P. H. ZIMMER.

STARTING RHEOSTAT.

APPLICATION FILED DEC. 26, 1907.

919,998. Patented Apr. 27, 1909.

Fig. 1.

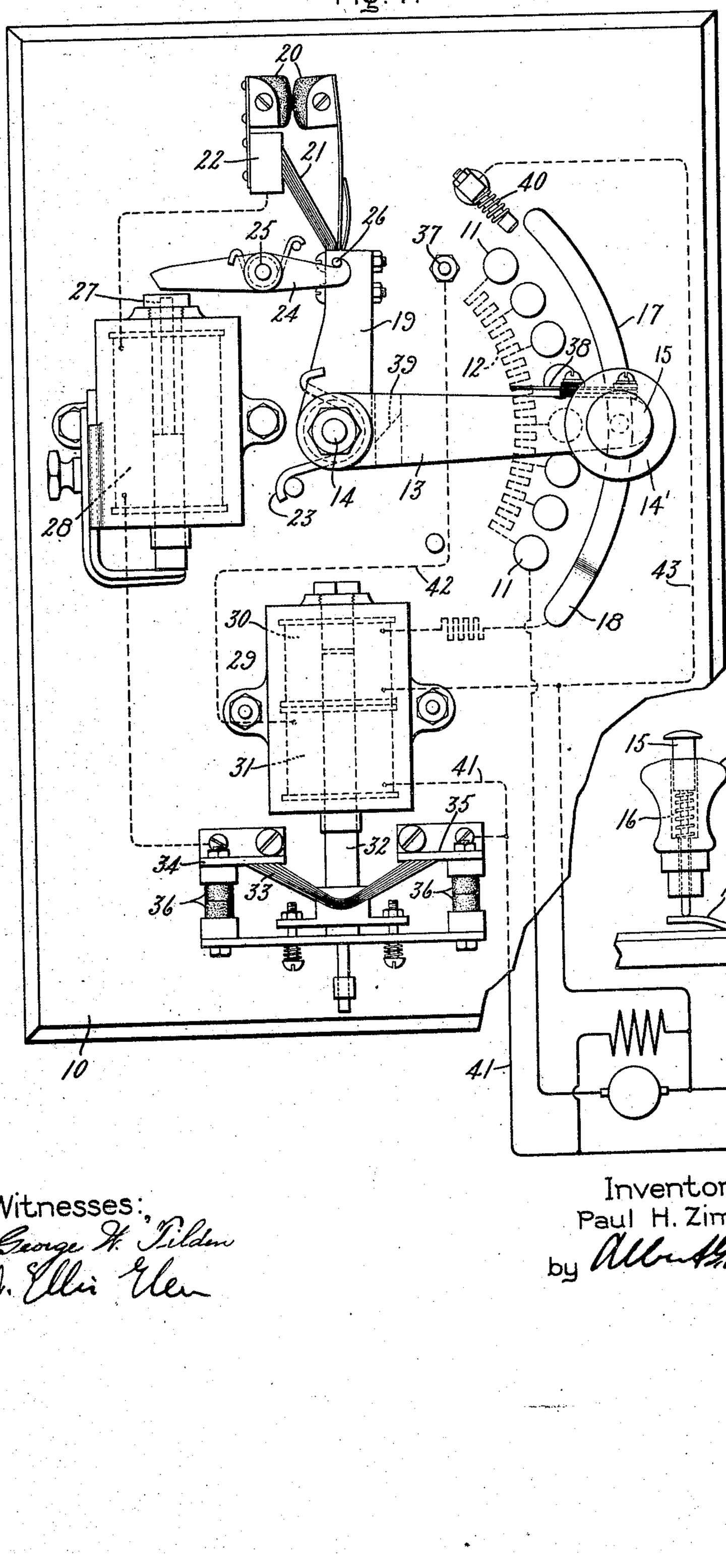

Fig. 2.

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UNITED STATES PATENT OFFICE.

PAUL H. ZIMMER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

STARTING-RHEOSTAT.

No. 919,998. Specification of Letters Patent. Patented April 27, 1909.

Application filed December 26, 1907. Serial No. 408,146.

To all whom it may concern:

Be it known that I, PAUL H. ZIMMER, 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-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 which cannot be destroyed by the careless handling of the operator, or by the occurrence of abnormal circuit conditions, and which is, at the same time, simple in construction in addition to being extremely reliable, efficient and durable.

My invention relates more specifically to motor starting rheostats. In devices of this character it is common to start the motor by moving the controlling arm over contact studs until the no-voltage magnet is reached, the motor circuit being closed upon the first contact stud. With this arrangement, upon the failure of voltage, the arm returns to the starting position and the circuit will be opened upon the first stud, thereby causing arcing and burning of the contact studs.

One of the objects of my invention is to provide, in combination with an electromagnetic switch for closing the main circuit, means for mechanically closing the same before the resistance is varied; means for opening the switch upon the occurrence of overload conditions; and a separate, independently actuated switch energized upon the initial movement of the arm for closing the circuit. This latter switch is arranged to open upon the failure of voltage, so that it is unnecessary that the controlling arm be biased to the off position. I also provide a normally open circuit closing device in connection with the starting arm, whereby the electromagnetic switch is controlled so that the circuit will always be opened if the arm is left in any other than the full running position.

In the accompanying drawing, in which I have shown my invention embodied in concrete form, Figure 1 is a plan view of my device partly broken away showing the circuit connections, and Fig. 2 is a detail view of the operating handle and switch.

Referring to the drawings, 10 represents an insulating base of slate or soapstone provided with a series of contact studs 11 forming terminals of starting resistance 12. A controlling arm 13 is pivoted at 14 so that its free end engages the contact studs 11, to vary the resistance in the usual way. The arm is provided with a handle 14′ having a contacting plunger 15 arranged to reciprocate therein, and biased to an outward position by means of a spring 16. This plunger is adapted to engage a contact segment 17 arranged concentrically with the studs 11. Contact between plunger and segment is made when pressure is applied to the plunger so as to overcome the tension of the spring 16 and force the end of the plunger into engagement with the segment. When, however, the full running position is reached, the plunger is forced upward by means of an offset 18, which holds the plunger and segment in permanent contact. A switch arm 19 is pivoted concentrically with the arm 13 and is arranged to close the main circuit through carbon contacts 20 and a laminated contact 21 engaging the fixed contact 22. The switch is biased or spring-pressed to an open position by means of a spring 23, while a latch 24 pivoted at 25 is spring-pressed over a pin 26 on the switch arm and locks the same in place. The free end of the latch 24 is arranged to be engaged by the plunger 27 of the overload magnet 28 so that, as the plunger rises to trip the latch, it releases the switch arm 19 to open the main circuit. A solenoid switch 29 is mounted conveniently upon the base and is provided with two windings 30 and 31, operating upon the core or plunger 32, carrying at its lower end a laminated brush contact 33 arranged to bridge the fixed contacts 34 and 35 when the core is raised. This switch is also provided with carbon contacts 36 for taking the final break of the circuit. The winding 31 is energized through a fixed contact 37 arranged to be engaged by contact 38, mounted upon but insulated from the arm 13, when the latter is in its starting position. The arm 13 is provided with a shoulder 39 adapted to engage the arm 19 and force it to a closed position when the arm 13 is moved to the left of its starting position on the first of the studs 11. Movement to the left is opposed

by a spring plunger 40 which returns the arm to the starting position. This plunger is connected to the circuit so as to energize winding 31 when it is bridged to stud 37 by contact 38.

The arrangement of circuits and mode of operation are as follows: When it is desired to start the motor the arm 13 is moved to the left in a counter-clockwise direction. When the arm reaches the starting position, contact 37 is engaged by contact 38, and the winding 31, which is a lifting winding, is energized from the positive main through conductor 41, conductor 42, stud 37, plunger 40, conductor 43 and back to line. At the same time, by forcing the arm 13 to the left, the switch arm 19 is latched to a closed position, whereupon, the main armature circuit is closed at this switch. At the same time, the armature circuit is closed at the contacts 34 and 35 by the energizing of the coil 31. As the arm is moved to cut out resistance, the circuit of winding 31 will be broken at contact 37, but the circuit of the holding coil 30 has been energized by the operator forcing the plunger 15 into contact with the segment 17, so that the circuit will be kept closed at contacts 34 and 35. If the operator should attempt to leave the arm in any position other than the full running position, the circuit of the winding 30 will immediately open and thereby open the main circuit. When, however, the running position is reached, the offset 18 maintains the coil 30 energized. Upon the occurrence of an overload the core 27 will trip the latch 24 and allow the switch arm 19 to open the main circuit while the coil 30 acts as an underload coil to open the circuit upon the failure of voltage. In this way the rheostat is protected against careless handling of the operator, since the arm must always be brought to starting position before the circuit can be closed, while it cannot be left in any other than the running position with the circuit closed.

While I have described my invention in connection with a particular mechanism and arrangement of circuits, it should be understood that I do not limit my invention in these particulars, except in so far as it is limited by the scope of the claims annexed hereto.

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

1. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, and means whereby said switches are closed by an initial movement of said arm.

2. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, and means whereby one of said switches is closed mechanically and the other electromagnetically upon an initial movement of said arm.

3. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means for closing said switches upon an initial movement of said arm, and means whereby said switches are opened upon the occurrence of no-voltage and overload conditions, respectively.

4. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means whereby one of said switches is closed mechanically and the other electromagnetically upon an initial movement of said arm, and means whereby said switches are opened upon the occurrence of no-voltage and overload conditions, respectively.

5. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means whereby said switches are closed by an initial movement of said arm, and a normally open circuit closing device in connection with said arm for controlling one of said switches.

6. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means whereby one of said switches is closed mechanically and the other electromagnetically upon an initial movement of said arm, and a normally open circuit closing device in connection with said arm for controlling one of said switches.

7. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means for closing said switches upon an initial movement of said arm, means whereby said switches are opened upon the occurrence of no-voltage and overload conditions, respectively, and a normally open circuit closing device in connection with said arm for controlling one of said switches.

8. A starting rheostat comprising a resistance varying arm, a switch in series therewith, means for mechanically closing said switch by a movement of said arm, a second switch in the armature circuit, and an electromagnetic device for closing the same arranged to be energized upon the initial movement of said arm.

9. A starting rheostat comprising a resistance varying arm, a switch in series therewith, means for mechanically closing said switch by a movement of said arm, an electromagnetic device for opening said switch upon the occurrence of overload conditions, a second switch in the armature circuit, and an electromagnetic device responsive to no-voltage conditions and arranged to be energized upon an initial movement of said arm for closing said switch.

10. A starting rheostat comprising a resistance varying arm, a switch in series therewith, means for mechanically closing said switch by a movement of said arm, a second switch in the armature circuit, an electromagnetic device for closing said switch arranged to be energized upon an initial movement of said arm, and a normally open circuit closing device in connection with said arm for controlling said electromagnetic device.

11. A starting rheostat comprising a resistance varying arm, a switch in series therewith, means for mechanically closing said switch by a movement of said arm, an electromagnetic device for opening said switch upon the occurrence of overload conditions, a second switch in the armature circuit, an electromagnetic device for closing said switch and arranged to be energized upon the initial movement of said arm, and a normally open circuit closing device in connection with said arm for controlling said second electromagnetic device.

12. A starting rheostat comprising a resistance varying arm, a switch in series therewith, means for mechanically closing said switch by a movement of said arm, an electromagnetic device for opening said switch upon the occurrence of overload conditions, a second switch in the armature circuit, an electromagnetic device for closing said switch comprising a pair of windings, one of which is energized by an initial movement of the controlling arm, and a circuit closing device in connection with said arm for controlling the other winding during starting.

In witness whereof, I have hereunto set my hand this 18th day of December, 1907.

PAUL H. ZIMMER.

Witnesses:
BENJAMIN B. HULL,
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