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54 **Thermostat.**

57 A thermostat comprising a bimetal switch element (7) reacting upon temperatures, which on one of its ends is fastened on a frame and on the other end is provided with an electric contact adapted to engage a fixed contact provided on the frame, said frame comprising two mutually parallel sheet-like metallic contact carriers (2, 3) forming a base unit, through which two parallel ceramic pins (4, 5) are extending for connection of both contact carriers and on which pins the contact carriers, with a tight fit, are slidable to and fro one another and permanent mutually parallel during mounting, which thermostat may be provided with an external heating means, at least one of the pins is made of PTC-material.

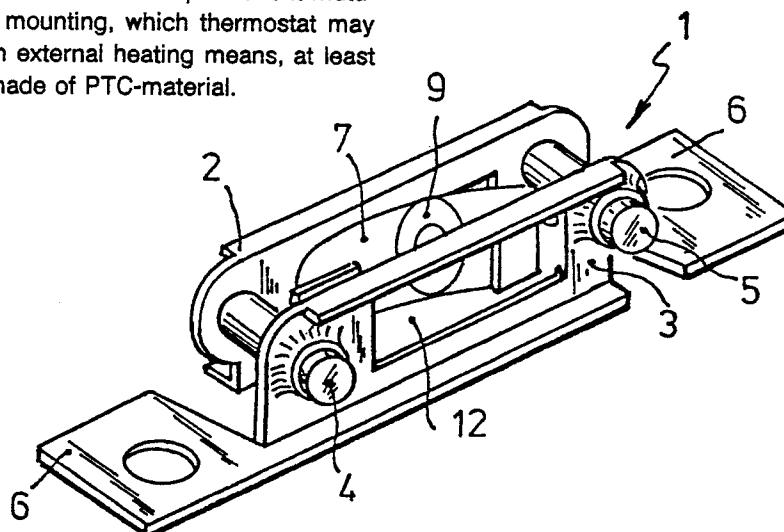


FIG. 1

Thermostat

The present invention relates to a thermostat comprising a bimetal switch element reacting upon temperatures, which on one of its ends is fastened on a frame and on the other end is provided with an electric contact adapted to engage a fixed contact provided on the frame, said frame comprising two mutually parallel sheet-like metallic contact carriers forming a base unit, through which two parallel pins are extending for connection of both contact carriers and on which pins the contact carriers, with a tight fit, are slidable to and fro one another and permanent mutually parallel during mounting, which thermostat may be provided with an external heating means, an internal heating means, a heat capacity, as well as various embodiments of connecting terminals for the contact carriers.

Such a thermostat has been described in the not prepublished European patent application 83200914.

A number of embodiments of said thermostat are shown, influencing the current sensibility and/or the times of switching it on and off, and/or connection and mounting possibilities.

For instance various embodiments of connecting terminals for the contact carriers are shown: an external heating element that is fed by the current to be switched, possibly arranged in or on a heat capacity; contact carriers, one of which or both being made in a resistance material, possibly combined with a special configuration of said carriers and/or an additional heat capacity.

Furthermore the possibility is indicated of adding to these embodiments a heat source connected in parallel, preferably with PTC-characteristics, keeping the thermostat open after being opened until the main current is interrupted, so that a so-called manual reset function is obtained.

A drawback of this structure is that an additional component (requiring additional space) and contact-making means have to be added, whilst special care should be bestowed on stability, for instance in the event of vibrations. It is a further drawback that in the automatic reset function, that is without an additional heat source connected in parallel, the switch-back times highly depend upon the ambient temperature, and the range of switch-back times is restricted i.e. by the difference between the switch-back temperature and the ambient temperature.

While maintaining the advantages with respect to the known thermostats, mentioned in the above indicated patent application, the invention tends to abolish the above indicated drawbacks and for that purpose it is characterized in that at least one of

the pins is made of PTC-material, from which pins, when energized, electrically generated heat can be transferred by conduction, convection and radiation to the temperature sensitive switching element of the thermostat.

Because of the application of said feature the possibilities of use are enlarged by a broader range of switch-back times and reset functions, a simpler mounting without additional components is possible, minimal room is necessary, said thermostat being reliable in a fabrication-technical respect and the time at which it switches back on again can be accurately influenced.

One, or both, pins can be made of a PTC-material with a predetermined Curie-temperature with which a simple, solid structure is obtained. Heat generated in this or these PTC pins is transferred by radiation, conduction and convection to the switching member of the thermostat. Because of the close construction of the device the Curie-temperature of the PTC pin, when energized, determines mainly the temperature of the switching member. At lower ambient temperatures it creates an artificial direct ambient temperature. When the Curie-temperature of the PTC pin is chosen in such a way that this artificial direct ambient temperature lies between the switch-off and switch-on temperature of the thermostat, the latter cannot switch back again when the ambient temperature falls. Only externally switching-off the current can switch the thermostat on again, a so-called manual reset function. When the Curie-temperature is chosen in such a way that this artificial direct ambient temperature in the application at decreased ambient temperatures in the situation of thermal balance is below and close to the switch-on temperature, a very long time for switching-on again is provided. This switching-on takes place automatically and the time of switching-on again depends less upon the ambient temperature. The closer the Curie-temperature is to the switch-on temperature, the longer the cooling time of the thermostat will be.

If one of said pins is made of PTC-material, security is given in case, upon short-circuiting of the pin, the latter would burn. The other pin, made of an insulating material, maintains the function of the thermostat and the mechanical structure of the whole.

The invention will be elucidated now on the basis of the drawing.

Fig. 1 shows schematically an embodiment of a thermostat according to the invention.

Fig. 2 shows an upper view of the thermostat of Fig. 1.

The base unit 1 comprises two mutually parallel, sheet-like contact carriers 2 and 3 which, with a tight fit, are fastened on two parallel pins 4 and 5, one pin or both pins thereof being made of PTC-material.

The pins extend through two deep-drawn holes in the contact carriers. The contact carriers are slidable on the pins to and fro one another and mutually parallel during the composition and adjustment of the thermostat. Each contact carrier comprises connecting terminals 6, 6 which are provided on opposite ends of the base unit and are aligned to one another and extend in longitudinal direction of the base unit.

On the inner side of one of the contact carriers 2, 3 a switch element 7 is fastened at 8 on the relevant contact carrier by e.g. welding. The switch element consists of a bimetal and comprises a setting which enables independent switching with a snap action at a determined switch-on temperature and switches back at a lower temperature.

If the direct ambient temperature remains above the switch-back temperature no switching-back takes place, unless resetting is performed mechanically or the direct ambient temperature is reduced. The switch-over temperatures are determined by the configuration of the setting and the manner of mounting.

The setting is circular in the shown embodiment, however, it may have another shape too.

The switch element comprises on its movable end a contact 10 adapted to engage a fixed contact 11 fastened on the inner side of the other contact carrier. The contact carriers may have any configuration. For instance they can have an aperture 12 as illustrated in fig. 1 for laterally exposing almost the entire switch element 7. Furthermore each contact carrier can be made of a resistance material by which the current sensibility is increased. The contact carriers can be made of the same material or of two different materials. A contact can consist of three layers, for instance of Ni, Cu, Ag(Cdo). It is also possible that the switch element has not been provided with a setting. The connection terminals can be also have various configurations and positions, and a heat well can be used as well as the external or an internal heating means.

Claims

1. A thermostat comprising a bimetal switch element reacting upon temperatures, which on one of its ends is fastened on a frame and on the other end is provided with an electric contact adapted to engage a fixed contact provided on the frame, said frame comprising two mutually parallel sheet-like contact carriers forming a base unit, through which

two parallel pins are extending for connection of both contact carriers and on which pins the contact carriers, with a tight fit, are slidable to and fro one another and permanent mutually parallel during mounting, which thermostat may be provided with an external heating means, a heat capacity, as well as various embodiments of connecting terminals for the contact carriers, characterized in that at least one of the pins (4, 5) is made of PTC-material, from which pins, when energized, electrically generated heat can be transferred by conduction, convection and radiation to the temperature sensitive switching element of the thermostat.

2. A thermostat according to claim 1, characterized in that the PTC-material has a Curie-temperature chosen so that the resulting temperature at the sensing element stays between the switch-off and the switch-on temperature of the thermostat, when the ambient temperature decreases in the application.

3. A thermostat according to claim 1, characterized in that the PTC-material has a Curie-temperature chosen so that the resulting artificial direct ambient temperature in the application at decreased ambient temperatures in the situation of thermal balance is below the switch-on temperature of the thermostat.

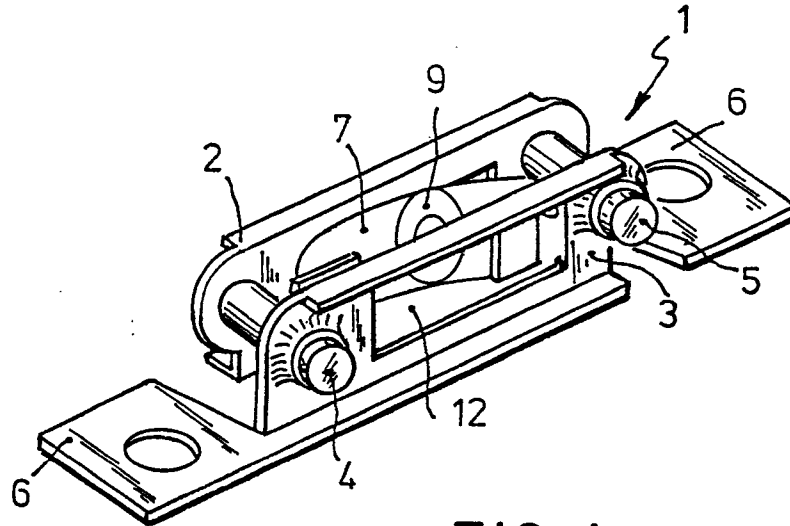


FIG. 1

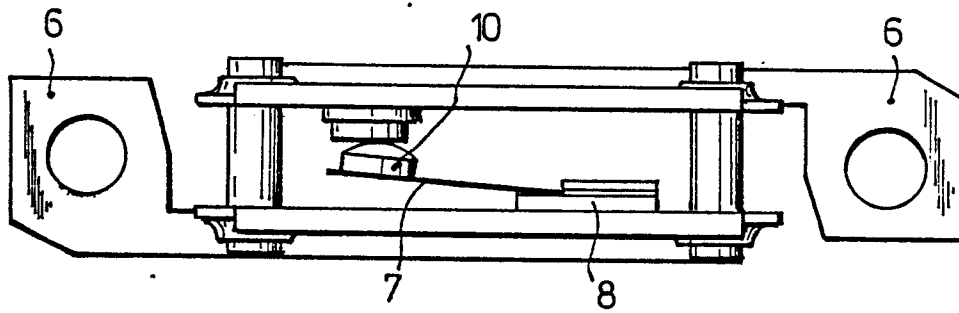


FIG. 2



EP 85 20 1824

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,Y	EP-A-0 128 978 (TEXAS INSTRUMENTS HOLLAND B.V.) * claims 1, 18; page 5, paragraph 3; figure 1 *	1	H 01 H 37/14 H 01 H 61/02
Y	--- DE-A-2 113 388 (TEXAS INSTRUMENTS INC.) * claims 1, 3, 4; figures 1, 2 *	1	
A	--- EP-A-0 114 071 (F. EICHENAUER GMBH & CO. KG) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			H 01 H 37/00 H 01 H 61/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 12-06-1986	Examiner RUPPERT W
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	