No. 822,312. PATENTED JUNE 5, 1906.

G. E. STEVENS.

RHEOSTAT.

APPLICATION FILED OCT. 12, 1904.

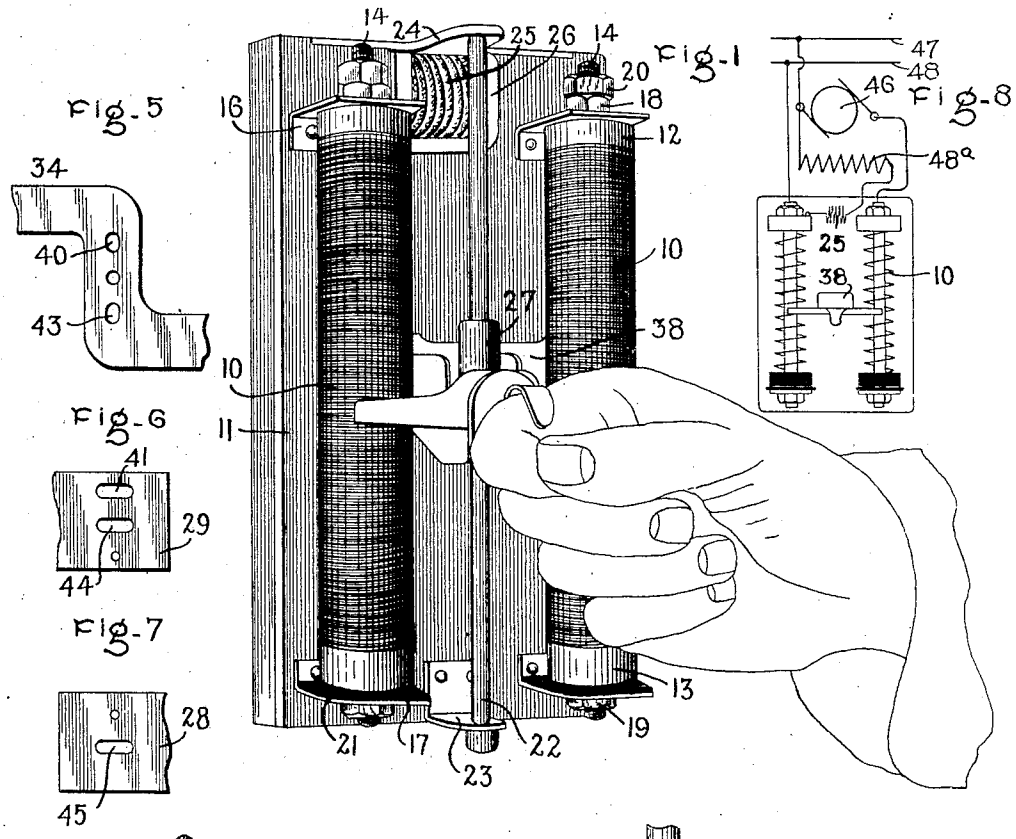


Fig. 1

Fig. 8

Fig. 5

Fig. 6

Fig. 7

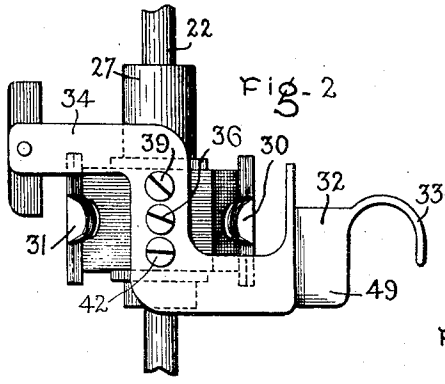


Fig. 2

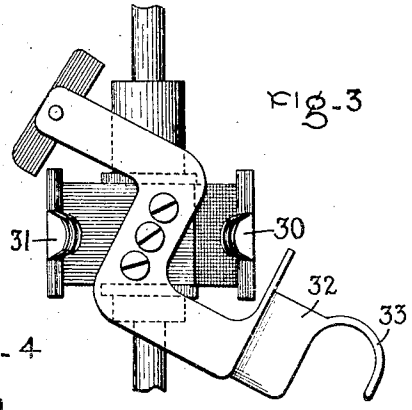


Fig. 3

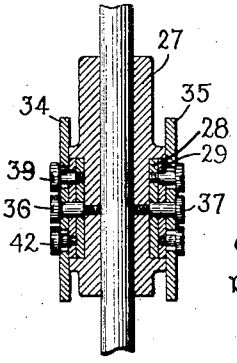


Fig. 4

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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

No. 822,312. Specification of Letters Patent. Patented June 5, 1906.

Application filed October 12, 1904. Serial No. 228,134.

To all whom it may concern:

Be it known that I, GEORGE E. STEVENS, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

The present invention relates to rheostats; and the principal object of the invention is to provide a rheostat which is of large capacity relative to its bulk, simple and substantial in structure, efficient in operation, and cheap to manufacture; and it consists in a novel organization and arrangement of parts, together with certain structural features, all of which will be best understood upon reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of a rheostat constructed in accordance with my invention. Fig. 2 is a side elevation of the movable contact member, showing the parts in contact-engaging position. Fig. 3 is a similar view showing parts in non-engaging position. Fig. 4 is a sectional view of the same, taken on a plane indicated by the line 4 4 of Fig. 2. Figs. 5, 6, and 7 are detail views of the operating-lever and the coöperating contact-carrying plates, and Fig. 8 is a diagram of the electrical connections.

In carrying out the present invention, although other forms of resistance may be employed, I preferably employ a unit of the type disclosed in my prior application, Serial No. 193,713, filed February 15, 1904. This resistance unit is made up of an edgewise-wound helical conductor-ribbon whose turns are insulated from each other and forced together to form a rigid structure. The insulation employed may be of any desired kind; but, preferably, I employ an insulating material which is cementitious in character and which, therefore, serves not only to insulate the turns, but to bind them together, and thereby increase the rigidity of the structure. In the present drawings two such resistance units (designated 10) are mounted side by side upon a suitable supporting-base 11, of wood or other insulating material. The helical windings abut at their upper ends against cylindrical contact-pieces 12, composed of copper or like conducting material, and at their lower ends against similar contacts 13, and their turns are forced together and the various parts held in place by bolts 14, which extend through the members 12 and 13 and the interior of the unit. These bolts also pass through the supporting-lugs 16 and 17, which are secured to the base 11. The desired compression of the parts is obtained by means of nuts 18 and 19, which are screwed upon the opposite ends of the bolts against the adjacent supporting-lugs. The upper ends of the bolts 14 serve as terminals for the windings of the resistance units 10, and the nuts 20 serve to bind the connecting-leads in position.

As clearly illustrated in Fig. 8, the bolts 14 are in electrical connection with the resistance-windings at their upper ends, but are insulated therefrom at their lower ends. These bolts are insulated from the contacts 13 by a suitable insulation 21. The movable element of the rheostat is mounted on a longitudinally-extending guide-rod 22, located between the resistance units 10 and secured to the base at its opposite ends by suitable lugs 23 24. A retaining-magnet 25, having its polar faces 26 extending slightly above the surface of the base 11, is located adjacent the upper end of the guide-rod.

The movable member comprises a tubular support 27, which rides along the rod 22. The support 27 is channeled at its opposite sides, as clearly illustrated in Fig. 4, and in these channels are located the oppositely-extending and laterally-movable plates 28 and 29. These plates carry at their outer ends the contacts 30 and 31, which are bent at their opposite ends to conform to the curvature of the exterior surface of the unit 10, with which they are adapted to engage. These contacts are composed of a bundle of laminations, of suitable conducting material, and by reason of their location engage the opposite sides of each of the resistance units which are left exposed and may even be cut away so as to insure good electrical contact.

An operating-lever 32, provided with a handhold 33 and bifurcated Z-shaped arms 34 35, is pivotally secured to the support 27 by the screws 36 37. An armature 38, adapted to engage the polar face 26 of the retaining-magnet 25, connects the inner-ends of the arms 34 35 of the operating-lever. The connections between the operating-lever and the contact-supporting plates 28 29 are such that

when the operating-lever is rocked from the position shown in Fig. 3 to that shown in Fig. 2 the contacts 30 and 31 are drawn toward each other into frictional engagement with the opposite sides of the resistance units 10. These connections are established by means of screws and slots arranged as follows: Screws 39 extend through the slots 40 in the arms 34 and 35 and through the slots 41 in the arms 29 into threaded engagement with the innermost plates 28, as clearly illustrated, and screws 42 extend through slots 43 in the arms 34 and 35 into threaded engagement with the plates 29. The plates 28 and 29 are also provided with longitudinal slots 44 and 45, through which the pivot-screws 36 and 37 extend. With this organization, as previously indicated, the partial rotation of the operating-lever 32 forcibly draws the contacts 30 and 31 toward each other into engagement with the fixed element of the rheostat.

In Fig. 8 I have shown the rheostat connected up with an electric motor. As there indicated the motor-armature 46 is connected directly between one of the leads 47 of the supply-circuit and one of the terminals of the rheostat, and the other terminal of the rheostat is directly connected to the other lead 48 of the supply-circuit. The coil of the retaining-magnet 25 and the motor field-winding 48^a is connected in series in a branch between the latter terminal and the line side of the armature. In the operation of the device the movable member normally occupies a position at the lower end of the resistance units 10, and the position of its parts is that illustrated in Fig. 3. In this position the contacts 30 and 31 are not in engagement with the resistance units, but rest upon the insulation 21, which separates the units from their supporting-lugs. When it is desired to start the motor and cut out the resistance of the rheostat, the operating-lever 32 is drawn upward into the position illustrated in Fig. 2, and the contacts 30 and 31 are thereby forced into firm engagement with the terminal contact members 13. The circuit is then completed between the terminals of the rheostat through both resistance-windings and the contacts 30 and 31, which bridge the space between the contact members 13. By drawing upward upon the lever 32 the contacts 30 and 31 slide over the surface of the resistance units and successively cut out the turns of the winding, and thereby reduce the amount of resistance in circuit. Finally, when the uppermost position is reached the space between the contact members 12 will be bridged by the movable contacts and all the resistance will be cut out of circuit. In this position the armature 38 engages the polar faces 26 of the retaining-magnet, and the magnet being energized holds the parts in this position, even though the operator remove his hand from the operating-lever. In case of a failure of current in the line or the occurrence of other conditions which will sufficiently de-energize the retaining-magnet the weighted portion 49 of the lever 32 will be sufficient to rock the parts into the position shown in Fig. 3, thus withdrawing the contacts 30 and 31 from their frictional engagement and allowing the movable contact to fall under the action of gravity to its normal position.

It will be obvious to those skilled in the art that many alterations and modifications may be made in the structure which I have herein disclosed without departing from the spirit and scope of my invention. I therefore do not wish to be limited to the specific matter disclosed, but aim to cover by the terms of the appended claims all such alterations and modifications.

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

1. A rheostat comprising two oppositely-disposed resistance units each consisting of a helical insulated conductor having its turns continuously forced together to form a rigid structure, an intermediate guide-rod, a cooperating sliding contact carried thereby, and electrically-controlled means for maintaining said contact in a predetermined position.

2. A rheostat comprising two oppositely-disposed resistance units each consisting of a helical insulated conductor having its turns continuously forced together to form a rigid structure, an intermediate guide-rod, and a coöperating sliding contact carried thereby.

3. A rheostat comprising two vertically-disposed elongated resistance units each having an exposed contact-surface extending throughout its length, an intermediate guide-rod, a coöperating sliding contact carried thereby, a retaining-magnet located at the upper end of said rod, and a coöperating armature carried by said contact.

4. A rheostat comprising two vertically-disposed resistance units each consisting of a helical insulated conductor having its turns continuously forced together to form a rigid structure, an intermediate guide-rod, a cooperating sliding contact carried thereby, a retaining-magnet located at the upper end of said rod, and a coöperating armature carried by said contact.

5. A rheostat comprising an elongated resistance unit having an exposed contact-surface extending throughout its length, a cooperating contact movable lengthwise of said unit and laterally into engagement with said surface, and means for giving said contact a lateral movement and then a longitudinal movement in response to a pull in one direction.

6. A rheostat comprising a resistance unit consisting of a helical resistance-conductor having its turns continuously forced together

to form a rigid structure, a coöperating contact movable laterally toward and from said unit and longitudinally over its surface, and means for giving said contact a lateral movement and than a longitudinal movement in response to a pull in one direction.

7. In a rheostat, a movable contact member comprising a longitudinally-movable support, a contact mounted to slide laterally on said support, and means for giving said contact a lateral movement in response to a pull in a longitudinal direction.

8. In a rheostat, a movable contact member comprising a longitudinally-movable support, a contact mounted to slide laterally on said support, and a lever pivoted to said support and connected to said contact so as to give it a lateral movement in response to a longitudinal pull.

9. In a rheostat, a movable contact member comprising a longitudinally-movable support, oppositely-extending plates mounted to slide laterally on said support, contacts carried at the outer ends of said plates, an operating-lever pivoted to said support, and pin-and-slot connections between said lever and said plates whereby the movement of said lever will produce a lateral movement of said plates and contacts.

10. A rheostat comprising two vertically-disposed resistance units each having exposed contact-surfaces extending throughout its length, an intermediate guide-rod, a contact-support movable thereon, contacts mounted to slide laterally on said support into engagement with said contact-surfaces, and a weighted lever pivoted to said support and connected to said contacts so as to move them laterally when rocked and normally holding said contacts in non-engaging position.

11. A rheostat comprising two vertically-disposed resistance units each having exposed contact-surfaces extending throughout its length, an intermediate guide-rod, a contact-support movable thereon, contacts mounted to slide laterally on said support into engagement with said contact-surfaces, a weighted lever pivoted to said support and connected to said contacts so as to move them laterally when rocked and normally holding said contacts in non-engaging position, an armature connected to the light end of said lever, and a coöperating retaining-magnet at the upper end of said guide-rod.

12. In a rheostat, a movable contact-carrying member comprising a member movable into and out of frictional engagement with a fixed surface, means for throwing said member into engagement with said surface and moving it over the same, and means for retaining the parts in frictional engagement at the end of their movement so as to lock them against return.

13. In a rheostat, a movable contact-carrying member comprising a member movable into and out of frictional engagement with a fixed surface, means for throwing said member into engagement with said surface and moving it over the same, and electromagnetic means for retaining the parts in frictional engagement at the end of their movement so as to lock them against return.

14. A rheostat comprising an elongated resistance unit having an exposed contact-surface extending throughout its length, a movable contact-carrying member, a contact thereon movable into and out of frictional engagement with said surface, means for throwing said contact into engagement with said surface and moving it over the same, and means for retaining the parts in frictional engagement so as to lock them against return.

15. A rheostat comprising an elongated resistance unit having an exposed contact-surface extending throughout its length, a movable contact-carrying member, a contact thereon movable into and out of frictional engagement with said surface, means for throwing said contact into engagement with said surface and moving it over the same, and electromagnetic means for retaining the parts in frictional engagement so as to lock them against return.

In witness whereof I have hereunto set my hand this 10th day of October, 1904.

GEORGE E. STEVENS.

Witnesses:
JOHN A. McMANUS, Jr.,
DUGALD McK. McKILLOP.