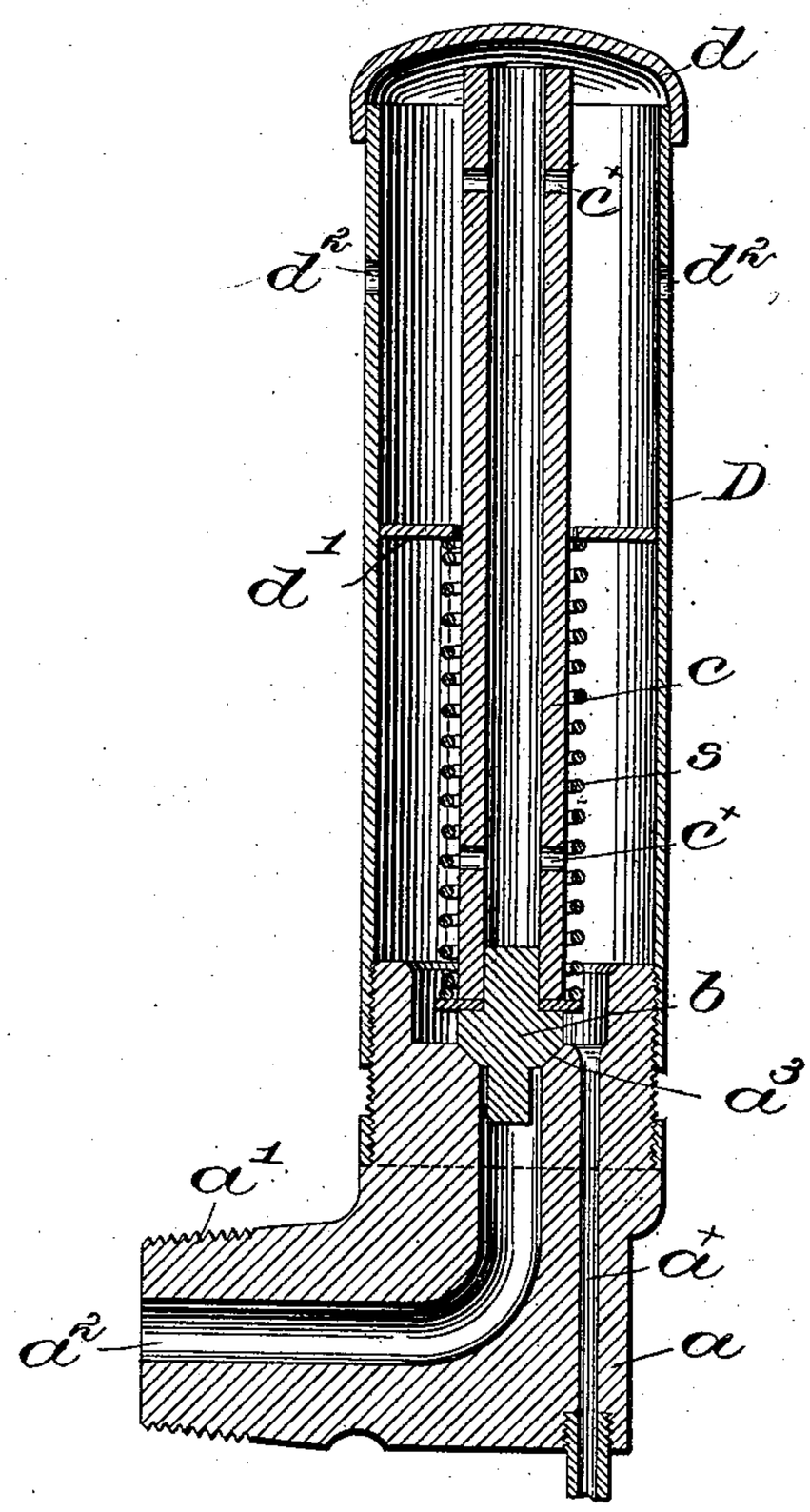
(No Model.)

A. HUBBARD.

AIR VALVE FOR RADIATORS.

No. 491,112. Patented Feb. 7, 1893.



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UNITED STATES PATENT OFFICE.

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AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 491,112, dated February 7, 1893.

Application filed February 8, 1892. Serial No. 420,638. (No model.)

To all whom it may concern:

Be it known that I, ALLEN HUBBARD, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Air-Valves for Radiators, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

In air valves for radiators as at present constructed, the valve proper is usually carried by one end of a bar of sensitive expansible material, rigidly secured at its opposite end to the radiator or some part secured thereto, the valve being normally open to permit the escape of air from the radiator as the heating medium is admitted. As soon however as the air is expelled from the radiator and the steam or other heating medium issues through the valve opening, the expansible bar which carries the valve will be heated by the escaping heating medium and will expand, thereby closing the valve and preventing further escape of the heating medium. Valves constructed in this manner are objectionable in that when the steam or heating medium is cut off from the radiator and the latter cools, the consequent contraction of the expansible bar which carries the valve, will draw the latter away from its seat and permit air to enter the radiator to fill the vacuum left therein by the condensation or withdrawal of the heating medium, so that when the heating medium is again admitted in the radiator it will be necessary to expel the entire quantity of air previously admitted thereto through the open valve before the heating medium can have free circulation through the radiator.

This invention has for its object to provide a valve of the class above referred to which will permit the free escape of air from the radiator when the heating medium is admitted, and which will close when the air has been fully expelled from the radiator and thereafter remain closed when the heating medium is cut off to thereby maintain the vacuum within the radiator so that little air will be contained within the radiator to be expelled by the heating medium when the latter is subsequently admitted again to the radiator. The normally closed valve also maintains a vacuum in the radiator and system to thus permit the water in the generator to boil at a lower temperature than would otherwise be possible, permitting a lower fire to be carried during mild weather.

In accordance with this invention the valve is acted upon and moved against its seat by the expansion of the expansible rod, the rod being free to contract without moving the valve away from its seat, so that when the valve is once seated by the expansion of the rod to cut off the escape of the heating medium from the radiator, the subsequent contraction of the rod will not draw the valve away from its seat.

One part of this invention in air valves for radiators therefore consists of a valve seat, a valve therefor, and an expansible rod adapted by its expansion to move said valve to its seat, but which is free to contract without moving said valve, substantially as will be described.

Other features of this invention will be hereinafter described and pointed out in the claims.

The drawing represents in section a valve embodying this invention.

Referring to the drawing, a represents a plug threaded at one end as at a', and adapted to be tapped into any suitable radiator, said plug having an interior passage a^2 which terminates at one end in a suitable valve seat a^3 on which is seated a valve b. An expansible rod or tube c of sensitive material, adapted by its expansion to move the valve b to its seat, is herein shown as interposed between the valve and an abutment d, the latter being fixed with relation to the valve seat a^3, and in the present instance forming the end of an inclosing tube or case D, threaded upon the end of the plug a, as shown, such inclosing case serving as a protection for the valve and expansible tube. A suitable guiding plate or bar d' for the upper end of the expansible tube c is secured within the inclosing case D, said case being perforated as at d^2 to permit the escape of air or steam issuing from the radiator through the valve opening.

The expansible tube c will preferably be perforated as at $c^\times$ to permit the heating medium to enter within the tube in order that the latter may more quickly respond to the changes in the temperature due to the escape

of the heating medium, the length of the said tube being normally such as to permit the valve *b* to be lifted from its seat.

The operation of the valve is as follows:— Assuming the plug *a* to be tapped into a radiator, steam or other heating medium admitted to the radiator will force the air contained therein out through the passage a^2 of the plug *a*, the valve *b* being lifted from its seat to permit the air to escape through the perforations in the inclosing case D. As soon however as the air has been completely expelled from the radiator, the steam or heating medium will enter the inclosing case D through the open valve, and by contact with the expansible tube *c* will cause the latter to expand and lengthen, such lengthening of the tube forcing the valve *b* to its seat and holding it there to cut off further escape of the heating medium from the radiator. If now the heating medium be cut off from the radiator the latter will cool and the expansible tube *c* will be permitted to contract or shorten in length, but the said tube being free or unattached to any rigid support at its upper end permits the valve to be retained against its seat to thereby maintain the vacuum within the radiator, the contraction of the expansible tube simply moving its free end away from the abutment *d*, so that when the heating medium is again admitted to the radiator, little air will be found therein to retard its free circulation, and what little air may be found in the radiator will be forced out through the valve *b* which will be closed again as soon as the heating medium begins to escape.

It will thus be seen that while the valve *b* is free to open to permit the escape of air when the heating medium is admitted to the radiator, it will close as soon as the heating medium begins to escape and will remain closed after the latter has been cut off to thereby maintain the vacuum within the radiator, the contraction of the expansible tube or bar being independent of the valve, and failing to move the latter from its seat.

In the present instance I have also shown a light spiral spring *s* interposed between the plate or bar *d'* and the valve to assist in closing the same when the heating medium is cut off from the radiator. Such spring would be necessary if the air valve were inverted from its position but when the air valve is arranged in its upright position, as shown, the spring *s* may if desired be omitted, and gravity alone be depended upon to move the valve to its seat when the heating medium is cut off, atmospheric pressure afterward holding it against its seat.

The plug *a* may be provided with a drip passage a^x, which may be fitted with a drip cock, or be connected with a drip-pipe in suitable manner to conduct away any water of condensation or other liquid which may collect within the inclosing case D.

In a heating system equipped with air valves constructed in accordance with this invention, the valves normally remaining closed maintain a vacuum within the system thus relieving the water in the boiler or generator from atmospheric pressure, permitting the water to boil at a much lower temperature than would otherwise be the case. This is of great value for it permits a low fire to be carried during mild weather, and the water to be boiled to generate steam at a much lower temperature than would be possible if the air valves were normally open instead of normally closed, for if the valves were normally open it would be necessary to keep the water at or above 212° Fahrenheit continually in order to boil it under the atmospheric pressure entering through the open air and radiator valves.

The inclosing case or tube D is not essential, it simply forming a protection and a convenient adjustable support for the abutment *d*, but the said abutment may be supported in any other desired manner; neither is this invention limited to the particular construction or arrangement of the parts herein shown for the shape of the valve may be varied; any expansible bar of desired shape may be employed in place of the expansible tube herein shown; and the construction of the air valve varied in other ways to meet varying conditions without departing from the scope of the invention, the gist of this invention lying in the combination with a valve seat and a valve therefor, of an expansible rod or tube adapted by its expansion to move said valve to its seat, but which is free to contract without moving the valve.

I claim—

1. In an air valve for radiators, a valve casing having an inlet and an outlet, an adjacent valve seat, and an abutment, combined with a valve normally resting on said valve seat, and an expansion rod between the valve and the abutment, the combined lengths of said rod and valve at ordinary temperatures being less than the distance between the valve seat and the abutment, but substantially equal thereto when the rod is expanded, substantially as described.

2. In an air valve for radiators, a valve casing having an inlet and an outlet, an adjacent valve-seat, and a fixed abutment, combined with a valve normally resting on said seat and movable therefrom by pressure, and an expansion rod between and bearing against said abutment and valve when expanded by heat, to keep the latter seated, substantially as described.

3. In an air valve, a plug having an inlet passage, and adapted to be tapped into a radiator, a valve seat for said passage, an inclosing case attached at one end to said plug, and provided with an outlet and an abutment at the other end of said casing, combined with a valve normally resting on said seat, and an expansion rod longitudinally movable and interposed between said valve and abutment,

the length of said rod at ordinary temperatures being less than the distance between the valve and the abutment, substantially as described.—

4. In an air valve for radiators, a valve casing having an inlet and an outlet, an adjacent valve seat therefor, and an abutment, combined with a valve, a spring to normally maintain it against its seat, and an expansion rod between said valve and abutment, to prevent movement of the valve while expanded, substantially as described.

5. In an air valve for radiators, a valve casing having an inlet and an outlet, a valve seat therefor, and a fixed abutment, combined with a valve, and an expansible rod interposed between the valve and abutment, the rod when expanded preventing movement of the valve, the latter being free to move when the rod is contracted, substantially as described.—.

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

ALLEN HUBBARD.

Witnesses:
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