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E. A. BOHLMAN

1,778,306

RHEOSTAT

Filed Feb. 19, 1925

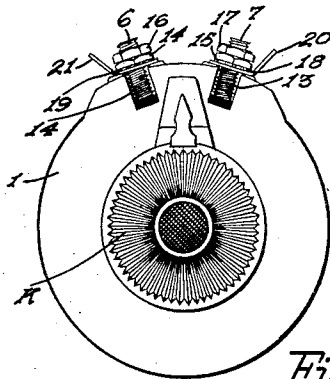


Fig. 1.

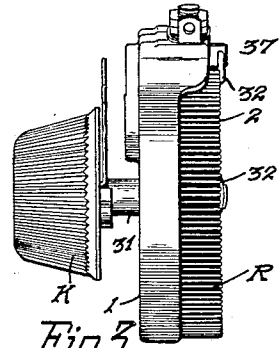


Fig. 3.

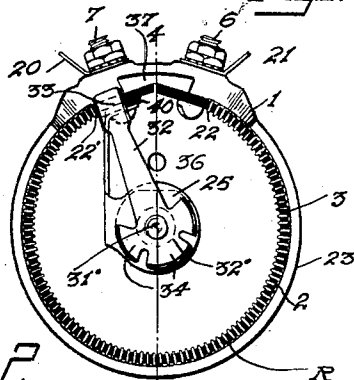


Fig. 2.

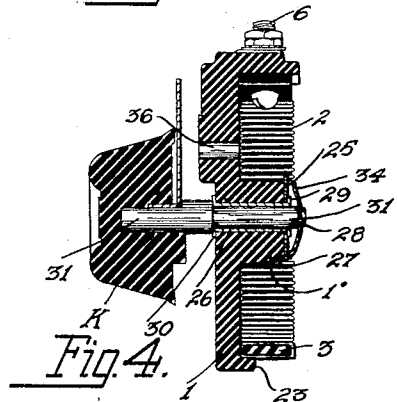


Fig. 4.

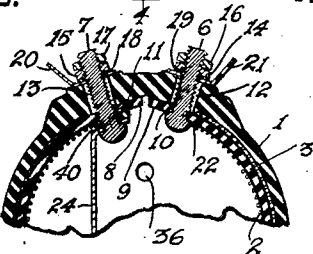


Fig. 5.

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UNITED STATES PATENT OFFICE

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RHEOSTAT

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My invention relates to rheostats for varying the resistance in an electric circuit and is adapted particularly for use in controlling the filament of electron tubes. An object of my invention is to provide a rheostat that is simple in construction but very durable and efficient in its operation.

A feature of my invention is the provision of a porcelain base for supporting the resistance element, the wiper associated therewith and the terminals to form a unit structure.

Another feature of my invention is the provision of a novel wiper arrangement in which the wiper, which engages the convolutions of the resistance unit, is provided with integrally formed means, which in addition to providing frictional means for maintaining the wiper in any of its adjusted positions, forms a wiping contact between the wiper and the conducting member which electrically connects the wiper with one terminal of the rheostat. This construction provides a positive connection between the wiper and the conducting member and insures a positive electrical contact.

The above features, as well as others, will be more particularly pointed out in the ensuing specification and in the appended claims. For a more complete understanding of my invention, reference may be had to the accompanying drawing in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a front view of the rheostat of my invention;

Fig. 2 is a rear view of the rheostat of my invention illustrating it in its normal or off position;

Fig. 3 is a right side view of Fig. 1;

Fig. 4 is a sectional view along the line 4-4 of Fig. 2;

Fig. 5 is a sectional rear view showing a part of the rheostat of my invention.

Referring now more in detail to my invention as illustrated in the accompanying drawing, it comprises a resistance unit or coil 2, which may be of any predetermined ohmic resistance, wound by a suitable machine upon a flat strip of insulating material

3. The ends of the resistance coil 2 are held in place by being passed through suitable orifices in the strip 3. After the strip 3, which carries the resistance coil 2, has been wound it is formed into a substantially ring-shaped member R by means of a suitable forming operation. The porcelain base 1 is provided with a peripheral rim 23 which forms a shallow cupped portion into which the ring-shaped member R is placed. The member R is now secured to the circular porcelain base 1 by means of screws 6 and 7 which pass through suitable orifices 10 and 11 in the ends 8 and 9 of the strip 3 and orifices 12 and 13 in the porcelain base 1. Nuts 14 and 15 which are threaded on the screws 6 and 7 clamp the ends 8 and 9 against the inner peripheral face of the rim 23 to secure the member R in position on the base 1. Lock washers 18 and 19 are provided which are placed between the terminals 20 and 21 to prevent rotation of the terminals relative to the screws 6 and 7 and also provide means for locking the nuts 14 and 15 against rotation. Terminals 20 and 21 are for the usual soldered connections and the nuts 16 and 17 provide means for clamping conductors to the screws 6 and 7 when the terminals 20 and 21 are not to be used for soldered connections. One end 22 of the resistance coil 2 is secured to the screw 6 which connects this end to the terminal 21, the other end 22' being secured to the strip 3 by passing the same through a suitable orifice in the end 8. To the screw 7 is secured an arm 24 which is an integral part of a circular plate 25 formed of any suitable conducting material. This circular plate 25 has a central orifice of a size to fit over the ferrule 26 and rests against the face 27 of the integrally formed hub 1' of the porcelain base 1. The plate 25 is held in place by the upset edge 29 of the ferrule 26 which fits in a central orifice 28 in the hub 1' of the porcelain base 1. The edge 30 of the ferrule 26 is also upset and serves to keep the ferrule 26 in its proper position.

The shaft 31 is provided with a reduced portion 31' which is inserted through the central orifice in the ferrule 26. The end of said shaft extends slightly beyond the upset

edge 29 of the ferrule 26 for purposes as will be described later. The shoulder formed by the reduced portion 31' of the shaft 31 rests against the upset edge 30 of the ferrule 26. To the end of the shaft 31 is attached a knob K which is provided for rotating the shaft and its associated parts and for a detailed description of the method of supporting the knob reference may be had to an application of Emil J. Nielsen, Serial No. 603,927, filed November 29, 1922, which matured as U. S. Letters Patent No. 1,678,524.

The wiper 32 is provided with an enlarged end portion 33 which is adapted to contact with the peripheral portion of the convolutions of the resistance unit 2. The wiper 32 is so formed as to provide a spring effect for gripping the convolutions of the coil 2 to assure a good contactual engagement between the wiper 32 and the convolutions of the coil 2. The wiper 32 is also provided with an integrally formed disked semi-circular shaped portion 32', provided with a central orifice of a size to permit the insertion of the reduced end portion 31' of the shaft 31 and this protruding end of the shaft 31 is spun over to secure the wiper 32 to the shaft 31, thereby causing the wiper 32 to rotate when the shaft 31 is rotated. The disked semi-circular shaped portion is split and contacts with the disk 25. This split disked portion 32' of the wiper 32 engages the face of the circular plate 25 of the arm 24 to provide frictional means for holding the wiper 32 in any of its adjusted positions and also serves as the contact means between the other terminal 20 of the rheostat and the wiper 32. The edges of the split portions 34 of the wiper 32, being in frictional engagement with the face of the portion 25 of the arm 24, provides a positive rubbing contact between the wiper and the conducting arm 24 thereby insuring a positive electrical contact.

The porcelain base 1 is provided with an integrally formed lug which engages the panel to which it is mounted. An orifice 36 is provided as a means for mounting the rheostat and a mounting screw is inserted thru the panel and thru this orifice 36 and a nut is threaded upon the screw to secure the rheostat as a whole to the panel. An integrally formed lug 37 is also provided on the porcelain base 1 to act as a stop for the wiper 32 when in its normal or extreme advanced position. One end of the connecting arm 24 is provided with an orifice thru which the screw 7 passes to complete the electrical circuit from the plate 25 to the screw terminal 7. An insulating washer 40 is mounted between the end 8 of the strip R and the overturned portion of the connecting strip 24 to insure that the strip 24 will not contact with the end of the winding on strip R and also serves as a normal resting place for the wiper.

Having described the apparatus which comprises the rheostat, I will next give a description of its operation. The rheostat, as shown in Fig. 2, is in its normal or off position. When the knob K is turned, the shaft 31 rotates and causes the wiper 32 to move into engagement with the peripheral face of the resistance coil 2. This completes a circuit from terminal 20 to terminal 21 by way of screw 7, arm 24, circular plate 25, wiper 32, resistance coil 2, screw 6 to terminal 21. As the wiper 32 is rotated the amount of resistance in the circuit is lessened by the wiper 32 cutting off or excluding a number of turns of the wire on the resistance coil 2 and consequently a larger amount of current is allowed to pass through the circuit. The wiper 32 may be rotated until it reaches the end 22 of the resistance coil 2 where it comes in contact with the integrally formed shoulder 37 of the base 1.

While I have described a particular form of my invention, it is to be understood that I do not wish to be limited to the exact structure as illustrated and described but I wish to cover all such changes and modifications that come within the scope and spirit of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device of the character described including a supporting base, a peripheral rim integrally formed with said base, a ring shaped resistance element lying within said rim and secured at its ends to said base, said rim serving as protecting and supporting means by partly encasing said resistance element, terminals secured to said base, a hub integral with said base, a sleeve extending through said base and being self-sustaining therein, a conducting member having one end secured to one of said terminals and its other end enlarged and secured to said sleeve, a shaft extending through said sleeve and having a reduced end portion, a wiper secured to the reduced end of said shaft, said end being spun over to operatively support said wiper for engagement with said resistance element, said wiper preventing longitudinal movement of said shaft, and having an enlarged-end comprising a plurality of depending legs constituting spring means adapted to engage the enlarged end of said conducting member.

2. A device of the character described including a supporting base, a peripheral rim integrally formed with said base, a ring shaped resistance element lying within said rim and secured at its ends to said base, said rim serving as protecting and supporting means by partly encasing said resistance element, terminals secured to said base, a hub integral with said base, a sleeve extending through said hub and being self-sustaining.

therein, a conducting member having its one end secured to one of said terminals and its other end enlarged and secured to said sleeve, a shaft having a reduced end portion rotatably secured in said sleeve, a wiper secured to said shaft by an upsetting operation for engagement with said resistance element and the enlarged end of said conducting member, said conducting member forming a single conducting element between said one terminal and said wiper, said wiper preventing longitudinal movement of said shaft, and spring means comprising a plurality of depending legs integrally formed with said wiper and adapted to engage the enlarged end of said conducting member to insure electrical contact between said wiper and said conducting member.

3. A device of the character described including a supporting base, a ring shaped resistance element secured at its ends to said base, a peripheral rim integrally formed with said base and serving as protecting and supporting means for said resistance element by partly encasing said element, a terminal secured to said base, a hub integral with said base, a sleeve extending through said hub and being self-sustaining therein, a conducting member having its one end secured to said terminal and its other end enlarged and secured between said hub and an upset portion of said sleeve, a rotatable shaft having a reduced end portion extending through said sleeve, a wiper secured to said reduced end portion of said shaft, said end portion being spun over to operatively support said wiper for engagement with said resistance element and for engagement with the enlarged end of said conducting member, said wiper preventing longitudinal movement of said shaft, said conducting member forming a single conducting element between said terminal and said wiper, and spring means comprising a plurality of depending legs integrally formed with said wiper adapted to engage said enlarged end of said conducting member for yieldingly holding said resistance element.

4. A device of the character described including a supporting base, a ring shaped resistance element secured at its ends to said base, a peripheral rim integrally formed with said base and serving as protecting and supporting means for said resistance element by partly encasing said element, a terminal secured to said base, a hub integral with said base, a sleeve extending through said base and being self-sustaining therein, a conducting member having one end secured to said terminal and its other end enlarged and secured to said sleeve, a shaft having a reduced end portion extending through said sleeve, a wiper secured to said end portion of said shaft, said end portion being spun over to operatively support said wiper for engagement with said resistance element, said wiper pre-

venting longitudinal movement of said shaft, and spring means comprising a plurality of depending legs integrally formed with said wiper adapted to engage the enlarged end of said conducting member for yieldingly holding said wiper in any adjusted position relative to said resistance element and for insuring electrical contact between said wiper and said conducting member which forms a single conducting element between said wiper and said terminal.

5. A device of the character described including a supporting base, a ring shaped resistance element secured at its ends to said base, a peripheral rim integrally formed with said base and serving as protecting and supporting means for said resistance element by partly encasing said element, a terminal secured to said base, a hub integral with said base, a sleeve extending through said hub and being self-sustaining therein, a conducting member having one end secured to said terminal and its other end enlarged and secured to said sleeve, a shaft rotatably supported in said sleeve, a wiper having an enlarged end comprising a plurality of depending legs secured to said shaft, the free end of said wiper engaging said resistance element and said depending legs engaging the enlarged portion of said conducting member for holding said wiper in position, said conducting member forming a single conducting element between said terminal and said wiper, said device adapted to be secured to a panel of any thickness without adjustment of the wiper.

6. A device of the character described including a supporting base, a ring shaped resistance element secured at its ends to said base, a peripheral rim integrally formed with said base to form protecting and supporting means for said resistance element by partly encasing said resistance element, a terminal secured to said base, a hub integral with said base, a sleeve extending through said hub and being self-sustained therein, a conducting member having one end secured to said terminal and its other end enlarged and secured to said sleeve, a rotatable shaft extending through said sleeve, and a wiper having an enlarged end comprising a plurality of depending legs secured to said shaft and preventing longitudinal movement of said shaft, the free end of said wiper engaging said resistance element and the depending legs of said wiper engaging the enlarged end of said conducting member to provide a wiping contact between said member and said wiper, said member forming a single conducting element between said terminal and said wiper.

7. A device of the character described including a mounting member, a resistance element secured to said mounting member, a peripheral rim integrally formed with said

mounting member having an enlarged portion for supporting a pair of terminals and serving as protecting and supporting means for said resistance element, said rim partly encasing said resistance element, a hub for said mounting member, a shaft rotatably supported in said hub, a wiper for contacting with said resistance element and having an enlarged end comprising a plurality of depending legs riveted to said shaft, and adapted to prevent longitudinal movement of said shaft, and a conducting member secured to said hub and having an enlarged end adapted to be contacted by spring means composed of said depending legs to form a conducting element between said terminal and said wiper and to maintain said wiper in any of its adjusted positions relative to said resistance element.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 17th day of February, 1925.

ERNEST A. BOHLMAN.

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