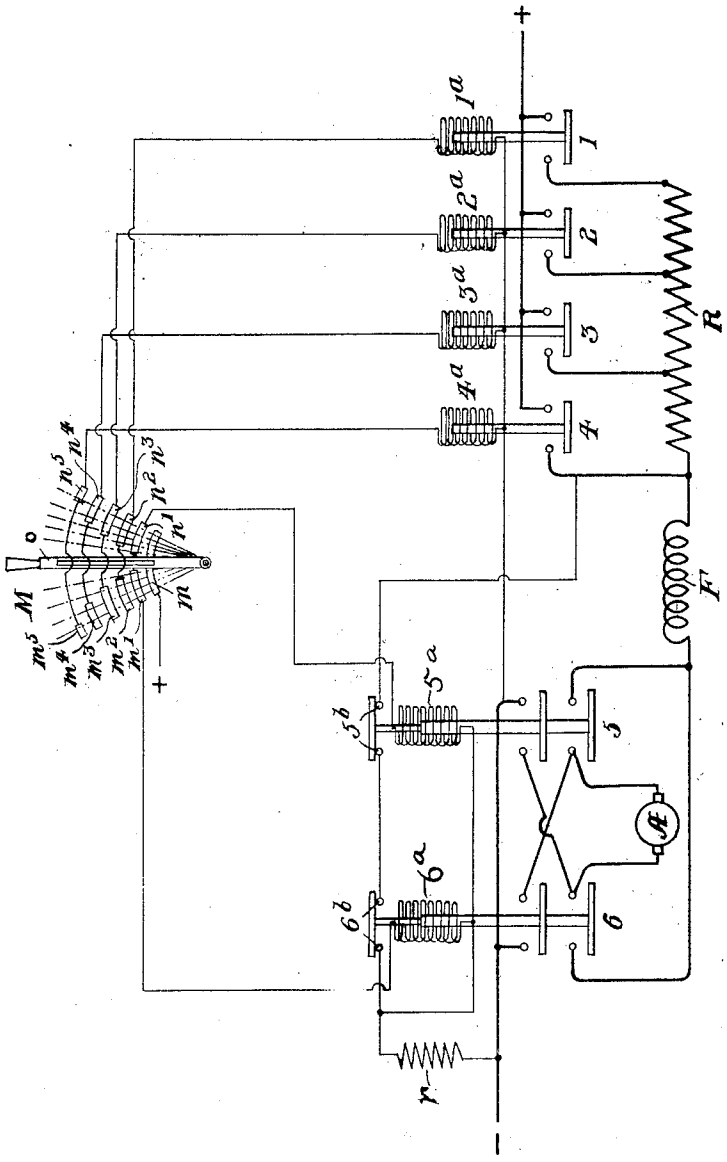
997,280. Patented July 11, 1911



WITNESSES

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ELECTRIC CONTROLLER.

997,280. Specification of Letters Patent. Patented July 11, 1911.

Application filed September 24, 1910. Serial No. 583,536.

To all whom it may concern:

Be it known that I, ARTHUR C. EASTWOOD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention relates to electric motor controllers of that type in which separately actuated magnetic switches are used to make the proper connections for starting the motor, operate it in different directions, and vary its speed. It sometimes occurs in the operation of such controllers that when the master controller is moved to the off position some one of the resistance cut-out switches may remain closed due to a heavy arc which has been formed at its contacts which welds them together.

The object of my invention is to provide a controller in which it will be impossible to operate the main switch or reverser in case any of the resistance cut-out switches is closed. This may be accomplished in a number of ways, one of which is shown diagrammatically in the accompanying drawing.

On the drawing, I have shown a pair of reversing switches 5 and 6 operated, respectively, by the windings 5^a and 6^a and having the auxiliary contacts 5^b and 5^c closed when the said switches are open. The common return from the operating windings 5^a and 6^a is connected through the said auxiliary contacts in series to the left-hand or negative end of the starting resistance R; and also through the resistance r to the negative main. The remaining terminals of the windings 5^a and 6^a are connected, respectively, to the segments n' and m' on the master switch M, which has the arm o arranged, when moved to the right or left from the off-position, to connect the winding 5^a or 6^a to the positive segment m.

If the controller arm o be moved so as to engage the segment m', current will flow from the positive segment m through the arm o, the segment m', the winding 6^a, and the resistance r to the negative main, causing the switch 6 to close its main, or motor, contacts and to open its auxiliary contacts 6^b. No current flows through the motor as the arm o does not engage any of the segments m^2 to m^5 connected respectively to the operating windings 1^a to 4^a of the switches 1 to 4, which control the sections of the resistance R in an obvious manner.

When the arm is moved step by step so as to engage the segments m^2 to m^5 the windings 1^a to 4^a become successively energized causing the switches 1 to 4 to close successively, whereby the motor is caused to start and automatically increase its speed in a manner well known.

To stop the motor the arm o is moved to the off-position which is that shown on the drawing, causing the deënergizing of all the windings 1^a, 2^a, 3^a, 4^a, and 6^a. All of the switches 1, 2, 3, 4, and 6 should open at once and the auxiliary contact 6^b should close. In case, however, one of the resistance switches, as 3, should remain closed and the arm o be moved upon the segment m', a connection exists from the positive main through the switch 3, the last section of the resistance R, the auxiliary contacts 5^b and 6^b to the lower terminals of the windings 5^a and 6^a. A connection also exists from the positive on the master switch to the upper end of the winding 6^a. As both ends of this winding are connected to positive conductors, no current can flow through it and the switch 6 cannot close, the winding being short-circuited through the contacts 5^b and 6^b.

When the arm o is moved to the left from its off-position, the operation described will apply except that the winding 5^a will be energized and the switch 5 will close, causing the armature A to rotate in a reverse direction.

The opening of the auxiliary contacts 5^b or 6^b when the corresponding switch 5 or 6 is closed prevents connecting the lower end of the winding 5^a or 6^a to the positive main, which would make the said winding inoperative as hereinbefore explained.

I claim—

1. In a circuit, a resistance, a set of resistance switches having contacts for connecting said resistance to one side of a source of current supply, a main switch for connecting said resistance to the other side of said source, an operating winding for said switch, means including the said contacts for closing a short circuit around said winding when any of said resistance switches are closed, means for energizing said wind-

ing when all of said resistance switches are open, and means for opening said short circuit when said main switch operates.

2. In a motor control system, a circuit containing a motor, a magnetically operated reverser, a resistance, one or more switches having contacts connected to said resistance, means including the said contacts when said reverser is in its open position for connecting both ends of its operating winding to the same side of a source of supply when any of the resistance switches is closed.

3. In a motor control system, a circuit containing a motor, a magnetically operated reverser, a resistance, one or more switches having contacts connected to said resistance, means including the said contacts when said reverser is in its open position for connecting both ends of its operating winding to the same side of a source of supply when any of the resistance switches is closed, and means for energizing said winding only when all of said resistance switches are open.

4. In a motor control system, a circuit containing a motor, a magnetically operated reverser, a resistance, one or more switches having contacts connected to said resistance, means when said reverser is in its open position for short circuiting its operating winding through the said contacts when any of the resistance switches is closed, means for energizing said winding when all of said resistance switches are open, and means for opening said short circuit when the reverser operates.

5. In a circuit controller, a magnetically operated switch for connecting an electric circuit to one side of a source of supply, means for automatically short-circuiting the operating winding of said switch to prevent its operation if the circuit is connected at any point to the other side of the source of supply, the short-circuit being through the said point.

6. In a circuit controller, a magnetically operated switch for connecting an electric circuit to one side of a source of supply, means for automatically short-circuiting the operating winding of said switch to prevent its operation if the circuit is connected at any point to the other side of the source of supply, the short-circuit including the said point of connection, and an auxiliary switch operated by said switch for opening said short circuit when the switch operates.

7. A circuit, two reversing switches therefor, an actuating winding for each switch, a third switch in the circuit, a circuit including the third switch in shunt with the windings, a resistance in series with either winding and the shunt circuit, the resistance being of a value to prevent sufficient current to flow through either winding to actuate the corresponding reversing switch when the reversing switches are open and the third switch is closed, and means for opening the shunt circuit when either reversing switch is closed.

8. A main circuit, a switch to close the same at one place, a winding to actuate the said switch, a second switch to close the circuit at a second place, a circuit including the second switch in shunt with the winding, a resistance in series with the winding and the shunt circuit, the resistance being of a value to prevent sufficient current to flow through the winding to actuate the first switch when the latter switch is open and the second switch is closed, and means for opening the shunt circuit when the first switch is closed.

Signed at Cleveland, Ohio, this 19th day of Sept., A. D. 1910.

ARTHUR C. EASTWOOD.

Witnesses:
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H. M. DIEMER.