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HUMIDIFYING SYSTEM AND APPARATUS

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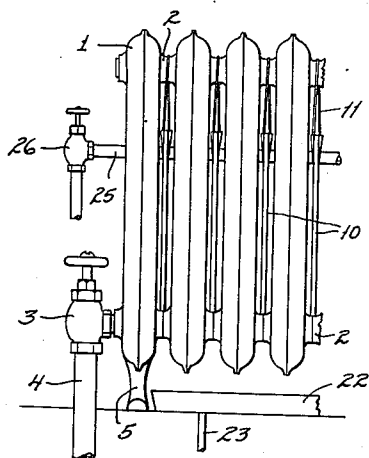


Fig. 1

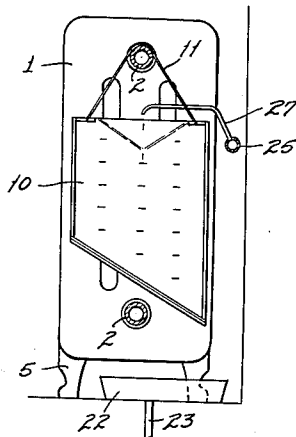


Fig. 2

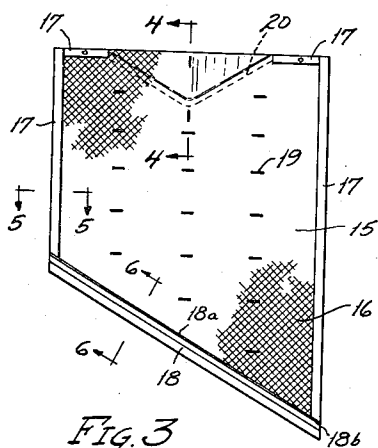


Fig. 3

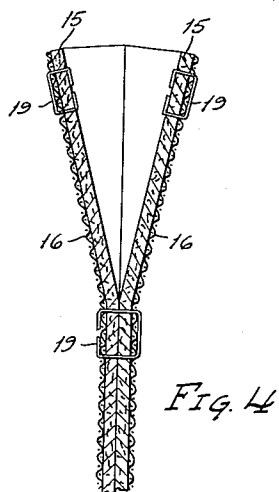


Fig. 4

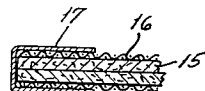


Fig. 5

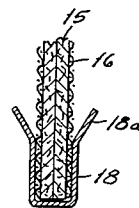


Fig. 6

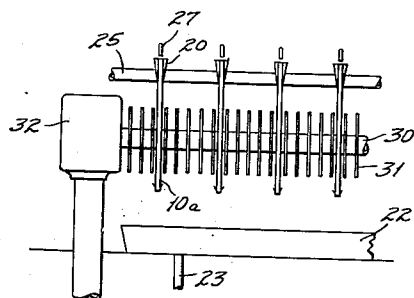


Fig. 7

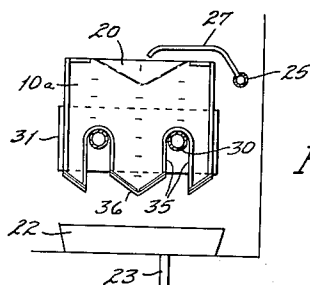


Fig. 8

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HUMIDIFYING SYSTEM AND APPARATUS

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5 Claims. (Cl. 261-103)

This invention relates to a humidifying system and apparatus, particularly for use in connection with convection radiators. These, as now used, in apartments, office buildings, dwelling houses, etc. are generally of two types, namely, the sectional type (made from a plurality of hollow iron castings, assembled so that they communicate with each other to form a complete radiator unit), and the tube-and-fin type (employing one or more parallel tubes with metal radiating fins projecting from the tube or tubes). Examples of both types are herein shown in connection with respective illustrative adaptations of the present apparatus thereto.

Various humidifying expedients have been devised for use with convection radiators of both types, and which employ the heat of the radiator to vaporize water and disseminate the vapor into the space heated by the radiator. A number of these employ open pans or vessels arranged to be heated by the radiators; and some incorporate wick arrangements operating in connection with suitable water reservoirs adapted to receive heat from the radiator with which associated. In general, said expedients have proved unsatisfactory, principally because water standing in an open vessel eventually becomes sour and then stinks. Moreover, deposits of lime and other salts on the bottoms and walls of such vessels and receptacles occasioned by the action of heat on the standing water are extremely difficult to remove. Furthermore, it is practically impossible to obtain the desired degree of humidity by such methods due principally to the relatively enormous volume of water required by the air for such purpose. In average climates it requires from ten to twenty-five gallons of water per day to properly humidify the air in a six-room residence in winter.

With the above in view, the principal object of the present invention is to provide a humidifying system and apparatus which will not have the above mentioned disadvantages, and which will operate efficiently indefinitely without requiring attention, to supply the desired degree of moisture for proper humidification.

Another object is to provide a humidifying element or unit which will operate effectively with standard convection radiators, without having to dismantle the same for installation, or alter the construction thereof, or having to supply a great variety of shapes and sizes of apparatus.

Another object is to provide a humidifying device which will operate properly without re-

quiring any special reservoir, other than the necessary pipes or tubes to conduct water to the device.

Still another object is to provide a practical humidifying element, which may be made sufficiently inexpensively to permit the same to be easily replaced when accumulation of lime and other foreign matter renders the same inefficient.

Other objects and features of the invention will become apparent from the following description relating to the accompanying drawing, showing exemplary forms.

Referring to the drawing, Fig. 1 is a side elevation showing part of a radiator of the sectional type, above mentioned, and including the humidifying apparatus hereof in one form; Fig. 2 is a sectional end elevation of the same radiator and apparatus; Fig. 3 is a side elevation showing one form of humidifying element; Figs. 4 to 6 are detail sectional views of the humidifying element of Fig. 3, as indicated thereon; Fig. 7 is a side elevation of part of a tube-and-fin type radiator and a modified form of humidifying apparatus associated therewith; Fig. 8 is a sectional end elevation of the arrangement shown in Fig. 7.

Referring to Figs. 1 and 2 conventional cast-iron radiator sections are shown, assembled together to form a radiator unit of suitable length, one end only of said unit being illustrated. The sections have hollow boss effects 2 which match in position on adjacent sections to communicate them, and which also generally space the sections apart an inch or so. The radiator may be supplied by steam or hot water, as through a valve 3 and supply line 4.

Such radiator may be supported on legs, brackets or by the supply and discharge pipes, so that the radiator unit is in spaced relation to the floor and adjacent wall of the building occupied thereby. The endmost sections may have legs, as indicated at 5.

The humidifying elements hereof are in the form of individual evaporating pads 10. These are adapted to be disposed between the radiator sections 1, on any suitable support, for instance, wires 11, passing over the upper boss effects 2 of adjacent radiator sections. Irrespective of the manner of their support, the elements present their broad faces to the relatively broad heating surfaces of the radiator sections, and, when the radiator is functioning, more or less rapid evaporation of water from the pad or pads takes place.

The pad, as shown in Figs. 2 and 3, preferably has parallel vertical side edges, horizontal top

edges and diagonal or inclined bottom edges. In construction, these pads may comprise two sheets or layers of absorbent material 15, say loose asbestos fibre board or blotting paper (as many layers as desired) and this material is reinforced, preferably externally, by metal screen 16 or equivalent open or reticulated reinforcing material.

The open reenforce prevents the absorbent material from warping and thus coming into contact with the radiator, but nevertheless nearly completely exposes the absorbent material for heating and evaporation of the water content thereof.

The sides, bottom and part of the top edges of the pad are preferably bound as by folded metal binding strips 17, 18, of more or less conventional construction (special at the bottom, as will be later mentioned) and the metal screen and interposed absorbent layers may all be fastened together as by wire stitches or staples 19 passing therethrough, as indicated in Figs. 3 and 4.

Referring to the water reception pocket, a generally triangular upper region of the pad is left unstapled or fastened and unbound, so that the absorbent layers and the metal reenforce may be spread apart as shown in Fig. 4, as by hand, to form a permanent water-receiving pocket 20. The shape of the pocket may be as indicated by the dotted lines 20, Fig. 3.

If desired, the layers 15 may be individually fastened to the adjacent reenforce coextensively with the pocket area so that the absorbent material will not warp and draw away from the reenforce in such manner as to close or partially close the pocket.

Referring to the binding strips, these, being generally U-shaped, see Figs. 5 and 6, form edge-retaining troughs for excess water, and this function is particularly important at the bottom edge or edges of the pad, where definite discharge point or points may be provided for drainage of any such excess. The binding strip 18, Figs. 3 and 6, has outwardly flared free edges 18a which catch whatever water may collect on and run down the outer pad surface. The trough effect formed by the bottom edge binding obviously drains at the lower corner 18b, which may be open, and the opening may be located over any suitable water catch. A catch basin 22 is indicated in Figs. 1 and 2, 7 and 8, which may drain into the sewage system through a suitable pipe 23. Once the entire apparatus of the system is properly adjusted, the catch basin becomes unnecessary, for the reason that the pads evaporate all the water that is fed to the pockets.

It may be noted that the pads may be packed flat for economy in shipping and storage space; the pocket effects being formed by distorting the screen and absorptive layers when the pads are installed.

The arrangement for admitting water at intervals into the pocket effects 20, comprises, as shown, a water feed pipe 25, provided with a suitable manually or automatically controllable valve or valves. A hand valve is shown at 26. The feed pipe extends adjacent the radiator, parallel therewith, and small branch tubes 27 lead laterally from the pipe 25 between the radiator sections, the branches terminating over respective pocket effects of the pads. Preferably, the pipe 25 is disposed below the level of the pockets 20 of the pads, so that in the event the discharge ends of any of the branch tubes dip into water contained in the pocket effects, water will nevertheless

not be syphoned out of the feed pipe to overflow the pocket or pockets. Ordinarily, this could not occur because the branch tubes discharge from points above the pockets, and, moreover, water is unlikely to accumulate to any material extent in the pockets.

Referring now to the illustrated adaption to radiators of the tube-and-fin type, (Figs. 7 and 8), horizontal radiator tubing is shown at 30 provided with fins in the form of transverse metal plates 31, the plates having openings closely embracing the tubes, two of which latter are shown. The tubes lead from hollow headers 32, one only of which is shown, and to and from which the heating fluid is supplied and removed. We propose to supply the pads so that as many of these as needed may be disposed between adjacent fins 31 and present their broad faces to the broad faces of the fins.

The pads 10 are cut away at their bottom edges, forming recesses 35 to clear the tubes, so that the pads may be set down over the tubes and be fully exposed to said broad heating surfaces while spaced therefrom, as above mentioned.

Any convenient suspending or supporting means may be provided. As a practical matter, the pads may rest on the tubes for support; the lower edges of the pads having metal binding as before, following the contour of the recesses and provided with flaring sides (per 18a Fig. 6 for example) for surface drainage.

The construction of the pads 10a may be essentially the same as previously described in connection with the pads 10; the bound diagonally inclined bottom edges 36 draining excess water toward definite drain points, as will be obvious from inspection. The other parts of the system are arranged essentially as above described and the parts are similarly numbered.

The humidifying elements, in both forms shown, conveniently fit between the spaced radiating surfaces of the radiator, and may be made as inconspicuous as desired while presenting their broad evaporating surfaces to the said radiating surfaces on both sides. The heat of the radiator will normally maintain the exposed surfaces of the absorbent layers in an apparently dry condition, and the overflow provisions, such as the trough effects 18, 18a, etc. and the catch basins, are safety measures.

It will be seen that the pads solve the difficulties above spoken of with respect to standing or stagnant water. Since the water is intended to be admitted to the pockets at intervals and in small quantities, such water will, in most cases, be very quickly absorbed into the pad for subsequent evaporation. The pockets have ample capacity to store water in event of temporary over-feeding (drop by drop e. g.) and in event of purposely feeding measured volumes at predetermined definite intervals. Incrustations formed by deposits from the evaporated water will be retained in the inner structure of the pad. This is a desirable feature since such incrustations, as published experiments have demonstrated, act both as a deodorant and germicide.

After the pads have operated for a year or so, the deposit of mineral and other matter from the water will eventually clog the pores of the absorbent material and reduce the efficiency of the pads. It is then a simple matter to remove the pads and replace them without disturbing the rest of the apparatus. The cost of so doing is negligible over so long a period of time.

As stated above, the ingress of water to the

supply pipe 25 may be under the control of a valve 26 which may be merely manually cracked, so as to allow the water to escape drop by drop from the feed ducts 27. Since this method would not ordinarily be very accurate, we propose using with the system a timing device for energizing a solenoid operated water inlet valve at regulatable intervals to admit water to the supply pipe for a few seconds, say, every fifteen or twenty minutes, or as may be required. Such solenoid valve is, in turn, controlled by an electric humidostat for opening the solenoid circuit whenever the relative humidity in the apartment, office or dwelling reaches a predetermined degree, and again closing the circuit when the humidity falls. Electrical equipment of the above described nature being well known, it is not believed necessary to illustrate the same.

We claim:

1. A humidifying element adapted for use between spaced radiator surfaces, comprising a laminated body of absorbent material in sheet form, the sheets of which are adapted to be spread apart at one edge of the body to provide a water pocket, and a reinforcing metal retainer for the body, having a multiplicity of vapor discharge openings.

2. A humidifying pad, comprising superposed sheets of absorbent material and a metal screen cover, means to hold said cover and sheets together, said means being absent from one por-

tion of the pad, near one edge, whereby the sheets and screen may be spread out to provide a water pocket.

3. A humidifying unit, comprising a body sheet of absorbent material, a reticulate metal reinforce substantially coextensive with the sheet, on one face of the latter, a channel shaped binder for the unit adapted to embrace margins of the reinforce and sheet, said binder forming a trough at the bottom edge of the unit for conducting surplus water to a definite drainage point.

4. A humidifying element, comprising a generally flat body of absorbent material, a reticulate metal reinforce having portions lying on both main faces of said body, said element being adapted to operate in upright position, binding means for the lower edge margins of the element, said binding means being generally U-shaped in cross section and having upwardly and outwardly directed flange portions for catching water from the outer surface of the element.

5. A humidifying element, comprising superposed absorbent sheets which are bound together in certain regions, and unbound at least at one edge of the element, whereby the sheets may be spread apart at such edge to form a water-receiving pocket.

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