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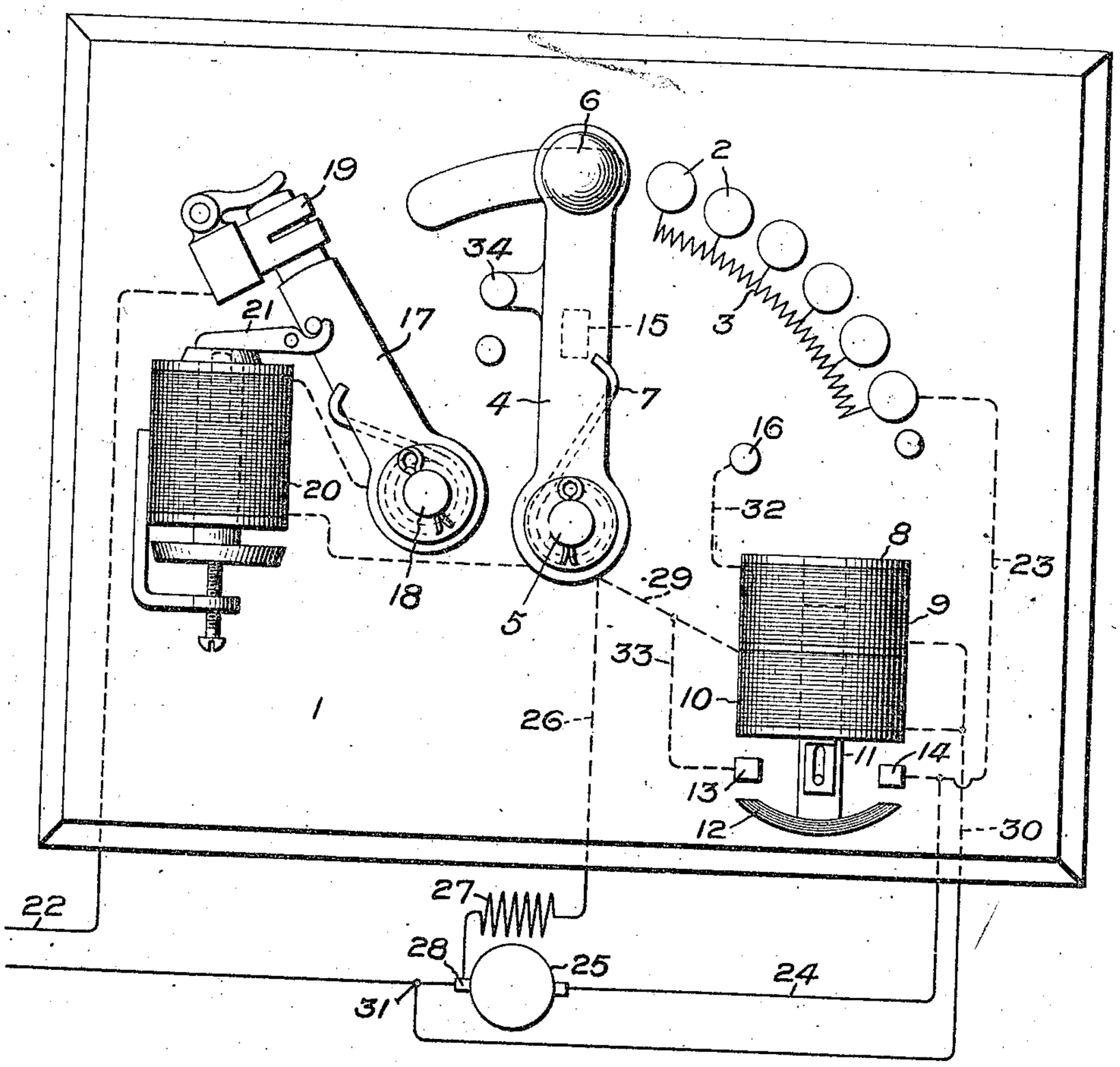
P. H. ZIMMER.

MOTOR STARTING RHEOSTAT.

APPLICATION FILED JUNE 28, 1905.



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UNITED STATES PATENT OFFICE.

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MOTOR-STARTING RHEOSTAT.

No. 840,186. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed June 28, 1905. Serial No. 267,367.

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 Motor-Starting Rheostats, of which the following is a specification.

This invention relates to devices for controlling motor-circuits, and has for its object the provision of a device of this character which cannot be destroyed by the careless handling of an operator, which is simple of construction, inexpensive to manufacture, and is at the same time durable and efficient.

More specifically, my invention relates to motor-starting rheostats. In devices of this kind, as is well known, the circuit is first closed through a starting-resistance, which is gradually cut out as the motor speeds up until all of the resistance is short-circuited. It has been the common practice heretofore to maintain the controlling-arm in the short-circuited position by means of a no-voltage magnet, so that upon failure of voltage the arm which is biased to starting position is released and flies back to the "off" position, so that upon the return of voltage the protecting resistance will be in series with the motor-armature. Such a construction has the disadvantage that the resistance contact-sheds are burned when the circuit opens and the arm flies back to its off position.

In carrying out my invention I also provide a controlling-arm biased to the starting position; but I further provide means whereby the controlling-arm will return to the off position as soon as the normal running conditions are established, thereby preventing damage to the contact-sheds. The motor is therefore protected in case the current should go off and on again suddenly, since during the operation of the motor the starting-arm is always in starting position.

My invention further consists in the details of construction and the arrangement and combination of elements hereinafter set forth, and particularly pointed out in the claims appended to and forming a part of this application.

The single figure of drawing is a plan view of a starting-rheostat embodying my improvements.

Referring to the drawing, 1 is an insulating-base of slate or soapstone, having mounted thereon the starting-studs 2, forming the terminals of starting-resistances 3. A lever or controlling arm 4 is pivoted at 5, so that its free end, which is provided with a handle 6, may be moved over and successively engage the starting-studs 2 in the usual manner. A spring 7 gives the starting-arm a bias to the off position, as shown in the drawing. A magnet 8, provided with two windings 9 and 10, controls an armature 11, carrying a bridging contact 12. When the magnet 8 is sufficiently energized, the armature 11 is drawn up so as to bridge the contacts 13 14, which closes a shunt-circuit around the starting-arm, as hereinafter set forth. The magnet 8 is normally energized by the winding 10, the circuit of which is independent of the controlling-arm; but the energization, however, is not sufficient to attract the armature to bridge the contacts. The other winding 9 must be energized in order to accomplish this result. The circuit of this winding, however, is not closed until the starting-arm is moved to the last stud and all of the starting-resistance thereby cut out. In this position the starting-arm engages, by means of a contactor 15, with the stud 16, to which one end of the winding 9 is connected. A circuit is thus established through winding 9, which is in parallel with the winding 10. The magnet 8 being sufficiently energized thereupon draws up the armature 11, bridges the contacts 13 14, and completes a shunt-circuit around the starting-arm. Upon being released the arm returns to its starting position, breaking the circuit of winding 9; but the shunt-circuit is maintained, since the single winding 10 is sufficient to maintain it. Upon failure of voltage the armature will drop and break the shunt-circuit, and the motor cannot be again started without repeating the operation above described.

In order to protect my device against overloads, I have provided a circuit-breaker comprising a lever 17, pivoted at 18, the free end of which is adapted to enter a clip 19 to close the motor-circuit. This lever is likewise spring-pressed, so as to leave the clip when released. An overload-magnet 20 controls the circuit-breaker by tripping the latch 21 upon an overload to release the lever 17 in a well-known manner.

The arrangement of circuits is as follows: Upon moving the controlling-arm onto the first starting-stud the current passes from lead 22 to clip 19, through lever 17 to magnet 20, thence to the pivot 5, arm 4, starting-resistance 3, conductors 23 24 to motor-armature 25, and back to line. The field-current passes from pivot 5 through conductor 26, field 27, back to the line at 28. A branch circuit passes from pivot 5, through conductor 29 to winding 10 of the magnet 8 and thence by conductor 30 back to the line at 31. When the starting-arm reaches the last stud, the circuit of the winding 9 is completed from pivot 5 through arm 4, contactor 15, stud 16, conductor 32, to winding 9, thence back to line through conductor 30. The magnet 8 is now sufficiently energized to draw up its armature and bridge the contacts 13 14. The circuit through the motor will now be as follows: from lead 22, through the circuit-breaker to pivot 5, thence through conductors 29 and 33, to contact 13, bridge 12, contact 14, and conductor 24 to the motor-armature 25, and back to line. A shunt is thus closed around the arm 4, so that the operator may release the handle, allowing the arm to return to starting position to be in readiness to start again. The circuit of winding 9 is broken by the return of the arm, but the winding 10, which is always in circuit as long as the circuit-breaker is closed, is sufficient to maintain the closed condition of the shunt. Upon overload the motor-circuit will be broken at the circuit-breaker, and upon failure of voltage, due to the opening of the circuit-breaker or to other causes, the bridging-contact 12 will drop and break the shunt-circuit. When the circuit-breaker is open, in order to start the motor the starting-arm is first moved to the left until the lug 34 engages the lever 17 to close the same. The arm is then moved to the right, as hereinbefore described.

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

1. In a starting-rheostat, the combination with a controlling member having a bias to the starting position, of electrically-controlled means for closing an auxiliary circuit around said arm when the latter is moved to running position.

2. In a starting-rheostat, the combination with a controlling-arm having a bias to the starting position, of electrically-controlled means for closing a shunt-circuit around said arm when the latter is moved to running position and for maintaining it closed when the arm is returned to starting position.

3. In a starting-rheostat, the combination with a pivoted controlling-arm having a bias to the starting position, of means for closing a shunt-circuit around said arm when the latter is moved to running position, said means including electromagnetic means for maintaining it closed when the arm is returned to starting position.

4. In a starting-rheostat, the combination with a pivoted controlling-arm having a bias to the starting position, of a switch, an electromagnet for operating the same to close a shunt-circuit around said arm when the latter is moved to running position, said magnet being normally energized sufficiently to maintain said shunt-circuit.

5. In a starting-rheostat, the combination with a pivoted controlling-arm having a bias to the starting position, of a switch, a compound-wound electromagnet for operating the same to close a shunt-circuit around said arm when the latter is moved to running position, said magnet being normally energized sufficiently by one of its windings to maintain the closed condition of said shunt-circuit.

6. A motor-rheostat comprising a variable resistance, a controlling-arm therefor, and electrically-controlled means for closing an auxiliary circuit around said arm when the latter is moved to a predetermined position and for maintaining it closed when the arm leaves said position.

7. A motor-starter comprising a spring-retracted starting-lever, a starting-resistance coöperating therewith, an electromagnet, a circuit-breaking relay cut in by said magnet when the lever is moved to full on position, and means dependent upon line-voltage for maintaining the relay active.

8. A starting-rheostat comprising a switch biased to open position, a resistance-controlling arm arranged to close said switch when moved in the direction to insert resistance, means responsive to normal circuit conditions for holding said switch closed, and means for closing an auxiliary circuit around said controlling-arm when the latter is moved to running position.

9. A starting-rheostat comprising a spring-actuated switch, a locking device for holding said switch in closed position, means responsive to overload conditions for releasing said device, a resistance-controlling arm, and an electromagnetic device responsive to underload conditions for closing an auxiliary circuit around said controlling-arm when the latter is moved to running position.

In witness whereof I have hereunto set my hand this 27th day of June, 1905.

PAUL H. ZIMMER.

Witnesses:
BENJAMIN B. HULL,
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