June 27, 1933. W. T. GIBSON 1,915,661

VACUUM AIR VALVE

Filed Feb. 3, 1932

Fig. 1.

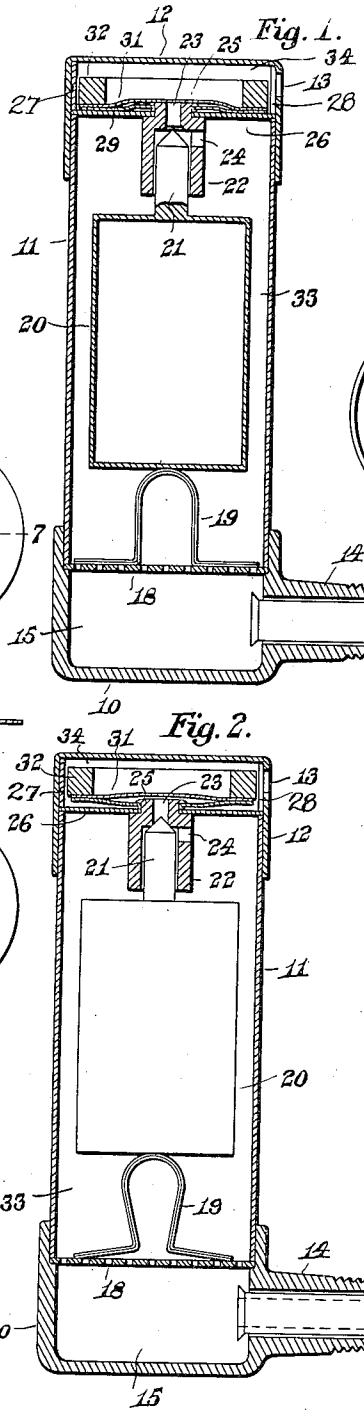


Fig. 9.

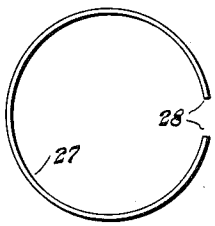


Fig. 10.

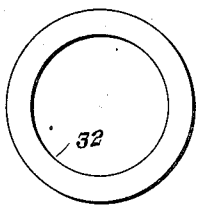


Fig. 6.

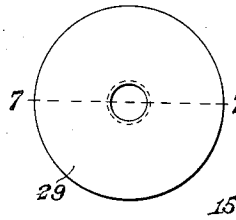


Fig. 7.



Fig. 2.

Fig. 8.

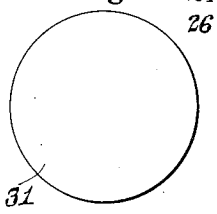


Fig. 4.



Fig. 3.

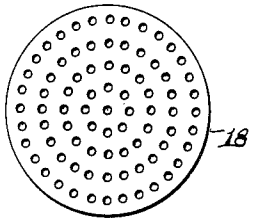
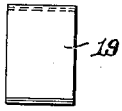


Fig. 5.



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Patented June 27, 1933 1,915,661

UNITED STATES PATENT OFFICE

WILLIAM T. GIBSON, OF EVERETT, MASSACHUSETTS

VACUUM AIR VALVE

Application filed February 3, 1932. Serial No. 590,650.

This invention relates to vacuum air valves for steam radiators and has for its object the production of a simple device of this character which will have a minimum number of parts but will be very effective in operation.

This object is attained by the mechanism illustrated in the accompanying drawing.

For the purpose of illustrating the invention, one preferred form thereof is illustrated in the drawing, this form having been found to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and the invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described except as required by the scope of the appended claims.

Of the drawing:

Figure 1 represents a vertical section of a device embodying the principles of the present invention with the outlet valve open.

Figure 2 represents a vertical section of same with the outlet valve closed.

Figure 3 represents a plan of the perforated disk in the lower end of the device.

Figures 4 and 5 represent a plan and end elevation of the bimetallic float-supporting element.

Figure 6 represents a plan of the lower flexible wafer to be attached to the valve guide.

Figure 7 represents a section of same on line 7, 7, on Fig. 6.

Figure 8 represents a plan of the upper imperforate wafer.

Figure 9 represents a plan of the split spacer ring, and

Figure 10 represents a plan of the weight for retaining in contact the edges of said wafers.

Similar characters indicate like parts throughout the several figures of the drawing.

In the drawing, 10 is a base of a casing including a cylindrical member 11 and a cap 12, said cap having a lateral air outlet 13.

The base 10 has a lateral tubular boss 14 adapted to be secured to a steam radiator to admit steam from said radiator to the chamber 15.

A siphon tube 16 extends from said chamber 15 through the boss 14 to the radiator, said tube having a diameter less than the passage 17 through the boss 14.

Within the chamber 15 and resting on a ledge formed on the inner wall of said base 10 is a perforated plate 18.

Supported on this plate 18 is a thermostatic device 19 consisting of a bimetallic strip bent U-shaped, as shown in Fig. 1.

When this strip 19 is subjected to excessive heat it will buckle, assuming the condition shown in Fig. 2 and raising the center thereof.

A float 20 rests on said thermostatic element 19 and is raised and lowered thereby.

Extending upwardly from the upper end of float 20 is a needle valve 21 surrounded by a guide 22 therefor, said guide having an opening 23 in its upper end adapted to be closed by said needle valve 21.

Near the upper end of guide 22 is a lateral orifice 24 through which air may pass to the opening 23.

The guide 22 has an upward extension 25 of reduced diameter which projects through a disk 26 resting on the upper end of cylinder 11 and retained in this position by the split ring 27 interposed between this disk 26 and the upper wall of the cap 12.

The ends 28 of the ring 27 are disposed on opposite sides of the discharge opening 13.

Surrounding the extension 25 is a thin flexible wafer 29 having an annular central flange 30 which retains this wafer separated from the disk 26.

The upper end of extension 25 is upset over the upper face of wafer 29 to secure together said wafer 29 and guide 22.

Superimposed on the wafer 29 is another flexible imperforate wafer 31, the edges of which are retained in contact with the edges of wafer 29 by means of the annular weight 32.

The ring 27 has sufficient weight to keep the edges of the two wafers 29 and 31 in

contact under normal conditions but may be raised under abnormal conditions.

The perforated disk 18 separates the chamber 15 from the float chamber 33 and the disk 26 separates the float chamber 33 from the air chamber 34 in which is located the flexible vacuum seat consisting of the wafers 29, 31 and weight 32.

When the valve 21 is open as in Fig. 1 any air under pressure within the chamber 33 may pass through the orifice 24 and port 23 into the air chamber 34 by lifting the wafer 31 and weight 32, thereby permitting the air to escape through the outlet 13.

As soon as the pressure within the float chamber is reduced the weight 32 will drop causing the edges of the wafers 29, 31 to contact and prevent any air to return to the float chamber 33.

Should water enter the float chamber 33 it will act against the float causing it to rise and close the valve.

Under normal condition the edges of the wafers 29, 31 are in contact when the valve 21 is open and at this time air may pass upwardly through opening 23 to the space between said wafers 29, 31 and cause the weight 32 to be lifted slightly, thus permitting the air from between the wafers to be discharged through the orifice 13.

As soon as all upward movement of air is stopped the weight 32 will move the edges of the wafer 31 into contact with the edges of the wafer 29 and consequently no air can be admitted to the chamber 33 through the openings 13, 23.

As a consequence of discharging the air from the chamber 33 and preventing any further admission of air to said chamber, a partial vacuum is created in said chamber 33.

As the steam condenses in the chamber 33 or in any part of the heating system, the vacuum in said chamber will be increased and as the valve 21 is open at this time there will be a vacuum created between the wafers 29 and 31.

This action will cause the wafers 29, 31 to be cupped as shown in Fig. 2 and the greater the vacuum the more said wafers will be cupped.

When this is occurring the weight 32 will be lifted slightly to permit the upward movement of the edges of the lower wafer 29.

The vacuum thus created will extend from the air valve throughout the entire heating system and prevent too rapid a condensation of steam into water.

As a matter of fact the steam will turn into a hot vapor rather than water and the entire heating system remains hot for a much longer period of time than is true of ordinary heating systems.

Should the steam be shut off from the radiator and said radiator become cooled, it has been found in practice that if the steam admission valve is gradually opened again, the vapor remaining in the radiator will immediately become heated and the hottest part of the radiator will be at the air valve end and not at the steam inlet end of said radiator.

It is believed that the operation and many advantages of the invention will be understood without further description.

Having thus described my invention, I claim

1. In a device of the class described, a casing provided with a steam inlet, a perforated support therein above said inlet, a thermostatic element on said support, a float supported thereby and provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, and means within said chamber normally closing said port and adapted to be lifted therefrom to permit escape of air through said chamber.

2. In a device of the class described, a casing provided with a steam inlet, a perforated support therein above said inlet, a thermostatic element on said support, a float supported thereby and provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, and weighted means within said chamber normally closing said port and adapted to be lifted therefrom to permit escape of air through said chamber.

3. In a device of the class described, a casing provided with a steam inlet, a perforated support therein above said inlet, a thermostatic element on said support, a float supported thereby and provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom, a thin imperforate wafer superimposed on said flexible wafer, and means for retaining the edges of said wafers in contact under normal conditions.

4. In a device of the class described, a casing provided with a steam inlet, a perforated support therein above said inlet, a thermostatic element on said support, a float supported thereby and provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber

provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom, a thin imperforate wafer superimposed on said flexible wafer, and an annular weighted member for retaining the edges of said wafers in contact under normal conditions.

5. In a device of the class described, a casing provided with a steam inlet, a perforated support therein above said inlet, a thermostatic element on said support, a float supported thereby and provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom by a centrally disposed flange, a thin imperforate wafer superimposed on said flexible wafer, and means for retaining the edges of said wafers in contact under normal conditions.

6. In a device of the class described, a casing provided with a steam inlet, a float within said casing provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom, a thin imperforate wafer superimposed on said flexible wafer, means for retaining the edges of said wafers in contact under normal conditions, and a thermostatic element within said casing adapted to raise said float to close said valve.

7. In a device of the class described, a casing provided with a steam inlet, a float within said casing provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom, a thin imperforate wafer superimposed on said flexible wafer, an annular weighted member for retaining the edges of said wafers in contact under normal conditions, and a thermostatic element within said casing adapted to raise said float to close said valve.

8. In a device of the class described, a casing provided with a steam inlet, a float within said casing provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, a flexible wafer secured to the upper end of said guide member and separated therefrom by a centrally disposed flange, a thin imperforate wafer superimposed on said flexible wafer, means for retaining the edges of said wafers in contact under normal conditions, and a thermostatic element within said casing adapted to raise said float to close said valve.

9. In a device of the class described, a casing provided with a steam inlet, a float within said casing provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, weighted means within said chamber normally closing said port and adapted to be lifted therefrom to permit escape of air through said chamber, and a thermostatic element within said casing adapted to raise said float to close said valve.

10. In a device of the class described, a casing provided with a steam inlet, a float within said casing provided at its upper end with a needle valve, a disk near the upper end of said casing forming a chamber provided with a lateral air outlet, a guide for said needle valve depending from said disk and having an orifice in the side wall thereof and a port communicating with said chamber, means within said chamber normally closing said port and adapted to be lifted therefrom to permit escape of air through said chamber, and a thermostatic element within said casing adapted to raise said float to close said valve.

Signed by me at 294 Washington St., Boston, Mass., this 1st day of February, 1932.

WILLIAM T. GIBSON.