Nov. 1, 1932. A. U. JONES 1,886,192

HUMIDIFYING RADIATOR

Filed March 25, 1932 2 Sheets-Sheet 1

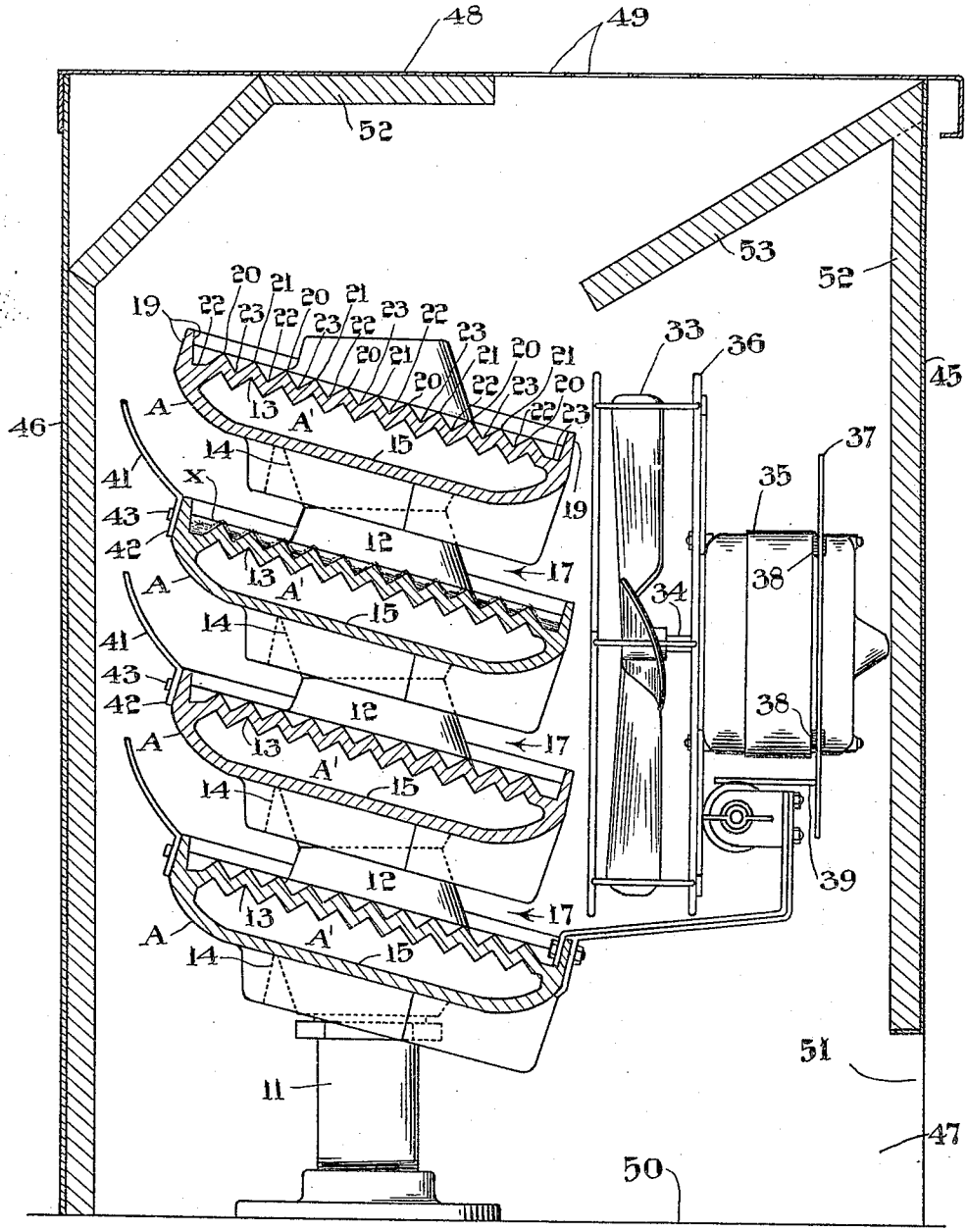


FIG. 1

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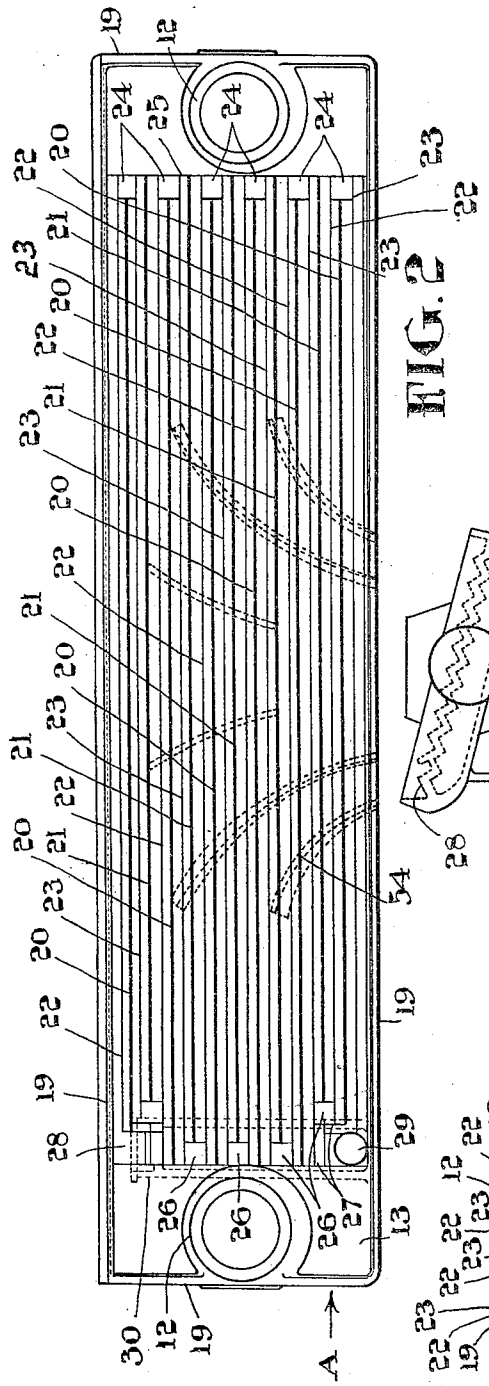


FIG. 2

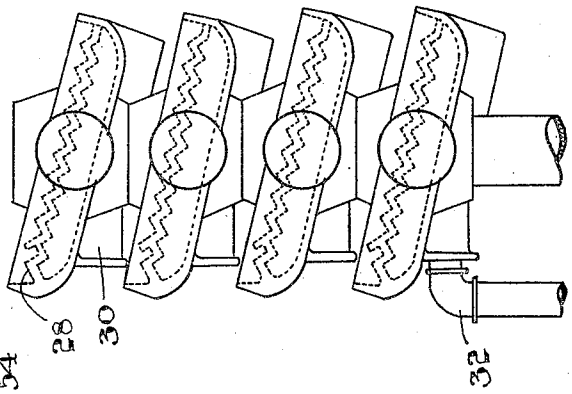


FIG. 4

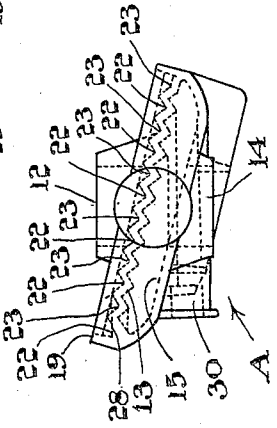


FIG. 3

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HUMIDIFYING RADIATOR

Application filed March 25, 1932. Serial No. 601,179.

This invention relates to radiators and particularly to humidifying radiator installations of the kind comprising water evaporating sections provided with recesses or water courses for containing the water to be evaporated.

The principal objects are to provide an improved installation in which provision is made for forcing air between the water evaporating sections to increase the evaporating efficiency and to effect rapid distribution of the humidified air throughout the room or other enclosure in which the installation is placed; to provide an installation in which the air forcing means is of such character that its operation may be controlled at will to regulate the water evaporating efficiency of the radiator within wide limits; to provide an installation in which the water evaporating sections are designed and arranged to utilize the evaporation-increasing effect of the air forcing means with a maximum degree of efficiency and, finally, to provide a generally improved installation which is particularly adapted by reason of its high evaporating efficiency for use in connection with hot water and other heating systems in which the temperature and evaporating effect of the heating medium is relatively low compared with steam heating systems.

Other objects, advantages and characteristic features of the invention will appear from the following detailed description taken in connection with the accompanying drawings, wherein—

Fig. 1 is a view partly in vertical section and partly in side elevation of the component elements of a humidifying radiator installation provided in accordance with this invention.

Fig. 2 is a top plan view of one of the humidifying radiator sections.

Fig. 3 is an end view of the radiator section appearing in Fig. 2.

Fig. 4 is an end view of the humidifying radiator as it appears without the casing and air forcing means ordinarily associated therewith.

The humidifying radiator shown in the present drawings is similar in many respects to that described and claimed in my co-pending application Serial No. 593,123, filed Feb. 15, 1932. It comprises a series of hollow radiator sections A spaced one above the other in vertical alignment, the lower section being mounted on suitable supporting legs 11. These sections are coupled together substantially in accordance with standard practice to provide for circulation of the heating fluid through the internal passages A'. As herein shown, each section is provided with vertical nipple receiving bosses 12 projecting upwardly from the top wall 13 in line with similar bosses 14 projecting downwardly from the bottom wall 15. Standard connecting nipples (not shown) are provided for coupling the lower bosses 14 of each section to the upper bosses 12 of the next lower section to secure the sections in the assembled relation shown in Figs. 1 and 4.

The angular relation between the bosses and the top and bottom walls of each section is such that, in the assembled relation of the sections, the general plane of each of said walls is inclined with respect to the horizontal so that its rear edge is higher than its front edge. This construction, in addition to other advantages hereinafter mentioned, provides a series of upwardly and rearwardly inclined air passages 17 which greatly facilitate the circulation of air between the various sections.

Each section A is provided with a top water evaporating area including a long tortuous water course of relatively narrow channel width. This water course is formed by providing the section with a marginal wall 19 and a series of parallel ribs or ridges 20 and 21 projecting upwardly from the wall 13. The two sets of ribs or ridges 20 and 21 ex-

tend longitudinally of the section and form, with the parallel portions of the wall 19, a series of parallel flow channels 22 and 23 which conjointly provide a continuous tortuous water course of substantial length. As shown to advantage in Fig. 2, the right hand end of each channel 23 communicates with the adjacent end of the next upper channel 22 through a gap or passageway 24 reserved between a transverse wall 25 and one of the ribs or ridges 20. The left hand end of each channel 23 communicates, in a similar manner, with the adjacent end of the next lower channel 22 through a gap or passageway 26 reserved between a transverse wall 27 and the adjacent end of one of the ribs or ridges 21. The uppermost channel 22 communicates at its left hand end with a pocket 28 into which the water to be evaporated by the section is initially introduced. From the pocket 28 the water flows via the channels 22 and 23 and the communicating passageways 24 and 26 to an outlet opening 29 at the left hand end of the lowermost channel 23. The water draining through this outlet 29 passes into a transversely extending drain conduit 30 having its delivery end positioned, as shown to advantage in Fig. 4, to deliver the water to the underlying pocket 28 of the next lower section. The primary supply of water to the evaporating surfaces of the sections A is preferably through a drip valve having its discharge end positioned directly above the pocket 28 of the uppermost section A. It is not considered necessary to show this drip valve in the present drawings since the arrangement thereof will preferably be the same as described in my prior application Serial No. 537,786, filed May 16, 1931. The water draining through the drain conduit 30 of the lowermost section A is delivered to a drain pipe 32 appearing in Fig. 4.

The amount of water supplied to the flow channels 22 and 23 of each section may be regulated so that the water will traverse the water course provided by these channels without overflowing the side walls of the channels. It is preferred, however, to regulate the water supply so that the water will not only flow along the channels from the inlet to the outlet end of each water course but will also overflow the lower side wall of each channel to produce a cascading effect whereby the entire upper surfaces of the walls 13, including the apices of the ribs or ridges 20 and 21, are submerged as indicated at X in Fig. 1. This cascading of the water over the dividing walls of the component channels of each water course maintains the entire upper surface of the wall 13, including the apices of the ribs or ridges 20 and 21, submerged beneath a thin film of water which has a fairly rapid downward travel across the width of said wall. This complete coverage of the wall 13 by a thin film of water exposed to the air passing above said wall increases the evaporating efficiency of the section in substantial degree and is particularly desirable in the present installation, wherein a rapid circulation of air between the sections is provided for by the air forcing means hereinafter described.

The flow of the water along the length of each water course is of advantage in that it tends to increase the water handling capacity of the section and to gradually move dirt or other foreign matter accumulating in the flow channels in the direction of the outlet 29. In this connection it may be observed that while the water channels 22 and 23 are level from end to end the downward slope of the wall 13 from its upper to its lower edge is sufficient to provide for movement of the water along the length of each water course, as herein described.

While the humidifying radiator described in the foregoing may be used alone as a satisfactory humidifying unit, its evaporation efficiency is increased in substantial degree by the addition of the fan appearing at 33 in Fig. 1. This fan is mounted close to the front portions of the radiator sections A and is substantially centered with respect to the length of said sections. The fan is fixed to the shaft 34 of an electric motor 35 and is preferably equipped with a guard frame 36. The motor 35 may be mounted in any desired way. It is herein shown as carried by a supporting ring 37 through the medium of a series of springs 38 which provide a substantially noiseless mounting due to the vibration absorbing effect of the springs. The ring 37 is supported from the lowermost section A by any suitable form of supporting bracket such as that indicated at 39.

When the fan 33 is in operation it causes a rapid circulation of air through the air passages 17 and over the upper water evaporating surface of each of the sections A. This not only increases the evaporating efficiency of the radiator but also provides for a rapid distribution of the humidified air throughout the room or other enclosure in which the radiator and fan are installed.

Due to the inclination of the wall 13 of each section the film of water covering the upper surface of said wall is obliquely disposed across the path of the horizontal air currents produced by the fan 33 and causes the humidified air to be gradually diverted in an upward direction as it passes towards the rear edge of each section. The angular disposition of the water film with reference to the horizontal paths traversed by the air currents is also of advantage in that the air is blown against the water at such an angle that the onward travel of the air is not impeded to any substantial degree as would be the case if the air currents were projected at right angles to the general plane of the water films.

In order to provide for a further upward deflection of the humidified air currents leaving the passages 17 each section A is preferably equipped with an upwardly and rearwardly curved deflector 41 having an attaching flange 42 at its lower edge attached to the section by means of screws 43 or other suitable fastening means. These deflectors 41 are preferably formed of sheet metal bent to the shape shown in Fig. 1.

The radiator and fan assembly described herein is preferably enclosed by a cabinet structure comprising a front wall 45, a rear wall 46, side walls 47 and a top wall or grill 48, the latter being provided with air outlet openings 49 and the lower edge of the front wall 45 being preferably spaced from the floor 50 to provide an air inlet 51. All or certain of the enclosing walls of the cabinet may be provided with a lining 52 of sound absorbing material in order to muffle the noise incident to the operation of the fan 33. The front wall 45 may also be provided with an inwardly and downwardly inclined deflector 53, of sound absorbing material, which overlies the fan 33 and serves to cause the air projected upwardly by the fan to be deflected onto the evaporating surface of the uppermost section A. Since the fan 33 is centrally located and is of relatively small diameter with reference to the length of the sections A, it is preferable to provide the bottom wall 15 of each section with a series of curved vanes 54 for causing the air entering the air passages 17 to be distributed over the length of the evaporating surface of each section A during its travel through said passage.

The speed of the fan 33 may be varied at will to regulate the evaporating efficiency of the radiator which depends in substantial degree upon the forcible circulation of air between the radiator sections. To this end the circuit connections to the fan operating motor 35 may include any suitable form of manually operable rheostat or resistance for varying the operating speed of the fan to increase or decrease the circulation of air between the radiator sections.

In view of the increased evaporating efficiency afforded by the fan 33, the humidifying radiator installation described herein is particularly adapted for use in connection with hot water heating systems where the relatively low temperature of the heating medium, as compared with steam heating systems, offers certain difficulties with respect to providing for the evaporation of an adequate quantity of water without increasing the size or number of the evaporating sections to the point where the cost of installation is excessive. With the present installation sufficient evaporation may be obtained in connection with hot water heating systems by the use of a relatively few evaporating sections of comparatively small size.

Having thus described my invention, what I claim is:—

1. A humidifying radiator installation comprising a plurality of vertically spaced radiator sections, each having a top water evaporating surface sloping downwardly toward the front of the section and means at the front of the radiator for effecting a positive horizontal flow of air in the direction of the sloping water evaporating surfaces.

2. A humidifying radiator installation comprising a plurality of vertically spaced radiator sections, each having a top water evaporating surface sloping downwardly toward the front of the section and shaped to provide a series of parallel flow channels extending longitudinally of the sections and communicating with each other to form a single tortuous water course having an inlet at one end of the uppermost channel and an outlet at one end of the lowermost channel, said channels being level from end to end.

3. A humidifying radiator as claimed in claim 2 in which each water course is supplied with sufficient water to overflow the dividing walls between the channels.

4. A humidifying radiator installation as claimed in claim 2 including a fan arranged adjacent the front of the radiator to produce a horizontal flow of air in the direction of the sloping evaporating surfaces.

5. A humidifying radiator installation comprising a plurality of vertically spaced radiator sections, each having a water evaporating surface at the top and air deflecting means at the bottom, said air deflecting means being arranged to deflect air passing transversely beneath each section toward the ends of the top evaporating surface of the next lower section.

6. A humidifying radiator installation comprising a plurality of vertically spaced radiator sections, each having a top water evaporating surface, a fan positioned in front of the central portions of the radiator for blowing air toward and between said sections, and deflectors between the sections for diverting the air passing between towards the ends of the evaporating surface.

7. A hollow radiator section having a top wall inclining downwardly toward the front of the section and shaped to provide a series of flow channels of relatively narrow channel width, said channels being parallel with each other and with the front and rear edges of the section and being level throughout their length, said channels being connected in end to end relation by communicating passages to form a single water course.

8. A humidifying radiator comprising a plurality of hollow radiator sections, each having a top water evaporating surface sloping downwardly toward the front of the section, an upwardly and rearwardly curved

air deflector projecting above the water evaporating surface at the rear edge of each section and a fan positioned in front of the radiator for forcibly circulating air between said sections.

9. A humidifying radiator comprising a plurality of hollow radiator sections each having a top water evaporating surface, an upwardly and rearwardly curved air deflector projecting above the water evaporating surface at the rear edge of each section and a fan positioned in front of the radiator for forcing air between said sections.

In witness whereof I have hereunto set my hand.

ANDREW U. JONES.