

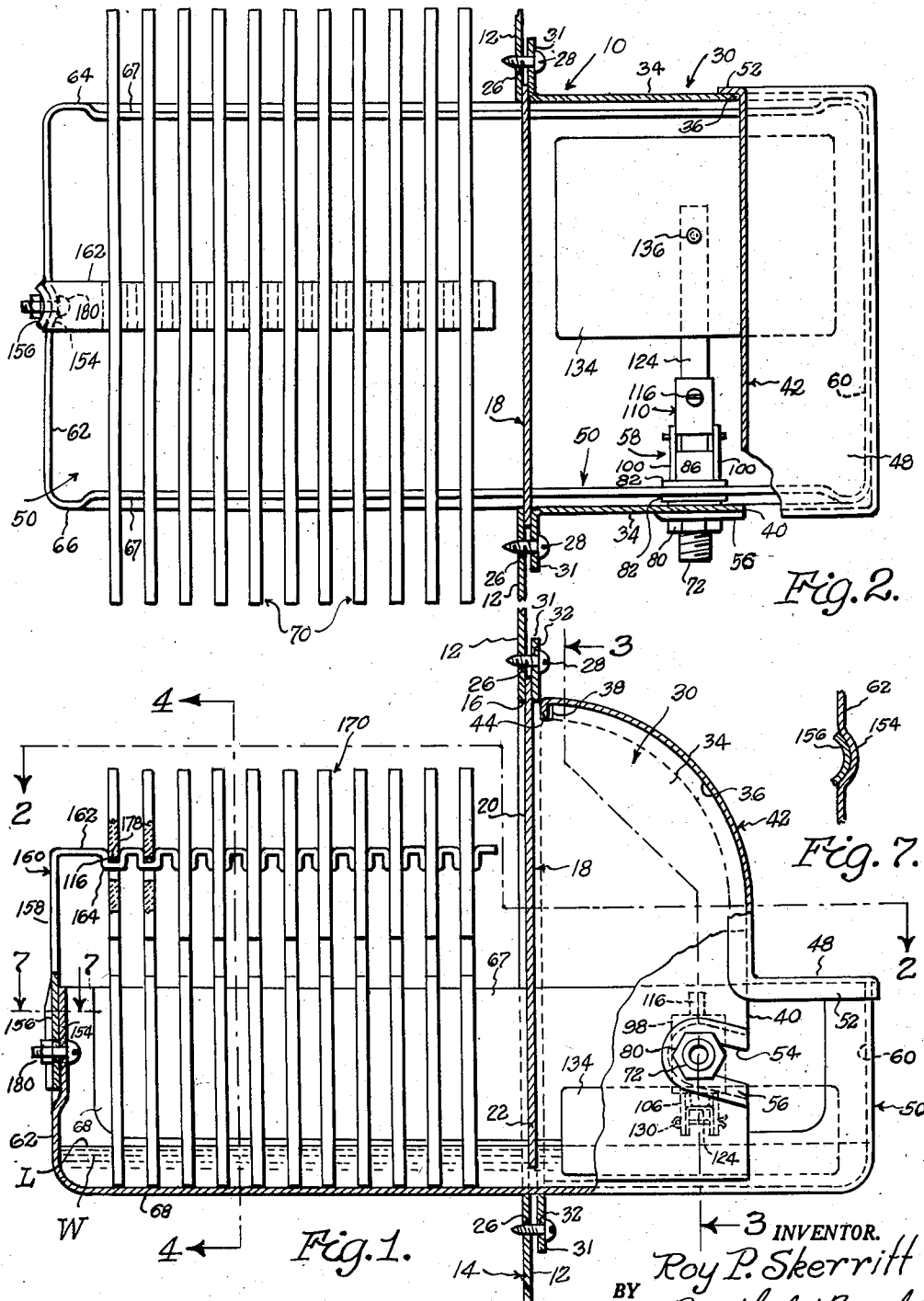
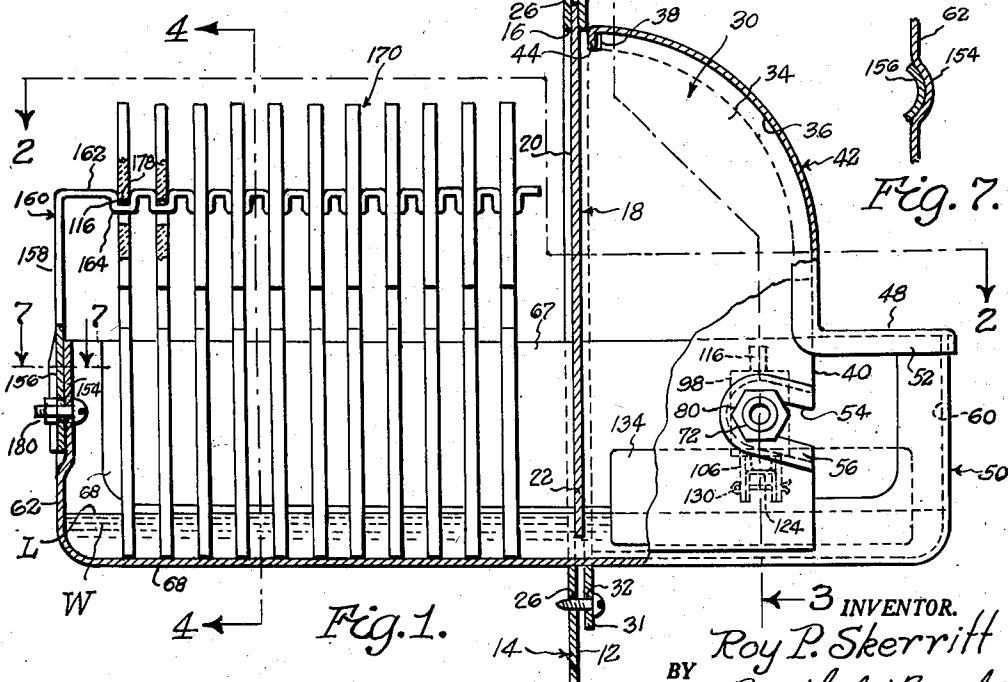
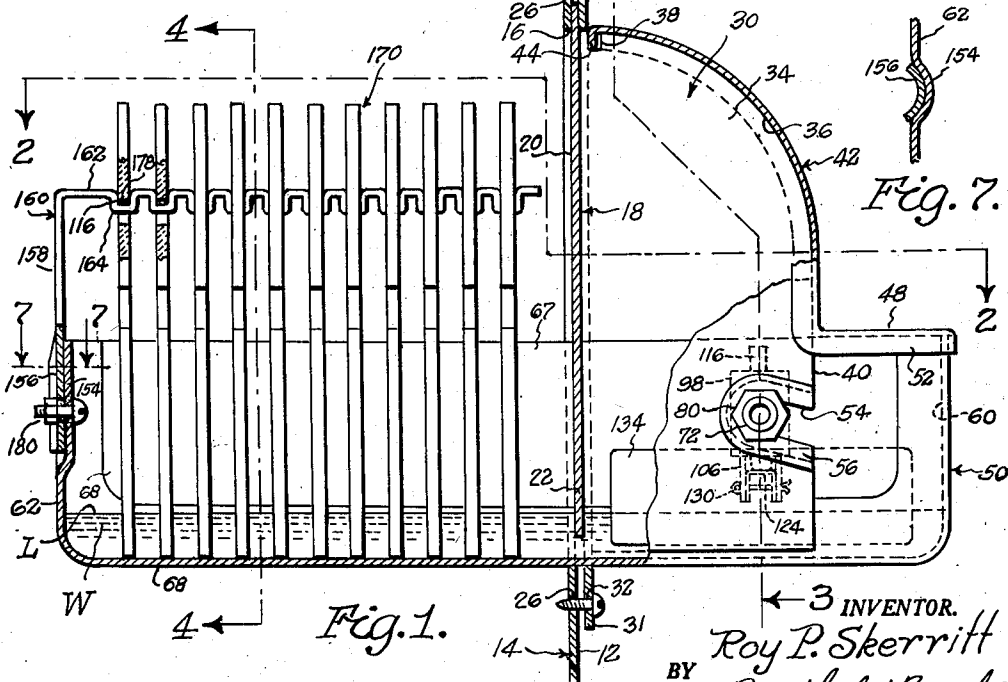
Jan. 27, 1959

R. P. SKERRITT
FURNACE HUMIDIFIER

2,870,762

Filed Oct. 25, 1955

2 Sheets-Sheet 1



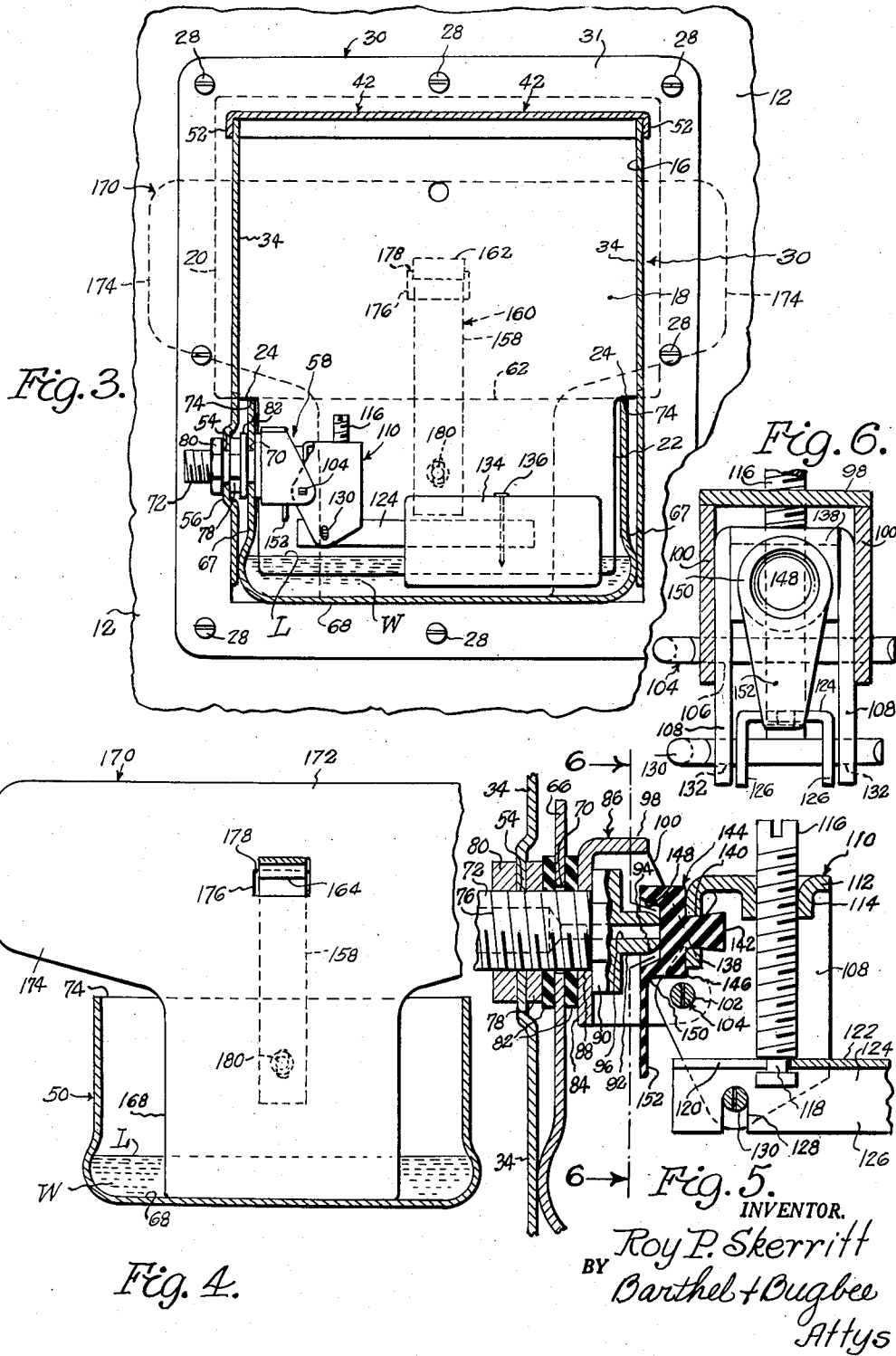
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FURNACE HUMIDIFIER

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2 Claims. (Cl. 126—113)

This invention relates to humidifiers and, in particular, to furnace humidifiers.

One object of this invention is to provide a furnace humidifier mounted on the furnace casing by means of an external mounting bracket attached thereto, the humidifier valve and float unit being mounted in the pan entirely outside the furnace casing where it is protected from the heat and consequent deposition of lime arising in the heated zone of the humidifier pan inside the furnace casing.

Another object is to provide a furnace casing humidifier of the foregoing character wherein the valve and float unit and the humidifier pan are secured to the mounting bracket by a part of the same means which also secures the valve to the pin, such as by a nut threaded onto the valve nipple.

Another object is to provide a furnace humidifier of the foregoing character wherein the mounting bracket contains a notch with an open front end into which the threaded valve nipple is slid and secured by means of nuts threaded thereon which also secure the valve nipple to the humidifier pan, the open-ended notch thereby enabling the pan and valve assembly to be inserted or removed from the furnace casing and mounting bracket merely by loosening a nut on the valve nipple and sliding the valve and pan assembly into or out of the notch, the notch being preferably inclined to inhibit accidental loosening of the valve nipple nut, this notch in the mounting bracket containing the threaded valve nipple also enabling the humidifier pan and float-operated valve unit to be quickly and easily removed for cleaning purposes and to be replaced with a minimum of labor or effort.

Another object is to provide a furnace humidifier of the foregoing character which is of more rugged construction, provides greater evaporating capacity by reason of enabling the mounting of more evaporator plates in a given space than hitherto, and, by locating all parts of the float and float-operated valve outside the furnace casing, without the necessity of a slot or other opening in the partition therebetween, provides superior operation with greater freedom from lime deposition or corrosion, especially under the heavy duty conditions encountered in geographic areas possessing hard water.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings, wherein:

Figure 1 is a vertical section through a furnace humidifier attached exteriorly to a furnace casing, according to one form of the invention, with an external portion thereof shown in side elevation;

Figure 2 is a top plan view partly in horizontal section, taken along the line 2—2 in Figure 1;

Figure 3 is an approximately vertical cross-section taken along the line 3—3 in Figure 1;

Figure 4 is a vertical cross-section taken along the line 4—4 in Figure 1;

Figure 5 is an enlarged central vertical section through

the flow control valve and adjacent float arm structure used in the furnace humidifier of Figures 1 to 4 inclusive;

Figure 6 is a cross-section taken along the line 6—6 in Figure 5; and

Figure 7 is a fragmentary horizontal section through the evaporator pan and evaporator plate bracket taken along the line 7—7 in Fig. 1.

Referring to the drawings in detail, Figures 1 to 4 inclusive show a furnace humidifier, generally designated 10, according to one form of the invention as mounted upon the casing 12 of a conventional heating furnace 14 and projecting through an approximately rectangular aperture 16 in the casing 14. As shown by the dotted lines in Figure 3, the aperture 16 is almost entirely closed by an approximately T-shaped partition 18 with an upper portion 20 wider than the aperture 16 and a narrower lower portion 22 separated from one another by horizontal shoulders 24. The casing 12 surrounding the aperture 16 is provided with multiple screw holes 26 receiving screws or other fasteners 28 which secure to the furnace casing 12 a humidifier mounting bracket, generally designated 30, and also the humidifier partition 18 (Figure 1).

The mounting bracket 30 consists of an approximately rectangular border portion 31 which is drilled as at 32 in alignment with the casing holes 26 to receive the screws or other fasteners 28. Projecting outwardly from the border portion 31 are two parallel mounting wings 34, each having an arcuate upper edge portion 36 terminating at its upper end in a notch 38 and at its lower end in a forward vertical edge portion 40. Fitting over the edge portions 36 and 40 is a correspondingly-shaped cover 42 having an upper edge flange 44 hooking into the notches 38. The cover 42 is curved to fit the arcuate edge portion 36 of the mounting bracket wings 34, and has a horizontal portion 48 fitting over the top of the front end of a humidifier pan, generally designated 50. The cover 42 is edge-flanged as at 52 to overhang the arcuate portions 36 of the mounting bracket wings 34 and also the front end of the humidifier pan 50. One of the wings 34 in its forward edge 40 is provided with an upwardly and inwardly inclined notch 54 with a raised border portion 56 (Figures 1 and 3) for securing the humidifier pan 50 to the mounting bracket 30 in cantilever-supported relationship therewith and also securing the float-operated valve unit, generally designated 58, to the wings 34 of the mounting bracket 30, as explained below.

The humidifier pan 50 is of elongated approximately rectangular shape with front and rear walls or ends 60 and 62 respectively, opposite side walls 64 and 66, each being inwardly bent as at 67 along the major portion thereof between its opposite ends 60 and 62, and a bottom wall 68. The left-hand side wall 66 (Figure 3) is provided with a hole 70 aligned with the rearward end of the notch 54, both serving for the passage of the threaded valve nipple 72 of the float-operated valve unit 58. The lower or narrower portion 22 of the partition 18 extends downwardly into the humidifier pan to a location near the bottom wall 68 thereof (Figure 3), and the shouldered portion 24 rests upon the upper edges 74 of the humidifier pan 50.

The valve nipple 72 is threaded as at 76 on the portion which passes through the hole 70 and notch 54 in the humidifier pan side wall 66 and mounting bracket wing 34 respectively (Figure 5), and carries nuts 78 and 80 by which it is secured thereto, with the intermediate aid of washers 82 of elastic deformable material, such as synthetic rubber. Also mounted on the threaded portion 76 of the valve nipple 72 is the rearward vertical wall 84 of a combined pivot bracket and spray hood, generally designated 86, the rear wall 84 being provided with a hole 88 for the passage of the threaded portion 76 of

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the valve nipple 72. The forward end of the valve nipple 72 is provided with an enlargement or flange 90 terminating in a valve nozzle 92 having a rounded valve seat 94 thereon. A fluid passageway or bore 96 passes through the nipple 72 and connection is made to the outer end of the threaded portion 76 by a water pipe with a conventional threaded pipe coupling (not shown).

The combined pivot bracket and spray hood 86 (Figures 3 and 5) is provided with a top wall 98 which cooperates with the rear wall 84 and parallel side walls or wings 100 to form a spray hood over and on both sides of the nozzle portion 92 of the valve nipple 72, so as to prevent water from spraying in undesired directions. The side wings 100, rear wall 84 and top wall 98 are formed by bending operations from a single piece of sheet material, such as sheet metal. The side wings 100 broaden in a downward direction and their lower portions contain aligned pivot holes 102 which receive an upper pivot element 104, such as a cotter pin, which also passes through holes 106 in the parallel side walls 108 of a float arm carrier 110 pivotally mounted on the pivot element 104. The float arm carrier 110 has an upper wall 112 which is provided with an indented internally-threaded tubular portion 114 into which is threaded a float arm adjusting screw 116, the lower end of which is grooved as at 118 to enter a slot 120 in the upper wall or web 122 of a float arm 124.

The float arm 124 is of channel cross-section (Figure 6) and its side flanges 126 are provided with notches 128 extending upward from their lower edges (Figure 5) and receiving a lower pivot element 130, such as a cotter pin, which is inserted through aligned holes 132 in the lower portions of the parallel side walls 108 of the float arm carrier 110. Thus, by moving the adjusting screw 116 upward or downward, the outer end of the float arm 124 can be raised or lowered around the lower pivot element 130 as a pivot axis, thereby adjusting the position of the float 134 relatively to the float arm carrier 110. The outer end of the float arm 124 is embedded in the float 134, which is preferably of so-called form glass, by pushing it therein, securing it by a nail or other fastener 136 passing through both the float 134 and the upper wall 122 of the float arm 124.

The float arm carrier 110 is provided with a downwardly-extending rear wall or flange 138 (Figure 5) which is drilled as at 140 to receive the slightly tapered stem 142 of a valve member, generally designated 144. The valve member 144 has a cup-shaped head 146 with a cup-shaped recess or valve seat 148 engageable with the stationary valve seat 94 on the nozzle portion 92 of the valve nipple 72 (Figure 5). Extending downwardly from the rim 150 around the recess 148 is a bib or drip apron 152 to further inhibit the water spray from the nozzle portion 92 and prevent the water from reaching the metallic parts of the float arm carrier 110, float arm 124 and its associated parts. This provision of the bib or apron 152 and of nonconducting foam glass float 134 thus prevents an electrical connection from being established between the water in the humidifier pan 50, the float arm carrier 110 or float arm 124 and its associated parts and the valve nipple 72, with a consequent corrosive electrolytic action which otherwise would be caused by the action of the electrolyte-forming salts present in water in various parts of the United States. The valve member 144 with its associated parts 142 and 152 is preferably formed of elastic deformable material, such as synthetic rubber. Thus, the float-operated flow valve unit 58 is mounted transversely of the humidifier pan 50 in the forward end portion thereof located outside the furnace casing 12 and protected from the heat inside the latter by the partition 18.

The rearward end wall 62 of the humidifier pan 50 is grooved vertically as at 154 (Figure 7) to receive the lower end portion 156 of arcuate cross-section of the vertical arm 158 of the evaporator plate supporting brack-

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et, generally designated 160. The latter is of inverted L-shaped form, with a horizontal forwardly-extending arm 162 provided with approximately rectangular bent portions 164 forming approximately U-shaped notches 166 spaced longitudinally apart from one another along the major part of the length of the bracket arm 162. Mounted in the humidifier pan 50 and resting upon the bottom wall 68 thereof are the lower narrow portions 168 of evaporator plates 170 of approximately T-shaped form, the wider upper portions 172 of which have wings 174 overhanging the upper edges 74 of the humidifier pan 50 so as to increase the evaporating capacity of the humidifier 10. The evaporator plates 170 are of porous material, such as compressed glass fiber, to provide a capillary action to lift the water from the pan 50. The upper portions 172 of the evaporator plates 170 are provided with rectangular apertures 176, the upper edge portions 178 of which are received in the approximately U-shaped notches 166 to prevent the plates 170 from tilting or becoming otherwise displaced while their lower ends rest on the bottom wall 68 of the humidifier pan 50 (Figure 1). The vertical arm 158 and the rearward wall 62 are drilled to receive an adjusting and clamping bolt 180 by which the bracket 160 may be raised or lowered in order to cause the sides of the bent portions 164 of the upper arm 162 to engage the opposite side surfaces of the evaporator plates 170 while the upper edge of the aperture 176 remains slightly above the bottom of the U-shaped notch 166 in which it is received.

In the operation of the invention, let it be assumed that the furnace humidifier 10 has been mounted in the manner described above with the rearward end of the pan 50 extending through the aperture 16 into the interior of the furnace casing 12 and resting on the lower edge of the aperture 16 (Figure 1), that the evaporator plates 170 have been inserted and held in the above-described manner by the multiple-notched bracket 160, and that a cold water pipe has been connected to the threaded portion 76 of the valve stem 72 of the float-operated valve unit 58. Let it further be assumed that water W has filled the pan 50 to the level L thereof, the adjusting screw 116 having been adjusted to close the valve member 144 upon the valve nozzle portion 92 at the level L, shutting off the further flow of water until the heat within the furnace casing 12 causes sufficient evaporation of the water W from the pan 50 to lower the level L thereof.

Meanwhile, the heated air passing upward past the pan 50 heats the latter and the water W therein while at the same time the evaporator plates 170 by their capillary action pull the water upward into their wings 174 from which the heated air takes off water vapor in order to humidify the air passing upward through the heating ducts into the building structure heated thereby. When the water level L drops by evaporation, the float 134 and arm 124 thereof swing downward (Figures 3 and 6), rocking the float arm carrier 110 around its upper pivot element 104 so as to withdraw the valve member 144 from sealing engagement with the valve seat 94 on the end of the valve nipple nozzle portion 92. Water accordingly drips or sprays out of the passageway 96, depending upon the amount by which the valve is opened, gravity causing the water to drop or drip downward. The hood formed by the walls 84, 98 and 100 of the combined pivot bracket and spray hood 86 cooperating with the cupped recess 148 of the movable valve member 144, confine the water drip or spray to a downward direction, aided by the drip apron or bib 152. This construction protects the adjacent metal parts from corrosion or erosion by electrolytic action and also from excessive deposition of lime.

Since the entire valve and float unit 58 is in the forward end of the humidifier pan 50 outside the casing 12 of the furnace 14, the partition 18 prevents heat or heated air from the inside of the furnace casing 12 from reaching the float and valve unit 58, further protecting this mechanism from electrolysis or lime deposition. The forward

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end portion of the pan 50 is, moreover, at a lower temperature than the rearward end thereof for the further reason that its portion of the bottom wall 68 is cooled by the cooler basement air outside the furnace casing 12, still further reducing the damaging effect of the hot water W upon the float and valve parts. For these reasons, the applicant's humidifier mechanism operates freely for longer periods of time, and with a lower cost of upkeep, than prior humidifiers not so constructed and protected.

The life of the present humidifier is still further prolonged if, as is preferred, the partition 18 is made from a sacrificial metal, such as aluminum, which will be attacked by any electrolytic action before the remainder of the humidifier, thereby protecting the latter.

What I claim is:

1. A furnace humidifier comprising a mounting bracket having an apertured mounting plate adapted to be secured to the furnace and having upright wings extending outwardly therefrom in spaced parallel relationship, one of said wings having a notch extending inwardly from an edge thereof, a humidifier pan extending through said aperture with its front end portion disposed between and secured to said wings and with its rearward portion extending rearwardly from said mounting plate in cantilever-supported relationship therewith, a partition plate disposed adjacent said mounting plate and extending downwardly over the aperture therein into said pan, and a float-operated valve unit disposed substantially entirely within said front end portion of said pan forwardly of said partition plate, said valve unit having a liquid supply conduit connection portion thereon passing through said pan and said notch and having fastening means thereon detachably securing said pan to said bracket.

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2. A furnace humidifier comprising a mounting bracket having an aperture mounting plate adapted to be secured to the furnace and having upright wings extending outwardly therefrom in spaced parallel relationship, one of said wings having a notch extending inwardly from an edge thereof, a humidifier pan extending through said aperture with its front end portion disposed between and secured to said wings and with its rearward portion extending rearwardly from said mounting plate in cantilever-supported relationship therewith, a partition plate disposed adjacent said mounting plate and extending downwardly over the aperture therein into said pan, and a float-operated valve unit disposed substantially entirely within said front end portion of said pan forwardly of said partition plate, said valve unit having a threaded liquid supply conduit connection portion thereon passing through said pan and said notch and having fastening means thereon threadably engaging said threaded portion and detachably securing said pan to said bracket.

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