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F. J. SEABOLT.
STARTING AND SPEED REGULATING RHEOSTAT.
APPLICATION FILED JAN. 25, 1908.

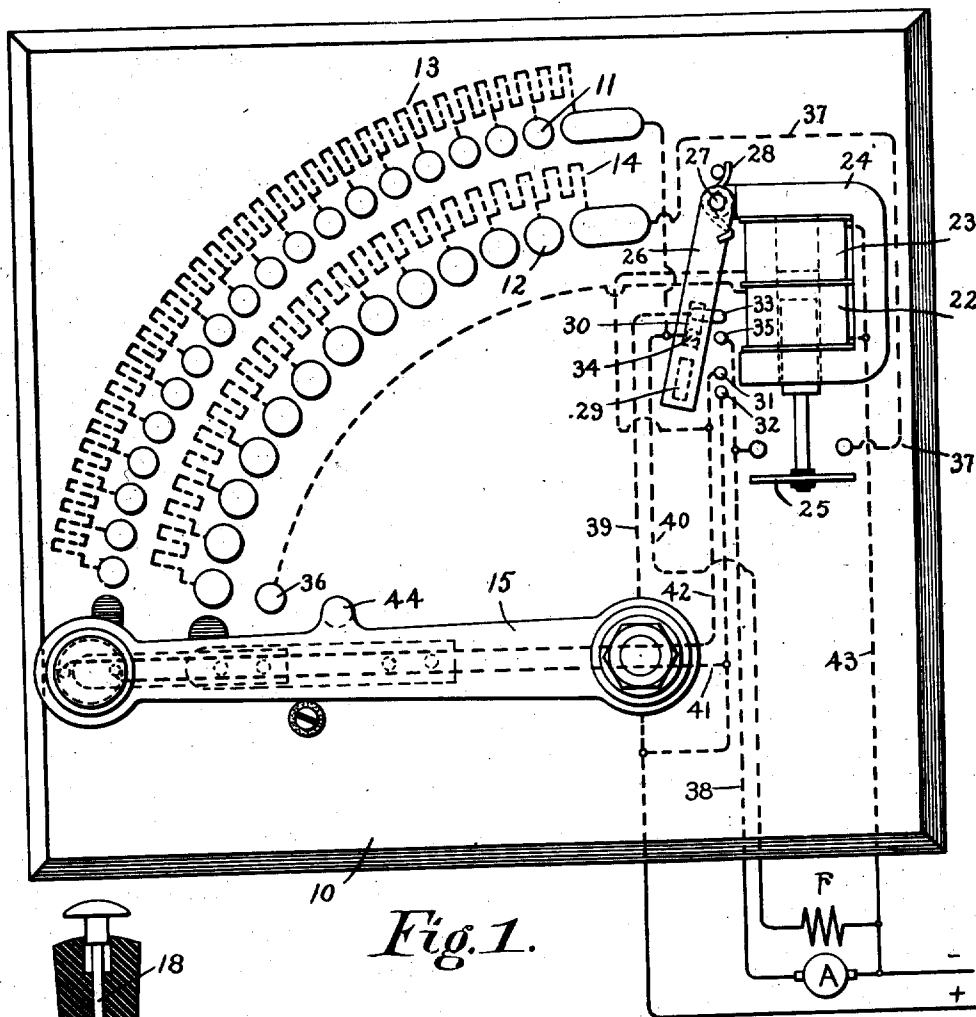


Fig. 1.

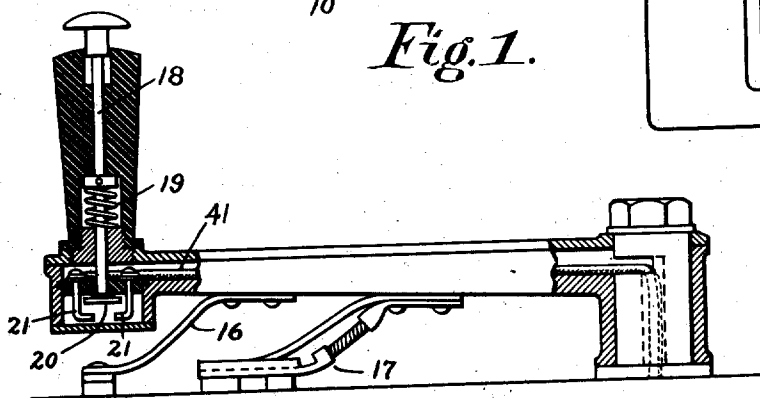


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

FRANK J. SEABOLT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

STARTING AND SPEED-REGULATING RHEOSTAT.

No. 897,497.

Specification of Letters Patent.

Patented Sept. 1, 1908.

Application filed January 25, 1908. Serial No. 412,539.

To all whom it may concern:

Be it known that I, FRANK J. SEABOLT, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Starting and Speed-Regulating Rheostats, of which the following is a specification.

This invention relates to devices for controlling electric motor circuits and has for its object the provision of a device of this character in which the starting and speed regulation of the motor may be accomplished in a reliable, simple and efficient manner.

My invention relates more specifically to devices for starting a motor and thereafter varying the speed.

In carrying out my invention I provide in connection with starting and speed regulating resistances, a single controlling arm arranged to control both of said resistances and thereby accomplish both the starting and speed regulation. In my previous patent No. 852,851, I have described a device of this character in which the controlling arm is biased to the off position so that upon failure of voltage it will always return to a protective position. In this rheostat the arrangement is such that when the controlling arm moves to vary the starting resistance the field resistance is short-circuited and while the field resistance is being varied the armature resistance is short-circuited. For certain purposes I have found that a rheostat of this type, in which the controlling arm is not biased to the off position, is desirable. I have also found in some cases that it is objectionable to open the circuit upon the contact studs. I therefore provide an electromagnetic switch which always opens the circuit in addition to a controlling arm which may be left in any position.

Other features of novelty will appear in the course of the following specification in which I have shown my invention embodied in concrete mechanism for purposes of illustration.

In the accompanying drawing disclosing my invention, Figure 1 is a plan view of the device showing the circuit connections and Fig. 2 is a detail view of the controlling member partly in section.

Referring to the drawing, 10 is an insulating base of slate or soapstone provided with two sets of concentrically-arranged studs 11

and 12 forming the terminals of the field and armature resistances 13 and 14 respectively. A controlling member 15 is pivoted concentrically with said studs so that the contacts 16 and 17 at its free end move over the respective studs to vary the resistance in a well-known manner. The handle of the controlling member is provided with a switch comprising a plunger 18 adapted to be moved longitudinally of the handle against the tension of the spring 19. This plunger is provided at its lower end with a bridging contact 20 arranged to bridge contacts 21 for the purpose hereinafter described. Adjacent to the running position of the controlling arm 15 is an electromagnetic switching device comprising an electromagnet having a lifting coil 22 and a holding coil 23 mounted in a metallic U-shaped frame 24. These two coils control the bridging contact 25 to close the armature circuit. The coil 22 is of sufficient strength to actuate the contact 25 while the winding 23 is only sufficient to hold the contactor in a raised position. A switch arm 26 is pivoted at 27 to the magnet frame so as to be held against the tension of the spring 28 when the magnet is energized. This arm is provided with contact strips 29 and 30 insulated from the arm. The strip 29 is arranged to bridge the contact studs 31 and 32 when the arm is moved into contact with the magnet while the strip 30 engages the contact segment 33 at all times. When in the position shown in the drawing, the strip 30 engages contact stud 34 while when it is moved up against the magnet it engages stud 35. The winding 22 is energized by means of a stud 36 arranged to be engaged by the contact 17 when the arm is in its initial position but it will be deenergized after the initial movement.

The arrangement of circuits and mode of operation are as follows: when it is desired to start the motor the arm 15 is moved to the right so as to engage the studs 11, 12 and 36. The winding 22 is thereupon energized to close the switch 25 as follows: from the positive main to the stud 36 thence through winding 22 and back to the negative main. The switch 25 being closed, the armature circuit is closed through resistance 14 as follows: from the positive main to contact 17, studs 12, conductor 37, switch 25, conductor 38, armature A and back to the negative main. At the same time the field resistance 13 is

short-circuited as follows: from the positive main through conductor 39, contact strip 30, conductor 40, field F and back to line. The armature resistance may now be cut out by moving the arm to the right in the usual way. When the contact is broken at stud 36, winding 22 will be deenergized but in the meantime the plunger switch 18 in the handle has been pressed down so as to bridge the contacts 21 thereby energizing the holding winding 23 as follows: from the positive main to conductor 41, contact 20, conductor 42, winding 23, conductor 43 and back to the negative main. This will hold the switch 25 closed, but if the operator should release the switch in the handle, the armature circuit will be immediately opened and it will be necessary to return the arm to starting position in contact with the stud 36 in order to again close it. When the arm 15 reaches running position, the switch arm 26 is forced over by the lug 44 into engagement with the magnet 24. This causes the armature resistance to be short-circuited across from conductor 39 to conductor 38 by the conducting strip 30 engaging the stud 35. At the same time the short-circuit of the field resistance 13 is opened at strip 30 by moving out of contact with the stud 34. By the bridging of studs 31 and 32 at strip 29 the switch in the handle, that is contact 20, is short-circuited so that the holding coil 23 is maintained energized. The arm 13 may now be moved backward so as to increase the speed of the motor and the speed is varied as desired by moving the arm back and forth over the studs 11. Upon failure of voltage the armature circuit will be opened at switch 25 and the arm 26 will return in response to the tension of its spring so as to open the short-circuit of the armature resistance and again close the short-circuit of the field resistance. The switch 25 being opened in order to again close it, the arm must be brought back to the starting position.

It will thus be seen that I have provided a simple and efficient arrangement for both starting and regulating the speed of the motor by means of a single controlling member in addition to means for protecting the rheostat from abnormal circuit conditions.

While I have described my invention in connection with specific mechanism and arrangement of circuits, it should be understood that I do not limit my invention thereto since various modifications 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. A controlling device for electric motors comprising a pair of resistances each provided with contacts, a controlling member

simultaneously engaging said contacts, an electromagnetic device for closing the motor circuit through one of said resistances, and means controlled thereby for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction.

2. A motor-starting and speed-regulating rheostat comprising an armature resistance and a field resistance each provided with contacts, a controlling member simultaneously engaging said contacts, electrically-controlled means arranged to be energized upon the initial movement of said arm for closing the motor circuit through the armature resistance, and means controlled thereby for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction.

3. A motor-starting and speed-regulating rheostat comprising an armature resistance and a field resistance each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device arranged to be energized upon the initial movement of said arm for closing the motor circuit through the armature resistance, means for short-circuiting the field resistance, and means controlled by said electromagnetic device for opening said short-circuit and simultaneously short-circuiting the armature resistance when the controlling arm reaches running position.

4. A controlling device for electric motors comprising a pair of resistances each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device for closing the motor circuit through one of said resistances, a switch in connection with said member for controlling said electromagnetic device, and means controlled by said electromagnetic device for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the other direction and simultaneously short-circuiting said switch.

5. A controlling device for electric motors comprising a pair of resistances each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device for closing the motor circuit through one of said resistances upon the initial movement of said member, means for reducing the energy of said device from an actuating to a holding current, and means controlled by said device for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction.

6. A motor starting and speed regulating rheostat comprising a starting resistance and

a field resistance each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device for closing the motor circuit through the armature resistance upon the initial movement of said member, a switch in connection with said member for controlling said electromagnetic device, means controlled by said device for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction, and means for short-circuiting said switch when the controlling member reaches running position.

7. A motor starting and speed regulating rheostat comprising a starting resistance and a field resistance each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device for closing the motor circuit through the armature resistance upon the initial movement of said member, means for reducing the energy of said device from an actuating to a holding current after said initial movement, a switch in connection with said member for controlling said electromagnetic device, means controlled by said device for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction, and means for short-circuiting said switch when the controlling member reaches running position.

8. A controlling device for electric motors comprising a pair of resistances each provided with contacts, a controlling member simultaneously engaging said contacts, an electromagnetic device for closing the motor

circuit through one of said resistances upon the initial movement of said member, a switch in connection with said member for controlling said electromagnetic device, means for reducing the energy of said device from an actuating to a holding current after the initial movement of said member, and means controlled by said device for rendering said member ineffective to control one of said resistances when moved in one direction and the other of said resistances when moved in the opposite direction and simultaneously short-circuiting said switch.

9. A starting device for electric motors comprising a resistance, a controlling member therefor, an electromagnetic device for closing the motor circuit through said resistance upon the initial movement of said member, a switch in connection with said member for controlling the circuit of said electromagnetic device, and means controlled by said device for short-circuiting said switch.

10. A starting device for electric motors comprising a resistance, a controlling member therefor, an electromagnetic device for closing the motor circuit through said resistance upon the initial movement of said member, means for reducing the energy of said device from an actuating to a holding current after said initial movement, a switch in connection with said member for controlling the circuit of said device, and means controlled by said device for short-circuiting said switch.

In witness whereof, I have hereunto set my hand this 23rd day of January, 1908.

FRANK J. SEABOLT.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.