Dec. 23, 1952 J. N. LOUGHNER 2,622,586

GAS BURNING HEATING APPARATUS

Filed May 11, 1949 3 Sheets-Sheet 1

Fig. 1

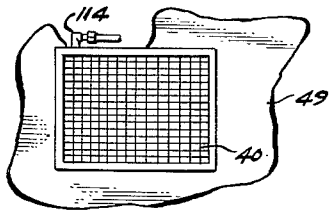


Fig. 2

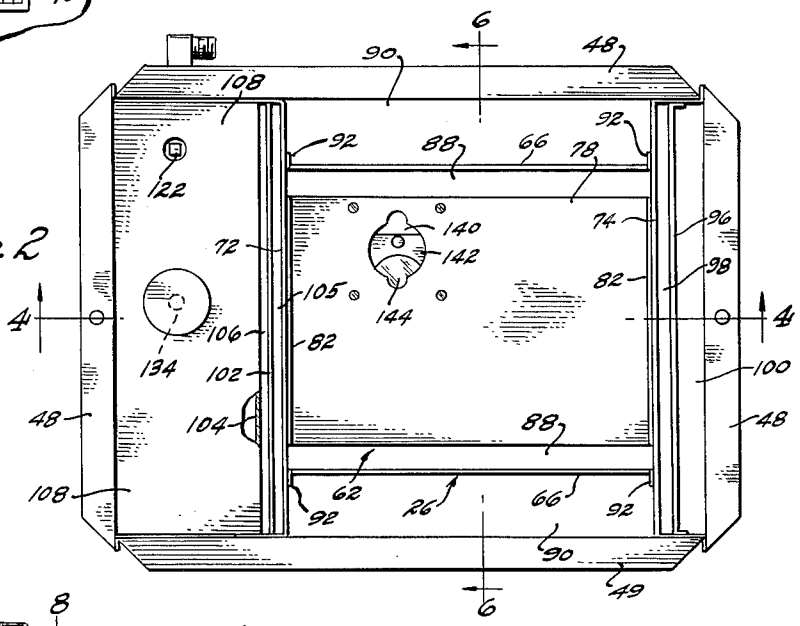
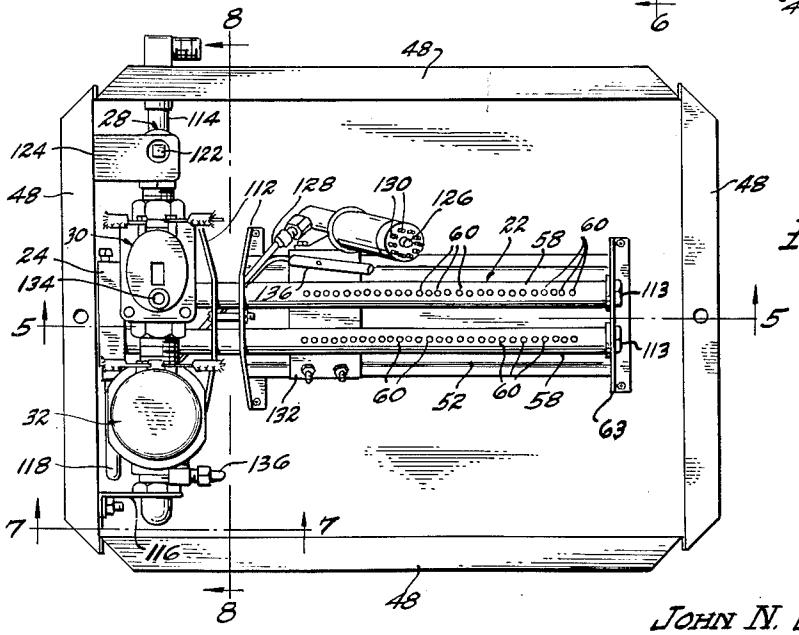


Fig. 3



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GAS BURNING HEATING APPARATUS

Filed May 11, 1949 3 Sheets-Sheet 2

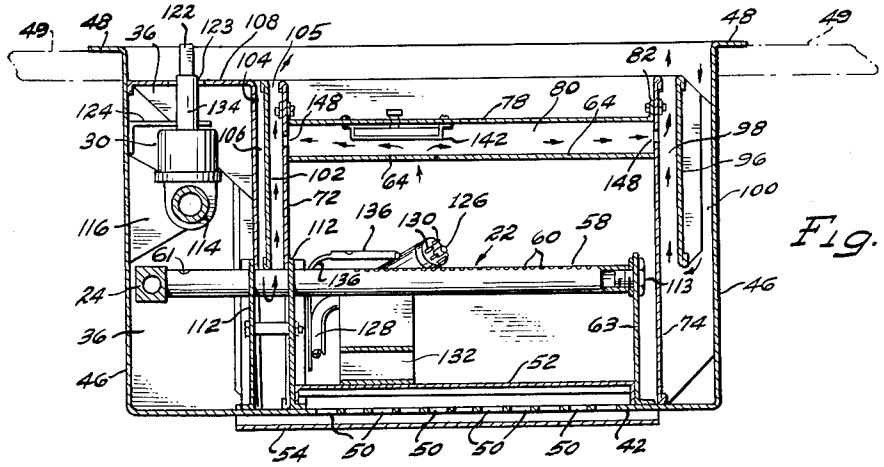

Fig. 4

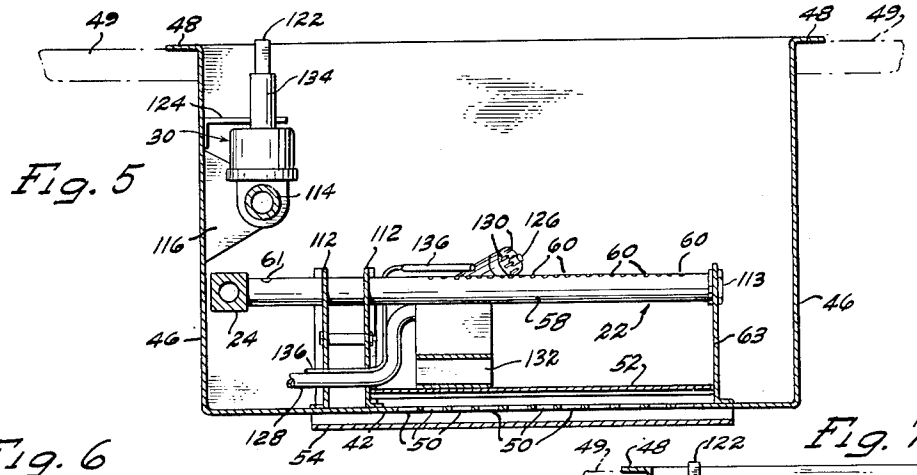

Fig. 5

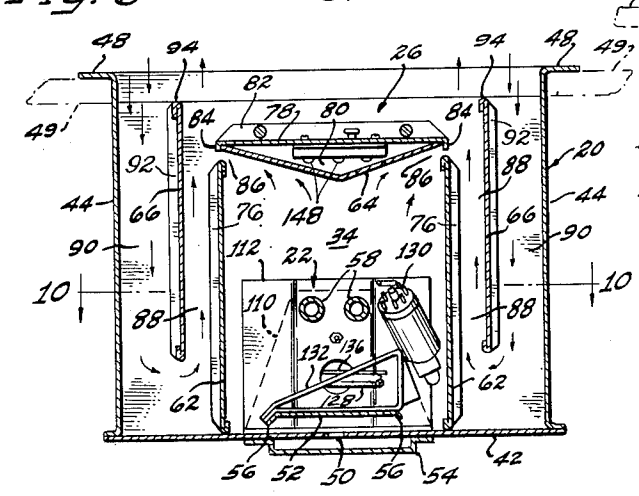

Fig. 6

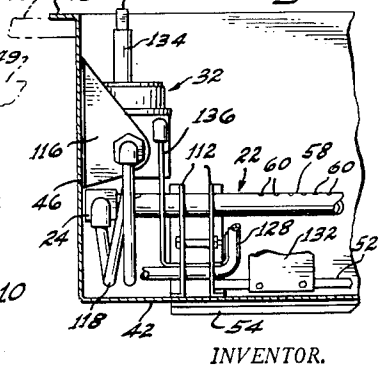

Fig. 7

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GAS BURNING HEATING APPARATUS

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Fig. 9

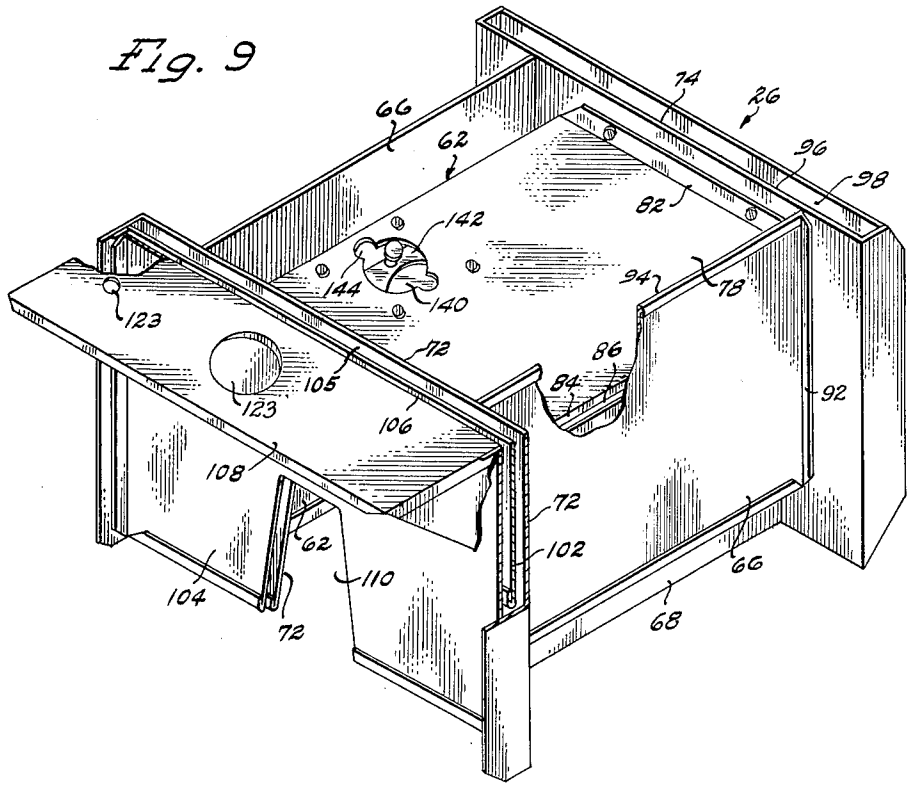


Fig. 10

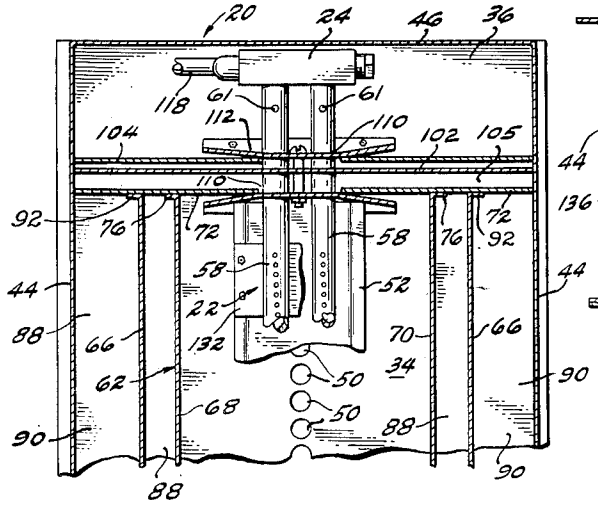
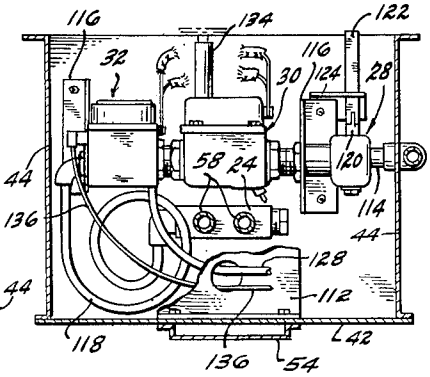


Fig. 8



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Patented Dec. 23, 1952

2,622,586

UNITED STATES PATENT OFFICE

2,622,586

GAS BURNING HEATING APPARATUS

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Application May 11, 1949, Serial No. 92,548

7 Claims. (Cl. 126—116)

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This inventon relates generally to heating apparatus and particularly to apparatus for burning gasified petroleum.

In the heating industry, considerable progress has been made in the development of so-called floor furnaces of the type which use gasified petroleum, known as butane-propane or so-called bottled gas as a fuel. However, much is left to be desired in these furnaces with respect to their construction, ease and expense of manufacture, and in their efficiency of operation. For example, the structural character and the arrangement of the elements of present day floor furnaces result in large bulky units which, for this reason alone, are not satisfactory from the standpoint of installation of these units in small spaces, such as in house trailers, for example. Then again, such bulky units are difficult and expensive to manufacture. Another objection found in floor furnaces of the past is that efficiency of combustion is unsatisfactorily low due, among other things to the burner construction. Inefficient operation results which alone is objectionable, but in addition requires the provision of a flue to carry away objectionable fumes including monoxide gas and other products of combustion. This is also true of gas cooking ranges which use gasified petroleum as fuel. Flues are, of course, objectionable because of the heat loss through them and because of their expense and appearance and the installation problems which they present, particularly in house trailers. In addition, floor furnaces have been costly to manufacture due to construction and assembly of the units in an effort to obtain complete combustion of the fuel and general efficiency of the furnaces.

Accordingly, it is the principal object of the present invention to provide an improved, hot air, gas burning apparatus in which the above mentioned objections are obviated.

Another object of the invention is to provide an improved gas burning, hot air heating apparatus of a character which eliminates the need for an exhaust flue while at the same time will deliver primary heated air to a room or space to be heated without generating monoxide gas or other objectionable fumes to any appreciable extent.

Another object of the invention is to provide an improved gas burning, hot air furnace in which both outside fresh air and room air are heated in a manner such that only the outside fresh air is used for combustion purposes.

Another object of the present invention is to provide an improved floor type, hot air, gas burning furnace of high efficiency, yet one which is compact and can be readily installed in small spaces.

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Another object of the invention is to provide an improved gas burner construction for hot air furnaces which effects substantial complete combustion of the fuel.

Another object of the invention is to provide a hot air floor furnace unit of improved construction so that substantially only outside fresh air is taken in for combustion purposes.

Another object of the invention is to provide a gas burning, hot air furnace which although located outside of the structure to be heated is so constructed as to eliminate need for heat insulating material without appreciable loss of heat.

Another object of the invention resides in the construction of a combustion chamber-air flow duct unit in which cooling of the top wall of the combustion chamber is effected by utilization of the air passing through the hot air ducts.

Another object of the invention is to provide an improved floor type gas furnace having a combustion chamber-air duct structure which is removable from the housing as a unitary structure to facilitate assembly and decrease manufacturing costs.

Another object of the invention resides in the provision of a burner support which also functions to locate and retain a combustion chamber and air duct unit in a housing in relation to controls therein and further functions as a closure for a clearance opening in the combustion chamber.

Another object of the invention is to provide a floor furnace for installation externally of a building or house trailer to be heated without being appreciably affected by drafts such as might be created by outside winds.

Other objects of the invention will become apparent from the following detailed description, taken in connection with the accompanying drawings in which

Fig. 1 is a plan view of my gas fired heating apparatus shown installed in the floor of a room or other space to be heated.

Fig. 2 is another plan view of the heating apparatus with the top or grill removed.

Fig. 3 is still another plan view of the heating apparatus with certain parts removed.

Fig. 4 is a view in vertical section of the heating apparatus taken longitudinally thereof or along the line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view of the heat-

ing apparatus, taken along the line 5—5 of Fig. 3.

Fig. 6 is a vertical, cross sectional view of the heating apparatus, taken along the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary, cross sectional view of the heating apparatus, taken along the line 7—7 of Fig. 3.

Fig. 8 is a cross sectional view of the heating apparatus, taken along the line 8—8 of Fig. 3.

Fig. 9 is an isometric view of a removable combustion chamber, air baffle, and air duct unit of the heating apparatus.

Fig. 10 is a fragmentary, horizontal sectional view of the heating apparatus, taken along the line 10—10 of Fig. 6.

Referring to the drawings by characters of reference and first to Figs. 1 to 10 inclusive, the floor furnace shown comprises, in general, a housing 20, a main gas burner 22, a burner header 24, a baffle duct unit 26, and burner controls 28, 30 and 32. In accordance with the compactness and efficiency features of my invention, I provide in the housing 20 a relatively large combustion chamber 34 and adjacent thereto, a relatively small control device compartment 36. The baffle-duct unit 26 is disposed within the housing 20 and divides the interior thereof into the combustion chamber 34 and the control device compartment 36, separating these compartments from each other. Among other functions, the baffle-duct unit 26 forms the combustion chamber 34 and in part forms the control device compartment 36. In the combustion chamber 34, or surrounded by the baffle-duct 26 is the burner 22, operatively connected to the header 24 which is located in the control compartment 36. Also in the control compartment 36, and above the header 24, are the burner controls 28, 30 and 32. Preferably, a floor grille or register 40 is provided for and secured to the top of the housing 20, as illustrated.

The housing 20 is preferably made of sheet steel and of rectangular shape in cross section having a bottom wall 42, side walls 44, and end walls 46. Preferably, the housing side and end walls are formed with upper outturned flanges 48 to support the housing in an opening in a floor 49 of a room or house-trailer to be heated. In the housing bottom wall 42, I provide a plurality of large air inlets 50 for entrance of air to the combustion chamber 34. These air inlets 50 are preferably arranged in a row extending lengthwise of the housing, substantially midway of the housing side walls. When the floor furnace is installed in the floor of a house-trailer, a lower portion of the housing 20 including the bottom wall 42 thereof will be externally of the house-trailer so that fresh, outside air will be taken in through the inlets 50 into the combustion chamber for combustion purposes. The utilization of fresh, outside air for combustion purposes aids toward the obtaining of substantially complete fuel combustion with little or no objectionable products of combustion so that no flue is required for the furnace.

Externally of the housing 20, I provide a baffle member 54 which I arrange to prevent direct drafts of air from passing up or down through the air ports 50 such as might be caused or induced by outside wind. The baffle 54 is an elongated channel which may be secured to the bottom of the housing 20, such as by welding, in overlying relation to the row of air inlets 50. Opposite ends of the channel are open for entrance of air to the combustion chamber 34.

Immediately overlying the row of air inlets 50 is an air baffle member or plate 52 to baffle the air entering the combustion chamber 34. This baffle plate 52 is elongated to extend longitudinally of the housing 20 and is slightly spaced from and above the housing bottom wall 42. Preferably, the side edges of the baffle plate 52 are flared downwardly, as at 56, to baffle the air further.

Extending immediately above the baffle plate 52 is the gas burner 22. In accordance further with my invention, I provide an efficient gas burner by constructing it of a number of pipes or tubes 58 and by providing each with a number of closely spaced, small diameter burner ports 60. As shown, the burner ports 60 are spaced apart lengthwise of the tubes and, of course, are arranged so that they face upwardly. I have found that in using gasified petroleum as fuel, a more complete combustion is obtained by a burner having a large number of closely spaced, small diameter ports than by a burner having a few large ports of the same total flow capacity as the small ports. This is due in part, at least, to the fact that the surrounding air which is constantly moving in and feeding the flames, penetrates more nearly to the centers of the small flames than to the centers of large flames, thus effecting a more complete combustion of the gas. It will be understood, that the gasified petroleum or butane-propane is delivered to the burner tubes 58 under low pressure such that the gas does not stream upwardly out of the ports 60, but instead egresses therefrom just sufficiently to effect low, hot flames. Preferably, the burner tubes 58 are spaced apart a distance approximately equal to the diameters of the tubes.

The burner tubes 58, of which there are two in the present furnace, but of which there may be one or more, extend longitudinally of and immediately above the baffle plate 52 in vertical spaced relation thereto. These burner tubes 58 extend from the combustion chamber 34 into the control device compartment 36 wherein they are individually connected to and in communication with the burner header 24. Air inlet ports 61 are provided in the burner tubes 58 within the control device compartment 36 for adding air to the gas. Preferably, the header 24 is an elongated, pipe-like member which is arranged to extend along and adjacent the housing end wall 46. The burner tubes 58 extend laterally from the header, longitudinally of the housing. The ends of the burner tubes 58, within the combustion chamber 34, may be supported by an upright bracket 63 which may be suitably secured to the housing bottom wall 42, adjacent the combustion chamber and wall 74.

Referring now in detail to my baffle-duct unit 26, this unit is of composite construction comprising, in general, an inner, upright air duct or jacket member 62, a top baffle member or plate 64 and upright hot air duct members 66. The duct member 62 carries the baffle plate 64 and also carries the hot air duct members 66. These parts are secured together as a unitary structure, preferably by welding. In the interests of low cost manufacture and ease of assembly, the composite baffle-duct unit 26 rests unattached on the housing bottom wall so that the unit can be readily inserted in and/or removed from the housing as a unitary structure. It will be understood that the baffle-duct unit can be removed from the housing readily by merely lifting the

unit through the open top of the housing. This provides for ease of maintenance of the furnace, provides for accessibility to the controls, and provides accessibility to the unit to clean it of debris which may drop thereinto. Preferably, the baffle-duct unit 26 is made of a high, heat conducting sheet material, such as sheet steel.

Like its housing 20, the inner duct member 62 is box-like, or of general rectangular shape in cross section having oppositely disposed side walls 68, 70 and oppositely disposed end walls 72, 74. The duct member side walls 68, 70 are preferably provided with outturned end flanges 76 for attachment by welding or by any other suitable means to the duct member end walls 72, 74 to secure the parts together. Overlying the upper open end of the duct member 62 is the baffle plate 64 and overlying and spaced above this baffle plate is a top wall or plate 78 which has the dual function of forming a heat insulating space 80 above the combustion chamber and of catching articles dropped through the grille. The top plate 78 is slightly spaced above the upper open end of the combustion chamber or duct 62 and may have upturned end flanges 82 for attaching the plate 78 by screws, or by other suitable means to the duct end walls 72, 74. Downturned flanges 84 may be provided around the edges of the top plate 78 to which the baffle plate 64 may be welded, the baffle plate 64 being supported slightly spaced above the upper end of the duct member 62 to provide a slot-like discharge opening 86 along each side of the duct. Preferably, the baffle plate 64 is bent to provide a V-section, to space the baffle plate from the top wall 78 and to present upwardly inclined baffle surfaces for directing hot air rising in the combustion chamber outwardly to the side discharge outlets 86.

Resting on the housing bottom wall 42, the lower end of the duct member 62 is open to receive or fit over the burner 22 and also to communicate directly with the fresh air inlets 50 in the housing bottom wall. Thus, the duct member 62 allows only fresh, outside air to flow to the burner, the updraft in the duct or combustion chamber 34 being effected, of course, by the heat of the burning fuel.

Whereas the burner 22 and the duct 62 constitute a primary heating system or system which supplies heat directly from within the combustion chamber into the room or other space to be heated, the ducts 66 provide a secondary heating system for reheating room air by inducing the room air to flow into heat absorbing relation with the outer surfaces of the combustion chamber or duct 62. As shown in Figs. 2, 6 and 10, the duct side walls 68, 70 are spaced inwardly from the side edges of the duct end walls 72, 74 to allow spaces for relatively small capacity, hot air ducts 88 and for relatively large capacity cold air ducts 90. The hot air duct members 66 are spaced from the outer surfaces of the combustion chamber side walls 66, 68 to form therewith and with the extended end walls, the hot air ducts or passages 88. Also, the hot air duct members 66 cooperate with the extended end walls 72, 74 and with the housing side walls 44 to form the cold air ducts 90, adjacent to and outwardly of the hot air ducts 88. The cold air ducts 90 in addition to conveying relatively cold room air downwardly for reheating, insulates the hot air ducts 88 and combustion chamber from the housing side walls without need of insulating material so that little or no heat will be lost although the housing 20 is located outside of the building or house-trailer to be heated.

At their opposite ends, the hot air duct members 66 may be provided with outturned flanges 92 which may be welded, or be otherwise suitably secured to the duct extended end walls 72, 74. As shown in Fig. 6, the upper edges, as at 94, of the hot air duct members 66 extend above the combustion chamber duct 62 and terminate below the top edges of the housing 20. At their lower ends, the hot air duct members 66 terminate below the burner 22, but in spaced relationship to the housing bottom wall 42 so as to provide communication adjacent the bottom of the housing between the cold and hot air ducts. Below the discharge outlets of the hot air duct members 34, the slot-like discharge outlets 86 of the combustion chamber discharge into the hot air ducts commingling or mixing with the reheated air and discharging therewith upwardly through the grille into the room or other space to be heated. The discharging of the primary, heated air through the slot-like discharge openings of the combustion chamber 34 into the hot air ducts creates an aspirating effect which aids further updraft in the hot air ducts.

Another hot air duct member, designated by the numeral 96, is secured to and spaced from the combustion chamber end wall 74, as shown in Fig. 4, to form an additional hot air duct or passage 98 for reheating of room air. Between the end wall duct member 96 and the housing end wall 46 is a cold air return duct or passage 100 which also insulates the combustion chamber end wall 74 from the housing end wall 46.

Secured to the combustion chamber end wall 72, adjacent the control device compartment 36 is an intermediate wall or partition 102 and an outer wall or partition 104. These walls 72, 102 and 104 are spaced apart to form an inner hot air duct 105 and an outer cold air duct 106. Also, the cold air duct 106 insulates the control device compartment 36 from the heat of the combustion chamber 34 without need of insulating material. As shown, the closely spaced walls 72, 102 and 104 extend to the sides of the housing 20 and the walls 72, 104 extend downwardly to the housing bottom wall 42. In order to provide communication between the hot and cold air duct, the lower edge of the intermediate wall 102 is terminated just above the burner tubes 58. Preferably, the spaced end walls 72, 102 and 104 are flanged and welded or otherwise suitably secured together. The wall 104 forms one wall surface of the control device compartment 36 and is L-shaped having an upper, horizontal leg 108 which overlies and functions as a top or cover for the control device compartment 36.

In the bottom edges of the spaced end walls 72, 104 of the baffle-duct unit, aligned clearance apertures 110 are provided to receive the burner tubes 58. In order that heat from the combustion chamber 34 does not pass through the clearance apertures 110 into the control compartment 36, I provide a pair of spaced closure members or plates 112, arranged upright to receive the end walls 72 and 104 therebetween and close the apertures 110. The closure plates 108 extend substantially parallel with the walls 72, 102 and 104 and are spaced apart a distance such that the walls 102 and 72 fit snugly therebetween and are slightly flexed inwardly as the unit is lowered into its housing 20. Thus, the closure plates 112 restrain the baffle-duct unit against movement in the housing as well as close the clearance aper-

tures 110. In addition, the closure plates 112 together with the bracket 63 support the burner tubes 58. The closure plates 112 and the bracket 63 may be made of sheet metal formed each with a foot which may be welded, or be otherwise suitably secured to the housing bottom wall 42. Adjacent the bracket 63, the ends of the burner tubes 58 may be tapped to receive studs 113 for securing the tube ends to the bracket and also for closing these ends of the tubes.

In the control device compartment 36, the controls 28, 30 and 32 are connected by suitable fittings in and to a gas delivery pipe 114. The pipe 114 projects into the compartment 36 through one of the housing side walls 44 and extends along the adjacent end wall 46 of the housing. Suitable brackets 116, secured to the housing end wall 46 may be provided for supporting the gas delivery pipe 114. A tube 118 may be provided to connect the gas delivery pipe to the burner header 24. The control 28 is a manually operable shut-off valve; the control 30 is a safety shut-off valve; and the control 32 is an automatic or temperature responsive valve. These valves have neither been shown nor described in detail since they are well known devices in the art and further since neither the controls per se nor the system which they compose form any part of the present invention. The valves 28, 30 and 32 are arranged in the direction of gas flow in the pipe 114 in the order named. This gas pipe 114 may be connected to a source or tank of pressurized, gasified petroleum or butane-propane or may be connected to a source of any other suitable gaseous fuel.

The manually operable shut-off valve 28 has an upstanding valve stem 120 which is rotatable to set or adjust the valve member (not shown). To this stem 120, an extension 122 may be pivotally connected and extend upwardly therefrom to a point adjacent the grille where a key (not shown) may be inserted through the grille and through an aperture 123 in the control compartment cover 108 to engage the extension 122 and operate the valve. A guide member 124 may be provided to receive and guide the stem extension 122 and this guide member may be welded or be otherwise suitably secured to the housing end wall 46.

The temperature responsive valve 32 is adapted to control flow of gas to the burner 22 in response to the temperature of a room or other space being heated. A room thermostat (not shown) of any suitable, well known type may be provided to control the valve 32 and be electrically connected thereto in the well known manner.

In the combustion chamber 34, is a pilot burner 126 for igniting the main burner 22 when the room thermostat calls for heat. This pilot burner 126 is arranged laterally of the main burner 22 and is angularly disposed to position the flame end near the burner ports 60 so that the housing 20 may be as shallow as possible. A gas delivery tube 128 connects the pilot burner 126 to the control 32 anteriorly to the valve. Surrounding the pilot burner 126 is a plurality of thermo-couples 130, arranged to be heated by the pilot and to control the safety shut-off valve 30. As is generally known, as long as the pilot remains lighted, the heated thermo-couples 130 will hold the safety valve 30 open and conversely, if for any reason the pilot flame becomes extinguished the cooled thermo-couples allow the control 30 to stop flow of gas to the main burner 22 and to the pilot. The pilot burner 126 and the associated thermo-couples are supported by a bracket 132 which is mounted on and may be suitably secured to the bottom air baffle plate 52.

Extending upwardly and externally from the casing of the safety shut-off valve is a manually operable plunger 134 by means of which the safety shut-off valve may be held open manually for the purpose of lighting the pilot. Between the pilot burner 126 and the main burner 22 is one end of a tube 136 which has its other end connected to the control valve 32. The control valve 32 is of the diaphragm type which requires bleeding of gas from one side of the diaphragm and this gas is delivered through the tube 136 to a Bunsen burner thereon where the gas is burned in the combustion chamber 34 as an efficient and safe means of disposing of the bleed gas.

In the top baffle plate 64 and in the top plate 78 are aligned apertures 140 through which to extend a lighted match or torch for initially lighting the pilot burner 126. To supply gas to the pilot burner 126, the plunger 134 is held down until such time as the thermo-couples 130 are heated to the temperature at which they will cause the safety valve to be held open. A slide closure member 142 may be provided to close the opening 140 in the top plate 78 and in this closure member may be provided, a transparent window 144 through which to view the pilot light. When the thermostat calls for heat the valve 32 opens to allow the gas to flow to the main burner 22 and be lighted by the pilot 126, providing, of course, that the safety control valve is open. Fresh, outside air is drawn by the burner heat upwardly through the bottom air inlets 50 and is baffled by the lower baffle plate 52 which causes the air to flow from beneath the plate at the side edges thereof. This fresh, outside air rises to the burner 22 to supply the necessary oxygen for good combustion. The heated air rises in the combustion chamber 34 and discharges through the outlets 86 into the air ducts 88 and then passes upwardly through the grille 40 into the room or other space to be heated. Relatively cold room air flows by gravity down the cold air ducts 90, 100 and 106 and up the hot air ducts 88, 98 and 105 where the air is reheated by conduction with the walls of the combustion chamber and discharges back into the room.

In accordance with another feature of my invention, I provide for cooling the top of the combustion chamber 34 by circulating air through the double wall space 80. To this end, I provide apertures 148 in the ends of the double wall space 80, establishing communication between the space 80 and the hot air ducts 98 and 108. Thus, it will be seen that hot air in the combustion chamber 34 will rise and pass upwardly through the opening 140 into the space 80 whence the air will flow out the apertures 148 into the hot air ducts, preventing build up of excessively high temperatures at the top of the combustion chamber. It will be noted that the aperture 140 through which a match or other igniter is inserted to initially light the pilot provides the necessary passage for air flow from the combustion chamber to the hot air ducts via the double wall top space 80.

From the foregoing description, it will be noted that I have provided an improved gas burning apparatus of a construction such that substantially only fresh, outside air is taken in for combustion purposes. This increases efficiency of the apparatus, eliminates need of flues with accompanying decrease in cost. Also, it will be noted

that I have provided an improved burner of a character to burn gasified petroleum efficiently. Furthermore, I have provided a compact arrangement of elements of a floor type furnace to enhance installation of such furnace. Further, I have provided a unitary removable combustion chamber and hot air duct construction to facilitate assembly and decrease cost of manufacture.

I claim:

1. In a heating apparatus, a housing, a removable wall structure in said housing dividing the interior thereof into a combustion chamber and a control device compartment, an upstanding closure member within said housing between said chamber and said compartment, a plurality of laterally positioned burner tubes in said combustion chamber extending through said closure member into said control device compartment, a control device in said compartment operatively connected to said burner tubes, and a clearance notch in a wall of said removable wall structure receiving said plurality of burner tubes and closed by said closure member.

2. In a heating apparatus, a housing having bottom and end walls and an air intake in said bottom wall, a plurality of burner controls within said housing adjacent one of said end walls, a gas burner header member within said housing beneath and controlled by said controls, a plurality of burner tubes connected to said header and extending laterally therefrom toward the other of said end walls, a pair of upright spaced plates supporting said burner tubes intermediate said end walls, and a removable wall structure within said housing forming a combustion chamber enclosing said burner tubes, said wall structure having an opening establishing communication between said combustion chamber and said air intake and having an end wall received and held between said upright spaced plates.

3. In a heating apparatus, a housing having bottom and end walls and an air intake in said bottom wall, a plurality of gas burner controls within said housing adjacent one of said end walls, a gas burner header within said housing beneath and controlled by said controls, a plurality of burner tubes connected to said header and extending therefrom toward the other of said end walls, a pair of upright spaced plates supporting said burner tubes intermediate said end walls, a removable wall structure including a combustion chamber surrounding said burner tubes, said wall structure having an end wall received between said spaced upright plates, wall means forming a duct on said last-named end wall, and wall means carried by said removable wall structure between said first wall means and said controls and engaged between said spaced upright plates.

4. In a heating apparatus, a housing having bottom and end walls and an air intake in said bottom wall, a plurality of gas burner controls within said housing adjacent one of said end walls, a gas burner header within said housing beneath and controlled by said controls, a plurality of burner tubes connected to said header and extending laterally therefrom toward the other of said end walls, a pair of upright spaced plates supporting said burner tubes intermediate said end walls, a removable wall structure surrounding and forming a combustion chamber for said burner having an end wall received between said spaced plates, said wall structure end wall separating said controls from said combustion chamber and cooperating with said housing to form a chamber for said controls, wall means between said controls and said wall structure end wall and carried by said removable wall structure, said wall means forming an air duct with said wall structure end wall open at top and bottom to atmosphere, and a cover overlying said control compartment and carried by said wall structure.

5. In a heating apparatus, a housing having bottom and end walls and an air intake in said bottom wall, a plurality of gas burner controls within said housing adjacent one of said end walls, a gas burner header within said housing beneath and controlled by said controls, a plurality of burner tubes connected to said header and extending therefrom toward the other of said end walls, a pair of upright spaced plates supporting said burner tubes between said end walls, a removable wall structure enclosing said burner tubes and forming a combustion chamber, said wall structure having an upright wall disposed toward said one end wall, a wall member carried by said wall structure between said controls and said upright wall in spaced relation to and forming a duct with said upright wall, a second wall member carried by said wall structure between said controls and said first wall member forming a duct with the latter, said ducts having air discharge and intake openings respectively adjacent the top of said wall structure and said first wall member terminating above said burner pipes to establish communication between said ducts, said upright wall and said wall members being received between said spaced plates, clearance cutouts in said upright wall and in said second wall member to receive said burner tubes, and a horizontal flange on said second wall member overlying and covering said controls.

6. A combustion chamber and air duct unit for a gas burning heating apparatus comprising, a wall structure having top side and end walls forming a combustion chamber, said wall structure having a lower air inlet and having upper outlets adjacent the sides of said wall structure, plates attached to and spaced outwardly from each of the side walls forming air ducts respectively in communication with said upper outlets and having lower inlets in communication with atmosphere and upper outlets above said first upper outlets in communication with atmosphere, a plate attached to each of said end walls respectively in spaced relation thereto forming ducts open at top and bottom to atmosphere, and another plate attached to one of said last-named plates forming an air duct therewith open at top and bottom to atmosphere.

7. A combustion chamber and air duct unit comprising side and end walls connected together to form in part a combustion chamber for a gas burner, said end walls extending outwardly beyond said side walls, a baffle plate forming the top of the combustion chamber, said baffle plate being suported on said end walls in vertical spaced relation to the upper edges of said side walls to provide an outlet adjacent the top of the combustion chamber, plates attached respectively to the extended end walls in spaced relation respectively to the outer surfaces of said side walls to form air ducts open at top and bottom to atmosphere and communicating with said outlet, end plates spaced respectively from the outer surfaces of said end walls to form air ducts open at top and bottom

to atmosphere, and another end plate in spaced relation to the outer surface of one of said last-named plates to form air ducts open at top and bottom to atmosphere, said end plates extending substantially coextensive of the width of said end walls and attached thereto.

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