

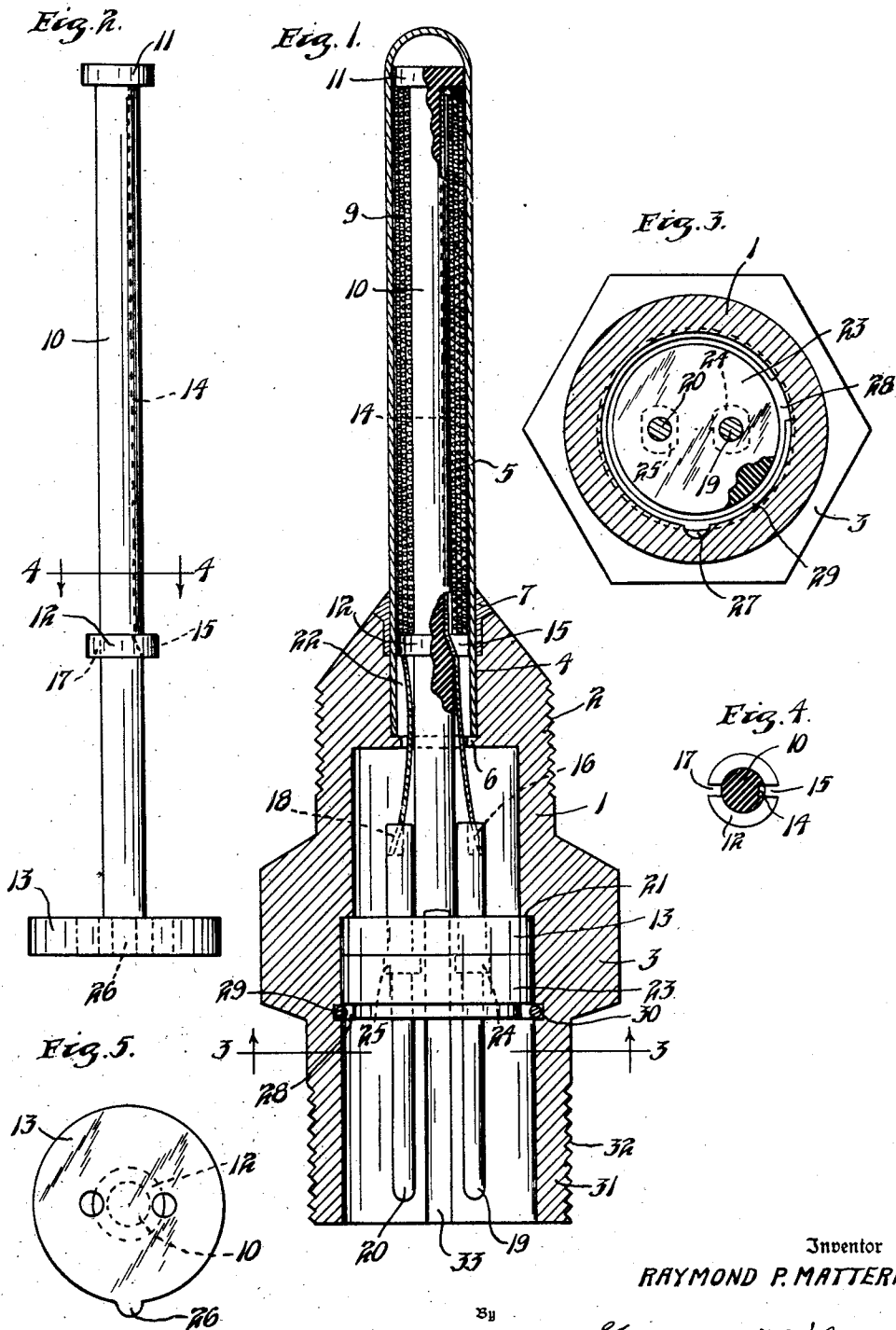
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TEMPERATURE RESPONSIVE RESISTANCE ELEMENT

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TEMPERATURE RESPONSIVE RESISTANCE
ELEMENT

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This invention relates to temperature responsive resistance elements and more particularly to an immersion type temperature responsive resistance bulb for use in the electrical measurements of temperature such as for airplane engines and oil temperature control systems.

An object of my invention is to provide a compact immersion type temperature responsive resistance bulb of great efficiency compared to its size and of such simplicity in construction as to adapt it for rapid manufacture at low cost.

Another object of my invention is to provide in a temperature responsive resistance bulb a spool upon which a suitable resistance element may be wound, such spool formed of suitable insulating material which may be rapidly and efficiently molded in a single operation.

Another object of my invention is to provide in a temperature responsive resistance bulb, an insulating spool formed in a single part of suitable plastic material and having three flanges, between two of which is wound the resistance elements and the third flange having suitable contact members mounted thereon. The first two flange members further serve to slidably engage the inner side wall of an immersion type bulb so as to accurately position the resistance winding immediately adjacent to the side wall of said bulb so that it may more readily respond to the temperature thereof.

Another object of my invention is to provide a moldable insulation spool of the character described readily adapted for carrying a plurality of layers of the resistance winding and including a slot extending longitudinally therein for receiving and fastening a conductor leading from one end of the winding and a slot formed in one of the flanges for receiving a conductor leading from the opposite end of said winding so as to thereby provide simple and efficient means for mounting the winding upon the spool so that the same may be rapidly and efficiently assembled without loss of time and at minimum expense and labor.

Other objects and advantages of this invention are set forth in the following description, taken with the accompanying drawing, and the novel features thereof are pointed out in the appended claims. The disclosure, however, is illustrative only and I may make changes in details, especially in matters of shape, size, and arrangement of parts within the principles of my invention to the full extent indicated by the meanings of the terms in which the appended claims are expressed.

In the accompanying drawing wherein like reference characters indicate corresponding parts of the various figures,

Figure 1 is a sectional view of my immersion type temperature responsive resistance bulb.

Figure 2 is a detailed side elevational view of the insulation spool, shown in Figure 1.

Figure 3 is a sectional view of my device shown in Figure 1 taken along the lines 2-2 and looking in the direction of the arrows,

Figure 4 is a sectional view of Figure 2 taken along the lines 4-4 and looking in the direction of the arrows, and

Figure 5 is an end view of the insulation spool shown in Figure 2.

In the form of my invention illustrated in Figure 1 there is provided a sleeve 1 having a threaded section 2 and a projecting portion 3 preferably formed in a hexagonal outline for receiving a wrench or other means for securing the threaded portion 2 in a tapped hole in an engine cylinder wall or the like. The threaded end of the sleeve 1 has provided therein an aperture 4 within which there is disclosed a tubular shell 5 closed at one end and having the opposite open end resting upon a shoulder portion 6 formed within aperture 4 of the sleeve 1. An annular opening 7 formed in the sleeve 1 surrounds the shell 5. A suitable quantity of solder is disposed within the annular opening 7 so as to seal the shell 5 to the sleeve 1, and close the opening 7 as shown in Figure 1.

The tubular shell 5 is preferably formed of copper or other suitable heat conducting material so that a heat responsive member mounted within the tubular shell 5 will readily respond to the temperature changes to which the shell 5 may be subjected. Mounted therefore within the shell 5 is a temperature responsive resistance winding 8 preferably comprising three layers of No. 40 Balco single glass covered wire which possesses a relatively high temperature coefficient of resistance, or other suitable temperature responsive, resistance material.

In order to support the resistance winding 8 within the tubular shell 5 I have provided a spool 10 preferably formed of moldable Bakelite. Formed integral with the spool 10 are the radial flanges 11, 12 and 13 positioned in spaced relation along the spool 10. The annular flanges 11 and 12 are of a substantially equal circumference. Wound about the spool portion 10 separating the said flanges 11 and 12 is the resistance element 9. Extending longitudinally along one side of the spool 10 is a slot 14 indicated by

dotted lines in Figures 1 and 2. A second slot 15 is positioned in the flange 12 as seen in Figures 1, 2 and 4.

The resistance wire 9 extending from one end 16 of contact pin 24 is disposed within the slots 15 and 14 to the annular flange 11 where the resistance winding is started about the core 10 in a spiral manner toward flange 15, additional layers may be added by continuing to wind the wire spirally on the core between flanges 11 and 12. Three layers of resistance winding are preferably made and the winding terminating at the end of the third layer adjacent the flange 12. A slot 17 is formed in this flange 12, as shown in Figures 2 and 4, and the end of the resistance winding 9 extends through the slot 17, terminating at 18, which is the inner end of the contact pin 25, as shown in Figure 1.

The flange 13 has a greater circumference than the flanges 11 and 12 and has projecting there-through contact pins 24 and 25 having the ends 16 and 18 to which the ends of the resistance winding 9 are attached respectively. The said flange 13 is formed at the opposite end of the core 10 from the flange 11. Upon the core 10 being inserted within the tubular shell 5, annular flange 13 is adapted to rest upon a seat portion 21 formed within the sleeve 1, and the annular flanges 11 and 12 are adapted to slidably engage the inner surface 22 of the tubular shell 5 and thereby accurately position the temperature responsive winding 9 in heat transfer relation to the tubular shell 5, whereby the winding will quickly assume the temperature of the medium surrounding the exterior of said shell, as best shown in Figure 1. A second annular insulation member 23 engages the contact pins 24 and 25 which project through suitable apertures formed therein. The contact pins 24 and 25 have provided the projecting parts 19 and 20 respectively which are positioned in suitable recesses provided in the insulation member 23, wherein the parts 24 and 25 are held by the member 13 and the shoulder portion of said recesses. The members 13 and 23 have formed at the circumferential edge thereof the projecting parts 26 and 27 respectively adapted to slidably fit within a longitudinal groove 33 formed in the inner surface of the sleeve 1 so as to lock the members 13 and 23 and thus the core 10 from rotary movement within the shell 5 and sleeve 1. The member 23 further has provided an annular indented portion 28 for receiving a split ring 29 adapted to engage in an annular channel 30 formed within the sleeve 1 so as to prevent longitudinal movement of the members 13 and 23 and accordingly the core 10. A socket portion 31 surrounds the contacts 19 and 20 and is adapted to receive a suitable plug, not shown, for electrically connecting the temperature responsive resistance element in a manner well known in the art. The outer edge 32 of the socket 31 is threaded for receiving a nut for fastening the plug within said socket.

In operation, from the foregoing description it will be evident that this device may be suitable attached to a portion of an internal combustion engine, an oil temperature control system, or to other devices where an immersion type temperature responsive resistance bulb may be utilized for continuously indicating temperature. When adjusted for use in a suitable device, the temperature of the medium surrounding the shell 5, will be quickly transmitted to the temperature resistance wire 9 whereby a change in the ambient temperature surrounding said shell will

quickly affect the resistivity of the coil 9, causing it to increase with a rise in temperature and vice versa, thus causing a change in the value of an instrument or circuit, not shown, which may be in electrical connection with the contact ends 19 and 20.

From the foregoing, it will be readily seen that the core 10 formed of any suitable plastic insulating material, such as Bakelite, may be readily molded in a single operation and in one part together with the flanges 11, 12 and 13. Thus, the device may be rapidly manufactured at low cost and with minimum labor. Because of the simplicity of the construction a minimum number of wearing parts are involved providing a device of sturdy construction.

While I have described a preferred embodiment of the invention, it will be understood that various changes may be made in the design and relationship of the several parts without departing from the spirit of my invention as set forth in the following claims.

I claim as my invention:

1. In a temperature responsive resistance bulb for the electrical measurement of temperature, comprising, in combination, a sleeve, a tubular shell affixed to said sleeve at one end and closed at the opposite end, a spool formed of insulating material positioned within said shell and sleeve, a first annular flange, a second annular flange and a third annular flange of substantially larger diameter than said first and second flanges, said annular flanges in equal spaced relation and projecting from said spool, a temperature responsive resistance winding having a relatively high coefficient of resistance positioned between said first and second flanges and wound about said spool between said first and second flanges, and said first and second flanges slidably engaging said tubular shell so as to accurately position said resistance winding in heat transfer relation to said tubular shell, whereby said winding assumes the temperature of the medium surrounding said shell, and means engaging said third annular flange for locking said spool within said shell and sleeve.
2. In a temperature responsive resistance bulb for the electrical measurement of temperature, comprising, in combination, a sleeve, a tubular shell affixed to said sleeve at one end and closed at the opposite end, a spool formed of insulating material positioned within said shell and sleeve, a first annular flange, a second annular flange and a third annular flange, said annular flanges in spaced relation and projecting from said spool, a temperature responsive resistance winding positioned between said first and second flanges and wound about said spool between said first and second flanges, and said first and second flanges slidably engaging said tubular shell so as to accurately position said resistance winding in relation to said tubular shell, whereby said winding assumes the temperature of the medium surrounding the exterior of said shell, a shoulder positioned within said sleeve for engaging said third annular flange for locking said spool against longitudinal movement in one direction in relation to said sleeve, an annular member mounted within said sleeve engaging said third annular flange, interfitting portions for preventing rotative movement of said spool within said sleeve and shell, an annular groove formed within said sleeve and a split ring disposed therein for releasably locking said member within said sleeve and preventing longitudinal movement of said

spool in a second direction in relation to said sleeve.

3. In a temperature responsive resistance element for the electrical measurement of temperature including a bulb, and a temperature responsive resistance winding mounted within said bulb; the improvement comprising a spool for carrying said temperature responsive winding, said spool formed of a plastic like material, a first and a second flange of substantially the same diameter positioned on said spool in spaced relation for supporting said winding, said first and second flanges slidably engaging the interior of said bulb for accurately positioning said winding in relation to said bulb, and a third flange which is substantially larger than said first and second flanges positioned exterior of said bulb for supporting said spool.

4. In a temperature responsive resistance element for the electrical measurement of temperature including a bulb, and a temperature responsive resistance winding mounted within said bulb; the improvement comprising a spool for carrying said temperature responsive resistance winding, the said spool formed in one part of Bakelite like material, a first and a second flange formed integral on said spool in spaced relation for supporting said winding, a longitudinal slot formed in said spool and said second flange for carrying one terminal of said winding, and a second slot formed in said second flange for carrying the opposite terminal of said winding, said first and second flanges slidably engaging the interior of said bulb for accurately positioning said winding in relation to said bulb, whereby the resistance of said winding will vary with the change of temperature of the medium surrounding said bulb, a third flange which is substantially larger than said first and second flanges formed integral with said spool and spaced apart from said second flange, means positioned within said sleeve for engaging said third flange for limiting the longitudinal movement thereof in one direction, contacts carried by said third flange electrically connected to the terminals of said resistance winding, a member positioned adjacent said third flange and engaging said contacts, first means limiting rotative movement of said member and second means limiting longitudinal movement of said member whereby said spool is fastened by said member within said bulb.

5. In a temperature responsive resistance element for the electrical measurement of temperature including a bulb and a temperature responsive resistance winding mounted within said bulb; the improvement comprising a spool for carrying said temperature responsive winding, said spool formed in one part of Bakelite like material, a first and a second flange formed integral with said spool in spaced relation for supporting said winding, and said first and second flanges slidably engaging the interior of said bulb for positioning said winding in relation to said bulb, and a third flange substantially larger than said first and second flanges formed integral with said spool for fastening said spool within said bulb against longitudinal and rotative movement relative to said bulb.

6. In a temperature responsive resistance element for the electrical measurement of temperature including a bulb and a temperature responsive resistance winding mounted within said bulb; the improvement comprising a spool formed of a plastic insulating material for carrying said temperature responsive resistance winding, a first flange forming a part of said spool and positioned at one end of said spool, a second flange substantially larger than said first flange forming a part of said spool and positioned at the opposite end of said spool, and a third flange forming a part of said spool and positioned intermediate the opposite ends of said spool, said first and third flanges being of substantially the same diameter are provided for the purpose of supporting said resistance winding on said spool, and said second flange including fastening means is provided for securing said spool within said bulb.

7. In a temperature responsive resistance element for the electrical measurement of temperature, comprising, a structure for supporting said element adjacent a medium whose temperature is to be measured, an annular recess in said structure, a tubular shell affixed to said structure for insertion in said medium, said tube being closed at one end, a core member having a first flanged portion at one end and a second flanged portion at the opposite end, said second flanged portion being substantially larger in diameter than said first flanged portion, an insulated resistance wire having a relatively high temperature coefficient of resistance wound on said core in abutting relation to said first flange and extending in heat transfer relation to said tubular shell for a substantial distance in the direction of said second flange, said first flange being adapted to support said wire on said core member, and said second flange being engaged in said annular recess of said supporting structure to secure said core against longitudinal movement.

8. In a temperature responsive resistance bulb for the electrical measurement of temperature, comprising, a member for supporting said bulb in a medium whose temperature is to be measured, an annular recess in said supporting member, a tubular shell affixed to said member for insertion in said medium, said tube being closed at one end, a core structure provided with first, second, and third flanged portions, said third flanged portion being of substantially greater diameter than said first and second flanged portions, said core member fitting within said shell and said supporting structure in such a manner that said first and second flanges engage the inner periphery of said shell and said third flange is engaged in the annular recess of said supporting structure, a resistance wire of relatively high temperature coefficient of resistance spirally wound on said core structure abutting said first flange at one end and said second flange at the other end, and said wire being in heat transfer relation to said shell.

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