No. 803,453. PATENTED OCT. 31, 1905.

G. E. STEVENS.

RHEOSTAT.

APPLICATION FILED OCT. 12, 1904.

Fig-1-

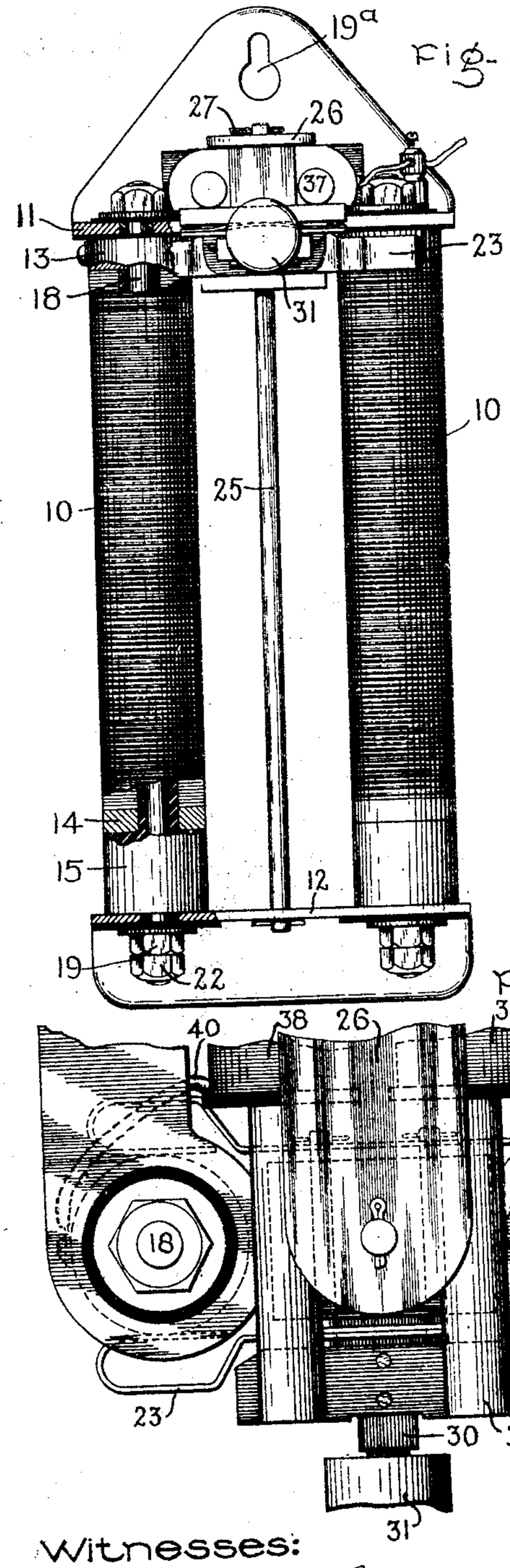


Fig-2-

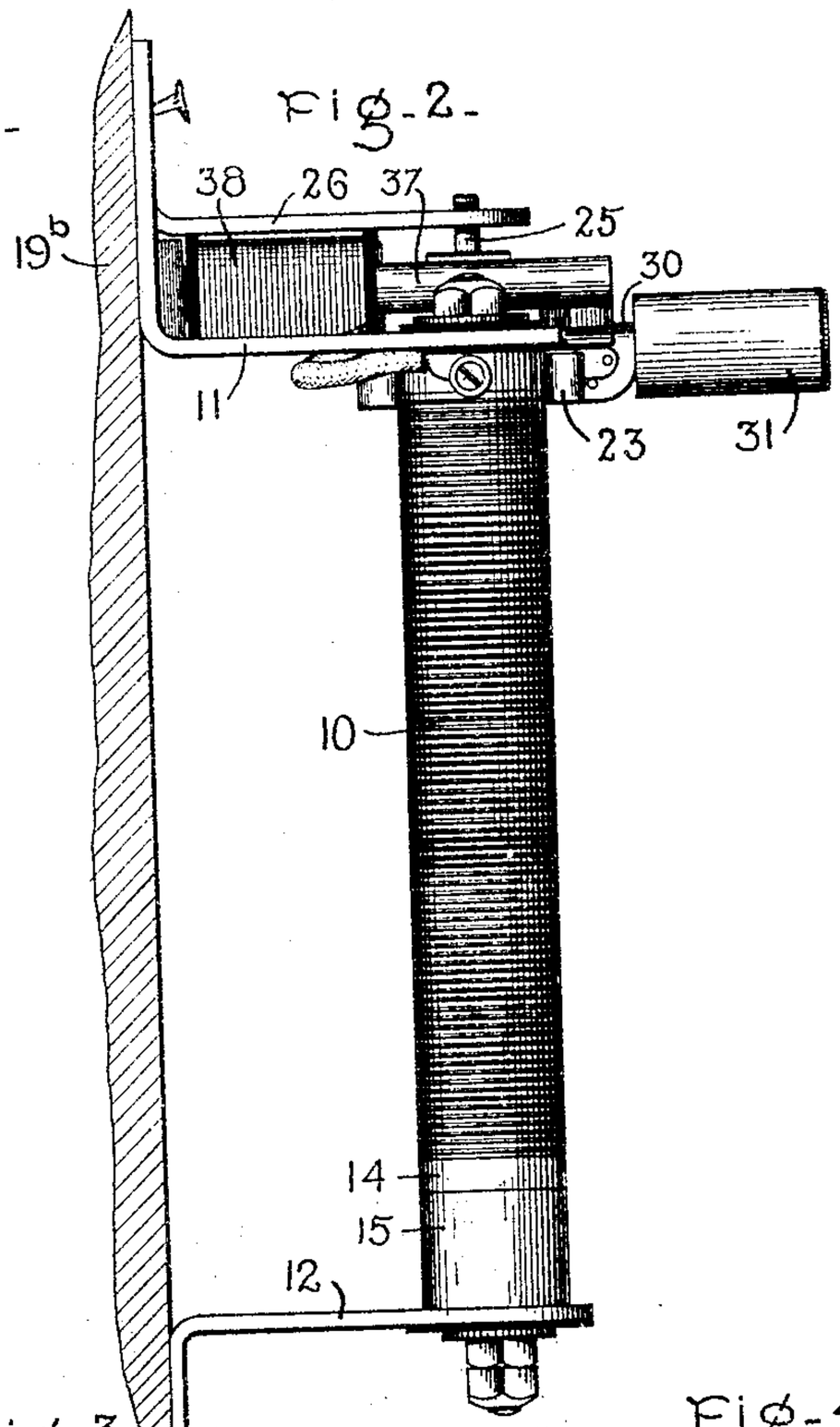


Fig-3-

Fig-4-

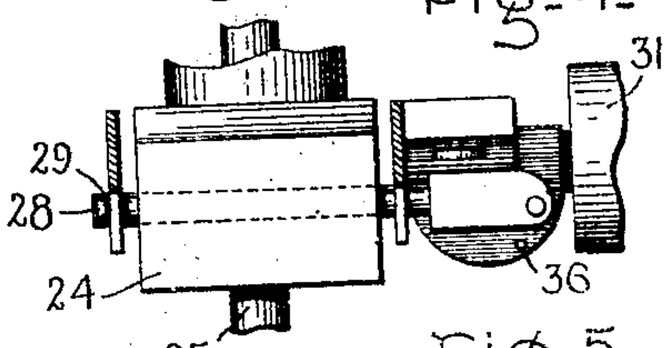


Fig-5-

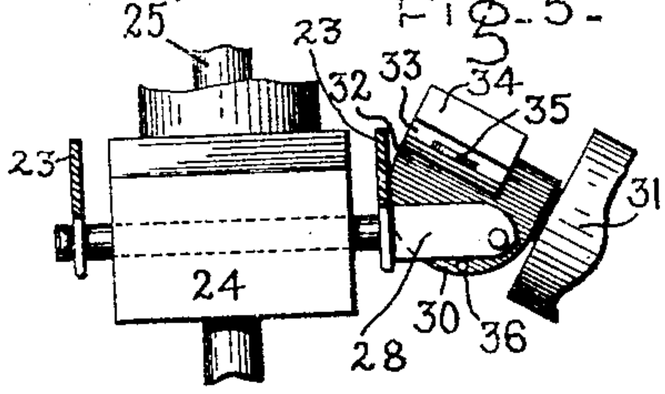
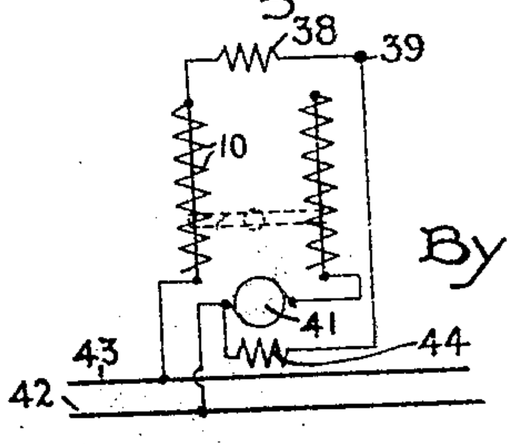


Fig-6-



Witnesses:

Ethnathan E. Briggs

Allen Alford

Inventor;
George E. Stevens
By Albert S. Davis
Atty.

UNITED STATES PATENT OFFICE.

GEORGE E. STEVENS, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

RHEOSTAT.

No. 803,453. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed October 12, 1904. Serial No. 228,135.

To all whom it may concern:

Be it known that I, GEORGE E. STEVENS, a citizen of the United States, residing at Lynn, in the county of Essex and 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 to this end it comprises a certain novel organization of parts and features of construction which will be best understood upon reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a rheostat constructed in accordance with the invention. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view of a portion of the same. Figs. 4 and 5 are side elevations of a portion of the movable element of the rheostat, showing the parts in different operative positions; and Fig. 6 is a diagram of electrical connections.

In carrying out my invention, although resistance units of other types may be employed, I preferably employ a unit of the type disclosed in my prior application, Serial No. 193,713, filed February 15, 1904. A unit of this type is composed of one or more edgewise-wound helical resistance-ribbons having their turns insulated from each other and forced together to form a rigid structure. The insulation used may be of any desired kind, but is preferably cementitious in character, thereby serving not only to insulate the turns, but to bind them together, so as to further strengthen the structure.

In the drawings, 10 designates two such units, which are arranged side by side and held between suitable supporting-plates 11 and 12. The winding of each unit is in electrical engagement at its upper end with a contact-block 13, composed of copper or other conductive material, and at its lower end with a similar block 14. Beneath the block 14 is a block 15 of soapstone or other insulating material. The parts of each unit are held together in a rigid connection with the supporting-plates 11 and 12 by means of a central bolt 18, which extends through the interior of the winding and through suitable apertures in the blocks 13, 14, and 15 and the supporting-plates 11 and 12. These bolts are threaded at their opposite ends for the reception of clamping-nuts 19, and, as clearly illustrated in Fig. 1, they are in electrical engagement with the contact-blocks 13 only and are completely insulated from the interior of the winding, the blocks 14 and 15, and the supporting-plates 11 and 12. The lower ends of the bolts 18 serve as terminals of the rheostat and are provided with additional nuts 22, by which the lead may be held in place. Holding the parts together in this way produces a mechanically-rigid structure which is at the same time light, and by turning the plates 11 and 12 outward suitable feet are provided upon which the rheostat may rest. By means of a keyhole-slot 19^a in the plate 11 the rheostat may be hung in any suitable support 19^b, as clearly illustrated in Fig. 2.

The movable element of the rheostat comprises two oppositely-extending bridging contacts 23, which have their outer ends bent back upon themselves, as clearly illustrated in Fig. 3, so as to still further increase their resiliency. These bent-back portions are adapted to engage the opposite sides of the resistance units 10 and to be moved along the same to progressively engage the turns of the winding and cut out the resistance in circuit. The conductors are left exposed throughout the length of the units at the points where they are engaged by the contacts 23, and may even be cut away so as to present a smooth contact-surface. To permit this longitudinal movement, the contacts 23 are secured to an apertured support 24, threaded upon a guide-rod 25, located between the units 10 and extending parallel thereto. This guide-rod is supported at its opposite ends by the supporting member 12 and a lug 26, stuck up from the upper supporting member 11, and the rod is held from displacement by the cotter-pins 27. The connection between the contacts 23 and the supporting-block 24 is obtained by two laterally-extending pins 28, which pass through suitable apertures in the contacts and permit of a lateral movement of the contacts. The displacement of the rear contact 23 is prevented by the cotter-pins 29, and the forward ends of the pins 28 extend on opposite sides of and pivotally support the cam member 30, to which is attached a weighted handle 31. This cam member is adapted to

engage the forward contact 23 when the handle 31 is drawn upward and to force said contact rearward, thereby increasing the friction between engaging portions of the contact 23 and the resistance units 10.

The different operative positions of the parts are clearly shown in Figs. 4 and 5. The upper portion of the cam is provided with a horizontal member 32, which supports a leaf-spring 33, which is bulged upward at its center, as clearly shown in Fig. 1, against the under side of an armature 34, to which it is secured at its central point, the ends of the spring being secured to the supporting member 32. Suitable stops 35 passing through slots in the outer ends of the spring 33 limit the downward movement of the armature 34 with reference to the supporting member 32. The under side of the supporting member 32 also limits the upward movement of the handle 31 by engaging with the upper surface of the outer ends of the pins 28, and when so engaging leaves the armature 34 horizontal. The movement of the handle 31 in the downward direction is limited by a suitable stop-pin 36, projecting laterally from the cam member and engaging the under side of the forward end of one of the pins 28. A retaining-magnet is also provided at the upper end of the guide-rod 25. This magnet comprises a horseshoe-core 37 and energizing-coils 38. It is housed between the adjacent projecting portions of the supporting member 12 and is firmly secured thereto. The outer ends of the core 37 extend outwardly over the upper ends of the resistance units 10 far enough to be engaged on their under side by the upper face of the armature 34. As clearly shown in Figs. 3 and 6, the coils 38 are connected in series between one of the contact-blocks 13 and a binding-post 39, said connections being made by the lead 40. The binding-post 39 is located at any convenient point—as, for example, on the supporting-plate 11.

In Fig. 6 I have shown a rheostat of the type described connected to an electric motor. As there shown, the motor-armature 41 is connected directly between one of the lower terminals of the rheostat and the lead 42 of a suitable supply-circuit. The other lower terminal of the rheostat is connected directly to the other lead 43 of the supply-circuit. The field-winding 44 of the motor is connected between the lead 42 and the binding-post 39, as previously indicated, and the coil 38 of the retaining-magnet is connected between said binding-post and the left-hand contact-block 13.

In the operation of the above device the movable member is normally at the lower end of the resistance unit 10, with its contacts 23 in engagement with the dead contact-blocks 15. When it is desired to operate the rheostat to cut out resistance, the handle 31 is drawn upward. This has the effect of first forcing the cam member forward against the forward contact 23, so as to increase the frictional engagement between the contacts 23 and the exterior of the resistance unit and then carry the same over the exterior surface of said units to progressively cut out the turns of the windings. Finally, when the position shown in Fig. 2 is reached the armature 34 is brought against the ends of the core 37 of the retaining-magnet, and the latter being energized will then hold the parts in the position illustrated, thereby leaving the rheostat with all the resistance cut out. In case of a failure of current in the line or upon the occurrence of other causes which will sufficiently deënergize the retaining-magnet the weighted handle 31 will drop and cause the cam member 30 to assume the position illustrated in Fig. 5, and thereby reduce the frictional engagement between the movable contacts 23 and the coöperating surfaces of the resistance unit and allow the parts to return to normal position under the action of gravity.

It will be apparent to those skilled in the art that many alterations and modifications may be made in the structure which I have disclosed herein without departing from the spirit and scope of my invention. I therefore do not wish to be limited to the specific matter illustrated, 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 an elongated resistance unit having exposed contact-surfaces extending throughout its length, a coöperating contact spring-pressed into engagement with said surface, and means for increasing the pressure of said contact and moving it longitudinally in response to a pull in one direction.

2. 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 spring-pressed into engagement therewith, and means for increasing the pressure of said contact and moving it longitudinally in response to a pull in one direction.

3. In a rheostat, a movable contact member comprising a longitudinally-movable support, a contact mounted to move laterally on said support, and a cam member operative to give said contact a lateral movement in response to a pull in a longitudinal direction.

4. In a rheostat, a movable contact member comprising a longitudinally-movable support, a contact mounted to move laterally on said support, a cam for engaging said member to move it laterally, and a weighted member connected with said cam to normally hold it in its non-active position.

5. In a rheostat, a movable contact member comprising a longitudinally-movable support,

oppositely-extending spring-contacts mounted to move transversely thereon, a cam pivoted to said support and operative to move the adjacent portions of said contacts toward each other, a weighted handle connected to said cam to normally hold it in non-active position, and stops for limiting the movement of the cam.

6. A rheostat comprising two vertically-disposed resistance units having exposed contact-surfaces extending throughout their lengths, an intermediate guide-rod, a contact-support movable thereon, contacts mounted to move laterally on said support and to engage said contact-surfaces, a cam for moving said contacts laterally to increase their pressure on said surfaces, and a weighted handle connected to said cam to normally hold it in non-active position.

7. A rheostat comprising two vertically-disposed resistance units having exposed contact-surfaces extending throughout their lengths, an intermediate guide-rod, a contact-support movable thereon, contacts mounted to move laterally on said support and to engage said contact-surfaces, a cam for moving said contacts laterally to increase their pressure on said surfaces, a weighted handle connected to said cam to normally hold it in non-active position, an armature connected to the upper side of the cam, and a coöperating retaining-magnet at the upper end of said guide-rod.

8. In a rheostat, a movable contact-carrying member comprising a spring-pressed member in frictional engagement with a fixed surface, means for increasing the friction between said member and surface and moving the former over the latter, and means for maintaining the increased frictional engagement between the parts at the end of their movement so as to lock them against return.

9. In a rheostat, a movable contact-carrying member comprising a spring-pressed member in frictional engagement with a fixed surface, means for increasing the friction between said member and surface and moving the former over the latter, and electromagnetic means for maintaining the increased frictional engagement between the parts at the end of their movement so as to lock them against return.

10. A rheostat comprising an elongated resistance unit having an exposed contact-surface extending throughout its length, a contact-carrying member movable longitudinally thereof, a contact thereon spring-pressed into frictional engagement with said surface, means for increasing the friction between said contact and surface and moving the former over the latter, and means for maintaining the increased frictional engagement between the parts so as to lock them against return.

11. A rheostat comprising an elongated resistance unit having an exposed contact-surface extending throughout its length, a contact-carrying member movable longitudinally thereof, a contact thereon spring-pressed into frictional engagement with said surface, means for increasing the friction between said contact and surface and moving the former over the latter, and electromagnetic means for maintaining the increased frictional engagement between the parts so as to lock them against return.

12. A rheostat comprising one or more resistance units and transversely-extending plates rigidly secured to the opposite ends thereof, a guide-rod supported by said plates, and a contact member movable longitudinally of said rod to vary said resistance, said plates being provided with outwardly-turned portions constituting feet upon which the rheostat is adapted to rest.

13. A rheostat comprising one or more resistance units, transversely-extending plates rigidly secured to the opposite ends of said units and provided with outwardly-turned portions constituting feet, and an opening through one of said feet by which the rheostat may be hung up.

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.