Jan. 20, 1931. C. A. MOORE 1,789,560

HEATING, VENTILATING, AND HUMIDIFYING APPLIANCE

Filed May 1, 1926

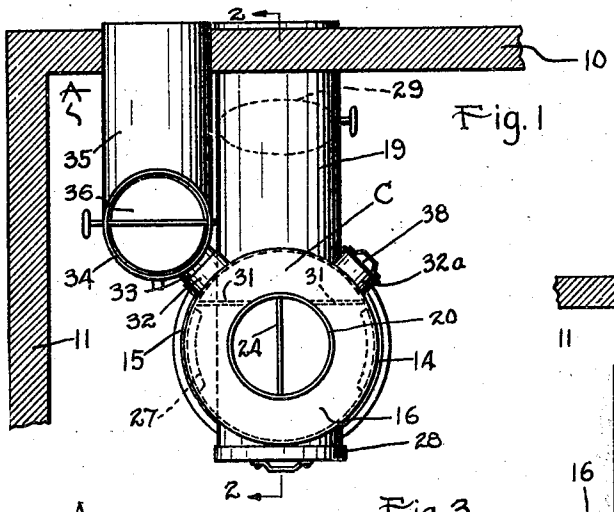


Fig. 1

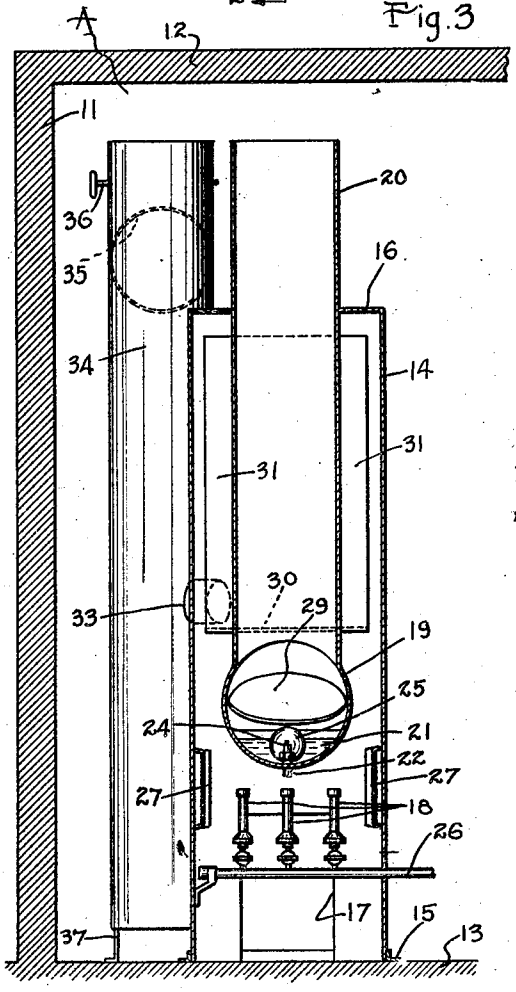


Fig. 3

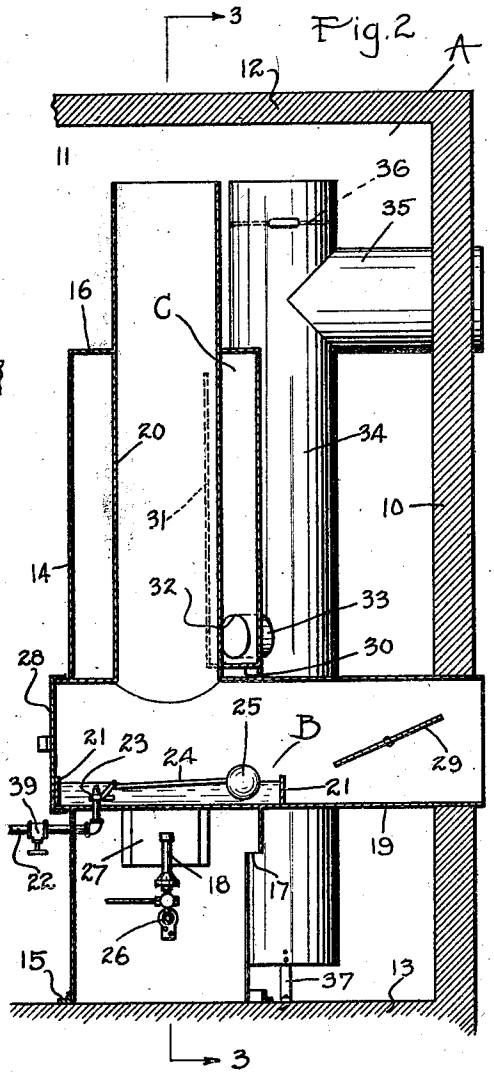


Fig. 2

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UNITED STATES PATENT OFFICE

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HEATING, VENTILATING, AND HUMIDIFYING APPLIANCE

Application filed May 1, 1926. Serial No. 106,142.

My invention relates to improvements in combination heating, ventilating and humidifying appliances.

An object of the invention is to provide an efficient stock appliance of the present nature, which is extremely simple, and inexpensive, and which is capable of being readily installed with the parts thereof in different relations to adapt the device to the accommodations afforded.

With the foregoing and other objects in view, which will appear in the following description, the invention resides in the novel combination and arrangement of parts and in the details of construction hereinafter described and claimed.

In the drawing, Fig. 1 is a plan view of an appliance embodying my invention, fragments of walls of a chamber forming structure containing the appliance being shown; Fig. 2 is a vertical sectional view of the appliance and associated structure, said view being taken on the line 2—2 of Fig. 1 and Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2.

Referring to the drawing, I have represented the walls 10 and 11, ceiling 12 and floor 13 of a structure forming a chamber A. The illustrated embodiment of my improved appliance, shown as installed within said chamber, includes an upright cylindrical casing of sheet metal 14, the same having a ring-like reinforcing footing 15 of angle iron. The upper end of the casing 14 is closed by a top plate 16, the lower portion of said casing being cut away as at 17 to permit of access to burners 18 soon to be described and to admit air from the lower portion of said chamber to the burners to support combustion at said burners. An ingress duct is provided to admit outer air into the chamber A and to conduct it upwardly thereinto. Said ingress duct comprises two pipes, one a horizontal pipe 19 extending through the casing 14 just above the opening 17, said pipe being supported by said casing and also extending through the wall 10 into the air outside of the building structure. The other pipe comprised in said ingress duct is an upright pipe 20 arranged concentrically within the casing 14, the lower end of said pipe connecting at its lower end with said horizontal pipe 19 and extending upwardly therefrom, through the top 16 of said casing to a point near the ceiling 12 of the chamber A. Within the horizontal pipe 19 at the bottom thereof are fitted two spaced segmental end plates 21, which together with said pipe 19 form a shallow pan or receptacle B immediately beneath the lower end of the upright pipe 20. Water is admitted to this receptacle B through a water pipe 22, the same being fitted with a conventional valve 23 actuated by a float lever 24 with a float 25 thereon for maintaining a fixed water level in said receptacle. Beneath the receptacle B in the horizontal pipe 19 are the burners 18 which are fed by a gas pipe 26. Flames from these burners, shielded from the casing by guard plates 27, play upon the underside of the horizontal pipe 19, heating the casing 14 from within the same, heating the air in the ingress duct through the horizontal pipe 19 and upright pipe 20, which comprise said ingress duct, and heating the water within the receptacle B vaporizing the same in said duct. The horizontal pipe 19 is equipped with a removable cap 28 at its inner end and is supplied near its outer end with a damper 29, the purposes of said cap and damper to be hereinafter explained. Within the casing 14 and communicating with the same at its upper portion is a down flue C for heated air and products of combustion rising from the burners 18 about the pipes 19 and 20. This down flue C is formed in part by the pipe 20 and casing 14 and in part by a bottom plate 30 and upright baffle plates 31, disposed, as shown, between said pipe and casing. The lower ends of the baffle plates 31 meet the ends of the bottom plate 30, the upper ends of said baffle plates 31 stopping short of the top 16 on the casing 14. Said down flue C opens at the lower portion thereof into a fitting 32 branching off radially from said casing. This fitting 32 removably joins a complementary fitting 33 on a second upright pipe 34, which together with a horizontal pipe 35 branching off therefrom near its upper end and passing through the wall 10 forms an egress duct for conducting air from

the chamber A to the outside. Said second upright pipe 34 is short of the floor 13 at its lower end and short of the ceiling 12 at the upper end thereof, a damper 36 being fitted near the upper end of said pipe above its junction with said horizontal pipe 35. In this connection it may be stated that this horizontal pipe 35 is preferably connected with a stack (not shown) to augment the up draft in the upright pipe 34. Legs 37 for said pipe 34 support the same from the floor 13.

It will be noted that the location of the fitting 32 in the casing 14 allows the upright pipe 34 to clear the horizontal pipe 19 at one side thereof. To suit different building structures and to meet various conditions, such, for example, as the clearing of a doorway in a wall of a structure, it is advantageous to be able to shift the upright pipe 34 to either side of the horizontal pipe 19. To this end, I provide a second outlet fitting 32^a for the down flue C, the same issuing from the casing 14 in angular relation with respect to said first fitting 32. One or the other of said fittings 32 and 32^a is selected for connection with the fitting 33 on the upright pipe 34, the unused fitting being sealed by a removable cap 38.

Normally, in heating, ventilating and humidifying the air in chamber A, water is admitted to the receptacle B, past a cut-off valve 39 therein, and through the float controlled valve 23. The burners 18 are lighted, the damper 36 closed and the damper 29 opened. Under such conditions, vapor forming at the receptacle B is picked up in pipe 19 by fresh incoming air impelled upwardly through the heated pipe 20 into the chamber A. Descending in the chamber as it becomes cooled, the air follows along the floor 13 to the lower end of pipe 34 into which it is drawn and from which it passes through pipe 35. The down flue C and its relationship with the pipe 20 play an important part in the efficient and economical operation of the device. That is to say, the rising heated air and gases from the burners 18 have a return sweep through said flue and along the pipe 20, thus effectively heating said pipe and thereby strengthening the up draft therein and enlarging its capacity to heat the incoming air passing therethrough. Further, by conducting the heated air and gases from the down flue C into the pipe 34 at a point remotely beneath the upper end of said pipe, a strengthened up draft is produced in that pipe. From the foregoing, it will become apparent, that my appliance is adapted to bring fresh air into the upper portion of a chamber, which air is heated and supplied with moisture in transit into the chamber, also that the colder, vitiated air is removed from the lower portion of the chamber.

If the percentage of humidity in the air becomes too great, the cut-off valve 39 in the water feed line 22 may be closed to discontinue the supply of vapor to the incoming air and, if such adjustment of said valve 39 will not suffice, the damper 36 may be opened more or less so that the air of highest percentage of humidity at the ceiling of the chamber may pass therefrom into pipe 34 and thence through pipe 35 to the outer air.

For simple heating of the chamber, without ventilation, the damper 29 in pipe 19 is closed and cap 28 removed from said pipe 19. The air, then trapped in the chamber, circulates from the lower portion of said chamber to the upper portion thereof and back, the upward flow taking place in the heated pipes 19 and 20. And, of course, moisture may be added to the air moving through said pipes by admitting water to the receptacle B.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The combination with a structure forming a chamber, of an appliance comprising an upright casing resting upon the floor of the chamber and having a top closing its upper end, said casing opening into the chamber near the bottom thereof, a horizontal ingress pipe extending into the casing and supported thereby, said pipe opening at its outer end through a wall of the chamber, an upright ingress pipe disposed within the casing, the lower end of said pipe connecting with said horizontal ingress pipe and the upper end thereof projecting upwardly through said top to a point near the ceiling of the chamber, spaced end plates fitted within the horizontal pipe and together therewith forming a receptacle for water directly beneath the lower end of said upright pipe, a heating element beneath said horizontal pipe for heating it and the water in said receptacle, partitioning members within the casing forming, in conjunction therewith and with said upright ingress pipe, an upright flue opening at the bottom thereof above the heating element and a second flue in reversed continuation of said first flue, and an egress pipe for conducting air from the lower portion of the chamber upwardly to the outer atmosphere, said egress pipe being in communication with said second flue at the lower portion thereof.

2. The combination with a structure providing a chamber, of an appliance of the class described comprising an ingress duct for admitting outer air into the chamber and conducting it upwardly thereinto, an egress duct for conducting air from the lower portion of the chamber upwardly to the outside thereof, a casing supporting said ingress duct and enclosing a portion thereof, a burner

within the casing for heating said ingress duct, partitioning members within said casing forming a down flue therein in communication with the interior of the casing at its upper portion, outlet pipe fittings extending in angular relation from said casing and communicating with said down flue at the lower portion thereof, and an inlet pipe fitting upon the egress duct, said inlet fitting being capable of being selectively coupled with said outlet fittings of the casing.

3. The combination with a structure providing a chamber, of an appliance comprising an ingress duct for admitting outer air to the chamber and conducting it upwardly into said chamber, said ingress duct including an upright pipe, an upright egress duct for conducting air from the lower portion of the chamber to the outer atmosphere, a cylindrical casing concentrically enclosing a portion of said upright pipe and formed with an air ingress opening in the lower portion thereof, a burner within the casing, two upright spaced baffle plates secured at their opposite longitudinal edges to said casing and upright pipe, respectively, an arcuate bottom plate secured at its inner edge to said upright pipe, at its outer edge to said casing and at its ends to said baffle plates, said baffle plates, bottom plate and portions of said upright pipe and casing forming a flue communicating at the upper portion thereof with the interior of the casing at the upper portion of said casing, said flue communicating at its lower portion with said egress duct.

4. The combination with a structure forming a chamber, of an appliance comprising an upright casing having a top closing its upper end, said casing having an opening therein near the bottom thereof, an upright pipe within the casing, for conveying air upwardly into the chamber, said pipe having an ingress connection bringing the lower portion thereof into communication with the outer atmosphere, the upper end of said pipe projecting through said top, a burner within the casing for heating the air about the lower portion of said pipe, a horizontal bottom plate and upright baffle plates arranged between said upright pipe and casing, said bottom plate, baffle plates and casing forming one flue opening above the burner and a second flue in reversed continuation of said first flue, and a second upright pipe having an egress connection bringing the same into communication with the outer atmosphere and also having an ingress connection bringing the same into communication with said second flue at the lower portion thereof.

5. The combination with a structure providing a chamber, of an appliance of the class described comprising an ingress duct for admitting outer air into the chamber and conducting it upwardly thereinto, a casing enclosing a portion of the ingress duct, an egress duct isolated from said ingress duct and casing for conducting air from the lower portion of the chamber upwardly to the outside, a heating element within the casing, partitioning members within the casing forming, together with the casing and with the ingress duct, a down flue communicating with the interior of the casing at the upper portion thereof, and a connection bringing the lower portion of the down flue into communication with said egress duct.

In testimony whereof, I have signed my name to this specification.

CHARLES A. MOORE.