ABSTRACT

A system for the automatic humidification of air being heated and distributed within a mobile or modular home having a heater unit delivering heated air into distribution conduit means at floor level, the heater unit comprising a housing containing a source of heat and a blower within its upper end for drawing in air to be heated and discharging that air downwardly past the source of heat, and a passage defining adapter secured over a top opening in the housing mounting a humidifier unit having an outlet for supplying moistened air substantially directly to the inlet of the blower for mixing with the air being drawn into said blower.

4 Claims, 6 Drawing Figures
This is a continuation of application Ser. No. 249,788 filed May 3, 1972 now abandoned.

This invention relates to the humidification of mobile or modular homes and the like and particularly to a special combination of heater system and humidifier components.

The growing use of trailers and like mobile homes as more or less permanent dwellings has resulted in improvements for reliably heating them. For example, it has become known to provide in these mobile homes forced draft downflow furnaces that pass air over a sealed combustion chamber or equivalent heat source and the heated air enters ducting below the floor which distributes the heated air into the interior of the home through a series of floor registers. An example of one type of furnace and heating system is disclosed in Davis et al. U.S. Pat. No. 3,601,116. Similar heating system arrangements have become common in modular homes.

While provision is made for introduction of some fresh air from outside the home to replace leakage, most of the air is recirculated with the home and reheated repeatedly. This results in gradual drying out of the air, with accompanying undesirable effects such as warping and shrinking of wooden doors and panels, as well as respiratory difficulties and discomforts to the occupants. The present invention is directed toward solution of this dry air problem, by providing for special controlled automatic humidification of the air being circulated within such homes, and this is the major object of the invention.

A more specific object of the invention is to provide a novel heater system and humidifier assembly combination in a mobile or modular home wherein the humidifier is mounted on the upper end of a downdraft furnace and has a branch connection to the heated air distribution duct or conduit beneath the floor.

Further objects will appear as the description proceeds in connection with the appended claims and the annexed drawings.

**BRIEF DESCRIPTION OF DRAWINGS**

FIG. 1 is a generally perspective view illustrating a preferred embodiment of the invention;

FIG. 2 is a side elevation mainly in section substantially on line 2—2 of FIG. 1 showing internal detail;

FIG. 3 is a fragmentary front elevation partly broken away and sectioned substantially along line 3—3 in FIG. 1, showing the air duct arrangement at floor level;

FIG. 4 is a front elevation generally in perspective showing the humidifier unit apart from the furnace;

FIG. 5 is a generally perspective exploded view showing how the humidifier is associated with the furnace top; and

FIG. 6 is a fragmentary view in section generally on line 6—6 of FIG. 2 illustrating humidifier action.

**PREFERRED EMBODIMENTS**

Within the interior of a mobile or modular home of generally conventional construction is installed a heater or furnace unit. As shown in FIG. 2 the home comprises a side wall 13, a roof 14 and a floor 15 spaced above a bottom wall 16.

The heater unit 12 may be located adjacent the wall 13 and is contained in a sheet metal housing 20 having a rear wall 19, a top wall 21 and side walls 22 and 23. Mounted within the housing is a sheet metal firebox 24 enclosing a combustion chamber containing a fluid fuel burner 25 connected to a gas or liquid fuel supply conduit system indicated at 26. The upper end of the combustion chamber 27, which is otherwise sealed is open to atmosphere through a flue 28 extending through the roof. An electrical unit may replace the combustion chamber as the source for heating the air in the broader aspects of the invention.

At the lower end of housing 20, the bottom wall and the floor are apertured at 29. A sheet metal casing 31, having an upper wall 32, extends in surrounding spaced relation to the firebox and through the aperture 29 where, below the floor, it appears as a conduit section 33 that extends horizontally in the space 30 between the floor and bottom wall 16. As shown in FIG. 3, conduit section 33 is a distribution conduit connected to one of more floor mounted registers 34 opening into the living space.

Within the upper portion of housing 20, a suitably mounted blower 35 of the centrifugal fan type has its outlet 36 connected through an apertures 37 in casing wall 32. Cool air is drawn into the housing and the blower intake 40 from the interior of the home through a louvered opening 42 in housing wall 19 and a filter 41, as indicated by arrows in FIG. 2. Also, as indicated by arrows in FIG. 2, the air delivered by blower 35 passes downwardly through casing 31 over the heated surface of the firebox and enters conduit section 33, from which hot air emerges through registers 34 (FIG. 3) to heat the interior of the home. Thus air is recirculated within the home and the temperature is controlled by suitable conventional thermostats and like devices (not shown).

Continuous recirculation and reheating will dry the air within the home abnormally, and the present invention provides automatic humidification to combat that problem.

A humidifier unit 41 is mounted on the top wall of housing 20 by means of a plenum adapter device 42. The humidifier unit itself may be a known type wherein (FIG. 6) an open-ended annulus 43 of polyurethane foam is rotated about its axis by a slow speed motor with its lower periphery disposed in a reservoir of water (not shown). A branch tube 44 which may be a flexible plastic pipe and may be insulated if necessary has its lower open end projecting through floor 15 and into the interior of hot air conduit section 33 and its upper open end mounted in a wall of the humidifier unit, so that hot air may be extracted to continually discharge into the humidifier unit. Preferably tube 44 enters an opening in end wall 45 of the humidifier for direct entry to the open end of annulus 43.

After passing through the water laden annulus, this extracted air passes without leakage through aligned side openings 46 and 47 in the humidifier and adapter respectively. The humidifier is secured to the side wall of adapter 42 by suitable screws (not shown) fixedly attaching the adjacent flush contacting walls containing openings 46 and 47. As shown in FIG. 2 the adapter 42 is open at its bottom over the housing opening at 48 to discharge humidified air down into the interior of housing 20 and, since opening 48 is preferably located operatively adjacent the inlet to blower 35, the humidified air will be drawn through the blower to mix with the incoming relatively cool air arriving from housing open-
ing 38 and uniformly impart moisture to the air being heated and supplied to the living space with the home. Since the pressure at the blower inlet is below that of the heated air in conduit 33 a suitable continuous flow of air through the humidifier is assured whenever air is being heated in the furnace.

Adapter 42, see FIGS. 2, 5 and 6, is rectangular in horizontal cross section and open only at 47 to the humidifier and at its lower end where it extends over housing opening 48 which is of the same size. Flanges 49 around the open lower end of the adapter are secured tightly to housing wall 21 around opening 48 as by screws 51, whereby the adapter and the humidifier mounted on it are supported on the top of the heater housing.

Humidifier unit 41 is shown rather diagrammatically and it may be essentially of conventionalconstruction per se. For example, see Stiles U.S. Pat. No. 3,640,515. Tube 44 may preferably be a length of flexible plastic pipe capable of conducting the heated air into the humidifier. A plastic clear window is provided in the humidifier to inspect the condition of the annulus.

In practice the heater unit 12 may be of conventional structure already installed and existing in the home. The invention may be incorporated merely by cutting a hole in the heater housing top, mounting the adapter and humidifier assembly over the hole, and then connecting the humidifier to the hot air conduit below the floor by cutting a suitable hole in the floor and providing a suitable length of plastic tubing. Thus the invention may be used for both old and new home installations where the furnace arrangements permit.

As shown in FIG. 1 the humidifier may have a side opening closed by a knockout closure 50 should it be desirable or more convenient to attach tube 44 to that side.

While the humidifier and adapter are disclosed as separate housings, it is within the scope of the invention to make the adapter member an integral extension of the humidifier housing. Also instead of extending through the living space as shown, tube 44 could be built into the adjacent wall of the home, especially in new constructions.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by letters patent is:

1. Apparatus for the automatic humidification of heated air comprising a hot air heater unit having a housing enclosing a source of heat, said housing having a top wall provided with a first opening and a further wall provided with a second opening, a blower for drawing in air to be heated from said space through said opening in said further housing wall mounted within the upper part of said housing with its inlet adjacent said top wall opening and its outlet adapted to direct air toward said source of heat, a hollow adapter member secured upon the top wall of said housing, said adapter member having a bottom opening extending substantially coextensively over the opening in the top wall of said housing and a further opening in another wall thereof but being otherwise closed, and a humidifier unit mounted on said adapter member, said humidifier unit having an inlet for entrance of air to be moistened and a moist air discharge outlet at said further opening in said adapter member, whereby said adapter member provides a substantially direct passage between the humidifier outlet and the blower inlet where moist air from the humidifier is mixed within the housing and prior to entering the blower inlet with air being drawn through said second opening in the housing.

2. The apparatus defined in claim 1, wherein distribution conduit means is provided for receiving heated air that has been forced past said source of heat by the blower, and branch conduit means is provided between said distribution conduit and the inlet of said humidifier unit.

3. The apparatus defined in claim 1, wherein a casing is mounted within the lower part of said housing enclosing the source of heat and defining a passage providing for air flow past the source of heat, and means is provided for connecting the blower outlet to discharge into said passage.

4. In the system defined in claim 2, said distribution conduit means being disposed below the floor of said home, and said branch conduit means being a tube extending through the floor from said distribution conduit means to said humidifier.

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