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AIR VENT AND VACUUM SEAL.

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1,424,756. Patented Aug. 8, 1922.

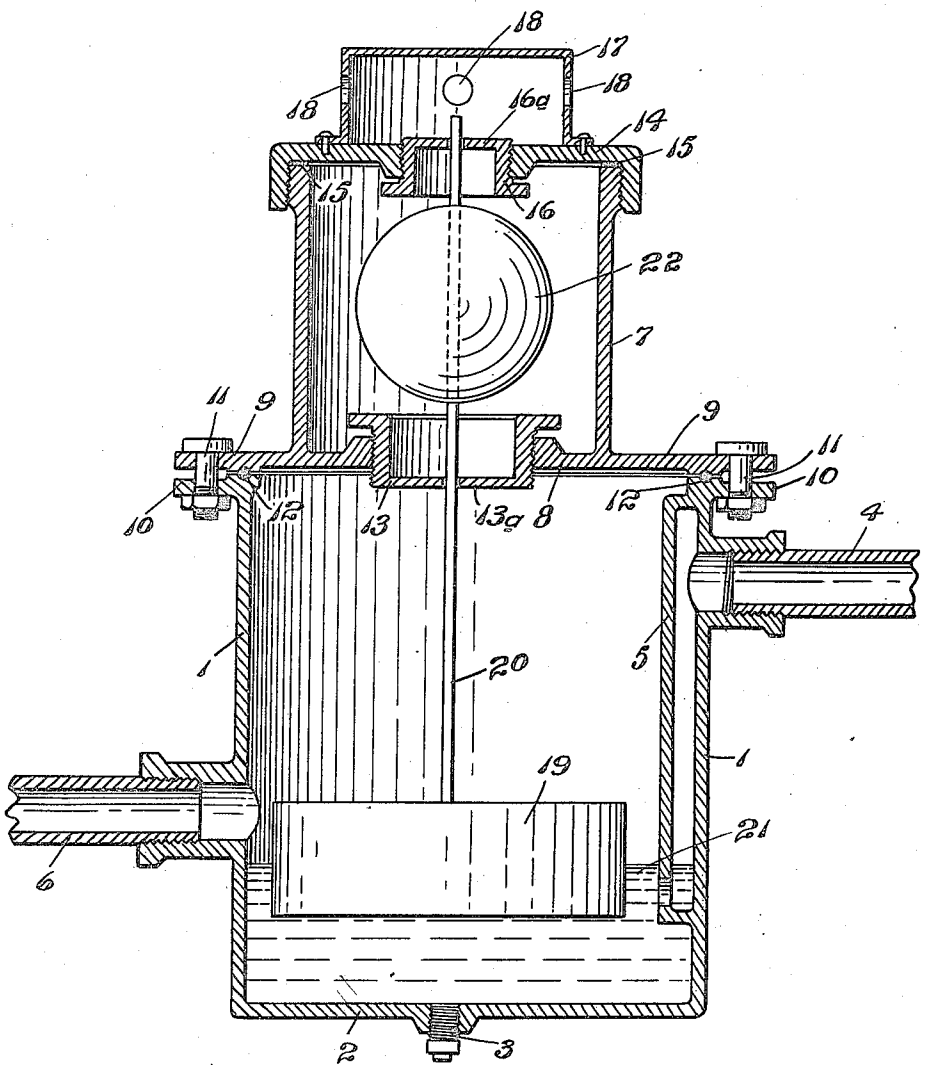


Fig. 1.

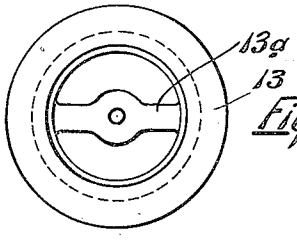


Fig. 2.

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AIR VENT AND VACUUM SEAL.

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To all whom it may concern:

Be it known that we, CHARLES V. DEAN and CHAUNCEY A. SIMONDS, citizens of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Air Vents and Vacuum Seals; and we 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 an air vent and vacuum seal, the primary object and purpose of which is to allow the escape of air from any of the various types of low pressure steam heating systems in which during certain intervals the steam pressure exceeds the atmospheric pressure and at other intervals is below that of atmospheric pressure, the device also being designed to prevent any re-entrance of air into the system.

This construction is applicable in use in venting the air from the steam or return piping in various types of heating systems such as are installed in buildings particularly what is known as one and two pipe gravity heating systems or of others known as vapor heating or vapor vacuum heating systems. The device is also applicable in many other relations and is not to be considered as limited in any respect to heating systems alone, being applicable in all cases where a venting of air is desired from an apparatus and the re-entrance of air into the apparatus is to be prevented.

For an understanding of the invention and the construction embodying the same, reference may be had to the following description taken in connection with the accompanying drawing, in which—

Fig. 1 is a vertical section taken through the device, and

Fig. 2 is a plan view of one of the valve seats forming an element of the device.

Like reference characters refer to like parts in the different views of the drawing.

In the construction a lower cylindrical member 1 is provided having a bottom 2 in which a drain opening is made normally closed by a plug 3. This provides a main chamber into which an inlet pipe 4 leads. This pipe leads into a subsidiary chamber formed by a wall 5 cast integral with but spaced from wall 1 and which extends downwardly toward the bottom of the chamber, and has an opening communicating with the main chamber adjacent the lower portion of said wall 5. The overflow pipe 6 leads from the opposite side of the chamber at a point above the opening made in the wall 5 as shown.

Above the main chamber a second chamber is located which is made from a member consisting of cylindrical walls 7 and a bottom 8. A flange 9 extends outwardly from the bottom of said upper chamber member and forms with the bottom of said upper chamber member the top or cover to the lower chamber, being connected with an annular outwardly projecting flange 10 at the upper end of the wall 1 by means of bolts 11, there being a suitable gasket 12 interposed between as shown. In the bottom 8 of the upper chamber member a valve seat 13 is placed, the same being of cylindrical form and threaded through said bottom 8 as shown.

The upper chamber member is closed by a cap 14 threaded onto the same between which and the upper edges of the walls 7 a gasket 15 is placed. A second valve seat 16 is threaded through the cap 14 being positioned directly above the similar but somewhat larger seat 13. Above the cap 14 an inverted cup shaped cover 17 is secured having a plurality of vent openings 18 in the sides thereof.

A float 19 is located in the bottom of the lower chamber member 1 and from said float a rod 20 extends upwardly through suitable guides 13^a and 16^a placed transversely across the seats 13 and 16. The float normally rests on water such as indicated at 21 and which normally is at a level below the overflow pipe 6 but above the opening made through the lower part of the wall 5. In the upper chamber between the two valve seats 13 and 16 a spherical valve 22 is secured on the rod 20.

The pipe 4 is connected with the return piping of the heating system at a point above the water line of the boiler. In practice any suitable thermostatic valve to prevent the passage of steam through the pipe 4 will be interposed in its length between the air vent construction and the heating system. Pipe 6 leads to and is connected to the return piping below the normal water line of the boiler. When the steam pressure in the system rises above normal atmospheric pressure, the air is forced out of the radiators into the return piping, flowing through the

pipe 4 and thence downwardly between the walls 1 and 5 through the openings in the wall 5 into the main chamber and therefrom through the valve seats 13 and 16 to the upper cap cover 17 and out through the vents 18. This will continue until all of the air is vented or until steam attempts to pass the thermostatic valve which valve allows the passage of cool air but closes and prevents the passage of steam as is well understood; and inasmuch as it forms no part of the present invention, it is not shown and described. When the steam pressure falls below atmospheric pressure there is a tendency for the water at 20 to be drawn into the pipe 4 due to the vacuum created and this will lower the float 19 and bring valve 22 into engagement with the lower valve seat 13, immediately checking and stopping any passage of air from the outside into the system. If, as many times occurs, water passes by the thermostatic valve through the pipe 4 and into the lower chamber, the effect is merely to raise the float 19 until valve 22 seats against the upper valve seat 16, whereupon the water is compelled to return to the system through the overflow pipe 6 and cannot pass upwardly through the upper chamber and out through the vent openings 18.

A device of the character described is particularly efficient in operation. As soon as the steam pressure drops below atmospheric pressure in a vacuum system a tight closure against the re-entrance of air is made inasmuch as the initial pressure of the valve 22 on the valve seat 13 is equal to the combined weights of the valve and the float 19. In practical operation when the steam pressure of a system has been reduced to atmospheric pressure and a vacuum is slowly being created in the system it has been found that the first stages of the vacuum condition are so slight that a valve resting on its seat by its own weight, unless built very heavy, will not prevent the leakage of air and, accordingly, the vacuum is dispelled nearly as rapidly as it is created. If on the other hand the valve is weighted to overcome this leakage it forms such great resistance to the passage of air during the pressure periods that the air does not entirely escape from the system. With this construction, however, as soon as a vacuum of even the smallest degree is created, a positive stop against the re-entrance of air is made while as soon as the pressure in the system rises to and above atmospheric pressure the weight of the float is carried by the water at 20 and the valve is automatically opened for the escape of air, the only resistance which the air has to overcome being merely to force itself through the very small head of water amounting to not more than one-quarter or one-half an inch which is above the opening in the lower portion of the wall 5.

The construction is very practical and efficient and in actual use has demonstrated its value. The material from which the valve 22 may be made is not of particular consequence though hard rubber or any relatively soft metal works very satisfactorily.

We claim:

1. A device of the character described, comprising a lower main chamber member having sides and bottom, an outlet pipe at one side thereof a distance above the bottom, an inlet pipe leading therein adjacent the upper edges of the member, said member being provided with a passage leading from said inlet pipe to a point a distance below the plane of the outlet pipe, a second and upper chamber member located above the first member and closing the upper end thereof and likewise having sides and bottom, the bottom thereof forming the closure to the lower member, a valve seat located in the bottom of the upper member, said valve seat having a passage therethrough connecting the interiors of the two members, a cap closing the upper end of the upper member, a second valve seat located in said cap and likewise having a passage therethrough, a rod passing downwardly through and guided by said valve seats, a float attached to the lower end of the rod adapted to be supported by water in the lower portion of the main member, and a spherical ball valve attached to the rod between the two valve seats, substantially as described.

2. A device of the character described, comprising lower and upper chamber members, each comprising sides and a bottom with the bottom of the upper member closing the upper end of the lower member, an outlet to the lower member a distance above the bottom thereof, said lower member being adapted to carry water therein below the level of the outlet, an inlet to the lower member adapted to carry water and air therein and enter the same below the level of the water, a cap closing the upper end of the upper chamber member, valve seat members inserted through the cap and the bottom of the upper member, a float in the lower member, a rod extending upwardly therefrom through said bottom of the upper member and said cap, and a valve construction on the rod between the valve seat members adapted to seat against either valve seat with the rise and fall of the water in the lower member, substantially as described.

3. In a device of the character described, a construction including upper and lower chambers separated by a partition between them, said lower chamber being adapted to contain water in the lower part thereof, an outlet to the lower chamber above the level of the water, an inlet to the lower chamber adapted to carry water and air therein and deliver the same into the water in the lower

chamber below the upper surface thereof, a valve seat member threaded through said partition, a cap closing the upper chamber, a similar valve seat member threaded therethrough, a float in the lower chamber, a rod extending upwardly therefrom through both chambers, and valve means on the rod within the upper chamber falling and rising therewith with the fall and rise of the float and adapted to seat against the valve seats, substantially as described.

4. In a device of the character described, a construction including upper and lower chambers separated by a horizontal partition, an inlet to the lower chamber at its lower portion, an outlet thereto above the inlet, a float in the lower chamber, a valve in the upper chamber, oppositely positioned valve seats in the under side of the top of the upper chamber and upper side of said horizontal partition, one above and the other below the valve, and a rod connecting the float and valve, substantially as described.

In testimony whereof we affix our signatures.

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