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E. A. BOHLMAN

1,739,942

RHEOSTAT

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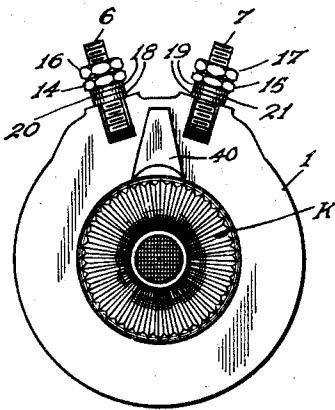


Fig. 1.

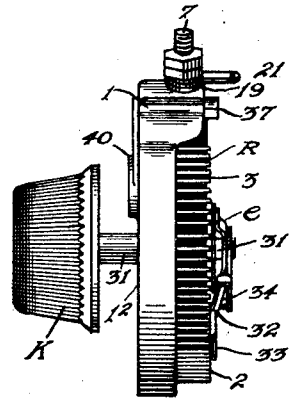


Fig. 2.

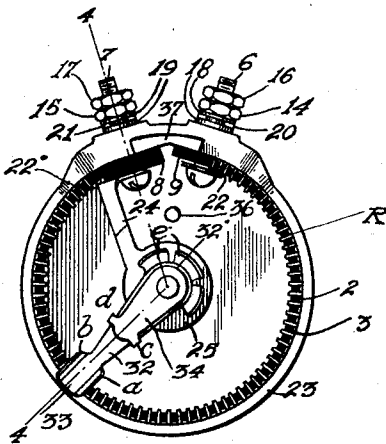


Fig. 3.

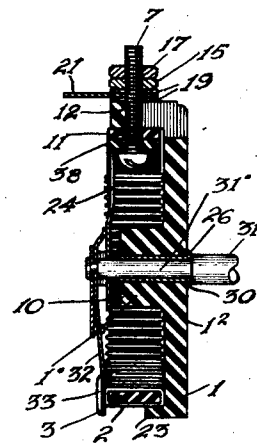


Fig. 4.

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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 electrical circuit and is adapted particularly for use in controlling the current in the filament circuits of electron tubes.

An object of my invention is to provide a rheostat that is simple in construction but very durable and reliable in its operation.

A 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, positive in its operation, 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 assures a positive electrical wiping contact.

The above and other features will be more particularly pointed out in the ensuing specification and the appended claims. For a more complete understanding of the same reference may be had to the accompanying drawing in which like reference characters denote like parts and in which:

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

Fig. 2 is a right side view of Fig. 1.

Fig. 3 is a rear view of the rheostat of my invention, illustrating it in one of its actuated positions.

Fig. 4 is a sectional view along the line 4-4 of Fig. 3.

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 unit 2 are held in place by being passed through suitable orifices in the strip 3. After the coil 2 has been wound upon the insulating material 3, the whole is formed into a sub-

stantially ring shaped member R by means of a suitable forming operation.

The bakelite or 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 secured within the circular bakelite base by means of screws 6 and 7 which pass through suitable orifices as 11 in the ends 8 and 9 of the strip 3, orifices 12 in the base 1, holes in the ends of terminals 20 and 21 and lock washers 18 and 19, respectively, nuts 14 and 15 being threaded on the screws 6 and 7 to clamp the parts in position. The 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 used. One end 22 of the resistance coil 2 is secured to the screw 6 to which is joined the terminal 20. The other end 22 of coil 2 is secured to the strip 3 by passing the same through an orifice provided for this purpose in the end 8 of the insulating strip 3.

The screw 7 passes through the base of an arm 24 of conducting material which terminates at its opposite end in a circular plate 25. Plate 25 has a central orifice of a size to fit loosely around a shaft 31 which extends through a ferrule 26 which rests in a suitable orifice in the hub 1' formed integrally with base 1.

The ferrule 26 has its opposite ends upset against the face 10 of the integrally formed hub 1' and the face 1² of the base 1 as shown at 30.

The part of the shaft 31' which extends through the ferrule 26 is reduced to provide a shoulder which rests against the turned up end 30 of the ferrule 26 and prevents inward longitudinal movement of the shaft 31. A knob K is attached to the end of the shaft 31, rotating the shaft and its associated parts. For a detailed description of the method used to support the knob K reference may be had to Patent No. 1,678,524, issued to Emil J. Nielsen, July 24, 1928. The other end of the shaft 31 extends beyond the face 10 of the

integrally formed hub for purposes herein-after described.

Wiper 32 is provided with an enlarged end portion 33 which has its edges *a* and *b* slightly turned up so as to facilitate its movement across the turns of wire which comprise 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 end 33 of the wiper 32 and the convolutions of the coil 2. An arm 34 of a suitable size and material is secured to wiper 32 by the two depending legs *c* and *d* which are so spaced as to snugly receive the wiper 32 therebetween.

The wiper 32 is also provided with an integrally formed dished semi-circular portion 32', the portion 32' and the arm 34 having suitable orifices of a size to fit over the reduced end portion 31' of the shaft 31, which is then spun over firmly to secure the wiper 32 and the arm 34 on the reduced end portion 31'.

The dished semi-circular portion 32' is split into sections *e* which are bent down in order to provide a better contact with the circular plate 25 of the arm 24; thus providing frictional means to hold the wiper 32 in any of its adjusted positions. The arm 24 is so formed that it has a tendency to spring away from the face 10 of hub 1'; thus maintaining the circular portion 25 in good contactual engagement with the legs *e* of the wiper 32. The arm 24 electrically joins the wiper 32 to the terminal 21 of the rheostat.

The porcelain or bakelite base 1 is also provided with an integrally formed lug 40 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 in the orifice 36 and a suitable orifice provided in the panel. A nut is then threaded on the screw and this serves to hold the rheostat in its proper position upon the panel. An integrally formed lug 37 is provided on the porcelain base 1 to act as a stop for the wiper end 33 when in its normal or extreme advanced position. An insulating washer 38 is mounted between the end 8 of the strip R and the turned over portion of the connecting strip 24 to prevent the strip 24 from contacting with the end of the winding on the strip R, and also to serve as a normal resting place for the wiper end 33.

Having described the apparatus which comprises the rheostat, I will next give a description of its operation. When the wiper end 33 rests on the insulating washer 38 the rheostat is in its normal or off position and no current passes through the resistance coil 2. When the knob K is turned the shaft 31 rotates and with it the wiper arm 32, and the member 34, the flared end 33 of the wiper arm 32 passing into engagement with the peripheral face of the resistance coil 2. This completes an elec-

trical circuit from terminal 20 to terminal 21 by the way of screw 7, arm 24, circular plate 25, depending legs *e*, wiper 32, flared wiper end 33, resistance coil 2, screw 6 to terminal 20. As the wiper 32 is rotated the amount of resistance in the circuit is lessened by the wiper 32 reducing the number of turns of wire on the resistance coil 2 between brush 33 and terminal 20 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. When the wiper is in such a position practically none of the convolutions of wire are in the circuit and the maximum amount of current is passing through the circuit.

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

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

1. In a rheostat, a supporting base, a resistance element mounted on said base, a hub integral with said base, a shaft rotatably supported by said hub in said base, a wiper secured to said shaft by an upsetting operation and arranged to traverse said resistance element upon rotation of said shaft, said wiper having an enlarged portion comprising a plurality of depending legs adjacent said shaft, a terminal on said base and a resilient arm having one end fixed to said base, the opposite end of said arm being held firmly in engagement with the depending legs of said wiper, said engaging portions of said arm and wiper being located on the same side of said hub, said arm electrically joining said wiper to said terminal and preventing longitudinal movement of said shaft and also operating frictionally to retain said wiper in adjusted position due to the resiliency of said arm.

2. In a rheostat, a supporting base, a resistance element mounted on said base, a shaft rotatably supported by said base, a wiper secured to said shaft by an upsetting operation and arranged to traverse said resistance element upon rotation of said shaft, said wiper having an enlarged portion comprising a plurality of depending legs, a terminal on said base and a spring arm having one end fixed to said base, the opposite end of said arm being held by its resiliency firmly in engagement with the depending legs of said wiper to prevent longitudinal movement of said shaft, said arm and said wiper engaging each other on the same side of said supporting base.

3. In a rheostat, a supporting base, a resistance element mounted on said base, a shaft rotatably supported by said base, a wiper fixed to said shaft by an upsetting operation and arranged to traverse said resistance element upon rotation of said shaft, said wiper having an integrally formed enlarged portion comprising a plurality of depending legs, a terminal on said base and an arm having one end fixed to said base, the opposite end of said arm being held resiliently in engagement with the depending legs of said wiper, said arm and said wiper engaging each other on the same side of said supporting base, said arm electrically joining said wiper to said terminal and also acting frictionally to hold said wiper and shaft in their various adjusted positions, and serving as means to prevent longitudinal movement of said shaft.

4. In a rheostat, a supporting base, a resistance element mounted on said base, a shaft rotatably supported by said base, a wiper secured to said shaft by an upsetting operation and arranged to traverse said resistance element upon rotation of said shaft, an offset portion on said wiper adjacent to said shaft comprising a plurality of depending legs, a terminal on said base and a spring arm having one end fixed to said base, the opposite end of said arm being held by its resiliency firmly in immediate electrical engagement with said depending legs of said wiper, said engaging portions of said wiper and said arm being located on the same side of said base and said arm cooperating with said depending legs to prevent longitudinal movement of said shaft.

5. In a rheostat, a supporting base, a resistance element mounted on said base, a shaft rotatably supported by said base, a wiper secured to said shaft by an upsetting operation and arranged to traverse said resistance element upon rotation of said shaft, an enlarged portion on said wiper comprising a plurality of depending legs, a terminal on said base, and a spring arm having one end fixed to said base, the opposite end of said arm surrounding said shaft and held by its resiliency firmly in immediate electrical engagement with the depending legs of said wiper, said arm electrically joining said wiper to said terminal, the engaging portion of said arm and wiper being located on the same side of said supporting base, and also acting frictionally to retain said wiper in its adjusted positions, said arm and wiper cooperating to prevent longitudinal movement of said shaft.

6. In a rheostat, a supporting base, a ring shaped resistance element secured to said base, a terminal secured to said base, a hub integral with the base, a shaft rotatably mounted in said hub, a resilient conducting member having one end secured to said terminal and

its other end loosely fitted on the said shaft, said shaft having a reduced end portion, a wiper supported on said reduced portion by upsetting the end of said reduced portion, said wiper arranged to traverse said resistance element on rotation of said shaft, said wiper having an enlarged portion comprising a plurality of depending legs, said conducting member being resiliently held in immediate electrical engagement with the said wiper, said engaging portions of said arm and wiper being located on the same side of said hub member and serving as means to prevent longitudinal movement of said shaft.

7. In a rheostat, a supporting base, a ring shaped resistance element secured at its ends to said base, a terminal secured to said base, a hub integral with said base, a shaft having a reduced end portion rotatably mounted in said hub, a resilient arm of conducting material, one end of which is secured to said terminal and the other end of which is loosely fitted about said shaft, a wiper having an enlarged portion comprising a plurality of depending legs, said reduced end of said shaft being spun over to secure said wiper to said shaft, one end of said wiper engaging said resistance coil, an arm secured to said reduced end of said shaft having depending legs which engage the said wiper on opposite sides to assure the rotation of said wiper, said resilient arm having an enlarged portion adapted to engage the said plurality of depending legs on said wiper, said engaging portions of said resilient arm and wiper being located on the same side of said hub.

8. In a rheostat, a supporting base, a ring shaped resistance element secured to said base, a terminal secured to said base, a hub integral with said base, a sleeve extending through said hub and being self-sustained therein, a rotatable shaft having a reduced end portion extending through said sleeve, a resilient conducting member having one of its ends secured to said terminal, and its other end loosely fitted around said shaft, a wiper adapted to engage said resistance element and having an enlarged portion comprising a plurality of split portions, said reduced end of said shaft being upset to secure said wiper to said shaft, and cause the same to rotate, an arm secured to said shaft having depending legs which engage said wiper on opposite edges thereof to assure the rotation of said wiper, said resilient arm and said split portions of said wiper adapted to engage each other, said resiliency of said conducting member maintaining contactual engagement of said wiper and said conducting member.

9. A device of the character described including a supporting base, a ring shaped resistance element secured to said base, a terminal secured to said base, a hub integral with said base, a sleeve extending through said hub and being self sustaining therein, a rotatable

shaft extending through said sleeve and having a reduced end portion, a spring arm of conducting material, one end of which is fixed to said base and the other end of which is enlarged and loosely fitted about said shaft, a
5 wiper adapted to engage said resistance element, said reduced end of said shaft being spun over to rigidly secure said wiper to said shaft, depending legs integrally formed with
10 said wiper adapted to be engaged by the enlarged end of said arm which is interposed between said depending legs of said wiper and the hub portion of said base, said arm operating electrically to join said wiper to
15 said terminal and also provide friction means for maintaining said wiper in any of its adjusted positions and for preventing longitudinal movement of said shaft.

In testimony whereof I have signed this
20 specification.

ERNEST A. BOHLMAN.

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