March 7, 1950 W. A. RAY 2,499,779

THERMOSTATIC SWITCH

Filed March 11, 1946

Fig. 1

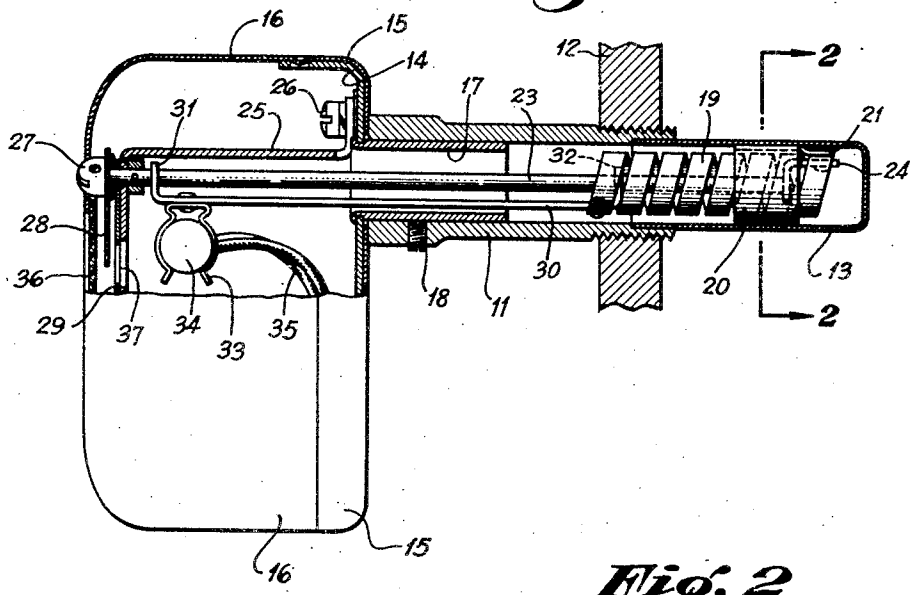
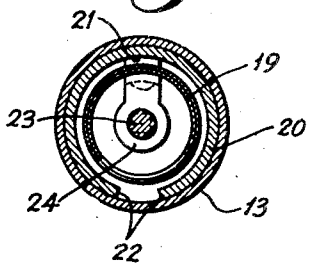


Fig. 2



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THERMOSTATIC SWITCH

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7 Claims. (Cl. 200—139)

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My present invention relates to control apparatus, and more particularly to improvements in thermostats of the type adapted to be mounted on the wall of a chamber, such as that defined by a water-boiler, hot-air furnace, or the like, and having a hollow portion or well, containing the temperature-responsive element, extending into the chamber in good heat-conducting relation to the fluid therein.

An object of this invention is to provide, in a thermostat of the character described, means for so mounting the temperature-responsive element in the well that it is maintained in good heat-conducting relation to the wall thereof but can be readily removed, if desired, without disturbing the well; an ancillary object being the provision of means for facilitating transfer of heat from the well to the element.

Another object is to provide novel and simplified means for adjusting the setting of the thermostat.

For full understanding of the invention, and further appreciation of its objects and advantages, reference is to be had to the following detailed description and accompanying drawing, and to the appended claims.

In the drawing:

Figure 1 is a longitudinal sectional view of a thermostat embodying the invention; and

Figure 2 is an enlarged transverse section taken along the line 2—2 of Fig. 1.

In the drawing, the numeral 11 indicates a tubular member which is threaded at one end for mounting in an opening through a wall 12 which may be the wall of a chamber defined by a water-boiler, hot-air furnace, or the like. Secured, as by brazing, to the member 11, at its end within the chamber, is a closed tube or well 13 of thin metal. Supported by the other or outer end of member 11 is a case or housing comprising a cupped sheet-metal base formed by nested inner and outer shells 14 and 15, respectively; the mouth of the inner shell projecting beyond that of the outer to form a support for a cupped cover 16. Secured to the housing-base 14—15, in an opening therethrough, is a tube 17 which is a free fit in the bore of member 11 and is held there in position by a set-screw 18.

Within the well 13 is a helical bimetallic member 19 which is held there in position by a cylindrical member or shoe 20 having an integrally-formed projecting finger 21 which is riveted to the inmost end portion of the bimetallic member. The shoe 20 is split, as indicated at 22 in Fig. 2, and spread so that it

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engages the side-wall of the well 13 relatively tightly. The shoe serves not only as substantially the sole means for supporting the bimetallic member, but also as the main means for transferring heat thereto from the well 13 and is therefore of metal having high thermal conductivity, such as copper. If the well is of metal, such as stainless-steel, having a coefficient of thermal expansion lower than that of the shoe material, with rise of temperature the shoe tends to more tightly grip the wall of the well. For the same purpose, the shoe optionally may be of bimetallic material.

A rod 23 is secured to the shoe 20 by means of a right-angled connection 24 riveted to the rod and to the shoe-finger 21 with the end portion of the bimetallic member therebetween. The rod extends through the interior of the bimetallic member and is freely supported at its left-hand end in an opening through a bracket 25 mounted on the housing-base 14—15 by screws 26. Secured to the left-hand extremity of rod 23 is a slotted head 27 which carries an indicator or pointer 28 cooperable with temperature indicia on a plate 29 behind it; the head 27 being accessible through an encircling opening in the cover 16 so that by rotating the head with a screw-driver the shoe 20, and therewith the bimetallic member 19, can be rotated with respect to the well 13.

Secured, as by a rivet, to the left-hand end of the bimetallic member 19 is an elongated strip or bracket 30 having bent-up end-portions 31 and 32 through openings in which the rod 23 freely passes. Mounted on the underside of the bracket 30, by means of clips 33, is a switching device 34 of the tiltable mercury-contact type having flexible leads 35 for which connection-terminals (not shown) may be provided in the lower part of the housing 15—16. In the front of the cover 16 is a window, covered by glass 36, for viewing the pointer 28; openings 37 also being provided in bracket 25 and plate 29 through which the condition of the switch 34 may be observed.

To install the thermostat, it is conveniently first disassembled by loosening set-screw 18 and withdrawing the housing 15—16, along with its contents and the bimetallic member, from the mounting member 11; the friction fit of the shoe 20 being such as to permit such withdrawal. The member 11 is then screwed in place and the remainder of the thermostat reassembled and locked in position by the set-screw; care being taken that the housing is in exactly vertical position, as may be determined by a spirit-level or

pendulum (not shown) conveniently arranged within the housing. By rotation of head 27, and therewith the friction-shoe 20 and the bimetallic member, the desired setting of the thermostat can be obtained. It is apparent that with rise and fall of temperature, and resultant rotation of the free left-hand end of the bimetallic member, the mercury-contact tube is rocked to perform its customary circuit-controlling function.

The embodiment of my invention herein shown and described is obviously susceptible of modification without departing from the spirit of the invention, and I intend therefore to be limited only by the scope of the appended claims.

I claim as my invention:

1. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a tube, of good heat-conducting material, adapted to project into the chamber through an opening in a wall thereof: a portion of said tube defining a cylindrical surface; an elongated thermostatic member in said tube and having at one of its ends resilient means arranged to grip said surface; said resilient means being movable on said surface to adjust the operative position of said member and serving as the sole means for maintaining the member in adjusted position; and switching means connected to the other end of the member.

2. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a cylindrical metallic tube adapted to project into the chamber through an opening in a wall thereof: an elongated, helical, bimetallic member freely disposed in said tube and having at one of its ends means forming a resilient enlargement arranged to grip the inner surface of the tube; said enlargement being rotatable on said surface to adjust the operative angular position of said bimetallic member and serving as the sole means for maintaining the member in adjusted position; and switching means connected to the other end of the member.

3. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a cylindrical metallic tube adapted to project into the chamber through an opening in a wall thereof: an elongated, helical, bimetallic member freely disposed in said tube; a split, annular metallic shoe secured to the end of said bimetallic member inmost of said chamber and arranged to grip the inner surface of the tube; said shoe being rotatable on said surface to adjust the operative angular position of the bimetallic member and serving as the sole means for maintaining the member in adjusted position; a rod secured to said shoe and extending outwardly of said tube through the interior of the bimetallic member for adjustably rotating the shoe; and switching means connected to the other end of the member.

4. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a tube, of good heat-conducting material, adapted to project into the chamber through an opening in a wall thereof: a portion of said tube defining a cylindrical surface; an elongated thermostatic member in said tube and having at one of its ends resilient means arranged to grip said tube-surface and movable thereon to adjust the operative position of said thermostatic member; said resilient means serving as the sole means for maintaining the member in adjusted position, and being in the form of a split, annular, metallic shoe secured to said one end of the member; and switching means connected to the other end of the member.

5. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a cylindrical metallic tube adapted to project into the chamber through an opening in a wall thereof: an elongated, helical, bimetallic member freely disposed in said tube and having at one of its ends means forming a resilient enlargement arranged to grip the inner surface of the tube; said enlargement being rotatable on said surface to adjust the operative angular position of said bimetallic member; said enlargement serving as the sole means for maintaining the bimetallic member in adjusted position, and being in the form of a split, annular, metallic shoe secured to said one end of the member; and switching means connected to the other end of the member.

6. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a cylindrical metallic tube adapted to project into the chamber through an opening in a wall thereof: an elongated, helical, bimetallic member freely disposed in said tube and having at one of its ends means forming a resilient enlargement arranged to grip the inner surface of the tube; said enlargement being rotatable on said surface to adjust the operative angular position of said bimetallic member; said enlargement serving as the sole means for maintaining the bimetallic member in adjusted position, and being in the form of a split, annular, metallic shoe secured to said one end of the member; the material of said shoe having higher thermal expansion than the material of said tube, so that with rise of temperature the gripping action is increased; and switching means connected to the other end of the bimetallic member.

7. In a thermostat of the type adapted to respond to the temperature of a chamber and having for that purpose a cylindrical metallic tube adapted to project into the chamber through an opening in a wall thereof: an elongated, helical, bimetallic member freely disposed in said tube; a split, annular, metallic shoe secured to the end of said bimetallic member inmost of said chamber and arranged to grip the inner surface of the tube; said shoe being rotatable on said surface to adjust the operative angular position of the bimetallic member; said shoe being arranged to surround a substantial portion of the bimetallic member and serving as the sole means for maintaining the member in adjusted position; a rod secured to said shoe and extending outwardly of said tube through the interior of the bimetallic member for adjustably rotating the shoe; and switching means connected to the other end of the member.

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