Nov. 2, 1937. M. H. WARD 2,098,201

WATER CONTROL THERMOSTAT CONSTRUCTION

Filed Sept. 5, 1931

Fig. 1.

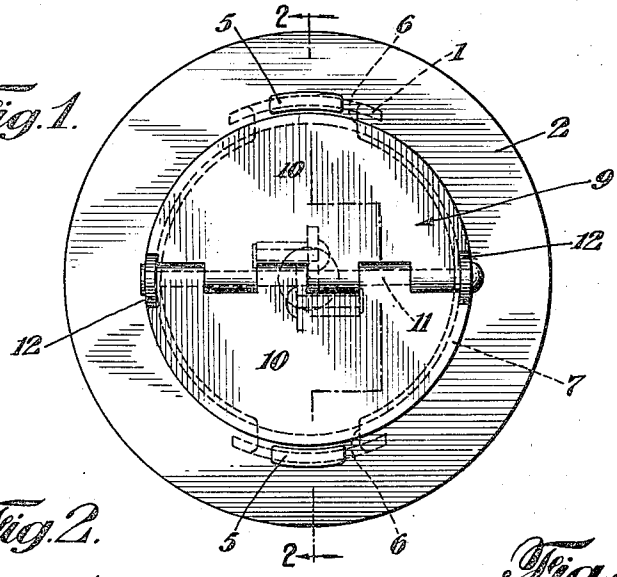


Fig. 2.

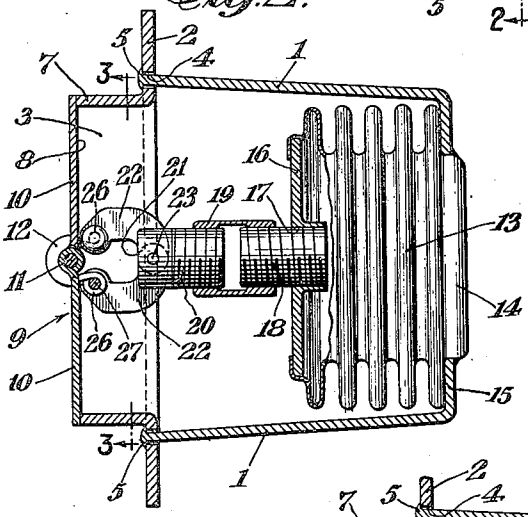
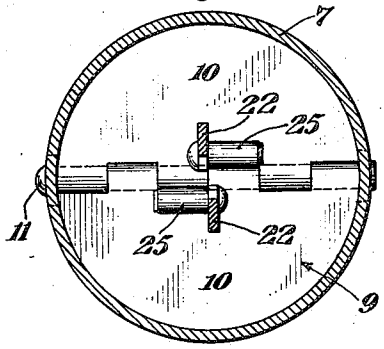


Fig. 3



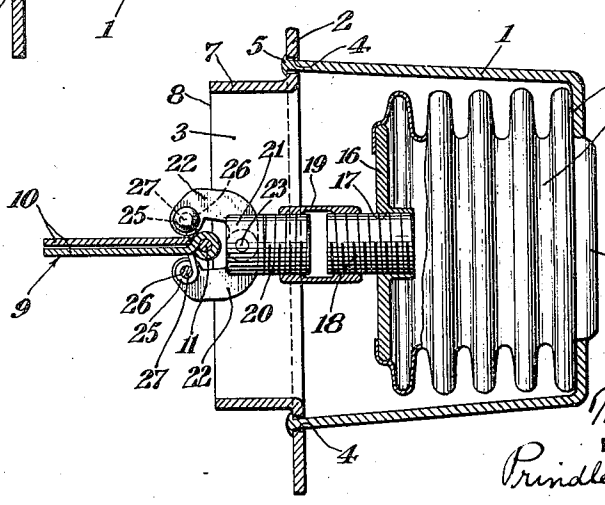


Fig. 4.

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UNITED STATES PATENT OFFICE

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WATER CONTROL THERMOSTAT CONSTRUCTION

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Application September 5, 1931, Serial No. 561,349

17 Claims. (Cl. 236—34)

This invention relates to improvements in water control thermostat construction, and the principal object is the provision of such a device which is composed of few parts and therefore simple in construction, cheap to manufacture, easy to assemble, efficient and effective in operation, capable of ready adjustment to meet varied operating conditions, and in which the valve is constructed so that when open it will present a minimum amount of obstruction to the full flow of liquid therethrough.

This invention is designed primarily for a water control for internal combustion engines and the like.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, this invention consists in the construction, combination and arrangement of parts hereinafter described and then sought to be defined in the appended claims, reference being had to the accompanying drawing forming a part hereof and which shows, merely for the purpose of illustrative disclosure, a preferred embodiment of my invention, it being expressly understood, however, that various changes may be made in practice within the scope of the claims without digressing from my inventive idea.

In the drawing—

Figure 1 represents a front plan view of one embodiment of my device;

Figure 2 represents a longitudinal vertical cross section, taken substantially on line 2—2 of Figure 1.

Figure 3 is a transverse vertical cross section taken substantially on line 3—3 of Figure 2, looking in the direction of the arrows.

Figure 4 is a longitudinal vertical cross section showing the bellows in an expanded position and the flap valve in an open position.

Referring now to the drawing the numeral 1 designates a suitable frame or cage which is secured at one end to the radial flange 2 of the annular valve seat and valve holding member 3. One form of connection is by providing slots 4 in the radial flange 2 and upsetting the ends or heads 5 of the reduced part 6 of the sides of the frame or cage after they have been passed through said slots. The member 3 is also provided with an axial annular flange 7, the outer end of which forms the valve seat 8.

The valve 9 is in the form of a two-part flap valve, the two parts 10 being hinged or pivoted together along the center line on the pin or rod 11 which is supported in the ears or lugs 12 outstanding from the edge of the axial flange 7.

This valve is opened and closed entirely or partially by the action of a thermostatic element, preferably in the form of a metallic bellows 13 which is sealed and filled with a volatile fluid so as to expand or contract in accordance with changes in the temperature of the liquid in contact therewith. This thermostatic element 13 is formed with a base portion 14 which fits within and is secured to the end 15 of the frame or cage 1. The other end of the thermostatic element is closed by means of the plate or head 16 which is formed with an internally threaded socket 17 to receive the screw threaded plug or rod 18. An adjusting sleeve member 19 is oppositely internally threaded at its two ends to receive the end of the plug 18 in one end, and the externally threaded plug 20 in the other end, plug 20, of course, being threaded oppositely to plug 18 and with the sleeve 19 providing a sort of turnbuckle adjusting means whereby the relation of the valve and the linkage assembly to the bellows may be changed, as desired. The plug 20 is provided with a flattened head member 21 to which a pair of curved lever members 22 are pivotally connected as at 23. These lever members extend axially away from the plug member 20, their outer ends 24 being positioned in alinement with the off-set arms or members 25 which extend laterally or away from the two plate members 10 forming the valve 9, on opposite sides of their meeting edges and near the center thereof. Each of these arms or members 25 is curved to form an eye or loop 26 to receive pin or pintle 27 by means of which the ends 24 of the levers 22 are pivotally connected thereto. Thus a positive connection is provided between the thermostatic element 13 and the two parts 10 of the valve 9 so that as the thermostatic element expands or contracts, due to changes in the temperature of the liquid within which it is in contact, the two plate members 10 of the valve 9 will be raised or lowered on the central pivot 11 of the valve as a whole. The position of the arms or members 25 or their form may be changed, if desired, to position the pivots 27 nearer to the center of pressure against the valve, so as to facilitate its closing and maintaining it in closed position.

It is seen, therefore, that I have provided a very simple device which may be readily interposed in a conduit and which will readily and effectively operate the valve to control the course of the liquid passing through the conduit in accordance with the temperature thereof. The device may be readily adjusted so as to

insure absolute accuracy in operation in accordance with temperature changes. The valve when fully opened interposes a minimum amount of obstruction to the flow of the liquid therethrough. The valve when closed, or in fact in any position, is securely and positively held, due to the positive connections between the valve and the thermostatic element.

The entire valve assembly, including the valve seat and opening and valve proper, is assembled as a unit upon the valve seat and valve holding member and the opening through this member is large so as to permit an adequate flow of liquid therethrough.

What I claim is:

1. A device of the character described, including in combination a frame or support, a valve seat member mounted upon one end thereof, a valve member supported upon said valve seat member, the valve proper being composed of two hinged parts, a thermostatic element mounted in said frame or support and operative connections between said thermostat element and each part of said valve.

2. In a device of the character described, including in combination, a frame or support having a thermostatic element mounted in one end, a valve assembly mounted upon the other end of said support, said valve assembly including an annular member providing a valve seat and opening of substantial diameter, a valve proper composed of two parts hinged so as to move toward and away from said valve seat, and levers operatively connecting said two-part valve with said thermostatic element, and adjustable means interposed between said levers and said thermostatic element for varying the relation of said levers to said thermostatic element and therefore the opening movement of said valve parts.

3. In a device of the character described, including in combination, a frame or support having a thermostatic element mounted in one end, a valve assembly mounted upon the other end of said support, said valve assembly including an annular member providing a valve seat and opening of substantial diameter, a valve proper composed of two parts hinged so as to move toward and away from said valve seat, and lever means operatively connecting said two-part valve with said thermostatic element, one lever being provided for each valve part.

4. In a device of the character described, including in combination, a thermostatic element, a valve seat, a valve for said valve seat composed of two parts hinged so as to move outward from the valve seat to open position, the two parts of said valve having operative connection with said thermostatic element.

5. In a device of the character described, including in combination, a thermostatic element, a valve seat, a valve for said valve seat composed of two parts hinged so as to move outward from the valve seat to open position, the two parts of said valve having operative connection with said thermostatic element, said operative connection including a member for each valve part pivotally connected to said valve part and also connected to said thermostatic element.

6. In a device of the character described, including in combination, a thermostatic element, a valve seat, a valve for said valve seat composed of two parts hinged so as to move outward from the valve seat to open position, the two parts of said valve having operative connection with said thermostatic element, said operative connection including means for adjusting the opening of said valve parts relative to predetermined operating temperatures.

7. In a device of the character described, including in combination, a thermostatic element, a valve seat member having an opening of substantial diameter therethrough with a valve seat therearound, a circular valve member adapted to close against said valve seat and composed of two parts hinged together and a lever means for each valve part pivotally connected to said thermostatic element whereby said valve parts are moved in accordance with the expansion and contraction of said thermostatic element.

8. In a device of the character described, including in combination, a frame, a thermostatic element mounted on said frame, a valve seat associated with said frame, a valve for said valve seat including hinged parts, and link means connecting said hinged parts and said thermostatic element.

9. A thermostat construction adapted to control the flow of water in a cooling system for internal combustion engines, which includes, in combination, a frame, a thermostatic element mounted on said frame and adapted to respond to conditions in the cooling system, a valve seat on said frame, a valve for said valve seat, said valve including a plurality of parts hinged on a common axis, a plurality of levers for connecting said valve parts and said thermostatic element whereby said hinged valve parts are securely and positively held in closed position when said thermostatic element is contracted and said hinged valve parts are securely and positively held in open position when said thermostatic element is in expanded condition.

10. A device of the character described, adapted to control the flow of water in a cooling system for internal combustion engines including, in combination, a thermostatic element, a valve seat, a valve for said valve seat and including two valve parts hinged so as to be adapted to move away from said valve seat to open position, the parts of the valve having operative connection with said thermostatic element, said operative connection including a member for each valve part pivotally connected to said valve part and also connected to said thermostatic element.

11. In a thermostatic valve structure, a body member having an opening therein adapted for the flow of fluid therethrough in one direction, separate valve members pivotally connected to said body member and co-operable to close said opening, a bellows type thermostat, and means operatively connecting said valve members and said thermostat to open said valve members in the direction of flow through said opening, the relative areas of said valve members and said thermostat subjected to pressure of the controlled fluid during operation thereof being such as to approximately balance each other.

12. In a thermostatic valve structure, a body member including an annular ring, a pin carried by said body member, a plurality of valve members pivoted on said pin and movable to close the central opening in said ring, and thermostatic means for moving said valve members.

13. In a thermostatic valve structure, a body member including an annular ring, a pin carried by said body member diametrically thereof, oppositely extending valve members pivoted on said pin and movable to engage an end edge of said ring to close said member to the flow of fluid

therethrough, supporting means carried by said body member, a bellows type thermostat carried by said supporting means, and links connected to said thermostat and to said valve members for causing interrelated movement thereof.

14. A thermostatic valve structure adapted for insertion in a cooling water passage of an internal combustion engine to control the flow of water therethrough comprising, in combination, an apertured body member adapted to be sealed to the walls of said passage, separate valve members carried by said body member and pivotally connected thereto, said valve members combining to form a closure for the aperture in said body member, thermostatic means supported by said body member, and connecting means between said thermostatic means and said valve members whereby the position of said valve members is controlled by said thermostatic means.

15. In a thermostatic valve structure, in combination, a body member having an opening therethrough for the flow of fluid, valve members pivotally associated with said body member and combining to form a closure for said opening, a thermostat supported by said body member and means operatively connecting said valve members and said thermostat, said thermostat being arranged to move said valve members from closed toward open position in the direction of flow of fluid therethrough.

16. In a thermostatic valve structure, in combination, a body member having an opening therein adapted for the flow of fluid therethrough in one direction only, valve members pivotally associated with said body member and combining to form a closure for said opening, a link connected to each of said valve members, and a thermostat connected to said links and arranged to move said valve members in opposite directions of rotation through substantially equally angular distances in the direction of flow of said fluid through said opening when moving said valve members from closed to open position.

17. A device of the character described, including, in combination, an apertured body member, a bellows thermostat associated with said body member, a valve seat on said body member, a valve for said valve seat comprising a plurality of parts supported for movement toward and away from said valve seat, said valve parts having operative connection with said bellows thermostat.

MARSHALL H. WARD.