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(71) Applicant: **PRODIGY ITALIANA S.r.l.**
20091 Bresso (Milano) (IT)

(72) Inventor: **Pollina, Antonio**
20091 Bresso, Milano (IT)

(74) Representative: **Cicogna, Franco**
Ufficio Internazionale Brevetti
Dott.Prof. Franco Cicogna
Via Visconti di Modrone, 14/A
20122 Milano (IT)

(54) Thermostat for adjusting the temperature in electric appliances

(57) The invention relates to a thermostat for adjusting the temperature in electric appliances, of the type comprising a temperature probe holding a liquid herein, the volume of said liquid changing depending on the temperature and a capillary element transmitting the volume variation to a membrane held inside a box-like body. The membrane transmits its volume variation to a non conductive material pad, through a metal lever, pivoted to a side of the box-like body, to which it is rigidly applied, so that the pad is caused to drive a metal blade from a first position, in which the blade provides an electrical connection between an input terminal and a first output terminal, and a second position, in which the blade provides an electrical connection between the input terminal and a second output terminal, in order to drive an alternative device.

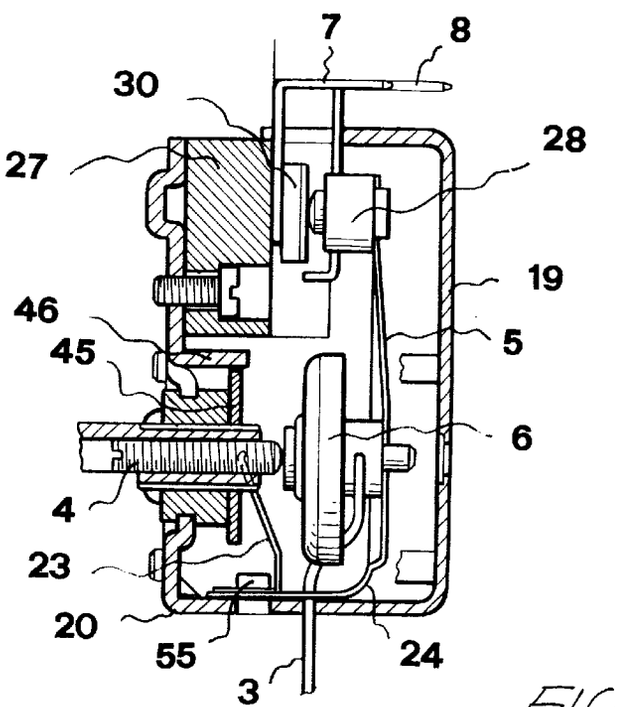

FIG. 3

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a thermostat for adjusting the temperature in electric appliances.

[0002] Temperature adjusting thermostats for adjusting the temperature in apparatus in general and, in particular, in electric appliances, and using a temperature probe, are already known.

[0003] The temperature measuring probe holds herein a liquid the volume of which changes depending on the temperature being sensed.

[0004] A capillary element is in turn coupled to a membrane generally arranged inside the thermostat and operating, through suitable volume variation transmitting means, the electric contacts of the thermostat.

[0005] Prior thermostats, however, have frequently a comparatively large size and are not fully reliable and accurate in operation.

SUMMARY OF THE INVENTION

[0006] Accordingly, the aim of the present invention is to provide a thermostat for adjusting the temperature in electric appliances or apparatus, which has a very small size and, moreover, is very reliable.

[0007] Within the scope of the above mentioned aim, a main object of the present invention is to provide such a thermostat affording a very good insulation between the mechanical and electrical parts of the electric appliance or apparatus.

[0008] A further specific object of the invention is to provide such a thermostat which can be accurately and easily adjusted to the operation temperature of said appliances.

[0009] Yet another object of the present invention is to provide such a thermostat including small cost components.

[0010] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a thermostat for controlling the temperature in electric appliances, of the type comprising a temperature probe holding herein a liquid the volume of which changes depending on the temperature, as well as a capillary element transmitting the volume variation to a membrane, held inside a box-like body, characterized in that said membrane is provided with transmitting means for transmitting the volume variation of said membrane so as to drive a metal blade from a first position in which said blade provides an electric connection between an input terminal and a first output terminal, to a second position in which said blade is not electrically connected to said first output terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further characteristics, details and advantages of the present invention will become more apparent hereinafter from the following disclosure, given by way of an illustrative but not limitative example, with reference to the accompanying drawings, where:

Figure 1 is a front view of the thermostat according to the present invention;

Figure 2 is a rear view of the inventive thermostat, devoid of its outer cover;

Figure 3 is a cross-sectional view, substantially taken along the section line A-A of Figure 1, illustrating the thermostat according to the invention provided with operating terminals allowing said thermostat to operate as a switching element; and

Figure 4 is a further cross-sectional view, substantially taken along the section line B-B of Figure 2 illustrating the thermostat according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] In the following disclosure reference will be made to some preferred embodiments of the invention, which has been shown by way of a not limitative example of possible variations of the invention.

[0013] More specifically, and as it will become more apparent hereinafter, the present invention provides a thermostat element which can be used either as a simple switch thermostat, for switching on and off an electric appliance as the temperature thereof exceeds a set threshold, or as a switching element adapted to operate an alternative device.

[0014] The thermostat according to the invention, which has been generally indicated by the reference number 1, is of a type comprising a temperature probe (not shown) holding herein a liquid adapted to change its volume depending on the temperature, and a capillary element 3 transmitting said volume variation to a membrane 6.

[0015] The membrane 6, in particular, is held inside a box-like body, comprising a metal base 20 and a cover element 19, made of a plastic material.

[0016] The metal base 20 and plastic cover element 19 are connected to one another by a fixed-joint type of connection, and to the base 20 a supporting element 27 made of a non conductive material is applied, on said supporting element being arranged the electric terminals of the thermostat, said electric terminals comprising the input terminal 9 and the output terminals 7 and 8.

[0017] Such arrangement of said base 20, cover element 19 and supporting element 27 provides a box-like body, holding therein the operating or driving elements of the thermostat 1, which will be disclosed in a more detailed manner hereinafter, from which box-like body the end portions of the terminals 7, 8 and 9 and said

capillary element 3 included in said temperature measurement probe project.

[0018] The base 20 comprises two flat elements, connected to provide a L-shape, and the shorter element of said base 20 includes therein latching seats 55 for engaging therein a blade 24, in turn L-bent, which is extended by a metal lever 5 having a substantially trapezoidal configuration and overlaying in a parallel relationship the longer side of the base 20.

[0019] To said metal lever 5 is rigidly applied said membrane 6, facing the space defined between the long side of the base 20 and said lever 5, whereas to the end portion of the lever 5 opposite to the end thereof engaging in the seats 55, a non conductive material pad 28 is applied, said pad facing the long side of the base 20.

[0020] The pad 28 is adapted to drive a metal blade 30, providing an electric connection to the input terminal 9 and, alternately, in the case in which the thermostat is used as a switching element, to one of the output terminals 7 and 8.

[0021] On the contrary, if the thermostat is designed to operate as a simple switch, then the blade 30 will provide or interrupt the electric connection between the inlet terminal 9 and an output terminal.

[0022] More specifically, the first and second output terminals 7 and 8 are provided with overlapping terminal portions defining a space in which a corresponding contact portion of the metal blade 30 is engaged.

[0023] In order to provide a better electric connection between said portions, the blade 30 comprises a double contact 33 which will alternately engage with contact elements 36 and 37 respectively provided on the first and second output terminals.

[0024] The blade or reed 30 is preferably contoured to present a ridge 38 thereagainst said non conductive material pad 28 abuts; moreover, the convexity of said ridge 38 is turned toward said pad 28.

[0025] The thermostat 1 operates as follows.

[0026] During a normal operation of said thermostat, the pad 28 will press on the blade or reed 30 to provide an electric connection with the first output terminal 7.

[0027] As the temperature of the fluid being controlled increases, the liquid held in said temperature probe, coupled to the membrane 6 through the capillary element 3, will cause the membrane 6 volume to expand or increase.

[0028] The membrane 6, by expanding, will drive the metal lever 5 to which it is connected thereby, as the temperature increases, the pressure exerted by the pad 28 on the ridge 38 of the metal blade 30 will be progressively released.

[0029] As the temperature increases, the pressure provided by the pad 28 will decrease to cause the metal blade or reed 30 to abruptely switch from a first position in which it is electrically connected to the first output terminal 7, to a second position in which the mentioned connection is interrupted.

[0030] This will occur, in particular, with a thermostat 1 designed to operate as a simple switch thermostat.

[0031] When the thermostat 1 is designed to operate as a switching element proper, then the blade or reed 30, in said second position thereof, will provide an electric connection with the second output terminal 8, coupled to an alternative device.

[0032] The metal blade 30 is provided, at a middle portion thereof, with a curved portion 35 having one end coupled to the input terminal 9, thereby facilitating a resilient recovering of the blade 30 from the first position to the second position thereof.

[0033] Thus, the blade 30 will be subjected to a snap type of displacement between the two mentioned positions, so as to prevent sparks or electric arches from forming during the status switching of the thermostat 1.

[0034] The thermostat according to the invention comprises moreover a driving shaft or spindle 4, on which is pivoted said membrane 6, and by means of which it will be possible to manually adjust the spacing of the membrane 6 from the long side of the base 20.

[0035] By this adjustment, the thermostat can be accurately calibrated on the desired operation temperature.

[0036] Preferably, the driving spindle 4 will rotatively drive a wheel element 45 provided with a projecting lug which, at an end of stroke position, will abut against a pin 46 rigid with the base 20 of the box-like body.

[0037] Moreover, on the wheel 45 a resilient fork element 23 is engaged, said fork element having end portions engaged in the seats or recesses 55, so as to properly hold the wheel element 45 in its desired position.

[0038] Finally, the disclosed thermostat, owing to its small size and simple construction, can be made with a very high constructional accuracy, thereby providing a highly reliable thermostat.

Claims

1. A thermostat for controlling the temperature in electric appliances, of the type comprising a temperature probe holding herein a liquid the volume of which changes depending on the temperature, as well as a capillary element transmitting the volume variation to a membrane, held inside a box-like body, characterized in that said membrane is provided with transmitting means for transmitting the volume variation of said membrane so as to drive a metal blade from a first position in which said blade provides an electric connection between an input terminal and a first output terminal, to a second position in which said blade is not electrically connected to said first output terminal.

2. A thermostat for adjusting the temperature in electric appliances, according to Claim 1, characterized in that, in said second position, said blade provides an electric connection between said input terminal

and a second output terminal.

3. A thermostat for adjusting the temperature in electric appliances, according to Claims 1 and 2, characterized in that said membrane volume variation transmitting means comprise a metal lever to which said membrane is rigidly connected.

4. A thermostat for adjusting the temperature in electric appliances, according to Claim 3, characterized in that said membrane is pivoted to a side of said box-like body.

5. A thermostat for adjusting the temperature in electric appliances, according to Claim 3 or 4, characterized in that to said metal lever a non conductive material pad operating on said metal blade is applied.

6. A thermostat for adjusting the temperature in electric appliances, according to one or more of the preceding claims, characterized in that said first and second output terminals are provided with overlapping terminal portions defining a space therebetween, in said space being engaged said contact portion of said metal blade.

7. A thermostat for adjusting the temperature in electric appliances, according to Claim 6, characterized in that said blade is provided with a double contact respectively contacting contact elements provided on the first and second output terminals.

8. A thermostat for adjusting the temperature in electric appliances, according to Claim 6 or 7, characterized in that said blade is so contoured as to present a ridge thereagainst said non conductive material pad abuts.

9. A thermostat for adjusting the temperature in electric appliances, according to Claim 7 or 8, characterized in that said metal blade is provided, at a middle portion thereof, with a curved portion having one end coupled to the input terminal, thereby facilitating a resilient recovering of said blade from said first position to said second position thereof.

10. A thermostat for adjusting the temperature in electric appliances, according to one or more of the preceding claims, characterized in that said box-like body comprises a metal base and a plastic material cover element, said metal base and cover element being fixedly joined to one another.

11. A thermostat for adjusting the temperature in electric appliances, according to one or more of the preceding claims, characterized in that said thermostat comprises moreover a driving spindle for adjusting, depending on a desired adjusting or control temperature, a spacing between said membrane and said base of said box-like body.

12. A thermostat for adjusting the temperature in electric appliances, according to Claim 11, characterized in that said driving spindle rotatively drives a wheel element provided with a projecting lug which, at an end of stroke position, abuts against a pin element rigid with said box-like body base.

13. A thermostat for adjusting the temperature in electric appliances, according to Claim 11, characterized in that on said wheel element a resilient fork element is engaged.

14. A thermostat for adjusting the temperature in electric appliances, according to one or more of the preceding claims, characterized in that to said box-like body base a non conductive material supporting element for supporting said terminals is applied.

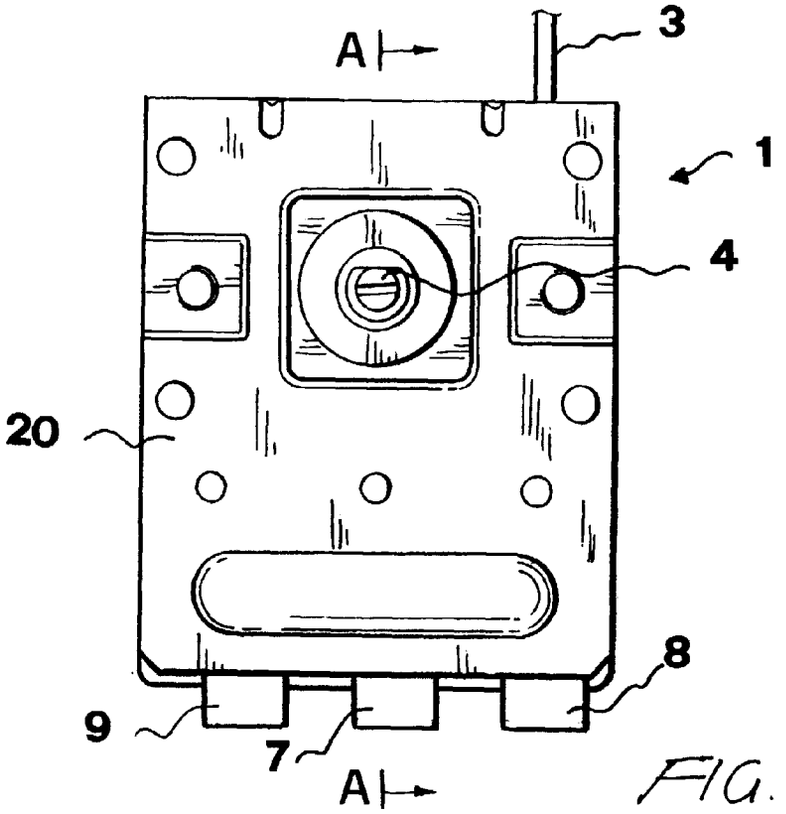

FIG. 1

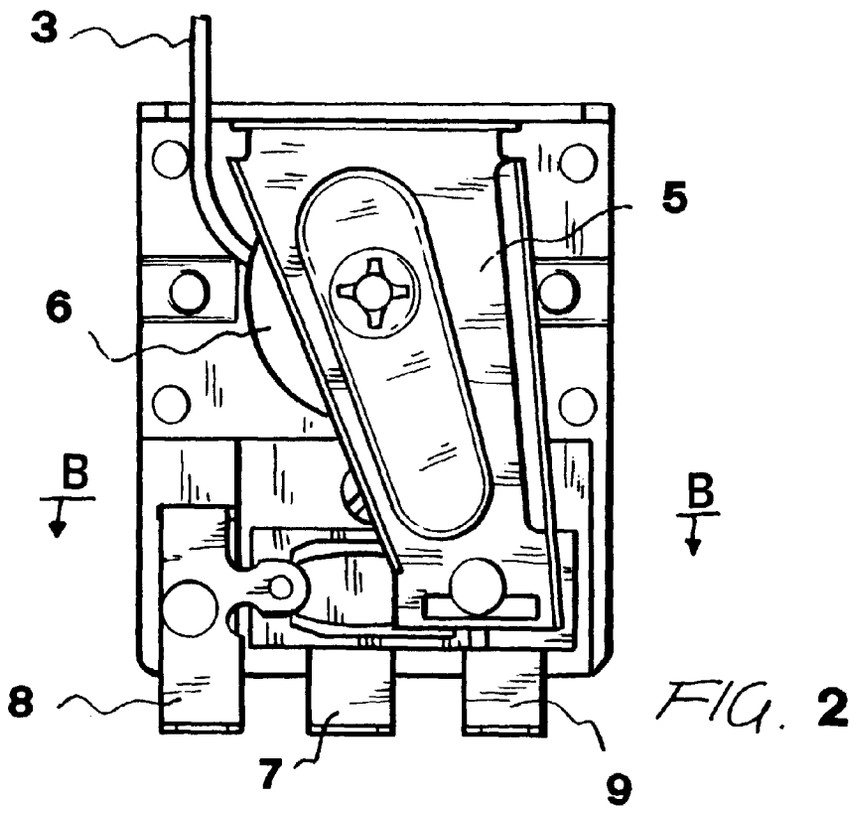

FIG. 2

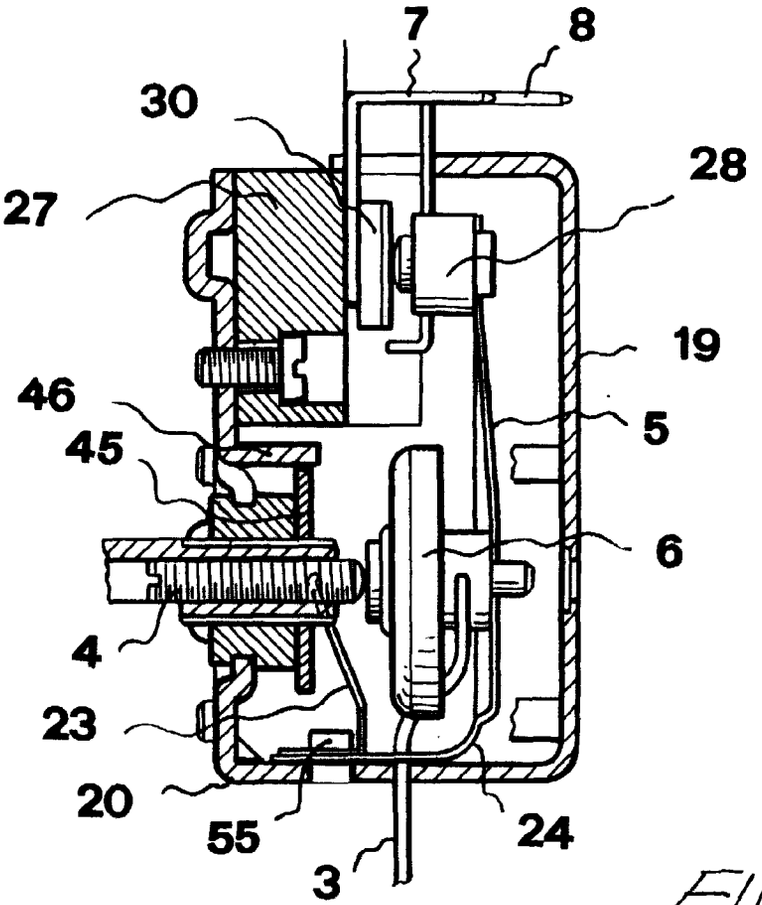

FIG. 3

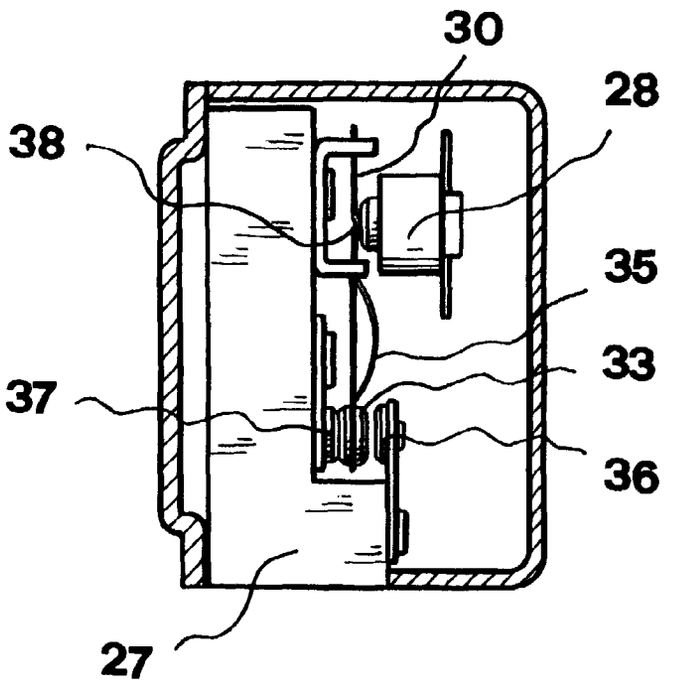

FIG. 4