

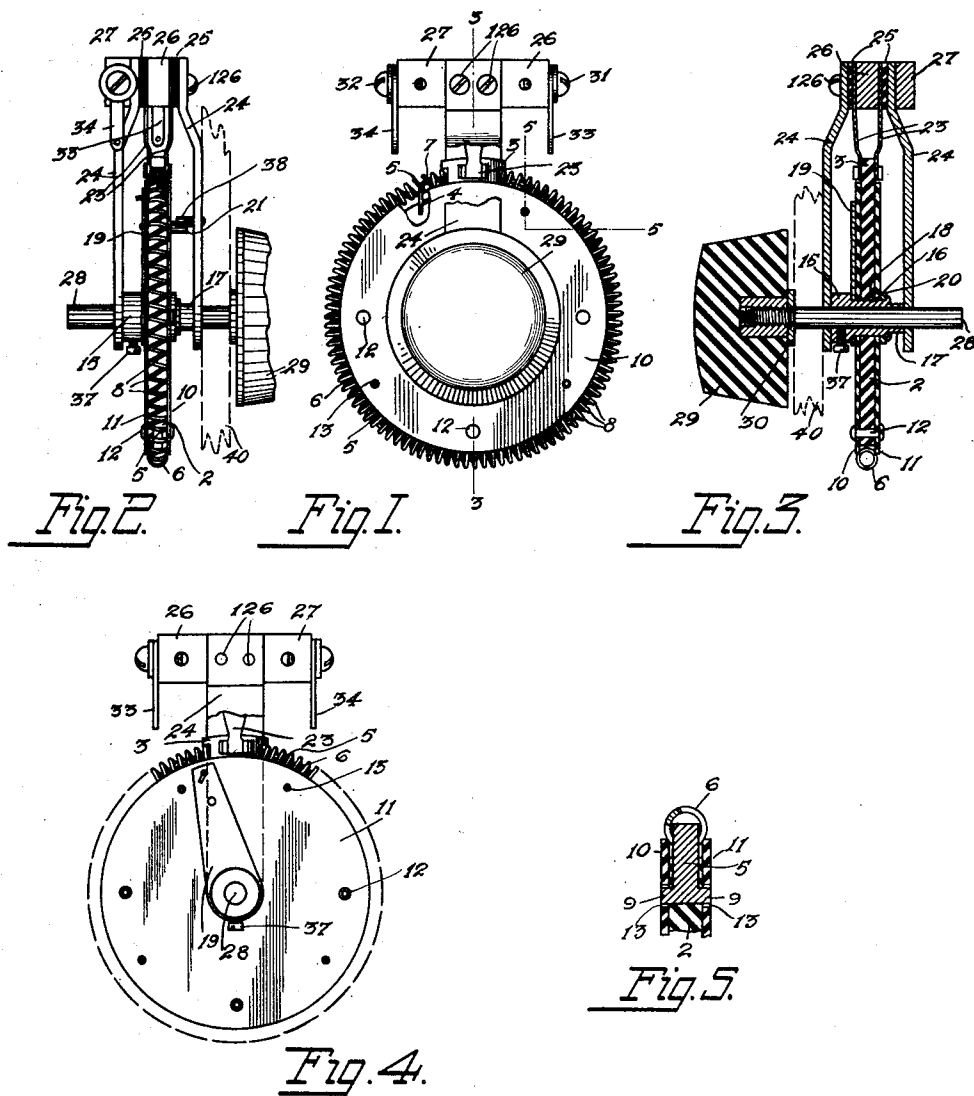
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RHEOSTAT

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## UNITED STATES PATENT OFFICE.

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## RHEOSTAT.

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My invention relates to rheostats, such as are used for controlling the filaments of electron tubes, and has to do more particularly with an improved rheostat in which the resistance element is rotated.

A feature of my invention lies in the provision of a resistance coil mounting unit so constructed that the heating of the resistance element or coil is greatly reduced, and also simplified means for securing the resistance element or coil to said mounting unit.

Another feature relates to the construction of the insulated disk that carries the resistance element, the means for holding the resistance element in place and the construction of the contact springs for cooperation with the resistance element.

Other features of my invention reside in the details of construction which produce a very efficient, easily operated, but economical to construct device.

The above features, as well as others, will be pointed out more in detail in the ensuing specification, and for a clearer understanding of my invention reference may be had to the drawing, in which like reference characters denote like parts in the several views, and in which—

Fig. 1 is a front plan view of my rheostat in its normal position;

Fig. 2 is a left side view of Fig. 1;

Fig. 3 is a sectional view of my rheostat along the line 1—1 of Fig. 1;

Fig. 4 is a back plan view of my rheostat; and

Fig. 5 is a sectional view showing the mounting unit and the means for securing the resistance element or coil on said mounting unit.

Referring now more particularly to my invention, 2 is a round flat piece of non-conducting material having an extension 3 integrally formed therewith, and also provided with a plurality of peripheral slots 4 for receiving holding clips 5. A pair of non-conductor disk members 10 and 11, larger in diameter than the diameter of the member 2, are provided and which are adapted to be secured to the sides of the member 2, by means of suitable rivets 12. A resistance element or coil 6 is provided which is slightly thicker than the thickness of the member 2. The clips 5 have their one end 7 turned over and the other end provided with integrally

formed lugs 9 on each side thereof, said other end adapted to fit in the peripheral slot 4 of the member 2 and the lugs 9 extend outwardly beyond the sides of the member 2. In assembling the various parts mentioned above, the end of the clips 5 carrying the lugs 9 is fitted into the peripheral slots 4 in the member 2. The disk members 10 and 11 are provided with openings 13 for receiving the lugs 9 of the clips 5, and are secured to the member 2 by suitable rivets 12. The resistance element or coil 6 has the lower portion of a few of its turns 8 at different places engaging the turned over ends 7 of the clips 5, and since the diameter of the turns 8 of the coil 6 is greater than the thickness of the member 2, the coil 6 rests upon and between the inner edges of the disk members 10 and 11, said coil being drawn taut and secured in this position by the clips 5, the ends of the coil 6 being separated from each other by the extension 3 of the member 2, said extension 3 having extending portions 3' which engage the upper portion of the turns 8 at the ends of the coil 6 to prevent the said ends from flaring up. By having the coil 6 resting upon the inner edges of the members 10 and 11, an air space is provided between the coil 6 and member 2, which will permit the circulation of air to reduce the heating of the coil 6. The members 10 and 11 engaging the lugs 9 of the clips 5 secure said clips in place in the slots 4, and the rivets 12 secure the members 2, 10 and 11 together as a single unit.

A cylindrical member 15 of conducting material is provided, which has an intermediate reduced portion 16 and a further reduced end portion 17, said member 15 adapted to extend through a central orifice 18 in the members 2, 10 and 11 until the intermediate portion 15 engages the central orifice 18, the orifice 18 being slightly smaller in diameter than the diameter of the reduced portion 16, so that a drive fit is effected. A plate 19 of conducting material having a suitable opening in its one end for receiving the reduced portion 16 of the member 15, is provided and clamped between the members 10 and 15, the other end of said plate 19 having an orifice for receiving one end of the coil 6, whereby said plate connects the coil 6 with the member 15. A flat washer 20 having a suitable opening fits over the reduced portion 16 extending through the cen-

tral opening 18 in the members 2, 10 and 11, and engages the face of the member 11. The end of the reduced portion 16 is now pierced or blunted at several places by a punching operation to prevent the displacement of the washer 20, whereby the member 15 is securedly held in the central opening 18 of the members 2, 10 and 11. A stop pin 21 is provided and is secured in suitable openings in the members 2 and 10 by means of a drive fit, and the purpose of said stop pin 21 will be pointed out later.

A pair of contact wipers 23 for engaging the resistance element or coil 6 are provided which are separated from each other and secured to a terminal member 26, and between a pair of mounting legs 24 but insulated therefrom by non-conducting members 25 by means of suitable screws 126 which extend through suitable openings in the legs 24, terminal member 26, insulated members 25, and have screw-threaded engagement with suitable tapped orifices in another terminal member 27, which terminal member 27 is in contactual engagement with one of the mounting legs 24. A shaft or rod 28 of conducting material having a thumb and finger knob 29 of insulating material secured to its one end by a screw-threaded engagement is provided, there being a flat washer 30 for engaging the threaded end portion of said shaft or rod 28, and which also engages the inner face of the knob 29. Secured to the terminal members 26 and 27 by means of screws 31 and 32 are terminals 33 and 34, respectively, which terminals 33 and 34 are adapted to have conductors connected to them for purposes well known to those skilled in the art.

The manner in which the resistance element or coil is secured in operative relation with the stationary contact wipers 23 will now be described. The resistance coil carrying unit is inserted between the mounting legs 24 and the extension 3 of the member 2 is inserted between the contact wipers 23, said contact wipers having a spring effect whereby they tend to spring together to grip the extension 3. The shaft or rod 28 is now inserted into and through suitable openings in the legs 24 and through the central opening 16 in the member 15, the legs 24 engaging the ends of said member 15 to prevent endwise movement of said member 15. A set screw 37 is provided in the member 15 and when the shaft or rod is extended through the member 15 and the legs 24, said set screw 37 is caused to engage the shaft or rod 28, thereby causing the coil carrying unit and shaft 28 to rotate together when the knob 29 is turned, and to also prevent the removal of the shaft 28. A stop pin 38 is suitably secured to one of the legs 24 and in the path of travel of the pin 21 for limiting the extent of rotation of the coil

carrying unit. The coil carrying unit when rotated off normal brings the resistance element or coil 6 in engagement with the contact wipers 23 to include a certain amount of resistance in the operating circuit in which my rheostat is being used and when not in use the coil carrying unit is rotated back to its normal position where the extension 3 engages the contact wipers 23 and when in this position the contact wipers are no longer in engagement with the resistance element or coil 6.

In Figs. 2 and 3 I show a mounting member 40 to which my rheostat may be mounted in any suitable manner, the shaft or rod 28 being first extended through a suitable opening in said mounting member until the outer face of the washer 30 engages the face of the mounting member. By having the shaft or rod adjusted in the legs 24 and member 15 of my rheostat by means of the set screw 37, it is at once apparent that my rheostat may be mounted on mounting members of different thicknesses.

Having described a particular structure of my invention it is to be understood that I do not wish to be limited to the exact structure as described and illustrated, but I wish to cover all that comes 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. In a rheostat including a resistance element, a supporting unit comprising three plates secured together and adapted to have said resistance element secured thereon, but only in contactual engagement with two of said plates, clips secured to said supporting unit for retaining said resistance element on said supporting unit, contact wipers, and means for rotatably associating said resistance element with said contact wipers.

2. In a device of the class described including a resistance coil, a resistance coil carrying unit, said resistance coil carrying unit comprising a disk member having a disk member secured to each side thereof and adapted to receive said resistance coil in such manner that said resistance coil does not engage said first disk member, holding clips for retaining said resistance coil on said unit, supporting means having contact members secured thereto, and means for rotatably supporting said unit on said supporting means and to effect the engagement of said resistance coil and said contact members.

3. In a rheostat including a resistance element, supporting means for said resistance element comprising three plates of non-conducting material secured together, a clip engaging a slot in one of said plates and having integrally formed lugs for engaging said other two plates to prevent the

displacement of said clip, said clip engaging the resistance element to retain the same in its mounted position on said supporting means, a mounting frame having stationary contact wipers secured thereto, and means for rotatably supporting said supporting means on said frame and the resistance element in operative relation with said contact wipers.

4. In a device of the class described including a round flat piece of non-conducting material provided with a plurality of peripheral slots, clips for engaging said slots, a disk member, greater in diameter than that of said flat piece, secured to each side of said flat piece to form a single unit 1, said disk members engaging said clips to prevent their displacement from their respective slots, a resistance coil adapted to engage the inner edges of said disk members and secured thereto by said clips, a pair of mounting legs having a pair of contact wipers secured thereto, and means for rotatably supporting the coil carrying unit between said mounting legs and said resistance coil in operative relation with said contact wipers.

5. In a rheostat as described including three disks of non-conducting material secured together to form a unit, one of said disk members being smaller in diameter than the diameter of said other disks and secured between said other disks to provide an opening between the peripheral edges of said other disk members, a resistance element adapted to engage said opening and to engage the inner edges of said other disk members, without engaging the central disk member, holding clips secured in said central disk members for retaining said resistance element in its mounted position, mounting means having a pair of contact members secured thereto, and means for rotatably associating said resistance element with said pair of contact members.

6. In a rheostat including a resistance element, a unit comprising three flat disk members secured together for supporting said resistance element, said resistance element engaging only two of said disk members while an air gap is provided between said resistance element and the other of said disk members, means for holding said resistance element in its supported position, said means engaging slots in said other disk member and held therein by said two disk members, mounting means having contact members secured thereto, and means for supporting said unit on said mounting means to bring said resistance element in operative relation with said contact members.

7. In a device of the character described including a non-conducting member provided with a plurality of peripheral slots, a clip for engaging each of said slots, a pair

of disk members greater in diameter than the diameter of said first member and secured to said first member, said disk members engaging the clips to prevent their removal from their respective slots, a resistance element greater in diameter than the thickness of said first member, said resistance element positioned between and on the inner edges of said disk members and secured in position by said clips, a supporting frame, contact members secured to said supporting frame, and means for rotatably supporting said first member and said disk members on said supporting frame, to bring said resistance element in operative relation with said contact members, said means being micrometrically adjustable to permit said device to be secured to mounting members of different thicknesses.

8. In a rheostat including a resistance coil, means for supporting said resistance coil, said means comprising three plates secured together so that said resistance coil only engages two of said plates, the third plate provided with an integrally formed extension for separating the ends of said coil and for retaining said ends in their supported position, clips engaging said means and adapted to engage the convolutions of said resistance coil to maintain said resistance coil in its supported position, mounting means having contact members secured thereto, and means for rotatably supporting said coil supporting means on said mounting means and to operatively associate said resistance element with said contact members, said contact members adapted to engage the extension on said third plate when the rheostat is in its normal position, but to disengage said extension and to engage said resistance element when in its operated position.

9. In a rheostat including a terminal member, a contact member secured to each side of said terminal member and in contactual engagement with said terminal member, said contact members extending substantially opposite each other, a mounting leg secured to each side of said terminal member but insulated from said contact members, said contact members extending between said legs, a resistance coil, mounting means comprising three plates and adapted to have said resistance coil mounted thereon, one of said plates having an integrally formed extension for separating the ends of said coil and for retaining said ends in position on said mounting means, a micrometrically adjustable shaft for rotatably supporting said mounting means and resistance coil between said mounting legs so that said contact members engage said extension when said rheostat is in normal position and to engage said resistance coil when said rheostat is in off normal position.

10. In a rheostat including a terminal member, a pair of contact members secured to said terminal member and separated from each other by said terminal member, a mounting leg secured to each side of said terminal member but insulated from said contact members, said contact members extending between said mounting legs, a resistance coil, a resistance coil carrying unit adapted to have said resistance coil secured thereon, said unit comprising three plates one of said plates having an integrally formed extension for breaking the circuit of said resistance coil and for maintaining the ends of said coil in position on said unit, means for supporting said unit between said mounting legs and said resistance coil in operative relation with said contact members, said contact members having a spring effect and of sufficient length to insure contactual engagement with said resistance coil when said rheostat is in its operated position and to disengage said resistance coil and to engage said extension when in its normal position.

11. A rheostat including a resistance wire, a supporting unit consisting of a plurality of elements, two of which contact with the wire, and holding means spaced on another of said elements and supported thereby for securing the resistance wire in place, said last element being substantially smaller in diameter than said other two elements and located between said two elements to form a receptacle for said resistance wire and to provide an air gap between said third element and the resistance wire.

12. A device of the character described including a mounting frame, a resistance element, a pair of contacts secured to said mounting frame, means including a plurality of disks, one of said disks being smaller in diameter and located between two other disks to form a receptacle for the resistance element and to provide an air gap between said first disk and said element, for rotatably supporting said resistance element on said mounting frame and in operative relation with said pair of contacts, said element resting in engagement with two of said disks, and means supported by another of said disks for maintaining said element in position against movement.

13. A device of the class described including a pair of contacts, a resistance element, members secured together to form a unit, said members including three disks, one of which is smaller in diameter and located between the other disks to form a receptacle for said resistance element and to provide an air gap between said element and said first disk, said resistance element secured to said unit and engaging only two of said members, holding means secured to

another of said members for maintaining said element in engagement with said two members against movement, and means for rotatably supporting said unit and said resistance element in operative relation with said pair of contacts.

14. A device of the character described including a plurality of plates secured together to form a single unit, a resistance element engaging only a pair of plates of said unit, one of said plates being smaller in diameter and located between the other plates to form a receptacle for the resistance element and to provide an air gap between the said element and center plate, a lug integrally formed with one of said plates, spring contacts, and means for rotatably securing said resistance element and unit in operative relation with said spring contacts, said spring contacts adapted to engage said resistance element to close a circuit therethrough, and adapted to engage said lug to open the circuit through said resistance element.

15. A device of the class described including a resistance element, a circular plate unit consisting of three plates one of which is smaller in diameter than the other two and is located between said other two to form a receptacle for the said resistance element and to provide an air gap between said element and said center disk, means for securing said resistance element to said plate unit, an extending portion for said plate unit, and means for rotatably supporting said plate unit and resistance element, and spring contacts for engaging said resistance element to close a circuit and to engage said extending portion to open said circuit.

16. A device of the character described including a mounting frame, a circular plate unit, a resistance element, means for securing said resistance element to said unit, said plate unit comprising three plates, one of said plates being smaller in diameter than the other plates and located between said other plates to separate the same to form a recess for the resistance element and to provide an air gap between the said element and center plate, an extension integrally formed with one of the plates of said unit, contacts secured to said mounting frame, means for rotatably supporting said unit and resistance element in operative relation with said contacts, said contacts engaging said resistance element to close a circuit and to engage said extension to open said circuit, and stop pins for limiting the degree of rotation of said resistance carrying unit.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 19th day of October, 1922.

ERNEST A. BOHLMAN.