S. LIPPERT.

THERMOSTATIC VALVE.

APPLICATION FILED AUG. 21, 1915.

1,376,818. Patented May 3, 1921.

FIG. 1

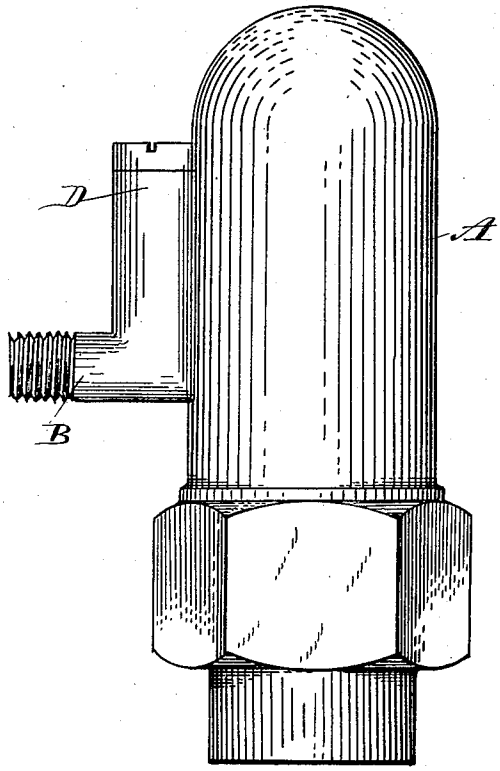


FIG. 2.

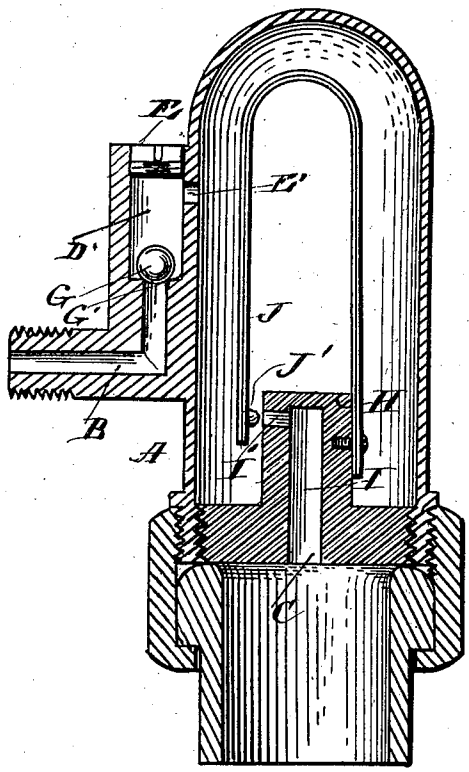
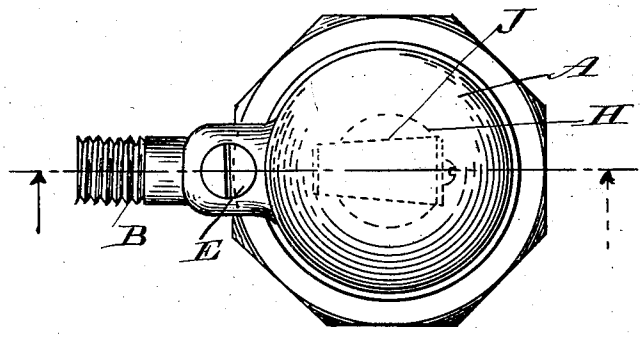


FIG. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

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THERMOSTATIC VALVE.

1,376,818. Specification of Letters Patent. Patented May 3, 1921.

Application filed August 21, 1915. Serial No. 46,707.

To all whom it may concern:

Be it known that I, SAMUEL LIPPERT, a citizen of the United States, and resident of East Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Thermostatic Valves, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are to provide a thermostatic valve for attachment to a radiator in a heat supplying and controlling system, and adapted to act automatically to permit the condensed water and air to escape into a pipe leading to a separating tank, where the condensed steam is returned as water to the boiler, and the foul air is carried away and discharged where it will occasion no annoyance.

In this system a partial vacuum is created by means of a vacuum pump which draws the steam entirely through the radiators and insures its entering the very last heating tube of the system.

The action of the thermostat is two-fold and produces two advantageous effects, the first of which is to provide means permitting all foul air and water of condensation to escape from the radiators under the action of the vacuum pump, and to retain the steam therein after it has been drawn into the last section or tube of the radiators, and second, to provide means for permanently retaining the condition of vacuum in the radiators, whereby a very great saving in cost of fuel and labor is obtained since when the fires are permitted to go down at night, the vacuum will remain and when again started in the morning the steam will instantly be drawn to the remotest heating element of the system.

Many air venting devices are on the market which are successful in eliminating air from a steam system, which is necessary to permit heating the radiators, but discharge it into the room which is unsanitary and obnoxious. These valves do not permit the discharge of the water of condensation or steam from the radiators, and when retained in the radiator this causes water hammer and constant leaking through improperly packed valves. Again the accumulation of water in the radiators interferes with the passage of the steam and with quick heating of the radiators.

My thermostatic valve assembly enables the circulating passages thereof to be readily and thoroughly cleaned from molding sand as well as from sediment that may enter the same from radiators.

It also permits of drawing off the cold water of condensation collected in the radiator which can be emptied from this source.

The invention further includes thermally operated means for automatically closing the passages of the device when affected by steam, and also mechanical means for automatically closing the passage to the vacuum lines when the pump ceases to work and thus prevent the loss of the vacuum in the radiator.

The invention further includes the combination and arrangement of parts and construction of the various details hereinafter described, shown in the accompanying drawings and specifically pointed out in the claims.

In the accompanying drawings Figure 1 is a vertical elevation of the device; Fig. 2 is a vertical central section thereof; Fig. 3 is a plan of the device shown in Fig. 2 showing the thermal element in dotted lines.

In these views A represents the shell or casing of the device, B represents the inlet opening thereto, C the outlet opening leading therefrom.

Intermediate of these openings is the vertical tubular passage D′ closed at the upper end by the screw threaded adjustable plug E, below which is formed the lateral passage E′ communicating with the main chamber A. In the base of the passage D′ is inserted a ball valve G which rests upon a seat G′.

The invention includes the employment of a peculiarly sensitive and positively acting thermal element to control the passage of steam. In Fig. 2 J is this element, which

comprises a looped band composed of a multiple number of thin bands of metal having different ratios of expansion.

This looped band is formed of bars of metal united together throughout their length by means of a fused metal interposed between them. The bars are then rolled out into thin bands and separated into lengths which are bent into flat loops as shown in the drawings. The sides of the loops may be of equal length, and one end is attached to a wall H of the vertical passage I centrally positioned in the chamber F. The thermal element is provided at the other end with a self adjusting valve J′ which, when the element expands as the hot steam enters the chamber, closes the outlet I′ of the passage I. This action is obtained by the unequal ratio of expansion of the outer and inner layers of metal composing the expanding element. The outer element expands the most and hence bends the free end of the loop inward so that the valve closes upon its seat.

The flat band shape of the metal layers prevents distortion of the loop as it bends, and its thinness permits it to be very sensitive and to act quickly.

The metals used are preferably a composition of bronze aluminum and gold in the outside layer, having the higher ratio of expansion and a composition of nickel in the inner layer having the lower ratio of expansion.

In use with steam the metal loop will endure all temperatures, whereas some thermostatic elements employed heretofore in air venting valves and composed of copper or sulfur vulcanite will disintegrate and melt when the steam pressure rises above 15 to 25 lbs. Such materials ordinarily melt at 260° F. or less, and are useless where steam pressure at high temperature is required, as in public buildings where steam is carried at 150 lbs. pressure, at a temperature of 366° F.

The ends of the thermal loop F at normal temperatures are separated so as to remove the valve J from its seat on the outlet of the passage I, but when expanded the valve will close the opening leading to the passage I.

This device forms a feature in the vacuum system and the closing of the central passage I when the radiator is filled with steam prevents the steam from passing the thermostat and destroying the vacuum created by the pump in the system.

It is further of great importance to automatically maintain substantially constant the partial vacuum created in each radiator, and after the radiator has cooled and the pump or other vacuum creating agency has ceased to operate, since it would otherwise be necessary to operate said vacuum creating agency every time the radiator becomes cool.

To provide for this effect a ball valve G preferably operated by gravity, is seated in the vertical branch of the inlet passage B in an air tight seat G′. This valve closes automatically when the radiator commences to cool, and forms a seal, preventing the return of air or vapor therethrough and thus retaining in the system the vacuum caused by the condensation of the steam.

Consequently, the pump or other vacuum creating agency can cease to operate and the valve will hold the partial vacuum in the system between the thermostat and boiler.

Accumulation of molding sand and other material in the chamber is prevented by the position of the outlet orifice I′, since all floating refuse and water of condensation will flow through this opening and prevent interference with the action of the thermostat valve.

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

1. A valve assembly for the purpose specified comprising a casing, a bottom closure for said casing having a projection extending upwardly into said casing and provided with a passageway extending through said closure and into such projection, there being a lateral port extending from said passageway through said projection, a thermostatic loop secured at one end to the side of said projection opposite said port and provided at its opposite end with a valve coöperating with said port, an outlet connection extending from beneath said closure, an upwardly extending inlet connection arranged externally of said casing and communicating therewith through a port located above the first-mentioned port, and a gravity closing valve in said connection below the second port.

2. A valve assembly for the purpose specified comprising a casing, a bottom closure therefor forming a chamber therewith and having an outlet passageway, a thermostat within said casing, a valve carried by said thermostat and adapted to close said passageway, an outlet connection leading from beneath said closure, an upwardly extending inlet connection arranged externally of said chamber and communicating therewith through a port located above said valve, and a gravity closing valve in said connection below said port.

3. A valve assembly for the purpose specified comprising a casing having a bottom closure forming a chamber therewith and provided with an outlet passageway, a thermostat in said chamber, a valve operative by the expansion of said thermostat to close said passageway, an upwardly extend-

ing inlet passageway arranged externally of said chamber and provided with a port communicating with said chamber above said outlet passageway, said inlet passageway having a valve seat beneath said port, and a ball valve in said inlet passageway above said seat.

In testimony whereof, I hereunto set my hand this 19 day of August, 1915.

SAMUEL LIPPERT.

In presence of—
FRANK H. EWING,
AMOS FLUVY.