R. S. MAYER.

THERMOSTATIC VALVE.

APPLICATION FILED SEPT. 14, 1911.

1,231,044.

Patented June 26, 1917.

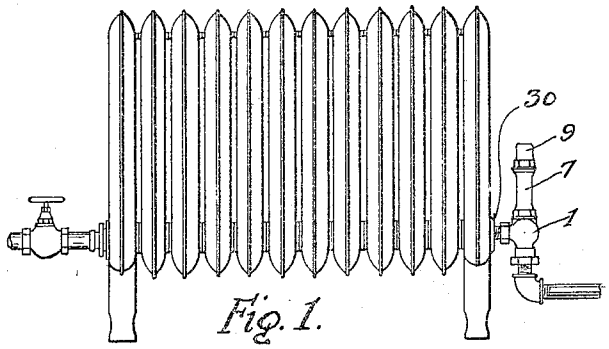


Fig. 1.

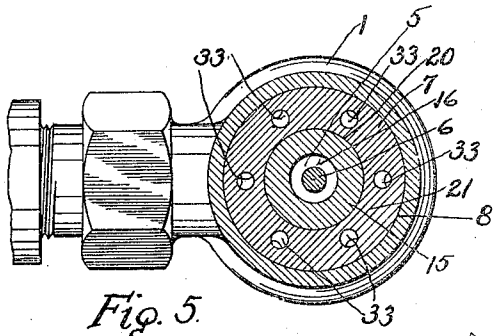


Fig. 5.

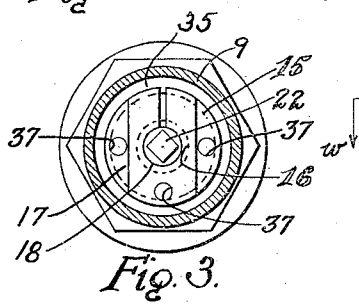


Fig. 3.

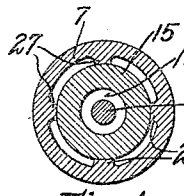


Fig. 4.

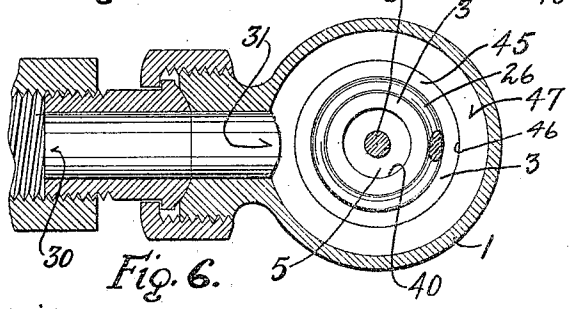


Fig. 6.

Fig. 2.

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THERMOSTATIC VALVE.

1,231,044. Specification of Letters Patent. Patented June 26, 1917.

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To all whom it may concern:

Be it known that I, ROBERT S. MAYER, a citizen of the United States, residing at Norwood, in the county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Thermostatic Valves, of which the following is a specification.

My improved device is adapted to be used in connection with heating systems, for instance at the outlet opening of a radiator, between the radiator and the return-pipe, and is especially applicable in so-called two-pipe systems. My invention contemplates the employment of an expansion-member, and is arranged for sensitive control and wide range of movement.

It is the object of my invention to provide novel means for guiding the expansion-member, whereby distortion of the same is avoided; further to provide novel valve-mechanism; and further to arrange the expansion-member and valve-mechanism in novel relation; and the invention will be further readily understood from the following description and claims, and from the drawing, in which latter:

Figure 1 is a side elevation of a radiator having my improved device applied thereto.

Fig. 2 is an axial section of my improved device.

Fig. 3 is a cross-section of the same on the line *z—z* in Fig. 2.

Fig. 4 is a cross-section of the same on the line *y—y* of Fig. 2.

Fig. 5 is a cross-section of the same on the line *x—x* of Fig. 2; and,

Fig. 6 is a cross-section of the same on the line *w—w* of Fig. 2.

A valve casing 1 has a seat 2 therein for receiving a valve-seat member 3, the latter being provided with a valve-seat 4. A valve 5, shown on a stem 6, is adapted to seat against the valve-seat. The casing is provided with an extension, shown in the form of a housing 7, instanced as secured to the casing by threaded connection 8, the housing having a cap 9 secured thereto, as by threaded connection 10.

An expansion-member 15 is received in the housing. This expansion-member is of suitable material sensitive to the action of heat for expanding the same, and is preferably in the form of a tube having a central bore 16 through which the stem 6 is received.

A head 17 is provided for the expansion-member, and is shown in the form of a split nut received about the threaded end 18 of the stem 6, the split nut acting as a clamp-nut for holding the stem in adjusted positions. The head 17 receives one end of the expansion-member, the other end of the expansion-member being received in a socket 20 of the base 21 of the housing 7. The expansion and contraction of the expansion-member takes place between said base and said head, the connection of the latter with the stem 6 causing longitudinal movement of the stem, for seating the valve 5 against the valve-seat 4, by expansion of said expansion-member, and, on contraction thereof, permitting said valve to recede from said valve-seat for opening the valve, in other words, the valve opens by a movement away from said expansion-member. The stem is adjustable with relation to the cap for determining the moment of closure of the valve 5 by the expansion-member, the outer end of stem being shown provided with a polygonal end 22 for the purpose.

The expansion-member is shown of shank-form. One of the difficulties heretofore experienced with expansion-members of the shank-form has been a buckling and bending of the expansion-member when subjected to a higher temperature than that for which the same has been adjusted. In order to avoid a difficulty of this kind, my improved expansion-member is provided with novel means, shown in the present exemplification of my invention, as the valve-seat member 3 held in place by a spring 26 shown received between said valve-seat member and the base 21, which is of sufficiently strong resistance to overcome the expanding action of the expansion-member when subjected to temperatures within ordinary working conditions or limits within which said expansion-member has been set for movement, but arranged to yield when the expansion-member is subjected to excessive heat or a heat which would otherwise tend to cramp or buckle the expansion-member between the base 21 and the head 17, when the valve 5 is set against the valve-seat 4. When the expansion-member has been expanded to sufficient extent to seat the valve 5 against the valve-seat 4, upon further expansion of said expansion-member the valve-seat member 3 is moved against the action of the spring 26 for relieving the expansion-member from such cramping action and preventing buc-

kling thereof. I also prefer to guide the expansion-member between ribs 27 extending longitudinally of the housing.

The steam is received from the radiator, shown at 30, through an inlet passage 31 of the casing 1. The interior space of the casing extends upwardly about the base 21 for forming a pocket or pockets 32 above the lower end of said base. The steam received in said casing will ascend into said pocket or pockets and pass through apertures 33 in said base and pass upwardly into the space 34 between the side-wall of the housing 7 and the outer periphery of the expansion-member and into the space 35 in the cap 9, and will descend through the openings 37 in the head into the space 38 between the stem 6 and the wall of the bore 16 and be received through the opening 39 in the base 21, through which the stem is also received. In this manner the steam has circulation along the peripheral surface and the surface of the bore of the expansion-member, for heating the same quickly, or subjecting the same quickly to the cooling action in the absence of heat. The direction of circulation about and through the expansion-member may of course be changed without departing from the spirit of my invention.

Upon accumulation of water in the casing, the expansion-member will cool, and if the water attains a sufficient height, for instance to close the inlet passage of the casing, the circulation of steam about the expansion-member will cease and the same will cool quickly.

Upon cooling of the expansion-member, the valve 5 will retreat from the valve-seat 4 and permit the escape of water from the casing. The spring 26 surrounds the valve-passage 40 and acts as a strainer for preventing the passage of the larger particles of foreign matter into contact with the valve-seat.

The valve and valve-seat are also preferably made with downwardly sloping mating contact-walls which prevent the lodgment of foreign substances thereon, the valve being shown as a conical valve having movement longitudinal of its axis, the valve preferably opening downward and being at the lower side of the valve-seat member, while the expansion-member is at the upper side of said valve-seat member, the said valve-seat member having yielding connection with the casing.

The upper end of the valve-seat member is preferably as low as the lower wall of the inlet passage, for preventing the formation of a detrimental waterpocket in the casing, permitting the complete escape of water accumulations from the inlet passage, and causing the full capacity of the fluid openings to be operative. The valve-seat member is provided with a hub 43 positioned in the opening 44 of the casing, preferably in the manner as to exclude passage of water between said hub and wall of said opening upon axial movement of said valve-seat member. The valve-seat member is also provided preferably with an annular flange 45 received above the seat 2 for limiting the movement of said valve-seat member away from the said expansion-member.

The interior of the casing is provided with a downwardly extending pocket 47 in which dirt or grit may find lodgment, the annular seat 46 and the fit of the periphery of the flange 45 therewith preventing passage of said grit or dirt to the seat 2.

All the operating parts are supported by the housing, upon removal of which from the casing, the valves are exposed for repair, the construction further providing ready means for assembling the parts.

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

1. In a thermostatic valve, the combination of a supporting housing provided with oppositely disposed interior members, one of said members being yieldable and formed with a valve seat; an expansion member; a valve connected to said expansion member and coacting with said valve seat; yieldable means tending to hold said housing members apart a predetermined maximum distance, said valve being arranged to move its seat member against the action of said yieldable means; and inlet and outlet openings for said housing.

2. In a thermostatic valve, the combination of a supporting housing provided with depending and upwardly extending interior members, one of said members being yieldable and formed with a valve seat; an expansion member; a valve connected to said expansion member and coacting with said valve seat; a coil spring tending to hold said housing members apart a predetermined maximum distance, said valve being arranged to move its seat member against the action of said spring; and inlet and outlet openings for said housing.

3. In a thermostatic valve, the combination of a supporting housing provided with depending and upwardly extending interior members forming upper and lower pockets, one of said members being yieldable and formed with a valve seat; a hollow expansion member; a valve connected to said expansion member and coacting with said valve seat, yieldable means tending to hold said housing members apart a predetermined maximum distance; an inlet opening for said housing intersecting the interior thereof between said upper and lower pockets and communicating with the same; an annular chamber disposed between the in-

ner wall of said housing and said expansion member; passages providing communication between said upper pocket and said chamber and the latter and the interior of said expansion member, respectively; and an outlet for said housing, the interior of said expansion chamber communicating through said interior housing members and said valve with said outlet.

4. In a thermostatic valve, the combination of a casing having an inlet-opening and a central depending portion surrounded by an upper pocket, a yieldable valve-seat member having a central upwardly extending portion surrounded by a pocket, a coil-spring between said downwardly extending portion and said yieldable valve-seat member, an expansion-member, and a valve connected with the latter coacting with said valve-seat member and arranged to move said valve-seat member against the action of said spring, substantially as described.

In testimony whereof, I have signed my name hereto in the presence of two subscribing witnesses.

ROBERT S. MAYER.

Witnesses:
CHAS. E. WEBER,
THERESA SILBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."