No. 673,217. Patented Apr. 30, 1901.

D. F. MORGAN.

AIR VALVE FOR RADIATORS.

(Application filed July 16, 1900.)

(No Model.)

Fig. 1.

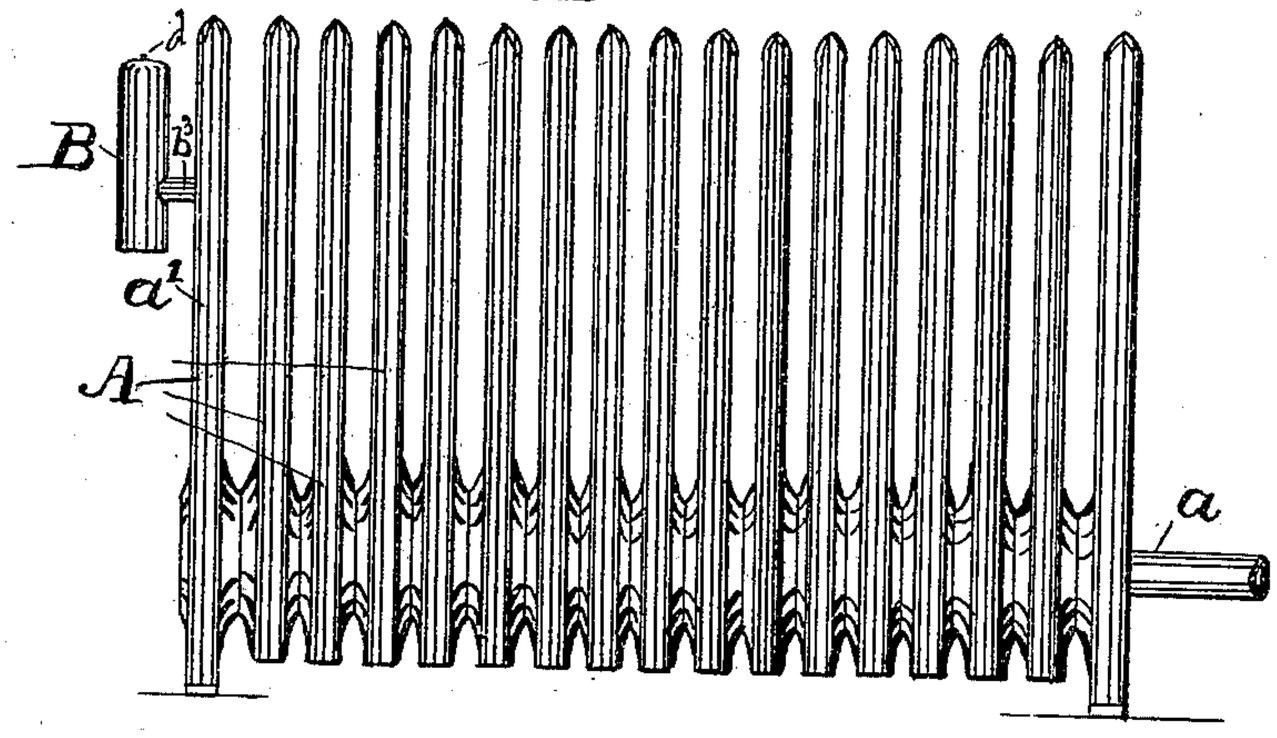


Fig. 2.

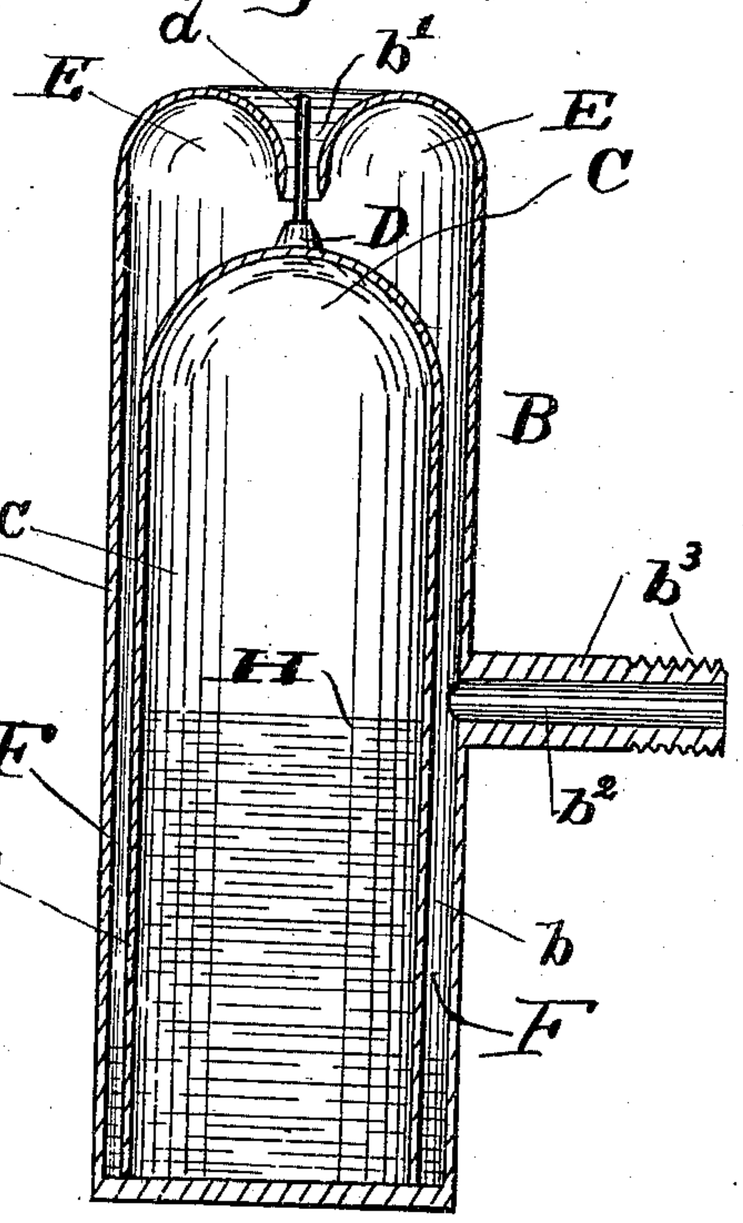
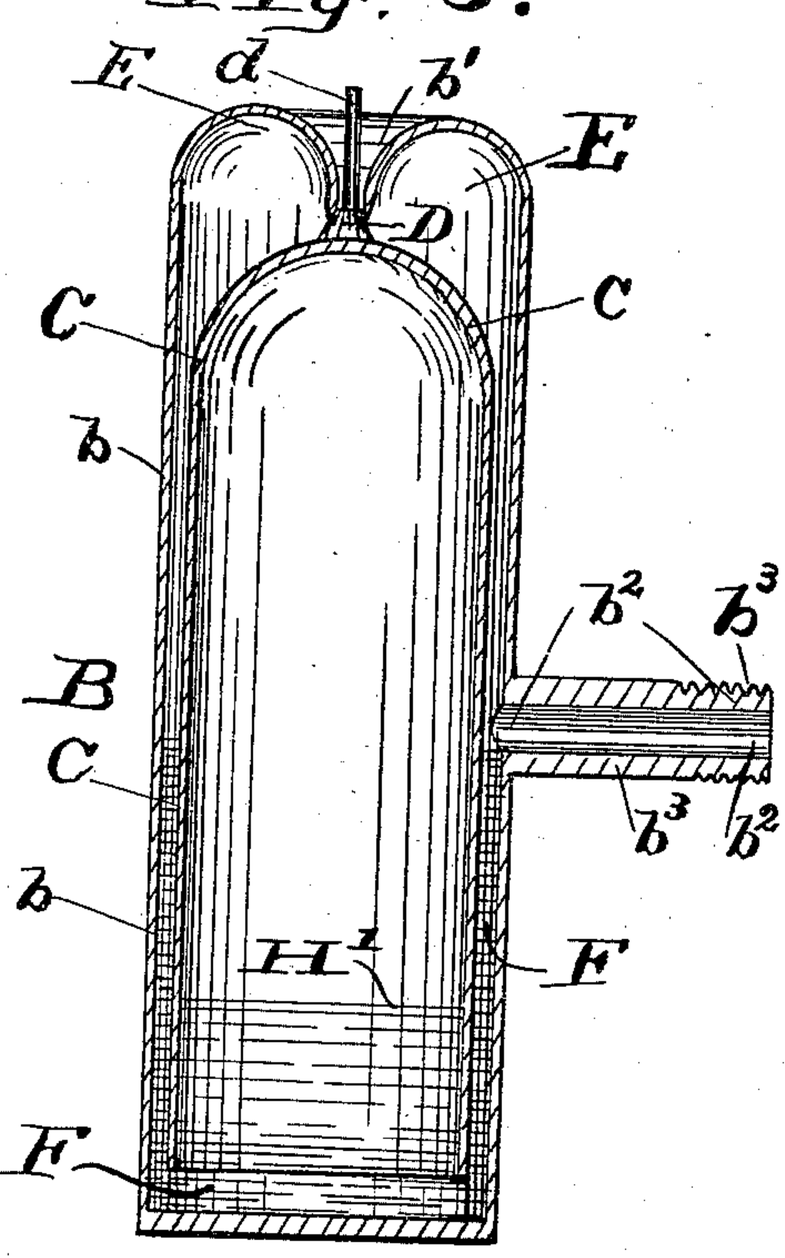


Fig. 3.



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UNITED STATES PATENT OFFICE.

DOCTOR FRANKLIN MORGAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO SCOVILL MANUFACTURING COMPANY, OF WATERBURY, CONNECTICUT.

AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 673,217, dated April 30, 1901.

Application filed July 16, 1900. Serial No. 23,795. (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 Air-Valves for 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.

This invention relates to air-valves designed to be attached to steam or hot-water radiators to permit air to flow or to be forced therefrom and to automatically close against the flow of steam and water from the radiator; and one object of this invention is to obtain an air-valve whereof the expansible member will at all times be in operative condition and substantially the same as when the valve is first put into use.

A further object of this invention is to obtain an air-valve wherein there are no adjustable parts, but few pieces, and those readily assembled, and whereof the several parts or pieces are not liable to break or get out of order.

In the drawings referred to and wherein a letter of reference used to designate a given part is applied to indicate such part throughout the several views wherever the same appears, Figure 1 is an elevation of a radiator with an air-valve embodying this invention attached thereto; Fig. 2, a vertical sectional view of an air-valve embodying this invention with the movable float and valve thereon in the position obtaining when air is flowing therethrough, the expansible member being in a cooled condition; and Fig. 3, a vertical sectional view of such air-valve with the expansible member thereof warmed and in an expanded condition, with the outlet of the air-valve closed by the valve on the float being seated.

A is a common steam or hot-water radiator, a the steam-inlet end thereof, and a' the end thereof to which the air-valve B is attached.

b is the outer shell or casing of air-valve B, b' the outlet of such shell or casing, and b^2 the inlet thereof.

b^3 is the screw-threaded member of the shell or casing b, fitting into a correspondingly-threaded hole in the radiator A.

C is the float of the air-valve, D is the valve mounted on float C, and E is the upper internal end surface of shell or casing b.

d is the spindle of valve D and is of sufficient length to remain at all times in outlet b', forming a guide to the valve.

The expansible member of the apparatus is the air or gaseous contents of float C, such air or gas being there confined by the water of condensation in the well F of shell b or in the lower open end of the float. The height of the water in the float when the air or gas therein is at atmospheric temperature is shown in Fig. 2 and lettered H, and the height of the water in the float when the air or gas therein is expanded, as by steam, sufficiently to close the valve D on its seat, is shown in Fig. 3 and lettered H'.

It will be observed that the inlet b^2 of the shell or casing b is so positioned as to obtain well F in such shell or casing and that the float C is of sufficient length to extend from the bottom of such well to near the outlet b' of the shell or casing.

The relative capacity of the float C and of the annular chamber in well F between the float and the shell or casing b below inlet b^2 is such that the liquid contents (water of condensation) of such annular chamber may be contained in the float, together with sufficient air or gas to cause the specific gravity of the float and its contents to be when at atmospheric pressure about the same as the specific gravity of water of condensation. The expansion of the air in the float C is so great when the temperature of the contents of the shell or case b are at about the temperature of the steam in the radiator that some of the air therein will be expelled therefrom. It occurs, therefore, when all of the water of condensation in such annular chamber in well F is for any reason drawn or forced into the float C if more or additional air is required to replace any which has been expelled therefrom because of expansion by heat such additional air will enter the float, passing through such water of condensation as is contained in the float at the bottom thereof.

In the operation of this apparatus air will oftentimes be expelled from the float C by its expansion due to the rise of temperature thereof, and thereafter upon the temperature being reduced, say, to near atmospheric temperature air will pass into the float through the water of condensation in the lower end thereof, thereby maintaining the apparatus in operative condition.

The operation of the apparatus embodying this invention is as follows: When no water of condensation is contained in the shell or casing *b*, the float C will rest on the bottom of the well F, and the outlet *b'* will be open for the passage of air therethrough. When water of condensation passes through the inlet b^2 into shell or casing *b* in sufficient quantity to fill the well F to, say, about the inlet b^2 and at atmospheric temperature, the float C will still remain with the lower end thereof in contact with the shell or casing *b*, with but little weight thereon, however, the specific gravity of the float and air contained therein being at such time substantially the same or but little greater than the specific gravity of water of condensation. At such time some water of condensation will of course enter the lower open end of the float C, compressing the air contained therein a corresponding amount. It is evident that the temperature of the contents of the shell or casing *b* may be raised, as by steam entering such shell or casing through inlet b^2, or that additional water of condensation may enter such shell or casing through the inlet. If at such time when the specific gravity of the float C and the air contained therein is about the same as the specific gravity of water of condensation the temperature of the contents of the shell or casing *b* is raised, as by steam entering thereinto through inlet b^2, the air contained in the float C will be thereby expanded, and such float will be raised to close valve F on its seat, such air thereby forming the expansible member of the air-valve and preventing the escape of steam therefrom. In practice there will be at all times sufficient water of condensation in shell or casing *b* to seal the lower end of float C. If additional water enter the shell or casing *b* through inlet b^2 at the time when float C and its contents are at atmospheric temperature of about the same specific gravity as is water of condensation, the float C will thereby be raised to seat valve D and prevent the flow of water from the air-valve. I prefer to make the internal surface E of the upper end of the shell or casing *b* so as to present returning curves terminating in an edge around the valve-seat of the outlet *b'*. When water of condensation is contained in shell or casing *b* above the inlet b^2, the air or gaseous contents thereof, particularly the contents of float C, is so compressed as to tend to expel such water of condensation therefrom through inlet b^H back into the radiator A, and additional air thereafter entering the shell or casing *b* may be so reduced in temperature (and so reduce the temperature of the contents thereof, particularly the air or gaseous contents of float C) that such float will fall sufficiently to open, or partially so, the valve D from its seat, thereby permitting such air to flow from the shell or casing.

The foregoing-described operations are repeated until the radiator A is emptied of the air or gaseous contents thereof.

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

1. In a radiator air-valve, the combination of a shell provided with an outlet, a float open at the lower end contained in the shell, a valve on the float coacting with the outlet, and such shell provided with an inlet communicating with the space around the float at a point above the lower open end of such float, whereby a well is obtained in the shell to hold water of condensation and a passageway is obtained through the shell from the radiator to the atmosphere independently of the float; substantially as described.

2. In a radiator-valve, a shell or casing provided with an outlet, a float open at the lower end in the shell, a valve on the float arranged to seat to close the outlet by the upward movement of the float, and such shell provided with an inlet communicating with the space between the float and the shell at such a point as to allow water to collect in the shell sufficient, when the gaseous contents of the float are expanded by heat above climatic temperature, to raise such float; substantially as described.

Signed at Chicago, Illinois, this 5th day of June, A. D. 1900.

DOCTOR FRANKLIN MORGAN.

In presence of—

CHARLES TURNER BROWN,
CORA A. ADAMS.