H. C. NAGEL.

RHEOSTAT.

APPLICATION FILED DEC. 22, 1919.

1,433,740. Patented Oct. 31, 1922.

Fig. 1.

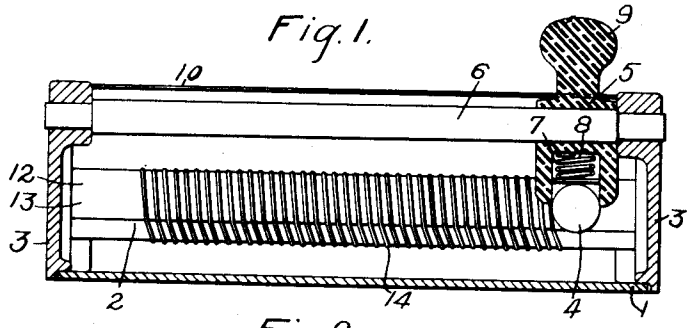


Fig. 2.

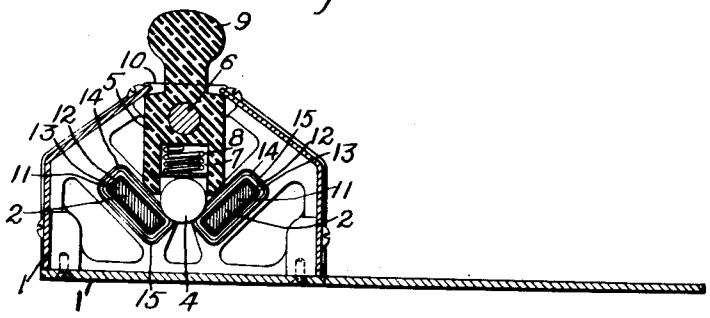


Fig. 3.

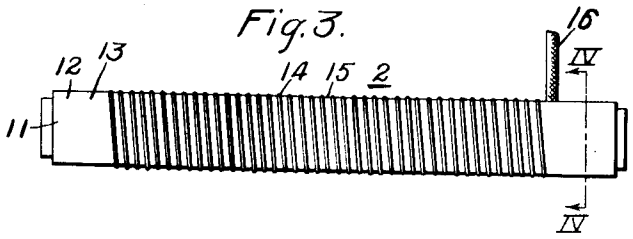


Fig. 4.

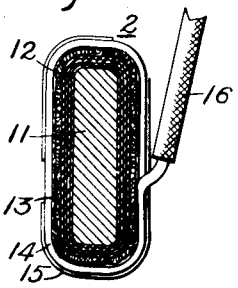
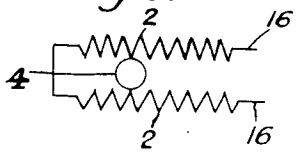


Fig. 5.



WITNESSES:

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Patented Oct. 31, 1922. 1,433,740

UNITED STATES PATENT OFFICE.

HARRY C. NAGEL, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

RHEOSTAT.

Application filed December 22, 1919. Serial No. 346,593.

To all whom it may concern:

Be it known that I, HARRY C. NAGEL, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rheostats, of which the following is a specification.

My invention relates to rheostats and it has for its object to provide a rheostat that is simple and compact in structure and is economical in manufacture.

Resistance devices constructed in accordance with my invention are particularly adapted for use in connection with small electric motors, for controlling electric lighting circuits, and for any application where a very gradual change in the value of current is desirable. I provide a pair of resistors in side-by-side relation and a ball of steel, or other suitable conducting material, which rests upon both resistors and may be rolled by suitable actuating means from one end of the resistors to the other to gradually shunt the resistors.

The details of my invention will be described in connection with the accompanying drawing in which Fig. 1 is a longitudinal sectional view of a rheostat constructed in accordance with my invention; Fig. 2 is a view, in transverse section, of the mechanism of Fig. 1; Fig. 3 is a view, in side elevation, of a resistor; Fig. 4 is a sectional view taken on line IV—IV of Fig. 3 and Fig. 5 is a diagrammatic view of a portion of an electrical system embodying my invention.

Referring particularly to Figs. 1 and 2, a casing 1 of substantially polygonal cross section, supports a pair of resistors 2 which are rigidly held in position by the end plates 3 of the casing. The resistors 2, which are of rectangular cross section, are arranged in side-by-side relation with their upper sides inclined toward each other. The casing has a broad base and its sides are so bent as to partially cover the resistors.

The resistors are controlled by a movable ball 4 which is actuated by means of a holding member 5 that is slidably mounted on a rod 6. The member 5 has a cup-shaped recess 7 within which the ball 4 is loosely mounted and within which is a spring 8 for maintaining a yielding engagement between the ball and the resistors. The member 5 has a knob 9 which projects through a longitudinally-extending groove 10 in the top of the casing.

As best shown in Figs. 3 and 4, each of the resistors 2 comprises a metallic core member 11 that is surrounded by layers of insulating material. The insulating material may consist, for example, of layers of mica and suitable paper indicated at 12 and an outer covering of asbestos 13. A resistance element 14, of bare wire, is wound over the asbestos and retained in position by a layer of cement 15, or other suitable means, which entirely covers the resistance element except that portion of the surface which is brought in contact with the ball 4. The resistance elements 14 of resistors 2 are electrically connected at one of their adjacent ends by a suitable conductor and, at the other ends, each element 14 is connected to a circuit to be controlled by a lead 16. (See Fig. 5 of the drawing.)

To operate the rheostat, the operator may gradually introduce resistance by sliding the holder 5 from its position, as shown in Fig. 1 of the accompanying drawing, along the rod 6, thus causing the steel contact ball to roll over the resistance elements 14 and thereby gradually insert the resistors in the circuit. When the holder 5 reaches the other end of the casing, the current traverses the entire length of the resistors. The operator may decrease the resistance in the circuit by reversing the direction of the movement of the holder 5 until it is returned to the position in which it is shown in the drawing, in which position, the steel contact ball 14 shunts all the resistance and completes a direct connection between the two leads 15.

The side-by-side arrangement of the resistors and their series relation permit the ball to shunt double the value of resistance that would be possible if only one resistor were employed. The side-by-side relation of the resistors also prevents lateral movement of the spherical member.

The use of a resiliently mounted spherical contact member insures a good contact with the resistance elements as the sphere not only rests upon the windings but projects slightly between them. The rolling motion of the sphere permits it to be easily moved over the surface of the resistors.

Although I have described a simple and

preferred form of my invention, I desire that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a resistance device, the combination with two resistors in side-by-side relation, of a contact member for gradually shunting turns of the said resistors, and means for effecting a rolling movement of said contact member.

2. In a resistance device, the combination with two resistors in side-by-side relation, of a single spherical contact member for gradually shunting turns of said resistors, resilient means for maintaining said contact member in contact relation with said resistors, and means for effecting movement of said contact member throughout the length of said resistors.

3. In a resistance device, the combination with two resistors in side-by-side relation, of a loosely-mounted spherical contact member for shunting turns of said resistors, and means for effecting rolling contact relation of said contact member with the said resistors throughout their length.

4. In a resistance device, the combination with two resistors in side-by-side relation, of a spherical contact member for gradually shunting turns of said resistors, a cup-shaped holder for positioning said contact member, a resilient means for maintaining said contact member in contact relation with said resistors, and a guide member upon which said holder is slidably mounted to permit the movement of said holder to bring said contact member in contact with said resistors throughout their length.

5. In a resistance device, the combination with two resistors in side-by-side relation and having sides angularly disposed toward each other, of a contact member for gradually shunting turns of said resistors, and means for effecting movement of said contact member throughout the length of said resistors.

6. In a resistance device, the combination with two resistors in side-by-side relations and having sides angularly disposed toward each other, of a contact member for gradually shunting turns of said resistors, resilient means for maintaining said contact member in contact with said resistors, and means for effecting movement of said contact member throughout the length of said resistors.

7. In a resistance device, the combination with two resistors in side-by-side relations and having sides angularly disposed toward each other, of a contact member for gradually shunting turns of said resistors, resilient means for maintaining said contact member in contact with said resistors, and means for effecting a sliding movement of said contact member throughout the length of said resistors.

8. In a resistance device, the combination with two resistors in side-by-side relations and having sides angularly disposed toward each other, of a contact member for gradually shunting turns of said resistors, a holder for positioning said contact member, a resilient member for maintaining said contact member in contact relation with said resistors, and a guide member upon which said holder is slidably mounted and which permits the movement of said holder and said contact member throughout the length of said resistors.

9. In a resistance device, the combination with two resistors in side-by-side relation, of a loosely-mounted spherical contact member for gradually shunting turns of said resistors, resilient means for maintaining said contact members in contact relation with said resistors, and means for effecting a rolling movement of said contact member throughout the length of said resistor.

10. In a resistance device, the combination with two resistors in side-by-side relation and having sides angularly disposed toward each other, of a spherical contact member loosely mounted for gradually shunting turns of said resistors, resilient means for maintaining said contact member in contact relation with said resistors, and means for effecting rolling movement of said spherical member throughout the length of said resistors.

11. In a rheostat device, the combination with a casing, of two metallic core members in side-by-side relation in said casing and having sides angularly disposed toward each other, insulating means consisting of mica and paper with a binder surrounding the said members, a layer of asbestos superimposed upon the said insulating means, metallic resistance elements helically wound upon the said asbestos, a cement covering for protecting and for positioning the said elements, a spherical contact member for gradually shunting turns of the said resistors, a recessed holder for controlling the said contact member, a resilient member for maintaining the said contact member in contact with the said resistors, and a guide member upon which the said holder is slidably mounted for movement of the holder to actuate said contact member throughout the length of said resistors.

In testimony whereof, I have hereunto subscribed my name this 21st day of November, 1919.

HARRY C. NAGEL.