J. W. SHEPHERD.

HUMIDIFYING VALVE.

APPLICATION FILED JAN. 25, 1917.

1,365,284. **Patented Jan. 11, 1921.**

Fig. 1.

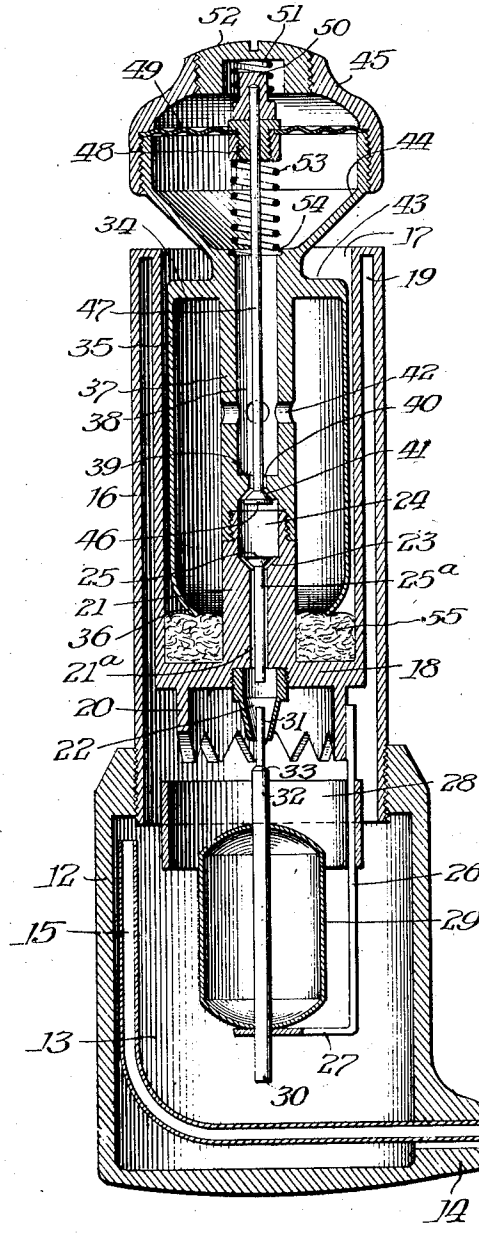
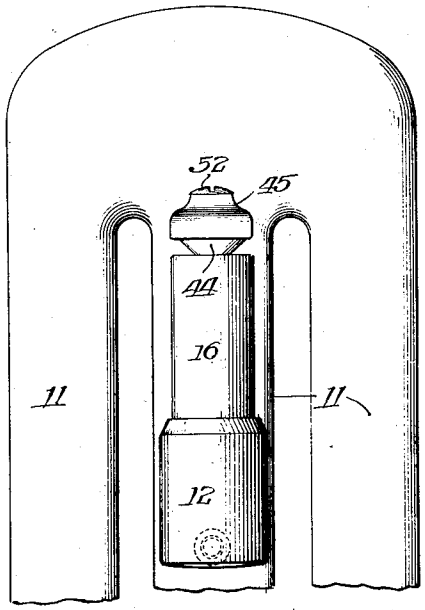


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN W. SHEPHERD, OF ANDREWS, INDIANA.

HUMIDIFYING-VALVE.

1,365,284. Specification of Letters Patent. Patented Jan. 11, 1921.

Application filed January 25, 1917. Serial No. 144,386.

To all whom it may concern:

Be it known that I, JOHN W. SHEPHERD, a citizen of the United States, residing at Andrews, county of Huntington and State of Indiana, have invented certain new and useful Improvements in Humidifying-Valves, of which the following is a specification.

My invention relates to valves which are particularly adapted to allow the escape of steam or other fluid in order to increase the amount of humidity in the atmosphere. It is well known that in many cases particularly when the exterior temperature is relatively low the percentage of moisture in the heated air of a building becomes too low for comfort or health. Many expedients have been used to increase the amount of moisture such as devices for causing the evaporation of water by heat coming from a radiator, register or the like. Such devices have proved inexpedient as the percentage of moisture in the air can not readily be increased to any desired extent and the regulation of the moisture is difficult to attain.

My present invention constitutes an improvement on the humidifying valve described in Letters Patent No. 1,178,032, issued to me on April 4, 1916.

One of the objects of my invention is to provide means in connection with a humidifier whereby the valve therein may be closed to prevent water which accumulates in the humidifier from escape therethrough, causing damage in the room where the radiator may be.

A further object of my invention consists in the provision of means by which the steam which flows to the atmosphere is kept in a heated condition until its actual delivery to the atmosphere, and condensation is thus prevented.

A still further object of my invention consists in providing means whereby the humidifying valve is automatically closed when there is a partial vacuum in the radiator, thus preventing air from being drawn into the radiator from the atmosphere.

A still further object of my invention consists in providing means by which water condensing in the humidifying valve is prevented from reaching parts of said valve which might allow the water to pass beyond the first or high pressure chamber of said valve.

These and other objects and advantages of my invention will be more readily understood by reference to the accompanying drawings, which show a preferred embodiment of my improvements, and in which—

Figure 1 is a vertical section through my humidifying valve.

Fig. 2 is a fragmentary view of a radiator showing the humidifying valve embodying my invention secured thereto, the valve being shown in elevation.

The boss 10 is attached to any suitable portion of a radiator 11 and to this boss is attached my humidifying valve represented as a whole by the numeral 12. The valve consists of a high pressure chamber 13 in communication with the pipe 14 which is screwed into the boss 10 on the radiator. The chamber 13 is substantially cylindrical in shape and is provided with a supply pipe 15 which extends through the opening in the pipe 14 and upwardly toward the top of the interior of the chamber 13, the purpose of which will be explained later.

Secured to the upper portion of the chamber 13 is a hollow cylinder 16 open at its lower end. The cylinder has a hollow interior portion 17 substantially cylindrical in shape which is closed at the bottom by a wall 18. Between the interior and exterior walls of the cylinder 16 there is a steam jacket 19 which opens directly into the high pressure chamber 13. Mounted on the under side of the bottom wall 18 is a serrated collar 20. Arising from the bottom wall 18 is a column 21 which in the preferred form of my valve terminates short of the middle portion of the interior 17. Column 21 is provided with a passage 21^a therethrough. At the lower end of the passage 21^a is an enlarged portion into which is threaded the nipple 22 having a restricted inlet end. The upper end of the passage 21^a is provided with a valve seat 23 and a chamber portion 24. At the upper end of the passage 21^a is a valve 25 adapted to seat against the seat 23 and having a stem 25^a which extends downwardly into the nipple. Mounted on the serrated collar 20 is a downwardly extending bracket 26 with an L-shaped lower end 27. To the member 26 is fastened a guard ring 28 preferably slightly larger in diameter than the collar 20. Supported by the member 27 is a float 29 having a stem 30 extending completely through the body

of the float and projecting below and above the ends of the same. The upper portion of the stem has a reduced end 31, forming at the shoulders 33 a valve, the lower end of the stem 30 serving as a guide to direct the lower end of the float in the bracket 27 as the float is raised and lowered. The upper end 31 of the stem is made sufficiently long to extend within the nipple 22 when the float is at rest on the bracket 27 to serve both as a guide and a means for maintaining valve 25 open when the float is raised to close the opening through the nipple.

The low pressure chamber of the valve is indicated by the numeral 34 and comprises a cylindrical body 35 having an open lower end 36 of less diameter. In the interior of the body 35 there is provided a central column 37 having an aperture 38 extending therethrough and a lower wall 39 near the bottom thereof. For securing the low pressure chamber to the cylinder 16, the column 21 is threaded at its upper end and the lower end of the column 37 is threaded to engage the threads on column 21 whereby the cylinder 35 may be removably fastened thereto. The wall 39 is provided with an opening 40 smaller in diameter than the aperture 38 and on the lower side thereof there is formed a valve seat 41. To connect the aperture 38 of the column 37 and the low pressure chamber 34 apertures 42 are provided in the wall of the column 37. The upper end of the chamber 34 is closed by the wall 43, the column 37 extending thereabove and terminating in an enlarged hollow portion 44 closed by a threaded top member 45. Extending through the aperture 38 of the column 37 is a valve member, the valve head 46 projecting beyond the wall 39 of the column 37 and adapted to seat against the valve seat 41. The stem 47 extends upwardly through the enlarged portion 44 and is secured to a nipple 48 which in turn is fastened to a diaphragm 49 held in place between the members 44 and 45. Fastened to the upper portion of the nipple 48 is a boss 50 surrounding which is a coil spring bearing against the inside of the plug 52 which forms a portion of the cover 45, and bearing against the under side of the nipple 48 is a coil spring 53, the other end of which is retained in the seat 54 at the upper end of the column 37. The springs 51 and 53 are so adjusted as to hold the valve 46 open with respect to its valve seat 41 when in normal position. The valve 25 is held closed against the seat 23 by gravity when the valve is not in operation and under normal conditions the float 29 rests on the member 27 of the bracket 26. I prefer to make the low pressure chamber 34 so it terminates short of the bottom wall 18 of the cylinder 16 and in the space therebetween I insert a removable porous disk or washer 55 preferably made of wool or other similar material. This member 55 serves also as a means for preventing the steam from escaping noisily as such member retards the emission of the steam.

The operation of the humidifying valve is as follows:

Under normal conditions of operation the parts assume positions as shown in Fig. 1. Steam enters the high pressure chamber 13 through the pipe 15 from the radiator 11 and fills the steam jacket 19 of the cylinder 16, the air within the jacket 19 being gradually replaced by this steam. Also the steam enters the nipple 22 and passes through and unseats valve 25 and because valve 46 is held in open position by springs acting on the diaphragm 49, the steam passes up and into the aperture 38 of the column 37 filling the head 44, and also passes through the apertures 42 into the interior of the low pressure chamber 34, whereupon it is driven downwardly through the porous member 55 and escapes to the atmosphere through the annular space between the inner wall of the cylinder 16 and the outer wall 35 of the low pressure chamber. The steam within the jacket 19 prevents the condensation of steam as it thus escapes to the atmosphere, which escape therefore, is noiseless as the pressure of the steam is substantially atmospheric and no appreciable condensation occurs.

Some condensation of steam occurs in the steam jacket 19. To prevent this water of condensation entering the low pressure chamber, a serrated collar 20 is provided around the nipple 22, the water collecting thereon dropping from the points of the serrations without reaching the nipple 22. As the water accumulates in the high pressure chamber 13 it runs out through the pipe 14, the bore of which is only partially filled by the steam supply pipe 15, back into the radiator 11.

In the mornings especially it happens that the radiators to which the humidifying valves are attached are cold so that the first steam admitted thereto is to a large extent condensed. This condensation results in a large quantity of water accumulating in the radiators a portion of which water enters the high pressure chamber of the humidifying valve. The entry of water into the low pressure chamber 13 which occurs especially in the morning when the heating system is cold raises the float 29, closing the nipple 22 by engagement therewith of the valve 33 on the stem of the float. By reason of the elongated portion 31 the valve 25 is opened and maintained open as long as the float is in raised position to prevent trapping of any steam in the opening above the valve 25. To prevent such water entering the low pressure chamber the float 29 is provided

which, when the water enters the chamber 13 is elevated thereby and causes the valve 33 to close the restricted opening of the nipple 22 thus preventing the admission of any water to the interior of the low pressure chamber. As the steam pressure in the system increases, some of the steam enters the low pressure chamber 13 through the pipe 15 above the water, forcing the latter out of the chamber 13 through the opening in the nipple 14 back into the radiator, thus gradually displacing all of the water in the chamber 13 with steam whereupon the float will drop. The stem 31 of the float 29 is made long enough so that when the float is raised by the water to close the restricted opening of the nipple 22 the upper end of the stem 31 will push against the stem 25^a of the valve 25, and hold said valve in open position and will continue to hold it open as long as the float is in its uppermost position with the valve 33 seated. Unless this were done the steam in the nipple 22 and the passage 21^a would be trapped and might condense thus forming a partial vacuum which would result in locking valves 25 and 33 in closed position.

As the pressure of the steam in the low pressure chamber increases toward a predetermined maximum, the diaphragm 49 is moved to partially close the valve 46 against the seat 41 thereby restricting the escape of steam from the high pressure chamber into the low pressure chamber. This valve acts to maintain substantially constant pressure between the predetermined limits in the low pressure chamber, as the pressure of the steam against the diaphragm 49 causes the diaphragm to move with very slight variation in pressure of the steam thereagainst. Because of the steam jacket 19 the space around the chamber 34 is kept hot, hence, any steam escaping through the porous member 55 will be admitted to the atmosphere without appreciable condensation and will humidify the surrounding atmosphere.

The control of the valve 46 to hold the pressure in the low pressure chamber between the predetermined limits is by means of the diaphragm 49 controlled by springs 51 and 53, the tension of which is regulated by screw cap 52. The valve 46 is operated as above mentioned by the steam pressure from the high pressure chamber entering through the valve seat 41 and acting against the diaphragm 49. The variations in pressure of the steam acting against said diaphragm causes it to move thereby regulating the opening between the valve seat 41 and the valve 46, and causes the valve 46 to act as a reducing valve to maintain the steam passing therethrough at substantially constant pressure.

My valve is suitable for use in connection with the well known vacuum system of heating. It is understood that in order to make the vacuum system effective there must be means for preventing the entrance of air while there is a vacuum in the system. I accomplish this by using the gravity valve 25 which seats against the valve seat 23 whenever a vacuum is created in the heating system.

It is thus evident that my improved humidifying valve may be used in a vacuum system, and automatically becomes operative when the pressure within the system rises above atmospheric pressure.

Many changes may be made in the details of the humidifying valve which I have described without departing from the spirit or scope of my invention, as defined in the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A humidifying valve adapted for connection to a source of steam, comprising automatic means for maintaining the pressure of said steam below a predetermined maximum, means for noiselessly delivering the said steam to the atmosphere, said means including a heating jacket extending to the point of exit for preventing condensation of said steam as it is being delivered to the atmosphere.

2. A humidifying valve, adapted for connection to a source of steam, comprising in combination a high pressure chamber, a low pressure chamber, automatic means for maintaining the pressure of said steam in said low pressure chamber below a predetermined maximum, and means including a steam jacket surrounding said low pressure chamber and extending to the point of steam exit for preventing condensation of said steam as it is being delivered to the atmosphere.

3. A humidifying valve, comprising in combination a high pressure chamber adapted for connection to a source of steam, a steam jacket in communication therewith, a low pressure chamber within and spaced from said steam jacket, automatic means to maintain the pressure of said steam in said low pressure chamber below a predetermined maximum, and means including a porous member extending transversely of the low pressure chamber adapted for closing the end of the low pressure chamber for noiselessly delivering the steam from said low pressure chamber to the atmosphere.

4. A humidifying valve comprising in combination a high pressure chamber adapted for connection with a source of steam, a low pressure chamber in communication with the said high pressure chamber, a steam jacket surrounding said low pressure chamber and communicating with said high

pressure chamber, and automatic means including a diaphragm controlled valve in communication with the passageway between the high and low pressure chambers to maintain the steam pressure in the low pressure chamber below a predetermined limit, substantially as described.

5. A humidifying valve comprising in combination a high pressure chamber adapted for connection with a source of steam, a steam jacket arising from said high pressure chamber, a casing forming a low pressure chamber removably mounted within said steam jacket, and spaced from the walls thereof to form an escape passage, and means including a removable porous member for noiselessly delivering steam from said low pressure chamber through said escape passage, substantially as described.

6. A humidifying valve comprising in combination a high pressure chamber adapted for connection with a source of steam, a hollow cylindrical steam jacket arising therefrom and communicating with the interior thereof, a low pressure chamber mounted within said steam jacket member having one end open and provided with automatic means including a pressure responsive member for maintaining the pressure therein below a predetermined maximum, and means including a removable porous member for noiselessly delivering the steam to the atmosphere.

7. A humidifying valve, comprising in combination, a high pressure chamber adapted for connection to a source of steam, said connection including a plurality of openings communicating with the interior thereof at different heights, a low pressure chamber, a communicating passage therebetween, a gravity valve in said passageway, and a float valve in said high pressure chamber adapted to directly engage and maintain said gravity valve in open position when said float is in raised position.

8. A humidifying valve comprising a high pressure steam chamber adapted for connection with a source of steam, a steam jacket rising from said chamber, a low pressure chamber embraced by said steam jacket, a passage connecting the high pressure chamber and the low pressure chamber and a moisture collecting means surrounding the opening of said passage at the high pressure steam chamber end, substantially as described.

9. A humidifying valve comprising a high pressure steam chamber adapted for connection with a source of steam, a steam jacket rising from said chamber, a low pressure chamber embraced by said steam jacket, a passage connecting the low pressure chamber and the high pressure chamber, and a serrated collar surrounding the lower end of said passage but in spaced relation thereto.

10. A humidifying valve, comprising in combination a high pressure chamber adapted for connection with a source of steam, a steam jacket rising therefrom, a low pressure chamber in communication with said high pressure chamber and surrounded by said steam jacket, a valve seat at the high pressure chamber end of said communicating means and a collar surrounding said valve seat in spaced relation thereto, and having a series of serrations on its lower edge, substantially as described.

Signed at Chicago, State of Illinois, United States of America, this 23rd day of January, A. D. 1917.

JOHN W. SHEPHERD.

Witnesses:
ED W. WAIR, Jr.,
L. E. HANNEN.