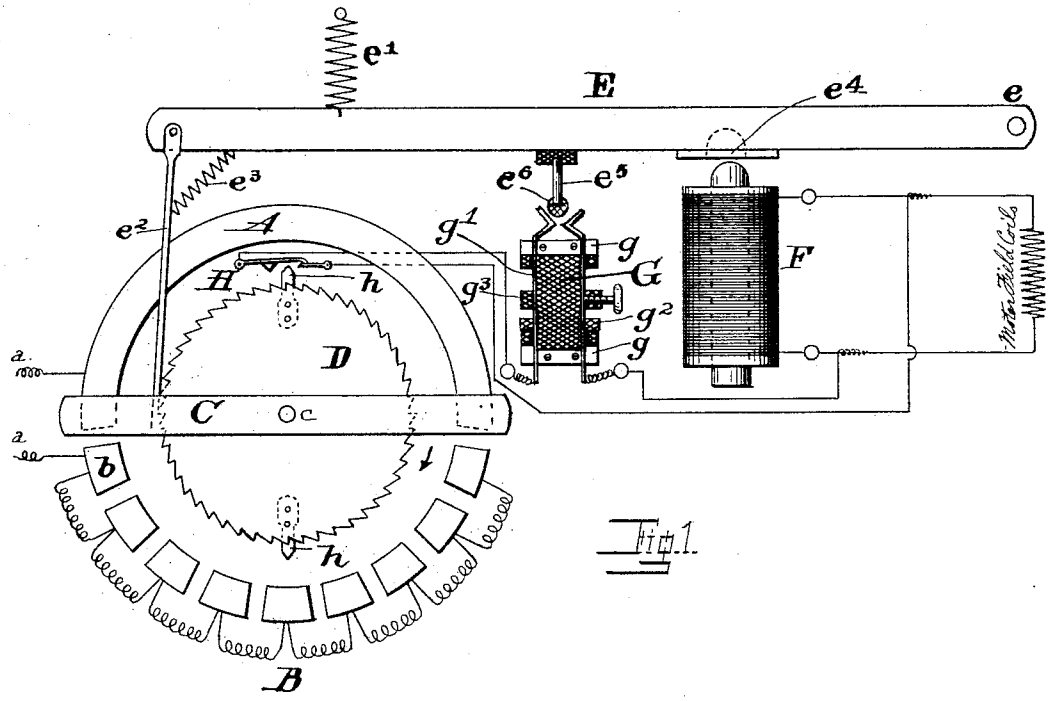
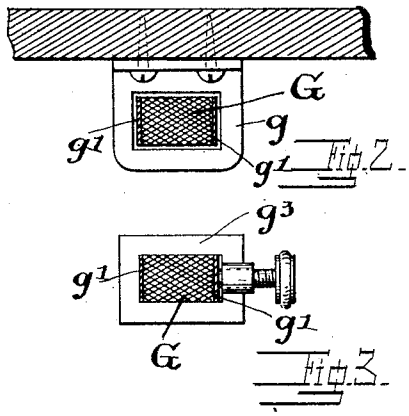
(No Model.)

R. W. HOLLIS.

AUTOMATIC RHEOSTAT.

No. 531,617. Patented Dec. 25, 1894.





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RODOLPHUS W. HOLLIS, OF ATLANTA, GEORGIA.

AUTOMATIC RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 531,617, dated December 25, 1894.

Application filed April 30, 1894. Serial No. 509,522. (No model.)

To all whom it may concern:

Be it known that I, RODOLPHUS W. HOLLIS, a citizen of the United States of America, and a resident of Atlanta, in the county of Fulton and State of Georgia, have made a certain new and useful Improvement in Automatic Rheostats; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates as above stated to rheostats for progressively applying to electro-motors and analogous devices their actuating current, the object of the invention being to obviate the necessity for the manual operation of such rheostats and so do away with any irregular or improper method of applying the current therewith, and also to automatically cut off the current upon the stoppage of its flow through the line wires for any cause, such as the shutting down of the generators, or the momentary grounding of the current, whereby the safety of the motor coils is insured.

The invention consists of the device as hereinafter set forth and claimed.

In the accompanying drawings: Figure 1 is an elevation of the device, same being in somewhat diagrammatical form, and showing the parts in the position when the current is cut off. Fig. 2 is a detail of the guides for the jack, and Fig. 3 is a view of said jack in section showing the motion limiting stop thereon.

In the figures, like reference marks indicate corresponding parts in all the views.

A and B are rheostat segments, the segments B being connected electrically by the resistance coils, and both the segment A and one of the segments B being provided with leading-in wires *a*. C is the brush thereof, which is mounted on a shaft *c*, which shaft carries, preferably within the casing usually provided for rheostats, the ratchet wheel D. It is obvious that a partially rotary movement of the said ratchet will impart a corresponding movement to the brush C and cause it to move in contact with the segment A traversing the segments B successively, until it reaches the one at the extreme left, after which, one step further in its progression it will break the circuit, and leave the opposite end of the brush in a position to be passed in the same manner over the segments B.

A lever E pivoted at *e*, and being drawn upwardly by a spring *e'*, carries on its distal extremity, a pawl e^2, which is held against the ratchet-wheel D by a spring e^3, which keeps it in contact therewith. This lever E carries on its under side an armature e^4, which is perforated to receive the end of the electro-magnet F, which is wired in series with the field-coils of the motor, and consequently acts to draw the lever E downwardly upon the initial energizing of the said field-magnets, which causes the pawl e^2 to engage a tooth lower down on the ratchet D. This lever would remain in its depressed condition as long as the field-magnets were energized, were it not for means which I have devised for short-circuiting the said magnet on the lever reaching its ultimate point of depression. For this purpose, I have supplied the following described device: Brackets *g* preferably made from insulating material are secured to the base of the device. A block G of insulating material carrying the spring *g'* on opposite sides slides vertically in the guides *g*, its downward movement being limited by a stop g^2 thereon, while its upward movement is limited by an adjustable stop g^3, consisting in the present construction of a ring, and set-screw for securing the same. The springs *g'* are converged at their upper ends so as to contact with a pin e^5 set in but insulated from the lever E, and being provided with a head e^6, of insulating material. Each of the springs *g'* is connected to one of the wires leading from the field-magnet coils to the magnet F, whereby a short-circuit is made in said circuit broken between the two springs *g'*. Thus it is seen that, as soon as the magnet draws the lever E down it is short circuited, thus allowing the spring *e'* to elevate the lever and partially revolve the wheel D. As the lever E ascends it elevates the jack G to the limit prescribed by the stop g^3, whereupon the pin e^5, is withdrawn from between the springs *g'*, thereby energizing the magnet

again. This operation would continue until the current was cut off from the motor, were it not for the fact that as soon as the end of the brush bears upon the segment *b*, the short-circuit is broken, and remains broken, and the lever depressed until the current is cut out from the field-magnets which would be done by the ordinary double-pole switch, which demagnetizes the magnet and allows the retractile spring *e'* to elevate the lever E, and move the brush another step, placing it in the position shown in Fig. 1, in which it is in position to again perform its operation. This is done by a switch H opened by contact of lugs *h* therewith.

The operation of this device is as follows: The current being turned on into the motor by a switch, energizes the field magnets, and the magnet F which pulls down the lever E, causing the pawl e^2 to engage the teeth of the wheel D, and forcing the pin e^5 between the springs *g'* of the jack G, the insulated head e^6 preventing too early electrical contact of said pin therewith, and also serving to cause an engagement between said pin and springs. This short-circuits the electro-magnet F, and allows the retractile spring *e'* to elevate the lever E, and partially revolve the wheel D and brush C. The lever, in ascending, elevates the jack G until the stop g^3 comes into contact with the upper guide *g*, whereupon the continued upward movement of the lever E withdraws the pin e^5 from contact with the spring *g'*, and allows the jack to drop to its normal position. This operation is continued until the spring C is in contact with the segment A and segment *b*, at which time the lug H is in contact with the lever of the switch H and has elevated said lever, thus breaking the shunt or short circuit around the magnet F, exteriorly of the jack G. All parts will remain in this position, the lever E being depressed and the magnet F remaining energized until the current is cut from the field-magnets by the switch, and the magnet F thereby demagnetized, which will allow the lever E to be pulled upwardly moving the spring C into the position shown, which is its normal position.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of the rheostat comprising segments, and a spring brush pivoted by the middle concentrically thereof, an electro-magnet in circuit with the motor-field-coils, an armature thereto, and means for connecting said armature with the rheostat lever operatively, a shunt-circuit, including a switch adapted to close said shunt-circuit after the energizing of the magnet, and a switch adapted to open said circuit on the rheostat, being turned to full on, for the purpose specified.

2. The rheostat consisting of segments, a shaft mounted centrally thereof, a brush carried on said shaft, and adapted to traverse said segments, a ratchet-wheel mounted on said shaft, a lever, a pawl thereon adapted to engage said ratchet-wheel, an electro-magnet adapted to actuate said lever, and means for short-circuiting said magnet on the depression of the lever, consisting of a shunt-circuit, including vertically movable separated terminals, and a pin carried on the lever adapted to engage said terminals on the depression of the lever, for the purpose specified.

3. The rheostat, consisting of segments, a shaft mounted centrally thereof, a brush carried on said shaft, and adapted to traverse said segments, a ratchet-wheel mounted on said shaft, a lever, a pawl thereon adapted to engage said ratchet-wheel, an electro-magnet adapted to actuate said lever, and means for short-circuiting said magnet on the depression of the lever, consisting of a shunt-circuit including springs carried on a vertically movable block, set in guides, a motion-limiting stop, and a pin having its end enlarged carried on the said lever, in such a position as to be inserted between the springs on the depression of the lever, for the purpose specified.

4. The rheostat, consisting of segments, a shaft mounted centrally thereof, a brush carried on said shaft and adapted to traverse said segments, a ratchet-wheel mounted on said shaft, a lever, a pawl thereon adapted to engage said ratchet-wheel, an electro-magnet adapted to actuate said lever and means for short-circuiting said magnet on the depression of the lever, consisting of the shunt-circuit and spring-jack therein, and pin on the lever, a self-closing switch in said shunt-circuit and pins on the shaft of the rheostat adapted to trip same, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

RODOLPHUS W. HOLLIS.

Witnesses:

A. P. WOOD,

L. J. HENDERSON.