July 12, 1927.

E. JACOBUS

1,635,790

RADIATOR VENT VALVE

Filed Dec. 31 1926

Fig. 1

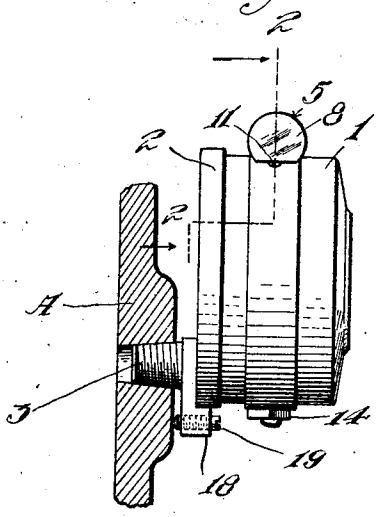


Fig. 2

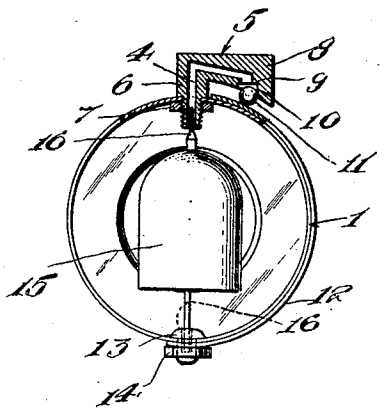


Fig. 3

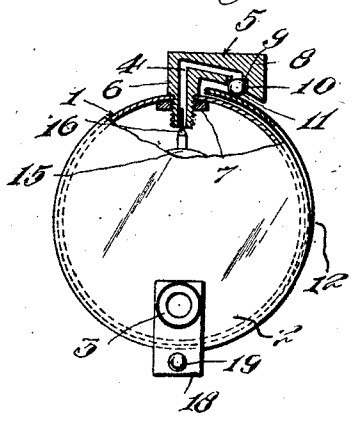
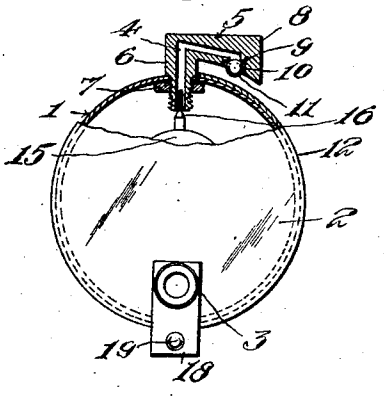


Fig. 4



INVENTOR

Edward Jacobus,

BY

Everett A. Cook.

ATTORNEYS.

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UNITED STATES PATENT OFFICE.

EDWARD JACOBUS, OF NEWARK, NEW JERSEY.

RADIATOR VENT VALVE.

Application filed December 31, 1926. Serial No. 158,172.

This invention relates particularly to vent values for radiators of steam or vapor house heating systems of the type including a thermostatic valve which automatically permits air to be ejected from the radiator while the latter is cool and prevents the escape of steam or hot vapor from the radiator, the valve being also automatically actuated by vacuum within the radiator to prevent the influx of cold air when the pressure in the radiator falls below that of the atmosphere. The valve is in general similar to that shown in my Patent No. 1,536,861 dated May 5, 1925.

A common objection to such valves is that the valve head often becomes stuck or corroded upon the valve seat so that the pressure within the radiator cannot unseat the valve head and permit the escape of air, this being particularly true where the system is operating upon extremely little pressures, for example close to atmospheric pressure. Also, in many instances the weight of the valve head itself is so great as to prevent its being raised from its seat by the pressure within the radiator, even though the valve head is not struck or corroded to the seat. Also, it has been found difficult to provide a proper cooperation between the thermostat, the valve head and the valve seat so that closing and opening of the valve at the proper times to ensure efficient operation of the heating systems, is obtained.

The objects of this invention are to overcome the above-mentioned difficulties common to known types of valves of this character, one particular object being to provide a construction wherein the valve head is normally influenced from its seat by action of gravity, and positively forced against its seat by the thermostat upon influx of hot fluid into the radiator and also by action of the vacuum in the radiator when the pressure therein falls below atmospheric, whereby the valve has great sensitivity to small pressures both positive and negative and also to temperature in both opening and closing movements.

Other objects are to provide in such a valve an outwardly and downwardly facing valve seat in the outlet passage of the valve with which cooperates a ball interposed between the valve seat and the thermostat element and movable thereby and independently thereof, the thermostat being automatically movable toward and from the valve seat upon influx of cold and hot fluid respectively into the casing; to provide a valve of this character which is simple and inexpensive in construction and reliable and durable in operation, and to obtain other results and advantages as may be brought out by the following description.

Referring to the accompanying drawings, in which corresponding and like parts are designated throughout the several views by the reference characters,

Figure 1 is a side elevation of a radiator vent valve embodying the invention, showing the same attached to a radiator illustrated in fragmentary section;

Figure 2 is a vertical sectional view, taken on the line 2—2 of Figure 1, with the cover of the valve casing removed, showing the valve in open position;

Figure 3 is a similar view showing the valve positively closed by a thermostat, and

Figure 4 is a like view showing the valve head held to its seat by vacuum within the valve casing.

In the specific embodiment of the invention shown on the drawings, the reference character 1 designates a substantially hollow cylindrical casing which is closed at both ends and may be conveniently formed of sheet metal by a drawing operation, with one end in the form of a cover 2 to which is secured a threaded nipple 3 for connecting the valve to a radiator A of a steam heating system. The casing 1 is provided at one side thereof, in the present instance the top when the valve is applied to a radiator, with an outlet passage 4 which may be formed in a nipple 5 which is substantially right angular in shape and has one arm 6 thereof passing through an opening in the casing and secured to the casing by a nut 7 and by solder or otherwise, as may be desired. The other arm 8 of the nipple 5 is disposed substantially tangential to the casing 1 exteriorly thereof and in spaced relation thereto, the underside of said arm having a downwardly and outwardly opening valve seat 9 in the outlet passage 4. Said outlet passage 4 is enlarged outwardly of said valve seat 9, as indicated at 10, to loosely receive a ball valve 11.

A substantially semi-circular thermostatic strip 12 has one end thereof fixedly secured to the casing 1 exteriorily thereof and in spaced relation to the valve seat 9 by suitable means such as a bolt and nut 13 and 14. The other or free end of the thermostatic

strip underlies the ball valve 11, and the thermostatic strip preferably closely conforms to the exterior contour of the casing 1 when the valve is cool, as shown in Figure 2 of the drawings. With the thermostatic strip in this position, the distance between the free end of the strip and the valve seat 9 is less than the diameter of the ball 11, and the ball is unseated by action of gravity and rests upon the thermostatic strip. The enlarged outer end 10 of the outlet passage prevents lateral displacement of the ball from beneath the arm 8 of the nipple.

The thermostatic strip 12 may be of any suitable construction, but preferably is laminated comprising two metals having different co-efficients of expansion and so arranged that upon heating, the ends of the strip will tend to separate; in other words the strip is such that upon influx of hot fluid into the casing 1 the free end of the thermostatic strip 12 will move toward the valve seat 9, while when cool fluid enters the valve casing the free end of the thermostatic strip will move away from said valve seat. It will be obvious from the foregoing that upon getting up steam in the system or at any time when the radiator is cool, the valve ball 11 will be unseated as shown in Figure 2, so that any air in the radiator may escape through the outlet passage 4. As steam enters the radiator the free end of the thermostatic strip moves the ball 11 tightly against the valve seat 9 so as to close the oulet passage and prevent escape of steam. When the radiator begins to cool the pressure therein gradually falls below atmospheric, and at a certain negative pressure, depending upon the weight of the ball 11, said ball will be sucked to its seat as shown in Figure 4 so as to close the outlet passage and prevent influx of air into the radiator. After the valve casing is cool and the pressure in the radiator begins to rise, as is the case when there is air in the radiator and steam is being generated, the free end of the thermostat will of course swing inwardly against the casing, and the pressure in the radiator together with the weight of the ball 11 will unseat the ball, as shown in Figure 2, to permit the escape of air.

It is also desirable in radiator vent valves to provide means for preventing the escape of water from the radiator when it is either hot or cold. For this purpose, I may mount a bell float 15 within the casing 1 upon a stem 16 one end of which is mounted in a recess 17 in the bolt 13, the other end of which is slidable in the outlet passage 4 and carries a valve head 16 to cooperate with the inner end of the arm 6 of the nipple 5. Obviously, should water flow into the casing 1 the float 15 will be raised and the valve head 16 caused to engage the end of the nipple 5 and close the passage 4 so that water cannot escape through said passage.

Radiator vent valves of this type have been found to be subject to theft, and to prevent unauthorized removal of my valve from a radiator I may form a radially projecting lug 18 on the cover side of the casing in which is arranged a set screw 19. After the nipple 3 has been screwed into the radiator, the set screw 19 is tightened against the radiator as shown in Figure 1 of the drawings to serve as a lock, it being obvious that the valve cannot be rotated to unscrew the nipple until the set screw has been loosened.

It will be understood that the particular details of construction herein illustrated are more particularly for the purpose of explaining the principles and a now preferred embodiment of the invention, and these details may be modified or changed by those skilled in the art without departing from the spirit or scope of the invention. Also, it will be understood that the invention may be embodied in other valves than radiator vent valves. Therefore, I do not desire to be understood as limiting myself except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. A valve of the character described, comprising a casing having an inlet and an outlet, said outlet having an outwardly facing valve seat, a thermostatic element mounted exteriorly on said casing to move toward and from said valve seat upon influx of hot and cold fluid respectively into said casing, and a valve head mounted between said thermostatic element and said valve seat and unconnected with either thereof to close said outlet independently of said thermostatic element upon decrease in pressure in said casing below atmospheric and freely movable independently of said thermostatic element away from said valve seat upon influx of cold fluid under pressure into said casing, said valve head being forcibly actuated into engagement with said valve seat by said thermostatic element upon influx of hot fluid into said casing.

2. A valve of the character described, comprising a casing having an inlet and an outlet, said outlet having a downwardly and outwardly facing valve seat, a thermostatic element mounted exteriorly on said casing to move toward and from said valve seat upon influx of hot and cold fluid respectively into said casing, and a valve ball loosely interposed between said thermostatic element and said valve seat and movable in all directions independently of said thermostatic element, so that said ball is freely movable away from said valve seat automatically by action of gravity upon influx of cold fluid pressure into said casing and is automatically drawn

into engagement with said valve seat to close said outlet upon decrease in pressure in said casing below atmospheric, and is automatically forcibly actuated into engagement with said valve seat by said thermostatic element upon influx of hot fluid into said casing.

3. A valve of the character described, comprising a casing having an inlet and an outlet, said outlet having an outwardly and downwardly facing valve seat, a thermostatic element mounted on said casing and movable toward and from said valve seat upon changes in temperature in said casing, and a valve head to cooperate with said valve seat to open and close said valve and mounted to be forcibly actuated into engagement with said seat by said thermostatic element upon increase in temperature and to be drawn into engagement with said seat independently of said thermostatic element upon decrease in pressure in said casing below atmospheric pressure, said valve head being movable by gravity away from said valve seat upon decrease in temperature.

4. A valve of the character described, comprising a substantially cylindrical casing having an inlet and an outlet nipple formed with an arm exterior of said casing and in spaced relation to the outer periphery thereof, said nipple having an outlet passage provided with an outwardly and downwardly facing valve seat on the under side of said arm of said nipple, a substantially arcuate thermostatic strip of substantially the same radius as said casing secured at one end to said casing exteriorly thereof so as when cool to substantially conform to said casing, the free end of said thermostatic strip underlying said nipple arm and being movable toward and from said valve seat upon changes in temperature in said casing, and a valve ball interposed between said free end of said thermostatic strip and said valve seat to be forcibly actuated into engagement with said seat by said thermostatic strip upon increase in temperature and to be drawn into engagement with said seat independently of said thermostatic strip upon decrease in pressure in said casing below atmospheric pressure, said valve ball being movable by gravity away from said valve seat upon decrease in temperature.

EDWARD JACOBUS.