S. LIPPERT.

THERMOSTATIC VALVE.

APPLICATION FILED AUG. 7, 1916.

1,302,938. Patented May 6, 1919.

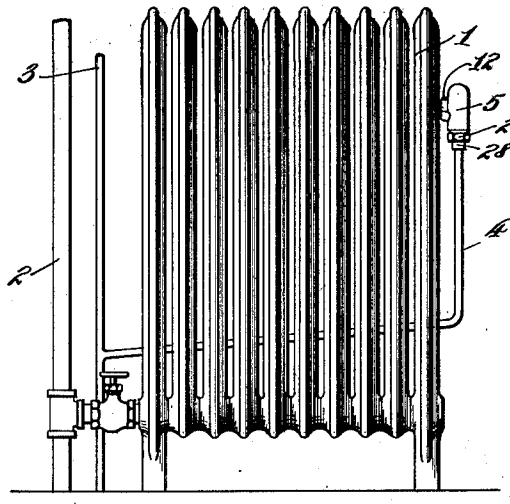

Fig. 1.

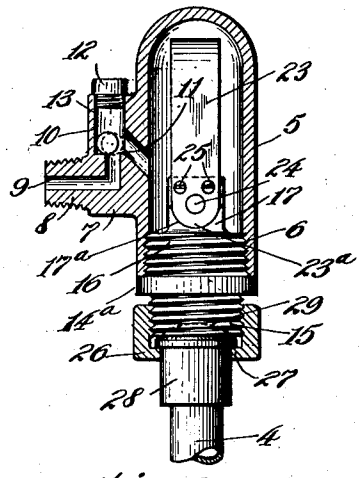

Fig. 2.

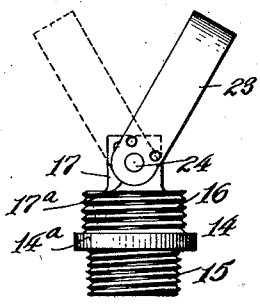

Fig. 3.

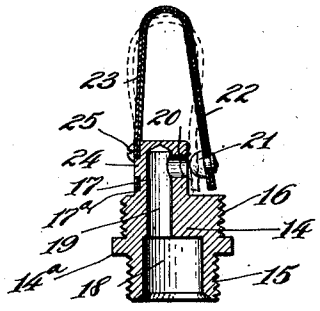

Fig. 4.

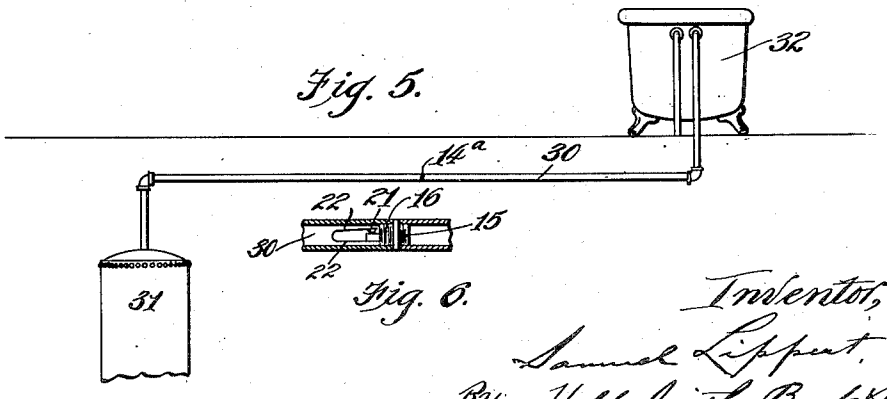

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

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THERMOSTATIC VALVE.

1,302,938. Specification of Letters Patent. Patented May 6, 1919.

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To all whom it may concern:

Be it known that I, SAMUEL LIPPERT, a citizen of the United States, residing at East Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Thermostatic Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to thermostatic valves operating to automatically cut off the supply of a fluid (liquid or gaseous) when the temperature of such fluid reaches a predetermined degree. As is well known, valves operating upon this principle have been used extensively in connection with steam-heating systems to prevent circulation of steam or vapor through radiators when the temperature of the latter has reached a desired predetermined degree. Another field for the use of valves of this type resides in the pipes or systems through which liquid is circulated.

It is the general purpose and object of my invention to produce a thermostatic valve which shall be more efficient than any of its predecessors with which I am acquainted; one which is comparatively inexpensive of production but which is, nevertheless, extremely sensitive in operation; one which will be absolutely reliable and uniform in operation; and one which is so constructed as to permit the valve and its seat to be cleared of obstruction by a simple and convenient manipulation. Further and more limited objects of the invention are to provide a fitting, including such valve, which will be practically immune from clogging or choking. Still further objects of the invention will appear in the detailed description hereinafter and will be set forth in the combinations of elements embodied in the claims hereto annexed.

In the drawings forming part hereof, Figure 1 represents a side elevation of a radiator and its connections, showing my valve applied to the exhaust or vacuum line leading therefrom; Fig. 2 is a longitudinal sectional view through a fitting of which my valve forms a part, certain parts being shown in elevation; Fig. 3 an elevation of the valve body including the thermostatic loop; Fig. 4 a longitudinal sectional view through such body and loop; Fig. 5 a diagrammatic elevation illustrating the application of my valve to a hot water system to prevent the flow of overheated water to a bath tub; and Fig. 6 a sectional detail showing the mode of application of my valve to the hot water pipe in the foregoing view.

Describing by reference characters the various parts illustrated herein, 1 denotes a radiator having connected therewith a steam supply pipe 2, the air exhaust line 3, and the water return line 4, the last mentioned line being connected to the exhaust loop of the radiator through my fitting, which will now be described. This fitting comprises a casing 5, preferably made as a casting having its lower end internally threaded, as shown at 6 and having at one side a boss 7 provided with the threaded connection 8 whereby the casing and its associated parts may be applied to a radiator, as indicated in Fig. 1. For convenience of description, the fitting will be considered as applied to the casing 5 in a vertical direction, and the terms "top", "bottom", 'upwardly", and "downwardly" will be correspondingly employed to designate the positions of the various parts of the fitting—without, however, limiting the use of the fitting to any particular position. The connection 8 is provided with an inlet passageway comprising an inlet branch 9 extending inwardly from the outer end thereof, said branch merging with a vertically extending branch opening into the chamber 10, said chamber containing a ball check valve 11 and having at its top a removable closure 12. A downwardly inclined branch passageway 13 extends from the lower portion of the chamber 10 through the wall of the casing 5.

It will be observed that the bottom of the chamber 10 is shown as straight, or in a plane at right angles to the longitudinal axis of the chamber. This is preferable to the usual tapered or conical seat, for it provides a sharp edge contact with the ball, which insures the valve against leakage. Attention is also called to the fact that the passageway 13 opens into the chamber at the

plane of the valve seat. As a consequence of this arrangement, the ball valve 11 is lifted bodily and sustained quietly and without vibration off its seat during the flow of fluid into the casing 5. Experience has proved that, if the usual construction is carried out, to-wit, the inverted conical seat for the ball and the elevation of the passageway 13 to a higher plane with respect to the valve seat, the ball will vibrate and create an annoying humming sound when fluid passes into the casing 5. Because of the advantages gained by this construction I consider it an essential part of my invention.

The lower end of the casing 5 is provided with an outlet controlled by my thermostatic valve, which will now be described. This valve comprises generally a body 14, preferably formed as a casting and comprising a lower externally threaded portion 15 and an upper externally threaded portion 16, there being a flange 14ª interposed between said portions. The upper portion of the valve body carries (and has preferably cast therewith) a block 17, said block being preferably square or rectangular in section and being mounted eccentrically on top of the portion 16, for a purpose to be hereinafter explained. 18 denotes a chamber which is provided in the lower end of the body 14, from the upper end of which chamber there extends a branch passageway 19, arranged eccentrically with respect to said chamber, said branch extending upwardly into the block 17 and merging at its upper end with a transverse branch 20, the two branches constituting the outlet passageway from the casing. The outer end of the branch passageway 20 forms a valve seat for a valve 21 which is carried by one end of a leg 22 of a loop the opposite leg 23 whereof is secured to the block 17 in the peculiar manner shown herein. In axial alinement with the branch 20, the block 17 is provided with a stud 24, said stud forming a pivotal support for the portion of the leg 23 which is directly opposite the valve 21. In practice, I prefer to recess the face of the block which carries the stud 24 so that the rounded lower end 23ª of the leg 23 may rotate in conjunction with a corresponding concaved shoulder 17ª therebeneath. For the purpose of normally preventing the loop from turning about the stud 24, I secure the leg 23 to the upper end of the block by means of one or more screws 25, and making the apertures for the screws of sufficient size to provide clearance with the bodies of the screws and backing off the screws so that they will not interfere with the harmonious expansion and contraction of the legs 22 and 23 of the loop.

By means of its threaded lower extremity, the valve body 14 may be conveniently connected to any conduit (for instance, the exhaust or vacuum line of a radiator) as by means of a nut 26 having at its lower end an inturned flange 27 which is adapted to support a connection 28. This connection may be provided with a rounded head 29 adapted to form ground-joint with a correspondingly rounded end of the body portion 15.

The thermostatic loop which I employ is a compound bar or strip of metal the members of which are preferably united by rolling them together in the presence of an interposed adhesive. The inner member of the loop may be nickel and the outer member composition bronze, the thermostatic bar formed in this manner having been found to be particularly well adapted for my purposes. The ratio of expansion of the bronze at the same temperature is greater than nickel.

It will be observed that the branch passageways 9, 10, 13, 20 and 19 are of progressively increasing diameter from the inlet end to the outlet end of the fitting. In practice, the branch passageway 10 has been made with a drill of a size next larger than that with which the branch passageway 9 is made, while the branch passageway 13 has been made with a drill of the next size larger than the branch passageway 10, and so on for the branch passageways 20 and 19. The object of forming the branch passageways in this manner is to prevent any possible choking or clogging of the fitting. It will be obvious that anything that can enter the inlet branch can also pass through any of the succeeding branches.

Reference has been made hereinbefore to the axial alinement of the valve 21 and the stud 24. This is an important feature of my invention, since it results in absolute uniformity of expansion and contraction for the two legs 22 and 23 of the loop. This, of course, means that the valve will always open and close under the same temperature conditions for which the loop is designed and adjusted.

This axial alinement also has another important advantage. Should the valve become leaky in its seat or should any sediment accumulate upon the valve or the seat, by taking out the screws 25, the operator can rock the loop upon the stud 24 as a pivot (as shown in dotted lines in Fig. 3) holding the valve in engagement with the seat. This rocking will enable the operator to provide a ground fit between the valve and its seat; this regrinding operation can be performed whenever occasion may require. The valve is thus ground to fit in practical uses. In practice, the valve 21 is preferably hemispherical.

Reference has been made hereinbefore to the fact that the block 17 is at one side of the body 14. This provides sufficient clearance between the face of the block which

carries the valve seat and the surrounding casing 5 to enable the thermostatic strip to expand without interference by said casing. In practice, this strip is made of metal which is not tempered to a degree to prevent the loop from being bent or otherwise shaped so as to render it adjustable to vary the closing of the valve in accordance with the temperature conditions in any particular installation.

In Figs. 5 and 6, I have shown the valve body and its thermostatic valve connected in a pipe line 30 supplying hot water from a tank 31 to a bath tub 32. The valve may be conveniently connected to the pipe line by means of the threaded portions 15 and 16 of the body 14. The thermostatic loop having been adjusted for the desired temperature, it will be absolutely impossible for a person to supply water to a bath tub at a temperature which will be injurious. As is well known, the accidental turning of the hot water spigot in place of the cold water spigot has resulted in a large number of casualties; and this is particularly true in the case of insane asylums.

While the thermostatic valve shown herein will operate positively and efficiently under the temperatures for which it is set or adjusted, it possesses an added advantage. Because of the manner in which it is constructed, should the operator place the valve in an apparatus or system wherein the temperature is considerably in excess of that for which the valve is designed, it has the capability of adjusting itself for the control of such system. For instance, assuming that the thermostatic loop is adjusted for a temperature varying from 80° in water to 180° in steam and that it is installed in a system wherein the temperature materially exceeds that for which it was set, at 80° for water it will adjust itself under 212° to permit water of 100° to pass and in the case of steam at 180°; steam at 100 lbs. at 327° will permit it to pass liquid at 200° to 205°, as a self adjusting of about 20° and in practice will stay at the new adjustment. If the valve is to be adjusted to accommodate a lower temperature it must now be manually contracted so as to permit of desired temperature.

Having thus described my invention, what I claim is:—

1. In a valve of the character described, the combination, with a block or body having a passageway extending thereinto from one side thereof, a thermostatic loop having one of its legs connected to the side of the body opposite that from which the passageway extends and at a point in substantial alinement with said passageway, and a valve carried by the other leg of said loop in position to close said passageway, said connection between said loop and said body being a pivotal one whereby the loop may be rocked about the pivot for the purpose of grinding the valve member against its seat.

2. In a valve of the character described, the combination, with a block or body having a passageway extending thereinto from one side thereof, of a thermostatic loop having one of its legs pivotally connected to the side of the body opposite that from which the passageway extends, and a rounded valve carried by the opposite leg of the thermostat and adapted to close the opening in the said passageway through the contraction of said loop.

3. In a valve of the character described, the combination, with a block or body having a passageway extending thereinto from one side thereof, of a thermostatic loop having one of its legs pivotally connected to the side of said body opposite that from which the passageway extends and in substantially axial alinement with the inlet opening of said passageway, and a valve carried by the other leg of said loop and adapted to seat within said opening.

4. In a valve of the character described, the combination, with a block or body having a passageway extending thereinto from one side thereof, of a thermostatic loop having one of its legs pivotally connected to the side of said body opposite that from which the passageway extends and in substantially axial alinement with the inlet opening to said passageway, a valve carried by the other leg of said loop and adapted to seat within said opening, and additional means for securing the first mentioned leg of said loop to said body.

5. In a device of the character described, the combination of a casing having a supply passageway comprising an inlet branch, a vertical branch, and a downwardly inclined branch communicating with said casing, of an outlet connection from said casing, said connection having a passageway comprising a lateral branch and a vertical branch, a thermostatic valve controlling the lateral branch, the cross-sectional areas of said branches progressively increasing from the inlet branch to the outlet branch.

6. In a device of the character described, the combination of a casing having a supply passageway comprising an inlet branch, a branch extending at an angle therefrom, a check valve controlling the last mentioned branch, and a branch between the last mentioned passageway and the casing, a pair of branches providing an outlet passageway from the casing, and a thermostatic valve controlling the inner of the two last mentioned branches, the cross sectional areas of said branches increasing progressively from the inlet to the outlet.

7. In a device of the character described,

the combination of a casing, there being a series of connected branch passageways for conducting fluid into said casing, a check valve controlling one of said passageways, there being also a plurality of connected branch passageways extending from the casing, and a thermostatic valve controlling the inner branch passageway of the last series, the cross sectional areas of said branch passageways increasing progressively from the inlet to the outlet.

In testimony whereof, I hereunto affix my signature.

SAMUEL LIPPERT.