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VACUUM RADIATOR VALVE

Filed Jan. 14, 1929

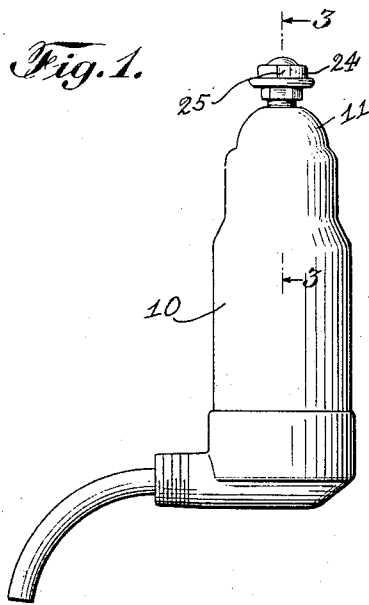
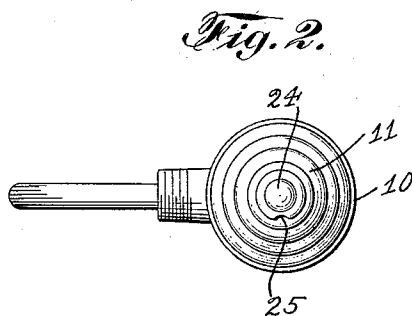


Fig. 3.

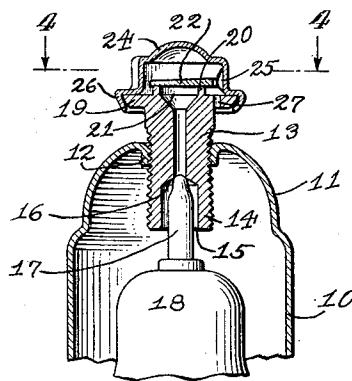
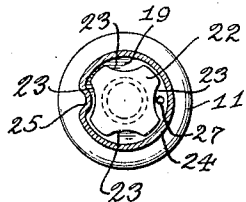


Fig. 4.



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VACUUM RADIATOR VALVE

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This invention relates to heating apparatus, and more particularly to a "vacuum" valve adapted to permit air to be exhausted from a radiator but preventing the entrance of air thereto when the radiator has cooled off.

One object of this invention is to provide a vacuum radiator air valve having an auxiliary air check comprising a floating disc normally resting upon an annular valve seat, said disc being adapted to become unseated for releasing air when the steam pressure in the radiator rises above atmospheric and adapted to automatically reseat itself upon the valve seat when the steam pressure falls below atmospheric.

A further object is to provide a device of the above nature in which the rim of the annular valve seat is convex in cross-section thus preventing the formation of sharp edges on the valve seat when the disc is rotated thereon during use, the convex shape of said rim also reducing the area of contact of the check disc and permitting the latter to be more easily raised from its seat.

A further object is to provide a device of the above nature in which the air check valve disc is wedge-shaped, or thinner at one side than at the other, the thin edge being adapted to be raised higher off the seat than the opposite edge by the escaping air, and when said disc is again resealed, the jar incident to its fall will cause it to slide laterally and change its position on the seat, thus rendering the edvice self-cleaning.

A further object is to provide a device of the above nature which will be simple in construction, inexpensive to manufacture, and very efficient and durable in use.

A further object is to provide a radiator air valve of the above nature in which the check valve disc and valve seat are surrounded by a protecting cap, the latter having an indented lug for engagement with any one of a series of recesses on the valve disc, whereby the seat may be kept clean by the manual turning of the cap for grinding the disc upon its seat.

With these and other objects in view there has been illustrated on the accompanying

drawing one form in which the invention may be conveniently embodied in practice.

In the drawing:

Fig. 1 represents a side view of the radiator valve.

Fig. 2 is a top plan view of the same.

Fig. 3 is a longitudinal sectional view of the upper portion of the valve taken along the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a transverse sectional view taken along the line 4—4 of Fig. 3 just above the valve disc, looking downwardly.

In the use of steam heating systems in the past it has been customary to provide each radiator with a valve which will automatically permit air to be forced therefrom when the steam pressure rises above the pressure of the atmosphere. When the air has been completely expelled from the radiator, the heat of the steam would cause the valve to close and prevent steam from escaping into the room. If the steam pressure thereafter fell below that of the atmosphere, however, the valve would again open and permit the inrush of air into the radiator which would cause the steam to condense and render the radiator noisy and sluggish, so that when additional heat was required, a materially higher steam pressure would be necessary to drive out the air than would be needed to supply heat alone.

In order to exclude the air from the radiator it has previously been proposed to employ auxiliary check devices consisting of balls or discs adapted to close the top of the valves whenever the pressure in the radiator falls below atmospheric. It has been found in practice, however, that such auxiliary check devices were apt to accumulate sediment after a relatively short period of use, thereby becoming sticky and leaky, and permitting the entrance of air into the radiator.

By means of the present invention the above and other disadvantages have been avoided. This has been accomplished by providing an air check disc covered by a rotatable cap and non-rotatively connected therewith, whereby the disc may be ground upon the seat from time to time by manu-

ally twisting the cap. Moreover, the check valve disc itself is made wedge-shape in section so that after each operation of the valve, the check valve disc will slide laterally and
 5 be tilted in such a manner that it will fall back upon the valve seat at a different position.

Referring now to the drawing in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates the outer shell of the valve casing, said shell having an upper spherical dome section 11 provided with a downwardly extending inner collar 12 for
 10 receiving an adjustable hollow screw plug 13 of non-corrosive metal, such as nickel-silver or "Monel metal."

The adjustable screw plug 13 has a depending tubular stem 14 threaded on its exterior to engage corresponding interior threads on the collar 12. The bore of the stem 14 is enlarged at its lower end 15, and the upper part of said enlarged section has a conical shoulder 16 which serves as a seat
 25 for a needle valve 17 mounted upon the top of a thermostatic chamber 18 which serves to force said needle valve 17 upon its seat when heated by the steam from the radiator after the air has been expelled therefrom.

The top of the plug 13 is provided with a beveled outwardly extending flange 19, above which is a vertical annular central valve seat 20 surrounding an enlarged conical outlet section 21. The rim of the annular valve seat 20 is made convex in cross-section so as to prevent the wearing of sharp corners when the check valve disc 22 slides laterally thereon and is rotated to "grind off" rust or other sediment which may collect thereon.
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The check valve disc 22 is wedge shaped and preferably has its lower surface "lapped" to form a tight fit upon the annular seat 20. The check disc 22 is provided with four recesses 23 upon its outer periphery so that the disc presents a substantially octagonal shape in plan view.
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In order to protect the upper part of the valve from dust and to hold the check valve disc in position, provision is made of a hollow cap member 24 having an indented lug 25 formed therein, said lug 25 being adapted to extend within one of the recesses in the disc 22 so that when the cap is manually rotated the disc 22 will be "ground" upon its seat. The cap 24 has a depending skirt 26 spun inwardly about the beveled lower edge of the flange 19, said flange also having a vent hole 27 on one side of the plug 13 to permit the escape of air therefrom.
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Operation

In operation, assuming the radiator to be filled with air, when steam is admitted there-
 65 to, air will be forced out of the radiator into

the space between the casing 10 and thermostatic chamber 18, and after passing by the needle valve 17 and through the plug 13, will raise the check valve disc 22, the air then escaping out through the vent hole 27. 70
 When all of the air has been expelled from the radiator, the heat of the steam in the valve casing 10 will expand the chamber 18 causing the needle valve 17 to be pressed tightly upon its seat 16, and thereby closing 75
 the valve and preventing the escape of steam into the room. When the pressure in the radiator again falls below atmospheric and the chamber 18 contracts allowing the needle valve 17 to drop from its seat 16, the check 80
 disc 22 will effectively exclude air from the radiator and will maintain a vacuum therein, thus maintaining the heat in the radiator for a longer period and rendering it easier for the latter to be again heated up 85
 when the pressure of steam has been restored.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims. 90
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Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is: 100

1. In an air check for the outlet of an automatic radiator valve, a wedge-shaped check member above said outlet and adapted to seat thereon for excluding air from the radiator when the amount of heating medium therein falls below normal, said check member being caused to shift laterally on its seat each time it is lifted therefrom. 105

2. In an air check for the outlet of an automatic radiator valve, a wedge-shaped check disc on the outside of said outlet and adapted to seat thereon for excluding air from the radiator when the amount of heating medium therein falls below normal, said check disc being caused to shift laterally on its seat each time it is lifted therefrom. 110
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3. In an air check for the outlet of an automatic radiator valve, a wedge-shaped check plate above said outlet and adapted to seat thereon for excluding air from the radiator when the amount of heating medium therein falls below normal, said check plate being caused to shift laterally on its seat each time it is lifted therefrom. 120
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4. In an air check for the outlet of an automatic radiator valve, a wedge-shaped check member adapted to seat upon said outlet to exclude air from the radiator when the pressure within the radiator falls below atmospheric, said check member being 130

caused to shift laterally on its seat each time it is lifted therefrom and thereby be "self-cleaned".

5 In an automatic radiator valve, a casing having a radiator connection at its lower end, a hollow plug closing the upper end of said casing, a wedge-shaped check valve disc seated on the top of said plug to permit the escape of air from said radiator but preventing entrance of air thereto, and a manually-rotatable cap loosely surrounding the top of said plug, said disc having a recess in its periphery, and said cap having an inwardly extending projection for engaging in said recess for non-rotatively connecting said cap with said disc whereby the check valve seat may be kept clean by turning said cap.

6. In an automatic radiator valve, a casing having a radiator connection at its lower end, a hollow plug closing the upper end of said casing, a check valve disc seated on the top of said plug to permit the escape of air from said radiator but preventing entrance of air thereto, and a manually-rotatable cap loosely surrounding the top of said plug, said disc having a plurality of recesses in its periphery, and said cap having a single inwardly extending projection for engaging in any one of said recesses for non-rotatively connecting said cap with said disc whereby the check valve seat may be kept clean by turning said cap.

In testimony whereof, I have affixed my signature to this specification.

WILLIAM H. CADWELL.

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