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(54) TEMPERATURE DETECTING DEVICE

(71) We, HONEYWELL INC, a Corporation organised and existing under the laws of the State of Delaware, United States of America of Honeywell Plaza, Minneapolis, Minnesota 55408, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Temperature detectors which employ thermistors in operating contact with an environment which is being monitored for temperature have many uses, more particularly in our modern society which is becoming more energy conscious. Protection of the thermistor from that environment while simultaneously permitting heat transfer on a uniform basis to permit accurate monitoring, is a major concern. This is true particularly when the environment and/or the temperature range is extreme.

When a thermistor is directly soldered onto the inner bottom of a protection tube, the thermistor will be reliably connected to the tube. This, however, is a difficult operation because the silver electrode surface of the thermistor easily reacts with the solder. Moreover, protection tubes are normally formed by cutting and machining metal, which results in a surface which is not completely smooth and uniform. Oxidation can then develop during the use of the device over varying temperature cycles, giving rise to the occurrence of contact resistance.

It is an aim of the invention to provide an improved temperature detector.

According to the invention, there is provided a temperature detecting device comprising a protective tube closed at one end and open at the other end; a closure member for closing said open end; a resilient metallic member positioned within said tube, said resilient member having a first end portion urged by the resilience of the resilient member into thermal contact with said one end of the tube and having a second end portion in contact with said closure member; a thermistor mounted on a portion of the resilient member intermediate said first and second end portions; and a layer of metal softer than that of said resilient member and located between said first end portion and the inner surface of said one end of the tube.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, in which:—

Figure 1 is a partially cutaway view of a temperature detecting device according to the invention, and

Figure 2 is a plan view of a resilient metal plate used in the device of Figure 1.

Referring to the drawings, the temperature detecting device includes a protection tube 1 open at one end and which houses and protects a thermistor 2 mounted on a resilient metal plate 10. The plate is studded in a notch of an insulation plate 3 which along with conductor 6 provides a closure for the open end of the tube via seal 7. A pair of terminals 4 and 5 are studded in the plate 3, one terminal 4 being connected to the thermistor 2 and the other terminal 5 being connected to the protection tube 1 through conductor 6.

As shown in Figure 2, the metallic resilient member 10 is formed from a single piece of resilient metal plate by means of a punch press or may be casting. In the central portion of the plate 10, the plate is bifurcated to form two sections 11 and 12. A bottom portion of the member 10 is formed by folding legs 13 and 14 along the dotted lines into opposite directions such that they are generally perpendicular to the remaining portion of the member 10. When the insulation plate 3 is in position to close the tube, the bifurcated sections 11 and 12 of the member 10 are bowed in opposite directions and the resilient nature of the metallic member forces the legs into a uniform and permanent thermal contact with closed end 8 of tube 1; the legs 13 and 14 extend in opposite directions along the inner surface end 8 and position the resilient member centrally of the tube.

In order to obtain maximum contact between the metal plate 10 and the inner surface of end 8, an electroplated layer 9 of of a metal softer than the metal plate 10 is employed, either on the inner surface of end 8 or on the surface legs 13 and 14 of the metal plate 10 contacting end 8. Metals such as gold, silver, nickel, solder, and other metals which are softer than the metal plate 10 may be employed. The metal plate 10 is made of a resilient material such as, for example, the metals used for blades of switches. The electroplated layer of a soft metal, and particularly one which does not oxidize, permits the contacting pressure from the bifurcated sections of 11 and 12 of the member to force the legs 13 and 14 into contact with the electroplated layer 9 to ensure uniform and permanent thermal contact with the end 8 of the tube 1.

The above described temperature detector devices have been manufactured and employed in tests over substantial temperature variations. Since the effective contacting area remains constant, no appreciable variation in operating characteristics were detected and the device was found to be satisfactory and essentially trouble free.

WHAT WE CLAIM IS:—

1. A temperature detecting device comprising a protective tube closed at one end and open at the other end; a closure member for closing said open end; a resilient metallic member positioned within said tube, said resilient member having a first end portion urged by the resilience of the resilient member into thermal contact with said one end of the tube and having a second end portion in contact with said closure member; a thermistor mounted on a portion of the resilient member intermediate said first and second end portions; and a layer of metal softer than that of said resilient member and located between said first end portion and the inner surface of said one end of the tube.

2. The device of claim 1, wherein said first end portion is provided by two legs extending in opposite directions along the inner surface of said one end whereby to position the resilient member substantially centrally of the tube.

3. The device of claim 1 or claim 2 wherein the resilient member includes a bifurcated portion, the bifurcated sections bending in opposite directions and providing a resilient force to urge said first end portion against said one end of the tube.

4. The device of claim 1, 2 or 3, wherein the thin layer is of gold, silver, nickel or solder.

5. A temperature detecting device substantially as herein described with reference to the accompanying drawings.

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1596494 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

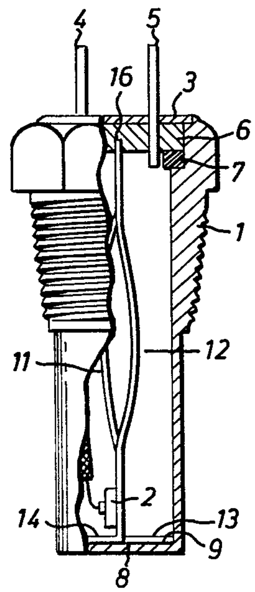

FIG.1

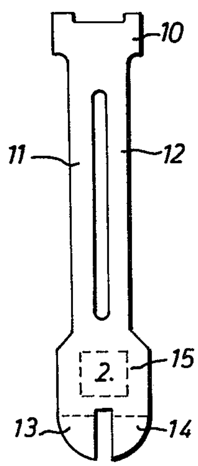

FIG.2