G. D. HOFFMAN.

AUTOMATIC AIR VALVE.

APPLICATION FILED AUG. 30, 1907.

899,111. Patented Sept. 22, 1908.

Fig. 1

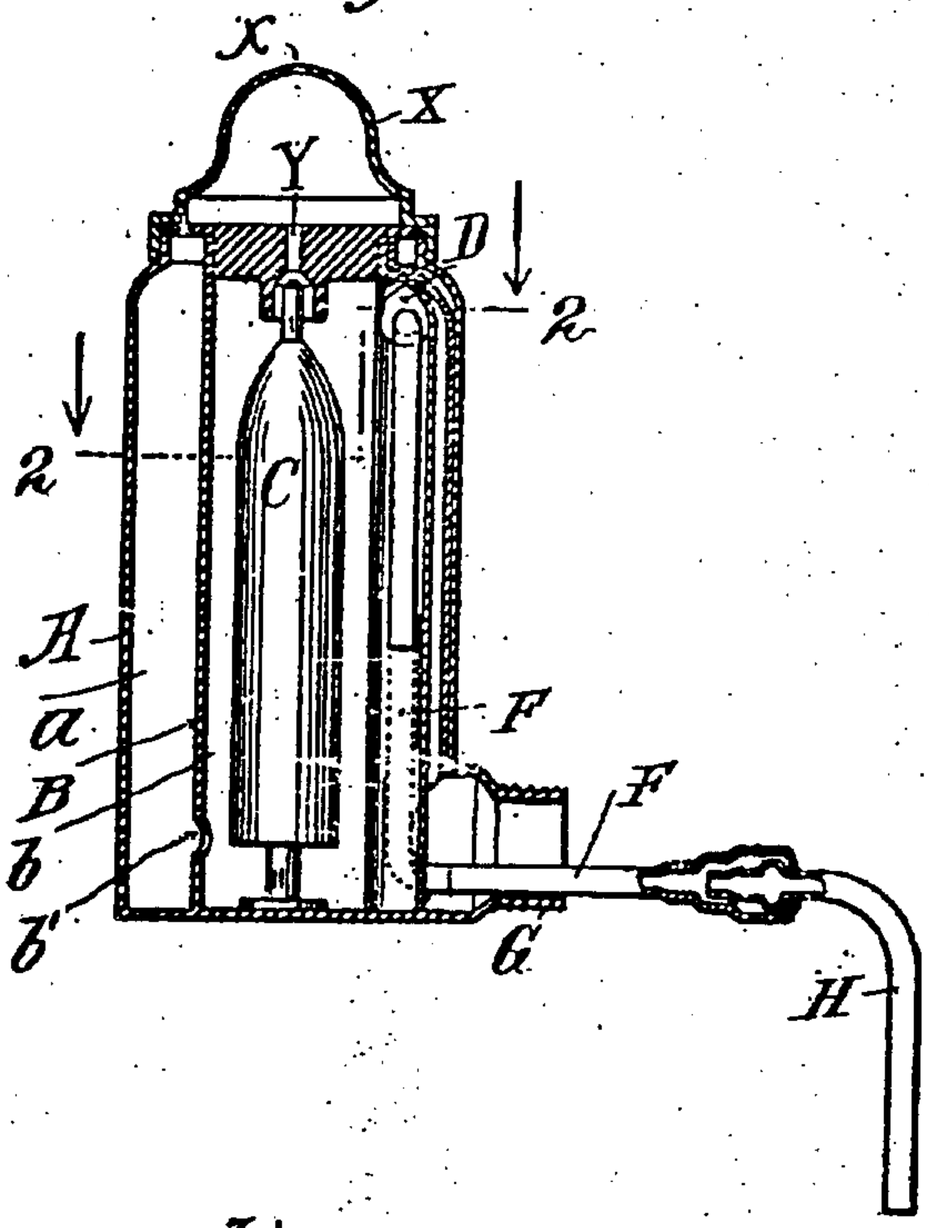
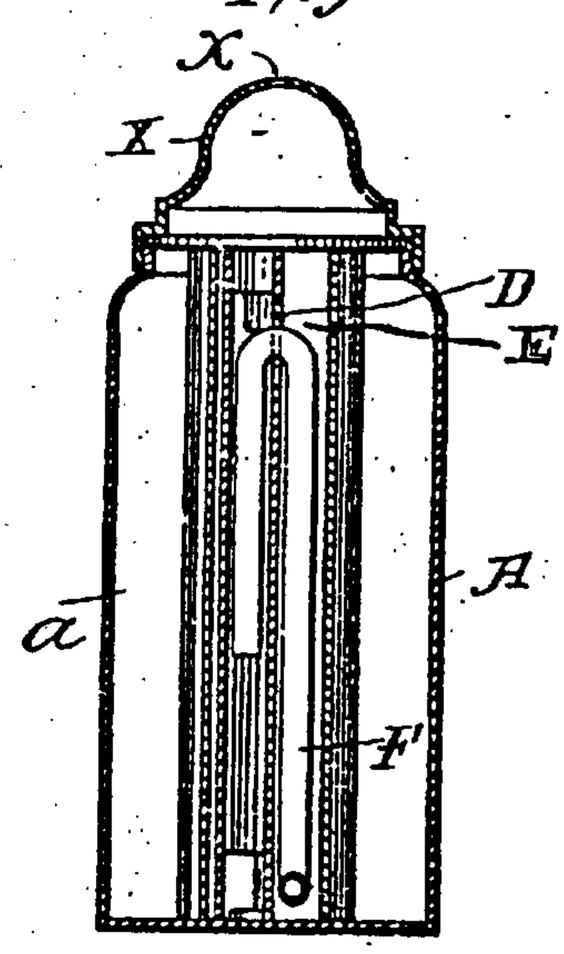


Fig. 3.



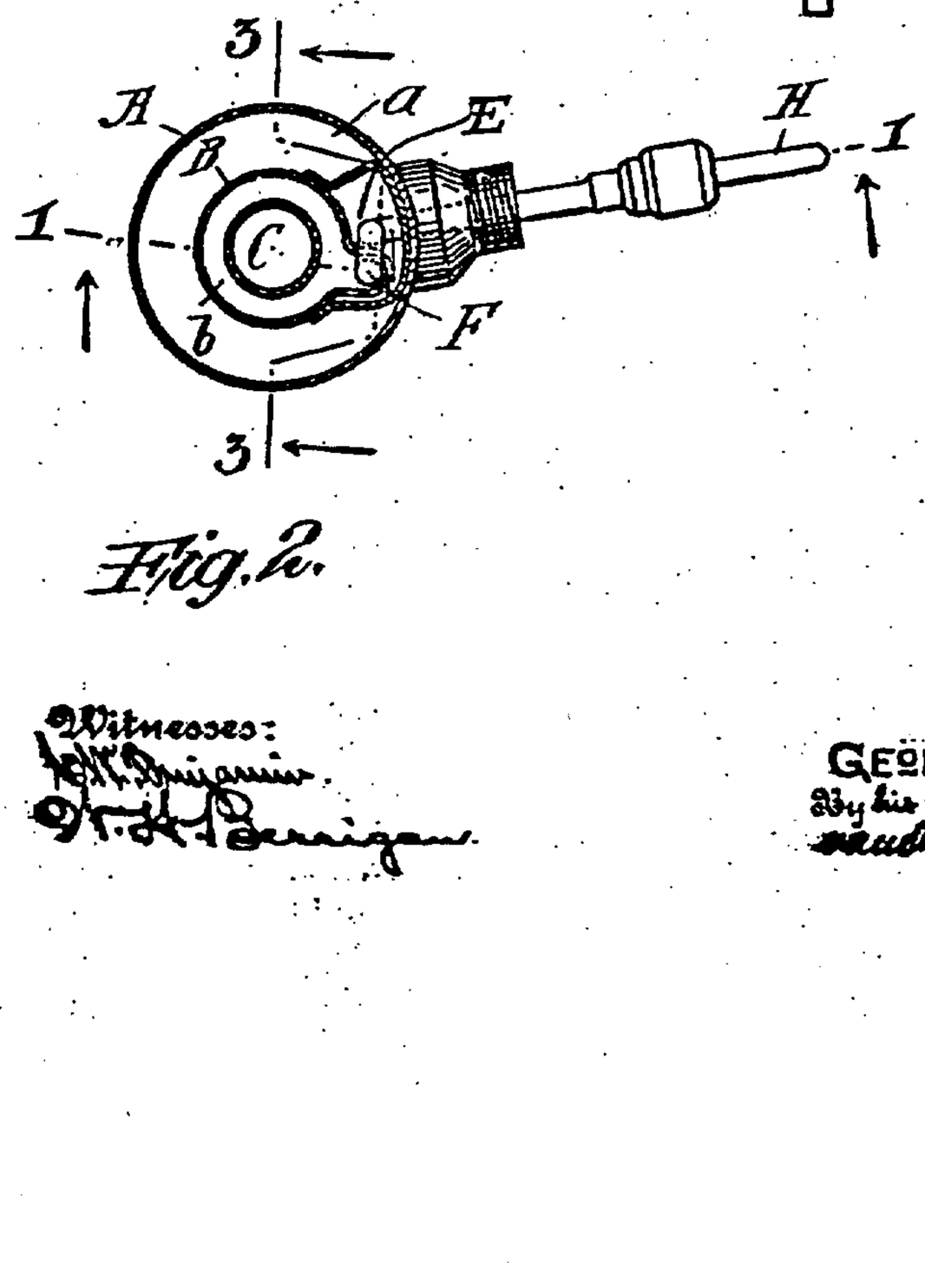


Fig. 2.

Witnesses:

Inventor,
GEORGE DE LOS HOFFMAN.
By his Attorneys

UNITED STATES PATENT OFFICE.

GEORGE DELOS HOFFMAN, OF NEW YORK, N. Y., ASSIGNOR TO NORWALL MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC AIR-VALVE.

No. 899,111. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed August 30, 1907. Serial No. 390,723.

To all whom it may concern:

Be it known that I, GEORGE DELOS HOFFMAN, a citizen of the United States of America, residing temporarily in the borough of Manhattan, city and State of New York, United States of America, have invented a new and useful Automatic Air-Valve; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present improvements relate to automatic air valves (especially those applied to steam radiators) wherein water, due to condensing of steam, is used to operate a float carrying a valve, and wherein the differences in temperature of the air or steam in a radiator, cause expansion and contraction of air in an air-chamber for the purpose of raising and lowering the level of the water in the float-chamber.

The object of the invention is to provide such an automatic air valve with an improved form of siphon, in order to remove surplus water from the float-chamber and to lead such surplus to the radiator.

In the accompanying drawings, Figure 1 indicates a vertical section, on line 1—1 of Fig. 2, through one form of automatic air valve embodying my present improvements; Fig. 2 is a cross-section, on the line 2—2 of Fig. 1; and Fig. 3 is a vertical section, on the line 3—3 of Fig. 2.

The device shown comprises essentially an outer casing, an inner casing, a top provided with a valve and a bottom, a drainage-chamber within said casing, a siphon in the inner casing and in the drainage-chamber, and a radiator nipple.

A indicates the outer casing, cylindrical in shape, and B indicates the inner casing, concentric with that first named, and provided with a longitudinal depression or rib. Between the two mentioned casings, a ring-like air-chamber, *a* is provided, which is interrupted, as hereinafter described, by a drainage-chamber. The inner casing B comprises and provides a float-chamber *b*, and the air-chamber is connected as usual with the float-chamber, near its bottom, by an opening *b'* in the casing B. A bottom and a top, of usual construction, are provided, the latter having a port Y, which is closed, or opened to the desired extent, by a valve carried upon the upper end of a float C in the float-chamber. This latter chamber, near its top, also communicates, by opening D, in the upper part or end of the longitudinal depression or rib, with the upper end of a drainage-chamber E, of sheet metal bent to shape to form a narrow casing, the length of which substantially equals the space between the inner and outer casings and which while it includes the depression or rib aforesaid, is entirely included in and closed from the air-chamber. At its lower end, the drainage-chamber opens into and constitutes a continuation of the opening through a radiator-nipple G, extending outwardly from the outer casing near the lower end of the device, and the exterior of which nipple is threaded for screw engagement with a radiator. The air-chamber *a* is entirely shut off from nipple G.

A cap, X, mainly ornamental, is screwed to the upper end of the device, and is provided with an opening *x* for the escape of air and steam.

Within the drainage-chamber E, I house one end (the longer leg) of a siphon F, the inner or shorter end of which after passing through the opening D, depends into the depression or rib of the float-chamber to a point (about) midway of the length thereof, while the outer end or leg of such siphon leads through the opening of the radiator-nipple, near the bottom of such opening and projects beyond such nipple for a considerable distance.

In practice, I have found that a siphon, even when complete, does not, when used alone, always give satisfactory results for the purpose of removing surplus water from the float-chamber. In a companion application Serial No. 390,727, filed simultaneously herewith, I have shown the employment, in the drainage-chamber, of a pipe additional to and separated from the siphon.

The present invention contemplates the addition to the outer end of a complete siphon, of a pipe H constituting, substantially, a continuation of said siphon and having a swiveling connection with the latter, so as not to interfere with the screwing of the nipple, in the usual manner, to the radiator. For this purpose, the end of the outer leg of the siphon may be expanded and inwardly flanged and that part of the pipe H therein housed may be provided with an annular enlargement, thereby holding the two pipes in the desired relation without interfering with the free rotation of pipe H within the

leg of the siphon. The addition of the pipe H. to the siphon F, I regard as highly important, especially when the pipe H is of larger diameter than the siphon. In such event, the siphon apparently empties itself quite readily, and, the capillary action of the water in the siphon is overcome.

In practice, and upon first use of the device, steam enters (from the radiator) through nipple G, and, after passing through drainage-chamber E, enters the float-chamber *b* and escapes through port Y. The condensation of steam in the float-chamber soon produces enough water therein to raise the float C and cut off the escape of steam through port Y. The heating of the air-chamber *a*, during the operation aforesaid, has rarified the air in that chamber and caused escape of some air through opening *b'* and by way of port Y. Upon a subsequent cooling of the device, the contraction of the air in chamber *a* draws water thereinto from the float-chamber, and the float descends and again opens port Y, again permitting escape of steam, a consequent reheating of the air-chamber, an expansion of air therein, and transfer of water therefrom to the float-chamber and the lifting of the float and seating of the carried valve.

It frequently happens that a radiator, while venting, discharges water, and under this condition, the water surges against the air-valve. In ordinary float-valves, the valve attached to the float closes a port (as Y), and the valve remains closed and the radiator partially cold. With my construction, however, the valve, while freely venting the air from the radiator, closes against water (as with ordinary valves) and remains closed as long as water remains against the valve; but the instant the water in the radiator falls away from the valve, the siphon automatically discharges the surplus water (from chamber *b*) back to the radiator and the valve re-commences venting. No matter how frequently water may come to the valve, the latter will instantly close tightly against leakage therethrough; and the instant the water falls in the radiator, the siphon always automatically begins its work.

What I claim is:

1. In an automatic air-valve, a casing comprising a float-chamber and an air-chamber connected with the lower part of said float-chamber, a radiator-nipple also connected with the float-chamber, and extending from the outside of the casing, a siphon having its inner and higher end within the float-chamber and having its outer and lower end passing through said nipple, and a tubular continuation from said lower end of said siphon having a swiveling connection therewith and extending outwardly and downwardly from said outer end of the siphon.

2. In an automatic air-valve, a casing comprising a float-chamber and an air chamber also connected with the lower part of said float-chamber, a drainage-chamber connected with the upper end of the float-chamber, a radiator-nipple connected only with the drainage-chamber and extending outwardly therefrom, a siphon passing through the drainage-chamber and having its inner and higher end depending in the float-chamber and its outer and lower end passing through said nipple, and a tubular continuation from the outer end of said siphon having a swiveling connection therewith and extending outwardly and downwardly from said outer end of the siphon.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE DELOS HOFFMAN.

Witnesses:
WM. H. BERRIGAN,
JOHN H. HOVING.