Dec. 23, 1952 W. V. RIFLE 2,622,585

GAS FIRED HOT-AIR FURNACE

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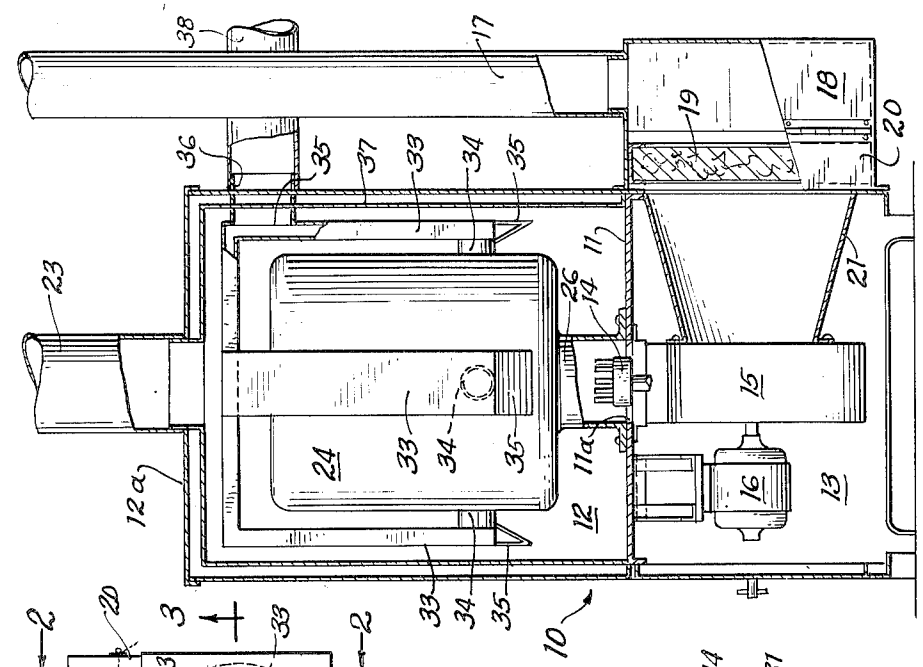


Fig. 2

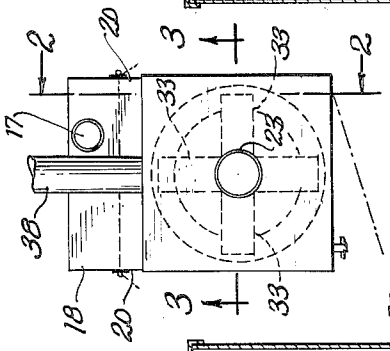


Fig. 1

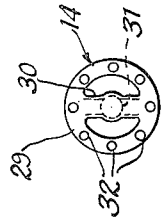


Fig. 4

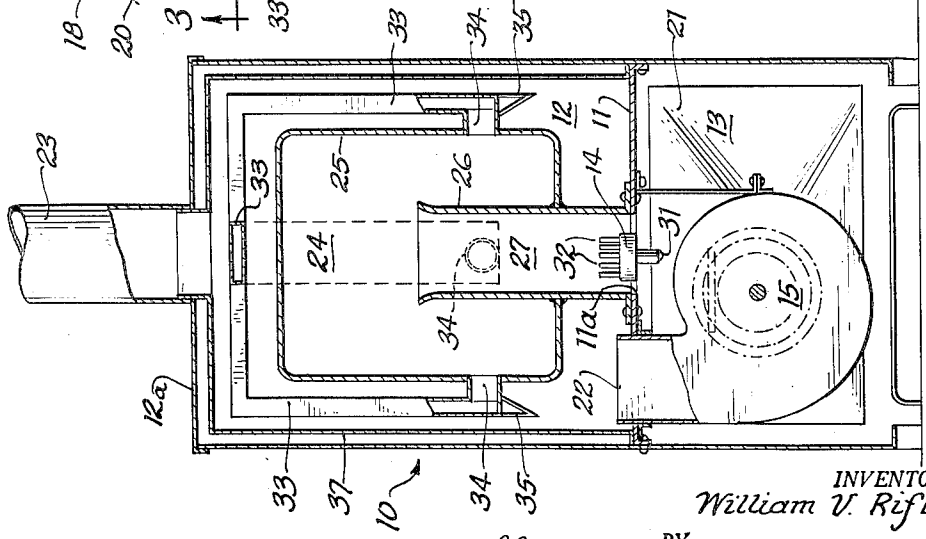


Fig. 3

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## GAS-FIRED HOT-AIR FURNACE

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1 Claim. (Cl. 126—110)

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This invention relates to improvements in heating apparatus.

One object of the invention is to provide improved heating apparatus adapted for use of gaseous fuel as a furnace in heating air that is conveyed by ducts to registers in various rooms or locations in a home or other building.

Another object of the invention is to provide heating apparatus of the type mentioned which comprises a radiator so constructed and so arranged within a heating chamber as to insure uniform circulation of hot combustion gases within the radiator for effecting the efficient release of heat to air forced through the heating chamber in close or scrubbing contact with the exterior surfaces of the radiator.

Another object of the invention is to provide combined combustion and heat radiating chambers that cooperate in effecting uniform circulation within and through the radiating chamber of the hot combustion gases generated in the combustion chamber for insuring effective release of heat to the air as it is circulated about the exterior of the radiator.

An additional object of the invention is to provide a combined combustion and heat radiating chamber of simple and economical construction that is provided with a plurality of supplementary heat radiating ducts on the exterior of the radiator whereby the combined chambers when positioned in a heating chamber through which air is circulated, will provide a large area for scrubbing contact with the air for effective heat transfer thereto.

Other objects of the invention relate to various features of construction and arrangement of parts, which will be apparent from a consideration of the following specification and accompanying drawings, wherein:

Figure 1 is a top plan view of a furnace that is illustrative of the present improvements;

Fig. 2 is an enlarged broken sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged broken sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a top plan view of a preferred form of gas burner shown in Figs. 1 and 2.

In the drawings, the furnace is shown as comprising an outer casing 10, preferably of sheet metal and which instead of being rectangular in plan view as shown, may be of any other suitable shape. The casing 10 is provided with a transverse partition 11 that divides the interior of the casing into an upper compartment providing a heating chamber 12 and a lower blower chamber 13. The partition 11 is provided with a central aperture 11a for accommodating the location of a gas burner 14 which is positioned within a lower portion of a communicating combustion chamber. The aperture 11a admits flow of secondary air to the burner.

Within the blower chamber 13 is located a

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suitable blower or fan 15, operated by a motor 16, for drawing air through cold air duct 17, from a room or rooms to be heated. The air from duct 17 passes into filter chamber 18 containing a dust filter 19 which can be removed from or inserted into the chamber through a door 20, one of which preferably is provided at each side of the chamber. The air passing through the filter is directed by a duct 21 to the intake of the blower and thence passes through the discharge end 22 of the fan into the heating chamber 12. The heated air from the chamber exhausts through duct 23, located centrally of the upper end of the casing, for distribution to the room or rooms to be heated.

Located within the upper compartment is a combined combustion and heat radiating member which preferably is constructed as a unit for convenient mounting within the upper compartment through the upper end of the latter prior to the mounting of the inner casing defining the chamber 12 and prior to attachment of the top wall 12a of the latter in position. The radiating chamber 24 is defined by a drum casing 25 which is shown as of cylindrical shape and through an opening in the lower end of which extends a tubular or cylindrical member 26 open at both ends and which forms a combustion chamber 27. The chamber forming member 26 has its lower end portion, which is exterior of the casing 25, mounted on and secured to the partition 11 in air tight relation with respect thereto. The chamber 27 is designated as the combustion chamber since combustion of the gaseous fuel is initiated in this chamber and, especially at low flame, may be practically completed within the chamber although some combustion may occur above the chamber forming tube 26.

A gas burner 14 is located in the lower portion of the casing 26 and preferably is of the type shown in the drawings although other suitable burner structures may be employed. In Fig. 4 the burner is shown as comprising a hollow ring 29 spanned by a hollow web 30 to which a gas delivery pipe 31 is connected for supplying gas and primary air to the burner. The ring is provided with a plurality of upstanding flame tubes 32 through which jets of gaseous fuel issue for combustion at the upper ends of the tubes. The burner structure, as shown, provides spaces through which secondary air can rise into the tube 26 for the complete combustion of the fuel, the air entering the casing 10 at the bottom thereof.

The hot combustion gases rise into the drum radiator 25 and are required, by the construction of the radiator, to take predetermined exit paths which effect substantially uniform flow of the combustion gases within the chamber 24. The means for effecting the uniform flow of the gages within the chamber 24 comprise uniform-

ly spaced apart heat radiating ducts **33** forming a part of the heat radiating system. In the form illustrated, four ducts **33** are shown, located 90° apart at their entrance ends and being integrally joined at the upper ends above the casing **25**. The ducts **33** are shown as rectangular in cross-section and considerably wider than deep, to provide a large area for heat radiating purposes. The lower ends of the ducts **33** communicate with the chamber **24** through horizontal tubes **34** shown as of cylindrical shape. The parts of the combined combustion and heat radiator chambers preferably are welded together and may be of stainless steel sheet material.

One of the ducts **33** has an exhaust port **35** provided with an outlet **36** welded to the outer side wall of the duct and extending through an opening provided in a casing **37** surrounding the drum. An exhaust flue **38** for carrying the exhausted products of combustion to a chimney is connected to the outlet **36**. The space between the casing **37** and the outer casing constitutes a portion of an insulating air space while the space between the members **25** and **37** constitute the heating chamber **12**.

As shown in Fig. 3, the inlets **34** of ducts **33** are located at a level below the upper end of the tube **26** which causes the products of combustion rising into the radiating chamber against the upper end wall, to flow downwardly along the cylindrical wall of the chamber to the outlet ducts. The division and circuitous flow of the hot gases within the radiating chamber are uniform by reason of the symmetrical arrangement of its ducts **33** and thus there is substantially uniform heating of the casing **25**.

The ducts **33** are spaced from the outer side and top walls of the casing **25** as well as from the walls of the casing **37**, as shown. This arrangement exposes the entire exterior surface of the casing **25** as well as the entire exterior surface of the ducts **33** to scrubbing contact with air passing through the heating chamber **12**. A large heat radiating area is thus provided as will be seen. The lower ends of the ducts **33** preferably are provided with deflectors **35** of angularly shaped sheet metal that direct rising air streams into the spaces between the respective ducts **33** and the adjacent portions of the outer surface of the casing **25**.

The improved combined combustion and heat radiating unit shown and described which is of integral construction by reason of the welding of the connected parts can easily be placed in operative position within the heating chamber, as will be seen, while the arrangement of the outlets **34** below the level of the upper end of the combustion casing or tube **26** avoids the short circuiting of the gases direct to the outlets from the burner, but due to the upward direction of the column of gases effected by the tube **26**, they impinge the upper wall of the radiator and thence flow generally radially toward the side walls and down to the outlets, thereby effecting efficient transfer of heat to the radiator walls.

The improved furnace is adapted for automatic control as desired, as will be appreciated. The unitary construction of the heat radiator and combustion chamber is of advantage not only from a manufacturing standpoint but the axial location of the tubular member **26** with respect to the drum **25** and described arrangement of the ducts **33** insure uniform flow of hot gases within the radiator, thereby avoiding so-



called hot spots and resulting distortion of the structure.

While I have shown and described the invention in its preferred form, various modifications thereof may be made within the spirit of the invention defined by the appended claim.

I claim:

A gas fired hot air furnace comprising an outer casing having vertical sides, front and rear walls, a top wall, and an open lower end, a transverse partition in said casing above the lower end thereof and provided with a centrally located opening and an eccentrically located opening, an inner casing above said partition comprising conjoined side and top walls each spaced inwardly from the adjacent corresponding wall of the outer casing, said inner casing being supported by and secured to said partition to provide a heat insulating space between the inner casing and the contiguous portions of the outer casing, said inner casing providing a heating chamber for air passing upwardly through said eccentrically located opening and through the inner casing, a blower beneath said partition having an exhaust nozzle communicating with said eccentrically located opening for forcing air to be heated upwardly through said inner casing, a hot air outlet duct extending from an upper portion of said inner casing to the exterior of said outer casing, a heat radiating drum axially located within said inner casing and spaced from the walls thereof, said drum being closed at the upper end and provided with a centrally located opening in the lower end and provided with a plurality of heat radiating ducts located in the space between the drum and the said walls of said inner casing, said ducts having inlets in the lower ends communicating with lower portions of the drum and extending upwardly in spaced relation with respect to the sides of the drum and conjoined above the upper end of the drum, a gas exhaust flue extending through the upper portions of said outer and inner casings into communication with said ducts, and a vertical tubular member open at opposed ends extending through and secured within said opening in the lower end of said drum and having a gas burner located therein, the lower end of said tubular member registering with said centrally located opening in said transverse partition for delivering combustion supporting air to said burner, the upper end of said tubular member being disposed within the drum at an elevation above the level of the inlets for said heat radiating ducts whereby the hot combustion gases from the burner are released by the tubular member at an elevation above the level of said inlets whereby said gases flow laterally and downwardly within the drum in passing to said inlets of the heat radiating ducts.

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