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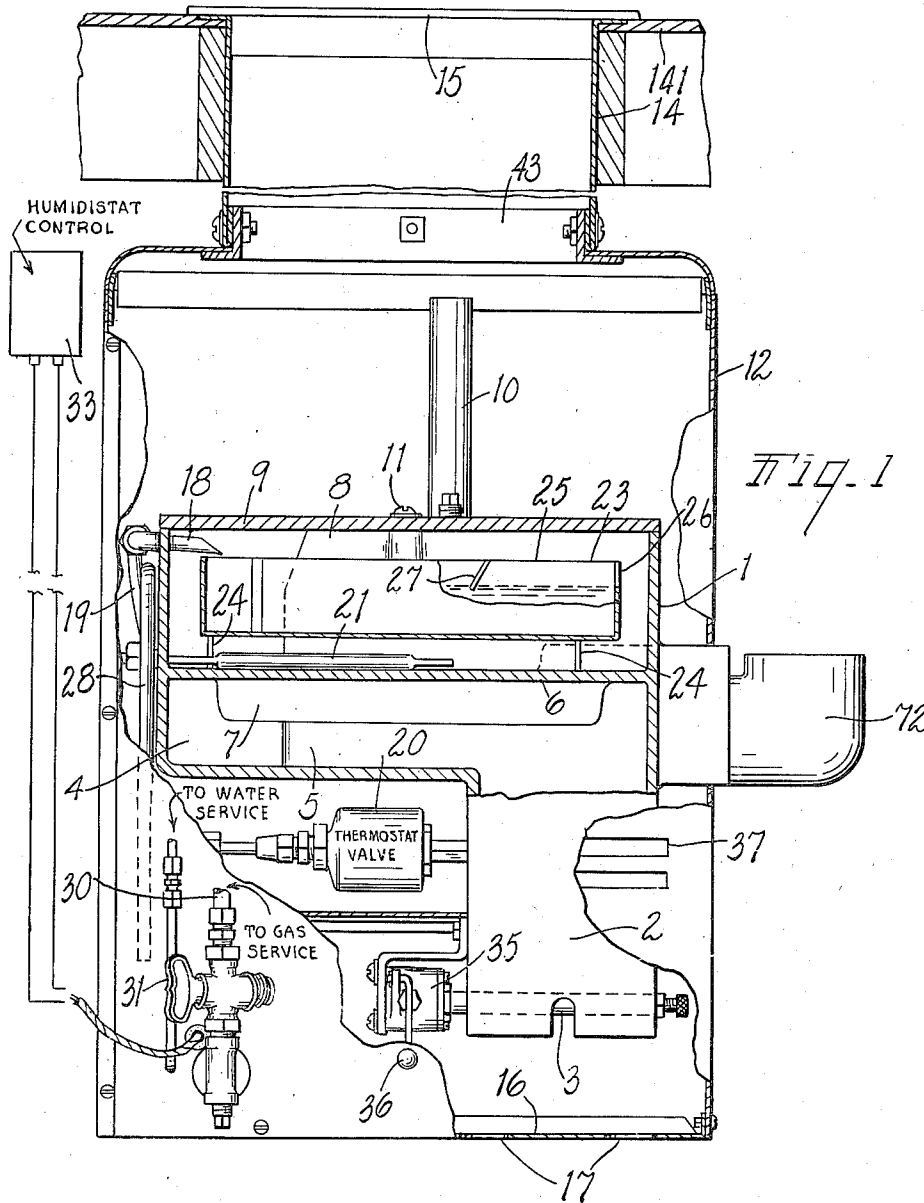
F. N. SMITH ET AL

2,244,126

HUMIDIFIER

Filed Feb. 26, 1940

3 Sheets-Sheet 1



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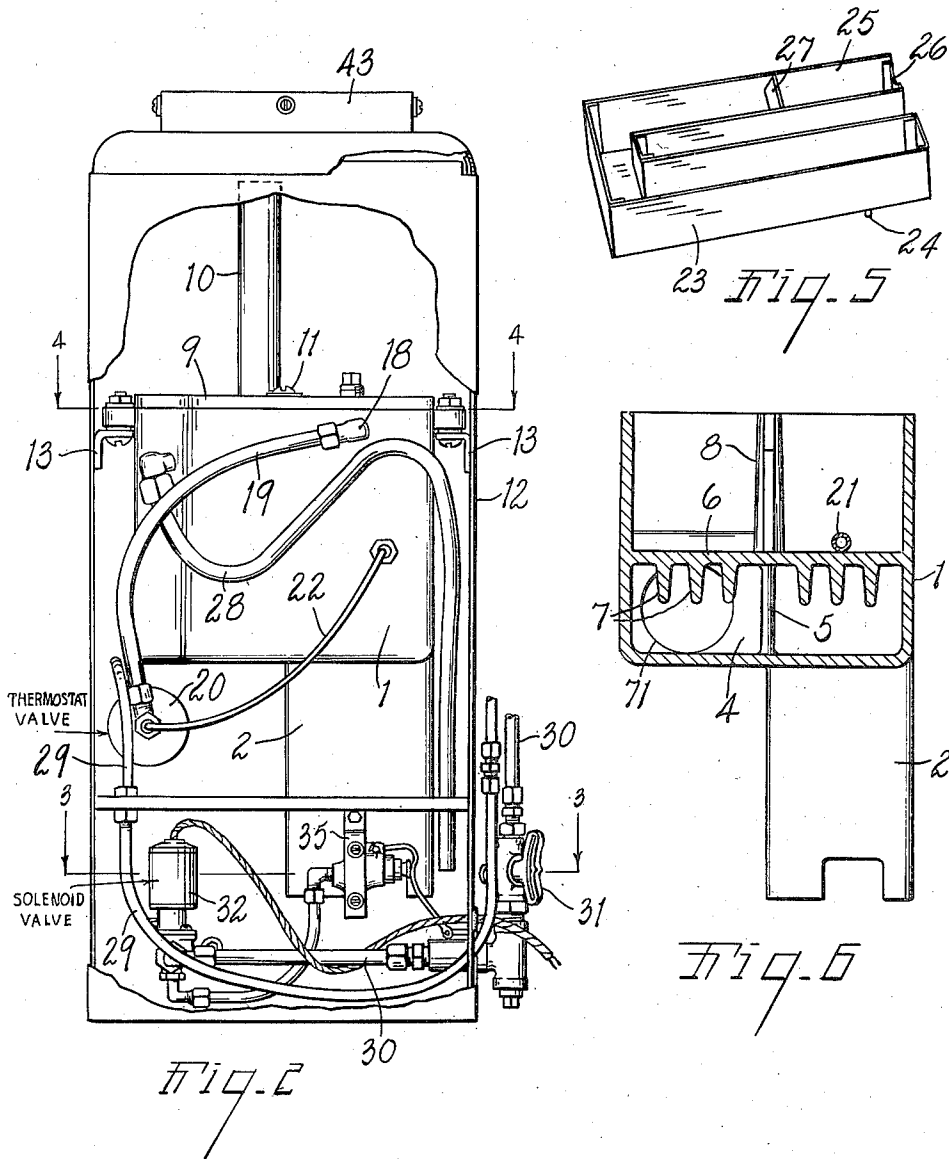
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3 Sheets-Sheet 2



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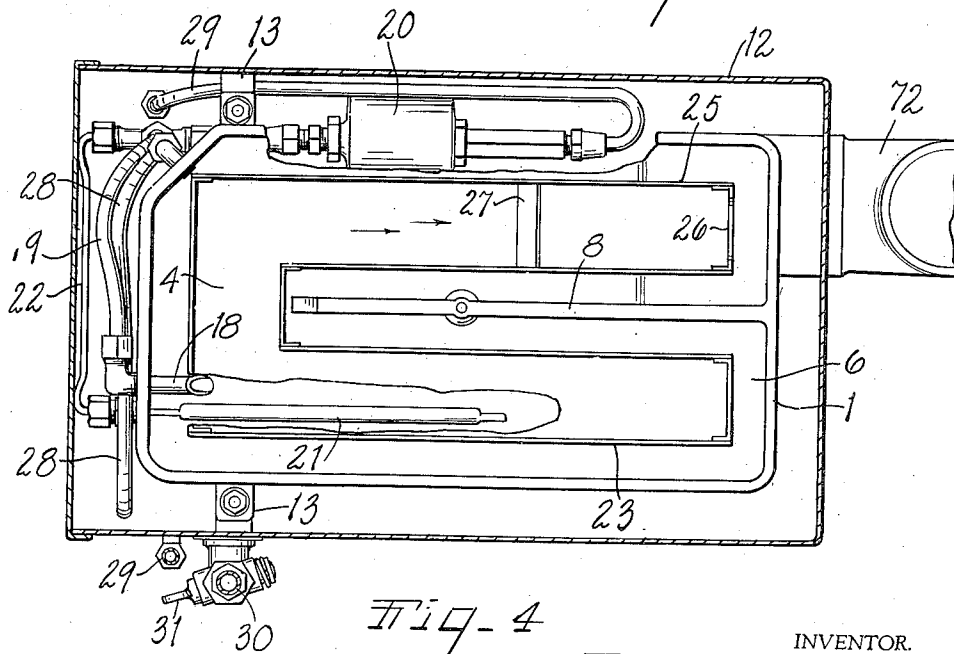
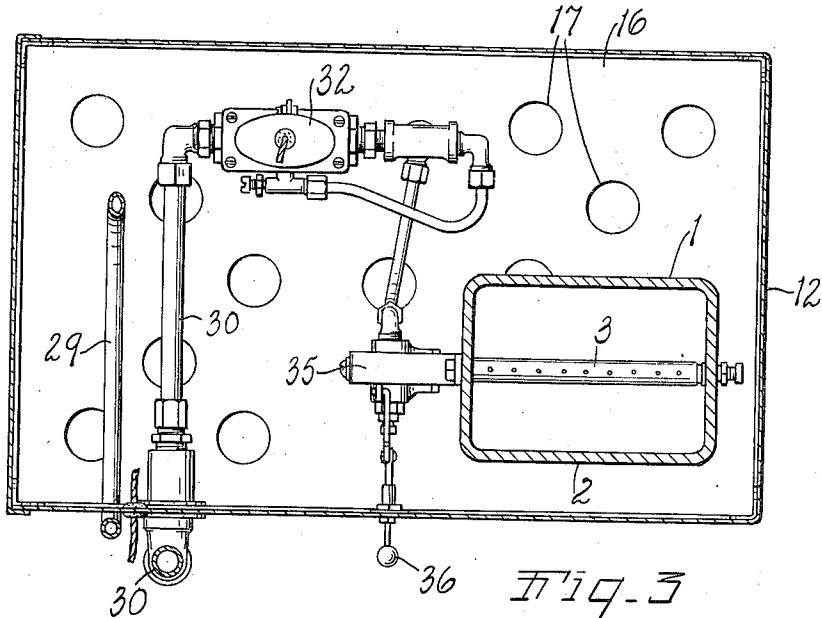
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HUMIDIFIER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,244,126

HUMIDIFIER

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aire Corporation, Grand Rapids, Mich.

Application February 26, 1940, Serial No. 320,828

19 Claims. (Cl. 126—113)

This invention relates to improvements in humidifiers.

This is a continuation in part of our application Serial No. 223,463, filed August 6, 1938.

The main objects of the present invention are:

First, to provide a self-contained humidifier unit which is well adapted for household and like installations or uses.

Second, to provide a humidifier of the type described which is very compact and simple in structure, but has very substantial humidifying capacity.

Third, to provide a structure having these characteristics which is entirely automatic in operation, is noiseless in operation, and has no moving parts positioned so that they are likely to become clogged or inoperative in use.

Fourth, to provide a humidifier of the type described which operates efficiently even though the water used therein is relatively impure, containing considerable quantities of sediment, lime deposits, and the like.

Fifth, to provide a humidifying structure which is very responsive in its action, producing humidifying vapor in a relatively short time after the burner thereof comes into operation.

Sixth, to provide a humidifier which is intermittently operative in accordance with the temperature of the vaporizer thereof and which is humidostatically controlled from the space or room into which the vapor discharges.

Seventh, to provide a structure of the type described which may be readily cleaned to remove any deposits of sediment or the like which may have accumulated therein.

Eighth, to provide a structure whose operation is unimpaired by the deposition of lime, sediment and the like from the water used.

Further objects relating to details and economies of our invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of our invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view in side elevation, partially broken away and in vertical section illustrating the arrangement of the parts constituting the humidifier of our invention.

Fig. 2 is a view in end elevation, also partially broken away to illustrate details of structure and arrangement of the parts.

Fig. 3 is a view in section on line 3—3 of Fig. 2.

Fig. 4 is a plan view partially broken away and in section on line 4—4 of Fig. 2.

Fig. 5 is a perspective view illustrating the sediment or deposit collection pan utilized in connection with the boiler of the present humidifier.

Fig. 6 is an end view in vertical section illustrating details of the integral casting constituting the boiler, burner chamber, and circulating passage for products of combustion which is incorporated in the present structure.

The present invention deals with a humidifier which is especially designed as a household unit, i. e., designed to be installed in a home for the purpose of properly controlling the humidity therein. In many installations, it is impractical and in others it is very difficult to provide the required degree of humidity in connection with the heating system of a house, particularly in the cases where hot water and steam heating systems are employed. Our humidifying unit may be readily installed in a convenient position to supply humidity to a house, the only portion exposed in the room being supplied being a register resembling the floor register of a heating system. While the apparatus furnishes some heat, inasmuch as its operation involves the rapid vaporization of water, this is of secondary importance, the primary object being the control of humidity.

Hitherto known humidifying systems have involved the use of a pan or container holding a gallon or so of water supplied either manually or by a float valve, which pan is associated with a heated furnace surface or part and heated each time the furnace comes into operation. This means that from eight to twelve pounds of water must be heated each time the furnace comes on. However, with the new type anticipating thermostats, the "on" period of the furnace is so short that it does not allow such a considerable quantity of water to heat up so that any appreciable water vapor is given off.

In another type of humidifier, fixed porous bricks or ceramics are employed which, due to their porous structure, cause water from a container to rise over the surface due to capillary attraction. However, the difficulty with such a system is that in a short period of time the small capillary holes in the ceramics fill up with impurities from the water, with the result that the evaporative efficiency drops to the amount of surface evaporation to be expected from a water pan.

The present humidifier operates on an entirely different principle from the above systems, namely, on the theory that it is better and more efficient to heat a small quantity of water and evaporate it and then repeat this evaporating cycle

while a controlling humidostat is still calling for more humidity. To this end, we employ a thermally responsive element located in the boiler of the humidifier and serving to control the admission of water to the latter. This element is set to operate at a temperature substantially above the boiling point of the water, for example, about 235° F., and it follows that when it is surrounded or in contact with water in the boiler, no water will be admitted to the latter, since the water temperature influencing the thermally responsive element cannot exceed 212° F. However, when this water becomes evaporated, the temperature of the element rises and more water is admitted, which undergoes the same cycle of evaporation.

The structure includes a deposit collection pan of novel form which holds a predetermined quantity of water in the boiler chamber at 212° while the humidifier is in operation. Incoming water is heated to 212° in this pan, thus precipitating temporary hardness in the pan. At certain intervals, depending upon the hardness of the water and the amount of evaporation, the pan may be removed and cleaned. This minimizes the amount of deposit left on the floor of the boiler and insures that evaporation from the boiler floor will take place very rapidly by preheating the water prior to its overflowing on that surface.

Various details of construction of the pan, boiler, and position of the thermally responsive control element in the latter contribute greatly to the thermal efficiency of operation of the above generally outlined structure, notwithstanding a desired compactness of form, and will be referred to in detail in the description to follow.

Referring to the drawings, in the embodiment of our invention illustrated, the reference numeral 1 designates an integral cast iron body casting (see Figs. 1 and 6) conformed to provide a restricted upright combustion chamber 2 in the bottom of which a gas burner 3 is disposed and a U-shaped or reversely bent flue passage 4 for the products of combustion of the burner disposed above and opening to the combustion or burner chamber, the legs of this flue passage being defined by a central partition 5 which extends substantially less than the entire length of the casting, as illustrated in Fig. 1. The top wall of this passage forms the bottom or floor of the vaporizer or boiler which is indicated by the reference numeral 6. This top wall has depending parallel fins 7 increasing the contact surface for the production of combustion and consequently the heat transfer capacity of the bottom of the boiler. The products of combustion discharge through a flue opening 71 in the opposite extremity of the U-shaped passage from the combustion chamber 2 to an upturned flue 72 from which they may be discharged into the atmosphere of the room in which the humidifier is located or into a chimney if desired.

The boiler is also of U shape (see Fig. 4), the legs thereof being separated by a vertical partition 8 coextensive in height with the boiler walls, but terminating in substantially spaced relation to one end of the boiler, as illustrated in Fig. 4. A removable cover 9 provided with an upwardly directed vapor outlet 10 is secured to the boiler by means of a screw 11.

The foregoing U shape construction of the boiler and flue passage presents a large surface for the absorption of heat units from the prod-

ucts of combustion in the latter. The gases circulate a maximum distance, so that when they reach the flue 72 practically all of their efficiently available heating value has been abstracted. Notwithstanding this substantial length of travel of the gases and economy of heating units, the casting is an exceedingly compact one. Furthermore, it offers no especial difficulty in the casting thereof, which contributes to the economy of construction of the entire unit.

The foregoing casting is suitably supported within a casing or housing 12 on angle iron elements or lips 13 spot welded to the casing as illustrated in Fig. 2 in such manner that the combustion chamber 2 is maintained in proper relation to burner 3 and the vapor outlet 10 in proper relation to the top opening 43 of the casing. A suitable galvanized conduit 14 is connected to the housing or casing at this opening for suspending the humidifier from the floor 141 of a room, the humidifier preferably being located in the space between and below the floor supporting joists. An ornamental grille 15 covers the conduit opening. The bottom of the humidifier casing is provided with a closure 16 having a plurality of holes 17 therein for the ready admission of air to the casing interior.

In the end wall of the boiler remote from the combustion chamber 2, an opening is formed which receives a feed water spout 18 and water is supplied through this spout from a feed line 19 connected to a thermostatically controlled valve 20 similar to that shown and described in U. S. Letters Patent No. 2,018,097, issued October 22, 1935, to Ferris N. Smith. Accordingly, the structure and operation of this valve will not be detailed, but it will suffice to state that the valve is controlled by means of a bulb 21 containing a thermally responsive fluid and operatively communicated with the valve 20 through tubing 22 extending through a packed opening in the boiler wall. The bulb lies loosely on the floor of the boiler, being preferably capable of some freedom of movement with reference thereto, for we have found that in the case of a bulb mounted loosely, as described, any sediment deposited tends to build up underneath the bulb and not in embedding relation to the latter so as to detract from its thermal responsiveness by insulating the same. It should be noted also that bulb 21 is not disposed at the hottest part of the evaporator or boiler floor, which is of course immediately over the combustion chamber 2, but instead is positioned in substantially offset lateral relation to this hottest spot. The purpose of this is to avoid the precipitation of permanent hardness adjacent the bulb. The precipitation of permanent hardness which does occur takes place directly over the burner and combustion chamber, hence does not cover the thermostatic bulb.

In operation, the thermostat valve is set to come into operation when the temperature adjacent bulb 21 reaches approximately 235° F. and at such time the valve opens to admit water through spout 18. This incoming water is heated to 212° F. in the pan and flows over weir 25 onto the boiler floor. When the bulb becomes cooled below this temperature by water adjacent the same, the valve shuts off, as explained above.

In order to minimize the necessity for frequent cleaning out of deposit collections on the floor of the boiler and to promote the action of the humidostat in accordance with the above de-

scribed theory of intermittent operation, we provide an auxiliary sediment collection pan 23 of copper sheet metal construction, which, as clearly illustrated in Fig. 4, is of U shape like the boiler 6 and flue passage 5. This pan has supporting legs 24 engaging the boiler floor and the end wall of one leg of the pan is provided with a semi-circular notch or weir 26 over which water overflows from the pan onto the boiler floor. In the same leg we dispose a dam 27 which depends below the normal water level in the pan and serves to scrape off any scum existing on the surface of water therein, thereby furthering our object of preventing deposition of sediment or deposits of any type on the boiler floor.

It should be noted that spout 18 is disposed so as to deliver to the pan at the bight end thereof and at a point above the thermostatic bulb 21, i. e., at a relatively cool part of the evaporator as compared to that above the combustion chamber. The details of construction of the sediment collection pan are clearly illustrated in Fig. 5.

An overflow pipe 28 communicates with the boiler wall below the top of the sediment pan and the water supply pipe for supplying water to the thermostat valve is indicated by the reference numeral 29.

Certain of the remaining instrumentalities illustrated in the drawings do not per se constitute part of our invention, save in the manner in which they coact with the above described construction. Accordingly, they will be referred to only generally.

The reference numeral 30 designates a gas line for the burner 3, being provided with a manual control cock 31 and an automatically acting solenoid valve 32 which is wired to and actuated by a humidostat control 33. This humidostat is preferably located on the wall of a room next to the thermostat which controls the furnace of the dwelling. The reference numeral 35 generally indicates a pilot mechanism for the burner 3 including a manually actuated push button 36 for facilitating the initial lighting of the pilot. These elements are suitably supported interiorly of the casing 12 in a manner not thought necessary to describe.

A feature of importance in our invention is the provision of air circulating openings 37 in the sides of the housing or casing 12 enclosing the boiler and combustion casting 1. These provide for a highly desirable circulation of air over the casting resulting in quick absorption of the vapor generated by the boiler and minimizing condensation of the moisture, since the air circulating past the boiler is heated thereby. At the same time, the casing contributes to safety by eliminating the possibility of burns arising from contact with the hot boiler and combustion unit.

The foregoing humidifier device is mainly characterized by its speed and efficiency in operation, the intermittent and rapid evaporation of small quantities of water on which the improved results depend being made possible by reason of the construction and arrangement of the parts as described. There is a minimum of deposition of sediment, but whatever sediment is deposited may be very easily removed, so that the structure is well adapted for use in localities having poor water conditions. The maximum heating efficiency prevails by reason of the U shape construction employed, which provides a long path for circulation of the heating gases and absorp-

tion of their heating units without unduly increasing the dimensions of the device.

We have illustrated and described our improvements in an embodiment which is very practical. We have not attempted to illustrate or describe other embodiments or adaptations as it is believed this disclosure will enable those skilled in the art to embody or adapt our improvements as may be desired.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A self-contained humidifier comprising a casting having a U-shaped boiler and a U-shaped flue passage vertically aligned therewith and separated therefrom by a horizontal partition and an integral combustion chamber communicating with one leg of said flue passage, a U-shaped sediment collection pan disposed in said boiler and having an overflow weir in the leg thereof distant from said combustion chamber, thermostatically controlled means for supplying water to said pan including a water supply line, a valve therein, and a bulb containing a thermally responsive liquid controlling said valve, said bulb being disposed adjacent and over said partition at a point spaced laterally from said combustion chamber and being free to move slightly relative to the partition whereby embedding thereof in any sediment overflowing the pan and deposition of permanent hardness on the bulb are avoided, a cover for said boiler having a vapor outlet, a burner disposed in said combustion chamber, and a casing enclosing said casting and associated parts, said casing having openings in the side wall thereof for the circulation of air past the casting whereby to heat the air, said heated air traveling past said vapor outlet and preventing condensation of vapor emitted therefrom.

2. A self-contained humidifier comprising a casting having a U-shaped boiler and a U-shaped flue passage vertically aligned therewith and separated therefrom by a horizontal partition and an integral combustion chamber communicating with one leg of said flue passage, a U-shaped sediment collection pan disposed in said boiler and having an overflow weir therein, thermostatically controlled means for supplying water to said pan including a water supply line, a valve therein, and a bulb containing a thermally responsive liquid controlling said valve, said bulb being disposed adjacent and over said partition at a point spaced laterally from said combustion chamber and being free to move slightly relative to the partition whereby embedding thereof in any sediment overflowing the pan and deposition of permanent hardness on the bulb are avoided, a cover for said boiler having a vapor outlet, a burner disposed in said combustion chamber, and a humidostat control for said burner.

3. A self-contained humidifier comprising a casting having a U-shaped boiler and a U-shaped flue passage vertically aligned therewith and separated therefrom by a horizontal partition and an integral combustion chamber communicating with one leg of said flue passage, a U-shaped sediment collection pan disposed in said boiler with its legs lying in the legs of the boiler, and thermostatically controlled means for supplying water to said pan including a water supply line, a valve therein, and a bulb containing a thermally responsive liquid controlling said valve, said bulb being disposed adjacent the partition in lat-

erally spaced relation to the point of communication of the combustion chamber and flue passage and free to move slightly relative to the partition whereby embedding thereof in any sediment overflowing the pan and deposition of permanent hardness on the bulb are avoided.

4. A self-contained humidifier comprising a casting having a U-shaped boiler and flue passage separated by a horizontal heat conducting partition constituting a floor for the boiler and a top for the passage, a combustion chamber communicating with said flue passage at a point beneath one leg of said boiler, a U-shaped sediment collection pan disposed in said boiler, thermostatically controlled means for supplying water to said pan including a bulb containing a thermally responsive liquid disposed on said floor at a point spaced laterally from said combustion chamber, said bulb being free to move slightly relative to the floor whereby embedding thereof in sediment contained in water overflowing the pan and deposition of permanent hardness on the bulb are avoided, a vapor outlet for said boiler, and a casing enclosing said casting and associated parts, said casing having openings in the side wall thereof for the circulation of air past the casting whereby to heat the air, said heated air traveling past said vapor outlet and preventing condensation of vapor emitted therefrom.

5. A self-contained humidifier comprising a casting having a U-shaped boiler and flue passage separated by a horizontal heat conducting partition constituting a floor for the boiler and a top for the passage, a combustion chamber communicating with said flue passage at a point beneath one leg of said boiler, a U-shaped sediment collection pan disposed in said boiler and having an overflow weir in the leg thereof distant from the point of communication of said combustion chamber with said passage, thermostatically controlled means for supplying water to said pan, a vapor outlet for said boiler, and a casing enclosing said casting and associated parts, said casing having openings in the side wall thereof for the circulation of air past the casting whereby to heat the air, said heated air traveling past said vapor outlet and preventing condensation of vapor emitted therefrom.

6. A self-contained humidifier comprising a casting having a U-shaped boiler and flue passage separated by a horizontal heat conducting partition constituting a floor for the boiler and a top for the passage, a combustion chamber communicating with said flue passage at a point beneath one leg of said boiler, a U-shaped sediment collection pan disposed in said boiler with its legs lying in the legs of the boiler and having an overflow weir therein at a point remote from the hottest point of the boiler above the entry of said combustion chamber thereto, and thermostatically controlled means for supplying water to said pan including a bulb containing a thermally responsive liquid disposed on said floor, said bulb being free to move slightly relative to the floor whereby embedding thereof in sediment contained in water overflowing the pan and deposition of permanent hardness on the bulb are avoided.

7. A humidifier for dwellings and the like, comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a casting supported by said casing and comprising integral U-shaped boiler and flue passage chambers separated by a horizontal

partition constituting the floor of the boiler chamber and the top of the flue passage, the respective legs of said U-shaped boiler and passage being vertically aligned, said casting also having an integral combustion chamber, a discharge passage for products of combustion communicating with the other leg of the flue passage at the end thereof, a U-shaped sediment collection pan disposed in said boiler chamber, thermostatically controlled means for supplying water to said pan at a point remote from the combustion chamber, including a spout discharging into said pan at said point, a thermostatic valve and a thermally responsive element disposed in said boiler chamber to lie adjacent the floor thereof at a point spaced from said combustion chamber, said pan having a weir at the end of the leg remote from said burner chamber over which water heated to 212° F. discharges onto the boiler floor to thereby cool said element and being provided with a dam to remove scum existing on the top of the water in the pan, and a cover secured to said casting to close said boiler chamber and provided with a vapor outlet discharging to said conduit, said casing having air circulating openings in the sides and bottom thereof for the admission of air to said burner and for the circulation of air past the sides of the casting whereby the air is heated to absorb vapor issuing from said outlet and prevent condensation thereof.

8. A humidifier for dwellings and the like, comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a casting supported by said casing and comprising integral U-shaped boiler and flue passage chambers separated by a horizontal partition constituting the floor of the boiler chamber and the top of the flue passage, the respective legs of said U-shaped boiler and passage being vertically aligned, said casting also having an integral combustion chamber communicating with one leg of said flue passage adjacent the end thereof, a burner disposed in said combustion chamber, a discharge passage for products of combustion communicating with the other leg of the flue passage at the end thereof, a U-shaped sediment collection pan disposed in said boiler chamber, thermostatically controlled means for supplying water to said pan at a point remote from the combustion chamber, and a cover secured to said casting to close said boiler chamber and provided with a vapor outlet discharging to said conduit, said casing having air circulating openings in the sides thereof for the circulation of air past the sides of the casting whereby the air is heated to absorb vapor issuing from said outlet and prevent condensation thereof.

9. A humidifier for dwellings and the like, comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a casting supported by said casing and comprising integral U-shaped boiler and flue passage chambers separated by a horizontal partition constituting the floor of the boiler chamber and the top of the flue passage, the respective legs of said U-shaped boiler and passage being vertically aligned, said casting also having an integral combustion chamber communicating with one leg of said flue passage adjacent the end thereof, a burner disposed in said combustion chamber, and means for supplying water to said boiler chamber at a point intermediate the leg thereof.

10. A humidifier for dwellings and the like,

comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a cast U-shaped boiler chamber and a flue passage supported by said casing and separated by a horizontal partition constituting the floor of the boiler and the top of the flue passage, a combustion chamber communicating with said flue passage, a burner disposed in said combustion chamber, a discharge passage for products of combustion communicating with the flue passage at a point remote from the combustion chamber, a U-shaped sediment collection pan disposed in said boiler chamber and having legs spacing the same from the floor of the chamber, thermostatically controlled means for supplying water to said pan at a point remote from the combustion chamber, including a thermally responsive element disposed in said boiler chamber adjacent the floor thereof at a point spaced from said combustion chamber, said pan having a weir at the end of the leg remote from said burner chamber over which water heated to 212° F. in the pan discharges onto the boiler floor to thereby cool said element, and being provided with a dam to remove scum existing on the top of the water in the pan, and a cover secured to said casting to close said boiler chamber and provided with a vapor outlet discharging to said conduit, said casing having air circulating openings therein for the circulation of air past the sides of the casting whereby the air is heated to absorb vapor issuing from said outlet and prevent condensation thereof.

11. A humidifier for dwellings and the like, comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a boiler chamber and a flue passage supported by said casing and separated by a horizontal partition constituting the floor of the boiler and the top of the flue passage, a combustion chamber communicating with said flue passage, a burner disposed in said combustion chamber, a discharge passage for products of combustion communicating with the flue passage at a point remote from the combustion chamber, a sediment collection pan disposed in said boiler chamber, thermostatically controlled means for supplying water to said pan, including a thermally responsive element disposed in said boiler chamber adjacent the floor thereof, said pan having a weir therein over which water heated to 212° F. in the pan discharges onto the boiler floor to thereby cool said element, and a cover secured to said casting to close said boiler chamber and provided with a vapor outlet discharging to said conduit, said casing having air circulating openings therein for the circulation of air past the sides of the casting whereby the air is heated to absorb vapor issuing from said outlet and prevent condensation thereof.

12. A humidifier for dwellings and the like, comprising a casing having a conduit adapted to be secured to a floor opening to support the casing from the floor, a cast U-shaped boiler chamber and a flue passage supported by said casing and separated by a horizontal partition constituting the floor of the boiler and the top of the flue passage, a combustion chamber communicating with said flue passage, a burner disposed in said combustion chamber, a discharge passage for products of combustion communicating with the flue passage at a point remote from the combustion chamber, a U-shaped sediment collection pan disposed in said boiler chamber, and

thermostatically controlled means for supplying water to said pan, including a thermally responsive element disposed in said boiler chamber adjacent the floor thereof, said pan having a weir therein at a point spaced substantially laterally of the point of communication of the combustion chamber and flue passage over which water heated to 212° F. in the pan discharges onto the boiler floor to thereby cool said element.

13. A humidifier of the type described comprising a casting having an integral boiler and flue passage and a combustion chamber opening to said passage, said boiler and passage being generally U-shaped and spaced vertically with the legs thereof in corresponding disposition and being separated by a partition constituting the floor of the boiler and the top of the passage, a U-shaped sediment collection pan disposed in said boiler and removable therefrom for cleaning, said pan having a weir at the end of one leg thereof over which water admitted to the pan overflows onto the boiler floor and a dam for removing scum from the surface of water in the pan, and means for controlling the admission of water to said pan, comprising a thermally responsive element disposed in said boiler to lie adjacent the floor thereof, said element being alternately cooled and heated when water discharged from the pan contacts the same and is evaporated by heat from the boiler, said alternate cooling and heating of the element controlling the admission of further water to the pan.

14. A humidifier of the type described comprising a casting having an integral boiler and flue passage and a combustion chamber opening to said passage, said boiler and passage being separated by a partition constituting the floor of the boiler and the top of the passage, a sediment collection pan disposed in said boiler and removable therefrom for cleaning, said pan having a weir therein over which water admitted to the pan overflows onto the boiler floor and a dam for removing scum from the surface of water in the pan, and means for controlling the admission of water to said pan, comprising a thermally responsive element disposed in said boiler to lie adjacent the floor thereof, said element being alternately cooled and heated when water discharged from the pan contacts the same and is evaporated by heat from the boiler, said alternate cooling and heating of the element controlling the admission of further water to the pan.

15. A humidifier of the type described comprising a boiler, a sediment collection pan disposed in said boiler and removable therefrom for cleaning, said pan having a weir therein over which water admitted to the pan overflows onto the boiler floor and a dam for removing scum from the surface of water in the pan, and means for controlling the admission of water to said pan, comprising a thermally responsive element disposed in said boiler to lie adjacent the floor thereof, said element being alternately cooled and heated when water discharged from the pan contacts the same and is evaporated by heat from the boiler, said alternate cooling and heating of the element controlling the admission of further water to the pan.

16. A humidifier of the type described comprising a boiler, a sediment collection pan disposed in said boiler and removable therefrom for cleaning, said pan having a weir over which water admitted to the pan overflows onto the boiler floor and a dam for removing scum from the sur-

face of water in the pan, and means for controlling the admission of water to said pan.

17. In a humidifier of the type described, a boiler chamber adapted to be heated and to have water admitted thereto and evaporated therein, a deposit and sediment collection pan disposed in said chamber to receive water admitted thereto, said pan having an overflow weir therein and a depending dam for removing scum from the surface of water therein, a thermally responsive element disposed adjacent the floor of the boiler to be alternately cooled and heated following the overflowing of water onto the floor of the boiler and the evaporation thereof, and means controlled by said thermally responsive means for regulating the supply of water.

18. In a humidifier of the type described, a casting including a chamber having a deposit and sediment collection pan disposed therein adapted to receive water admitted to the chamber, and an evaporating surface, means for heating said surface, said pan having a weir remote from the hottest part of said surface over which water admitted to the pan overflows onto said surface, means for supplying water for said pan, and means for controlling said supply, comprising a thermally responsive element disposed adjacent

said surface and capable of limited movement in relation thereto, said element being adapted to be alternately cooled and heated by water overflowing from said pan onto the surface and by the evaporation of the water, and means controlled by said thermally responsive element for governing the flow of water in said supply means.

19. In a humidifier of the type described, a chamber having a deposit and sediment collection pan disposed therein adapted to receive water admitted to the chamber, an evaporating surface, means for heating said surface, said pan having a weir remote from the hottest part of said surface over which water admitted to the pan overflows onto said surface, means for supplying water for said pan, and means for controlling said supply, comprising a thermally responsive element disposed adjacent said surface, said element being adapted to be alternately cooled and heated by water overflowing from said pan onto the surface and by the evaporation of the water, and means controlled by said thermally responsive element for governing the flow of water in said supply means.

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