(No Model.)

G. E. DIXON.

AIR VALVE FOR RADIATORS.

No. 504,972. Patented Sept. 12, 1893.

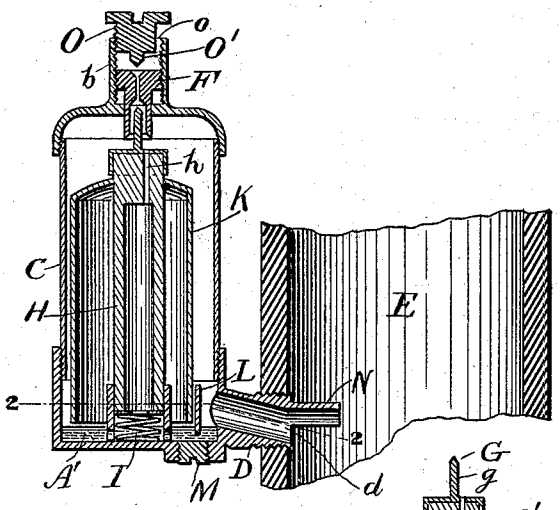

FIG. 1.

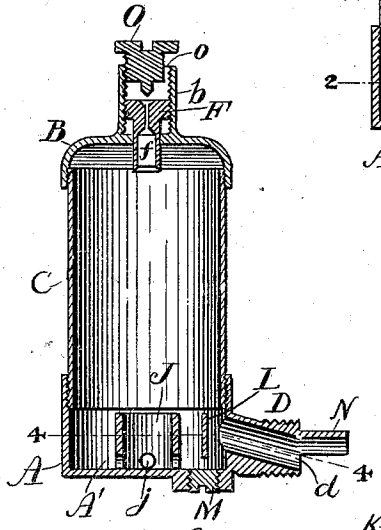

FIG. 3.

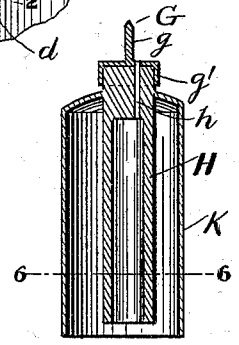

FIG. 5.

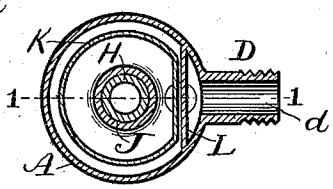

FIG. 2.

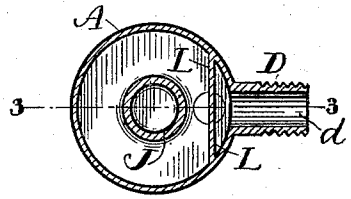

FIG. 4.

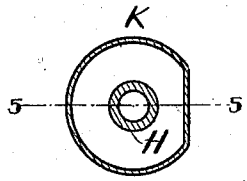

FIG. 6.

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UNITED STATES PATENT OFFICE.

GEORGE E. DIXON, OF CHICAGO, ILLINOIS.

AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 504,972, dated September 12, 1893.

Application filed March 1, 1892. Serial No. 423,395. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. DIXON, a citizen of Great Britain, residing at 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 is a specification.

The present invention relates to that class of valves which are designed to be attached to steam radiators and permit cold air to escape therefrom, but which close automatically and prevent the escape of either steam or water.

The object of the invention is to improve these air valves in respects that appear hereinafter, and to this end the invention consists in certain features of novelty that are particularly pointed out in the claims hereinafter.

In the accompanying drawings, which are made a part of this specification, Figure 1 is a vertical section of the improved valve and a portion of one of the loops of a radiator to which it is attached. Fig. 2 is a horizontal section of said valve. Fig. 3 is a vertical section of the valve casing and its accessories. Fig. 4 is a horizontal section thereof. Fig. 5 is a vertical section of the valve and its operating mechanism, *i. e.*, the expanding member and the float. Fig. 6 is a horizontal section thereof.

The valve casing is formed of a base A, a crown piece B, having an internally screw-threaded nozzle *b*, and a cylinder C united at bottom to the base and at top to the crown. The base has a laterally projecting externally screw threaded stem D, which is designed to be screwed into a screw threaded opening in one of the loops of the radiator, only a portion of which is shown at E. This stem is provided with a duct *d*, which extends quite through it and connects the interior of the radiator with the interior of the valve casing, forming the passage through which air, steam and water pass from the radiator into the valve casing, and through which water flows from said casing back into the radiator.

F is a plug screwed into the nozzle *b* and having through it a duct *f*, which forms the passage through which air escapes from the valve casing into the external atmosphere. This duct is of two diameters, the portion of larger diameter being at the lower end of the plug, and the two portions are united by a flaring surface which forms the seat for a valve G, which is fixed to the upper end of a post H of expansive material. I prefer to form this valve on the end of a stem *g*, which rises from a metal cap *g'* that embraces and is fixed to the upper end of the post. The post is hollow nearly to the top, and through its upper portion is formed a duct *h*, which places its interior in communication with the upper part of the valve casing. At its lower end it rests upon a coiled spring I through the medium of an annular washer, and fits in a socket formed by an annular flange J, which rises from the base A and confines it against lateral movement, while permitting it to rise and fall freely. The flange is provided with openings *j* for the escape of the water resulting from the condensation of steam within the post.

K is an inverted cup-shaped float which may be formed separate and attached to the post H, but which is preferably integral therewith.

The inlet *d* communicates with the valve casing some distance above the bottom thereof, so as to form a well A', and opposite said inlet is situated a baffle-plate L, the lower edge of which extends downward slightly below the lowest part of said inlet.

The operation of this valve is as follows: So long as cold air fills the loop E of the radiator down to the level of the inlet *d*, the parts will remain in the positions shown by Fig. 1, and the air that enters the casing will escape through the outlet *f*, but as soon as all the cold air is expelled from the radiator and steam enters the casing, the heat will cause the post H to expand and in so doing force the valve G upward and close the outlet. If, however, before the valve is thus seated by the presence of steam, water should rise up in the loop E of the radiator and enter the casing, before it has reached the level of the outlet *f* it will have lifted the float K, which will carry up the post H and with it the valve G, and thus close the outlet and prevent the escape of water. The valve will remain in this condition until the water in the loop E of the radiator falls below the level of the duct *d*, whereupon the water will flow from

the casing out through said duct and back into the radiator. As this takes place the valve G is drawn away from its seat by gravity, and the discharge of cold air through duct *f* will be resumed and will continue until the valve is again seated by the presence of either steam or water in the casing, as described.

Heretofore it has been the custom to seat the post H directly against the bottom of the casing, but with such an arrangement if the post expands after the valve comes to its seat—and it is bound to do so at one time or another—there is nothing to compensate for the excess of expansion, and the result is that something must give or break. It is to guard against breakage from this cause that I interpose between the bottom of the post and the casing a compressible compensating device, such as the coiled spring or some other suitable device. I am aware that the expanding member itself has been made of a coiled spring, but this is not the equivalent of my invention. Water entering the casing through the duct *d*, or resulting from the condensation of steam within the casing, will fill the well A′ and seal the lower edge of the baffle plate, but will not seal the bottom of the float, because the latter, even when at its lowest position, is slightly above the high water line of the well. As steam or air enters the casing it strikes the baffle plate and as the bottom of this plate is sealed, the incoming fluid is deflected upward, and thereby prevented from getting beneath the float and trapping the valve.

I do not limit myself to any particular material of which to form the post and float, although I prefer to form both of rubber or vulcanite.

In the bottom of the casing is an opening, through which accumulated sediment may be blown, said opening being normally closed by a screw-plug M.

Ordinarily the end of the stem D does not project beyond the inner surface of the loop E of the radiator, and as a consequence, when the water of condensation which trickles down the said surface comes to the duct *d*, it is carried into the valve casing by the inrushing air or steam. To prevent this I provide the inner end of the stem with a flange N which projects well into the interior of the radiator.

I am aware that it has been proposed to extend the stem itself so that it projects into the radiator, but this is not the equivalent of a flange projecting out over the entrance to the duct, which flange not only produces the result above stated, but, in addition, intercepts the steam, air, or water flowing upward through the radiator, and deflects it into the valve casing.

In the nozzle *b* is a screw plug O which may have an enlarged head so as to enable it to be turned by hand, or a notch for receiving a screw-driver, or both, as shown. One side of this plug is cut away to form a passage *o* for the escape of the air, and on its under side is a valve O′ which, when said plug is screwed down, closes the outlet *f* and thereby prevents the valve from operating automatically, as described. This hand valve is very useful, as by it the escape of air or steam can be prevented in case the automatic parts of the valve are disabled.

I am aware that broadly considered the combination of an automatic valve and a hand valve is not new.

I am aware that it has heretofore been proposed to place within the casing a single member or device which is sufficiently buoyant to seat the valve when water enters the casing, and which expands sufficiently to seat the valve when steam enters the casing, such device consisting of a hermetically sealed tube or cylinder containing either air or ether, or both. This construction is not the equivalent of an expanding member consisting of a post of durable material having a bearing independent of the float, so that when it expands no part of the pressure resulting from its expansion is transmitted through the float, said post and float being so related that when the float is lifted by the presence of water in the casing it carries the said post up with it.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a casing having an inlet and an outlet, a valve for closing said outlet, and a float for operating said valve, of a baffle-plate situated directly opposite the inlet and extending downward below it so as to intercept all of the air and steam entering through said inlet and prevent any of it from striking directly against the bottom of the float, substantially as set forth.

2. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, a float for operating said valve and a baffle plate interposed between the inlet and float and having its lower edge sealed, substantially as set forth.

3. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, mechanism for operating said valve, and a baffle plate interposed between said mechanism and the inlet, said casing having a well into which the lower edge of the baffle plate projects, substantially as set forth.

4. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, a post of solid expansive material, suitably connected with said valve, said post being free to move up and down within the casing, and a float surrounding said post and adapted to lift said valve when floated, said float having a chamber surrounding the post, and the post and float being so related that as the float is lifted by water rising up in the casing it lifts the post and when the water escapes the weight of the post assists in depressing the float and valve, substantially as set forth.

5. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, a solid expansive member suitably connected with said valve, a float connected with said expansive member so as to lift it when floated, and a support independent of the float upon which the expansive member rests, whereby the float is relieved of the pressure resulting from the expansion of said member, substantially as set forth.

6. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, a post of solid expansive material suitably connected with said valve, said post being free to move up and down within the casing, a float surrounding and connected to said post, so as to lift it when floated, said float having a chamber which surrounds the post, substantially as set forth.

7. The combination with a casing having an inlet and an outlet, and a valve for closing said outlet, of a post of solid expansive material suitably connected with said valve, said post being free to move up and down within the casing, and a float consisting of an inverted cup surrounding the post, so as to leave a chamber between the post and the outer side of the float, said post and float being so related that as the float is lifted by water rising up in the casing it lifts the post, and when the water escapes the weight of the post assists in depressing the valve and float, substantially as set forth.

8. The combination with a casing having an inlet and an outlet, and a valve for closing said outlet, of a post of expansive material suitably connected with said valve, said post being free to move up and down within the casing, a float connected to said post so as to lift it when water enters the casing, and a socket in which the lower end of said post fits loosely, whereby it is guided in its movement and held against lateral displacement, substantially as set forth.

9. The combination with a casing having an inlet and an outlet, of a valve for closing said outlet, a post of expansive material suitably connected with said valve, said post being hollow and open at top and bottom, and means substantially as described for closing the lower end of the post against the admission of air or steam while permitting the escape of water, substantially as set forth.

10. The combination with a casing having an inlet and an outlet, and a valve for closing said outlet, of a post of expansive material suitably connected with said valve, said post being hollow and open at both top and bottom, and a water seal covering the entrance to the lower end of said post, substantially as set forth.

11. The combination with a casing having an inlet and an outlet, and a valve for closing said outlet, of a post of expansive material suitably connected to said valve, said post being open at top and bottom, and an annular flange extending upward from the bottom of the casing and embracing the lower end of said post, said flange having side openings for the escape of water, and a water seal closing said openings, substantially as set forth.

12. The combination with a radiator, of a vent valve therefor, having a hollow stem D screwed into the radiator, and a flange projecting from the end of said stem into the radiator, said flange being located over the duct substantially as set forth.

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