March 2, 1926. 1,575,247

G. ANDERSON

VENT VALVE

Filed July 8, 1922

Fig. 1.

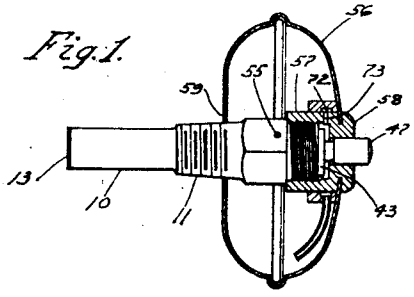


Fig. 2.

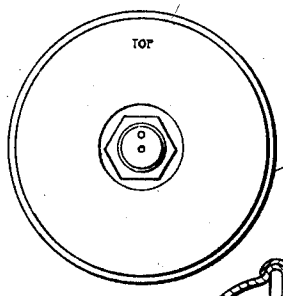


Fig. 3.

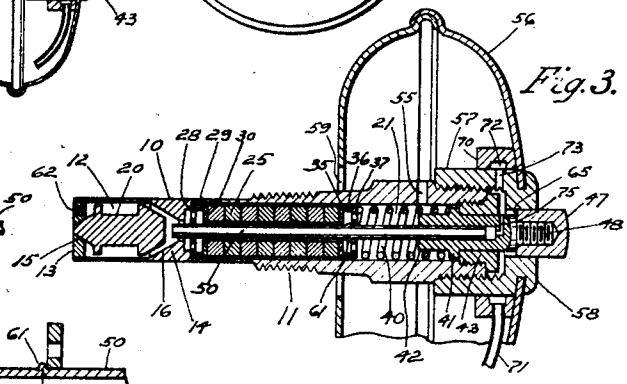


Fig. 6.

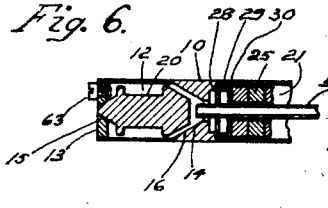


Fig. 10.

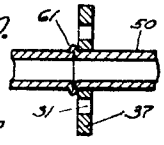


Fig. 4.

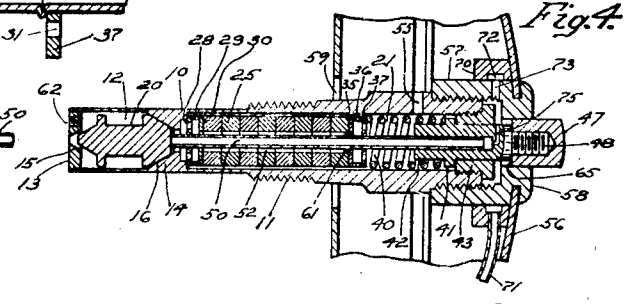


Fig. 7.

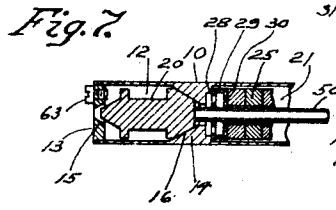


Fig. 5.

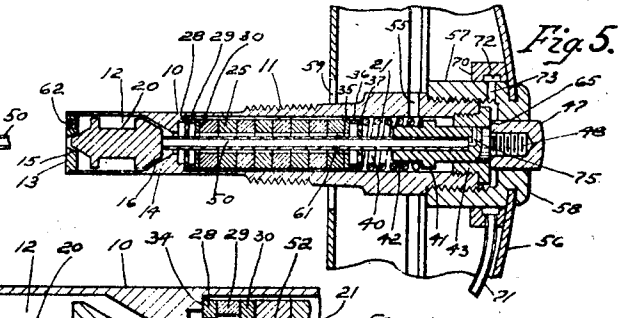


Fig. 8.

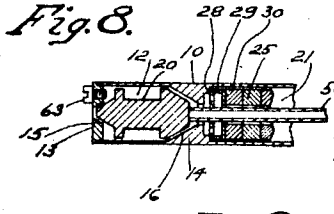
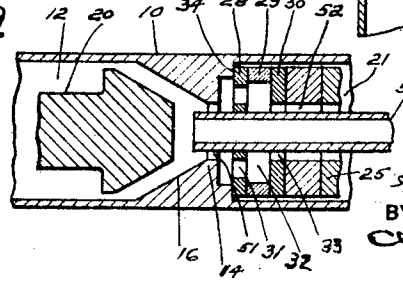


Fig. 9.



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UNITED STATES PATENT OFFICE.

GIDEON ANDERSON, OF NEW YORK, N. Y.

VENT VALVE.

Application filed July 8, 1922. Serial No. 573,574.

To all whom it may concern:

Be it known that I, GIDEON ANDERSON, a subject of the King of Sweden, residing at No. 450 East 148th Street, New York, county of Bronx, and State of New York, have invented certain new and useful Improvements in Vent Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to vent valves for radiators of steam or hot water heating systems.

It is one object of the invention to provide a vent which will permit escape of the cold air contained in the heating system, but which will be automatically closed upon the approach of steam or hot water, as the case may be.

A further object is the provision of a vent valve which is actuated positively, and is not dependent for its action upon flotation in the accumulated water of condensation.

A further object is the provision of a vent valve capable of use in steam vacuum heating systems.

A further object is the provision of a vent having means for collecting condensed steam and for automatically returning to the radiator, when the steam is shut off, that part of the condensed steam which is not evaporated by the heat of the radiator.

Other objects will be in part obvious and in part specifically referred to in the specification which follows.

In the accompanying drawings,

Fig. 1 is a side view, partly sectioned vertically, of a vent embodying my invention.

Fig. 2 is a front end elevation thereof.

Fig. 3 is an enlarged longitudinal vertical section with parts broken away.

Fig. 4 is a view similar to Fig. 3, showing the parts in different operative positions.

Fig. 5 is a view similar to Figs. 3 and 4, showing the valve moved off one of its seats by manually-operated means.

Figs. 6, 7 and 8 are longitudinal vertical sections taken through the valve-end of the vent, showing the parts in different operative positions, and also showing the vent adapted for use in vacuum heating systems.

Fig. 9 is an enlarged view similar to Figs. 6, 7 and 8, and

Fig. 10 is a vertical section of a detail of construction.

Referring to the drawings, the vent is shown as comprising a body portion 10 adapted to project into a radiator and be screw-threaded therein by means of a threaded portion 11 on said body. The latter is provided at its inner end which projects into the radiator with a chamber 12, the end walls of which, 13 and 14, are provided with valve-seats 15 and 16, respectively, with which cooperates a valve 20 fitting loosely in the chamber 12.

The body 10 in that part thereof forward of the wall 14 is hollowed out to form a second chamber 21, preferably cylindrical and extending to the front end of said body. Within this chamber 21 are positioned a plurality of discs 25 which are formed of fibre or other moisture-absorbing material. Interposed between these discs and the wall 14 are one or more metallic washers, here shown as three in number and indicated at 28, 29 and 30, the same having communicating openings 31, 32 and 33, as more clearly shown in Fig. 9, and the rearmost one abutting against a fixed shoulder 34 in a position just forward of the wall 14. A similar set of metallic washers 35, 36 and 37 are positioned in the chamber 21 at the front end of the discs 25. These several washers and discs are normally compressed together with the rearmost washer 28 bearing against the fixed shoulder 34 by means of a coiled spring 40 which bears at one end against the front washer 37 and at its opposite end against a flange 41 on a stud 42 which is slidably mounted in a nut 43 threaded into the front end of the vent body 10, the pressure of said spring against the flange 41 serving to yieldingly hold the stud 42 in a normal position with the front side of the flange 41 in engagement with the rear end of the stationary nut 43, as shown in Figs. 3 and 4.

A tube 50 longitudinally disposed within the body 10 is slidably mounted therein to extend from the front end of the valve chamber 12, through the wall 14 into the second chamber 21, and through openings in the several discs and washers contained in the latter to a seat in the stud 42 at the front end thereof. The tube is slidably mounted in said stud and in the end washers 28 and 37, which latter have central openings just large enough to permit of the sliding movement of the tube therethrough, and also have the additional openings 31.

The opening 51 in the wall 14 and the

openings 52 in the discs 25 are larger than the diameter of the tube which passes through them, whereby a continuous passage is formed from the valve chamber 12 through the openings in the several parts surrounding the tube to a radial outlet passage 55 in the body 10 adjacent the front end of the chamber 21, so that when the valve 20 is off its seat 16, fluid may flow through said openings to the outlet 55.

Should any liquid flow through the outlet 55, it is caught in a receptacle or drip-cup 56 journaled in a cap 57 threaded upon the outer end of the body 10. The front end 58 of this cap 57 is spun over the edge of an opening in the cup 56 to hold the latter rotatably mounted on the cap. To permit the receptacle and the cap being conveniently mounted on the body 10, the receptacle is provided with an opening 59 in its rear wall to permit of its being slipped over the front end of said body, and which opening also provides communication from the interior of the vent with the atmosphere through the passage 55.

The tube 50 is provided with an annular shoulder 61 in position for engagement with the inner wall of the washer 37 (see Figs. 3 and 10) so that upon any lateral contraction of the discs 25 under conditions to be presently described, the inward movement thereby permitted of the washer 37 under the action of the spring 40 will cause a corresponding movement of the tube. When the washer 37 is moved forwardly however, from the position shown in Fig. 3 to that shown in Fig. 4, as will be caused by the discs 25 when they expand as the result of the absorption of moisture by them, the tube will be free to be moved outwardly with the washer by the pressure of the valve against its inner end.

The tube 50 is of such length and so positioned that when the discs 25 are dry and in their contracted position, as shown in Fig. 3, the inner end of the tube extends into the chamber 12 a distance sufficient to prevent seating of the valve upon the seat 16. Any expansion of the discs 25 from such position is against the action of the spring 40.

In operation, when the steam is turned on, there is first a rush of cold air which enters the chamber 12 by an aperture 62 provided in the end wall 13, and from thence passes through the continuous passage provided by the openings in the several parts in the body 10 until it reaches the passage 55 through which it has an outlet to the atmosphere. If the pressure is sufficient to move the valve 20 off its seat 15, the valve will be held out of engagement with the seat 16 by the inwardly-projecting end of the tube 50, as in Fig. 3. The cold air will be followed by steam; the moisture being in part absorbed by the discs 25 which will thereupon expand against the action of the spring 40 and carry the washer 37 outwardly, thus permitting the valve to force the tube outwardly and engage its seat 16, as in Fig. 4, and thereby prevent further escape of steam to the outlet passage 55. When the steam is turned off, pressure in the system is gradually decreased until it is below atmospheric pressure. The valve will then be moved off its front seat 16 and onto the rear seat 15 by the air which rushes in through passage 55 to the chamber 12 and aperture 62, drying the discs 25 on the way and thus causing them to contract and permitting washer 37, under the action of the spring 40, to move the tube 50 inwardly, by engagement with its shoulder 61, to the Fig. 3 position.

It will be obvious that the vent hereinbefore described may be used in hot water heating systems in exactly the same manner as in steam heating systems. The vent may also be used in steam vacuum systems. In the latter case, the aperture 62 is closed up as shown in Figs. 6, 7 and 8, as by a screw 63, and when the steam is turned on, the valve 20 will be moved off its seat 15 to permit the cold air to escape through the outlet passage 55, the action of the vent otherwise being similar to that in the ordinary steam system hereinbefore described. When the steam is shut off, however, and the air rushes back through the passage 55, the valve will be forced off its front seat 16 and onto the rear seat 15, and since the aperture 62 is closed, no air can get into the system.

In order to prevent grit or other foreign matter from accumulating on the valve seat and thus preventing proper seating of the valve thereon, the tube 50 may be pushed inwardly against the valve to unseat the latter, as shown in Fig. 5, and thereby allow the steam to pass from the radiator between the valve and its seat to clean the latter. This operation of the tube may be effected by means of a button 47 which is threaded on to a stem 48 at the front end of the stud 42 in a position projecting slightly forward of the cup-carrying cap 57 where it may be conveniently reached for operation. The button 47 is provided with a shoulder 65 which is so positioned relative to the nut 43 as to engage the latter before the valve 20 engages its rear seat 15, as shown in Fig. 5, thus rendering it impossible to shut off the supply of steam to the chamber 12 during the cleaning operation.

The condensed water, if any, collected in the drip-cup may evaporate under the heat of the radiator. However, it may be desirable to return to the system automatically any water which may be collected in the drip-cup when the steam is shut off. For this purpose there may be mounted on the cap 57 a collar 70 carrying a tube 71 extending downwardly towards the bottom of

the drip-cup 56, said tube 71 communicating with the tube 50 through a series of connecting passages comprising an annular groove 72 in the inner wall of the collar 70, a radial passage 73 in the cap 57 leading from said groove to the interior of the cap, and a passage 75 in the stud 42 leading from the interior of said cap to the open front end of the tube 50, all as clearly shown in Figs. 3 and 4. With this construction and arrangement of parts, when the steam is shut off and the air rushes into the vent through the opening 55 to unseat the valve 20 from its seat 16, the collected liquid in the drip-cup 56 will be drawn through the tube 71 and connecting passages to the tube 50, from the latter to the chamber 12, and from thence through the aperture 62 to the radiator system. There is thus formed, in effect, a siphon for drawing the collected liquid.

In drawing the water from the drip-cup through the tube 50 in the manner described, rather than through the chamber outside of said tube, the drying and contracting of the washers 25 during such time is not interfered with.

In assembling the device, the cap 57 and attached drip-cup 56 may be threaded upon the end of the body 10, and when no further movement between the cap and the body is possible, the drip-cup and rigidly connected collar 70 may be further rotated on the cap until the word "Top" on the front side of the drip-cup is at the uppermost point, as shown in Fig. 2. In this position of the drip-cup the tube 71 is properly positioned downwardly.

The above description illustrates the principles embodied in my invention, but it will be obvious that various changes may be made within the scope of the invention as defined by the annexed claims.

What I claim is:

1. An automatic air vent for heating systems employing a moist heating medium, said vent comprising a member having a continuous passage therethrough leading to the outside thereof, a valve in said member for opening and closing said passage, a seat for said valve, means for holding the valve off its seat while the air escapes, means controlled by the moisture of the heating medium for permitting said valve to move said first-named means to ineffective position and allow seating of the valve and closing of said passage, and means operable to unseat the valve, when said first-named means is in ineffective position, to permit the heating medium to pass between the valve and its seat.

2. An automatic air vent for heating systems employing a moist heating medium, said vent comprising a member having a continuous passage therethrough, a valve in said member for opening and closing said passage, a seat for said valve, means movable in said passage for holding the valve off its seat while the air escapes through the passage, means for rendering said first-named means effective, and moisture-absorbing means which expands on absorbing the moisture of the heating medium to permit said valve to move said first-named means to ineffective position and allow seating of the valve, and manually-operable means for actuating said movable means to unseat the valve, when said first-named means is in ineffective position, to permit the heating medium to pass between the valve and its seat.

3. An automatic air vent for heating systems employing a moist heating medium, said vent comprising a member having a continuous passage therethrough, a valve in said member for opening and closing said passage, a seat for said valve, means movable in said passage for holding the valve off its seat while the air escapes through the passage, means for rendering said first-named means effective, and moisture-absorbing means which expands on absorbing the moisture of the heating medium to permit said valve to move said first-named means to ineffective position and allow seating of the valve, manually-operable means for actuating said movable means to unseat the valve, when said first-named means is in ineffective position, to permit the heating medium to pass between the valve and its seat, and resilient means for opposing the movements of said manually-operable means and the expanding movement of said moisture-absorbing means.

4. An automatic air vent for vacuum heating systems, said vent having an opening communicating with the system and having a passage extending to the outside thereof, a valve cooperating with said opening and passage to open and close the same, means for preventing closing of said passage by said valve to permit escape of air from the system to said passage when the pressure in the system exceeds the outside pressure, and means controlled by the heating medium for rendering said first-named means ineffective to permit closing of the passage and prevent escape of the heating medium, said valve closing said opening to prevent influx of air when the outside pressure exceeds the pressure in the system.

5. An automatic air vent for heating systems employing a moist heating medium, said vent comprising a member having a passage therethrough, a receptacle for receiving condensed moisture issuing from said passage, and a siphon for returning said condensed moisture from the receptacle to the system, said siphon comprising a passage communicating with said first-named passage and having a member ex-

tending into said receptacle, the influx of air through said first-named passage when the outside pressure exceeds the pressure in the system serving to draw the liquid through said second passage into the system.

6. An automatic air vent for heating systems, employing a moist heating medium said vent comprising a member having a passage therethrough, a receptacle for receiving condensed moisture issuing from said passage, and a siphon for returning said condensed moisture from the receptacle to the system, said siphon comprising a passage communicating with said first-named passage and having a tube extending downwardly into said receptacle, the influx of air through said first-named passage when the outside pressure exceeds the pressure in the system serving to draw the liquid through said second passage into the system, said receptacle and tube being rotatably mounted so that said tube may be adjusted to extend downwardly.

7. An automatic air vent for heating systems employing a moist heating medium, said vent comprising a member having a continuous passage therethrough, a valve in said member for opening and closing said passage, a seat for said valve, a tube movable in said passage, means for holding said tube in engagement with the valve to keep the latter off its seat while the air escapes through said passage, said means being adapted to absorb the moisture of the heating medium and expand to release said tube and permit it to be moved by the valve to ineffective position and thereby allow seating of the valve, a receptacle for receiving condensed moisture issuing from said passage, and a siphon for returning the condensed moisture from the receptacle to said system, said siphon comprising a tube extending down to the lower part of the receptacle, a passage connecting said second tube with the first-mentioned tube to form a continuous passage from the receptacle to said system, the influx of air through said passage in the vent, when the outside pressure exceeds the pressure in the system, serving to draw the liquid from the receptacle into said system.

In testimony whereof I affix my signature.

GIDEON ANDERSON.