No. 812,700. PATENTED FEB. 13, 1906.

G. E. STEVENS.

RHEOSTAT.

APPLICATION FILED OCT. 12, 1904.

Fig. 1.

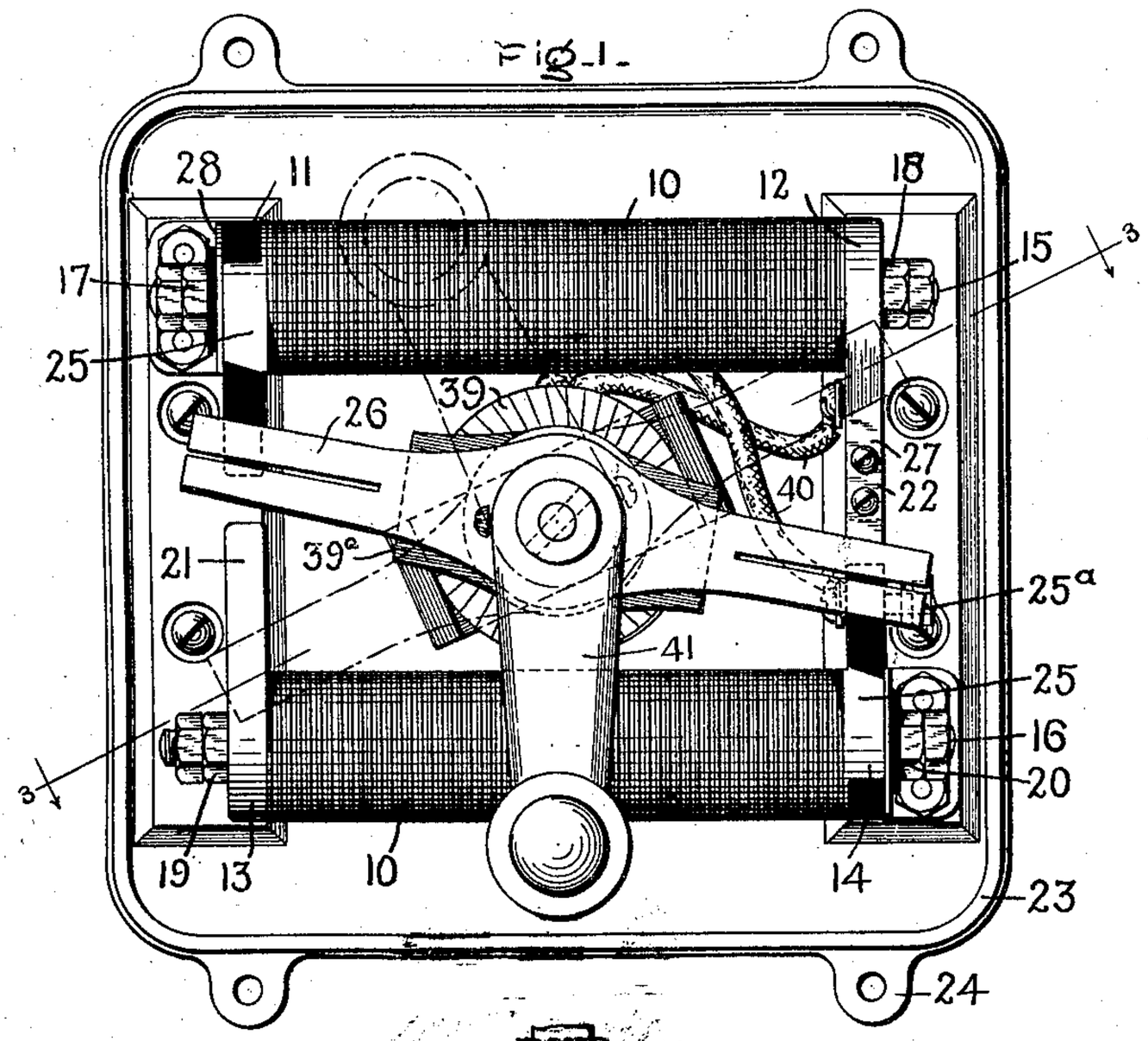

Fig. 4.

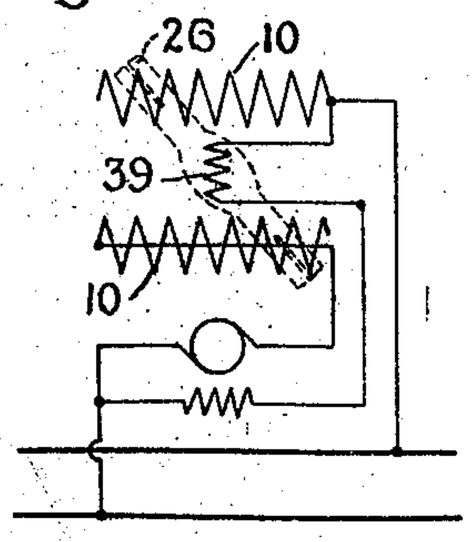

Fig. 3.

Witnesses:

Emily R. Lowry

Helen Alford

Inventor,

George E. Stevens,

By Albert G. Davis

Atty.

UNITED STATES PATENT OFFICE.

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

RHEOSTAT.

No. 812,700. Specification of Letters Patent. Patented Feb. 13, 1906.

Application filed October 12, 1904. Serial No. 228,133.

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 compact in structure, efficient in operation, and cheap to manufacture.

The nature and character of the invention, together with its various features and advantages, will be best understood upon reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a plan view of a rheostat constructed in accordance with my invention. Fig. 2 is a side elevation of the same, parts being broken away to illustrate the lower portion of the rotary member. Fig. 3 is a vertical section taken on a plane indicated by the line 3 3 of Fig. 1 and viewed in the direction of the arrows, and Fig. 4 is a diagram of electric circuits.

In carrying out my invention, although other forms of resistances may be employed, I preferably employ a resistance unit constructed in accordance with the disclosure in my prior application, Serial No. 193,713, filed February 15, 1904. Such a unit consists of one or more helices of resistance-ribbon wound on edge, with turns insulated from each other and forced together by a central bolt and clamping-nuts to form a rigid structure. The insulating material preferably consists of a fireproof refractory substance cementitious in character, which not only insulates the turns, but serves to bind them together.

In the drawings, 10 10 designate two units of this character, which are included between supporting-blocks 11 and 12, 13 and 14 and in which the clamping-bolts 15 and 16 extend through the interior of the winding and through suitable openings in said blocks. The clamping-nuts, (designated 17, 18, 19, and 20,) screwed onto the outer ends of the bolts, press against the blocks 11, 12, 13, and 14 and force the turns of the winding together and hold the parts in position. These blocks, which project below the lower surfaces of the units 10, are secured to the strips 21 and 22, securely held within an iron base 23, provided with apertured lugs 24, by which the whole may be attached to any suitable support.

The blocks 12 and 13, which are diametrically opposed, are composed of copper or other good conducting material and are in electrical contact with the ends of the adjacent ribbon winding and with their respective bolts 15 and 16 and are insulated from the supporting-strips 21 by a suitable insulation 13ª. The other two blocks (designated 11 and 14) are composed of some suitable insulating material, such as soapstone, and each has set into its upper face a strip of copper or other conducting material, which is bent down between the adjacent ends of the winding and the block, thus providing a contact for the outer end of the bridging contact 26. The contact-strips 25 do not completely cover the upper faces of the blocks 11 and 14; but in each case an insulating-face is left exposed, and upon these the outer ends of the bridging contact 26 are adapted to rest when the rheostat is in "off" position. The upper surfaces of the blocks 12 and 13 are also located so as to be engaged by the contact 26 The insulating-block 14 is also provided with a binding-post 25ª, and the adjacent blocks 12 and 14 are connected by a strip 27, which constitutes a stop for the rotary contact 26.

From the above it will be seen that each of the central bolts 15 and 16 is in electrical circuit with one end of the resistance-coil through which it passes. Consequently the rheostat may be connected up by clamping the leads between the nuts 17 or 18 on the one end and between the nuts 19 and 20 on the other. I furthermore provide an additional terminal for each of the insulating-blocks 11 and 14 by means of an angle-plate 28. This plate is in electrical engagement with the central bolt in each instance and is firmly secured to and insulated from the adjacent supporting-strip 21. Suitable clamping-nuts 29 serve to hold the leads in place.

The rotary contact 26 of the rheostat consists of a strip of springy conducting material with its ends split, so as to provide good electrical contact with the end blocks 12 and 13, the contact-strips 25, and the upper surface of the resistance units 10, with which it is adapt-

ed to engage. The engaging portions of the units are not covered by an insulating-coating, but are left exposed and may even be smoothed off, so as to further improve the electrical contact. The center of the contact 26 is apertured so as to fit over the neck 30 of a hollow member 31, rotatably mounted upon the pivot-post 32, located midway between the resistance unit 10 and extending transversely thereto. The pivot-post is secured to the base 23 through the agency of a magnet-core 33, which is secured to the base by screws 34 and to a projecting hub on the post by screws 35. A collar 36, retained in position by a set-screw 37, presses down upon the upper side of the contact 26, so as to hold it in position, and a helical spring 38, coiled about the pivot-post 32 and secured at one end thereto and at the opposite end to the member 31, serves to return the contact to off position. The magnet-core 33 is provided with an energizing-coil 39, which is connected by means of suitable terminals 40 between the conductor-blocks 12 and 14. This magnet is a retaining or locking magnet and is designed to hold the contact 26 in its "on" position—that is, in that position in which all the resistance of the rheostat is cut out—and prevent it from returning to the off position under the action of the returning-spring 38. This action is brought about through the agency of the armature 39ª, which is secured to the lower end of the rotary member 31, which carries the contact 26. Normally the resiliency of the contact 26, bearing at its ends upon the fixed element of the rheostat, is sufficient to hold the armature 39ª far enough away from the magnet to prevent it from being drawn into engagement therewith. Movement is transmitted to the contact 26 in opposition to the returning-spring 38 by means of an operating-lever 41. This lever has a limited vertical movement between a thrust-bearing 42 at the upper end of the post 32 and a shoulder 43 on said post. The lever also transmits its motion to the rotary member 31 and thence to the contact 26 by means of a cam projection 44 on the member 31, which engages a notch 45 in the adjacent portion of the handle. In the operation of the device the contact 26, which serves as a spring, forces the parts 31 and 41 into engagement with such pressure that the rotation of the lever 41 is transmitted to the member 31 without the shoulder 46 on the lever riding up over the inclined surface 47 of the cam projection on the member 31. In this way the movement of the operating-lever is transmitted to the contact 26, and it is carried around over the resistance-winding so as to successively cut out its turns, while the armature remains in the raised position. (Illustrated in Fig. 2.) However, when the contact 26 has been moved far enough to cut out all the resistance of the rheostat the contact will be brought up against the stop 27 and its further rotation prevented. A further movement of the operating-lever 41 will cause the shoulder 46 to ride up on the inclined surface 47, and thereby force the member 31 and the armature 39 downward against the face of the locking-magnet. In this position the pull of the magnet will be sufficient to hold the parts against return. In case of failure of current or the occurrence of other conditions which will sufficiently deënergize the magnet the armature will be released, and after being drawn upward by the spring action of the contact 26 the movable parts will be returned to their off position by the return-spring 31.

It is obvious that resistance units of other constructions than that herein described may be used and that many alterations and modifications in the specific matter illustrated may be made without departing from the spirit and scope of my invention. I therefore do not wish to be limited to the specific structure shown and described, 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 a fixed resistance element, a coöperating movable contact, a spring for returning the parts to off position, a fixed locking member, a yieldingly-mounted coöperating locking member carried by the movable contact and movable transversely thereto, and means for mechanically moving said locking members into engagement.

2. A rheostat comprising a fixed resistance element, a coöperating movable contact, a spring for returning the parts to off position, a fixed locking-magnet, an armature therefor carried by the movable contact and movable transversely to the said contact, and means for moving said armature transversely into operative relation to said magnet.

3. A rheostat comprising a fixed resistance element, a coöperating movable contact, a spring for returning the parts to off position, a fixed locking-magnet, a yieldingly-mounted armature therefor carried by the movable contact and movable transversely to the said contact, and means for moving said armature transversely into operative relation to said magnet.

4. A rheostat comprising a base, a fixed resistance element secured thereto, a coöperating movable element, a spring for returning the parts to off position, an electromagnet mounted on said base, a yieldingly-mounted armature on the movable element of the rheostat normally held away from said magnet, and means for mechanically moving said armature and magnet into operative relation whereby the movable element will be held against the tension of the spring.

5. In a rheostat, the combination with a

fixed resistance element and a base therefor, of a pivot-post secured to said base, a magnet located at the foot of said post, a rotary armature supported on said post and movable longitudinally thereof, a yielding laterally-extending contact secured to said armature and adapted to engage the fixed element of the rheostat and to be put under strain by the downward movement of said armature, and means for mechanically forcing said armature downward into operative engagement with said magnet.

6. A rheostat comprising a fixed resistance element, a coöperating movable contact, a fixed locking member, a coöperating movable locking member carried by said movable contact, an operating-handle, and means whereby the movement of said handle will move said contact to its limiting position and a further movement will bring said locking members into engagement.

7. A rheostat comprising a fixed resistance element, a coöperating movable contact, a fixed locking member, a coöperating movable locking member carried by said movable contact, an operating-handle, frictional connecting means between said handle and contact whereby the movement of the former is transmitted to the latter, a stop for limiting the movement of the contact, a cam connection between the locking member and the handle whereby upon a further movement of the latter the locking members will be moved into engagement.

8. In a rheostat, the combination with a fixed resistance element and a base therefor, of a pivot-post secured to said base, a magnet located at the foot of said post, a rotary armature supported on said post and movable longitudinally thereof, an operating-lever mounted on said post above said armature, a yielding laterally-extending contact secured to said armature and adapted to engage the fixed element of the rheostat and to hold the armature and operating-lever in close engagement, a stop for limiting the movement of said contact, and coöperating cam-surfaces on said armature and lever whereby the rotation of said lever is transmitted to said contact to carry it against said stop and its further movement forces the armature downward against the magnet.

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.