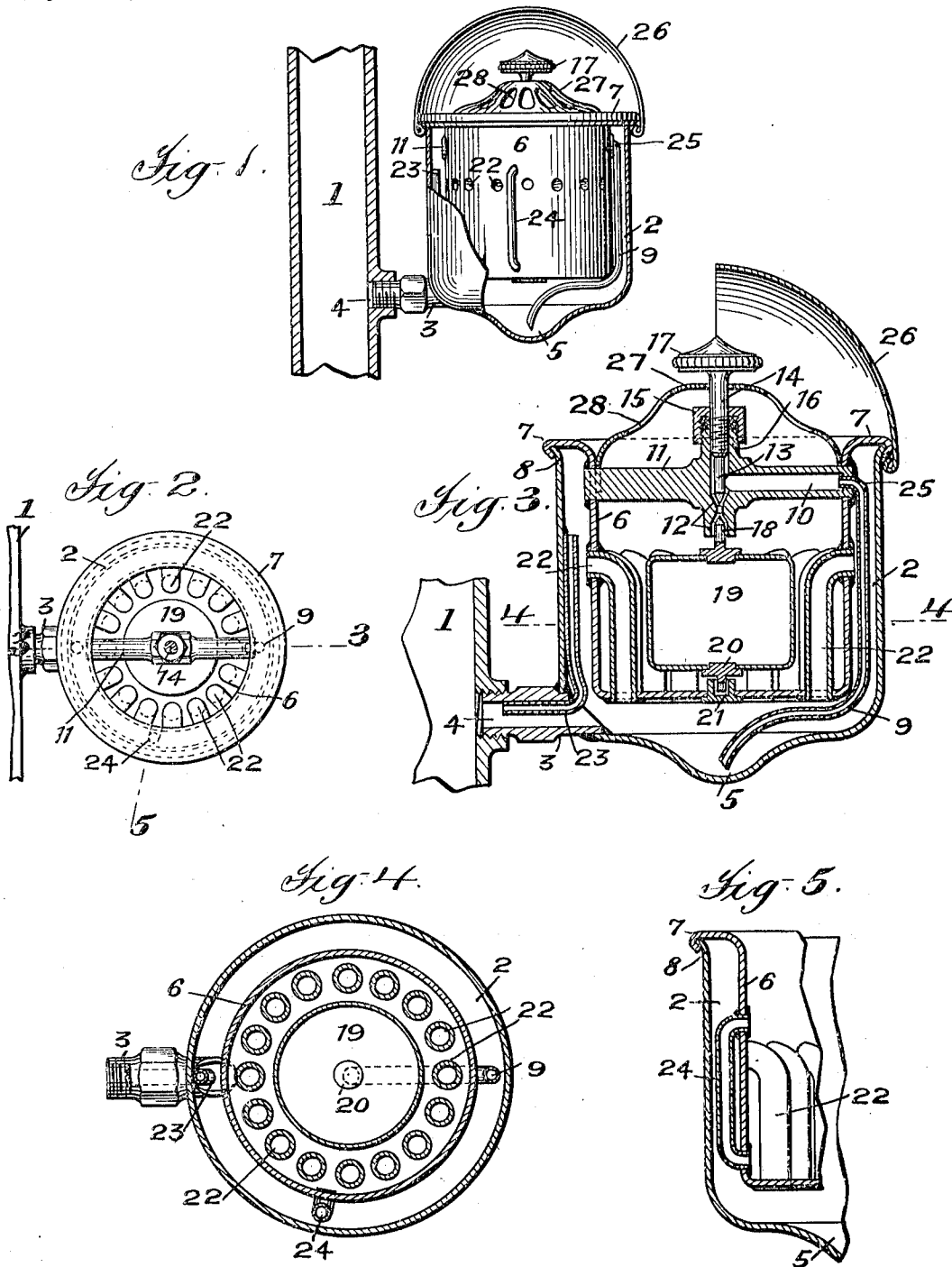


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AIR MOISTENING DEVICE FOR HEATING APPARATUS.
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AIR-MOISTENING DEVICE FOR HEATING APPARATUS.

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To all whom it may concern:

Be it known that I, WILLIAM A. RUSSELL, a citizen of the United States, residing at Waterbury, county of New Haven, and State of Connecticut, have invented certain new and useful Improvements in Air-Moistening Devices for Heating Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in air-moistening apparatus for use in connection with steam heating plants, it being the object of the present invention primarily to provide apparatus of this kind which may be readily applied to such plants after they have been installed, although it will be understood that the invention, broadly considered, may be carried into effect by equipping such a plant, while being installed, with such an apparatus either in the form in which it is shown herein or in any other form which may be found best suited to the requirements of the place where the plant may be located.

It has long been recognized that a room is not properly heated, for the comfort and healthfulness of its occupants, unless, during the heating, the humidity of the atmosphere is maintained at say about 60 to 75 per cent. of saturation. In other words, if in the heating of a room the humidity of its atmosphere is lowered to a substantial extent an atmospheric condition results which is not only uncomfortable to the occupants of the room but is a source of great danger to them in that it renders them, while in the room or on leaving it, very liable to contract colds and various ailments of the throat, bronchial tubes and lungs. Heating of a room in this way also results in great waste of fuel and in damage to those parts or contents of the room which are susceptible to changes in humidity. These difficulties in the heating of a room or like place are overcome by the air-moistening apparatus constituting the present invention, which is designed to automatically control or regulate the humidity of the atmosphere of the room in which it may be located so that as the heat from the steam plant is increased or decreased, respectively, the humidity of the room will be maintained at the proper point or, by adjustment, at any selected point required for special purposes.

As a full understanding of the improvements of the present invention can best be given by a detailed description of an organization embodying the same, such description will now be given in connection with the accompanying drawings, in which—

Figure 1 is a sectional elevation of a steam radiator tube or riser equipped with an air-moistening attachment embodying the present invention in its preferred form: Fig. 2 is a plan view of the same, certain parts hereinafter described as the deflector, cover and valve handle of the device being omitted so as to expose the interior construction thereof. Fig. 3 is a vertical section of the attachment on an enlarged scale taken on the line 3 of Fig. 2. Fig. 4 is a horizontal section of the same on the line 4 of Fig. 3; and Fig. 5 is a vertical section on the line 5 of Fig. 2.

Referring to said drawings, 1 represents a radiator tube or riser of a steam heating apparatus to which is attached the air-moistening device apparatus or attachment. This air-moistening attachment comprises an outer chamber 2 provided near its lower end with a short section 3 of pipe threaded at its outer end for engagement with corresponding threads formed in an opening 4 tapped into the radiator tube or riser 1. The chamber 2, which will be hereinafter referred to as the "condenser chamber," by reason of this connection with the tube or riser 1, communicates with the interior of the heating apparatus so as to receive steam therefrom, which is condensed therein, the water of condensation, of course, falling to the bottom of the chamber 2 which is preferably provided with a depressed bottom portion or pocket 5 for its reception. Within the condenser chamber 2 is provided a second chamber 6, which, for convenience of reference, will hereinafter be called the "evaporating chamber." This chamber 6 is open at its top so that it may evaporate its contents into the air of the room or other place where the apparatus may be located, its sides and bottom being closed, however, so that there is no communication between it (except through a connection hereinafter described) and the condenser chamber 2. The condenser chamber 2 must, of course, be closed to the atmosphere, and, in order to so close it, the sides or vertical portion of the chamber 6 flare outwardly, so as to provide a flange 7 which is bent downwardly

and then inwardly around the outwardly flaring edge 8 of the vertical portion of the condenser chamber 2, as best shown in Figs. 3 and 5. To secure a perfectly tight joint 5 between the flanges 7 and 8, solder or other suitable material may be employed.

With the parts thus constructed, and connected as shown with the riser or tube 1, the condenser chamber 2 communicates with 10 the interior of the radiator tube or riser from which it therefore receives steam, and is closed to the atmosphere so that steam may not escape from it, while the evaporating chamber 6 is open at its top to the 15 atmosphere but closed at its bottom and sides to the condenser chamber 2, so that while it will be heated by the steam in said condenser chamber 2, none of the steam may escape into it from said chamber 2. The 20 condenser chamber 2 and evaporating chamber 6 communicate with each other, however, so that the water of condensation from the former will be delivered into the latter, by means of a pipe 9, located between 25 the walls of the two chambers. The lower end of pipe 9 is in close proximity to the bottom of the pocket 5 (see Figs. 1 and 3), so that the water in the latter will at all times form an effective water seal about the 30 lower end of the pipe and thus shut off communication between chambers 2 and 6 so far as the escape of steam from the former to the latter is concerned; while the upper end thereof enters a passage 10 35 formed in a cross piece 11 secured to the upper end of the evaporating chamber 6, as best shown in Figs. 2 and 3.

From this construction it results that the 40 water of condensation deposited in the lower end or pocket 5 of the condenser chamber 2 will be forced therefrom, by the pressure of the steam about it in said chamber, upwardly through the pipe 9 and thence, by passage 10 and a vertical valve opening 12 45 leading therefrom, into the evaporating chamber 6. The valve opening 12, just referred to, is controlled at its upper end by a hand operated needle valve 13 provided with a threaded stem 14, passing through a 50 stuffing box 15 and a correspondingly threaded opening in a vertical boss 16 on the bar 11, and with a handle 17 at the upper end of said spindle by which said valve 13 may be moved upwardly or downwardly so as to 55 open or close or contract the upper end of valve opening 12 and thus open or close or partially shut off communication between the lower end or pocket 5 of the condenser chamber 2 and the evaporating chamber 6. 60 By adjusting the valve 13, the feed of the water of condensation from chamber 2 may be regulated so as to secure any desired degree of humidity. In addition to such means for manually controlling communication 65 between the condenser chamber 2 and

the evaporating chamber 6 there is also provided means for automatically controlling such communication so that the supply of water of condensation from the bottom or pocket 5 of the condenser chamber 2 may be 70 governed or regulated in accordance with the supply of water in the evaporating chamber 6; in other words, so that, as the water rises in said evaporating chamber, the supply of water of condensation to it from 75 chamber 2 will be diminished, while as the water therein decreases, such supply of water of condensation from chamber 2 will be increased. The means provided for this purpose consists of a needle valve 18 at the 80 upper end of a float 19 in said chamber 6 and controlling the lower end of valve opening 12. The float 19 is provided at its lower end with a downward projection 20 entering a guideway or opening 21 in the bottom 85 of the chamber 6, the function of which, co-acting with the valve 18 entering the lower end of the valve opening 12, is to guide the float 19 in its vertical movements. This float is of such height and buoyancy that 90 so long as the water of condensation in the evaporating chamber 6 does not rise above a certain predetermined level in said chamber, communication between the bottom of the condenser chamber 2 and said evaporat- 95 ing chamber will be fully open. When, however, the water in said evaporating chamber 6 rises above this predetermined level, the float 19, rising with it, will, through the valve 18 contract the passage 100 through the valve opening 12 and thereby diminish the supply of water of condensation to said chamber from the bottom of the condenser chamber 2; this upward movement of the float continuing, of course, so 105 long as the water in the evaporating chamber continues to rise until the water therein has risen so high that the valve opening 12 will be entirely closed by the valve 18 and further supply of water of condensation 110 from condenser 2 thus entirely shut off. As the water, thus supplied to chamber 6 and heated by the steam in the condenser chamber 2, is evaporated and the water level in said chamber 6 consequently falls, 115 the float 19 will also fall, thus opening the valve opening 12, when water of condensation will be again supplied to said evaporating chamber 6 from the pocket 5 of condenser chamber 2. 120

In some cases the heat of the steam in condenser chamber 2, by contact simply with the bottom and sides of the evaporating chamber, may be sufficient to heat and evaporate the water in said evaporating chamber. I prefer, however, that additional 125 means for heating the water in said evaporating chamber be provided, and for this reason I provide a series of vertical tubes 22 passing through the evaporating chamber 6, 130

in contact with the water therein, and connecting the upper and lower ends of the condenser chamber 2, so that the steam in chamber 2 is caused to circulate between the upper and lower ends thereof, and in passing through these tubes 22, will more perfectly heat the water in said chamber 6.

To prevent the water of condensation in the lower end of the condenser chamber 2 from filling and sealing the pipe 3 connecting said chamber with the interior of the radiator tube or riser 1, I provide a tube or pipe 23 having a vertical portion leading to the upper end of said chamber 2 and an outwardly or horizontally bent portion entering the upper part of the pipe 3, as best shown in Fig. 3. This avoids the formation of a water seal in the pipe connection 3, as, should the water of condensation accumulate in the bottom of the condenser chamber 2 so as to fill the pipe connection 3 up to the lower surface of pipe 23, the steam from the radiator tube or riser will then pass upwardly through the pipe 23 into chamber 2 and balance the water in said chamber with the result that part of said water will pass through pipe connection 3 back into the tube or riser 1.

It is possible that the heat of the steam within the condenser chamber 2 and the steam tubes 22 may be so great as to cause surface bubbling of the water in the evaporating chamber 6 to such an extent as to be disagreeable and possibly damage the floor or floor covering over which the device is located. To avoid this, I provide a connection, consisting of a pipe 24, between substantially the upper and lower ends of the evaporating chamber 6, which causes the water to circulate between the upper and lower ends of said chamber 6 and to thereby prevent such bubbling of the water.

Although the pipe 9 connecting the bottom or pocket 5 of the condenser chamber 2 with the evaporating chamber 6 may be entirely closed except at its opposite ends communicating with chambers 2, 6 and, so constructed, operate with more or less satisfactory results for the purpose of conducting the water of condensation from the condenser chamber 2 to the evaporating chamber 6, yet I have found in practice that the attachment operates most satisfactorily if said pipe 9 be provided, preferably near its extreme upper end, with a small vent or opening 25 in its side, as best illustrated in Fig. 3, through which said pipe and the upper end of the condenser chamber 2 are put into communication with each other. Such opening 25 is important in that it permits the escape through pipe 9 of air necessarily accumulating in chamber 2, and which, if permitted to remain there, would seriously interfere with and in some cases probably prevent operation of the apparatus.

With the apparatus just described, it will be apparent that the humidity of the atmosphere of the room in which it and the steam apparatus to which it is attached are located, may be perfectly regulated or controlled, so that it may be maintained at the point required by the health or comfort of the occupants or for the preservation of those parts or contents of the room which are damaged by low humidity, and may also be maintained at any other point necessary for special purposes. It will also be apparent that by reason of such automatic regulation or control of humidity a great saving in fuel is effected, the fact being, as heretofore indicated, that, with the proper degree of humidity maintained in heating, greater warmth and comfort are secured with a low degree of heat, and therefore less fuel, than is possible with a much higher degree of heat, and therefore more fuel, where such degree of humidity is not maintained.

Another advantage of the apparatus described is that the water which it evaporates into the atmosphere is, in effect, distilled water and therefore in the best possible condition for the purpose. It is quite possible that, in some steam heating plants, the water of condensation may have a slightly oily odor, but, if this be disagreeable to the occupants of the room, the difficulty may be readily overcome by introducing into the chamber 6 some fluid or solid substance having a more agreeable odor which will mask such oily odor. In this connection it may also be well to state that if desired the evaporating chamber 6 may be cut off from communication with condenser chamber 2 by closing valve 13, the water or other fluid to be evaporated from chamber 6, in such case, being wholly or partly poured by hand into said chamber 6, which will, of course, still be heated by the steam in condenser chamber 2.

The apparatus has the still further advantage that, because of the automatic control, by valve 18 and float 19, of communication between the evaporating chamber 6 and the condenser chamber 2 and therefore the heating apparatus itself, it performs not only the function of automatically controlling or regulating the humidity of the atmosphere, but also serves as an air valve permitting the escape of air from the radiator or riser 1, after the manner of the ordinary air valve.

I find it desirable to provide the apparatus with a deflector 26 in the form of a spherical-triangle shaped hood projecting over the top of evaporating chamber 6 and rotatably mounted on the flanges 7 so that it may be turned horizontally to any desired position and thus direct the vapor from chamber 6 to any desired point. The provision of such a deflector is desirable not merely for the purpose of directing the

vapor from chamber 6 into the center of the room, for example, and thus disseminating it through the atmosphere, but also for the purpose of directing it away from the wall of the room the decoration or covering of which might be injured by the vapor. I also find it desirable, in order to exclude dirt and scraps of paper, etc., from the evaporating chamber 6, to provide such chamber with a cover 27 having perforations or openings 28 through which the vapor may escape into the atmosphere from said chamber 6.

What is claimed is:—

1. An air moistening attachment for steam heating apparatus comprising an evaporating chamber, means for connecting it with the heating apparatus so that the water of condensation therefrom will be fed to said evaporating chamber, tubular steam conducting means passing through said evaporating chamber and connected at its opposite ends with the condensation inlet whereby the contents of the evaporating chamber are heated by the steam without escape of the latter into said chamber, and means for automatically regulating the feed of the water of condensation to the evaporating chamber, substantially as described.

2. An air moistening attachment for steam heating apparatus comprising an evaporating chamber, means for connecting it with the heating apparatus so that the water of condensation therefrom will be fed to said evaporating chamber, tubular steam conducting means passing through said evaporating chamber and connected at its opposite ends with the condensation inlet whereby the contents of the evaporating chamber are heated by the steam without escape of the latter into said chamber, and means controlled by the water in the evaporating chamber for automatically regulating the feed thereto of the water of condensation, substantially as described.

3. An air moistening attachment for steam heating apparatus comprising an evaporating chamber, means for connecting it with the heating apparatus so that the water of condensation therefrom will be fed to said evaporating chamber, tubular steam conducting means passing through said evaporating chamber and connected at its opposite ends with the condensation inlet whereby the contents of the evaporating chamber are heated by the steam without escape of the latter into said chamber, and a manually operated valve and also automatically controlled means for regulating the feed of the water of condensation to the evaporating chamber, substantially as described.

4. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber and means for connecting it with the heating apparatus so that the contents of said chamber will be heated by the

steam from the apparatus and said chamber be fed with the water of condensation therefrom, said chamber being provided with means for causing the water to circulate between its upper and lower ends.

5. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, a condenser chamber adapted for connection with the heating apparatus and inclosing said evaporating chamber so that the contents of the latter will be heated by the steam from the apparatus, connections between the two chambers whereby the evaporating chamber will be fed with water of condensation from the steam, and means controlled by the water in said chamber for automatically regulating the feed of the water of condensation.

6. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, a condenser chamber adapted for connection with the heating apparatus and inclosing said evaporating chamber so that the contents of the latter will be heated by the steam from the apparatus, connections between the two chambers whereby the evaporating chamber will be fed with water of condensation from the steam, a float in said evaporating chamber and a valve controlled thereby for automatically regulating the feed of the water of condensation.

7. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, a condenser chamber adapted for connection with the heating apparatus and inclosing said evaporating chamber so that the contents of the latter will be heated by the steam from the apparatus, and connections between the two chambers whereby the evaporating chamber will be fed with water of condensation from the steam, said evaporating chamber being provided with steam-circulating means passing through it and connecting opposite ends of the condenser chamber.

8. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, a condenser chamber adapted for connection with the heating apparatus and inclosing said evaporating chamber so that the contents of the latter will be heated by the steam from the apparatus, and connections between the two chambers whereby the evaporating chamber will be fed with water of condensation from the steam, said connections being so constructed as to provide for the escape of air accumulating in the condenser chamber, and said evaporating chamber being provided with steam-circulating means passing through it and connecting opposite ends of the condenser chamber.

9. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, a condenser chamber

adapted for connection with the heating apparatus and inclosing said evaporating chamber so that the contents of the latter will be heated by the steam from the apparatus, and connections between the two chambers whereby the evaporating chamber will be fed with water of condensation from the steam, said condenser chamber being provided with a pipe leading from the lower to the upper end thereof for preventing sealing of the connection from it to the heating apparatus by the accumulation of water of condensation in the bottom of said chamber.

10. An air-moistening attachment for steam heating apparatus comprising a condenser chamber 2, an evaporating chamber 6 inclosed by said condenser chamber, and a pipe 9 connecting the evaporating chamber with the lower end of the condenser chamber, the lower end of said pipe forming with the water of condensation in the lower end of the condenser chamber a seal preventing the passage of steam from said chamber.

11. An air-moistening attachment for steam heating apparatus comprising a condenser chamber 2, an evaporating chamber 6 inclosed by said condenser chamber, and a pipe 9 connecting the evaporating chamber with the lower end of the condenser chamber and provided with an opening 25 at or near its upper end, the lower end of said pipe forming with the water of condensation in the lower end of the condenser chamber a seal preventing the passage of steam from said chamber.

12. An air-moistening attachment for steam heating apparatus comprising a condenser chamber 2, an evaporating chamber 6 inclosed by said condenser chamber, and a pipe 9 connecting the evaporating chamber with the lower end of the condenser chamber, said evaporating chamber being provided with steam-circulating means, as

tubes 22, passing through it and connecting opposite ends of the condenser chamber.

13. An air-moistening attachment for steam heating apparatus comprising a condenser chamber 2, an evaporating chamber 6 inclosed by said condenser chamber, and a pipe 9 connecting the evaporating chamber with the lower end of the condenser chamber, said evaporating chamber being provided with water-circulating means, as pipe 24, connecting opposite ends thereof.

14. An air-moistening attachment for steam heating apparatus comprising a condenser chamber 2, an evaporating chamber 6 inclosed by said condenser chamber, and a pipe 9 connecting the evaporating chamber with the lower end of the condenser chamber, said condenser chamber being provided with a tube or pipe, as 23, leading from its lower to its upper end.

15. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, as 6, a condenser chamber, as 2, connections between the two for feeding water of condensation to the evaporating chamber, a float, as 19, and a valve controlled thereby and in turn controlling the feed of the water of condensation.

16. An air-moistening attachment for steam heating apparatus comprising an evaporating chamber, as 6, a condenser chamber, as 2, connections between the two for feeding water of condensation to the evaporating chamber, a float, as 19, and a valve 18 carried thereby and controlling the feed of the water of condensation.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM A. RUSSELL.

Witnesses:

J. A. GRAVES,
P. N. TILDEN.