June 5, 1928.

1,672,414

C. HORTON

RHEOSTAT

Filed July 3, 1925

Fig. 1.

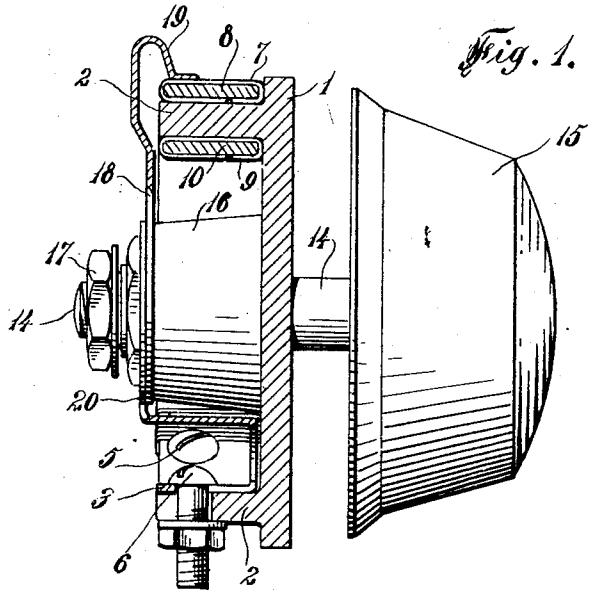


Fig. 3.

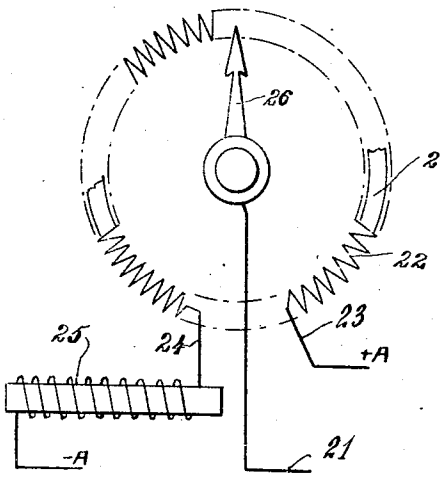
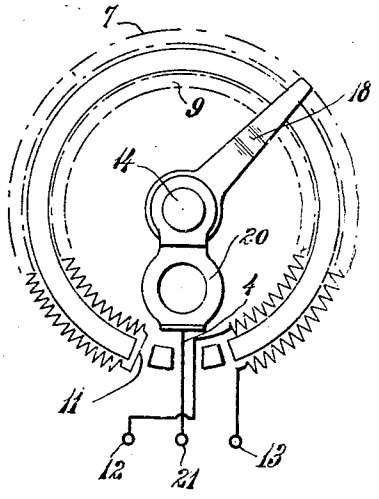


Fig. 2.



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RHEOSTAT.

Application filed July 3, 1925. Serial No. 41,254.

This invention relates to a novel form of rheostat particularly for use in radio reception devices.

It is well known that in a present radio reception apparatus there is a considerable disturbance caused by extreme oscillations in the vacuum tubes, which oscillations cause the tube to be more or less paralyzed. In order to correct this inherent disadvantage in radio reception there has been applied various forms of neutralizers for the oscillation by means of external electro-motive force which electro-motive force is impressed on the grid wherein the signals are received. The method applied for carrying this process out is the so called grid-bias method which method is carried out by the use of a potentiometer.

In the potentiometer method, the control for the resistance placed across the grid is carried on by means of a rheostat which rheostat generally operates to bring about a small drop in the voltage by the application of resistance of 200 to 300 ohms connected across the terminals of the "A" battery and an adjustable contact connected to the grid.

A well known rheostat, as above stated, is adapted to be formed of a 200 or 300 ohm resistance and consequently, usually being circular in form, will necessitate a very infinitesimally small movement of the adjustable contact thereon to produce a sufficient voltage drop to prevent the oscillation. Usually the reduction of the grid bias required to prevent oscillation is about one-half a volt and ordinarily the amount of movement of the contact required to produce this drop in potential is less than one-eighth of the total length of the resistance element. As a result thereof a fine regulation of the grid potential by a considerable movement of the rheostat is not possible and as a result thereof the percentage error due to the mechanical action of the operator is considerably greater than should be allowable in radio reception.

It is the purpose of this invention to provide a novel form of rheostat containing the required 200 or 300 ohm resistance, but being so arranged that the connection between the grid and the filament, has interposed therebetween only a 30 volt adjustable resistance, that is, a comparatively small portion of the total resistance of the rheostat in the potentiometer element is adapted in controlling the grid bias.

Among the objects of the invention it is aimed to provide a novel form of resistance in the form of a rheostat wherein a plurality of interconnected resistances are applied, but in which a proportionally small resistance is interposed for cooperation between the elements requiring a small potential difference; to provide a novel form of rheostat wherein the elements are compactly positioned in association with one another; to provide line of demarcation between the respective high and low resistance coils whereby each of the same will be independently controllable; to provide the coil of similar resistance applicable so as to occupy a considerable length whereby an adjustable contact cooperating therewith, will be movable a considerable distance to indicate smaller changes of resistivity whereby there will be a small quite negligible mechanical operation percentage error; and to provide a simple and yet novel readily controllable combined resistance application as an oscillation control biasing the grid.

Specifically it is aimed to provide a novel form of resistance element in the form of a rheostat wherein the resistance is formed of two sections each of which occupies a similar amount of space and which are interconnected, one of which elements or sections is considerably lower in resistivity whereby to allow for a considerable movement of the controlling element in contact therewith for but small change of resistance in the current in which the element is contained.

Still further it is aimed to provide a novel form of arrangement of the resistance elements in coil form, concentric to one another whereby the elements are properly insulated from one another so as to consequently occupy considerably small volume.

Still further it is aimed to provide the resistance element in the rheostat consisting of a plurality of resistances in series of which one of the resistances is considerably lower than the other and which resistance serves to provide the small potential drop necessary to control the grid bias for preventing oscillations in the vacuum tube.

Still further it is aimed to provide a novel form of rheostat wherein the total resistance of a plurality of elements of different

resistivity is equivalent to the resistance generally used in the single rheostat applied in potentiometers for controlling the grid bias.

Still further it is aimed to provide a simple structural arrangement of elements capable of providing a small potential drop in a grid circuit without a grid deviation from the required drop in the potential due to the mechanical properties of the resistance; in other words, to provide for a greater field of movement of the grid voltage control bringing about a small change in the potential across the grid.

These and other advantages, capabilities, and features of the invention, will appear from the subjoined detailed description of one specific embodiment of the invention as illustrated in the accompanying drawings in which

Fig. 1 is a side elevation partly in section, of the subject matter of the invention; and

Fig. 2 is a plan view, partially diagrammatic of the preferred form of the invention; and

Fig. 3, a plan view partially in section, of a still further modification of the invention.

Referring more particularly to the reference characters in the drawing, the numeral 1 indicates the insulated base of the rheostat, which base has projected therefrom and at a short distance from its outer periphery a cylindrical annular ring as numeral 2; having cut out portions 3 at its end extremity for the positioning of contact element 4, and resistance clamping elements 5 and 6.

The resistance elements in this rheostat consist of two independently formed resistance members, one of high resistivity, that is, 170 ohms, and the other of lower resistivity, that is, having a resistance of about 30 ohms. These resistance elements consist of fine wires wound about intercontacting core elements.

Referring particularly to Figs. 1 and 2; the outer resistance which is approximately 30 ohms consists of a fine wire 7, wound about an insulated core 8, which element is positioned on the insulated base concentric, adjacent and surrounding the annular ring member 2. The higher resistance element of approximately 170 ohms is similarly formed of a small wire 9, wound about an insulated core 10 and positioned on the base 1, concentric with the annular member 2 but along the inner periphery of said annular member. In other words, both resistance elements are concentric to one another and to the insulated ring 2.

In order to fasten the two resistance elements together applicant has provided apertures in the extremities of each of said core members 8 and 10 through which pass the bolt members 5 and 6 positioned in the openings 3, along the annular ring on the base of the rheostat.

As shown in Figs. 1 and 2, the resistance elements are interconnected in series as at 11, by splicing or soldering the extremities of the resistances 7 and 9. The other extremities of the resistance elements are connected respectively to the plus and minus terminals 12 and 13 respectively of the "A" battery. In other words, an adjustable contact may be provided to lead to other of the resistances in series, whereby the small deviation of said contact leading to the grid element will produce a large or small drop in voltage depending on whether the contact is with the low resistance element exterior to the annular ring, or to the high resistance element positioned interior of said annular ring.

In a central portion of base member 1 there is positioned a shaft element 14 having on its outer extremity an indicator dial 15 for rotating the shaft. This shaft passes through the hub member 16 formed integral with the base member 1 and has attached thereto at its outer extremity, a bolt member 17 which bolt member presses down firmly and touches the adjustable contact 18. This contact member consists of a copper or other conduct plate offset so as not to contact with the inner resistance 9 and having a bent over portion 19 at its outer extremity for positively contacting with the low resistance element 7. This contact member is fixed so as to constantly rotate with the shaft member 14 upon the movement by the operator of the dial member 15.

On the hub there is fixed a contact member 20, bent over in the form of a U which member is in constant contact with the member 19 so as to form a conductor so as to conduct the current tapped off in the resistance at 20 through a contact 4, to the grid element 21.

Referring particularly to Fig. 3, it is noted that this same result may be produced with a single resistance element 22 concentric to the annular ring 2, but having attached at one extremity thereof a terminal lead to the plus terminal of the "A" battery at 23, but having its opposite end 24 connected to the high resistance element 25 in series, which high resistance element is then connected to the minus terminal of the "A" battery. The adjacent contact or pointer element 26 may be actuated by the rotation of the dial 15 to contact at any point along the periphery of the low resistance element 22 whereby the appreciable angular movement of said pointer will produce a small drop in the grid circuit.

It is well within the province of the inventor to vary the locations of the respective low and high resistance elements as ap-

plied in a grid circuit, since the particular forms herein indicated in the specification are but two of the many ways for producing the same result.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims.

What I claim is:

1. A rheostat consisting of a cylindrical annular insulated support, a shaft passing therethrough, a conductor element on said shaft, a plurality of resistance elements one on each side of said annular support and connected to one another in series the resistances having considerably different resistance values, the said conductor element being in contact with the resistance element having the lower resistance value whereby considerable movement of said conductor element is required to produce a slight change in resistance in a radio circuit.

2. In a rheostat, the combination with a cylindrical annular insulated support, of a hub positioned thereon, a shaft passing through said hub, a conductor element on said shaft, means for rotating said shaft, a plurality of resistance elements, one on each side of said annular support and connected to one another the said resistances having considerably different resistance values, the said conductor element being in contact with the resistance element of lower resistance value whereby considerable movement of said conductor element upon actuation of said shaft is required to produce a slight change in the resistance.

3. In a rheostat, the combination with a plurality of fixed resistance elements of considerably different resistance values, concentric to and in series with one another, of a movable conductor element in adjustable contact with the resistance element of lower resistance value, whereby to vary the resistance in a radio circuit.

4. In a rheostat, the combination with a cylindrical annular insulated support of a hub positioned centrally thereof, a shaft passing through said hub, a conductor element fixed to said shaft and extending perpendicularly therefrom; means for rotating the said shaft, a plurality of resistance elements, one on each side of said annular support and connected with one another and having considerably different resistance values, a resilient offset projection at the extremity of said conductor element and contacting with the resistance element of lower resistance value, whereby considerable movement of said conductor element upon actuation of said shaft, is required to produce the slight change in resistance.

5. In a rheostat, the combination with a cylindrical annular insulated support member, of a plurality of fixed resistance members, one on each side of said annular member, and connected in series with one another the said resistances having considerably different resistance values, a hub positioned centrally of said insulated support, a shaft passing through said hub, a plurality of conductors associated with said shaft, one of said conductors being fixed to said shaft and rotatable therewith, to contact with the resistance element of lower resistance value, and the other conductor fixed to a U-shaped clip in contact with, but not actuated upon motion of said shaft, whereby considerable movement of said conductor element upon actuation of said shaft, is required to produce the slight change in resistance.

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