Sept. 4, 1934. R. R. CAMERON 1,972,549

GAS FURNACE

Original Filed Dec. 18, 1931 2 Sheets-Sheet 1

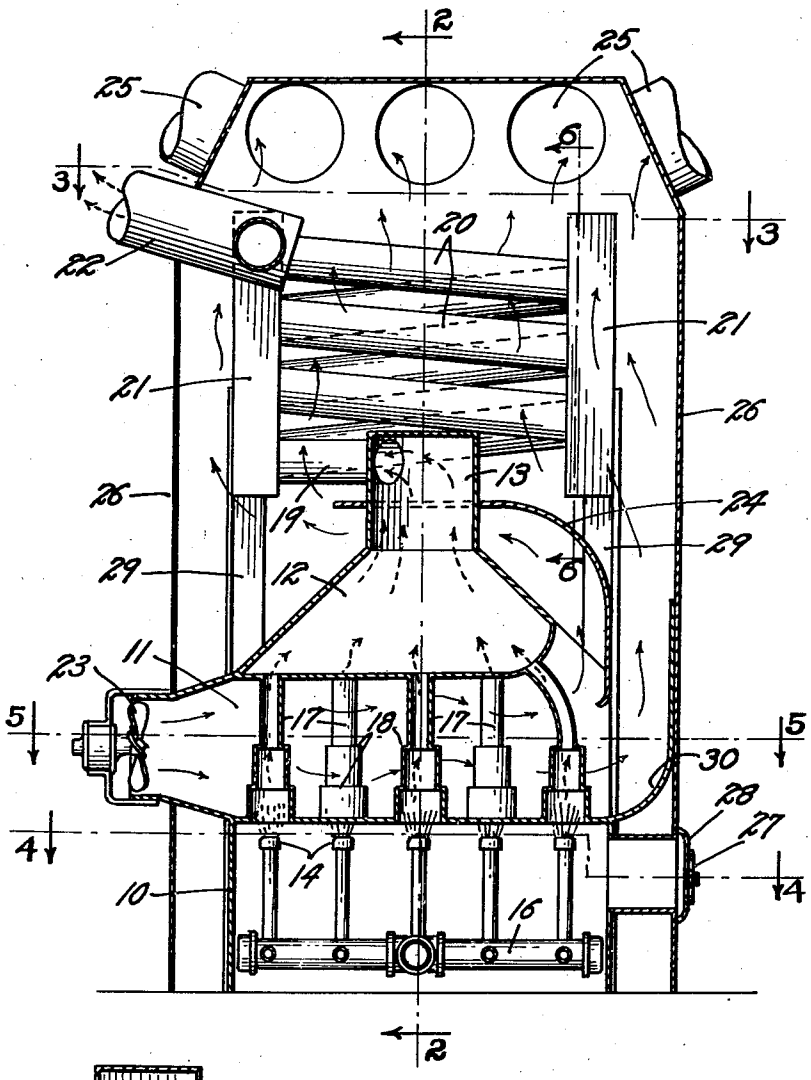


FIG. 1

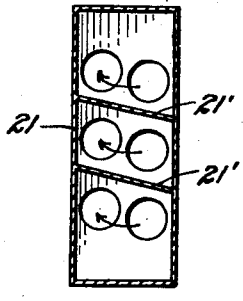


FIG. 6

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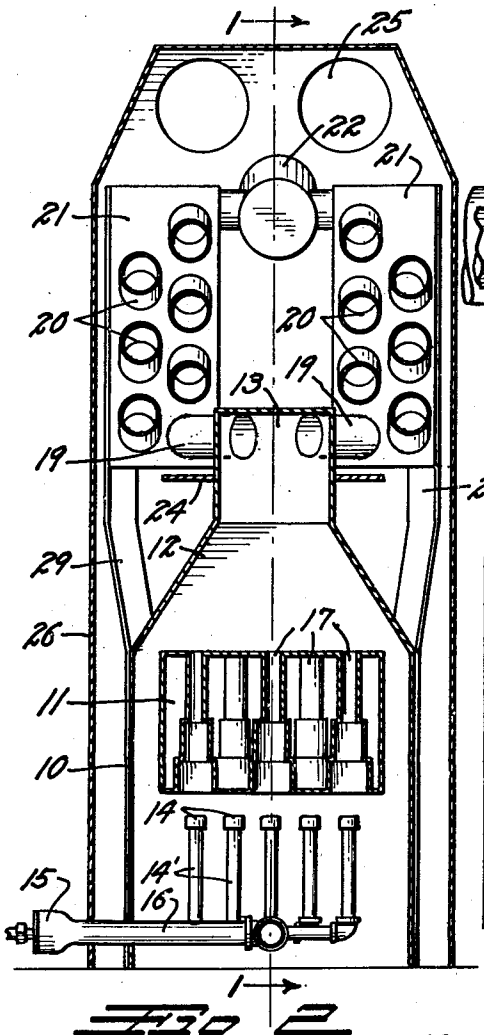


Fig 2

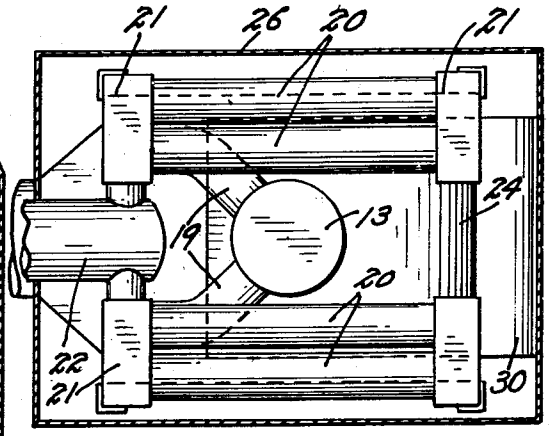


Fig 3

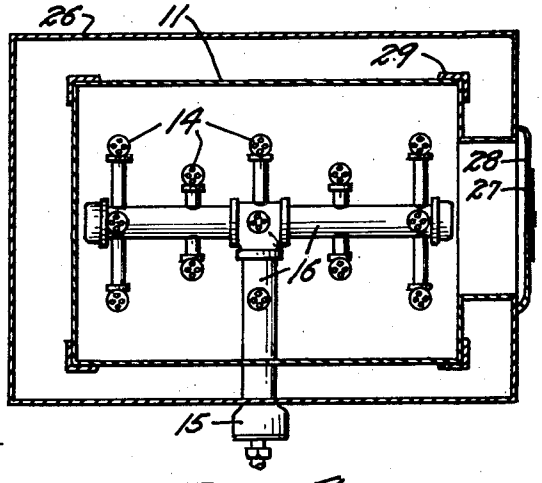


Fig 4

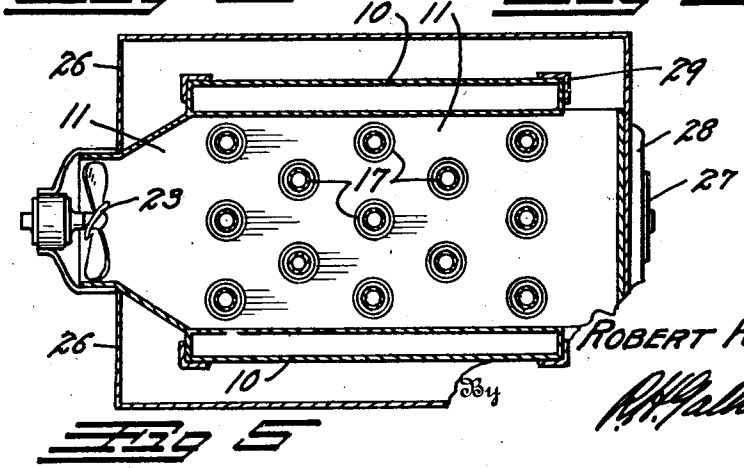


Fig 5

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UNITED STATES PATENT OFFICE

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GAS FURNACE

Robert R. Cameron, Denver, Colo.

Application December 18, 1931, Serial No. 581,799
Renewed February 2, 1934

4 Claims. (Cl. 126—116)

This invention relates to a hot air furnace and is more particularly designed for the use of gas for fuel. The principal object of the invention is to provide a gas furnace which will give an exceedingly high efficiency for a minimum amount of gas.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is a vertical section through the improved furnace taken on the line 1—1, Fig. 2.

Fig. 2 is a vertical section taken on the line 2—2, Fig. 1.

Fig. 3 is a horizontal section taken on the line 3—3, Fig. 1.

Fig. 4 is a horizontal section taken on the line 4—4, Fig. 1.

Fig. 5 is a horizontal section taken on the line 5—5, Fig. 1.

Fig. 6 is a detail section taken on the line 6—6, Fig. 1.

The invention comprises a burner housing 10, the top of which is inclined inwardly as shown at 12 terminating in a collecting drum 13. A series of individual burners 14 are positioned in the bottom of the burner housing 10 and supplied with a fuel gas mixture through a suitable air mixer 15 and a manifold 16. The primary combustion air for the burners 14 enters through the air mixer 15 and the secondary air enters through a suitable control damper 27 preferably positioned in a burner inspection door 28.

An air heating conduit 11 passes horizontally, entirely through the burner housing 10 immediately above the burners 14. A series of flame tubes 17 pass vertically through the conduit 11, there being one flame tube positioned over each of the burners 14. The flame tubes are preferably constructed as illustrated so as to have one or more shoulders 18 which decrease their diameter as they ascend. The burner flames pass within the flame tubes 17 and the steps 18 therein act to retard the flames so as to extract a maximum amount of heat therefrom before the combustion gases pass into the upper portion 12 of the flame housing.

The combustion gases flow from the collecting drum 13 through a pair of header tubes 19 into two series of inclined flue gas tubes 20. The flue gas tubes are supported from and communicate with header boxes 21 at their extremities. A detail section of the header boxes is shown in Fig. 6. They contain suitable partitions 21' which guide the incoming gases to the next outgoing tube 20 of the series so that a continuous circuit is maintained toward the uppermost tube 20. The tops of the rear header boxes 21 are connected to a common stack 22 which discharges the flue gases from the furnace.

The header boxes 21 and the flue gas tubes 20 are preferably supported above the burner housing 10 upon angle legs 29. The entire structure thus far described is enclosed in a suitable outer jacket 26, from the top of which, hot air distributing pipes 25 lead.

The air to be heated is forced through the air heating conduit 11 by means of a suitable fan 23. In passing through the conduit 11 the air is forced to assume a tortuous path about the flame tube 17 which brings it into very intimate contact with these highly heated tubes resulting in an efficient heat transfer from the tubes to the air. As the air exits from the heating conduit it is caused to be turned upwardly by means of a curved front plate 30 and is divided into two paths by means of a curved baffle plate 24. Thus, one path of the heated air is upwardly through the front part of the jacket 26 and the other will be turned rearwardly over and about the hot top of the burner housing 10 and upwardly through the rear portion of the jacket 26. This uniform column of rising air must flow about the hot flue tubes 20 and the heated headers 21 where it will absorb still additional heat before discharging through the distributing pipes 25.

It will be noted that the air heating conduit 11 is of less width than the burner housing 10 so that hot gases from the burners and from the lower portion of the burner housing will rise at each side of the air conduit so that the entire surrounding wall of the conduit will become heated.

If desired, the header boxes 21 can be eliminated and return bends placed upon the extremities of the flue tubes 20 so as to connect them in a continuous series. It has been found, however, that the header boxes 21 provide additional heating surface which is very desirable in increasing the efficiency of the transfer of the heat.

The burners may have any desired construc-

tion. As illustrated they comprise perforated pipe caps positioned on the top of a series of individual standpipes 14' arising from the manifold 16.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. An air heating furnace comprising: a burner housing; an air conduit passing through said housing; means for forcing air through said conduit; burners positioned within said housing below said conduit so as to heat the latter; a collector at the top of said housing arranged to collect the combustion gases from said burners; a series of flue pipes adapted to receive the combustion gases from said collector; a jacket enclosing said housing and said pipes; and a baffle plate curving rearwardly from the discharge of said heating conduit so as to return a portion of the discharging air over said housing.

2. An air heating furnace comprising: a burner housing; a frusto-conical top on said burner housing; a collecting drum at the apex of said top; means connecting said collecting drum with a discharge stack; a jacket surrounding said housing and spaced from the latter; an air conduit passing through said housing, said conduit opening through said jacket at its one extremity and discharging within the latter at its other extremity; means for forcing air into said conduit; a series of vertical flame tubes passing through said conduit and means for creating a flame below each of said flame tubes so that the combustion gases will pass through said conduit to said collecting drum.

3. An air heating furnace comprising: a burner housing; a frusto-conical top on said burner housing; a collecting drum at the apex of said top; means connecting said collecting drum with a discharge stack; a jacket surrounding said housing and spaced from the latter; an air conduit passing through said housing, said conduit opening through said jacket at its one extremity and discharging within the latter at its other extremity; means for forcing air into said conduit; a series of vertical flame tubes passing through said conduit and means for creating a flame below each of said flame tubes so that the combustion gases will pass through said conduit to said collecting drum; said flame tubes having successively reducing diameters as they ascend, said reductions forming a series of shoulders within said tubes to act as baffles for said combustion gases.

4. An air heating furnace comprising: a burner housing; a frusto-conical top on said burner housing; a collecting drum at the apex of said top; means connecting said collecting drum with a discharge stack; a jacket surrounding said housing and spaced from the latter; an air conduit passing through said housing, said conduit opening through said jacket at its one extremity and discharging within the latter at its other extremity; means for forcing air into said conduit; a series of vertical flame tubes passing through said conduit and means for creating a flame below each of said flame tubes so that the combustion gases will pass through said conduit to said collecting drum; said conduit entering one side of said housing and discharging from the opposite side thereof; the remaining sides of said housing being spaced from said conduit to allow the combustion gases to flow thereabout.

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