

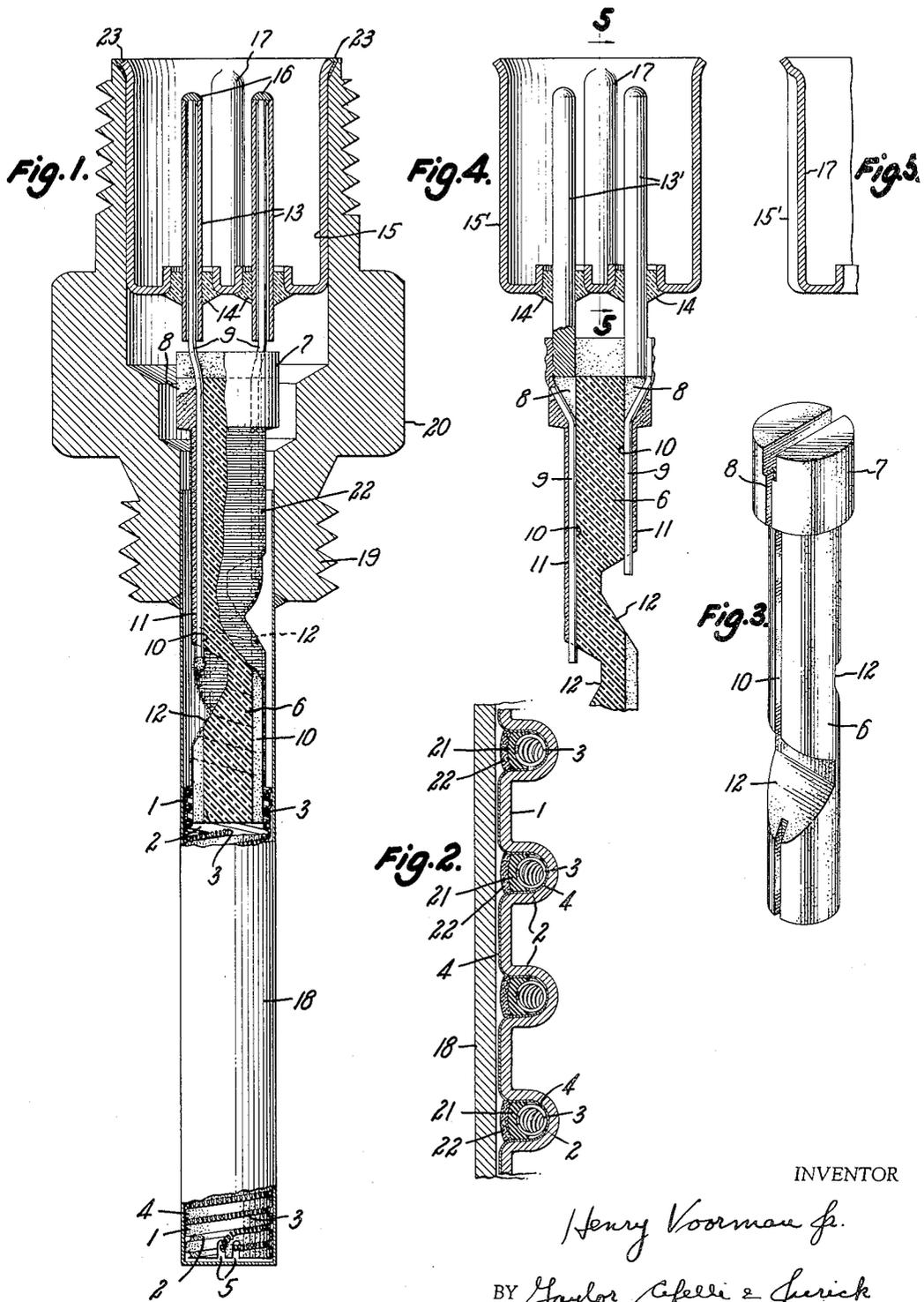
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RESISTOR BULB

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2,750,483

RESISTOR BULB

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This invention relates to resistor bulbs such as employed in the electrical measurement of temperature, and more particularly to resistor bulbs of the type in which the resistance wire is wound upon a metal tube that is housed within the hollow stem of a mounting head which provides a socket for receiving a terminal plug connector.

A resistor bulb of the general type stated is disclosed in Patent No. 2,149,448, issued March 7, 1939, on an application filed by K. M. Lederer and Alexander Dempster, and the mechanical construction there illustrated and described has proved quite satisfactory but is expensive to manufacture.

Objects of the present invention are to provide resistor bulbs which include a lesser number of parts and which are more readily and more economically manufactured than the prior resistor bulbs of the same general type. More specifically, an object of the invention is to provide a resistor bulb which comprises three main components; namely, a mounting head that includes a hollow stem for housing the resistance wire, a bushing of insulating material to which is secured an anodized aluminum tube carrying the resistance wire and which is provided with two longitudinal openings for connecting wires, and a pre-formed socket cup for insertion in the mounting head, the socket cup including glass-sealed terminal pins to which the connecting wires are soldered. A further specific object is to provide a resistor bulb in which all of electrical connections are soldered or welded.

These and other objects and the advantages of the invention will be apparent from the following specification when taken with the accompanying drawings in which:

Fig. 1 is an elevation, with parts broken away, of a resistor bulb embodying the invention;

Fig. 2 is a fragmentary central section, on an enlarged scale, through the stem of the resistor bulb and showing the relative arrangement of the resistance wire, its support and insulation;

Fig. 3 is a perspective view on an enlarged scale of the insulating bushing which is an important element of the resistor bulb;

Fig. 4 is a fragmentary central section of a modified form of terminal socket cup; and

Fig. 5 is a fragmentary section on line 5—5 of Fig. 4.

In the drawings, the reference numeral 1 identifies a thin aluminum tube in which a helical groove 2 is rolled or pressed to receive a winding of bare resistance wire 3 in the form of a closely-wound helical coil of small diameter and small pitch, the tube being anodized or covered with an integral layer 4 of insulating oxide. The tube may be provided with parallel notches 5, or an integral detent, at the bottom so that the winding may be looped back upon itself to place both terminals of the winding 3 at the upper end of the tube. The upper end of the supporting tube is slipped over and cemented to the lower end of a ceramic bushing 6, preferably of steatite, having an enlarged diameter head 7 through which openings 8 extend longitudinally to receive connecting wires 9. The bushing 6 is provided with longi-

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tudinal scores or slots 10 below the head 7 and in line with the openings 8 to receive the connecting wires 9 which are retained in place by a high-temperature cement 11. Notches 12 are cut into the bushing 6 from opposite sides to intersect the slots 10 and thus make the lower ends of the connecting wires 9 available for connection, preferably made by silver soldering or spot welding, to the upper ends of the resistance wire 3.

The connecting wires 9 pass upwardly through hollow terminals 13, 13 which extend through and are insulated by glass beads 14, 14 from a pre-formed cup 15, made of iron or other suitable metal and preferably cadmium plated to resist corrosion; the upper ends of the connecting wires 9 being anchored to the terminals 13 by solder 16 in the manner which is customary with the terminal connections of electron tubes. An alignment projection 17 is formed on the inner surface of the cup 15 for the proper positioning of a cable connector, not shown, for making electrical connection to the resistor bulb.

The mounting head of the resistor bulb includes a hollow stem 18, closed at its lower end, and welded into the lower threaded end 19 of a bushing having a hexagonal section 20 for receiving a wrench by which the threaded section 19 may be introduced into a correspondingly threaded opening in the water jacket or oil case of an engine, into the wall of a carburetor air inlet, or into any other object or fluid container where temperature measurements are to be made.

As shown in Figure 2, the groove 2 of the anodized aluminum tube 1 is of greater depth than the diameter of the single layer helix of resistance wire 3 and a coating of insulating enamel 21 is applied over the winding within the helical groove. For further insurance against any shorting of the resistance wire upon the stem 18 of a resistor bulb, a thread of glass fiber 22 is wound over the resistance wire and preferably is continued upwardly to the head 7 of the bushing 6, thus securely anchoring the resistance wire to the aluminum support and the connecting wires to the bushing 6.

After applying this insulation, the assembly is slipped, as shown in Fig. 1, into the mounting head and silver solder 23 is applied along the mutual peripheral surfaces of the pre-formed cup 15 and the mounting bushing to form a water-tight joint.

In a modified construction, as shown in Fig. 4, solid pin terminals 13' are employed in the cup 15' in place of hollow pin terminals, thus avoiding the inconvenience of making soldered connections to the upper ends of hollow pin terminals which are located somewhat below the top level of the cup 15. In the modified construction, the connecting wires 9 are spot welded to the bottoms of the terminal pins 13'.

From the above description of my invention, it will be apparent that a resistor bulb made in accordance therewith includes a greatly-reduced number of component parts and does not require close tolerances either in the production of the parts or their assembly. The bulb is hermetically-sealed yet the sub-assembly unit, comprising the pre-formed cup, ceramic tube and resistance wire, can be removed from the mounting socket by applying heat to the rim of the cup, thereby facilitating the replacement of a damaged unit. Such unitary sub-assembly arrangement also facilitates the production of the bulbs since all adjustments and tests can be performed prior to insertion of the sub-assembly into the mounting socket.

Having now described my invention in detail in accordance with the patent statutes what I desire to protect by Letters Patent of the United States is recited in the following claims.

I claim:

1. A resistor bulb for the electrical measurement of

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 temperature comprising a mounting head having an axial bore therethrough, a metal cup seated within the outer portion of said bore and having its rim mechanically secured and sealed to the adjacent peripheral edge of said mounting head, a pair of contact pins extending through the bottom wall of said cup and insulated therefrom, a bushing of insulating material having a pair of wires extending therethrough, a metal tube secured to and axially of the inner end of said bushing, a winding of resistance wire on and insulated from said tube, and soldered connections between the ends of said pair of wires and respectively said contact pins and said resistance wire.

2. A resistor bulb as recited in claim 1 wherein said metal cup constitutes a socket for receiving a terminal plug having contacts for engagement with said contact pins, and said cup is provided with a longitudinal indentation for alinement of the terminal plug within said socket.

3. A resistor bulb comprising a helically grooved and anodized aluminum tube, a winding of helically coiled resistance wire within the helical groove of said tube and spaced from the cylindrical surface defined by outer edges of said grooved tube, an insulating bushing having an outer cylindrical head and an inner cylindrical stem extending into the outer end of said tube to support the same, said bushing having a pair of openings therethrough, connecting wires extending through said openings and having their inner ends soldered to the respective ends of said resistance wire, a socket cup of sheet metal having a pair of contact pins extending through and insulated from the bottom wall of said socket cup, soldered connections between the outer ends of said connecting wires and said contact pins, a mounting head having an axial bore therethrough, and means hermetically sealing the rim of said socket cup to the outer end of said bore of the mounting head.

4. A resistor bulb as recited in claim 3, wherein the inner stem of said insulating bushing is of less diameter

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 than the outer cylindrical head thereof, said openings extend through the head of the bushing and align with diametrically arranged longitudinal grooves in the inner stem, in combination with cement retaining said connecting wires in said longitudinal grooves.

5. A resistor bulb as recited in claim 4, wherein said inner stem is provided with longitudinally spaced notches intersecting the respective grooves at the opposite sides thereof to expose the inner ends of said connecting wire for convenience in establishing said soldered connections.

6. A resistor bulb as recited in claim 3, wherein said mounting head includes an inner hollow stem for housing said metal tube and the resistance wire thereon, in combination with a coating of insulating enamel upon the resistance wire within the groove of said metal tube, and a winding of glass fiber thread over said enamel coating and within the helical groove of said metal tube.

7. A resistor bulb as recited in claim 6 wherein said winding of glass fiber thread extends beyond the outer end of said metal tube and covers the stem of said insulating bushing.

8. A resistor bulb as recited in claim 3, wherein said contact pins are hollow and said connecting wires extend through the same, in combination with solder uniting the upper ends of said contact pins and said connecting wires.

9. A resistor bulb as recited in claim 3, wherein said contact pins are solid and said connecting wires are united to the same below said socket cup.

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