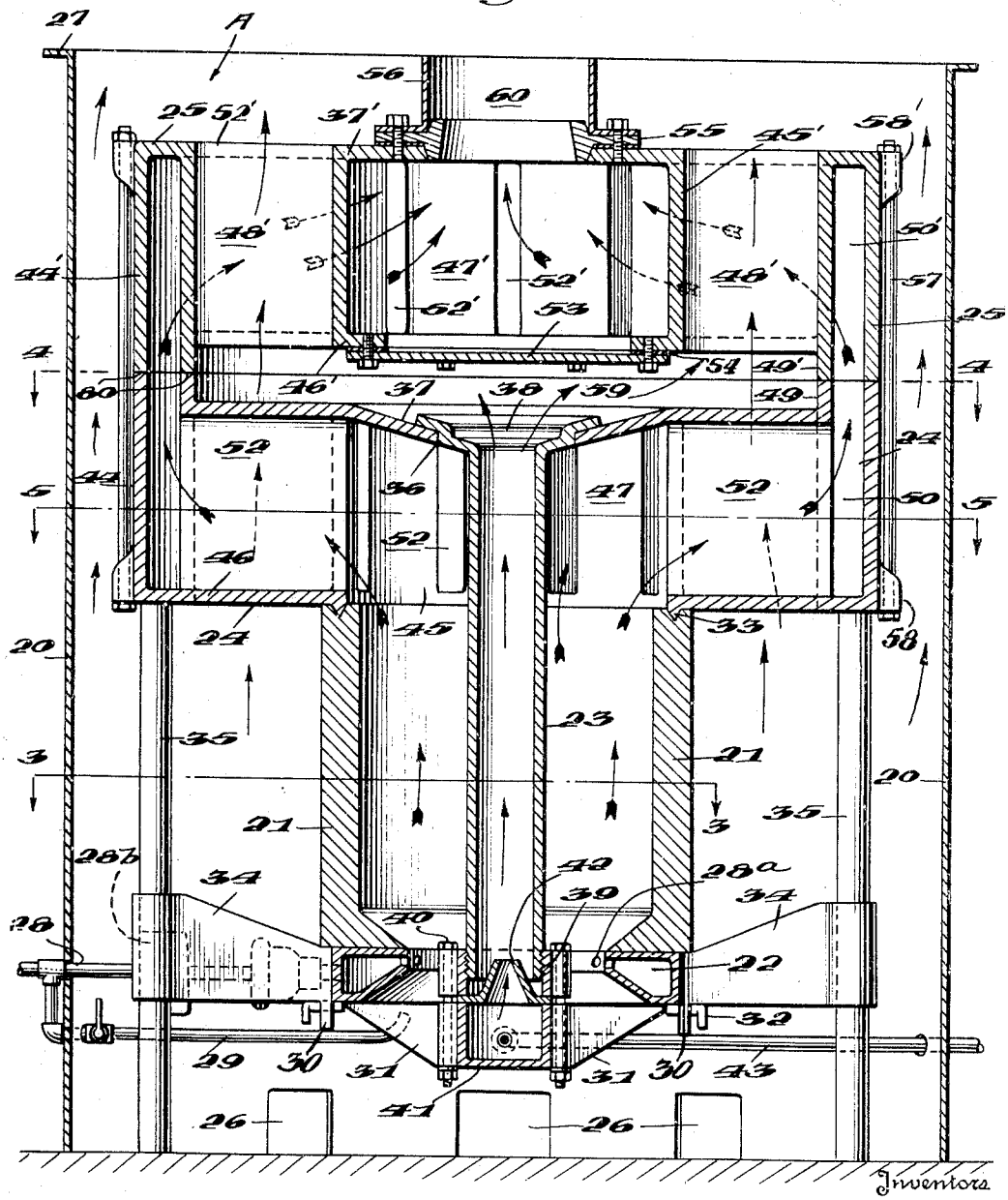
Nov. 8, 1949 A. E. MILLER ET AL 2,487,720

AIR HEATING AND HUMIDIFYING GAS BURNING FURNACE

Filed Dec. 1, 1947 3 Sheets-Sheet 1

Fig. 1.



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Filed Dec. 1, 1947 3 Sheets-Sheet 2

Fig. 2.

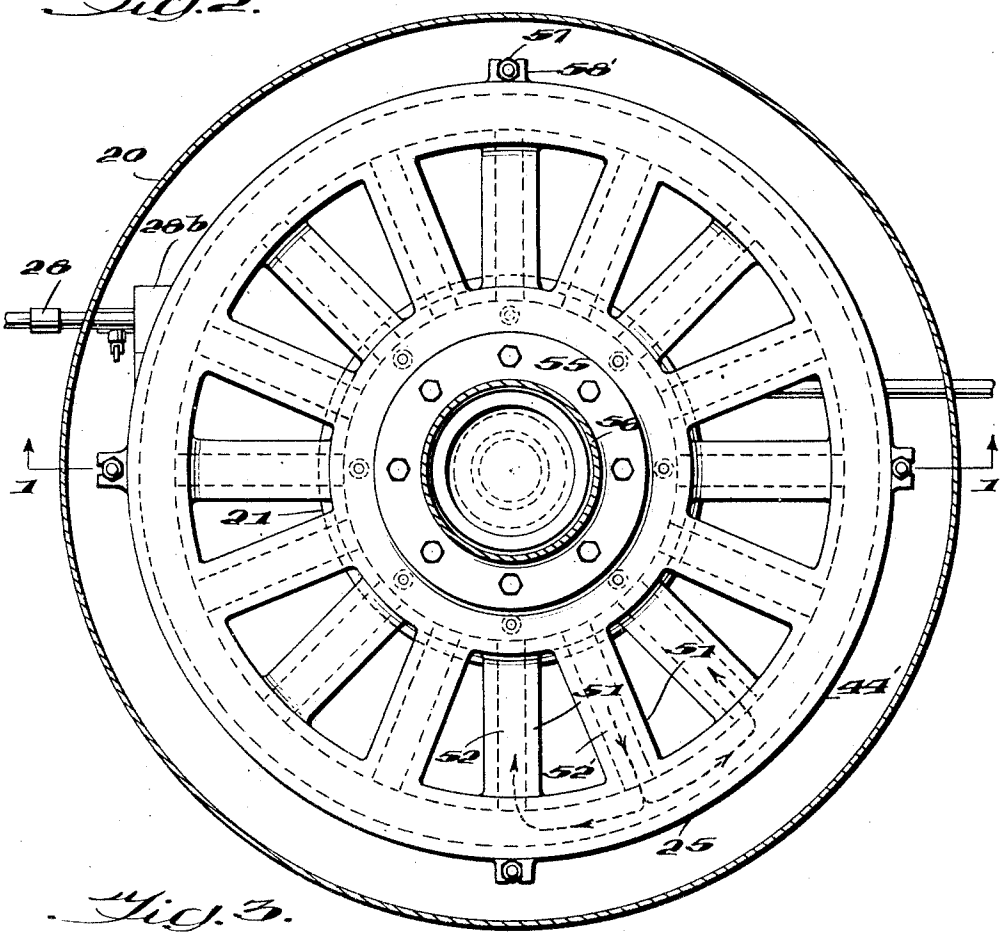
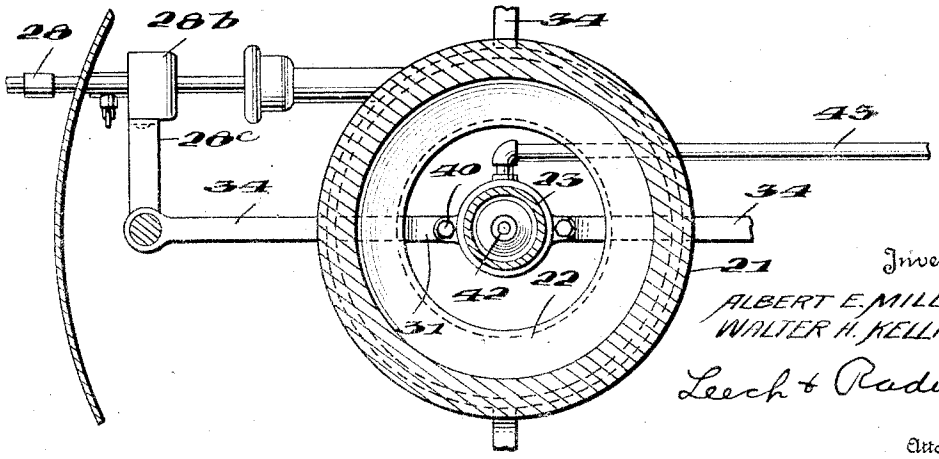


Fig. 3.



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Filed Dec. 1, 1947 3 Sheets-Sheet 3

Fig. 4.

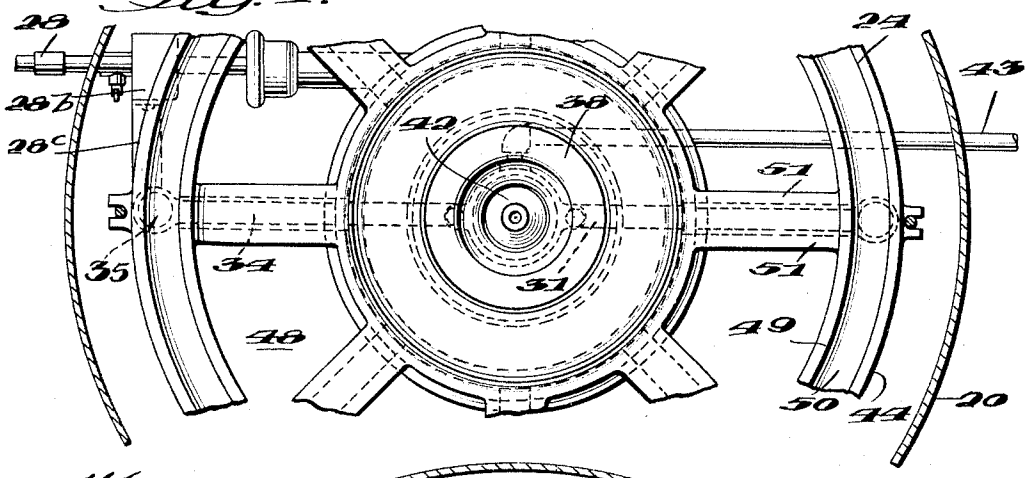
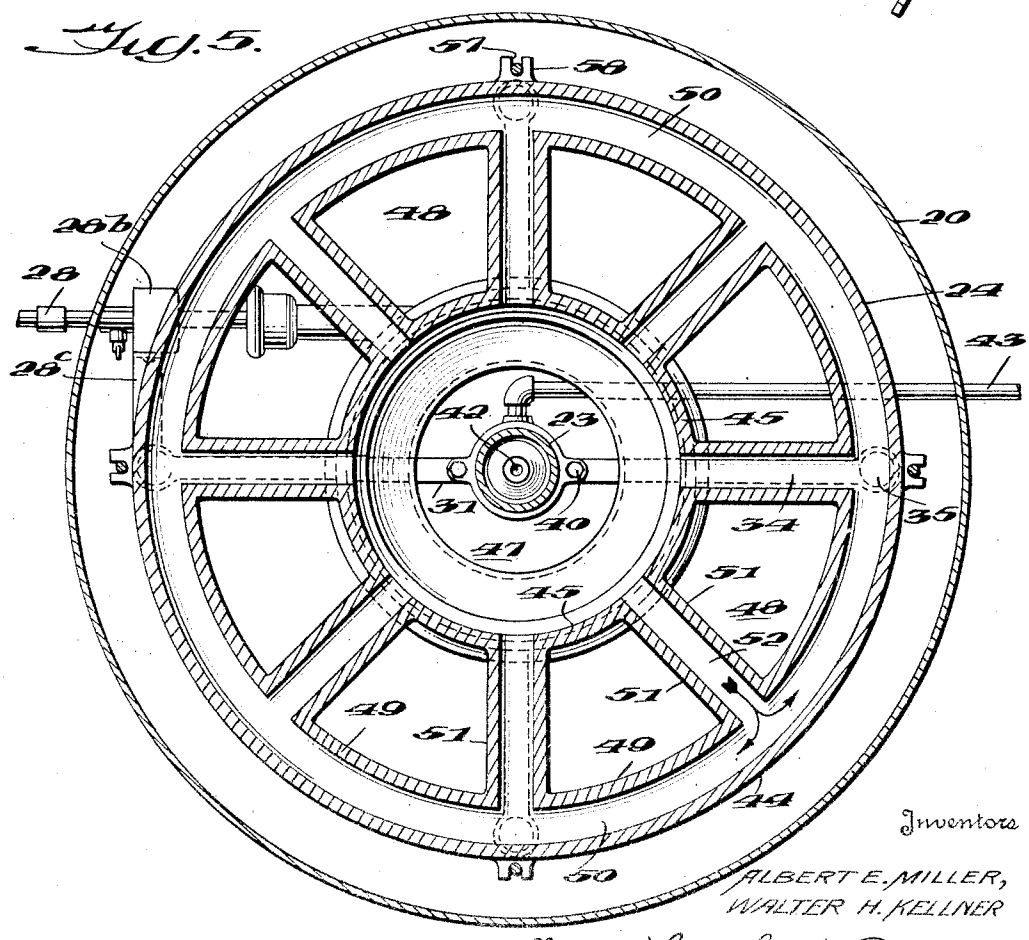


Fig. 5.



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AIR HEATING AND HUMIDIFYING GAS BURNING FURNACE

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6 Claims. (Cl. 126—113)

1

This invention relates to gas heaters and furnaces and more specifically to those types in which the humidity of the heated air may be controlled and adjusted as desired.

One of the primary objects of this invention is to provide an improved gas heater which may be utilized either as a floor heater for suspension beneath the floor of a room or hall as disclosed in Patent 1,766,394, granted to A. B. Miller and W. H. Kellner on June 24, 1930, or as a central heating unit adapted to heat a number of rooms.

Another important object of the invention is to provide novel means for permitting the heated air to circulate about and around the gas burner and into the room or rooms of the building to be heated, and in which the air to be heated is closely associated with but entirely separated from the air utilized to support combustion in the burner.

A further object of the invention resides in the provision of two or more superposed circular fume and air heating drums having outwardly disposed ring spaces and flow tubes for receiving the products of combustion from the burner and conducting them to the exterior of the building, and at the same time providing means whereby water vapor may be mixed with the heated air in controlled quantities to insure the proper humidity of the building to be heated.

A further object of the invention resides in the provision of a water spout and vaporizing tube assembly in which the tube extends vertically through a combustion chamber and communicates with openings between the flow tubes of the upper fume and heating drum, whereby the water may be quickly vaporized and admixed with the heated air to provide very healthful and beneficial heating.

A still further object is to provide a gas furnace unit that can utilize the old casing or walls of almost any conventional hot air heating plant.

A salient feature of this invention resides in the novel manner in which all of the heater and furnace parts are constructed and arranged so that they may be easily and quickly assembled or disassembled, thus enabling the unit to be quickly installed with a minimum of effort and greatly facilitating the cleaning and maintenance of the burner, water spout, combustion chamber and heating drums.

Further objects, advantages and features of invention and construction will appear from the following specification when taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a vertical section of a gas furnace installation, taken on the line 1—1 of Fig. 2, looking

2

in the direction of the arrows, and showing the flow paths of the products of combustion, heated air and water vapor;

Fig. 2 is a top plan view showing the arrangement of two superposed fume chambers and heating drums;

Fig. 3 is a section on the line 3—3 of Fig. 1, looking in the direction of the arrows, illustrating in particular the burner and water spout arrangement, and showing the gas and water inlets;

Fig. 4 is a section taken on the line 4—4 of Fig. 1, looking in the direction of the arrows, showing the top of the lower drum and the manner in which the water vapors and heated air are mixed; and

Fig. 5 is a section taken on the line 5—5 of Fig. 1, looking in the direction of the arrow, illustrating the novel arrangement of the heating drum and the separate courses for the products of combustion and the heated air.

Referring now to the drawings in detail wherein similar reference characters designate corresponding parts throughout the several views, the letter A indicates a heater installation which includes generally an outer casing 20, a cylindrical combustion chamber 21, a gas burner 22, a vaporizing tube 23, and two fume and heating drums 24 and 25, respectively.

The outer casing 20 has a series of openings 26 around its lower periphery through which fresh air is drawn to support combustion and for heating purposes as will be more fully explained in the operation of the furnace. The casing 20 is also provided with a flanged upper end 27 adapted either to fasten directly beneath a floor register as shown in Patent 1,766,394 or to be bolted or fastened to the dome structure of a conventional central heating plant having a blower, and a set of pipes and ducts for delivering heated air to a number of rooms in a dwelling. When used as a central heating unit, the casing or walls of an obsolete central heating plant of almost any type may be substituted for the casing 20, or, if the old casing be very large, the whole unit including the casing 20 may be placed in the old plant.

The burner 22 is of the whirlwind type, and is provided with a gas inlet pipe 28, a series of gas outlets 28a, and a gas pilot pipe 29. The gas inlet pipe is secured to a leg 35 by means of a bracket 28c (Fig. 4). The burner 22 is attached to the combustion chamber 21 by means of swinging arms 31 secured to the bolts 40 of a water vaporizer tube and dirt trap assembly 41. When supporting the burner the arms 31 extend

under the burner 22 and are held from movement by means of bolts 32. The flow of gas to the burner may be regulated by a conventional magnetic valve 28b controlled by a wall thermostat (not shown).

The combustion chamber 21 is formed with a V-shaped groove into which a complemental V-shaped projection on the lower fume and heating drum 24 is adapted to fit as shown at joint 33. The groove and projection are highly machined to form a gas tight seal through which no leakage will occur. In addition to the swinging arms 31 the fume and heating drum 24 and the combustion chamber 21 are held together by means of brackets or arms 34 slidably mounted on legs 35 and provided with conventional means (not shown) for releasably supporting them at a selected elevation. The brackets 34 extend under part of the wall of the combustion chamber 21 and flush with the side of the burner. The brackets 34 include a lower lip 39 through which the bolts 32 pass, thereby forming further support for the burner.

The lower fume and heating drum 24 is supported above the floor or foundation by means of four or more circular legs 35 which are adapted to screw into the lower part of the fume and heating drum outside the combustion chamber 21. This circular fume or heating drum 24 includes an outer casing 44 and an inner wall 45, top wall 37 and bottom wall 46. The top wall 37 extends beyond the inner wall 45 and is provided with an opening 36 centrally of and just above the central chamber 47. As shown best in Figs. 4 and 5, the top wall 37 and bottom wall 46 are provided with vertical spaces or conduits 48 which are sealed off and do not communicate with the central chamber 47. One wall 49 of the openings 48 cooperate with the outer casing 44 to form an outer space or ring 50, and the side walls 51 of the opening 48 define transverse flow tubes or passageways 52 which communicate with the central chamber 47 and the outer space or ring 50.

The upper fume and heating drum 25 is similarly constructed having an inner central chamber 47', an outer annular space or ring 50', vertical openings 48', and flow tubes 52', as shown in Fig. 1. The lower portion of the space 47' is sealed off by closure means in the form of a circular baffle plate 53 bolted to the bottom wall 46'. The sealing is insured by the provision of a gasket 54. Thus it will be seen that entrance into the central chamber 47' is had only through flow tubes 52'. The top wall 37' is provided with a pipe fitting 55 so that a pipe 56 for conducting the products of combustion to the outside of the house may be attached.

Resting in the central opening 36 of the top wall portion 37 of the lower fume and heating drum 24 and supported by means of a dished circular flange 38 is a depending vaporizing tube 23.

The vaporizing tube is threaded at its lower end and is provided with a threaded circular collar 39 having bolt lugs as shown. Secured to the collar 39 by means of bolts 40 is a water receptacle and dirt trap 41 also having cooperatively disposed bolt lugs. Clamped between the collar 39 and trap 41 is an upwardly directed nipple or water spout 42.

Water is lead into the trap 41 by means of pipe 43 and the supply may be either manually or automatically controlled by means of an attachment in the heated room or rooms.

The abutting surfaces 80 between casing 44 and casing 44', and wall 49 and wall 49' are highly machined and polished and form a very close and air-tight fit when secured together. It is to be noted that when thus secured there is no communication between the open spaces (48, 48'), and the confined spaces (47, 47' and 50, 50'). The aligned spaces 50, 50' comprise common vertical passageway means between passageways 52 and 52'.

As shown in Figs. 1 and 2, the fume and heating drum 25 is placed on top of drum 24 in an offset relation (Fig. 2) so that the air to be heated will take a tortuous path and be exposed to more of the heated surfaces than if the spaces 48 and 48' and flow tubes 52 and 52' were in alignment. It should be apparent, therefore, that the sectional view of Fig. 1 includes a section through the flow tubes 52 of the lower fume and heating drum 24 and a section through the openings 48' of the upper fume and heating drum 25.

The extended portions of the walls 49 and 49' cooperate with the top wall 37, baffle 53, and bottom wall 46' to form an intermediate chamber 59, and it is into this chamber that the water vapors flow and mix with the heated air. The drums are held together by means of a plurality of bolts 57 which pass through the respective lugs 58, 58'.

In the operation of the furnace, air is drawn from the bottom of casing 20 through openings 26, and as indicated best by the arrows in Figs. 1 and 5, part of the air enters the combustion chamber 21 and part passes along the outside of the combustion chamber and up through the separate vertical openings or conduits 48 and 48'.

The products of combustion formed when the air passes through the burner 22 continue up through the combustion chamber 21 into the central chamber 47 whence they are diverted into the passageways of the flow tubes 52, out into the annular space 50 of the lower fume and heating drum 24, up into the corresponding annular space 50' of the upper drum 25, into the openings of the transverse flow tubes 52', into the central chamber 47' and out of opening 60 whence they are conducted to the exterior of the house. These products of combustion heat the flow tubes 52 and 52', and other walls of the fume and heating drums 24, 25. As indicated by the arrows, the fresh air to be heated passes through the opening 48 defined by the flow tubes 52 and part of the air strikes the lower portion of the flow tube 52' and branches out into the openings 48', part of the air also passes along the outer walls 44, 44' of the fume and heating drums 24, 25. This air passes in close contact with the walls 44, 44', and the walls of the openings 48, 48', absorbs the heat given off and thus heat passes up into the room or rooms in any suitable manner as explained.

One of the salient features of this invention is the manner in which the heated air is humidified with a controlled amount of water vapor. This is accomplished in the following manner. Water enters the dirt trap chamber 41 by means of a water inlet pipe 43 and flows up into the water spout 42. Here due to the heat received from the encircling burner flame, it is vaporized, changing into a heavy vapor. The water vapors then rise in the vaporizing tube 23, as indicated by arrows, whereupon they strike the baffle plate 53 of the upper heating drum 25. There they are diverted into the intermediate chamber 59 from which they branch out into the opening 48'. In

opening 48', the freshly heated air picks up the water vapors and carries them into the room. By means of any conventional wall humidistat, the desired humidity can automatically be attained.

With the arrangement explained above, it can be seen that there is no possible chance of any of the fumes or products of combustion from the gas burner entering into the air being heated for the house or mixing with the water vapor. Thus, moisture is supplied to the freshly heated air giving a beneficial heat without danger of harmful contamination.

Another important advantage achieved by this invention is the simplicity of construction and the relatively few parts, all of which may be quickly and easily attached or removed. For example, by simply loosening bolts 32 and swinging the arms 31 aside the burner 22 may be removed, and by loosening the nuts on the bolts 40, the water spout 42 and dirt trap 41 may be taken off. The combustion chamber 21 and entire unit of combustion chamber and burner 22 may be removed by turning arms 31 to the side and by sliding or swinging the supporting brackets 34. The two fume and heating drums 24—25 may likewise be separated by removing the bolts 57.

Changes in details of construction and arrangement of parts may be made without departing from the principles of this invention and the scope of the appended claims.

Having thus described our invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. In a hot air furnace, the subcombination comprising a lower fume and heating drum; an upper fume and heating drum; means for securing said drums together in superposed relation; said lower and upper drums being constructed and arranged to provide when so secured a lower central chamber, an upper central chamber, and an intermediate chamber between the adjacent end portions of the drums, the upper central chamber having an open upper end and being provided with closure means at its lower end, and said lower and upper drums being also constructed and arranged to provide a plurality of lateral passageways extending outwardly from the respective central chambers, common vertical passageway means connecting the outer ends of said lateral passageways, and a plurality of separate conduits extending vertically through said lower and upper drums and communicating respectively with spaces above and below said drums, and with each other through said intermediate chamber; a combustion chamber forming a continuation of said lower drum and communicating with said lower central chamber; and an upright water vaporizing tube having an open end portion communicating with the intermediate chamber and closing the upper end of the central chamber of the said lower drum, said vaporizing tube extending downwardly through said lower drum and into the combustion chamber.

2. In a hot air gas furnace having a casing, the subcombination comprising, a first fume and heating drum; means for supporting said drum above the bottom of the furnace casing; a second fume and heating drum superposed on the first-mentioned drum, said drums each having a central chamber, an outer ring portion defining an annular space, and flow tubes extending outwardly from the central chamber and communicating with the annular space, said flow tubes

defining vertical open spaces intermediate the central chamber and the outer ring portion; a combustion chamber secured to the lower portion of the central chamber of the first fume and heating drum; a burner mounted within said combustion chamber; a water vaporizing tube having an open end portion closing the upper end of the central chamber of the first fume and heating drum, said tube extending downwardly through the central chamber of the first fume and heating drum into the combustion chamber and being closed at its lower end; and a baffle plate closing the lower portion of the central chamber of said second fume and heating drum, said first and second fume and heating drums being constructed and arranged to form in intermediate chamber between said baffle plate and said water vaporizing tube, and said intermediate chamber being in open communication with the water vaporizing tube and the vertical open spaces defined by the flow tubes of the first and second fume and heating drums.

3. A hot air gas furnace comprising an upright casing provided with openings at the bottom and top for the admission and discharge of air, respectively; a lower fume and heating drum supported within said casing above the bottom thereof; an upper fume and heating drum superposed on the lower drum, said drums each having a central chamber, an outer ring portion defining an annular space, and flow tubes extending outwardly from the central chamber and communicating with the annular space, said flow tubes defining vertical open spaces intermediate the central chamber and the outer ring portion, the central chamber of said upper drum being closed at its lower end and having a reduced opening at its upper end for outlet of the products of combustion, and said lower and upper fume and heating drums being constructed and arranged to form an intermediate chamber between the closed lower end of the upper drum and the adjacent end of the lower drum; a combustion chamber secured beneath the lower drum and communicating with the central chamber thereof; a water vaporizing tube having an open end portion formed and arranged to close the upper end of the central chamber of the lower drum and extending downwardly through the combustion chamber, said tube having its open end portion in communication with the intermediate chamber and being closed at its lower end; an annular gas burner mounted within the combustion chamber and encircling the lower portion of the vaporizing tube; and means for continually supplying water to the lower portion of the vaporizing tube in controlled amounts.

4. In a hot air gas furnace having a casing, the subcombination comprising, a first fume and heating drum; means for supporting said drum above the bottom of the furnace casing; a second fume and heating drum, said drums each having a central chamber, an outer ring portion defining an annular space, and an equal number of flow tubes extending outwardly from the central chamber and communicating with the annular space, said flow tubes defining vertical open spaces intermediate the central chamber and the outer ring portion; said second fume and heating drum being superposed on the first-mentioned drum so that the flow tubes of said first fume and heating drum will be offset with respect to the flow tubes of said second fume and heating drum; a combustion chamber secured to the lower portion of the central chamber of

the first fume and heating drum; a burner mounted within said combustion chamber; a water vaporizing tube having an open end portion closing the upper end of the central chamber of the first fume and heating drum, said tube extending downwardly through the central chamber of the first fume and heating drum into the combustion chamber and being closed at its lower end; and a baffle plate closing the lower portion of the central chamber of said second fume and heating drum, said first and second fume and heating drums being constructed and arranged to form an intermediate chamber between said baffle plate and said water vaporizing tube, and said intermediate chamber being in open communication with the water vaporizing tube and the vertical open spaces defined by the flow tubes of the first and second fume and heating drums.

5. A heating appliance comprising, a casing having air openings therein; an upper fume and heating drum; a lower fume and heating drum; means for supporting said lower drum within the casing, said heating drums each having a central chamber, an outer portion defining an annular space, flow tubes extending outwardly from said central chamber and providing passageways communicating with said outer annular space, said flow tubes defining vertical conduits intermediate the central chamber and the outer annular space and sealed therefrom; detachable means for securing the upper and lower heating drums together so that the flow tubes and vertical conduits are in an offset relation and so that the outer annular spaces are in communication; a combustion chamber detachably secured to the lower heating drum and communicating with the lower portion of the central chamber thereof; a burner secured within the lower end of the combustion chamber; a water vaporizing tube open at its upper end closing the top portion of the central chamber of the lower fume and heating drum and extending downwardly and centrally of the combustion chamber and burner; a water receptacle detachably secured to the lower end of the vaporizing tube; a baffle plate closing the lower portion of the central chamber in the upper fume and heating drum, said upper and lower fume and heating drums being constructed and arranged to form an intermediate chamber between said baffle plate and said water vaporizing tube, said intermediate chamber being in open communication with the water vaporizing tube and the vertical conduits defined by said flow tubes; and a fume conduit pipe secured to the upper portion of the central chamber in said upper drum.

6. A heating appliance comprising a casing, said casing having cutout portions around its lower periphery, a fume and heating drum; means for supporting said drum within said casing, said fume and heating drum having an annular outer wall, an annular inner wall, an annular intermediate wall spaced from said inner and outer walls, a bottom portion connecting all of said walls, and a top portion connecting the intermediate wall and the inner wall, said outer wall and said intermediate wall extending above the top portion and defining an outer space, said inner wall defining a central chamber, said inner and intermediate walls having a series of vertical openings, said top and bottom portions having a series of openings intermediate the outer space and central chamber, partition members connecting the openings in the inner and intermediate walls and forming communicating passageways between the outer space and central chamber, said partition members also sealing off the openings in the top and bottom portions from communication with the openings in the inner and intermediate walls; a second fume and heating drum similarly constructed; a baffle plate across the bottom portion of the central chamber in said second drum, said second fume and heating drum being superposed on said first-mentioned drum in inverted position so that the outer spaces defined by said outer walls of said two drums respectively and said intermediate walls are in communication with each other; a combustion chamber secured to the lower heating drum and communicating with the lower portion of the central chamber thereof; a gas burner secured to the lower periphery of the combustion chamber; a water vaporizing tube open at its upper end closing the top portion of the lower fume and heating drum and extending downwardly and centrally of the central chamber, combustion chamber and burner; a water receptacle secured to the lower end of said vaporizing tube, said first and second fume and heating drums being constructed and arranged to form an intermediate chamber between said baffle plate and said water vaporizing tube, and said intermediate chamber being in open communication with the water vaporizing tube and the openings in the top and bottom portions of said drums; a fume conduit pipe secured to the top opening of the central chamber of the upper drum and adapted to extend to the exterior of a dwelling; means for supplying water to said water receptacle; means for supplying gas and air to said gas burner.

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