No. 609,191. Patented Aug. 16, 1898.

E. P. ALLEN.

AUTOMATIC AIR VALVE FOR RADIATORS.

(Application filed July 15, 1897.)

(No Model.)

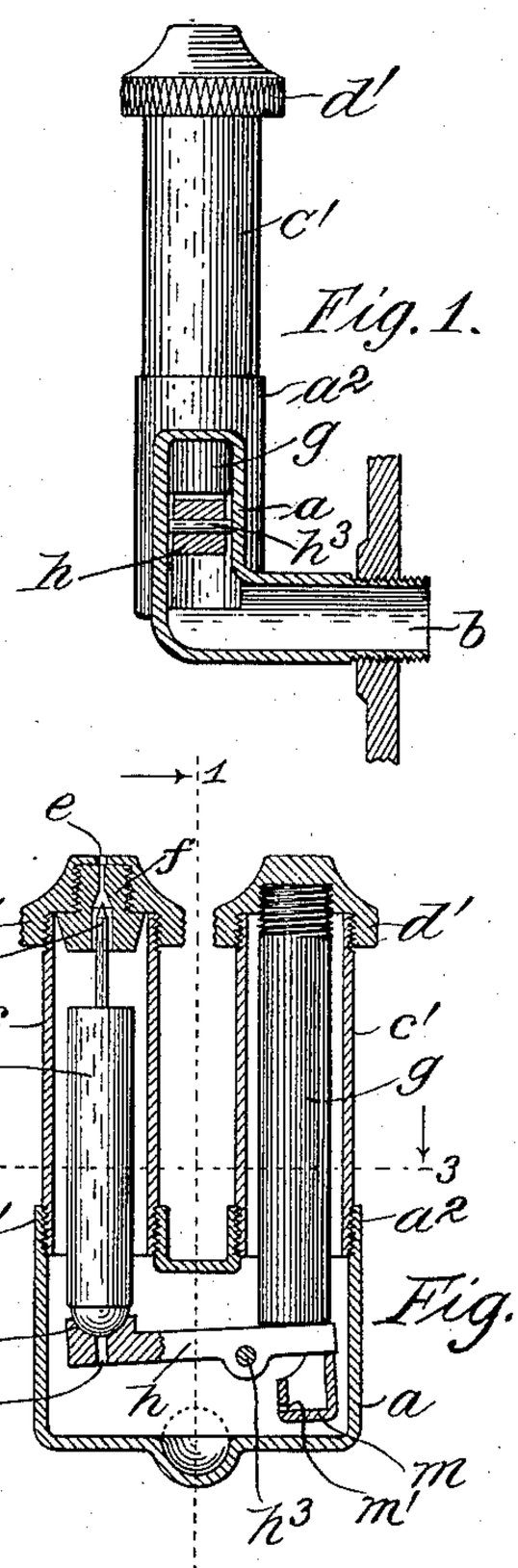

Fig. 1.

Fig. 2.

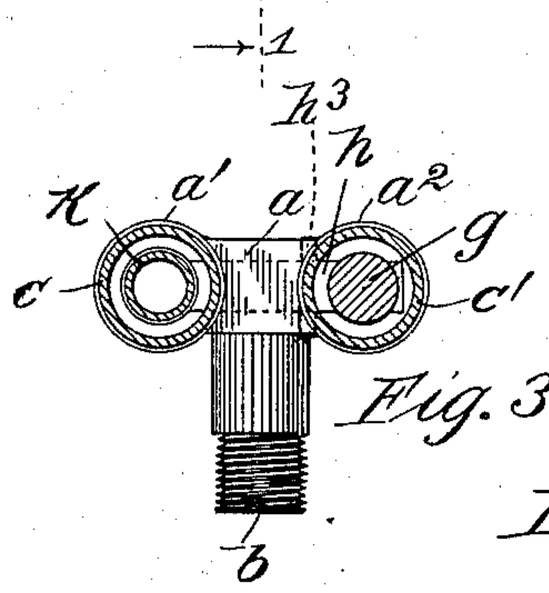

Fig. 3.

Witnesses:
D. McGannes
George L. Cragg

Inventor;
Everett P. Allen
By Barton & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

EVERETT P. ALLEN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO JAMES H. EGELSTON, OF SAME PLACE.

AUTOMATIC AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 609,191, dated August 16, 1898.

Application filed July 15, 1897. Serial No. 644,670. (No model.)

To all whom it may concern:

Be it known that I, EVERETT P. ALLEN, 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 Automatic Air-Valves for Radiators, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to automatic air-vent attachments for radiators, and has for its object the provision of such a device in which air may be admitted to the radiator and expelled therefrom, while at the same time the passage of steam or water from the radiator is absolutely prevented, and wherein the steam or water as it is admitted to the attachment is prevented from acting upon any water that may remain in the attachment to drive the same through the vent to the exterior.

Generally speaking, my invention comprises in its preferred form a hollow casing having a nozzle affording communication between the same and a radiator, a lever mounted within the casing, a float controlling the vent-valve adapted to be seated upon the lever, an expansible portion or rod adapted to actuate said lever, and preferably a bucket or receptacle carried by the lever for receiving the water as it enters the casing. By this construction I provide a valve which is actuated positively in one direction by the weight of the float to unseat itself and positively in the other direction through the agency of the steam or hot water acting upon the rod or by the water gradually admitted to the bucket, the float being easily removed from its seat by the water when it is admitted too suddenly to fill the bucket before the water is directed toward the vent.

I am aware that it is old to provide a lever engaged at one end by a tube which possesses a greater degree of expansion under heat than the casing which contains it and a valve linked at the other end of the lever so as to be actuated thereby positively in either direction as the lever is moved in one direction or the other through the influence of the expansible tube. With valves of this construction, however, the water is at all times free to flow through the outlet when the valve is open to admit air to the radiator. Such construction is exemplified in Patent No. 286,446, granted to John T. Kelly October 9, 1883. By my construction I am enabled at all times to admit air to the radiator or expel it therefrom when required and at the same time absolutely prevent the emission of water.

I will explain my invention more particularly by reference to the accompanying drawings, which illustrate the preferred embodiment of my invention as applied to a steam-radiator, in which—

Figure 1 is a vertical sectional view on plane 1 1 of Fig. 2. Fig. 2 is a vertical sectional view taken at right angles to plane 1 1. Fig. 3 is a sectional plan view on line 3 3 of Fig. 2.

Like letters indicate like parts throughout the different figures.

In practicing my invention I preferably employ a hollow base portion *a*, provided with a nozzle *b*, adapted for insertion into the radiator, the base portion having cylindrical extensions a' a^2, in which tubes *c* *c'* are screwed. Caps *d* *d'* are screwed upon the upper ends of the tubes *c* *c'*, respectively, cap *d* being provided with a vent *e* and supporting a valve-seat preferably formed in a separable plug *f*, screwed within the cap, the vent *e* being continued through this plug. Cap *d'* supports the rod of expansible material *g*, a threaded engagement being preferably employed for uniting the cap and rod. The rod is constructed of any suitable material, but preferably vulcanized rubber, which possesses a larger coefficient of expansion than the surrounding metal parts. The expansible material may be formed in other shapes than the rod, if desired.

I provide a lever *h* within the base portion *a* and preferably pivot the same between its ends. On one end of the lever I provide a recessed or cup-shaped seat *h'*, having a restricted opening h^2. The other end of the lever preferably rests in contact with the expansible rod *g*. The fulcrum h^3 of the lever is preferably placed nearer to the rod *g* than to the seat *h'*, so that the motion of the end of the lever engaging the rod will be accompanied by a magnified movement of the seat

h'. I provide a float k, which is preferably cylindrical, hollow, and sealed, the bottom of the float being preferably curved to conform to the recessed seat h'. A valve l is carried upon the upper end of the float.

I preferably provide a bucket m, carried beneath the shorter arm of the lever, which is adapted to receive water when the water reaches the level of the rim thereof. A small hole m' is provided near the bottom of the bucket to permit the water to pass therefrom.

Having particularly described one embodiment of my invention, I will now describe its operation.

The steam upon entering the hollow casing composed of the bottom portion a and tubes c c' expands the rod g, which depresses its end of the lever h and causes a magnified upward movement of the seat h', the float, with its valve, being elevated, the valve then sealing the vent to prevent the emission of water and steam. As the steam condenses the rod g contracts and permits the seat end of the lever to descend, whereby the vent is opened to admit or expel the air. If the water is gradually accumulated within the casing in sufficient quantity, the float will be lifted from its seat to seal the vent, the bucket m being filled at the same time. The position of the lever h will not be changed, however, when the bucket is filled until the water recedes from the casing, when the combined weight of the bucket and the water therein will elevate the seat h' into engagement with the float to maintain the valve closed until the water has receded from the casing. The hole m' permits the water to flow slowly from the bucket after and as the water recedes, whereby the seat h' is gradually lowered and the vent opened after practically all of the water has been removed. Water will also enter the bucket at the orifice m' as it accumulates within the casing. Often, however, the flow of water into and from the casing is quite rapid, so that the amount of water entering the restricted opening m' is very little compared with that entering the bucket at the top. Owing to the comparatively slow rate at which the water flows from the bucket the valve will be maintained closed as the water recedes from the casing.

The water often surges within the hollow casing, which in devices heretofore employed caused vibration of the float, since the float would rise and fall with the surging water. By providing the restricted opening in the seat h' this vibrating motion of the float is prevented, since a cushion of water is maintained between the float and seat, which is not subjected to the surging action of the water in the remaining parts of the casing. As the water becomes exhausted the float will gradually seat itself.

In the claims I use the term "rod," referring to the expansible portion g in its ordinary sense and as being of any suitable cross-section or in the sense of a long tube.

While I have particularly described the device of my invention as being employed with a steam-radiator, I do not wish to be limited to its use with this one type of radiator. It is obvious that changes in mechanical detail may be made from the preferred embodiment of my invention herein shown and described, and I therefore do not wish to be limited to the precise construction and arrangement of parts shown, except as hereinafter set forth in the claims; but,

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

1. In an air-vent attachment for radiators, the combination with a hollow casing having a vent and adapted for communication with the radiator, of a lever, means controlled by heat for actuating the lever, a float, said lever being adapted to actuate the float, the float being also capable of action by water accumulated in the casing independent of the lever, and a valve for opening and closing the vent controlled by the float, substantially as described.

2. In an air-vent attachment for radiators, the combination with a hollow base portion a, of tubes c c' communicating with the same, caps d d' provided upon the upper ends of tubes c c' respectively, cap d being provided with a vent e, a nozzle b adapted to afford communication between the radiator and the casing formed of said tubes and bottom portion, a lever h fulcrumed within the base portion, an expansible rod g engaging said lever and adapted to lift one end thereof as it is expanded, a float k adapted to be seated upon the end of the lever that is thus lifted, a valve l supported by said float and adapted to seal the vent when the float is elevated, the float being adapted to be elevated from its seat by the water that is accumulated within the casing and being further adapted to be lowered as the water recedes from the casing or as the engaging end of the lever descends upon the contraction of the rod g, substantially as described.

3. In an air-vent attachment for radiators, the combination with a hollow casing, having a vent and adapted for communication with the radiator, of a lever, an expansible rod adapted to actuate the lever under the influence of heat, a float removably seated upon the lever, a valve for opening and sealing the vent controlled by the float, the float being adapted to actuate the valve independently of the lever through the agency of water accumulated within the casing, and also adapted to actuate the valve through the agency of the lever and expansible rod, substantially as described.

4. In an air-vent attachment for radiators, the combination with a hollow casing, of a nozzle or other suitable means adapted to afford communication between the same and the radiator, a float, a valve supported or controlled by said float, a vent adapted to be

sealed by the valve as the float is elevated, and a recessed seat h' for the float provided with a restricted opening h^2, substantially as and for the purpose specified.

5. In an air-vent attachment for radiators, the combination with a hollow casing having a vent and adapted for communication with the radiator, of a lever, a float, a valve for opening and closing said vent controlled by the float, and a bucket adapted to receive water accumulated within the casing and adapted by its weight combined with the weight of the water contained therein to actuate said lever, as the water recedes from the casing, to maintain the valve closed, said bucket being provided with an outlet whereby the valve is opened after the water has all, practically, receded from the casing, substantially as described.

6. In an air-vent attachment for radiators, the combination with a hollow casing having a vent, of suitable means adapted to afford communication between the same and the radiator, a lever, a float removably seated upon the lever and adapted to be actuated thereby, a valve for the vent controlled by the float, and a bucket or receptacle connected with the lever adapted to receive water admitted to the casing, the bucket and water contained therein being adapted to actuate the lever when the water recedes from the casing to maintain the float in an elevated position, the vent being thereby closed while the water recedes from the casing, said bucket being also adapted to discharge its contents when the water in the casing has receded, substantially as described.

7. In an air-vent attachment for radiators, the combination with a hollow casing having a vent, of suitable means adapted to afford communication between the same and the radiator, a lever, a float removably seated upon the lever and adapted to be actuated thereby, a valve for the vent controlled by the float, a bucket or receptacle connected with the lever adapted to receive water admitted to the casing, the bucket and water contained therein being adapted to actuate the lever when the water recedes from the casing to maintain the float in an elevated position, the vent being thereby closed while the water recedes from the casing, said bucket being also adapted to discharge its contents when the water in the casing has receded, and an expansible portion adapted to also actuate said lever to seat the valve, substantially as described.

8. In an air-vent attachment for radiators, the combination with a hollow casing having a vent e and adapted for communication with the radiator, of a lever h pivoted between its ends within the casing, a float k removably seated upon the lever at one side of its pivot, a valve controlled by the float for opening and closing the vent, an expansible rod g adapted to be engaged by the portion of the lever upon the other side of its pivot, said rod g being adapted through the agency of heat to depress the portion of the lever engaged thereby to elevate the float, which thereupon is adapted to close the valve, the float being adapted to be removed from its seat upon the lever by the water accumulated within the casing to also close the valve, substantially as described.

In witness whereof I hereunto subscribe my name this 3d day of July, A. D. 1897.

EVERETT P. ALLEN.

Witnesses:
GEO. D. HOFFMAN,
GEORGE L. CRAGG.