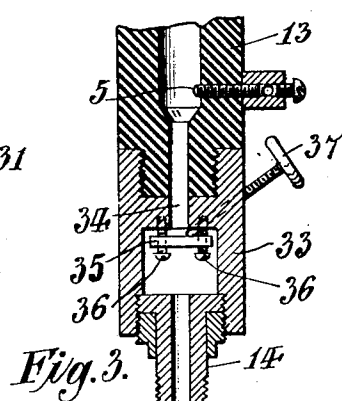
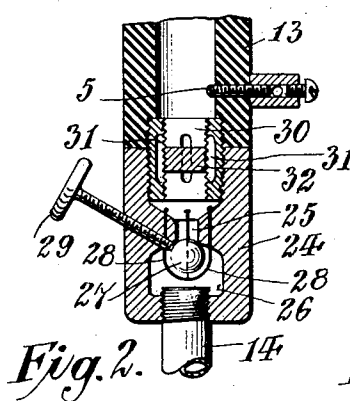
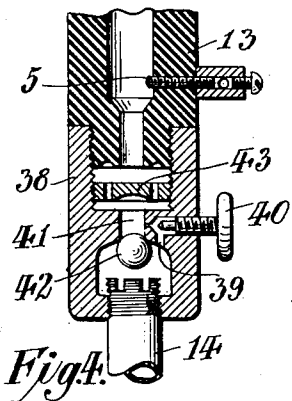
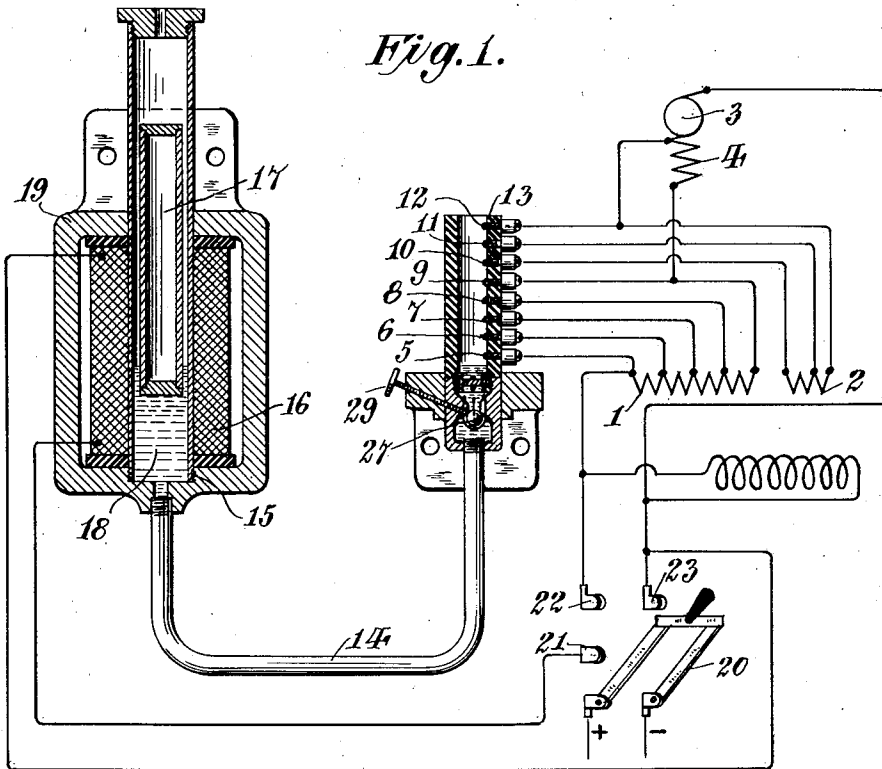


L. J. McDOWELL.
AUTOMATIC MOTOR CONTROLLER.
APPLICATION FILED FEB. 27, 1915.

1,226,546.

Patented May 15, 1917.



WITNESSES
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UNITED STATES PATENT OFFICE.

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AUTOMATIC MOTOR-CONTROLLER.

1,226,546.

Specification of Letters Patent.

Patented May 15, 1917.

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To all whom it may concern:

Be it known that I, LEWIS J. McDOWELL, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Automatic Motor-Controllers, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

This invention relates to automatic controllers for electric motors. The invention seeks to provide an efficient and reliable device of the character indicated and it consists of the features hereinafter pointed out and set forth in the claims.

In the accompanying drawings forming part of this specification and in which like reference numerals designate corresponding parts in the several figures,

Figure 1 shows in section and partly in diagram an embodiment of the invention.

Fig. 2 is an enlarged, fragmental, sectional view of the controlling valve shown in Fig. 1.

Figs. 3 and 4 are similar views showing modified arrangements of the controlling valve.

Referring now to the specific arrangement as shown in the drawings, 1 and 2 constitute the resistance for the motor comprising the armature 3 and field coils 4. Connecting with the resistance 1, 2 at various points therein are contacts 5, 6, 7, 8, 9, 10, 11 and 12. These contacts are fixed in the wall of a receiving cup 13 for a conducting liquid which conveniently consists of mercury. The bottom of this cup is connected by a tube 14 with a supply chamber 15 for the conducting liquid. This supply chamber is surrounded by the coil 16 of a solenoid having a hollow cylindrical core 17 floating on the conducting liquid 18. 19 is a metallic yoke for the solenoid providing a magnetic circuit therefor as well as a supporting bracket.

A starting switch 20 is connected with the feed and return wires and is provided with contacts 21, 22 and 23 suitably connected as shown with the motor and coil of the solenoid. When the switch 20 is closed, current is supplied to the motor and to the solenoid. The solenoid then draws down its core 17 forcing the conducting liquid 18 to elevate its level in the space between the core and the wall of the supply chamber 15.

This causes the level of the conducting liquid to rise in the receiving cup 13 so that it gradually makes connection in turn with the several contacts 5, 6, 7, etc., which project into the receiving cup 13, thereby gradually cutting out the resistance 1 from the field coil 4 and thereafter gradually cutting out the resistance 2 from the armature 3. This resistance should ordinarily be cut out in a very short time, to-wit, in about six seconds. It has been found that the sudden rush of the conducting liquid into the receiving cup 13 causes the conducting liquid to rise too rapidly within the receiving cup 13 with the result that much of the resistance 1 is ineffective. To remedy this defect a regulating valve is provided near the bottom of the receiving cup to check the inflow of the conducting liquid so that it may rise at a controlled speed in accordance with the working requirements.

The regulating valve may be variously constructed. In the form thereof shown in Figs. 1 and 2, the receiving cup is connected at its bottom to a coupling 24 whose lower end is connected to the tube 14. The coupling 24 is formed with a constricted passage 25 beneath which is a cavity 26 to receive a ball valve 27 which may be carried in a cage 28. When the mercury rises, it elevates the ball 27 against the inlet side of the passage 25. To prevent the ball from thus completely closing said passage, the turn screw 29 is employed. It works through the wall of the coupling 24 and projects into the path of the ball just below the passage 25. By projecting the screw 29 more or less inward, the space between the ball 27 and the passage 25 may be regulated so as to provide an effective passageway for the conducting liquid of the required size. By this means the flow of the conducting liquid is retarded and regulated so as to make orderly and reliable connection with the contacts in the receiving cup. When the conducting liquid recedes, the ball 27 is unseated to permit a rapid outflow. 30 is a thimble which connects the receiving cup 13 and the coupling 24. It is provided with internal peripheral passages 31 and a central diaphragm plate 32 to divide and retard the flow of the liquid.

In Fig. 3 a different form of regulating valve is shown. In this case the coupling 33 beneath the receiving cup 13 is provided with a constricted passage 34 beneath which

is a plate 35 having vertical movement on the fixed screws 36. The turn screw 37 operates to limit the movement of the plate 35 toward the passage 34 so that the inflow of the liquid

5 may be regulated as required.

In Fig. 4 another form of regulating valve is shown. In this case the coupling 38 has a smaller constricted passage 39 controlled by the turn screw 40 for the inflow of the liquid, the ball 42 closing the passage 41 during this period of inflow. When the liquid recedes, the ball 42 moves from its seat at the mouth of the passage 41, thereby permitting the rapid outflow of the liquid.

15 43 is a perforated plate to retard the flow of the liquid.

While it is preferred that a solenoid be employed as the means to cause the to-and-fro flow of the conducting liquid in the form shown in the drawings, it is to be understood that other means may be used for this purpose.

What I claim is:

1. In an automatic controller for electric motors, the combination of a resistance; contacts connecting with the resistance at various points; a receiving cup for a conducting liquid in whose walls said contacts are fixed at intervals; a supply chamber for the conducting liquid connected with the receiving cup; means for causing the conducting liquid to flow from the supply chamber into the receiving cup to connect said contacts in turn and thereby cut out more or less of the resistance; and an automatic check valve near the bottom of the receiving cup to check the inflow of the conducting liquid while permitting free outflow thereof.

2. In an automatic controller for electric motors, the combination of a resistance; contacts connecting with the resistance at various points; a receiving cup for a conducting liquid in whose walls said contacts are fixed at intervals; a supply chamber for the conducting liquid connected with the receiving cup; a solenoid for causing the conducting liquid to flow from the supply chamber into the receiving cup to connect said contacts in turn and thereby cut out more or

less of the resistance; and an automatic check valve near the bottom of the receiving cup to check the inflow of the conducting liquid, while permitting free outflow thereof.

3. In an automatic controller for electric motors, the combination of a resistance; contacts connecting with the resistance at various points; a receiving cup for a conducting liquid in whose walls said contacts are fixed at intervals; a supply chamber for the conducting liquid connected with the receiving cup; means for causing the conducting liquid to flow from the supply chamber into the receiving cup to connect said contacts in turn and thereby cut out more or less of the resistance, a restricted passage being formed near the bottom of the receiving cup; an automatic check valve cooperating with said restricted passage and arranged to be moved to its seat by the inflow of said liquid and to be moved from its seat by the outflow thereof; and means to regulate the seating of the valve.

4. In an automatic controller for electric motors, the combination of a resistance; contacts connecting with the resistance at various points; a receiving cup for a conducting liquid in whose walls said contacts are fixed at intervals; a supply chamber for the conducting liquid connected with the receiving cup; means for causing the conducting liquid to flow from the supply chamber into the receiving cup to connect said contacts in turn and thereby cut out more or less of the resistance, said means comprising a solenoid having its coil surrounding the supply chamber and its core floating in the conducting liquid in said supply chamber; and an automatic check valve near the bottom of the receiving cup to check the inflow of the conducting liquid while permitting free outflow thereof.

This specification signed and witnessed this 24th day of February, A. D. 1915.

LEWIS J. McDOWELL.

Signed in the presence of—

IDA G. GILMORE,
WORTHINGTON CAMPBELL.