Oct. 29, 1929. R. M. HEINTZ 1,733,984

RHEOSTAT

Filed Oct. 2,.1923

FIG. 1.

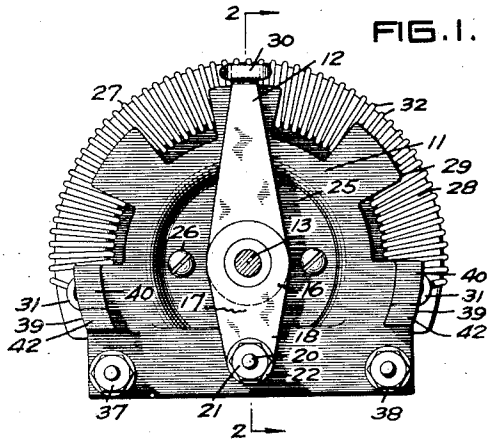
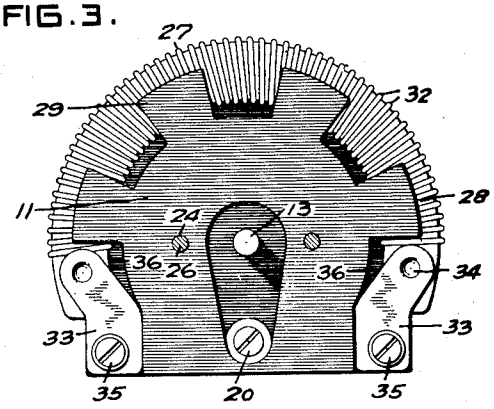


FIG. 3.



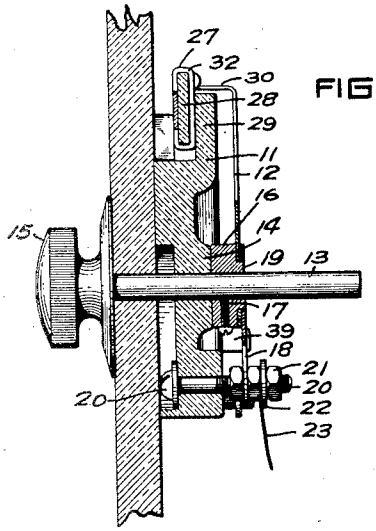


FIG. 2.

FIG. 4.

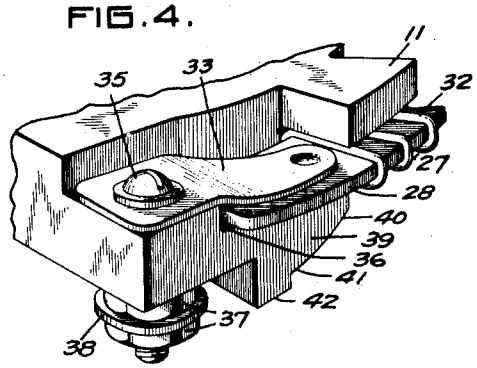
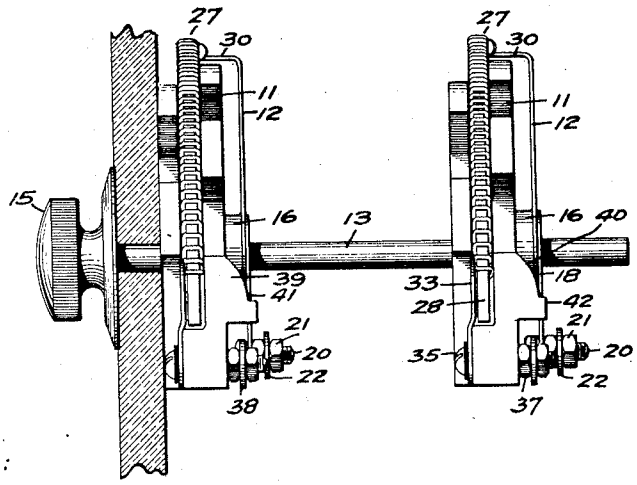


FIG. 5.



WITNESS:
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UNITED STATES PATENT OFFICE

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RHEOSTAT

Application filed October 2, 1923. Serial No. 666,154.

This invention relates to a rheostat, and more particularly to one in which the resistance is variable by the aid of a switch arm directly engaging the resistance element.

It is one of the objects of my invention to improve in general the construction of this type of rheostat.

Another object of my invention is to make it possible to substitute resistance elements in the rheostat so as to permit it to operate on a variable range. This feature is of especial utility where the rheostat is to be used for example in connection with radio apparatus to control the filament heating current of a thermionic detector, amplifier, or oscillator. There is a variety of such thermionic devices on the market, some requiring a relatively low resistance of say a few ohms, while still others require for proper control, a resistance as much as 20 or 30 ohms. Furthermore, it is sometimes desirable to provide a very much greater resistance of a few hundred ohms, to operate as a potentiometer. With the aid of my invention, it requires only a simple and short operation to remove a resistance element from the rheostat and insert another in its place.

It is still another object of my invention to provide a novel form of resistance element.

Still another object of my invention is to make it possible in a very simple manner to operate as many rheostats by a common operating member as desired, so that they may be all simultaneously varied.

My invention possesses other advantageous features, some of which, with the foregoing will be set forth at length in the following description, where I shall outline in full that form of my invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. Although I have shown in the drawings but one form of my invention, I do not desire to be limited thereto, since the invention as expressed in the claims may be embodied in other forms also.

Referring to the drawings:

Figure 1 is a front elevation of a rheostat embodying my invention;

Fig. 2 is a sectional view taken along plane 2—2 of Fig. 1;

Fig. 3 is a rear elevation of the same;

Fig. 4 is a perspective view of a portion of the resistance element as held within the rheostat, and the contact clips used for this purpose; and

Fig. 5 is a side view of a plurality of rheostats built according to my invention and operated by a common means.

The main support for the operating parts of the rheostat consists of a spider-like element 11, which is preferably made from insulating material, such as bakelite. Upon this member 11 is movably supported a contact arm 12, in this case shown as rotatably mounted, as by the aid of a shaft 13 passing through the hub 14 (Fig. 2) integrally formed on sopport 11. To this shaft 13 may be fastened any appropriate handle or thumb device 15. The shaft 13 is adjustable axially as regards the arm 12, which for this purpose carries a collar or hub 16, engaging with hub 14 of support 11. A set screw 17 or other fastening means serves to hold the shaft 13 to the collar 16, and thereby to complete the mechanical connection between this shaft and the arm 12.

The collar 16 is held against axial movement with respect to the hub 14 by the aid of a spring finger or connection 18. This connection is rotatably attached to collar 16 and adjacent the arm 12, by upsetting a projection 19 of this collar, which projection extends through both the arm 12 and the member 18, as most clearly shown in Fig. 2. It is evident that as arm 12 is rotated by the aid of shaft 13, there is a rubbing contact between the arm and the member 18; I prefer for this reason to utilize this member 18 as a connection to arm 12. The member 18 is stationarily supported on member 11, as by the aid of the screw 20 and the nuts 21. The screw head is disposed in a counterbore on the rear of the support 11, so that the head may not project above the rear surface of the support, and interfere with its mounting. These nuts and the screw, as well as the washer 22, may thus conveniently serve as one binding post for the rheostat, to which

binding post appropriate electrical connections, such as the wires 23, may be led.

The entire rheostat may be supported either on the front or the back of a panel, by the aid of appropriate fastening devices 26 passing through apertures 24 in support 11. These apertures are preferably located in the thin portion 25 of support 11. This portion is depressed below the main surface of the support 11, so that the heads of the fastening devices may easily clear the arm 12 as it is rotated for varying the resistance.

The resistance element 27 in the present instance is shown as made in the form of a flat coil of wire 32 wound on a thin insulation member or strip 28 of arcuate form. It is supported on member 11 in a position where it is substantially concentric with the axis of rotation of arm 12. For this purpose the support 11 is provided with two series of radial projections 29 forming an interrupted peripheral groove in which the element 27 is placed. The outer portion of the element is exposed entirely so that the spring contact point 30 of the contact arm 12 may sweep over it. It is furthermore to be noted that the radial projections or fins 29 are staggered on each side of the slot formed in the rim between them. This is of importance, since such a construction permits efficient ventilation, and the current carrying capacity of the element 27. This effect is increased by arranging the element 27 so that its inner surface is spaced slightly away from the bottom of this deep peripheral groove.

In order to support the element 27 properly in place between the projections or fins 29, this element may be provided with metallic eyelets 31, one near each end of the element. These eyelets I also use as the terminals of the element; for this purpose the ends of the wire coil 32 are in electrical contact with these eyelets. In order that a simple manual operation may suffice to fasten the element 27 between the fins 29, or to remove it, I make use of a pair of resilient elements 33, shown most clearly in Figs. 3 and 4. These form in fact spring contact arms, either or both of which may form appropriate terminals for the rheostat. A slight boss or projection 34, formed preferably by being struck up from these arms, is adapted to spring into the corresponding eyelet 31 and thereby to hold the element 27 against accidental removal.

The contact arms 33 are supported on member 11 by the aid of fastening devices 35 such as screws passing entirely through the member 11. The free ends of arms 33 are permitted to urge the element 27 resiliently against the surface 36 of member 11, which surface forms a continuation of one side of the interrupted peripheral groove. This construction is best understood from a consideration of Fig. 4. The screws 35 form binding posts on that side of the device where the contact arm 12 is supported, and for this purpose are provided with appropriate nuts 37 and washers 38. Either one or both of these binding posts may be used; thus if the left hand post 35 only be used, it is evident that a clockwise rotation of arm 12 will serve to increase the resistance included between post 20 and this left hand post 35; whereas if the right hand post 35 be used, a clockwise rotation of arm 12 will serve to decrease the resistance included between it and post 20. When using the device as a potentiometer, both of the posts 35 are active, the arm 12 then serving to vary the point of connection to the resistance from an outside circuit.

When using such a rheostat in the filament heating circuit of a thermionic device, it is advisable to ensure that at the end of the travel of arm 12, the resistance element will be entirely disconnected. To secure this result, I provide an arrangement whereby at either end of its travel, the arm 12 is lifted off the resistance element 27. To effect this result, there are a pair of raised bosses or projections 39 formed preferably integrally with the support 11, and disposed in the path of travel of the arm 12. There is an inclined portion 40 which the arm 12 first engages, and on continued movement, the cam action serves finally to place the arm 12 on the high flat part 41. In this position the contact point 30 is raised off the element 27. There is sufficient resiliency in arm 12 to permit the projection 39 to operate on it in this manner. Furthermore a stop 42 may also be provided on each of the projections 39 to limit the movement of the arm 12.

The rheostat as thus described has many advantages. It is simple to manufacture, and easy to operate. One of the most important is the ready detachability of the element 27, and its replacement by another element of different resistance. To accomplish this, it is necessary to exert a pull on the element 27 away from the groove in which it is disposed. This causes disengagement between the eyelets 31 and the projections 34. On reinsertion, these projections snap into the eyelets. The resilient arms 33 have their ends slightly upturned to facilitate this reinsertion.

The rheostat may very conveniently be operated in gangs of two or more, as shown diagrammatically in Fig. 5, by providing a common operating shaft for all of them. The corresponding resistance elements may be connected in any desired fashion as necessity dictates.

I claim:

1. In a rheostat, the combination of a resistance element having terminals, a support for said element, resilient contact elements on the support for detachably engaging the terminals, said contact elements being mounted to exert pressure on said resistance element to hold the latter releasably in place and permit

its removal, and a contact arm adapted to move along and engage the element at various points along its length and connect a variable portion of said element in circuit.

2. In a rheostat, the combination of a resistance element of arcuate form, a correspondingly shaped support having a slot in the rim thereof, said element having terminals, resilient contact elements mounted on the support to detachably engage the terminals whereby the resistance element can be removably mounted on the support, said contact elements being mounted to exert pressure on said resistance element to hold the latter releasably in place and permit its removal, and a contact arm to engage the resistance element and connect a variable portion thereof into circuit.

3. In a rheostat, the combination of a resistance element of arcuate form, a correspondingly shaped support therefor, said support having a groove in the rim thereof formed of projections on the support, said projections at one side of the support being staggered with respect to those at the other side, a material portion of the surface of said element being exposed, and said element having terminals, resilient contact elements on the support for detachably engaging the terminals and permitting the resistance element to be removably mounted on the support, and a contact arm for engaging the resistance element and connecting a variable portion thereof into circuit.

In testimony whereof I affix my signature.

RALPH M. HEINTZ.