No. 883,337. PATENTED MAR. 31, 1908.

C. C. PECK.

DRAINAGE VALVE.

APPLICATION FILED MAR. 25, 1907.

FIG. 1.

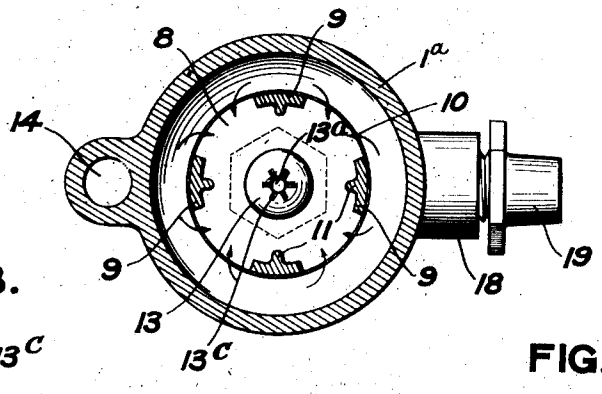


FIG. 3.

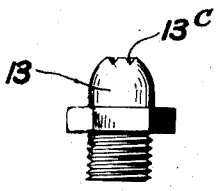


FIG. 4.

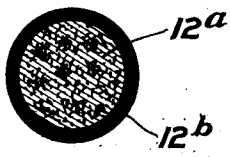
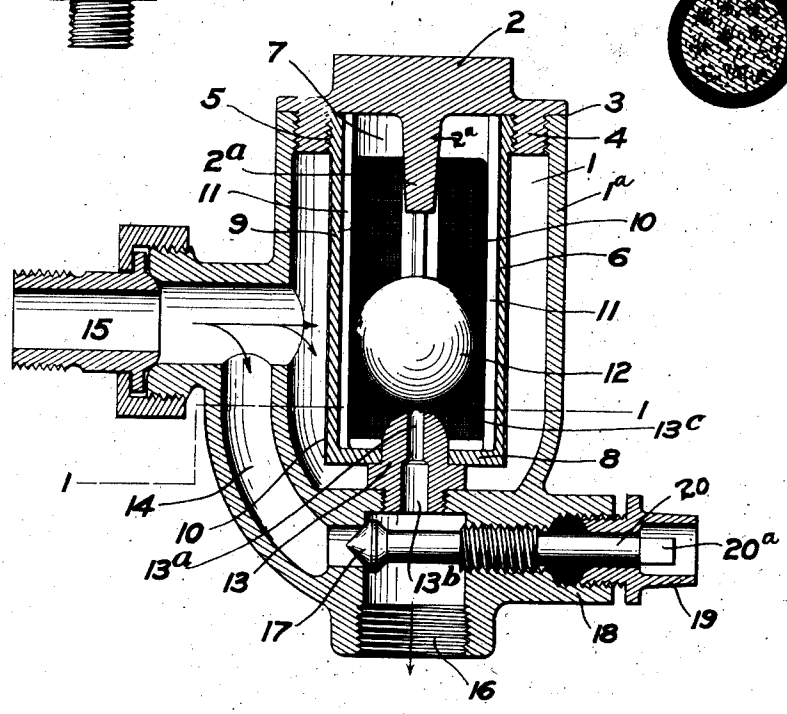


FIG. 2.



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CASSIUS CARROLL PECK, OF ROCHESTER, NEW YORK.

DRAINAGE-VALVE.

No. 883,337. Specification of Letters Patent. Patented March 31, 1908.

Application filed March 5, 1907. Serial No. 364,538.

To all whom it may concern:

Be it known that I, CASSIUS CARROLL PECK, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Drainage-Valve, of which the following is a specification.

My invention relates to the class of heating apparatus in which differential steam and air pressure is maintained as between radiators and their return pipes, there being usually some degree of vacuum in the latter, with less vacuum, or low steam pressure, in radiators. This condition effects a constant tendency for discharge of water, air and steam from radiators into return pipes.

The object aimed at is to free radiators from water and air while preventing the waste of heat and reduction of vacuum which would occur were any considerable amount of steam allowed to enter the return pipes. To this end I provide a valve which is intended to be placed in the return pipe from one or more radiators to separate them from the reduced pressure carried in returns, which valve possesses the following features, namely, a float which constitutes a valve and rises from a valve seat when water of condensation enters the valve body, and seats when the water has nearly or quite escaped; a valve seat with provision for passage of air from radiating surface to lower pressure in return pipes; a relatively large screen inclosing the valve and its seat for straining out solid matter carried into the valve body by water of condensation; a by-pass for permitting the flushing of the radiating surfaces and for quickly filling them with steam, and other constructive features to be hereinafter described.

In the drawings, Figure 1 is a horizontal cross section on plane of broken line 1—1, Fig. 2, through the valve body, screen frame, and by-pass passage, showing also a top view of the main valve seat. Fig. 2 is a vertical, central section of the valve body, with inlet passage and outlet passage, by-pass, screen frame, float seat and by-pass valve, the float valve and the stem of the by-pass valve being shown in elevation. Fig. 3 is an elevation of the valve seat on an enlarged scale. Fig. 4 is a central cross section of the preferred form of the float valve.

In the drawings 1 indicates a metal valve as a whole, 1^a the main body of the valve, having a cap 2 which screws down upon said body so as to form an air tight joint 3. The cap has also a downward projection 2^a for limiting the rise of the float valve. The rim 4 of said cap is threaded on the inside as shown at 5 and a screen frame 6 is adapted for being screwed into the cap. This frame consists of a top ring 7 connected to a bottom disk-ring 8 by ribs 9. The frame supports an exterior cover of wire cloth 10, and the inward projecting ridge 11 on each of the four ribs serves to guide and maintain the float 12 in the vertical axis of the valve seat 13, the upper end of which seat projects through ring-disk 8 and thus holds frame 6 in position at its lower end, the joint between said disk and the valve seat being sufficiently close to practically prevent the passage of water. The seat is preferably made with a relatively small passage 13^a at the upper end, and a relatively large passage 13^b at the lower end. Valve 12 is shown as made with a cork center 12^a, and india rubber composition cover 12^b, but may be a hollow metal or vulcanite ball.

The left hand side of valve body 1 has an ordinary union joint, the male portion of which is intended to screw into a radiator. On the same side of the body there is a passage 14 connecting the inlet 15 of the valve with its outlet 16, this passage being of smaller area than either the said inlet or outlet. Discharge from the lower end of said passage is controlled by the by-pass valve 17, the stem 20 of which passes by a screw-thread through the metal of the valve body, and is provided at its outer end with a stuffing-box 18, the cap of which has a shield 19, it being intended to operate the stem 20 by means of a key made to fit the square end 20^a of the stem.

In starting up any vacuum heating system the desired degree of vacuum is first secured in return mains so as to expedite as much as practicable the withdrawal of air from radiators. Previous to turning steam on to a radiator the ball 12, which constitutes the moving portion of my valve, rests on its seat 13, but the V shaped passages 13^c in the edge thereof allow air to pass from the radiator into the connection 16 with the main return. The valve seat should, for best results, have a thin edge at the valve bearing, as shown in Figs. 2 and 3, and is channeled, thus producing the serrated edge. On account of the suction in the outlet of the valve, a thick edge would prevent the valve from rising

freely from its seat when water runs into the valve chamber. Should the radiator (using this term to indicate either a cast or sheet metal radiator, or a pipe coil) be a large one, and it is desired to fill it with steam more quickly than could be done by evacuating air through passages 13^c, then by means of a key applied to the square end 20^a of by-pass stem 20 the by-pass valve 17, which is normally closed, or nearly closed, can be opened sufficiently long to allow practically all air in the radiator to be discharged into the return, and then closed; after which passages 13^c are designed to have sufficient opening to discharge the air which constantly accumulates as steam is supplied to a radiator and becomes condensed, especially if it be exhaust steam. This by-pass is also of practical value in catching and blowing out core sand, scale, oil, etc. which may require to be removed from the radiator. Also in case valve seat 15 becomes clogged, the by-pass can be slightly opened to keep the radiator drained of water and air until there is convenient opportunity for cleaning screen 10, seat 13, and passages 13^a and 13^b. As steam condenses in the radiator, water of condensation flows out therefrom through union connection 15 into by-pass passage 14 and into the body 1^a of valve 1, whence it passes through screen 10 to the interior of screen frame 6 and to valve seat 13, and, lifting the spherical float valve from its seat, flows out through passages 13^a and 13^b to the return pipe connection 16. When depth of water in valve body 1^a and in screen frame 6 becomes too little to support float valve 12, it settles to the seat 13, being guided by ribs 9 of the screen frame. The ball float as heretofore made of an interior of cork 12^a, and an exterior covering of rubber composition, or as a hollow sphere, floats with about five-eighths of its diameter submerged. As the ball rests on the serrated edge of seat 13, the V-shaped passages 13^c (see Fig. 3 and top view in Fig. 1) allow a certain amount of water to pass through the valve seat. Said passages are generally so proportioned as to allow the normal amount of condensation to pass through them, thus leaving valve 12 resting on seat 13 while allowing a limited amount of water and air to pass it; but when steam is first turned into the radiator, and condensation is more rapid than after the radiator and surrounding air become warm, water will accumulate sufficiently to lift the float valve and allow water to flow into the return pipe to extent of the capacity of passage 13^a, which is intended to have sufficient cross section to deliver the maximum amount of condensation. Another function of the relatively small passages 13^c—which are preferably but not necessarily V-shaped—is to prevent unbalanced pressure existing between the radiator and the return pipe from holding valve 12 so firmly to its seat that its flotative power will be insufficient to raise it when submerged in water. By reducing the amount of contact surface between the valve and its seat the effect on the valve of unbalanced pressure is correspondingly lessened, and at the same time the rapid flow of water through passages 13^c aids mechanically in raising the float valve.

The number of passages 13^c depends upon the size of passage 13^a. I prefer that the bearing edge for seating valve 12 shall not much if any exceed one sixteenth inch in length between openings, and that the depth of the V's shall be from one thirty-second to one sixteenth inch, but the amount of unbalanced pressure between the radiator and return piping must determine the right proportion of valve bearing surface and depth of V passages. Serrating the intake edge of the valve seat as described permits the use of valve seats differing from each other in size of main delivery passage 13^a, and thus in capacity for discharge, and avoids requirement for float valves of varying displacement having sufficient flotative power to rise from the seat when sufficiently submerged in water of condensation.

It will be observed that size, number, and spacing of the channels are all governing elements of operation in relation to the float valve, its seat, and the main discharge passage therethrough: that is to say, with a given size of float valve, the main passage 13^a through the seat will determine the number of channels 13^c, equally spaced, and of a given size, which will be required to allow passage of air without detrimental escape of steam, and to so far relieve the valve of unbalanced pressure that its factor of flotation will be sufficient to enable it to float freely on entrance of requisite water into the valve chamber. If but a single channel were provided in the valve seat, the valve would be thrown to one side from the channeled point by passage of water through the channel instead of being raised vertically, which would cause the valve to pound against the side of the screen case to injury of the valve; also, in case of a desirably small valve which would be held to its seat by unbalanced pressure, a single channel could not be so proportioned as to fulfil the double office of air vent, and pressure relief for the valve, without allowing escape of a wasteful amount of steam which would be detrimental in reducing pressure in the return pipe.

I prefer to make the float valve of spherical form so that it may be free to turn in any direction and seat equally well on any part of its surface, which insures good wearing conditions; to make the center of cork for lightness, and to resist collapse. In cleaning the valve seat, valve and screen, the cover 2 of

the valve body 1ª is unscrewed, and in removing the cover, screen frame 6 slips off of valve seat 13 and the screen and inclosed valve 12 go with the cover. Valve seat 13 is then accessible for cleaning or removal, and upon unscrewing frame 6 from cover 2, valve 12 can be taken out of the screen inclosed frame.

The valve shown and described is especially designed for use in connection with my pending application on vacuum heating apparatus, Serial Number 328,630, filed July 31st, 1006, and my application on vacuum heating system, Serial Number 335,980, filed September 24th, 1906, but is also adapted for general use on heating systems.

I do not confine myself to the exact proportions, or arrangement of parts, or way of putting same together as shown in the drawings, for these may be to some extent departed from without materially affecting what I claim as my invention.

What I claim as my invention and desire to secure by Letters Patent is,—

1. In a water drainage valve, a valve body having a valve chamber, an open inlet port into said chamber, an outlet port from said chamber, a discontinuous, removable valve seat for said outlet port; a float for said seat adapted to control said outlet port and to discharge water automatically from the valve chamber when raised from its seat by water in the chamber; and a removable frame loosely inclosing the valve and adapted to lead the valve to its seat.

2. In a water drainage valve, a valve body having a valve chamber, an open inlet port into said chamber, an outlet port from said chamber, and a removable valve seat for said outlet port, a removable cover for said chamber; a float valve for said seat adapted to control said outlet port and to discharge automatically from the valve chamber when raised from its seat by water in the chamber, and a frame removably attached to said cover loosely inclosing the valve and having guides to lead the valve to its seat.

3. In a radiator drainage valve, a valve body having in combination a valve chamber, provided with an inlet port and an outlet port, and a valve seat for said outlet port having a plurality of channels in the face thereof proportioned in number, size and spacing, for discharging air and some water, but not to allow passage of enough steam to reduce the desired amount of differential pressure between the valve chamber and the outlet thereof; and a float valve having less flotation than needful to raise it against existing differential pressure from its seat if the seat were unprovided with said channels, but adapted through the relieving effect of the channels to be freely floated from its seat by influx of water into the valve chamber, and to discharge said water.

4. In a water drainage valve, a valve body having a valve chamber, an open inlet port into said chamber, an outlet port from said chamber, a discontinuous, removable valve seat for said outlet port; a float for said seat adapted to control said outlet port and to discharge water automatically from the valve chamber when raised from its seat by water in the chamber; a removable frame loosely inclosing the valve and adapted to lead the valve to its seat; a by-pass passage connecting the inlet and outlet of the valve body; and a valve for closing the by-pass.

5. In a water drainage valve, a valve body having a valve chamber, an open inlet port into said chamber, an outlet port from said chamber, and a removable valve seat for said outlet port; a removable cover for said chamber, a float valve for said seat adapted to control said outlet port and to discharge automatically from the valve chamber when raised from its seat by water in the chamber, a frame removably attached to said cover loosely inclosing the valve and having guides to lead the valve to its seat; a by-pass passage connecting the inlet and outlet of the valve body; and a valve for closing the by-pass.

6. In a radiator drainage valve, a valve body having in combination a valve chamber, provided with an inlet port and an outlet port, and a valve seat for said outlet port having a plurality of channels in the face thereof proportioned in number, size and spacing, for discharging air and some water, but not to allow passage of enough steam to reduce the desired amount of differential pressure between the valve chamber and the outlet thereof; a float valve having less flotation than needful to raise it against existing differential pressure from the seat if the seat were unprovided with said channels, but adapted through the relieving effect of the channels to be freely floated from its seat by influx of water into the valve chamber, and to discharge said water; a by-passage around the float valve and valve seat for connecting said inlet and outlet ports; and a valve for closing the by-pass.

7. In a water drainage valve, a valve body having a valve chamber, a constantly open inlet port into said chamber, an outlet port from said chamber, and a valve seat for said outlet port; a float valve for said seat adapted to control said outlet port and to discharge water automatically from said valve chamber through being raised from its seat by water in the chamber; a removable frame loosely inclosing the valve and set over its seat and adapted to lead the valve to its seat; and a screen mounted on said frame in such manner that water entering the valve body must pass through said screen to reach said valve and seat.

8. In a water drainage valve, a valve body

having a valve chamber, a constantly open inlet port into said chamber, and a valve seat for said outlet port; a float valve for said seat adapted to control said outlet port and to discharge water automatically from the valve chamber through being raised from its seat by water in the chamber; a removable cover for said chamber; a frame removably attached to said cover and loosely inclosing the valve and set over its seat and adapted to lead the valve to its seat.

9. In a water drainage valve, a body having a valve chamber, a constantly open inlet port into said chamber, an outlet port from said chamber, and a valve seat for said outlet port; a float valve for said seat adapted to control said outlet port and to discharge water automatically from said valve chamber through being raised from its seat by water in the chamber; a removable cover for said chamber; a frame removably attached to said cover and loosely inclosing the valve and set over its seat and adapted to lead the valve to its seat; and a screen mounted on said frame in such manner that water entering the valve body must pass through said screen to reach said valve and seat.

CASSIUS CARROLL PECK.

Witnesses:
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FLOYD F. LISK.