

May 13, 1952

L. A. NEWNHAM

2,596,503

ELECTRIC RESISTANCE APPARATUS

Filed Sept. 1, 1950

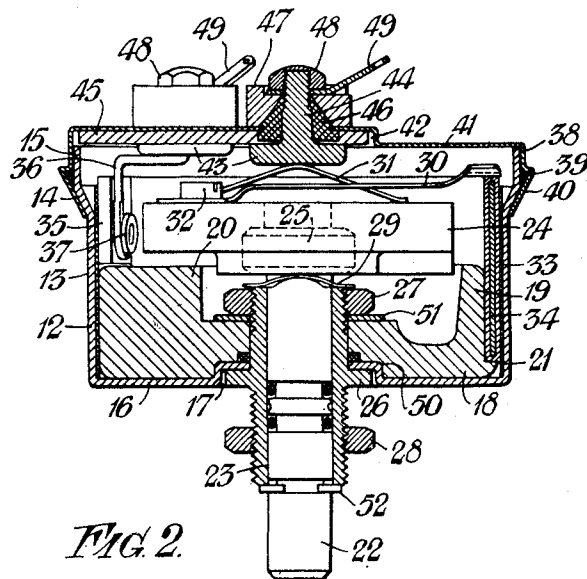


FIG. 2.

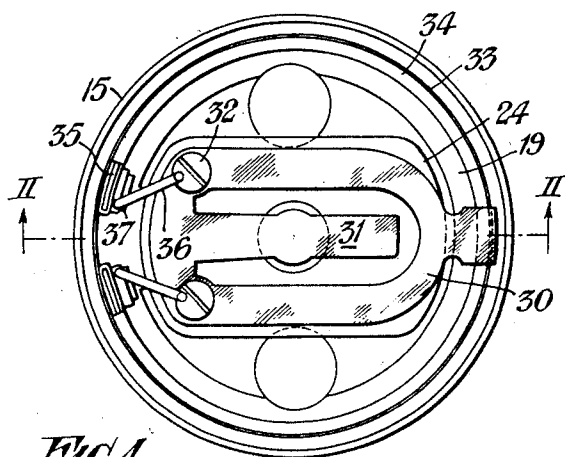


FIG. 1.

Inventor
Leonard A. Newnham
per *RB Bowden*
Attorney.

UNITED STATES PATENT OFFICE

2,596,503

ELECTRIC RESISTANCE APPARATUS

Leonard Albert Newnham, Cockfosters, England,
 assignor to The British Electric Resistance
 Company Limited, Enfield, England

Application September 1, 1950, Serial No. 182,679
 In Great Britain March 11, 1949

3 Claims. (Cl. 201-48)

1

This invention relates to electric resistors, potentiometers and rheostats of the kind which are enclosed in sealed moisture-proof housings for use with electric installations, instruments and appliances. A usual disadvantage in such resistors is that they easily become overheated owing to the difficulty of dissipating from the sealed housings the heat generated in the resistances.

An object of the present invention is to provide means for efficiently sealing the housing in which the resistance or resistances are mounted and for efficiently dissipating the heat from the housing so as to prevent damage to the resistance or the sealed housings thereof.

The invention resides in a sealed potentiometer comprising a cylindrical metal pot having an outwardly inclined surface terminating in an annular collar, a flanged removable cover for said pot, the edge of the flange of said cover being outwardly inclined and the flange being formed with an annular recess on the inner surface thereof, a gasket in said recess, electrical terminals on said cover and insulated therefrom, an arcuate resistance element mounted within and adjacent to the cylindrical wall of the pot, a packing of an electrically insulating material between the resistance element and the adjacent pot wall and in close contact therewith so as to electrically insulate the element from the pot, the insulating material being thin enough to transmit heat from the resistance element to the pot wall, and a spindle mounted in the closed end of the pot and carrying a brush contact adapted to engage slidably the arcuate resistance element.

Where desired the outer surface of the metal housing may be formed or provided with a matt surface, corrugations, fins or the like to increase the external surface of said housing and correspondingly increase the efficiency thereof as a radiator and dissipator of heat developed in the resistances contained within such housing.

The invention is further described with reference to the accompanying drawings illustrating by way of example a potentiometer constructed in accordance with the present invention and wherein like references indicate corresponding parts.

Figure 1 is a plan view of a potentiometer with the cover removed, and

Figure 2 is a section on the line II-II of Figure 1, the cover being shown in place.

The metal housing 12 for the resistance element has a cylindrical wall 13 which at its upper

2

end is inclined outwardly at 14 and terminates in an annular collar 15. Centrally in the bottom 16 of the housing 12 is a circular aperture. The bottom 16 is formed with an annular recess 17 in the outer surface of the housing 12 and around the aperture.

Located within the housing 12 is a moulding 18 of electrically insulating plastic or ceramic material. This moulding is formed with a wall 19 the outer surface of which lies adjacent the inner surface of the cylindrical part 13 of the housing. The moulding 18 is provided with an inwardly projecting tongue 20 and with a recess 21 in the outer surface; this recess 21 extends round the major part of the periphery of the outer surface but is discontinued adjacent tongue 20.

The spindle 22 which is rotatable within sleeve 23 carries the slider arm carrying member 24 moulded at its upper end. The spindle 22 is formed with a square section at 25 so that member 24 which is moulded round it will rotate with spindle 22. Member 24 is made of electrically insulating material.

Sleeve 23 has formed integral with it the annular projection 26 adapted to fit within the recess 17 and is threaded at either end, locking nuts 27, 28 being provided on the upper and lower threaded portions respectively. A spring washer 29 is fitted between member 24 and the end of sleeve 23 to take up manufacturing tolerances and to prevent end movements of spindle 22. Member 24 has secured to it the sliding contact 30 and the spring contact 31. Contacts 30, 31 are made from a single piece of resilient phosphor bronze which is secured to member 24 by screws 32.

In contact with the internal surface of the cylindrical wall 13 are mica strips 33, which may for example be of the order of about $\frac{1}{1000}$ of an inch thick. An arcuate strip 34 of resistance material of known type is wedged between the moulding 19 and the mica 33, its lower portion being housed in the recess 21, and its ends separated by the non-recessed part of moulding 18. The mica strip 33 is thus in close contact with resistance strip 34 and the wall 13 over its whole area. The upper parts of the free ends of the resistance strip 34 are encased in copper strip 35 and conductor wires 36 are secured to the ends of the resistance strip 34 by means of rivets 37.

The cover for the housing 12 is a cap having a flange 38 which is inclined inwardly to correspond with the outward inclination of wall 14 of

3

the housing 12. The flange 38 is so shaped as to form an annular groove 39 in the inner wall which groove 39 accommodates a rubber gasket 40. The top 41 of the cap is pressed to form a circular projection 42 extending from the rim of the cap and covering the centre thereof. In this part of the cap are secured three metal studs 43 one of which lies centrally of the cap. Each stud 43 has a stem 44 which passes through the circular layer of mica 45 on the underside of the cap, a conical insulator 46 and a disc-like ceramic insulator 47. Each stud 43 is held in position by a retaining nut 48 threaded to stem 44. A terminal tag is located between insulator 47 and nut 48.

During construction, the moulding 18 is first placed in position in housing 12. It is located in position centrally of the housing by virtue of the rebate 50 on the undersurface which engaged over the raised part of the bottom 16 surrounding the central aperture. The sleeve 23 is inserted into the aperture from below and secured in position by the nut 27 which contacts the washer 51 lying on the moulding 18. The spindle 22 with member 24 thereon is now lowered into the housing and into sleeve 23, being held in position by the spring clip 52. Spring 29 urges the spindle upwards relative to sleeve 23. The mica strip 21 and the resistance elements 34 are now inserted into place after which the sliding contact 30 and spring contact 31 are secured to member 24 by screws 32. Lastly, the cap is fitted on to the housing 12 and spun down against the outwardly inclined portion thereof so as to form a hermetically sealed joint in combination with the gasket 40 as shown in the drawings.

In operation, the spring contact 31 is forced against the undersurface of the central stud 43 while the ends of the resistance element 34 are in electrical contact with the other studs 43 through the leads 36. The mica 33 electrically insulates the resistance element 34 from the metal housing 12, while the heat generated in the resistance element 34 is conducted by the thin mica to the wall of the metal housing by which it is dissipated into the ambient atmosphere. To facilitate the same the outer surface of the housing may be formed or provided with a matt surface, corrugations or fins.

What I claim is:

1. A sealed potentiometer comprising a cylindrical metal pot, having an outwardly inclined surface terminating in an annular collar, a flanged removable cover for said pot, the edge of the flange of said cover being inwardly inclined and the flange being formed with an annular recess on the inner surface thereof, a gasket in said recess, electrical terminals on said cover and insulated therefrom, an arcuate resistance element mounted within said pot adjacent the cylindrical wall thereof, thin strip mica between said element and said wall and in intimate contact

4

therewith, a spindle mounted in the pot for rotation therein, a brush contact carried on said spindle slidably engaging said element, and electrical conductors from said brush and said element to said terminals.

2. A sealed potentiometer comprising a cylindrical metal pot, having an outwardly inclined surface terminating in an annular collar, a flanged removable cover for said pot, the edge of the flange of said cover being inwardly inclined and the flange being formed with an annular recess on the inner surface thereof, a gasket in said recess, electrical terminals on said cover and insulated therefrom, an arcuate resistance element mounted within said pot adjacent the cylindrical wall thereof, a packing of thin electrically-insulating material between said element and said wall and in intimate contact therewith, a spindle mounted in the pot for rotation therein, a brush contact carried on said spindle slidably engaging said element, and electrical conductors from said brush and said element to said terminals.

3. A sealed potentiometer comprising a metal pot having a cylindrical wall and a bottom, said wall having at the upper extremity thereof an outwardly inclined surface terminating in an annular collar, a flanged removable cover for said pot, the edge of the flange of said cover being inwardly inclined and the flange being formed with an annular recess on the inner surface thereof, a gasket in said recess, electrical terminals on said cover and insulated therefrom, an electrically insulating, substantially cylindrical body within said pot, said body having an arcuate rebate in the external cylindrical surface thereof forming an arcuate recess between said cylindrical wall of said pot and said body, an arcuate resistance element mounted within said arcuate recess with a part thereof projecting therefrom, a packing of thin electrically-insulating material between said element and said wall and in intimate contact therewith, said bottom having a central perforation and said body having an aligned bore, a spindle mounted for rotation in said bore and projecting through said perforation, a brush contact carried on said spindle slidably engaging the projecting part of said element, and electrical conductors from said brush and said element to said terminals.

LEONARD ALBERT NEWNHAM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,059,813	Schellenger	Nov. 3, 1936
2,213,078	Stoeckle	Aug. 27, 1940
2,266,188	Foley et al.	Dec. 16, 1941
2,333,477	Duston	Nov. 2, 1943