

J. A. BEMISH.
RADIATOR VALVE.
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1,044,729.

Patented Nov. 19, 1912.

Fig. 1.

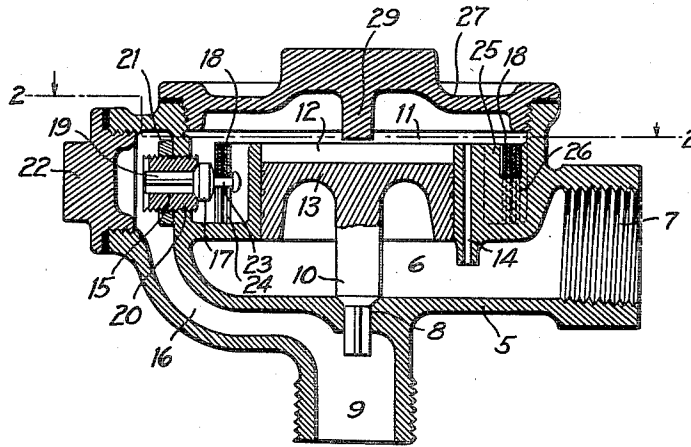


Fig. 2.

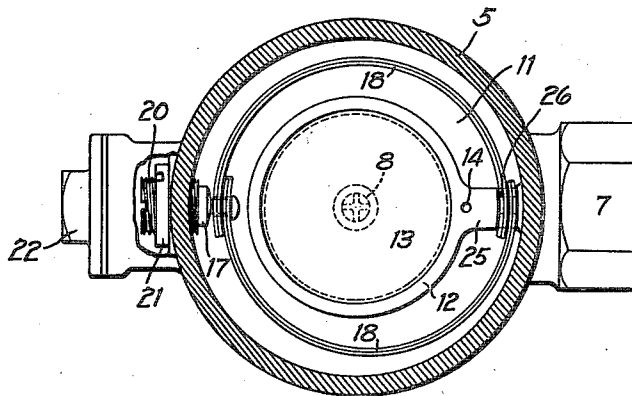
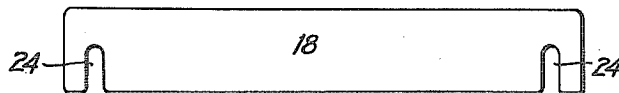


Fig. 3.



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RADIATOR-VALVE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN A. BEMISH, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Radiator-Valves, of which the following is a specification.

This invention relates to valves adapted for use in connection with steam-heating or radiating systems, particularly those of the vacuum type, for the purpose of automatically discharging air and water-of-condensation from the radiators.

A radiator-valve of the type in question has previously been proposed in which a discharge-valve is controlled by a piston, the piston being movable according to the difference in pressure between two chambers, and one of these chambers being connected with the radiator while the other is connected, through a valve-controlled vapor-outlet, with the vacuum-main or return-pipe. In such a radiator-valve it has also been proposed to operate the vapor-valve by means of a thermostatic device which is heated by the vapor passing through the vapor-outlet so as automatically to interrupt the flow of vapor through the radiator-valve when and after the accumulated air and water of condensation have been discharged, the vapor-valve and the water-valve then remaining closed until the thermostatic device has become cooled sufficiently to again open the vapor-valve.

The present invention relates to radiator-valves constructed as above described, and the object of the invention is to improve such valves in various respects, and to produce a radiator-valve which is simple, compact and inexpensive in construction, easy to adjust and assemble, and efficient and economical in operation.

To the foregoing ends I employ various features of construction and arrangement which will be hereinafter more particularly described. Among these features may be mentioned the novel form and location of the thermostatic device by which the vapor-valve is controlled, and the novel construction and arrangement of parts by which the vapor-valve is rendered readily accessible and adjustable.

In the accompanying drawings:—Figure 1 is a vertical median section of a radiator-valve embodying the present invention; Fig.

2 is a plan-view, in section on the line 2—2 in Fig. 1; and Fig. 3 is a development of one of the thermostatic springs shown in Figs. 1 and 2.

All of the working parts of the illustrated embodiment of the invention are inclosed within a casing 5, of which the lower part constitutes a primary chamber 6 adapted to receive the water of condensation from the radiator. This primary chamber is provided with an inlet 7 adapted to be connected, in the usual manner, with the radiator. At the bottom of the chamber 6 is a water-outlet 8, which discharges into a passage 9 adapted to be connected with the vacuum-main or drain-pipe of the heating system. The water-outlet is controlled by a water-valve 10 which is normally closed.

The upper part of the casing 5 forms a secondary chamber 11 which is connected with the lower chamber 6 by a vertical cylinder 12. A piston 13 fits closely within this cylinder and is vertically movable therein, and this piston is integral with the water-valve 10 so that the latter is controlled by the movements of the piston. The upper and lower chambers are further connected by a narrow vertical duct or by-passage 14, drilled through the wall of the cylinder and projecting downwardly into the lower chamber 6 so as to be more or less immersed in the water of condensation therein.

The primary chamber 11 is provided with a vapor-outlet 15 connected, through a passage 16, with the outlet-passage 9 so as to be in communication with the vacuum-main. The vapor-outlet is controlled by a vapor-valve 17, which is normally closed, and this valve is actuated by means of a thermostatic device 18.

As shown in Fig. 1, the vapor-valve 17 is provided with a guide-stem 19 which moves freely in the vapor-outlet 15, and this outlet is in the form of a central perforation in a screw-threaded bushing 20 passing through the wall of the upper chamber 11. This bushing 20 is normally fixed in position by means of a lock-nut 21. The outer wall of the casing is provided with a screw-plug 22 concentric with the bushing 20, and upon removing the plug 22 access may be had to the bushing 20 and the lock-nut 21. The bushing may accordingly be adjusted by rotating it, thus moving it horizontally toward or from the vapor-valve 17. This

permits adjustment of the valve whereby it may be caused to discharge at the required temperature, or with the required frequency, according to the normal temperature or vacuum required in the radiator. This arrangement also facilitates the construction and assembling of the valve, since it permits the vapor-valve and the bushing to be inserted through the opening in which the plug 22 is seated.

The vapor-valve is provided with a headed stem 23 which is engaged by the thermostatic device, and this device is in the form of two similar springs 18 of semi-circular form, these springs each consisting of two thicknesses of dissimilar metals united, in the usual manner, so as to form springs which tend to assume a more or less curved position, according to their temperature. As a simple and convenient method of connecting the thermostatic springs with the valve each spring is provided, at each end, with a notch 24, as shown in Fig. 3, so that by simply dropping the springs into the chamber 11 the notched ends may be engaged with the stem 23, thus operatively connecting them with the vapor-valve. The thermostatic springs are located within the annular space between the cylinder 12 and the walls of the upper chamber, as shown in Fig. 2, and their ends opposite to the vapor-valve are fixed by an arrangement somewhat similar to that just described. A lug 25 projects from the cylinder-wall toward the wall of the casing, thus producing a narrow space sufficient to receive the overlapped ends of the springs 18, and in this space is a narrow lug 26 projecting upwardly from the bottom of the chamber and adapted to engage the notches 24 in the ends of the springs, as shown in Figs. 1 and 2.

The upper part of the chamber 11 is formed by a removable cover or screw-plug 27 affording ready access to the upper chamber. This arrangement renders the valve very simple to construct and easy to assemble, for, after introducing the valve-bushing 24 and the vapor-valve, the thermostatic springs are merely dropped into position in the chamber 11 and the cover 27 is then screwed home, thus closing the casing and also retaining the thermostatic springs against accidental displacement.

The operation of the radiator-valve above described is as follows: The vacuum in the passage 9 acts to draw vapor and air through the vapor-outlet, the upper chamber 11 and the by-passage 14, and from the lower chamber 6 and the radiator. This action continues until the vapor passing through the upper chamber 11, in which the thermostatic springs, owing to their position in this chamber, are immersed, heats the springs sufficiently to cause them to move the vapor-valve to closed position. This action

of the thermostatic springs is due to the fact that the metal of greater co-efficient of expansion is employed on the inner surfaces of these springs. After the vapor-valve is closed, as just described, the pressure in the upper and lower chambers is equalized. Water of condensation now collects in the lower chamber, and is retained therein by the water-valve 10. At the same time more or less vapor may continue to pass through the by-passage and be condensed in the upper chamber, thus maintaining the temperature of the thermostatic springs and keeping the vapor-valve firmly closed by the expenditure of very little heat. After the water has reached the lower end of the duct 14 however, the flow of vapor into the upper chamber ceases, being resisted by the weight of the column of water in the by-passage. As the water continues to collect the thermostatic springs are gradually cooled, so that they contract and finally pull the vapor-valve from its seat. As soon as this occurs a vacuum is produced in the upper chamber equal to that in the vacuum-main. Upon this the pressure in the lower chamber forces the piston 13 upwardly, thus opening the water-valve and discharging the water which has collected. After the water has thus discharged vapor continues to flow through the by-passage, the upper chamber and the vapor-outlet, together with any air which may be in the radiator, until the thermostatic springs have again been heated so as to close the vapor-valve and permit the above-described cycle of operations to be repeated.

The location of the thermostatic springs within the upper chamber of the valve-casing not only permits them to be effectually subjected to the heating action of the vapor passing through this chamber, but it also causes them to be kept hot for a substantial period and then cooled slowly, so that sufficient time is afforded for the accumulation of a substantial amount of water in the lower chamber. By this arrangement, therefore, the action of the valve is rendered periodic, thus minimizing wear in the valve-mechanism and also economizing in the live-steam or vapor which passes through the valve in the discharging operation.

I claim:—

1. In a radiator-valve, the combination, with a casing comprising upper and lower chambers connected by a by-passage and a cylinder projecting upwardly into the upper chamber, the lower chamber having an inlet and a water-outlet and the upper chamber having a vapor-outlet, a piston movable in the cylinder, a water-valve actuated by the piston and controlling the water-outlet, and a vapor-valve controlling the vapor-outlet, of a thermostatic device encircling the cylinder and connected with and controlling

the vapor-valve, said device being thus inclosed between the cylinder and the walls of the upper chamber so as to be immersed in and heated by vapor passing through said chamber from the by-passage to the vapor-outlet.

2. In a radiator-valve, the combination, with a casing comprising upper and lower chambers connected by a by-passage, the lower chamber having an inlet and a water-outlet and the upper chamber having a removable closure at the top and a lateral vapor-outlet, a member movable in accordance with the difference in pressure between the chambers, a water-valve actuated by said member and controlling the water-outlet, and a vapor-valve movable horizontally and controlling the vapor-outlet, of a thermostatic device of substantially circular form connected with the vapor-valve and located in the upper chamber, said device being insertible and removable through the top of the upper chamber, and the valve-casing having a lateral opening in line with the vapor-valve and through which said valve may be inserted or removed.

3. In a radiator-valve, the combination,

with a casing comprising upper and lower chambers connected by a by-passage, the lower chamber having an inlet and a water-outlet and the upper chamber having a removable closure at the top and a lateral vapor-outlet, a member movable in accordance with the difference in pressure between the chambers, a water-valve actuated by said member and controlling the water-outlet, and a vapor-valve movable horizontally and controlling the vapor-outlet, of a thermostatic device of substantially circular form connected with the vapor-valve and located in the upper chamber, said device being insertible and removable through the top of the upper chamber, and the valve-casing having a lateral opening in line with the vapor-valve and through which said valve may be inserted or removed, and a longitudinally-adjustable bushing providing a seat for the vapor-valve and accessible through the said lateral opening.

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