Oct. 7, 1958 H. E. WEBKING 2,855,485

HERMETICALLY SEALED THERMOSTAT

Filed Sept. 16, 1957

FIG. 1

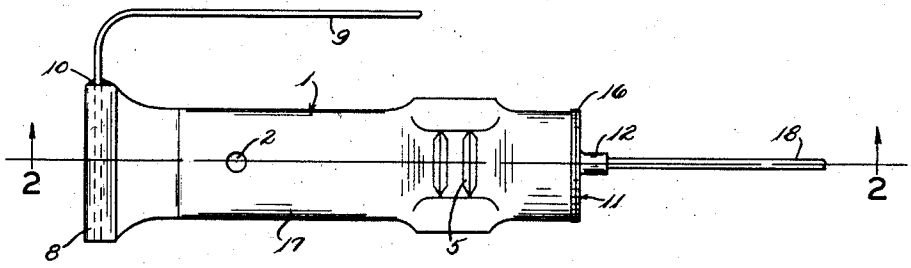
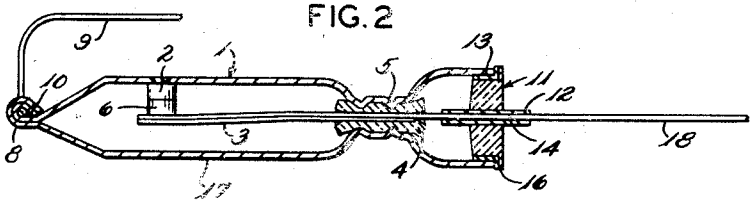


FIG. 2



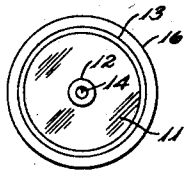


FIG. 3

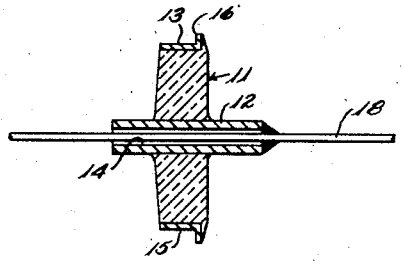


FIG. 4

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HERMETICALLY SEALED THERMOSTAT

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7 Claims. (Cl. 200—138)

This invention relates to thermostats and more especially to thermostats adapted to be used in the control of motors operating compressors or pumps. The invention is particularly useful where inflammable gases are present and open arcing is to be avoided.

In the control of electrical apparatus it is frequently desired to open or close electrical circuits by make or break contacts controlled by expansion or contraction of bimetal strips under changes in temperature. Where inflammable gases or vapors are present, open make or break circuits must be avoided as arcing at the contacts would cause ignition of such gas or vapor.

It is an object of this invention to provide a thermostat in which the contacts are hermetically sealed from surrounding gas, vapor, or liquid.

Other objects are to provide such a thermostat in which the sealing means is protected from stresses due to vibration of the bimetal strip or due to calibration of the thermostat.

Other objects are to provide a lasting seal between the insulating plug or bushing and the lead to the bimetal strip and between the bushing and the casing.

These and other objects will appear from the following description and the accompanying drawings.

Of the drawings,

Fig. 1 is a plan view of a thermostat constructed in accordance with and embodying the invention.

Fig. 2 is a longitudinal sectional view thereof taken on line 2—2 of Fig. 1.

Fig. 3 is an end view of an insulating bushing.

Fig. 4 is an axial sectional view of the bushing with a lead wire secured therethrough.

Referring to the drawings, the numeral 1 designates a metal casing of tubular form and having on a side wall thereof an electrical contact button 2 of non-tarnishing conductive metal. Within the casing 1 is a bimetal strip 3. One end of the strip 3 is surrounded by a tubular flexible insulating sleeve 4 which is clamped between flattened wall portions of the casing, as at 5. The opposite end of the bimetal strip carries a contact button 6 in position to engage contact 2. The end 8 of the casing 1 near the contacts 2 and 6 is crimped or flattened to bring its opposite walls into close engagement and are soldered to close the casing. A pig tail or lead wire 9 is secured to the closed end of the casing by solder or welding, as at 10.

For closing and sealing the opposite end of the casing, an insulating button or bushing 11 having a central tubular metal core member 12 extending therethrough and a surrounding collar 13 of metal, thereabout and spaced radially from the core, is provided. Both the central tubular core member and the collar are of metal capable of being soldered and the bushing is of glass composition and is fused or bonded to the metal member therebetween so that a hermetically sealed joint is provided between the glass and the metal.

The tubular member 12 has a drilled bore 14 adapted to closely fit a wire lead 18 extending therethrough and connected to the bimetal strip 3. The wire lead is soldered thereto at assembly. The tubular core spans a considerable length of the wire lead to provide an extended soldering surface. The extended core also provides for soldering the wire lead to the core at a position remote from the glass to prevent cracking of the glass. The metal collar 13 preferably has a plug portion 15 which closely fits the bore of the casing and a radial flange 16 which is adapted to abut the end of the casing to limit its entry and to increase the area of attachment. It is soldered to the casing at assembly.

The portion 17 of the casing between the closed end 8 and the flattened portion 5, where the casing is clamped about the bimetal strip and its insulating sleeve, is of oval cross section whereas the portion surrounding the insulating bushing 11 is of round cross section. The oval form at the portion 17 brings the contacts 2 and 6 into close spacing or face to face engagement depending upon whether the thermostat is to open or close with rise of temperature.

The flattened portion 5 may be grasped and the portion 17 may be bent into or out of alignment therewith to calibrate the thermostat.

In the manufacture of the thermostat, the button 2 may be secured and soldered to the wall of a length of tubing, the bimetal strip having a wire lead 18 soldered or welded thereto is inserted in the sleeve 4 of insulating material and with the sleeve 4 inserted in the casing. The casing is then flattened as at 5 by pressing or staking to clamp the bimetal strip in place. The end 8 may then be closed by flattening it and dipping in molten solder to seal it and simultaneously to solder any attachment of button 2 to the casing.

The button 11 is then threaded or passed over wire lead 18 into position with its plug portion of its collar within the casing and its flange thereagainst. That end of the thermostat is then dipped in molten solder which unites the wire lead hermetically to the surrounding tubular member 12 and simultaneously unites the casing to the collar 13 of the bushing hermetically by sweating of the solder into the joints.

Some flexibility is preferably provided in the lead wire 18 between the insulating button 11 and the flattened portion 5 of the casing so that the button is relieved from stresses tending to loosen it during installation or calibration of the thermostat. This also prevents stresses of the bushing due to difference in expansion or contraction of the casing and the bimetal strip.

The invention provides a thermostat in which the contacts are safely and hermetically sealed within a metal casing so that the thermostat may be mounted in an atmosphere containing inflammable or other gases, vapors or liquids, and may be mounted on or within a motor driving a pump or compressor where such materials are handled and where open arcing is to be avoided.

Thus it will be seen that the objects of the invention have been accomplished.

While a certain embodiment and construction details have been shown to illustrate the invention, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit or scope of the invention as it is defined by the following claims.

I claim:

1. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip,

the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to the end of said casing and to said wire lead.

2. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in postion to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to said casing and to said wire lead, said sealing means comprising a metal collar fused to said bushing thereabout and soldered to the end of said casing.

3. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to said casing and to said wire lead, said sealing means comprising a tubular metal core extending through said bushing and fused thereto, said core extending about said wire lead and soldered thereto.

4. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to said casing and to said wire lead, said bushing comprising a tubular metal core, a metal collar thereabout in diametrically spaced relation thereto, and a body of glass filling the radial space therebetween and fused to said metal core and collar, and said core and collar being soldered respectively to said lead wire and said collar.

5. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said

insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to said casing and to said wire lead, said bushing comprising a tubular metal core, a metal collar thereabout in diametrically spaced relation thereto, and a body of glass filling the radial space therebetween and fused to said metal core and collar, and said core and collar being soldered respectively to said lead wire and said collar, said collar having a plug portion closely fitting within the end of the casing, and a radial flange portion abutting the end of the casing.

6. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead, and means for hermetically sealing said bushing to said casing and to said wire lead at a position spaced axially of said casing from the clamped portion, said sealing means comprising a tubular metal core extending through said bushing and therebeyond and fused thereto, said core extending about and along said wire lead and being soldered thereto at least at a position remote axially from the insulating material of said bushing where the heat of soldering will not crack the bushing by expanding it.

7. A hermetically sealed thermostat comprising a bimetal strip, a metal casing surrounding and supporting the strip, means insulating the strip from the casing, said insulating means and said strip being clamped between opposed flattened walls of the casing at a position spaced substantially from either end of the casing, a contact button on said strip at a position spaced axially of the casing from the clamped area, a contact button on the wall of said casing in position to engage the button on the strip, the end of the casing adjacent said contact buttons being crimped and soldered to close it, a flexible wire lead secured to the clamped end of the bimetal strip, an insulating bushing of non-metallic material inserted in the opposite end of the casing about said wire lead at a position spaced axially of said casing from the clamped portion, and means for hermetically sealing said bushing to said casing and to said wire lead, said sealing means comprising a tubular metal core extending through said bushing and fused thereto, said core extending axially beyond the insulating material of said bushing and having a drilled bore receiving said wire lead and soldered thereto.

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