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Hire

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[54] **THERMOSTAT WITH RESET PIN**

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[52] **U.S. Cl.** **337/348**, 337/367, 337/376

[51] **Int. Cl.**.....**H01h 37/70**

[58] **Field of Search**.....337/56, 91, 343, 348, 354, 337/367, 380, 3, 376

[56] **References Cited**

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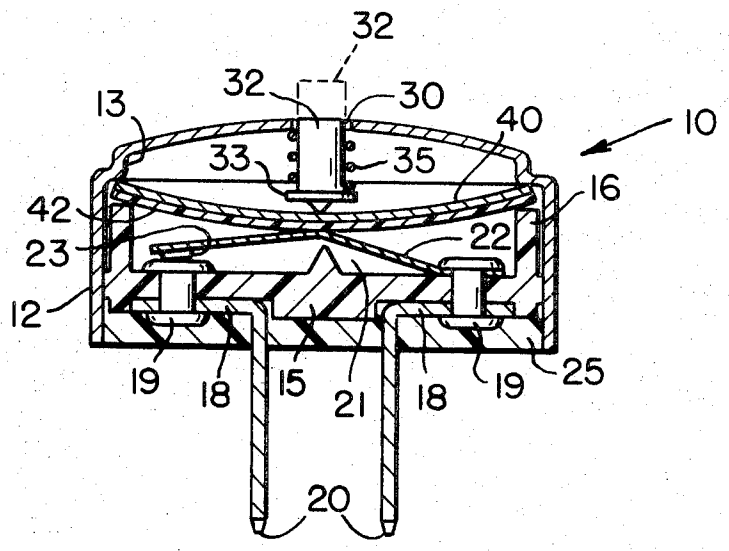
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[57] **ABSTRACT**

A reset pin is mounted to reciprocate in one end of a thermostat, and a pair of terminals project from the opposite end. A switch in the thermostat is normally held closed by a bimetallic, temperature-responsive disc, which is positioned between the reset pin and switch arm to operate both. A compression spring normally holds the reset pin in a retracted position in the thermostat, when the switch is closed. When the ambient temperature of the thermostat exceeds a predetermined value, the disc snaps against the reset pin to drive it outwardly to an extended position, and to allow the switch to open. The disc can be reset by pushing the pin inwardly when the ambient temperature falls to normal.

2 Claims, 2 Drawing Figures



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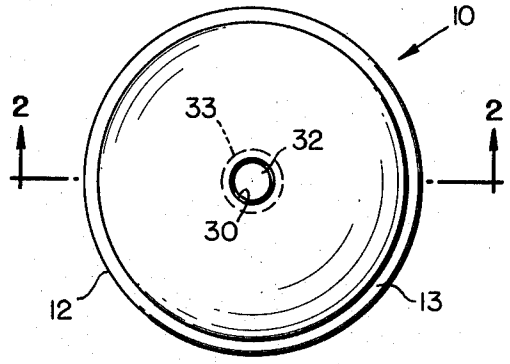


FIG. 1

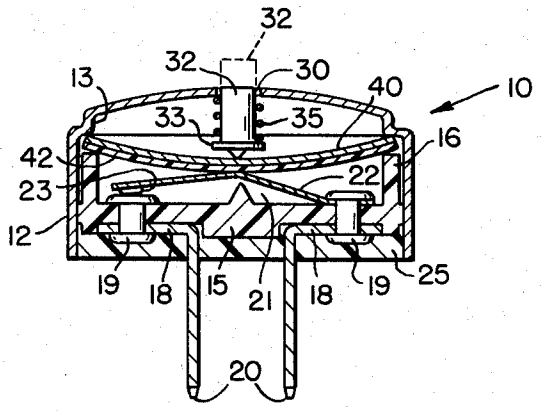


FIG. 2

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THERMOSTAT WITH RESET PIN

This invention relates to thermostats, and more particularly to a snap-action thermostat having a reset pin or button for resetting or closing the thermostat after it has been tripped or overheated.

Heretofore thermostats of the type employing bimetallic, temperature-responsive discs have been employed in clothes driers, heaters, air conditioning and ventilating equipment, etc. to prevent overheating and consequent damage to the equipment. Typically this type of thermostat comprises a housing containing a bimetallic disc, and a normally-closed switch connected in the operating circuit of the equipment. When the ambient temperature of the equipment exceeds a predetermined value, the disc snaps suddenly in a direction to open the switch and to deenergize the equipment's operating circuit.

Depending upon the particular application for which the thermostat is designed, its switch may automatically reclose, when the ambient temperature drops far enough to return the bimetallic disc to its normal position; or it may be necessary to reset or reclose the switch through the agency of a manually operable reset button.

Heretofore, in the case of thermostats of the type employing manually operable reset buttons, it has been the practice to mount the bimetallic disc in one end of the thermostat housing, and both the reset button and the switch terminals in the opposite end of the housing, so that the motion of the reset button must be transmitted through the associated switch arm and/or a switch actuating plunger to the bimetallic disc.

For certain applications it is desirable that a thermostat of the type described be mounted in equipment in such manner that its reset button be substantially inaccessible to all but a qualified serviceman, so that the button cannot be reset except, for example, by removing the thermostat from the equipment to see if a critical temperature has been exceeded. With a conventional thermostat this is not possible, because it is customary to mount it in equipment so that its terminal end, and hence the reset button, will be readily accessible. Also, because of its proximity to the thermostat terminals, it is sometimes difficult to operate the button without interfering with the terminal connections.

It is an object of this invention to provide an improved thermostat, which is substantially more compact and economical to manufacture than prior such thermostats. To this end it is an object of this invention to provide a novel thermostat in which a bimetallic disc is positioned between, and operates directly upon, both the switch arm and the reset pin of the thermostat.

Another object of this invention is to provide an improved thermostat of the bimetallic disc variety, which has a reset pin that is mounted in the end of the thermostat remote from the end from which the switch terminals of the thermostat project.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims, particularly when read in conjunction with the accompanying drawing.

In the drawing:

FIG. 1 is a plan view of a thermostat made in accordance with one embodiment of this invention; and

FIG. 2 is a sectional view of this thermostat taken along the line 2—2 in FIG. 1 looking in the direction of the arrows.

Referring now to the drawing by numerals of reference, 10 denotes a thermostat comprising an inverted, can or cup-shaped metal housing 12 that is provided with an internal, circumferential shoulder 13 adjacent its closed end (upper end in FIG. 2). Press-fit in the lower end of housing 12 coaxially thereof is a circular base 15, which is made of dielectric material, and which has an integral, annular flange 16 that projects coaxially upwardly in housing 12 toward its shoulder 13. Two, right-angular terminals 18 are secured each at one end to the underside of base 15 by rivets 19, so that the opposite ends of the terminals project from housing 12 as at 20.

Secured at one end by one of the rivets 19 to the upper surface of base 15, and extending transversely across the center of the recess 21 that is formed in the upper end of base 15 by its flange 16, is a flexible, electrically conductive switch arm 22. At its opposite, free end, arm 22 has secured thereto a metal contact 23, which is held in engagement with the inner end of the other rivet 19 against the resistance of arm 22, which urges the contact 23 upwardly toward an open position. The space in the housing 12 beneath base 15 is filled or potted with a layer 25 of epoxy resin, or the like.

Mounted to reciprocate in a central opening 30 in the upper, closed end of housing 12 is a cylindrical reset pin 32. On its inner end pin 32 has an external, circumferential shoulder 33, the diameter of which is larger than that of the opening 30. A coiled compression spring 35 surrounds pin 32 between its shoulder 33 and the closed end of housing 12 to resist the movement of the pin 32 from its solid to its broken line position as shown in FIG. 2.

Mounted in housing 12 between the pin 32 and the switch arm 22 is a temperature-responsive, bimetallic disc 40, the marginal edge of which is seated between the housing shoulder 13 and the upper end of the base flange 16. Interposed between disc 40 and the switch arm 22 is a thin, disc-shaped layer 42 of flexible, dielectric insulating material, which has the same diameter as the disc 40.

In use, the ends 20 of the terminals 18 are connected in an electrical circuit, so that under normal operating conditions the center of disc 40 will be bowed downwardly into the position shown in FIG. 2, wherein it urges the insulating disc 42 against the midpoint of switch arm 22 to hold its contact 23 in closed position against the rivet 19. Normally, then, the terminals 18 are electrically connected to one another so that they do not interrupt the circuit connected to their ends 20. Also, the spring 35 normally urges pin 32 inwardly to its retracted or lowered (solid line) position as shown in FIG. 2, so that the pin does not project beyond the closed end of housing 12.

When, however, the thermostat 10 is subjected to an ambient temperature equal to, or in excess of, the critical temperature for which its disc 40 is calibrated, the center of the disc 40 will snap suddenly upwardly from its position in in FIG. 2. This drives the reset pin 32 upwardly to its extended or broken line position (FIG. 2), where it will be readily visible to indicate that the thermostat has been tripped or overheated. If the disc 40 has been calibrated to snap back to its normal position after the ambient temperature has dropped approximately to room temperature, then the spring 35 will automatically return pin 32 to its inner or retracted posi-

tion concurrently with the reclosing of the switch arm 22 by disc 40. On the other hand, the disc 40 may not be calibrated automatically to return to its switch-closing position after its ambient reaches room temperature; and in such case it will be necessary to force disc 40 manually back to its inner or switch-closing position as shown in FIG. 2. This can be done merely by pushing on the button 32, when the latter is in its extended position; and if the ambient temperature has fallen sufficiently, then the inward movement of pin 32 will cause disc 40 to snap suddenly back to its switch-closing position.

From the foregoing it will be apparent that the herein disclosed thermostat is substantially more compact and economical to manufacture than prior thermostats of the type in which the reset button or pin is mounted for movement in the same end of the thermostat housing from which the switch terminals project. In thermostat 10 the reset button or pin 32 is positioned to be operated directly by the temperature-responsive disc 40, and except for the insulating disc 42, the switch arm 22 is also positioned to be operated directly by the disc 40. The thermostat is thus extremely compact, and requires no intervening plunger for transmitting the motion of the reset pin 32 to the disc 40, or vice versa.

In addition to functioning as a reset button or pin, pin 32 also operates to indicate, when in its broken line position (FIG. 2), that the thermostat has been tripped or overloaded, and that its switch arm 22 is in its open position. This is particularly useful if, for some reason, the associated equipment is shut down, and an operator is trying to determine what brought about the equipment failure. A mere glance at the upper, closed end of the can or housing 12 will inform the operator whether or not the switch 22 has popped open. Assuming it has, the button 32 will be in its broken line position, and the operator need only push the button inwardly; and assuming that the ambient temperature has fallen to a safe operating value, the disc 40 will be popped back to its switch-closing position by the pin 32.

A further advantage of thermostat 10 is that it can be mounted in equipment so that its terminals 20, and the wires attached thereto, will be hidden from view, and so that only the end of the can 12 that contains the button 32 will be readily viewable by, or accessible to, an operator of the equipment. This results in a much neater appearance than would be the case if the button 32 were located in the opposite end of the thermostat (in the base 15), in which case it would be necessary for both button 32 and the adjacent terminals 20 to be accessible to an operator.

Having thus described my invention, what I claim is:

1. A thermostat, comprising

a cup-shaped base having a pair of spaced electrical terminals projecting from one side thereof,

a normally-open switch mounted on the opposite side of said base and operative electrically to connect said terminals, when closed, and to disconnect said terminals from each other, when open,

a cover secured over said base,

a bimetallic disc mounted on the rim of said base beneath said cover normally to bow at its center into said cup-shaped base to close said switch, and operative to flex at its center outwardly to allow said switch to open, when the ambient temperature of the switch exceeds a predetermined value,

means insulating said disc electrically from said switch,

a reset pin mounted to reciprocate in an opening in said cover coaxially of said disc between a retracted position in which said pin is located substantially wholly within said cover and an extended position in which said pin projects at one end thereof outwardly beyond said cover readily to be viewable from the exterior of said cover, and

a spring interposed between said cover and a projection on the inner end of said pin resiliently to hold the inner end of said pin against the side of said disc remote from said switch.

2. A thermostatic switch comprising

a base,

a pair of spaced, electrical terminals projecting from one end of said base,

a contact secured in a recess in the opposite end of said base and in electrical connection with one of said terminals,

a flexible switch arm secured at one end in said recess in electrical connection with the other of said terminals, and pivotal at its opposite end between two positions in which it is engaged with, and disengaged from, respectively, said contact,

a cover secured to said base over said recess,

a bimetallic element mounted on said base between said cover and said arm normally to project into said recess to hold said arm in one of its two positions, and operative upon a predetermined change in ambient temperature to flex outwardly of said recess to allow said switch to move to its other position,

a pin reciprocably mounted in an opening in said cover at the side of said element remote from said arm, and with its inner end engaging said element for movement thereby from a retracted position within said cover to an extended position in which said pin projects at its outer end outwardly beyond said cover, when said element is flexed out of said recess,

said element being a bimetallic disc supported adjacent its marginal edge between said cover and said opposite end of said base normally to bow at its center into said recess,

said switch arm normally being held closed against said contact by said disc, and movable to its open position when said disc is flexed out of said recess,

a spring interposed between said pin and said cover resiliently to urge said pin toward its retracted position, and

means insulating said element electrically from said switch arm,

said cover being operative to enclose and hide from view substantially all of said pin, when the latter is in its retracted position.

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