(No Model.)

J. POULSON.

AIR VALVE FOR STEAM RADIATORS.

No. 442,911. Patented Dec. 16, 1890.

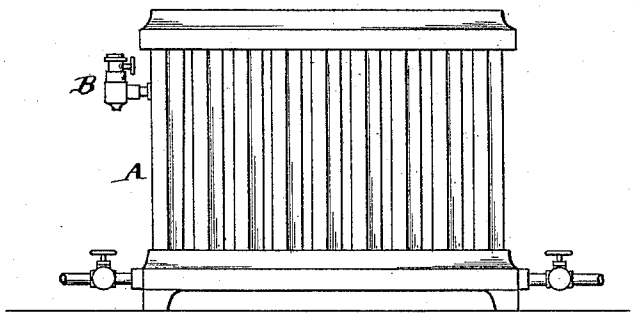

FIG. 1

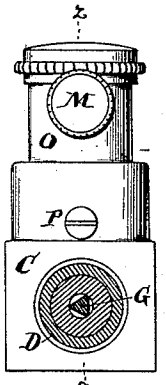

FIG. 3

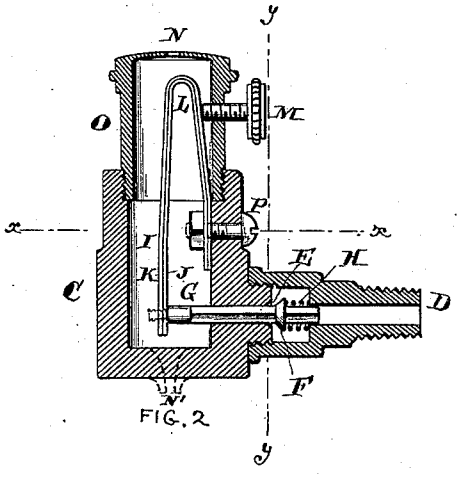

FIG. 2

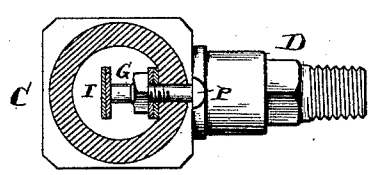

FIG. 4

Witnesses:
Henry Drury
Walter Famariss

Inventor:
Joseph Poulson
By his atty
[illegible]

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH POULSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PHILADELPHIA EXHAUST VENTILATOR COMPANY, OF PENNSYLVANIA.

AIR-VALVE FOR STEAM-RADIATORS.

SPECIFICATION forming part of Letters Patent No. 442,911, dated December 16, 1890.

Application filed June 20, 1890. Serial No. 356,161. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH POULSON, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Air-Valves for Steam-Radiators, of which the following is a specification.

My invention has reference to air-valves for steam-radiators; and it consists of certain improvements, all of which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

In carrying out my invention I combine the valve proper with a suitably-constructed spring formed, preferably, of two metals having different degrees of expansibility under heat, the action of which spring will tend to open the valve when the radiator is cold, but will allow the valve to close upon the expulsion of the air and the free admission of steam to the radiator. I provide, if desired, an auxiliary spring having much less power than the spring above mentioned, the said auxiliary spring being employed to positively actuate the air-valve to close it upon its seat as soon as the resistance of the first-mentioned spring has been removed. I also provide an adjusting-screw to vary the location of the first-mentioned spring within the chamber of the air-valve for the purpose of increasing or decreasing its power of action upon the valve proper.

The details of construction are clearly set out in the accompanying drawings, in which Figure 1 is a side elevation of a radiator, showing my improved air-valve applied thereto. Fig. 2 is a sectional elevation on line *z z* of Fig. 3, illustrating my improved air-valve. Fig. 3 is a sectional elevation of same on line *y y* of Fig. 2, and Fig. 4 is a sectional plan view of same on line *x x* of Fig. 2.

A is the radiator, and B is the air-valve, applied thereto in the customary position.

Referring specifically to the details of my improved air-valve, C is a casing, to which is secured a nipple D, adapted to be screwed into the side of the radiator. An aperture is formed through the side of the casing C, terminating in a valve-seat E upon its end adjacent to the radiator, and working through this aperture is the stem G of the air-valve F. A delicate spring H may be employed between the air-valve and nipple D for closing the air-valve upon its seat when the action of the spring I is removed by heat.

I is a spring, preferably of an inverted-U shape, bent upon itself at L, and preferably formed with one leg longer than the other, the shorter leg being secured to the casing C by a bolt P. This spring is formed of two metals—such as iron K and copper J—brazed together, and the longer leg or arm thereof is extended toward and receives the end of the stem G of the air-valve, as shown in Fig. 2. If desired, this end of the stem may be screw-threaded or otherwise formed for attachment to the free end of the spring I.

O is a cap secured to the casing C and inclosing the bend L of the spring I. This cap is provided with an escape-aperture N and holds an adjusting-screw M, which is adapted to be pressed upon the bend of spring I to adjust it with reference to its action upon the air-valve proper.

The operation will now be understood. The radiator being cold, and the parts in the position as indicated in Fig. 2, if we admit steam to the radiator the air contained in the said radiator will be blown through the nipple D and under the valve F through the aperture into the casing C, escaping by the aperture N or by an aperture which may be formed as at N′, Fig. 2. As soon as the air has been driven out, steam passes through the air-valve and heats the spring I, causing its free end to move away from the valve F. This action permits the spring H and the steam back of the valve to close the valve F upon its seat E, preventing the escape of more steam, and the action of this spring H, in conjunction with the pressure of the steam on the back of the valve F, holds the latter tightly upon its seat until the steam is shut off and the radiator becomes cool again. It is evident that the movement of the spring I may be utilized to positively draw the valve F against its seat E, obviating the necessity of the spring H; but in practice I prefer to employ both springs H and I. As soon as the valve F has closed upon its seat E, the steam-supply to the spring I ceases; but the spring still remains warm from conduction through the various parts,

and the pressure of the steam against the back of the valve prevents any tendency of the spring I forcing the valve open. As soon as the radiator has become cold the pressure upon the valve F has been removed, and if condensation has taken place in the radiator a tendency to a vacuum would be produced, which, with the action of the spring I, would positively move the valve F off its seat E and permit the entrance of air to destroy the vacuum, and bring the parts in proper position for the further elimination of the air when steam is once more turned upon the radiator.

It is evident that the spring I need not be U-shaped, and, broadly considered, it may be made of a single metal, as the heating tendency would make it move away from the valve-seat E upon the passage of steam, and thus allow the valve F to close upon its seat, as above described.

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

1. An air-valve for steam-radiators, consisting of an air nozzle or nipple for attachment to the radiator, a chamber or casing adjacent thereto having a passage-way communicating with said air nozzle or nipple and provided with a valve-seat in said passage-way, a valve for said valve-seat having a stem projecting through said passage-way into the chamber formed by the casing, and a compound spring formed of metals of different expansibilities, located in said casing, acting positively upon the projecting stem of said valve to normally open it, and adapted when heated to remove its pressure and permit the valve to close, whereby the steam from the radiator acts upon said compound spring only when the valve is open.

2. An air-valve for steam-radiators, consisting of an air nozzle or nipple for attachment to the radiator, a chamber or casing adjacent thereto having a passage-way communicating with said air nozzle or nipple and provided with a valve-seat in said passage-way, a valve for said valve-seat, having a stem projecting through said passage-way into the chamber formed by the casing, a compound spring formed of metals of different expansibilities, located in said casing, acting positively upon the projecting stem of said valve to normally open it, and adapted when heated to remove its pressure and permit the valve to close, whereby the steam from the radiator acts upon said compound spring only when the valve is open, and a removable cap or cover carried by said casing and inclosing said spring.

3. An air-valve for steam-radiators, consisting of an air nozzle or nipple for attachment to the radiator, a casing adjacent to said air-nozzle, forming a chamber, provided with a passage-way communicating with the air nozzle or nipple, said passage-way having a valve-seat located adjacent to the air nozzle or nipple, a valve for said valve-seat having a stem projecting through said passage-way into the chamber formed by the casing, a compound spring formed of metals of different expansibilities, located in said chamber, and acting positively upon the stem of said valve to normally open it, an auxiliary spring arranged adjacent to the valve, tending normally to close it, whereby said compound spring is acted upon by the steam from the radiator only when said valve is open, and when heated removes its pressure from the stem of said valve and permits the auxiliary spring to close it.

4. An air-valve for steam-radiators, consisting of an air nozzle or nipple for attachment to the radiator, a casing adjacent to said air-nozzle, forming a chamber, provided with a passage-way communicating with the air nozzle or nipple, said passage-way having a valve-seat located adjacent to the air nozzle or nipple, a valve for said valve-seat having a stem projecting through said passage-way into the chamber formed by the casing, a compound spring formed of metals of different expansibilities, located in said chamber, and acting positively upon the stem of said valve to normally open it, an auxiliary spring arranged adjacent to the valve, tending normally to close it, whereby said compound spring is acted upon by the steam from the radiator only when said valve is open, and when heated removes its pressure from the stem of said valve and permits the auxiliary spring to close it, and an adjusting-screw carried by the inclosing-casing and bearing upon the compound spring to adjust it.

5. As an article of manufacture, an air-valve for a steam-radiator, consisting of a casing C, provided with a nozzle D for attachment to the radiator and formed with a passage-way communicating with said nozzle, a valve in said passage-way, a compound spring in the casing acting upon the valve, and a removable cap or cover O, carried by the casing and inclosing the spring.

6. As an article of manufacture, an air-valve for a steam-radiator, consisting of a casing C, provided with a nozzle D for attachment to the radiator and formed with a passage-way communicating with said nozzle, a valve in said passage-way, a compound spring in the casing acting upon the valve, and a removable cap or cover O, carried by the casing and inclosing the spring, and provided with an adjusting-screw M, bearing upon the compound spring.

In testimony of which invention I have hereunto set my hand.

JOSEPH POULSON.

Witnesses:

ALEXANDER RICKEY,

CHAS. F. SIMMONS.