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Patented Aug. 28, 1900.

D. F. MORGAN.
COMBINED AIR, WATER, AND CHECK VALVE.

(Application filed June 13, 1899.)

(No Model.)

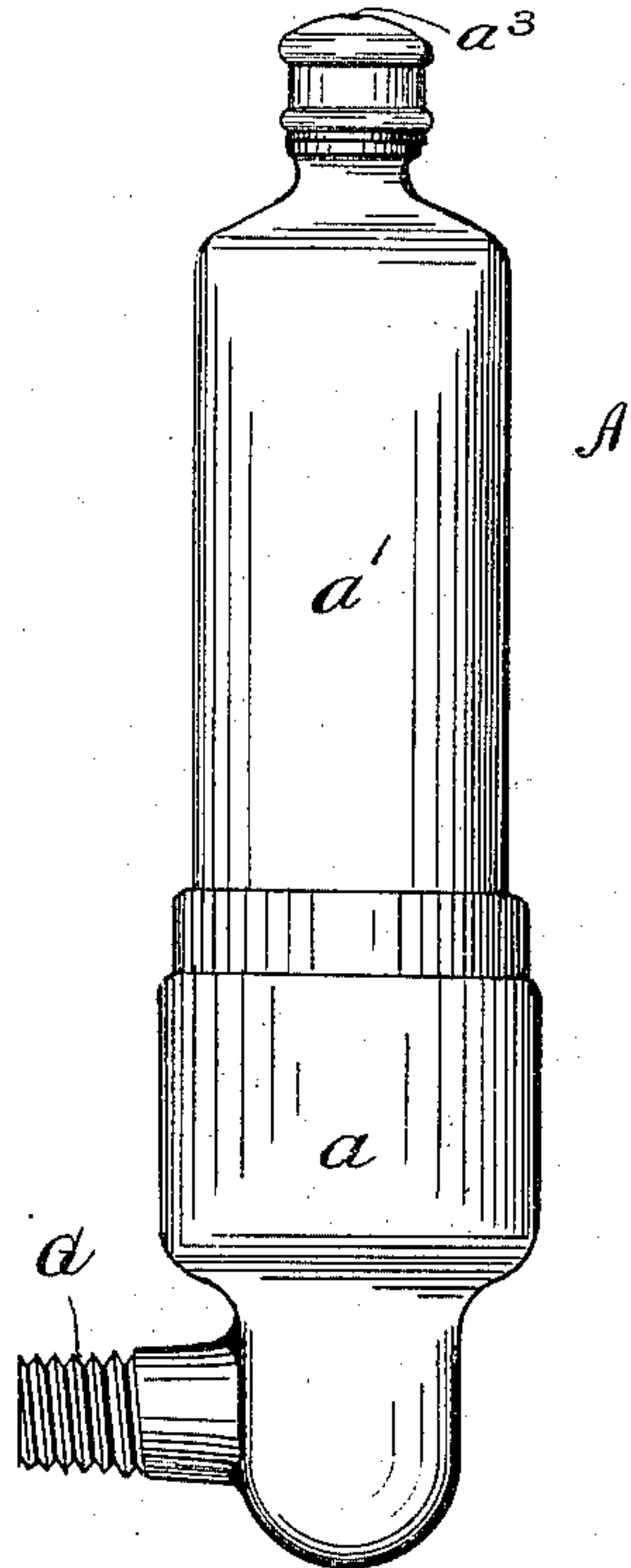


Fig. 1

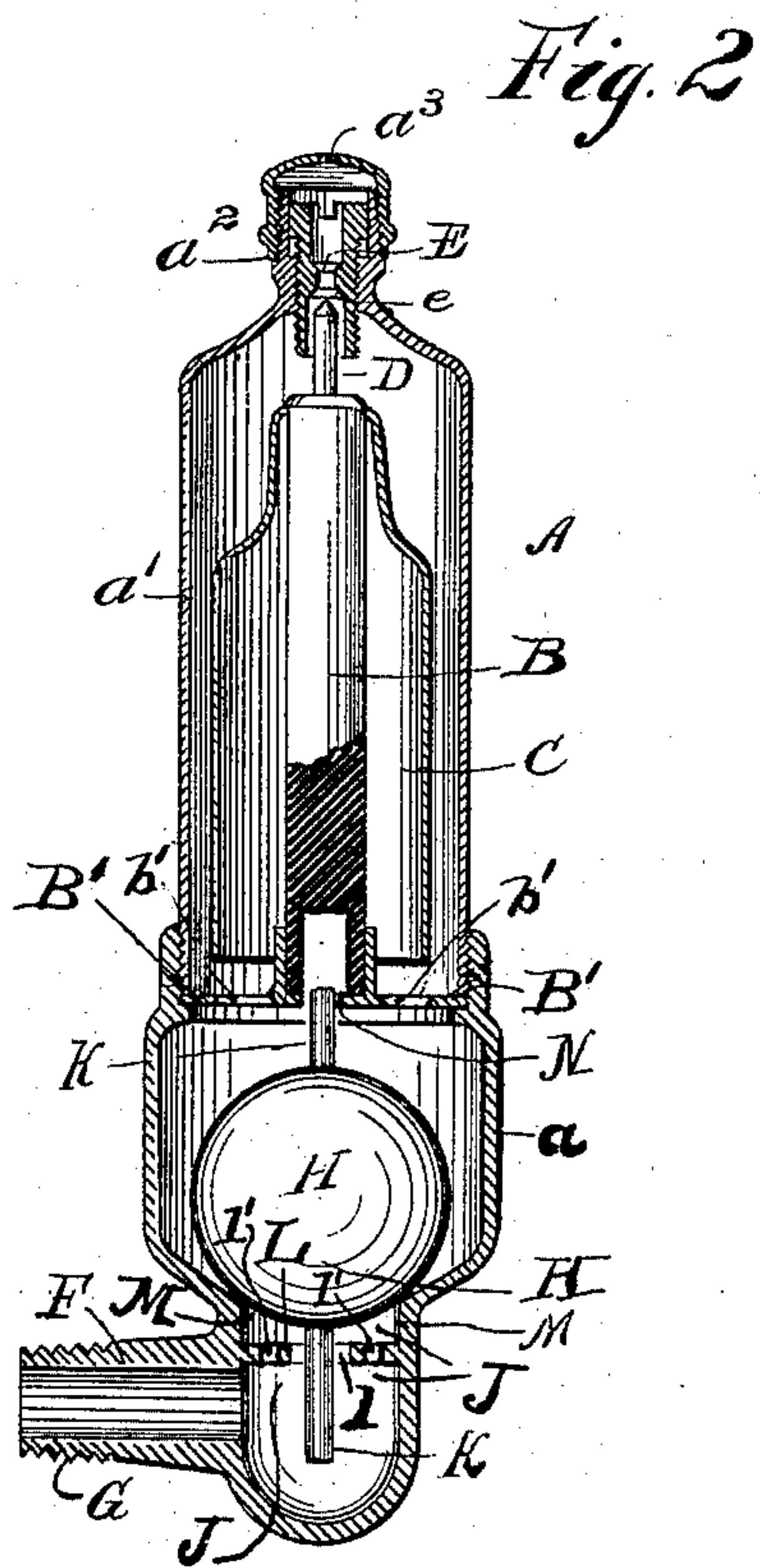
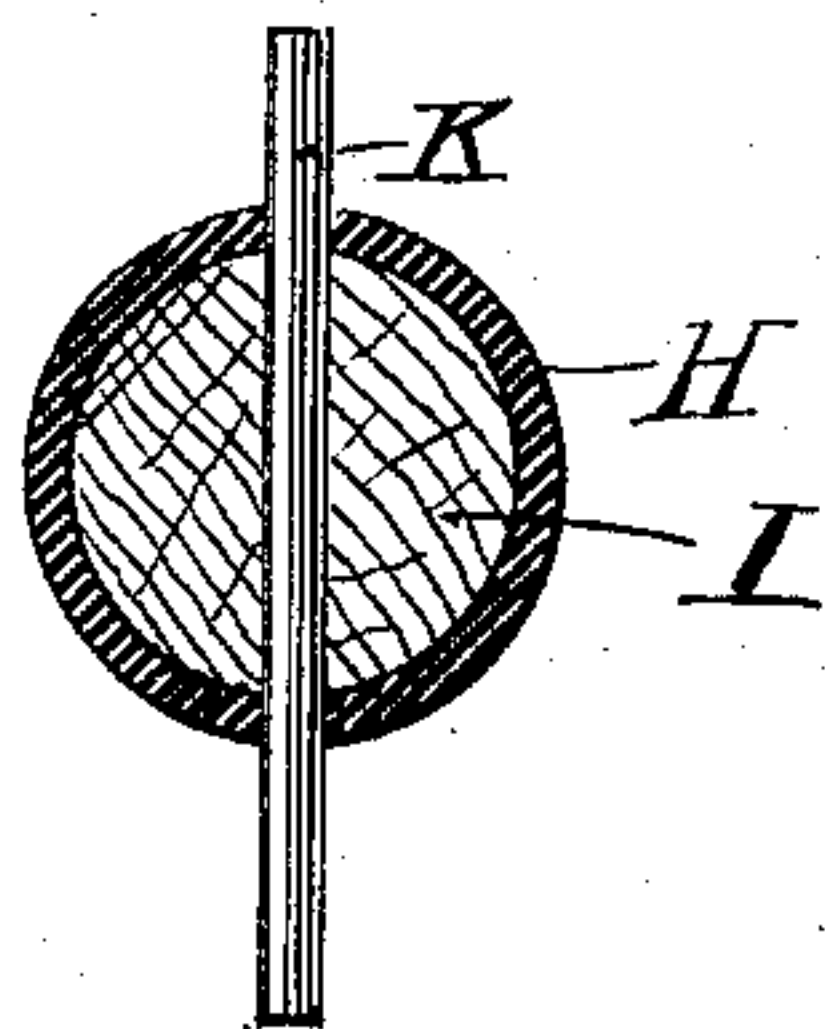


Fig. 2

Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

DOCTOR FRANKLIN MORGAN, OF CHICAGO, ILLINOIS.

COMBINED AIR, WATER, AND CHECK VALVE.

SPECIFICATION forming part of Letters Patent No. 656,746, dated August 28, 1900.

Application filed June 13, 1899. Serial No. 720,368. (No model.)

To all whom it may concern:

Be it known that I, DOCTOR FRANKLIN MORGAN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Combined Air, Water, and Check Valve for Steam-Radiators, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

The object of this invention is to obtain an apparatus whereby in a steam-heating system the air contained in the steam-supply pipes and radiators will be expelled when the pressure of the steam is above atmospheric, water of condensation will not be discharged from the radiators whatever pressure obtains in the system, and when the system is in operation air will not be delivered into the radiators through such apparatus whatever the pressure obtaining in the system may be, and whereby a steam-heating system having this apparatus attached to the radiators thereof can be started at a pressure greater than atmospheric, and there maintained until the several pipes and radiators of the system are filled with steam, (the air being expelled therefrom,) and thereafter the pressure in the system may be dropped below atmospheric, as on mild days, (or on the sunny side of the house where each radiator is controlled by a thermostat device,) at the will of the engineer or other person in charge.

In the drawings accompanying and forming a part of this specification, Figure 1 is an elevation of the apparatus embodying the invention; Fig. 2, a vertical sectional view thereof; and Fig. 3, a vertical sectional view of a float-valve member forming an element in the apparatus, such valve member being shown in elevation in Fig. 2.

A reference-letter applied to designate a given part is employed to indicate such part throughout the several figures of the drawings wherever the same appears.

A is the shell or casing of the apparatus, comprising the base a , the part a' , and the cap a^2 . Cap a^2 is provided with the perforation a^3 .

B is an expansible member mounted on

base B' , which may well consist of a disk of sheet metal provided with apertures $b' b'$ for the passage of air, water, and steam from base a of the shell to part a' thereof and with aperture N, forming a guide to stem K.

C is a float.

D is a valve-stem mounted on the float C. Float C is mounted on the expansible member B.

E is the outlet of the shell or case A. Outlet E is closed by the valve-stem D on the raising of the float C by water of condensation contained in the shell A, and also by the expansion of the expansible member B by the presence of steam in the shell A.

F is the inlet to shell A.

G is a screw-threaded stem to shell A, fitting into corresponding screw-threads in the wall of the radiator, to which the apparatus is to be attached.

When the shell A is attached to a radiator or to a steam-pipe, air, steam, and water of condensation may pass from the radiator or steam-pipe into the shell. Air passing into the shell A from the radiator (through inlet F) will pass from such shell by way of the outlet E. Water of condensation passing into the shell (through inlet F) will raise float C and close the valve-stem D onto its seat, preventing water of condensation passing through the outlet E. Steam may pass from the radiator into the shell A, and the expansible member B is thereby actuated to close the valve-stem D to its seat, and steam cannot therefore pass from the shell A by way of the outlet E.

A shell, as shell A, having an inlet, as inlet F, and an outlet, as outlet E, such shell having therein the expansible member B and the float C connected to the valve-stem D, substantially as hereinabove described, is old and well known in the art, such a construction constituting what is known in the art as a "combined air, steam, and water-of-condensation valve for radiators." In the combined air, steam, and water-of-condensation valves for radiators, as heretofore constructed, air is permitted to escape therethrough from the radiator to which such valve is attached, while water of condensation and steam are respectively prevented from escaping there-through, and upon the shutting off of steam in the radiator or the reduction of pressure

in the radiator to below atmospheric pressure air will flow into the outlet, as outlet E, and from thence through the inlet, as inlet F, into the radiator, so soon as the expansible member closing the valve-stem onto its seat in the outlet E has cooled sufficiently to move such valve-stem from such seat, and the water of condensation contained in the shell has flowed therefrom into the radiator, as through inlet F.

The main object of this invention is to prevent the entrance of air into the radiator through the apparatus last-above described, while water of condensation may flow therefrom back to the radiator and air, steam, and water may flow from the radiator into such apparatus. To accomplish such result, I place the float H (see Fig. 3) over the valve-seat M in such manner as to seat on and close the passage J, when the pressure in the shell A is greater than the pressure in the radiator to which the apparatus is attached, at all times, except when water of condensation is contained in the shell, the float H being raised by water of condensation in the shell, so that nearly all thereof will flow back into the radiator.

I is the inner part or portion of valve H, and preferably is made of wood.

K is a stem extending through the float H.

L is a perforated plate having the perforation l , through which stem K extends, (forming a guide for such stem,) and the perforations l' l' , through which air, water, and steam may pass.

M is the valve-seat of passage J.

When the apparatus embodying this invention is in use and a pressure greater than atmospheric prevails in the radiator to which it is attached, the air contained in the radiator will be forced through the inlet F and passage J into the shell A, passing through or by the valve member H (lifting the valve and float H from its seat) and from the shell.

Water of condensation will in like manner pass into the shell, but will be prevented from passing through the outlet E by the float C and valve-stem D. Steam may and will also pass into the shell A, (passing by or underneath the valve member H,) closing the valve-stem D on the seat e thereof. Water of condensation contained in the shell A will flow back into the radiator so long as there is sufficient of such water of condensation in such shell to raise the float-valve H. A balance will soon be obtained by the water of condensation remaining in the shell A, and thereafter but little force will be required to actuate the valve H to permit water of condensation, steam, or air to pass from the radiator into the shell A. If now the pressure of the steam or other contents of the radiator be reduced to below atmospheric, the valve H will be seated on valve-seat M and the passage J will be closed, thereby preventing the entrance of air into the radiator. After the air has been expelled from the entire steam-heat-

ing system to which this apparatus is attached, as, say, one of such apparatus to each radiator of the system, the pressure of the steam may be reduced to any desired extent, and yet the radiators of the system will remain warm, having steam therein at less than atmospheric pressure and the heat given off from such radiators thereby varied, although the entire radiator is filled with steam—that is, the entire surface of the radiator is in actual and active operation—but the temperature thereof is less than when the contents of the radiator is steam at above atmospheric pressure.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a combined air and check valve, the combination of a shell attachable to a radiator, such shell provided with an inlet from the radiator and an outlet, with a float-valve seating to close the inlet, whereby water in the shell may flow into the radiator and air in the shell is prevented from flowing into the radiator, an additional float provided with a valve-stem seating to close the outlet from the shell and an expansible member arranged to seat, when expanded by heat, the valve-stem on the second-named float, whereby air may flow from the outlet and water and steam are prevented from flowing therefrom; substantially as described.

2. In a combined air, steam and check valve having a shell attachable to a radiator, such shell provided with an inlet from the radiator, and an outlet, the combination of a float, constituting a valve member seating to close the inlet and movable by pressure from the radiator to open the inlet, and the float-valve member opening the inlet by the raising of the float, by means of water of condensation contained in the shell, a second float, an expansible member, and a second valve member, such second valve member seated by the raising of the second-named float and by the movement of the expansible member to close the outlet; substantially as described.

3. In a combined air and check valve, a shell attachable to a radiator and provided with an inlet from the radiator having a valve-seat at the discharge end thereof, and an outlet, in combination with a float in the shell, such float constituting a valve member seating to close the inlet, such valve member movable by pressure from the radiator to open such inlet, and also movable by water of condensation in the shell to open such inlet; such outlet of the shell provided with a valve-seat, a valve cooperating with such valve-seat, and an expansible member arranged to seat such valve, when expanded by heat; substantially as described.

DOCTOR FRANKLIN MORGAN.

In presence of—

FLORA L. BROWN,

CHARLES TURNER BROWN.