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H. A. MULVANY

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THERMOSTAT

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Fig. 1.

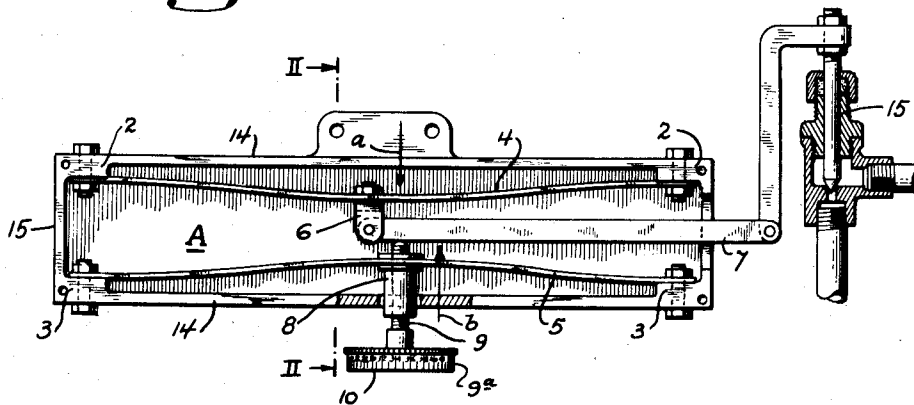
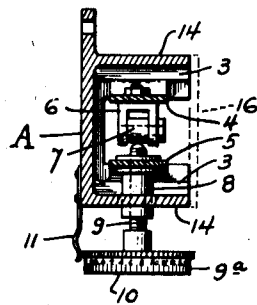


Fig. 2.



INVENTOR.
Harry A. Mulvany.

BY
Chas. C. Townsend.
ATTORNEY.

UNITED STATES PATENT OFFICE

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THERMOSTAT

Harry Alfred Mulvany, Berkeley, Calif.

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2 Claims. (Cl. 297—11)

This invention relates to thermostats, and especially to thermostats of the bi-metallic type.

In the operation of refrigerator cars, particularly during the winter months, heaters have been installed to prevent the temperature from dropping below the freezing point or some other predetermined destructive temperature. In conjunction with such heaters, thermostats have been used to turn the heaters automatically off and on, as the temperature increases or decreases within the refrigerator car, but although a number of thermostats have been employed, they have not been altogether satisfactory, as they are not sufficiently rugged to withstand the vibration, jars and shocks to which the cars are subjected during transit, and in addition thereto, they have usually been too complicated for the average trainman to adjust and take care of them properly.

The object of the present invention is generally to improve and simplify the construction and operation of thermostats; to provide a thermostat which consists of few parts and which is rugged in construction; to provide a thermostat which may be readily applied or attached to heaters of varying types; to provide a thermostat in which an actuating lever is the only movable part and a single screw the only adjustable part; to provide a thermostat which is composed of a single expandible member, to which is secured a pair of substantially non-expanding members, said members being flexible and bowed in opposition to each other to permit doubling or compounding of the movement of the expanding member; to provide means whereby the compounding movement of the substantially non-expanding, but flexible, members is transmitted to operate an actuating lever; and further, to provide an adjustment whereby the actuating lever becomes operative only at predetermined temperatures.

The thermostat is shown by way of illustration in the accompanying drawing, in which:

Fig. 1 is a side elevation of the same, said figure also showing the manner in which the thermostat is connected to operate and control a needle valve; and

Fig. 2 is a cross section taken on line II—II of Fig. 1.

Referring to the drawing in detail, and particularly to Fig. 1, A indicates an elongated base member constructed of aluminum or a similar material having a comparatively high coefficient of expansion. Formed at opposite ends of the base member are pairs of pads 2—2 and 3—3,

and extended lengthwise of the base and secured to the respective pairs of pads are strips 4 and 5 constructed of a material which is substantially non-expansive; a suitable material, and that which is actually employed, is a metal known to the trade as "Invar." The Invar strips are flexible, and they are bowed in opposition to each other, as clearly shown in Fig. 1, and as the base or expandible member lengthens or shortens due to temperature changes, the bow in the respective strips changes. This change in the bowing of the strips is transmitted to operate a pivotally mounted actuating lever, and this is accomplished as follows.

Secured or formed on the strip 4 is a pair of spaced lugs 6, and pivoted at one end between said lugs is an actuating lever 7. Secured to the strip 5 is a nut 8, and extending and engaging the lever 7 is an adjusting screw 9. By this arrangement movement is transmitted to swing the lever about the pivot 6, and at the same time it is possible to compound or double the movement of the base or expandible member and to transmit the compounding movement to the lever 7. For instance, if the temperature is cooling or dropping, the base A will contract and the bow in the strip 4 will consequently increase, thereby causing the pivotal point 6 to move in the direction of arrow a. The bow in the strip 5 will similarly increase, and the adjusting screw will accordingly move in the opposite direction, or that indicated by the arrow b. The adjusting screw will in that instance function as a fulcrum point for the lever 7, and as the pivotal point 6 and the fulcrum point 8 move in opposite directions, or towards each other, the contracting movement of the expandible member is compounded, with the result that considerable movement is imparted to the actuating lever even though the temperature change is comparatively slight.

The thermostat is here shown as connected with a needle valve 15 which controls the flow of fuel to a burner, and if the burner is employed in conjunction with a heater in a refrigerator car, the thermostat will automatically open the valve and increase the flow of fuel as the temperature drops below a predetermined point. This predetermined point is regulated by the adjusting screw 9, and for this reason the screw is provided with an enlarged head 9a, which carries a temperature-indicating scale 10. Also, the peripheral edge of the head is knurled or roughened, and it is engaged by a spring arm

pointer 11 (see Fig. 2), so as to normally secure the head and screw against rotation.

Thus, if it is desired to turn on the heater when the temperature in a refrigerator car drops to 34° F., the head 9a is rotated until 34° on the temperature scale registers with the pointer 11, and when this temperature is reached, the valve begins to open and the heater will gradually give off more heat and prevent a further temperature drop. Conversely, if the temperature rises, the valve will close, and a uniform predetermined temperature is thus automatically maintained.

The thermostat is exceedingly simple and rugged in construction, the only moving part employed being the actuating lever 7, and the only adjustable part being the screw 9, and as this is normally held against rotation by the spring arm or pointer 11, vibrations, shocks and the like imparted to the thermostat during transit of the car will in no way change the temperature adjustment. The trainman has only one thing to do, and that is to rotate the head 9a of the adjusting screw to set the thermostat for any temperature required, and that certainly does not require any skill. Other care or attention on the part of the trainmen is entirely unnecessary, as the chances of breakage or of parts getting out of adjustment is just about nil.

In fact, the thermostat as a whole is so simple in construction that the mechanism is usually covered. For this reason sides 14 and ends 15 are formed on the base plate A, enclosing the strips 4 and 5 and the actuating lever. A cover plate indicated by dotted lines at 16 may thus be applied, and the thermostat is substantially tamper-proof. The only parts projecting from the thermostat are the end of the control lever 7 and the adjusting screw 9 and its head 9a.

While the actuating lever 7 is here shown as connected to actuate a needle valve, such as shown at 15, it is obvious that it may be employed for many different purposes, and may be connected in different ways. For instance, lever 7 might be connected to actuate the contacts of an electric switch, relay, or similar mechanism. Suffice it to say that the actuating lever projects from one end of the base member, and as such may be readily connected in different ways with a mechanism to be actuated, and thus it is a simple matter to attach the thermostat to mechanisms of different types and character.

While certain features of my invention have

been more or less specifically described and illustrated, I nevertheless wish it understood that changes may be resorted to within the scope of the appended claims, and that the specific materials and finish of the parts employed may be such as the maker desires or various uses dictate.

Having thus described and illustrated my invention, what I claim and desire to secure by Letters Patent is:

1. A thermostat comprising an elongated holder formed of a thermally expansible material, a pair of non-expanding flexible members normally bowed in opposition to one another lengthwise of the holder and anchored at their opposite ends thereto, a lever extending in the direction of its length between said members and projecting at its outer end beyond the holder, and connections between said members and the opposite end portion of said lever at spaced points in the length of the latter, one of said connections including a pivot support anchored intermediate the ends of its respective flexible member, in which the extreme inner end of the lever is pivoted, and the other of said connections including an adjusting screw, the inner end of which bears against the lever at a point spaced from its pivot and is otherwise free thereof, and a tubular nut anchored in connection with the other flexible member and through which said adjusting screw works to a point beyond one side of the holder.

2. A thermostat comprising an elongated box-like holder formed of a thermally expansible material and having openings at one end and intermediate one side thereof, a pair of non-expanding members bowed in opposition to one another and disposed lengthwise within the holder and anchored at their ends thereto, a lever extending between said members and projecting at its outer end exteriorly of the holder through said end opening, and connections between said members and the inner portion of said lever at spaced points in the length of the latter, one of said connections including a pivotal support for the inner end of the lever, and the other connection including an adjustable screw bearing at its inner end against the lever and otherwise free thereof, and a tubular nut secured to the corresponding bowed member and through which said adjusting screw works to the exterior of the holder through the said side opening thereof.

HARRY ALFRED MULVANY.