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RHEOSTAT

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Fig. 1.

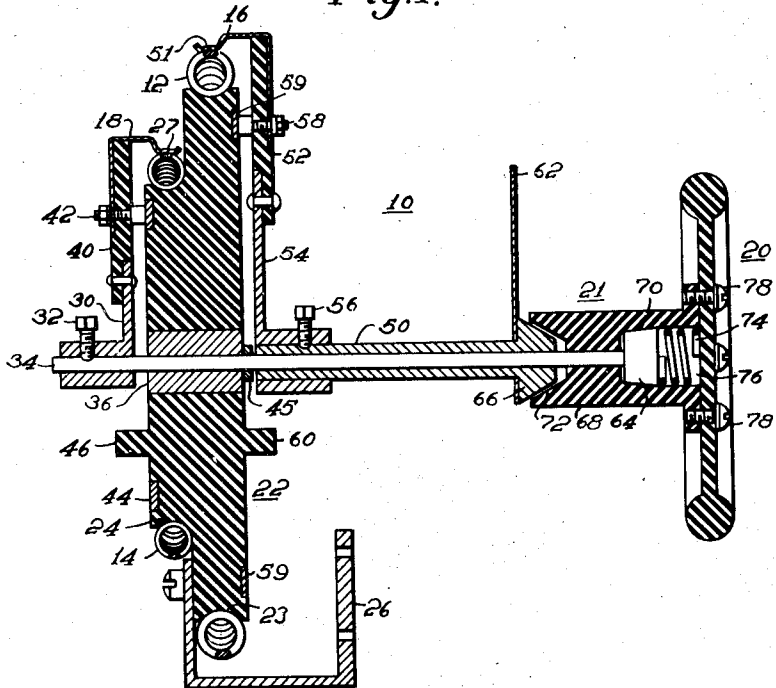
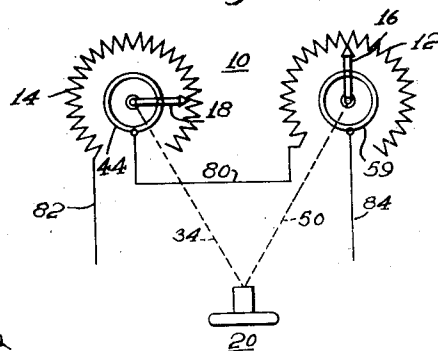


Fig. 2.



WITNESSES:

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RHEOSTAT

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2 Claims. (Cl. 201—55)

My invention relates, generally, to rheostats, and it has reference in particular to multiple element rheostats.

Generally stated, an object of my invention is to provide a multiple-element rheostat that is inexpensive to manufacture and simple to operate.

More specifically, it is an object of my invention to provide for selectively operating the contact members of the main and auxiliary elements of a rheostat.

Another object of the invention is to provide for selective operation of the main and auxiliary contact members of a multiple element rheostat by a common handle which is normally connected to one of the contact members.

A further object of the invention is to provide in a simple effective manner for operating the contact members of the main and auxiliary resistance elements of a rheostat by a single operating handle so as to permit the disconnection of the handle from the contact member of either element and its connection to the contact member of the other element in any position.

Other objects will, in part, be obvious, and will, in part, appear hereinafter.

In accordance with my invention, a multiple element rheostat may comprise, generally, a main resistance element, and an auxiliary vernier resistance element for effecting fine adjustments of the resistance in the circuit which is to be controlled. The contact members for the resistance elements may be mounted on coaxially related shafts provided with conical clutch members positioned in spaced relation. A common operating handle having clutch engaging surfaces may be so mounted on one of the shafts as to be actuable to engage either of the clutch members. A spring may be utilized for normally biasing the handle into position for operating the contact member of the vernier resistance element. By merely actuating the handle against the force of the spring, it may be positioned for operating the contact member of the main element.

For a more complete understanding of the nature and scope of my invention, reference may be had to the accompanying drawing, in which:

Figure 1 is a sectional view of a rheostat embodying the principal features of the invention; and

Fig. 2 is a schematic diagram of the rheostat of Fig. 1 showing one method of making electrical connections thereto.

Referring particularly to Fig. 1, the reference numeral 10 denotes, generally, a multiple ele-

ment rheostat comprising, for example, a main resistance element 12 and an auxiliary vernier resistance element 14. Slidable contact members 16 and 18 may be provided for making contact with the resistance elements 12 and 14, respectively, being actuated by a common handle 20 through clutch means 21.

The resistance elements of the rheostat 10 may be of any suitable nature and mounted in any manner well known in the art. For example, the resistance elements 12 and 14 may comprise elongated coils of any suitable resistance material secured to a base member 22, being, for example, positioned in concentrically spaced peripheral grooves 23, 24, respectively, about the circumference of the base member, which may be made of a suitable insulating material. Means, such as the bracket 26 may be provided for supporting the base member 22.

The main resistance element 12 preferably comprises a relatively high resistance material so that by moving the contact member 16 therealong, a relatively wide range of values of resistance may be included in the circuit which is to be controlled. The auxiliary or vernier resistance element 14 may comprise a material of lower resistance, so that by sliding the contact member 18 therealong, relatively small changes in the resistance of the circuit to be controlled may be made.

The contact member 18 may be mounted in any suitable manner for slidably engaging the auxiliary resistance element 14. For example, the contact member 18 may be provided with an end portion having an indent 27 conforming to the surface of the resistance element 14 so as to make the contact member self-aligning and prevent axial movement thereof. The contact member may be mounted on a rotatable arm 30 secured by means of a set screw 32 to a shaft 34. A bushing 36 may be positioned in the base or body member 22 to provide a bearing or guide for the shaft.

In order to effect suitable electrical connection to the contact member 18, the contact member may be insulated from the support arm 30 by means of suitable interposed insulation 40, and means, such as the contact member 42, may be provided for slidably engaging a collector ring 44 on the body member 24. Additional means may also be provided for preventing axial movement of the shaft 34, such as, for example, a collar 45, which may be so secured thereto in any suitable manner so that the contact members 18 and 42 will be maintained in the proper engage-

ment with the resistance element 14 and the collector ring 44, respectively. The contact member 18 may thus be slidably moved along the vernier resistance element 14 in either direction until the support arm 30 strikes the stop member 46 which projects from the body or base member 22.

For the purpose of supporting the contact member 16 for slidable engagement with the main resistance element 12, suitable means may be provided for mounting the contact member 16 in a manner similar to that in which the contact member 18 is mounted. For example, a tubular shaft 50 may be provided which is rotatably mounted on the shaft 34. The contact member 16 may be provided with an end portion having an indent 51 conforming to the contour of the resistance element 12 so as to make the contact member self-aligning therewith and prevent axial movement thereof. The contact member may be secured to suitable insulation 52 so as to be supported by a radial support arm 54 and insulated therefrom. The arm 54 may be secured to the shaft 50 in any manner well known in the art, such as by means of a set screw 56.

Suitable means such as the contact member 58 may be provided for slidably engaging a collector ring 59 on the body or base member 22 of the rheostat for making electrical connections to the contact member 16. Means such as a projecting stop 60 on the base member 24 may be provided for limiting the rotation of the arm 54, and a pointer 62 may be provided on the shaft 50 for indicating to the operator the position of the contact member 16 for the main resistance element, which is usually positioned on the other side of a panel from the operator. The collar 45 on the shaft 34, in addition to preventing axial movement of the shaft 34 serves as a spacer and prevents axial displacement of the shaft 50 when the handle 20 is connected thereto.

For the purpose of selectively actuating the shafts 34 and 50 so as to actuate the contact members 18 and 16 of the vernier and main resistance elements, respectively, the handle 20 may be associated with clutch means 21. Accordingly, the shafts 34 and 50 may be provided with suitable clutch members such as, for example, the alternatively acting, oppositely disposed conical clutch members 64 and 66, respectively. The handle 20 may be secured to a hub member 68 (constituting a part of clutch means 21), which is rotatably mounted on the shaft 34. The hub 68 encloses and is provided with means for engaging the conical clutch members 64 and 66, such as, for example the conically-shaped recesses 70 and 72 at the opposite ends thereof. Preferably, the slope of the side walls of the recesses 70 and 72 should be such that the angle between them is either slightly less or slightly greater than the angle between the sloping surfaces of the clutch members 64 and 66, so as to obtain a wedging action therebetween to insure sufficient frictional engagement between the surfaces. If desired, the surfaces of the recesses or the clutch members, or both, may be slightly roughened by sand blasting or suitably machining them to increase the frictional engagement therebetween and insure positive operation of the contact members.

In order to effect selective engagement of the handle 20 with the clutch members 64 and 66, the axial distance between the recesses 70 and 72 may be slightly less than the distance between the conical clutch members. Thus, when the

conical clutch member 64 is in frictional engagement with the side walls of the recess 70, there will be sufficient clearance between the clutch member 66 and the side walls of the recess 72 to freely permit rotation of the hub member 68 with respect to the clutch member 66.

With a view to providing normally for the connection of the handle 20 to the clutch member 64; so as to provide for operating the contact member 18 of the vernier resistance element 14, suitable means may be provided for so biasing the hub member 68 that the side wall of the recess 70 is normally in frictional engagement with conical clutch member 64. For example, a spring 74 may be so positioned in a recess 76 (forming a continuation of recess 70) at the outer end of the hub member 68 that when the handle 20 is secured to the hub member by means of the screws 78 the spring 74 is sufficiently compressed to force the hub member 68 in an axial direction to cause the conical clutch member 64 to frictionally engage the side walls of the recess 70.

In Fig. 2 one manner of connecting the main and vernier resistance elements for controlling the resistance of a circuit is illustrated. The vernier resistance element 14 may be connected in series circuit relation with the main resistance element 12 by means of a conductor 80 which connects the collector ring 44 to one end of the resistance element 12. External circuit connections may be made by means of the conductors 82 and 84 to one end of the resistance element 14 and to the collector ring 58 of the contact member 16.

In order to control accurately the resistance in such external circuit, the operating handle 20 may be actuated inwardly in an axial direction against the spring 74 so that the clutch member 64 is released and the side walls of the conical recess 72 frictionally engage the conical clutch member 66. The handle 20 may then be operated in either direction to move the contact member 16 along the main resistance element 12 until the approximate amount of resistance it is desired to include in the circuit has been inserted. By releasing the axial pressure on the handle 20 and allowing the spring 74 to move the handle 20 outwardly to its normal axial position into frictional engagement with the clutch member 64 (as illustrated in Fig. 1), the contact member 18 of the auxiliary or vernier resistance element 14 may then be operated by handle 20 in either direction until the arm 30 strikes the stop 46 to effect relatively fine adjustments of the resistance in the external or controlled circuit. The transfer of the handle 20 from an operating connection with either of the contact members 16 or 18 to an operating connection with the other contact member may thus easily be made in any position, so that relatively coarse or relatively fine adjustments of the resistance in the controlled circuit will be easily made.

From the above description, taken in connection with the accompanying drawing, it will be apparent that I have provided by my invention a simple and effective manner of selectively operating the contact members of a multiple element rheostat. A transfer of the single operating handle from operating connection with one of the contact members to operating connection with the other of the contact members may be made in any position, so that accurate adjustment of the resistance in the associated control circuit may always be had. A multiple element rheostat embodying the features of my invention

is simple and inexpensive to manufacture, may be easily installed, and is positive and fool-proof in operation.

Since certain changes may be made in the above description and the accompanying drawing, 5 and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all the matter contained in the above description or shown in the accompanying drawing shall be considered as il- 10 lustrative and not in a limiting sense.

I claim as my invention:

1. The combination, in a rheostat, of a main resistance element having a contact member operable to vary the amount of said resistance in 15 a circuit in relatively large steps, an auxiliary vernier resistance having a contact member for varying the amount of said resistance in the circuit in relatively small steps, a pair of independently rotatable coaxial shaft members for 20 actuating the contact members each having a clutch member positioned thereon, said clutch members being associated in spaced and opposed relation, a handle supported by one of said shaft

members having an additional clutch member positioned between the said clutch members axially movable in any position to engage only one or the other of the clutch members, and means normally biasing the handle to engage one of the clutch members.

2. A rheostat comprising a main resistance element, an auxiliary resistance element connected in series circuit relation therewith, a rotary contact member for each of the elements, a pair of coaxial shafts connected one to each contact member, relatively fixed clutch members mounted on the respective shafts in opposed and spaced relation, a handle rotatably supported by one of the shafts having means positioned between the clutch members axially movable in any position to effect engagement with only one or the other of the clutch members, and spring means normally urging the aforesaid means to effect engagement with one of the clutch members for rotating the contact member associated therewith.

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