April 20, 1926. 1,581,124

H. S. HUMPHREY

THERMOSTAT

Filed August 22, 1924

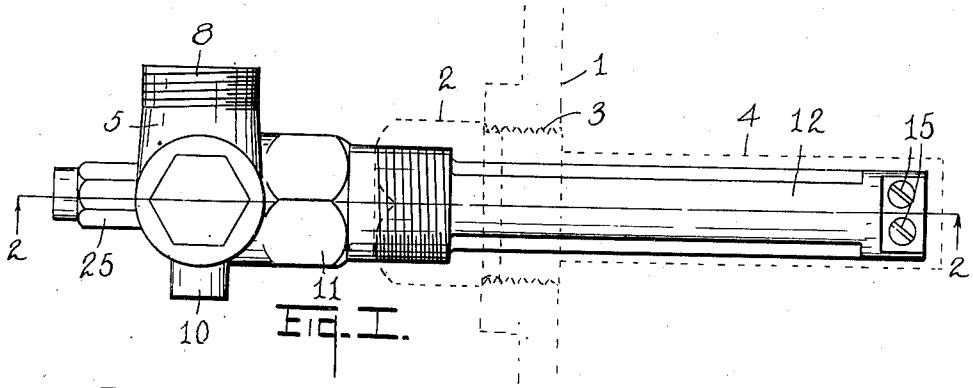


Fig. I.

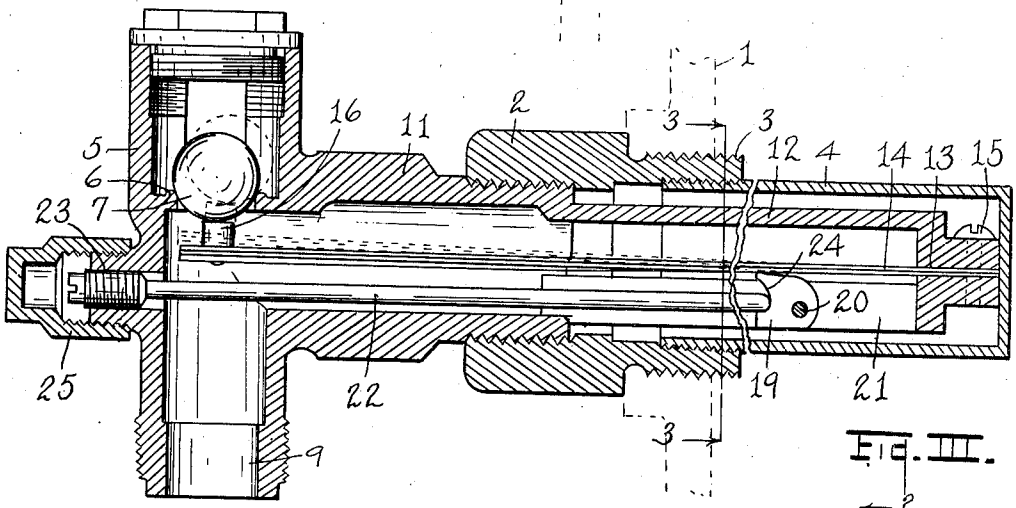
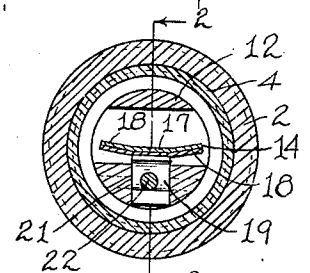


Fig. II.

Fig. III.



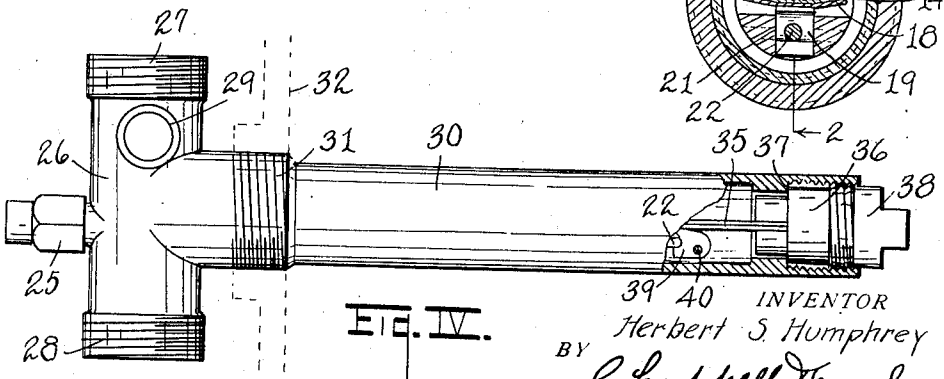


Fig. IV.

INVENTOR
Herbert S. Humphrey
BY Chappell Mead
ATTORNEYS

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UNITED STATES PATENT OFFICE.

HERBERT S. HUMPHREY, OF KALAMAZOO, MICHIGAN.

THERMOSTAT.

Application filed August 22, 1924. Serial No. 733,553.

To all whom it may concern:

Be it known that I, HERBERT S. HUMPHREY, a citizen of the United States, residing at the city and county of Kalamazoo, State of Michigan, have invented certain new and useful Improvements in Thermostats, of which the following is a specification.

This invention relates to improvements in thermostats.

My improved thermostat is particularly designed by me for use in water heaters and I have illustrated my improvements as I have embodied them for such use. Certain features of my improvements are, however, desirable and readily adapted for use in thermostats for other purposes.

The main objects of this invention are:

First, to provide an improved thermostat which may be very easily installed or applied to a water heater and the operative parts removed or replaced as occasion requires.

Second, to provide an improved thermostat which is very positive and accurate in its action and may be readily adjusted.

Third, to provide an improved thermostat which opens the valve controlled thereby with a "snap" action.

Fourth, to provide an improved thermostat which is very simple and economical in its structure.

Objects pertaining to details and economies of construction and operation will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing, forming a part of this application, in which:

Fig. I is a plan view of a portion of my improved thermostat, the housing tube, coupling member and a portion of a heater or tank wall being indicated by dotted lines.

Fig. II is a fragmentary vertical section on a line corresponding to line 2—2 of Figs. I and III.

Fig. III is a cross section on a line corresponding to line 3—3 of Fig. II.

Fig. IV is a fragmentary side elevation of a modified form or embodiment of my invention.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, 1 represents a portion of a heater or heater tank or other support on which the thermostat is mounted.

In the embodiment shown in Figs. I, II and III, I provide a coupling member 2 which is externally threaded at 3 to be screwed into the wall or support 1. The housing tube 4 is threaded into the inner end of this coupling member and projects into the tank or heater.

The valve casing 5 has an upwardly facing valve seat 6 for the ball valve 7. This valve casing has an inlet nipple 8 at one side and a discharge nipple 9. It also has a pilot connection nipple 10 above the valve seat. The valve casing has a lateral arm comprising a tubular portion 11 which is threaded into the outer end of the coupling member and a longitudinally slotted portion 12 projecting into the housing tube 4. This longitudinally slotted extension 12 has a horizontal slot 13 in its inner end in which the end of the laminated thermostatic element 14 is disposed and clamped by the screws 15 so that the thermostatic element is supported with its tappet 16 in coacting relation to the valve 7. This thermostatic element is formed of lamina of metal of different expansion co-efficiency as is well known practice. The same, however, has a channel cross section, as shown in Fig. III, it being preferably formed with a flat central portion 17 and side portions 18 disposed at an angle thereto. The element is supported with its channeled side facing the valve. The advantage of this is that the element may be made very thin so that it responds quickly to changes in temperatures and acts with a "snap" action.

The fulcrum or adjusting block 19 is pivoted at 20 in the vertical slot 21 of the arm portion 12 to engage the under side of the thermostatic element near its support. The adjusting rod 22 is threaded into the valve casing at 23 so that it is accessible from the outer side thereof. The rod engages a cammed notch 24 in the fulcrum block so that the longitudinal movement of the rod swings the fulcrum block on its pivot. A cap 25 is provided for the screw.

In the modification shown in Fig. IV,

the valve casing 26 is externally threaded at 27 to receive the supply connection and at 28 to receive the discharge connection, it having a pilot nipple 29 corresponding to the pilot nipple 10 of the embodiment shown in Figs. I to III. In this embodiment, the valve casing has an integral housing tube 30 corresponding to the housing tube 4, the arm having a threaded portion 31 threaded directly into the heater or tank wall 32. The thermostatic element 35 is carried by a block 36 which is seated in the end of the arm 30 against the shoulder 37 and clamped in position by the plug 38. The fulcrum block 39 is pivoted at 40 within the tubular arm 30, otherwise the structure is substantially the same as that of Figs. I, II and III.

I have not attempted to illustrate or describe certain other modifications and adaptations of my invention as I believe the disclosure made will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired.

The structure is very simple and compact. In the embodiment shown in Figs. I to III, the working parts may be removed without drawing the water or allowing the water to escape from the tank or heater.

The thermostat may be very accurately adjusted and is very sensitive in operation.

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

1. In a thermostat, the combination of a coupling member externally threaded to engage a support and internally threaded at each end, a housing tube threaded into the inner end of said coupling member, a valve casing and valve, an arm on said valve casing comprising a tubular outer portion threaded into the outer end of said coupling member and an inner portion projecting into said housing tube and slit to receive a thermostatic element, and a thermostatic element clamped in said slit and operatively associated with said valve.

2. In a thermostat, the combination of a coupling member externally threaded to engage a support, a housing tube threaded into the inner end of said coupling member, a valve casing having threaded engagement with said coupling member and provided with an arm projecting into said housing tube, and a thermostatic element mounted at the inner end of said arm.

3. In a thermostat, the combination of a coupling member, a housing tube threaded into the inner end of said coupling member, a valve casing and valve, an arm on said valve casing comprising a tubular outer portion threaded into the outer end of said coupling member and an inner portion projecting into said housing tube, a thermostatic element mounted on the inner end of said arm and operatively associated with said valve, a fulcrum member for said thermostatic element pivotally mounted on said arm adjacent its inner end, and an adjusting screw for said block disposed longitudinally of said arm.

4. In a thermostat, the combination of a coupling member, a housing tube threaded into the inner end of said coupling member, a valve casing and valve, an arm on said valve casing comprising a tubular outer portion threaded into the outer end of said coupling member and an inner portion projecting into said housing tube and constituting a thermostatic element support, and a laminate thermostatic element mounted on the inner end of said arm and operatively associated with said valve.

5. In a thermostat, the combination of a coupling member adapted to engage a support, a housing tube on the inner end of said coupling member, a valve casing detachably engaged with said coupling member and provided with an arm projecting into said housing tube and constituting a thermostatic element support, and a laminate thermostatic element mounted at the inner end of said arm whereby the valve casing and thermostatic element may be removed as a unit from the coupling member and the tube carried thereby.

6. In a thermostat, the combination of a valve casing and valve, an arm on said valve casing slit to receive a thermostatic element, a laminate thermostatic element clamped in said slit and coacting with said valve, an adjusting fulcrum pivoted on said arm to coact with said thermostatic element, and an adjusting screw threaded into the outer wall of said valve casing and disposed longitudinally of said arm to engage said adjusting fulcrum.

7. In a thermostat, the combination of a valve casing and valve, an arm on said valve casing, a laminate thermostatic element having a fixed mounting on the end of said arm to coact with said valve, an adjusting fulcrum pivoted on said arm to coact with said thermostatic element, and an adjusting screw threaded into the outer wall of said valve casing and disposed longitudinally of said arm to engage said adjusting fulcrum adapted for adjustment from outside the valve casing.

8. In a thermostat, the combination of a valve casing and valve, an arm on said valve casing, a laminate thermostatic element having a fixed mounting on the end of said arm to coact with said valve, an adjusting fulcrum mounted on said arm to coact with said thermostatic element, and an adjusting screw disposed to engage said adjusting fulcrum adapted for adjustment from outside the valve casing.

9. In a thermostat, the combination of a valve casing provided with a valve, a laminate thermostatic element supporting arm on said casing, a thermostatic element having a fixed mounting on the inner end of said arm in operative relation to said valve, an adjusting fulcrum for said thermostatic element disposed adjacent its inner end, and an adjusting screw for said fulcrum disposed longitudinally of said arm and adapted for adjustment from outside the valve casing.

10. In a thermostat, the combination of a valve casing provided with a valve, a laminate thermostatic element supporting arm on said casing, a thermostatic element having a fixed mounting on the inner end of said arm in operative relation to said valve, and an adjusting fulcrum for said thermostatic element disposed adjacent its inner end.

11. In a thermostat, the combination of a valve, a laminate thermostatic element supported at one end with its free end operatively associated with said valve, said thermostatic element having an angular cross section, there being a flat central portion, side portions at each side disposed at a slight angle thereto, and an adjustable fulcrum member engaging the rear side of said element adjacent its mounting.

12. In a thermostat, the combination of a valve, a laminate thermostatic element supported at one end with its free end operatively associated with said valve, said thermostatic element having an angular cross section, there being a flat central portion, and side portions at each side disposed at a slight angle thereto.

13. A thermostat comprising a laminate thermostatic element of angular cross section, there being a central portion and side portions at each side disposed at an angle substantially less than a right angle, a supporting means clamping one end of said element, a fulcrum member engaging the rear side thereof adjacent said supporting means, and means for adjusting said fulcrum member.

14. A laminate thermostatic element of angular cross section having a flat central portion and side portions disposed at a slight angle thereto.

15. A thermostat comprising a laminate thermostatic element of angular cross section, there being a flat central portion and side portions disposed at an angle substantially less than a right angle, and a supporting means clamping one end of said element.

In witness whereof I have hereunto set my hand.

HERBERT S. HUMPHREY.