Nov. 30, 1926. 1,608,525

E. F. POTTER

RHEOSTAT

Filed Oct. 21, 1922

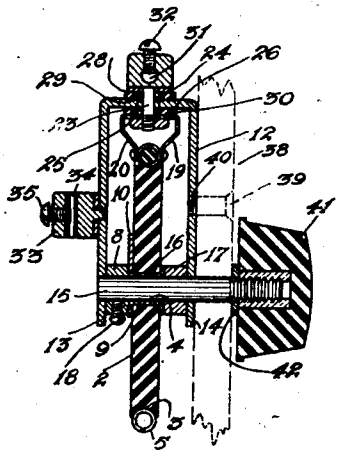

FIG. 3.

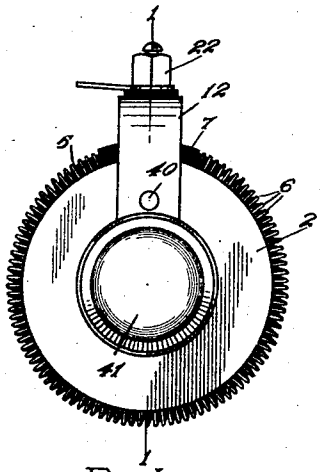

FIG. 1.

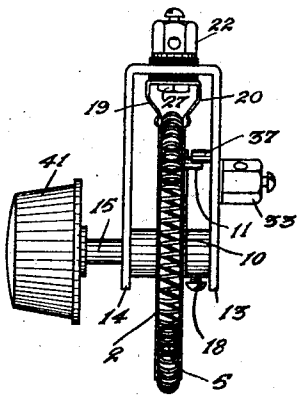

FIG. 2.

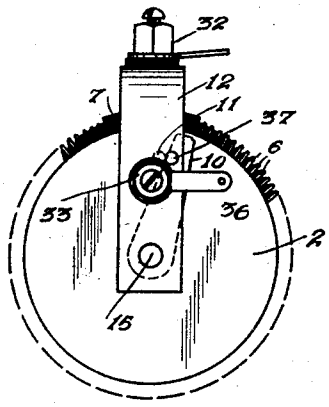

FIG. 4.

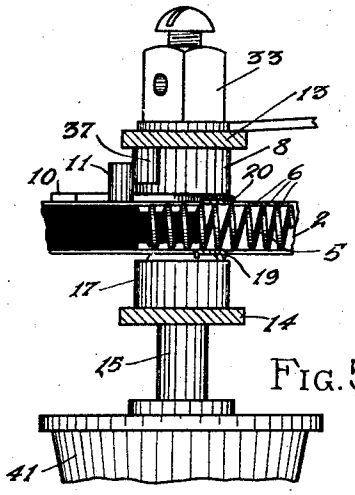

FIG. 5.

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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

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My invention relates to rheostats, such as are used for controlling the filaments of electron tubes.

An object of my invention is to provide a rheostat improved in its construction, and particularly in providing adjusting means for including the proper amount of resistance in the circuit in which my rheostat is employed. In rheostats prior to my invention, the contact wipers are arranged to include a full turn or convolution of the resistance coil between them, and when the rheostat is operated to increase or decrease the amount of resistance in the circuit in which the rheostat is used, the increase or decrease in the amount of resistance is effected by a complete turn of the turns or convolutions of the resistance coil. In other words, the resistance in the circuit is increased or decreased in steps of complete turns or convolutions of the resistance coil. This means of adjustment is objectionable in that it is difficult in some instances to obtain the proper amount of resistance in the operating circuit, and to overcome this objectionable feature I have designed a pair of terminals which permit an adjustment of the resistance in the operating circuit to be made in steps of half turns or convolutions of the resistance coil, that is, the resistance is increased or decreased in half turns of the resistance coil, and by this arrangement a finer adjustment of the amount of resistance in the operating circuit may be had. This feature will be more clearly understood from the ensuing specification.

Another feature of my invention is the provision of means whereby my rheostat may be secured to mounting plates or members of different thicknesses.

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

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

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

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

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

Fig. 5 is a view showing the resistance coil and contact wipers engaging the turns or convolutions thereof, together with other parts of my rheostat.

Referring now to the drawing, a flat, cylindrical, non-conducting member 2 having a peripheral arcuate shaped groove 3 and an orifice 4, is provided. A coil 5 of suitable resistance material having a plurality of turns or convolutions 6 engages the peripheral groove 3 and is drawn taut and secured in said groove 3 by having its ends extend through suitable openings in the member 2, and which ends are then turned back to prevent their removal. A non-conducting member 7 is provided, which has its end portions reduced and adapted to extend into the last few turns 6 of each end of the coil 5, the middle portion of the member 7 separating the two ends of the coil 5 from each other and also for engaging the contact wipers when in its normal position. A bearing member 8 having a reduced portion 9 is provided, said reduced portion being of the same length as the thickness of the member 2 and adapted to engage the orifice 4 in the cylindrical member 2. The diameter of the reduced portion 9 is slightly larger than the diameter of the orifice 4 in the member 2, so that a drive fit is afforded between the portion 9 and member 2. A plate 10 of conducting material having an orifice in its one end for receiving the reduced end portion 9 of the member 8, is secured on the reduced portion 9 between the member 8 and the side of the member 2, said plate 10 having an opening in its other end, to receive one end of the coil 5, which as before stated extends through an orifice in the member 2 and is then bent back. The plate 10 provides electrical connection between the resistance coil 5 and member 8. A stop pin 11 having a drive fit with a suitable orifice in the member 2 is provided, whose purpose will be explained later.

A U-shaped supporting frame 12 is provided between whose legs 13 and 14 is rotatably supported the coil carrying member 2 by means of a shaft or rod 15 which extends through suitable openings in the legs 13 and 14 and also through the opening 16 in the bearing member 8 and its reduced portion 9. A washer 17 of the same thickness as the thickness of the main body portion of member 8 is provided for receiving the shaft 15, said washer 17 separating the coil carrying

member 2 from leg 14 of the frame 12 while the enlarged portion of the member 8 separates the coil member 2 from the leg 13 of said frame 12. A set screw 18 is provided in the member 8 and adapted to engage the shaft or rod 15 to prevent endwise movement of said shaft or rod 15 to cause the coil carrying member 2 to rotate with the shaft 15 when the same is rotated.

To the inner face of the bridge portion of frame 12 connecting the legs 13 and 14 together in operative relation with the convolutions 6 of the coil 5 are secured the contact wipers 19 and 20 of my invention by means of the terminal 22 and nut 27. The contact wipers 19 and 20 are stamped out of a single flat piece of conducting material and are then turned back so that they are substantially opposite to each other but yet staggered enough so that a half of a convolution 6 of the coil 5 may be included between said contact wipers 19 and 20, as clearly illustrated in Fig. 5 of the drawing, and when the coil carrying member 2 is rotated, the contact wipers 19 and 20 engage and disengage the convolutions 6 of the resistance coil 5 in steps of half convolutions of the convolutions 6, as for example, a half convolution of a convolution 6 will engage the contact wipers 19 and 20, then another half convolution, making a full convolution 6 and as the member 2 is rotated the convolutions 6 engage the wipers 19 and 20 in like manner, viz, 1½, 2, 2½, 3, 3½, 4, 4½ convolutions, until the member 2 stops rotating. When the resistance in the operating circuit is desired to be increased, the resistance coil 5 is fed between the contact wipers 19 and 20 in steps of half convolutions of the convolutions 6, as just described above, thereby increasing the resistance in the circuit each time a half convolution of a convolution 6 engages said wipers 19 and 20. The resistance in the operating circuit is decreased in steps of half convolutions of convolutions 6 by rotating the coil carrying member in the opposite direction. By having the contact wipers staggered I am able to effect the engagement of a half convolution of a convolution 6 of the coil 5 with the contact wipers instead of a full convolution 6, as is the case in the prior art, thus giving a finer adjustment of the amount of resistance in the operating circuit in which my rheostat is employed. The contact wipers 19 and 20 are shaped to provide a spring effect for gripping the convolutions 6 of the coil so that a good contactual engagement is insured and also to prevent the disengagement of the said wipers and convolutions 6 of coil 5 from their adjusted engagement due to ordinary vibration or jarring.

The terminal 22 has a reduced screw-threaded portion 23, which reduced portion 23 extends through a suitable orifice 24 in the frame 12 and the portion 26 between the contact wipers 19 and 20, said terminal and contact wipers being secured in this position by the nut 27, which engages the bottom surface of said portion 26 and has screw-threaded engagement with the reduced portion 23 of terminal 22. The terminal 22 is insulated from the frame 12 by means of suitable non-conducting members 28 and 29, the contact wipers 19 and 20 and nut 27 being insulated from the frame 12 by a non-conducting member 30. The enlarged portion of the terminal 22 is provided with an opening 31 and a set screw 32 for receiving and securing a conductor thereto (said conductor not shown on the drawing) for purposes well known in the art. Another terminal 33, having an opening 34 and set screw 35 for receiving a conductor is provided, which terminal 33 is secured to a leg of the frame 12 by means of a screw-threaded reduced portion in engagement with a screw-threaded orifice in said leg. A terminal strip 36 is also provided, which has a suitable orifice for receiving the reduced portion of the terminal 33, said strip 36 being secured in position between the terminal 33 and frame 12. A stop pin or stud 37 is provided and suitably secured to one of the legs of the frame 12 and in the path of travel of the stop pin 11 secured to the member 2, so that when pin 11 is brought into engagement with said pin or stud 37 the further rotation of said member 2 in the same direction is prevented. The provision of the terminals 22 and 33 and terminal strip 36 is for purposes well known in the art, and no further description of the same is deemed necessary.

Referring now to the features whereby my rheostat may be mounted upon mounting members of different thicknesses, reference may be made to Fig. 3, in which I show a mounting member 38 in dotted lines having my rheostat mounted thereon by means of a screw 39 which extends through a suitable orifice in said mounting member and has screw-threaded engagement with an orifice 40 in the leg 14 of the frame 12. The screw-threaded end of the shaft 15 extends through a suitable opening in the mounting member 38 and has secured thereto a thumb and finger knob 41 by means of a screw-threaded engagement. A washer 42 engages the threads of the shaft 15 and rests between the inner face of the knob 41 and outer face of the mounting member 38, said washer adapted to rotate with the shaft 15. The set screw 18 engages the shaft 15 to prevent the endwise movement of the shaft 15 and also to prevent the shaft 15 from rotating within the member 8, so that when the knob 41 is rotated the shaft 15 and coil carrying member 2 is rotated there-

with. The coil carrying member 2 is permitted to be rotated in either direction until the stop pins 11 and 37 engage each other. By having the shaft 15 of my rheostat adapted to move in an endwise direction and by having the set screw 18 engaging the same, it is obvious that the shaft 15 may be adjusted in the frame 12 and to mounting members of different thicknesses, whereby the mounting of my rheostat is not limited to a mounting member of a certain thickness.

Having described the construction of my invention as illustrated in the drawing, it is to be understood that I do not wish to be limited to the exact structure as shown and described, as many changes and modifications will suggest themselves to those skilled in the art, but I aim to cover all that which 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 device of the class described including a mounting frame, a resistance element having a plurality of convolutions rotatably supported on said mounting frame, a pair of contact wipers secured to said frame and in operative relation with said resistance element, said contact wipers adapted to engage the convolutions of said resistance element in steps of a half convolution of said resistance element at a time when said resistance element is rotated.

2. In a device of the class described including a mounting frame, a resistance element having a plurality of convolutions rotatably supported on said mounting frame, a pair of contact wipers secured to said frame and in operative relation with said resistance element, said contact wipers arranged to engage a half of a convolution of said resistance element before a complete or full convolution of said resistance element is engaged.

3. In a device of the class described including a mounting frame, a resistance element having a plurality of convolutions rotatably supported on said mounting frame, a pair of integrally formed contact members for operatively engaging the convolutions of said resistance element, secured to said frame, said contact members arranged to engage the resistance element by a half of a convolution at a time when said resistance element is rotated.

4. In a device of the class described including a mounting frame, a non-conducting plate rotatably supported on said mounting frame, a resistance element comprising a plurality of convolutions secured to said non-conducting plate, a non-conducting member for engaging the last few convolutions at each end of said resistance element to separate said ends from each other, a pair of contact members secured to said frame and adapted to engage the convolutions of said resistance element when rotated, said contact member engaging said non-conducting member when said plate is in its normal position, and means for rotating said plate to bring the convolutions of the resistance element into engagement with the contact wipers by a half of a convolution of said resistance element at a time.

5. In a rheostat as described including a supporting frame, a round plate having a convolutely formed resistance element secured thereto, a shaft for rotatably supporting said plate on said supporting frame, said shaft being adjustable to permit said rheostat to be mounted on members of different thicknesses, and a pair of contact members secured to said supporting frame and adapted to engage a half of a convolution of said resistance element at a time when said plate is rotated.

6. A device of the class described including a supporting frame, a non-conducting member provided with a circumferential groove, a resistance element secured in said circumferential groove, means for rotatably supporting said non-conducting member on said frame, and a pair of contacts secured to said frame and staggered relative to each other for engaging a small portion of said resistance element.

7. A device of the class described including a mounting frame, a resistance element comprising a plurality of convolutions rotatably supported on said mounting frame, and a pair of contacts secured to said mounting frame for engaging said resistance element, said pair of contacts off-set relative to each other so that said contacts will engage only a half turn of a convolution of said resistance element at a time.

8. A device of the class described including a mounting frame, a resistance element rotatably supported on said mounting frame, a pair of integrally formed contacts for engaging said resistance element, said contacts being staggered relative to each other for permitting an infinitesimal portion of said resistance element to be engaged by said pair of contacts.

9. A device of the class described including a mounting frame, a pair of contacts secured to said frame, a resistance element comprising a plurality of convolutions, means for rotatably supporting said resistance element on said frame and for rotating said resistance element between said pair of contacts, said pair of contacts being arranged to engage a half of a convolution of said resistance element at a time.

10. A device of the character described including a mounting frame, a non-conducting

circular member, a resistance element secured to the circumferential face of said member, a non-conducting element for engaging and separating the ends of said resistance element, a pair of contacts, means for rotatably supporting said circular member on said frame and said resistance element and non-conducting element in operative position relative to said pair of contacts, said pair of contacts arranged relative to each other so as to engage a half of a convolution of said resistance element at a time to close a circuit therethrough and also adapted to engage said non-conducting element to open a circuit through said resistance element.

11. A device of the character described including a mounting frame, a resistance element formed into a plurality of convolutions, means for rotatably supporting said resistance element on said frame, a non-conducting member for engaging and separating the end convolutions of said resistance element, and a pair of contacts secured to said mounting frame and arranged relative to each other so as to engage the convolutions of said resistance element in steps of one half convolutions at a time to include all or any number of said convolutions in circuit, and adapted to engage said non-conducting member to remove all of said convolutions from circuit.

12. A device of the class described including a mounting frame, a resistance element formed into a plurality of convolutions and rotatably supported on said mounting frame, a non-conducting member for engaging and separating the end convolutions of said resistance element, and a pair of contacts secured to said frame and adapted to engage said resistance element so that said resistance element is included and excluded in circuit by a half of a convolution at a time, said pair of contacts adapted to disengage said resistance element and to engage said non-conducting member to remove said resistance element from circuit.

13. A device of the class described including a mounting frame, a non-conducting member provided with a circumferential groove, a resistance element secured in said groove, a non-conducting element engaging a portion of said groove for engaging and separating the end portions of said resistance element, a pair of contacts adapted to engage said resistance element and said non-conducting element at different times, means for rotatably supporting said non-conducting element upon said frame, and for rotating said resistance element into engagement with said contacts to include said resistance element in circuit by degrees, and also adapted to rotate said non-conducting element into engagement with said pair of contacts and said resistance element out of engagement with said contacts to open a circuit.

14. A device of the class described including a mounting frame, a helically formed resistance element rotatably supported on said frame, a non-conducting member for engaging and separating the ends of said resistance element, spring contacts secured to said frame, means for rotatably supporting said resistance element and non-conducting member on said mounting frame and in operative relation with said contacts, and stop pins for controlling the degree of rotation of said resistance element, said contacts arranged relative to each other so as to engage said resistance element in steps of one half of a convolution at a time to close a circuit and to engage said non-conducting member to open said circuit.

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

EARL F. POTTER.