May 1, 1934. F. L. HUTCHINSON 1,956,831

TEMPERATURE CONTROL VALVE

Filed May 28, 1931

Fig. 1.

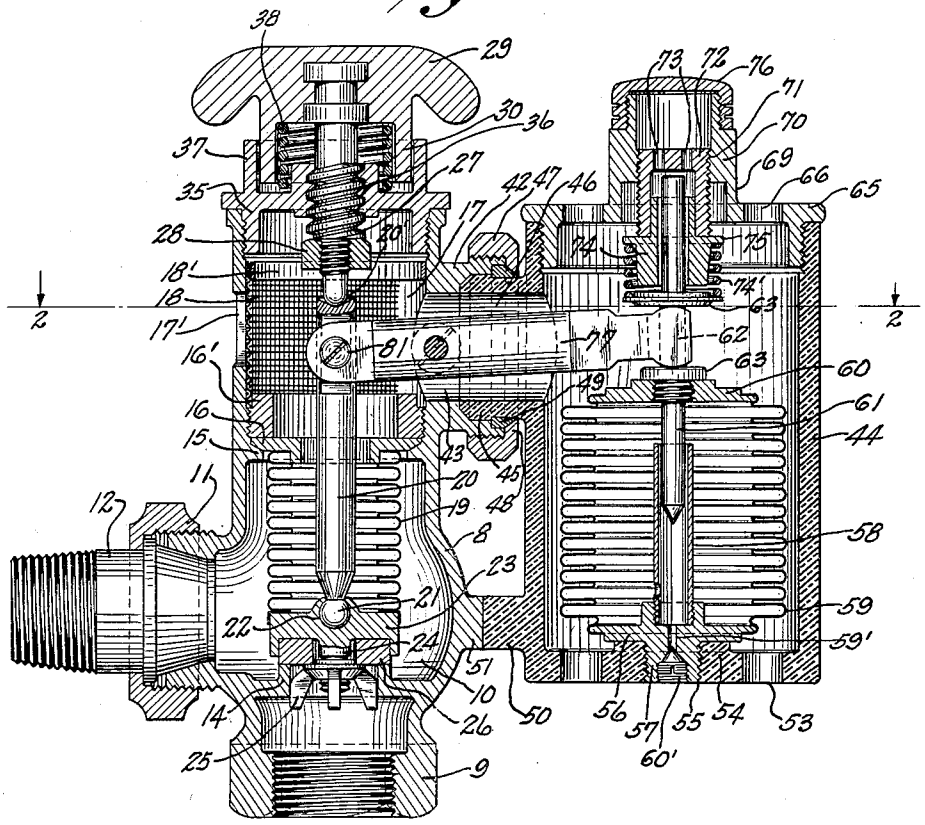


Fig. 2.

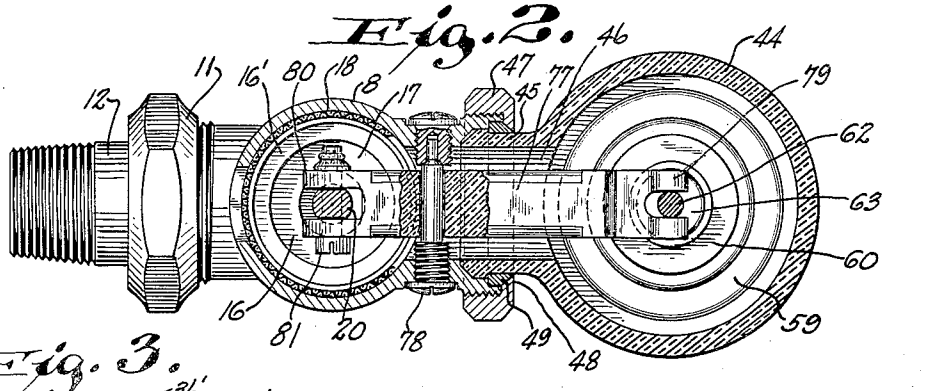
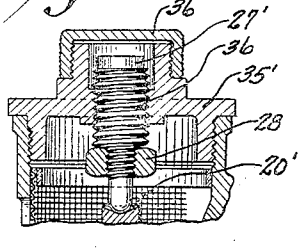


Fig. 3.



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TEMPERATURE CONTROL VALVE

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1 Claim. (Cl. 236—42)

This invention relates to improvements in temperature control valves.

It is the primary object of this invention to provide a temperature control valve for automatically regulating independent heating radiators, said valve being of the general type disclosed in application of present inventor, Serial No. 220,591, now Patent No. 1,756,688, the present application embodying certain improvements over said prior construction.

One of said improvements consists in the provision of novel means for adjusting the tension upon the thermostatic member.

A further improvement resides in the means for supporting the valve rod and in the means for effecting an engagement between the upper end of said valve rod and the manual adjustment member, said means permitting movement of the valve rod with a minimum amount of friction.

A further novel feature resides in the provision of an auxiliary casing for the thermostatic member which is constructed of non-heat conducting material, and in addition thereto in the provision of a lever extending between the two casings which is formed of similar material. By thus employing a non-heat conducting lever as well as a non-heat conducting auxiliary casing, all chance of conducting heat from the valve chamber to the thermostatic unit is eliminated with the result that the device is unusually accurate in operation, being influenced only by room temperature.

A further object of this invention is to provide a temperature control valve which is simple in construction and operation and well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved temperature control valve, and all its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawing, in which the same reference characters designate the same parts in all of the views:

Fig. 1 is a vertical sectional view of the improved valve shown connected with a radiator;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; and

Fig. 3 is a sectional view of the upper portion of the valve casing illustrating a construction which permits the substitution of a key controlled adjustment for the hand wheel.

Referring to the drawing, the numeral 8 designates the main casing of the valve, having a depending coupling portion 9 adapted to be secured to a fluid supply pipe (not shown). Said coupling portion 9 opens into a chamber 10 from which extends laterally another coupling portion 11 adapted to be secured to a pipe 12 communicating with a heating radiator (not shown). The casing 8, adjacent the opening from the coupling portion 9 into the chamber 10 is formed with an annular rib 14 to form a valve seat.

Within the casing 8, between its upper and lower ends, an internal annular rib 15 is formed, on which is seated a bushing 16, having a relatively large central opening, said bushing being held in contact with the rib 15 by a nut 16' which is in threaded engagement with the adjacent casing walls. Above the nut 16', an upper chamber 17 is defined, having an air opening 17' therein. A cylindrical screen 18 positioned adjacent the inner wall of the chamber 17 is held in position by a band 18'. A closed bellows member 19 has its upper end secured to the bushing 16.

A valve rod 20 extends vertically through the casing 8 and through the opening of the bushing 16 to the chamber 17 and has its lower end formed with a ball 21. The said ball fits within the recess 22 of the upper portion of a disk 23. A bolt 24 depends from the lower portion of said disk, the latter being secured to the lower end of the bellows 19. A nut 25, threaded on the lower end of the bolt 24, secures between it and the disk 23, a valve member 26. It will be evident, that the arrangement of the valve rod and bushings is such that friction in the movement of the valve rod is minimized, and also that the chamber 10 is sealed from the upper chamber 17 so as to prevent leakage.

The upper end portion of the valve rod 20 terminates interiorly of the upper end portion of the casing 8 and is formed with a concave recess 20'. Engageable with said recess 20' of the upper end of the valve rod is the lower end of a screw or turning member 27. A stop nut 28 to limit upward movement of the screw is threaded near the lower end thereof. The upper end of the screw is secured to a hand wheel 29, said hand wheel having an inverted cup-shaped lower portion 30.

A cover 35 is threaded in the upper end of the casing. The said cover has an enlarged midportion which is formed with a threaded bore 36 within which the turning member 27 is threaded. The cover is also formed with an upstanding annular portion 37 within which the inverted cup-shaped portion 30 of the hand wheel 29 is adapted to fit. A coil spring 38 is positioned within the portions 30 and 37.

It is evident that the valve rod 20 is free to move vertically with a minimum amount of friction, and without turning, with respect to the member 27, and upward movement is limited by contact with the lower end of the member 27. The distance between said lower end and the upper end of the valve rod may be varied by manipulating the hand wheel 29. When the

member 27 is turned downwardly sufficiently far, it will engage the valve rod and force the same downwardly to manually close the valve 14. If the member 27 is turned upwardly, the natural expansibility of the bellows 19 will lift the valve rod to open the valve.

The outer side of the casing 8 is formed with an extension 42 having a bore 43 communicating with the chamber 17. An auxiliary casing 44, constructed of fibre or other non-heat conducting material, has an extension 45 having an opening 46 communicating with the interior of the auxiliary casing. The extension 42 is readily removably secured to the extension 45 by a coupling nut 47 which is threaded on the extension 42, and which has an inwardly extending portion 48 for clampingly engaging an annular member 49 on the extension 45. A short lug 50, extending from the auxiliary casing is adapted to removably fit within a bifurcated extension 51 on the lower portion of the main casing to prevent turning of the auxiliary casing when the latter is in attached position as shown in Figure 1.

The lower end of the auxiliary casing has air perforations 53 and has an enlarged midportion 54 formed with a threaded bore 55. A disk 56 has a member 57 extending downwardly therefrom adapted to be threaded into the bore 55. The said disk has extending upwardly from its center portion a tubular member 58 having an open upper end. An expansible member 59 has its lower end secured to the disk 56 and its upper end to a disk 60. The expansible member 59 is filled through an opening 59' controlled by a pin valve 60' with a volatile fluid which is readily influenced by temperature changes.

Extending downwardly from the disk 60 is a rod 61 which is slidable within the tubular member 58 to maintain the parts in proper alinement. Extending upwardly from the disk 60 is a rod 62 having spaced apart collars 63 thereon.

An upper cover 65 is threaded in the upper end of the casing, the latter also being formed with air openings 66.

Extending upwardly from the cover is a cup-shaped portion 69 having an intermediate partition 70 formed with a threaded opening 71. Threaded in the opening 71 is an adjustment member 72 having a bore 73 therein and having its upper end formed with perforations 73 for the insertion of a key. A member 74 having an intermediate annular shoulder 75 has its upper end extending into the bore of the adjustment member 72. The member 74 is also formed with a bore within which the upper end of the rod 62 is slidable. A coil spring 74' surrounds the lower portion of the member 74 and is positioned between the shoulder 75 and the collar 63. A cap 76 is threaded on the upper end of the cup-shaped portion 69 to prevent unnecessary tampering with the adjustment member.

A lever member 77, constructed of fibre or any non-heat conducting material to prevent conductivity of heat from the radiator to the thermal unit, is pivoted on a fulcrum 78 and extends through the openings between the two casings. One end of the lever is bifurcated as at 79 to embrace the rod 62 between the two collars 63. The other end of the lever is also bifurcated as at 80 and said end of the lever is pivotally connected by a pin 81 to the flattened upper portion of the valve rod. By means of this lever, when the rod 62 is raised or lowered, the valve rod 20 will also be raised or lowered to open or close the valve.

In Fig. 3 the upper portion of the valve casing is shown. A different form of cover 35' has been substituted for the cover 35, said cover 35' having an upstanding annular portion threaded to receive a cap 36'. The member 27' performs the function of the member 27 of Fig. 1 and is operated by insertion of a key in perforations in its upper end. Thus the valve may be readily converted by substitution of the cap 35', from a construction having an accessible hand wheel to a construction in which the manual control can be accomplished only by a person having the necessary key.

In use, changes in room temperature will affect the volatile fluid within the expansible member 59. This will cause the expansion or contraction of the latter member, and through the simple lever arrangement, motion will be transmitted to the valve rod to automatically open or close the valve so that the room is maintained at a constant temperature. Also, when desired, the valve may be manually operated by turning the hand wheel 29. If, for any reason, it is desired to remove the automatic control, the auxiliary casing and lever may be easily detached and the opening in the main casing plugged. To obtain a fine adjustment of the automatically operating portions, the cap 76 is removed and a key is inserted in the recess 73 of the adjustment member 72, and turned to vary the limit of movement of the expansible member. This adjustment is usually made when the device is installed, and it is ordinarily unnecessary to change it thereafter.

It will be noted that the auxiliary casing and lever 77 are both constructed of a non-heat conducting material. This feature is very important, as it is desirable to prevent conductivity or radiation of heat from the radiator to the thermal unit. In many valves, where this occurs, the valve operates prematurely, before the temperature of the room justifies such operation. In the present invention, due to the use of fibre, the thermal member is influenced only by the room temperature and not by heat conducted from the radiator.

From the foregoing description it may be seen that the improved temperature control valve is simple in construction and operation and well adapted for the purpose described.

What I claim is:

In an automatic valve for fluid radiators, a supporting means, a thermostatically expansible member having one end in connection with said supporting means, a rod extending from the other end of said expansible member, a collar on said rod, a coil spring surrounding said rod and having one end engaging said collar, a member slidably positioned on said rod and having a portion engaging the other end of the coil spring and a portion of relatively large diameter surrounding the rod and positioned within the spring, and an adjustment member threaded in the supporting means and engageable with said slidable member for moving the latter to compress the spring and thus vary the tension upon the thermostatically expansible member.

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