

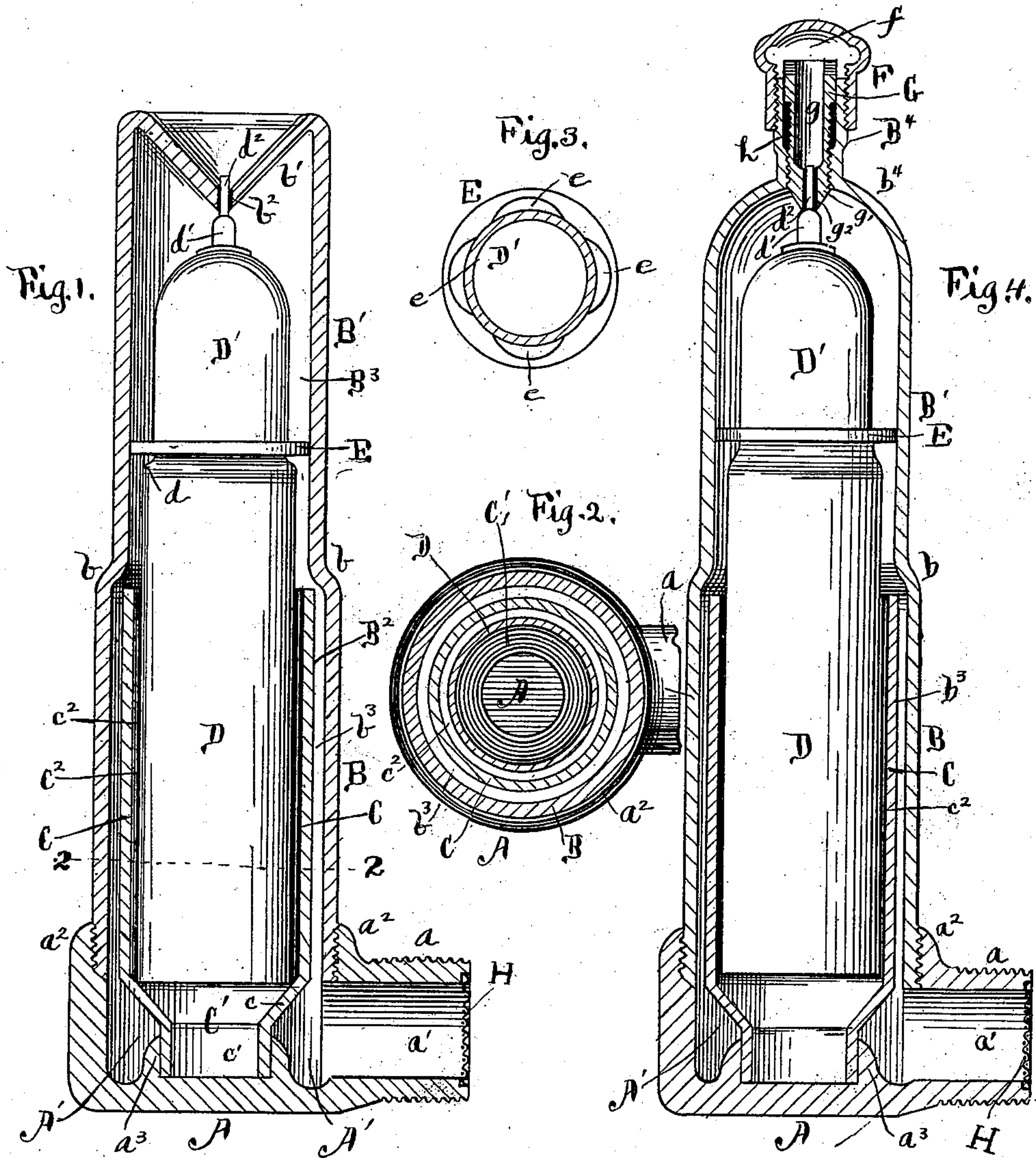
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Patented Mar. 18, 1902.

F. W. LEUTHESSER.
AIR VALVE FOR RADIATORS.

(Application filed Dec. 2, 1901.)

(No Model.)



Witnesses:
Samuel W. Banning.
Oscar W. Bond

Inventor:
Fred W. Leuthesser
By Banning & Banning.
Attys.

UNITED STATES PATENT OFFICE.

FRED W. LEUTHESSER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE
MONASH-YOUNKER COMPANY, OF CHICAGO, ILLINOIS, A CORPO-
RATION OF ILLINOIS.

AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 695,616, dated March 18, 1902.

Application filed December 2, 1901. Serial No. 84,381. (No model.)

To all whom it may concern:

Be it known that I, FRED W. LEUTHESSER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Air-Valves for Radiators, of which the following is a specification.

The object of the invention is to construct a simple, reliable, and efficient air-valve for application to steam-radiators for venting the air from the radiator and furnishing an effectual safeguard against the passage of steam or water through the valve when the air is vented or exhausted from the radiator; and the invention consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawings, Figure 1 is a sectional elevation of the outer and inner walls or shells of the valve with the float and the stem carried thereby for closing the vent-opening in the top of the outer wall or shell in elevation; Fig. 2, a cross-section on line 2 of Fig. 1; Fig. 3, a plan view of the guide and centering-ring with the float in section; and Fig. 4 a similar view to Fig. 1, showing a modification in the construction of the upper end of the outer wall or shell, and showing also an adjustable plug having therein the vent-opening for the passage of the air.

The base or cup A has an annular chamber A', and extending out from one side of the wall of the base or cup is a neck a , having an exterior screw-thread for attachment to the radiator, and the neck has a passage a' in communication with the chamber A' in the construction shown. The wall of the base or cup extends above the plane of the neck or nipple a and forms an annular rim a^2 , having an interior screw-thread, and extending up from the bottom of the base or cup into the chamber thereof is an annular rim a^3 , forming a shallow annular chamber open at the top. The outer wall or shell, as shown, is formed of a lower portion B and an upper portion B', integral with the lower portion and joined thereto by a curve or bend b , which furnishes a curved shoulder or face on the interior, as shown in Fig. 1, against which curved inner face the air will strike and be

deflected without stoppage or impediment into the upper compartment or chamber and by which inner curved face the water of condensation will be guided and turned to flow into the lower compartment or chamber, and the interior of the wall or shell as a whole has a lower compartment or well B² and an upper compartment or chamber B³ of a less diameter than the lower compartment or well. The upper end of the wall or shell in the construction shown in Fig. 1 is inwardly turned to form a wall b' , standing at an angle, approximately, of forty-five degrees to the wall or shell and having at the apex or center an opening or passage b^2 , which furnishes the vent for the outlet of the air.

An open-ended cylindrical wall or shell C is located within the lower chamber or well of the outer wall or shell and is of a less diameter exteriorly than the interior diameter of the chamber or well, leaving a channel or passage b^3 between the outer wall or shell and the inner wall or shell, which passage or channel extends up nearly to the curved shoulder or surface at the juncture of the upper and lower portion of the outer wall or shell, leaving a mouth or opening between the upper end of the inner wall or shell and the face of the curved shoulder, as shown in Fig. 1. The lower end of the open wall or shell C has an inwardly-inclined wall c and a straight wall c' , forming a mouth C', which has a narrow inlet and a spread outlet into the chamber or passage C² of the wall or shell, and the neck or straight wall c' enters into the chamber formed by the rim a^3 , which furnishes a step or support for holding the inner wall or cylinder in a vertical relation parallel with the outer wall or shell to maintain the uniformity of width for the passage or channel b^3 between the two walls or shells, so that the water of condensation entering the chamber A' through the inlet a' is free to rise in the passage or channel b^3 and flow over the upper end of the wall or shell C and enter the chamber or passage C² of such wall or shell, filling the chamber or passage from the bottom upwardly to the limit allowed by the float located and operating within the chamber or passage of the inner wall or shell. The float

is formed of sheet metal or other suitable material and, as shown, has a lower portion D and an upper portion D', formed integral one with the other, with a curved shoulder or rest at the juncture of the two portions or divisions. This float is left open at the bottom and is closed at the upper end, the top, as shown, being round or semispherical in shape, so as to form an interior chamber or compartment within the float, open at the bottom and closed at the top. The body of the lower portion D of the float is of a less exterior diameter than the interior diameter of the chamber or passage C², so as to leave a space or channel c² between the float and the inner face of the wall or shell, as shown in Fig. 2, into which space or channel the water of condensation overflowing the top of the wall or shell C is free to pass down, filling the lower portion of the chamber or passage of the outer wall or shell and entering into the chamber or compartment of the float at the lower end to the limit formed by the natural pressure of the atmosphere within the float. The upper end of the float has fixed thereto in the construction shown a head d', extending up from the center of which is a stem d², which passes through the vent hole or opening b², furnishing a guide for the rise and fall of the float at the upper end—for the rise of the float to cause the head to contact or seat against the face of the end of the outer wall or shell around the opening or hole b² and close the hole or opening, preventing the passage of steam or water therethrough, and for the fall of the float to withdraw the head from its contact or seat, opening the outlet or passage b² for the escape of air from the interior of the shell or casing. A metal ring or band E is slipped onto the upper smaller portion of the float to rest on the shoulder d and furnish a guide for positively centering the float in entering it into the shell or casing, so that the stem d² will readily enter the outlet or passage b² without the requirement of any special skill, thus facilitating the assembling of the parts, and this ring, in order to permit of the passage of air into the upper compartment or chamber B³, is provided with openings e of the form shown or other suitable form, which openings also permit steam to enter the upper compartment or chamber after the air is expelled.

The parts are assembled by inserting the inner wall or casing at its lower end in the opening therefor within the rim a³ of the base or cup, placing the float with its lower portion D into the wall or shell C in the chamber or passage C² of the wall or shell, slipping the ring or band E onto the upper portion D' of the float, and then passing the outer wall or shell over the inner wall or shell and the float and screw-threading its lower end into the rim a², completing the assembling of the parts with the inner wall or shell in place to leave the channel or passage b³ between it and the outer wall or shell and with the float in

place to leave a channel or space c² between it and the inner wall or shell and with the guide-stem d² passing through the hole or outlet b² in the inwardly-inclined end wall of the outer shell or casing. It will thus be seen that the parts can be readily and quickly assembled, such assembling requiring only the placing of the different parts in proper relative position and entering the outer shell or casing at its lower end into the screw-thread therefor in the base or cup, and when assembled the valve is ready for use.

In use the valve as a whole is attached or connected with the radiator-outlet for air, water, and steam by the screw-threaded neck a, so that the interior of the valve is in communication with the interior of the radiator through the inlet a' for the passage into the interior of the valve of air, steam, and water. The initial admission of steam to the radiator forces the air contained therein out therefrom, and the discharged air is free to pass into the chamber or compartment A of the base or cup and thence up through the passage or channel b³ into the upper chamber or compartment of the outer wall or casing, from which, with the float down, the air is vented or exhausted through the outlet or hole b² around the stem d² into the outside air. The air will be forced out or discharged until the steam following it enters the chamber or compartment of the cup or base and passes up through the channel or passage b³ into the upper chamber or compartment of the outer wall or shell, and when this occurs the heat of the steam will rarefy and expand the air contained in the float at the upper portion thereof, causing such air to act as a lifter and raise the float for the head d' to contact and seat around the hole or passage b², closing the hole or passage tightly against the escape of water and steam. The reduction of the steam-pressure and a consequent reduction of heat reduces the expansion of the air within the float, allowing the float to fall, opening the vent hole or passage b², allowing outside air to enter the valve for such air to pass back into the radiator, as the discharge of the water of condensation will leave the channel or passage b³ between the outer and inner wall or shell clear when the water of condensation is wholly withdrawn, and the entered air will be again forced out with the admission of steam and the action of the heat of the steam on the float. It will thus be seen that the operation of the valve is perfectly automatic in educting or venting the air from the radiator and that the water of condensation and the steam act as a means for the eduction of air when the float is down, the air traveling in the channel or passage between the outer and inner walls or shells, and the water of condensation which flows over the top of the inner wall or shell into the chamber or passage containing the lower portion of the float forms a perfect seal against the escape of air from the float and also furnishes

an abutment against which the rarefied or expanded air in the float acts to raise the float.

The parts composing the valve are simple in construction and can be readily and quickly assembled for use, and in use the valve will operate in a perfect and uniform manner for the purpose intended.

A modified form of construction for the upper end of the outer shell or wall is shown in Fig. 4, in which a continuation or neck B^4 , joined to the body of the outer portion B' of the wall or shell by a curve b^4 , is employed. The neck B^4 at its upper end, on the exterior, has a screw-thread, and at its lower end, on the interior, has a screw-thread, and a cap F , having a chamber f , with vent-openings therefrom, (not shown,) is screw-threaded onto the exterior of the neck. A plug having a screw-thread on its exterior is entered into the interior screw-thread of the neck, and its projecting inner end has a tapered or inclined face g' , and through this end is a central outlet or hole g^2 , which opens into a passage g longitudinally of the plug. The outlet or hole g^2 receives the stem d^2 on the float, so that the head d' will contact or seat around the outlet or hole at the apex end of the stem and close the outlet or hole. The assembling of the parts, so far as concerns the base or cup, the outer wall or shell, the inner wall or shell, and the float is the same as described for the construction of Fig. 1, with the addition for final assembling of having the plug with its tapered end entered into the neck and properly adjusted for the contact or seat of the head on the end of the float and the entry of the vent-cap onto the neck. The operation is the same as described for the construction of Fig. 1; but by means of the adjustable vent-plug compensation is provided for any wear between the valve-head and the valve-seat around the outlet or vent-hole, and the adjustable plug also enables the space between the end of the head and the end of the plug to be adjusted to regulate and control the venting or educting of the air.

A screen H can be located in the inlet a' to operate as a check against a too-rapid circulation of the water of condensation between the radiator and the valve, and this screen also serves as a means for maintaining a more uniform flow of the steam and water into and out of the valve, giving the float a more moderate and positive action in opening and closing the outlet or vent-passage for the air as the float falls and rises.

What I regard as new, and desire to secure by Letters Patent, is—

1. In an air-valve for radiators, the combination of a base or cup having an interior chamber and a neck with an inlet opening into the interior chamber, an outer wall or shell fixedly entered into the base or cup and having in its top or upper end an inlet or vent passage, an inner wall or shell seated at its lower end in the base or cup and closed at its lower end against communication with the

chamber of the base or cup and having a body of a less diameter than the interior diameter of the outer wall or shell leaving a channel or passage between the two walls or shells, a float loosely entered into the inner wall or shell and having a body of less diameter than the diameter of the inner wall or shell leaving a channel or space between the float and the inner wall or shell, and a head carried by the float at the upper end for closing and opening the outlet or vent-passage with the fall and rise of the float, substantially as described.

2. In an air-valve for radiators, the combination of a base or cup having an interior chamber and a neck with an inlet opening into the interior chamber, a rim on the upper face of the base or cup around the interior chamber and having an interior screw-thread, a rim on the bottom of the base or cup extending into the chamber and having a smooth interior face, a cylindrical outer wall or shell having the lower portion of its body of greater diameter than the upper portion and having in its top an outlet or vent-passage and screw-threaded at its lower end into the outer rim of the base or cup, an inner wall or shell open at both ends and having its lower end contracted and seated in the inner rim of the base or cup and closed at its lower end against communication with the chamber of the base or cup and of a less diameter than the interior diameter of the outer wall or shell leaving a channel or passage between the two walls or shells, a float having an open lower end and loosely entered into the inner wall or shell and having a body of less diameter than the diameter of the inner wall or shell leaving a channel or space between the float and the inner wall or shell, and a head carried by the float at its upper end for closing and opening the outlet or vent-passage with the fall and rise of the float, substantially as described.

3. In an air-valve for radiators, the combination of a base or cup having an interior chamber and a neck with an inlet opening into the interior chamber, a rim on the upper face of the base or cup around the interior chamber and having an interior screw-thread, a rim on the bottom of the base or cup extending into the chamber and having a smooth interior face, a cylindrical outer wall or shell having the lower portion of its body of a greater diameter than the upper portion with a curve at the juncture of the upper and lower portions and having in its top an outlet or vent-passage and screw-threaded at its lower end into the outer rim of the base or cup, an inner wall or shell open at both ends and having its lower end contracted and seated in the inner rim of the base or cup and closed against communication with the chamber of the base or cup and of a length approximately the same as the length of the lower portion of the outer wall or shell and of a less diameter than the in-

terior diameter of the outer wall or shell leaving a channel or passage between the two walls or shells and an opening at the upper end of the inner wall or shell, a float having
5 an open lower end and loosely entered into the inner wall or shell, having a body of a less diameter than the diameter of the interior wall or shell leaving a channel or space between the float and the inner wall or shell
10 in communication with the channel or passage around the inner wall or shell at the opening around the top, and a head carried by the float at its upper end for closing and opening the outlet or vent-passage with the
15 fall and rise of the float, substantially as described.

4. In an air-valve for radiators, the combination of a base or cup having an interior chamber and a neck with an inlet opening
20 into the interior chamber, a rim on the upper face of the base or cup around the interior chamber and having an interior screw-thread, a rim on the bottom of the base or cup extending into the chamber and having a
25 smooth interior face, a cylindrical outer wall or shell having the lower portion of its body of a greater diameter than the upper portion with a curve at the juncture of the upper and lower portions and having in its top an
30 outlet or vent-passage and screw-threaded at its lower end into the outer rim of the base or cup, an inner wall or shell open at both ends

and having its lower end contracted and seated in the inner rim of the base or cup and of a length approximately the same as
35 the length of the lower portion of the outer wall or shell and of a less diameter than the interior diameter of the outer wall or shell leaving a channel or passage between the two walls or shells and an opening at the upper
40 end of the inner wall or shell, a float having an open lower end and loosely entered into the inner wall or shell and having a body with a lower portion of greater diameter than the upper portion with the lower portion of a
45 less diameter than the interior diameter of the inner wall or shell leaving a channel or space between the float and the inner wall or shell having communication with the channel or passage around the inner wall or shell
50 through the opening at the top, a head carried by the float at its upper end for closing and opening the outlet or vent-passage with the fall and rise of the float, a guide ring or band entered onto the upper portion of the
55 body of the float for centering the float, and a screen located in the inlet and controlling the flow into and out of the valve from the radiator, substantially as described.

FRED W. LEUTHESSER.

Witnesses:

OSCAR W. BOND,

SAMUEL W. BANNING.