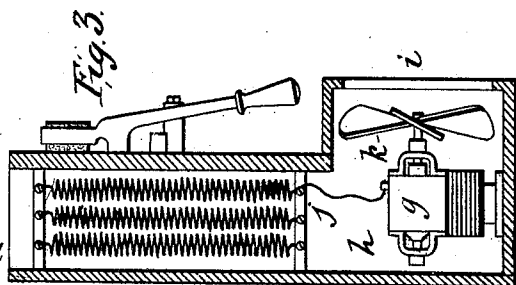
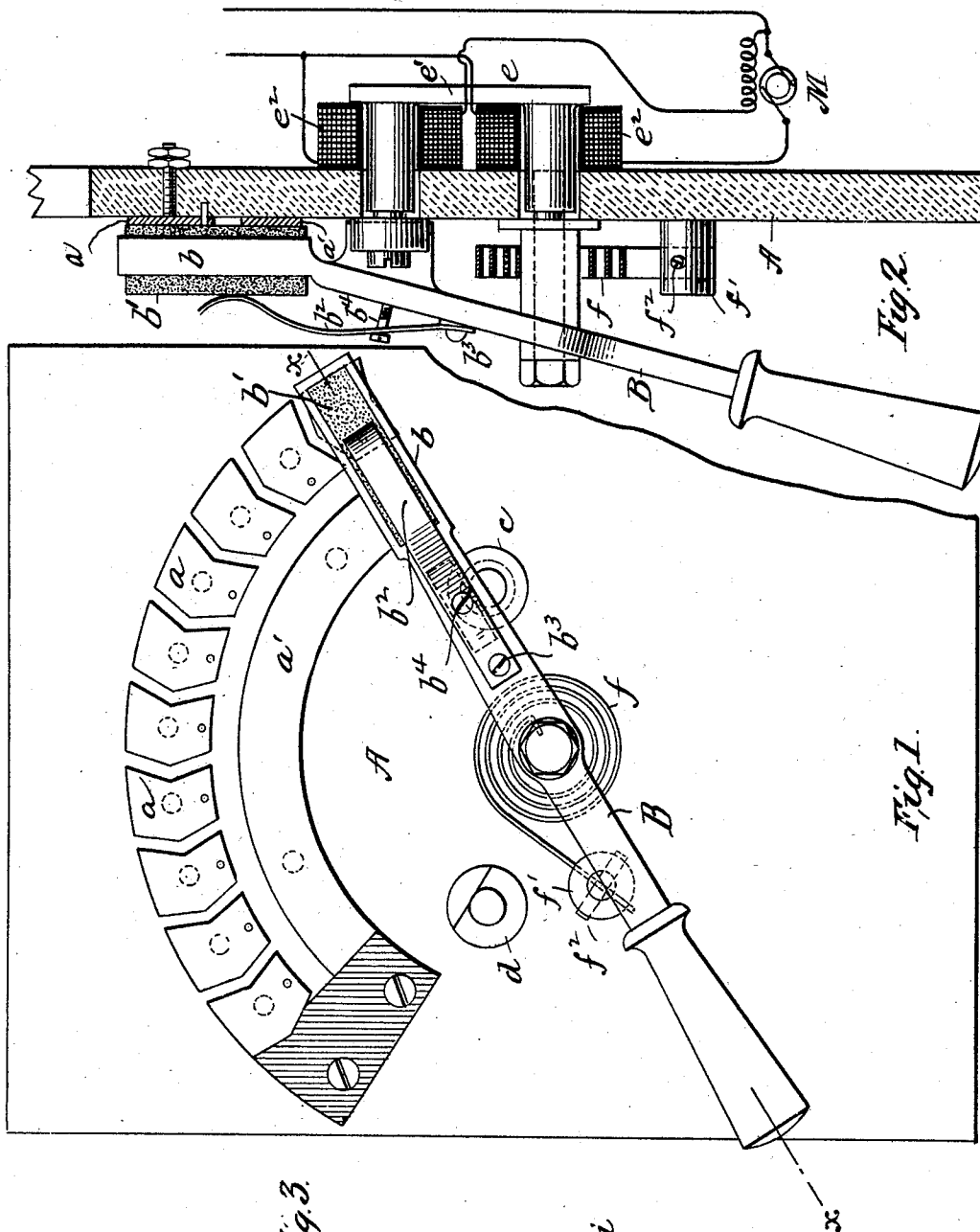


(No Model.)

T. J. FAY.
RHEOSTAT.

No. 556,408.

Patented Mar. 17, 1896.



WITNESSES:

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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 556,408, dated March 17, 1896.

Application filed December 19, 1895. Serial No. 572,649. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. FAY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rheostats, of which the following is a full, clear, and exact description.

This invention relates to rheostats intended for starting and regulating electric motors.

The object of the invention is, first, to provide an apparatus which will automatically protect the motor against burning out or serious injury due to overloading; second, to provide means for enabling a rheostat to carry more current than it would naturally carry; third, to cheapen and improve the details of construction of rheostats, while at the same time improving their operation.

The invention consists of constructions and combinations hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a face view of my improved rheostat. Fig. 2 is a section of the face-plate of the rheostat, taken on line xx of Fig. 1 and showing also certain circuits with which the rheostat is connected. Fig. 3 is a sectional view of the casing inclosing the rheostat and means for ventilating it.

A represents the face-plate of the rheostat. It is of insulating material—such as slate, as usual—and upon it are secured a series of metallic contact-pieces a , arranged in the arc of a circle and constituting the terminals of a series of resistance-coils of ordinary character, which are supposed to be located in a frame at the rear of the face-plate. Concentric with this row of contact-pieces is a continuous metallic strip a' . At the center of these arcs a handle B is pivoted. This handle carries at its forward end a rectangular frame b , in which is placed a block of carbon b' , adapted to connect the arc a^2 with the contact-pieces in the arc a . This block of carbon is loosely placed in the end of the handle, but the pressure with which it bears upon the contact-pieces is regulated by a spring b^2 , which is fixed at one end to the handle at the point b^3 , and its tension adjusted by the screw b^4 . The contact-pieces in the arc a are of peculiar shape, their adjacent edges or sides

being zigzagged—that is, one side forms a convex obtuse angle and the other a concave obtuse angle, the projection of one fitting into the cavity of the other. By this formation I am able to place the pieces comparatively far apart to prevent bridging by carbon dust or arcing and at the same time maintain a large surface of contact between the pieces and the block of carbon as the latter moves from one point to another, the contact with one being made before it is broken with the other.

At each end of the throw of the lever is placed a stop c and d . When the lever is against the stop c all resistance is cut out and when against the stop d the circuit is broken. The stop c and the post on which the lever turns constitute the poles of a horseshoe electromagnet e , connected together by the yoke e' . The coils of this magnet are shown at e^2 . The rheostat-lever is made of magnetic material, so that when the lever is against the stop c the magnetic circuit is completed and an attraction will exist between the stop and the lever.

Surrounding the post of the lever is a torsion-spring f , one end being fixed to the lever and the other passing through a slit in stud f' . The tension of this spring may be regulated by means of screws f^2 . The tendency of the spring is to keep the lever in contact with the stop d .

The motor which the rheostat controls is represented at M . It is a shunt-wound motor, the field-circuit of which includes one of the coils of magnet e , the other coil being in the armature-circuit of the motor and wound in opposition to the first coil. The magnetism induced by the coil in the field-circuit is in opposition to and stronger than the pull of spring f . When the motor is running with all the resistance out—that is, when the lever is against stop c —the lever is held in that position by the magnetic attraction.

In starting the motor the lever is gradually moved from its position against stop d to the stop c , where the motor normally would run at full speed; but if the motor should be overloaded, or for any reason did not run up to its full speed, the armature would then draw more current than it should and the excess would be felt in magnet e , and, acting in con-

junction with the spring *f*, would overcome the magnetism induced by the field-circuit and release the lever, allowing it to fly back to stop *d* under the action of the spring, thus saving the motor, the rheostat, and the fuses from possible injury.

My invention, broadly considered, involves a magnet energized by two circuits opposed to each other, and one carrying a current of constant strength and the other one of variable strength. As such, the invention is not limited to the shunt and armature circuits of a motor.

Ordinary starting-rheostats are usually designed to carry their heaviest currents but a short time, and if subjected to such currents for a considerable period will burn out. I propose to divide the total resistance of the rheostat into two parts, making the conductor of an electromotor one of the parts and utilizing the power of such motor to create a current of air for cooling the other part. This idea is carried out in the following manner: An ordinary fan-motor *g* is placed in a box *h*, having an open front *i* and communicating with the chamber containing the resistance-coils of the rheostat through a passage *j*. The motor carries a fan *k*, which draws air into the box and forces it through the rheostat. In this way the temperature of the wires is maintained at a low point constantly, and they will therefore carry heavier currents than they otherwise would.

This motor is in the armature-circuit with the regular rheostat and operates in conjunction therewith, and is controlled by the switch on the face of the rheostat. The current which it consumes is therefore put to use instead of being wasted, as in the coils of the other portion of the resistance.

Having fully described my invention, I claim—

1. In a rheostat or switch, the combination of a controlling-lever, an electromagnet the lever being pivoted to one of the poles of the magnet, a spring arranged to swing the lever on its pivot, the magnet being included in two circuits adapted to oppositely magnetize its core; substantially as described.

2. The combination with a shunt-wound electric motor of a rheostat therefor, a controlling-lever for the rheostat, an electromagnet, the lever being pivoted to one of the poles of the magnet, a spring arranged to swing the lever on its pivot, the magnet being

wound with two opposing coils located respectively in the field and armature circuits of the motor; substantially as and for the purpose set forth.

3. In a rheostat or switch, the combination of a controlling-lever, an electromagnet, the lever being pivoted to one of the poles of the magnet, a spring, whose tension may be adjusted, arranged to swing the lever on its pivot, the magnet being included in two circuits adapted to oppositely magnetize its core; substantially as described.

4. In a rheostat or switch, the combination of a controlling-lever, an electromagnet the lever being pivoted to one of the poles of the magnet, a spring, arranged to swing the lever on its pivot, the magnet being included in two circuits adapted to oppositely magnetize its core, one of said circuits carrying a constant current and the other a variable current; substantially as described.

5. In a rheostat or switch, the combination of a controlling-lever, an electromagnet, the lever being pivoted to one of the poles of the magnet, the magnet being included in two circuits adapted to oppositely magnetize its core, one of said circuits carrying a constant current and the other a variable current; substantially as described.

6. The combination of a rheostat, a box or chamber connected therewith, an electric fan located in said box or chamber and suitable openings into the box and from the box into the rheostat, whereby a blast of air may be sent through the rheostat; substantially as described.

7. The combination of an ordinary rheostat and an electromotor, the conductors of the motor forming a part of the resistance medium of the rheostat; substantially as described.

8. The combination of an ordinary rheostat and an electromotor, the conductors of the motor forming a part of the resistance medium of the rheostat and means whereby the motor may be used to ventilate the other portion of the resistance medium; substantially as described.

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

THOMAS J. FAY.

Witnesses:

WM. A. ROSENBAUM,
FRANK S. OBER.