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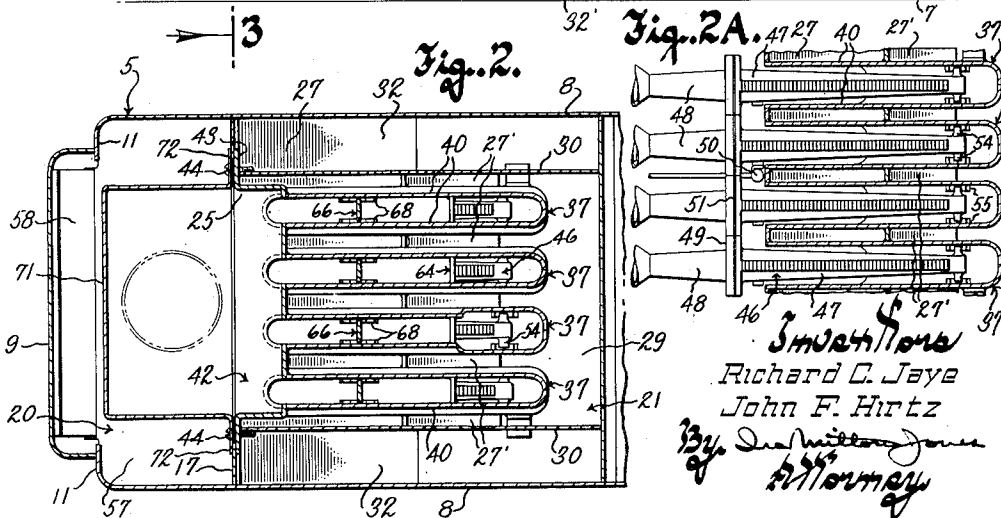
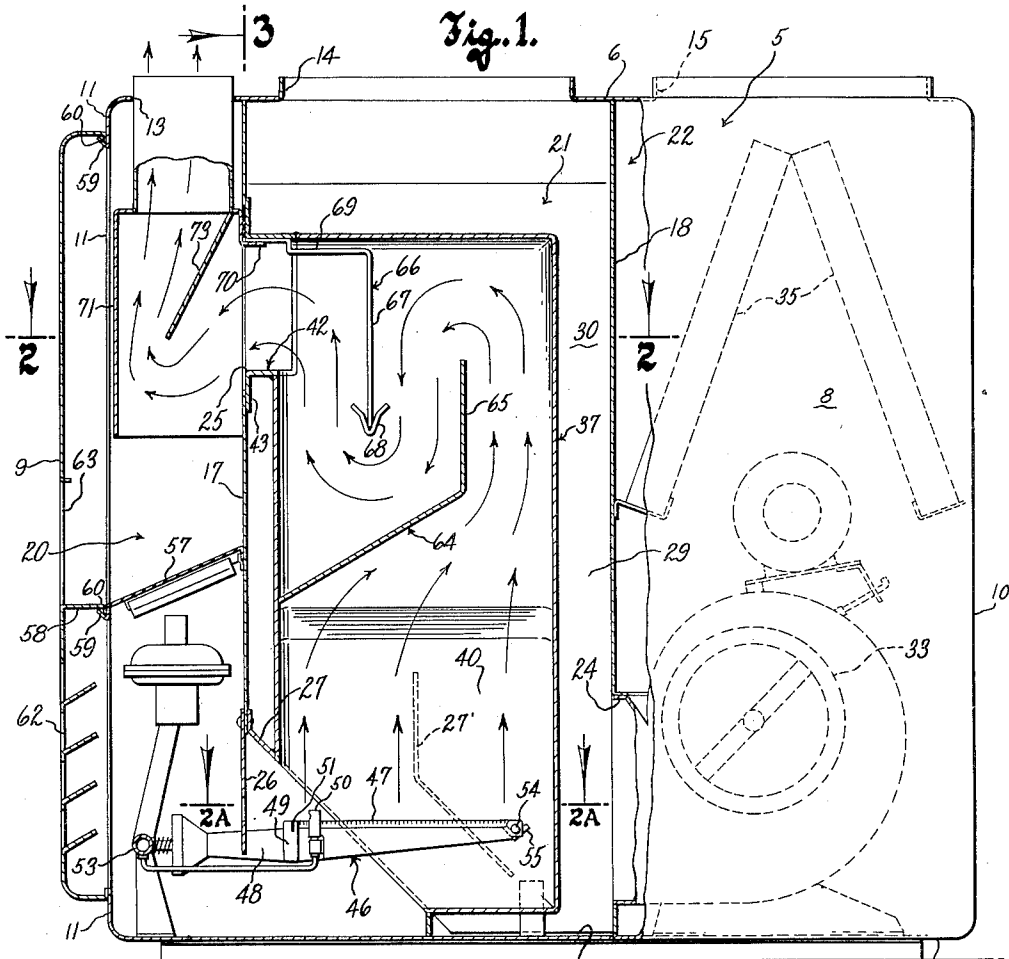
R. C. JAYE ET AL

2,658,504

GAS FIRED FORCED AIR FLOW AIR HEATING FURNACE

Filed March 27, 1952

2 Sheets-Sheet 1



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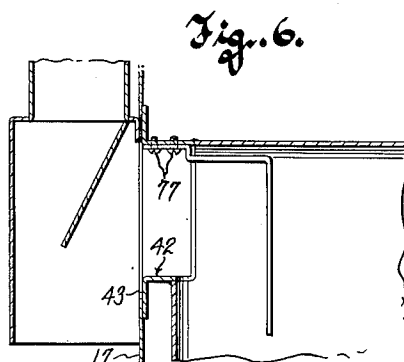
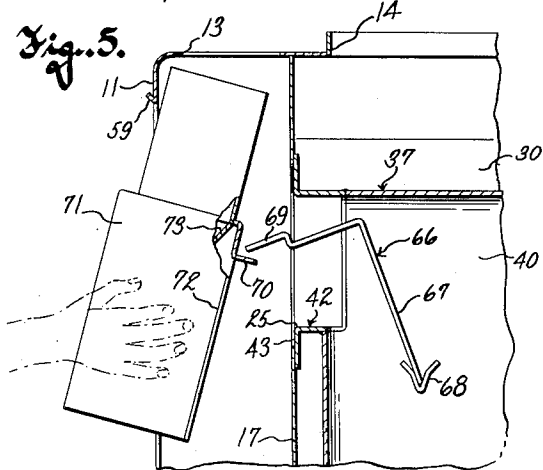
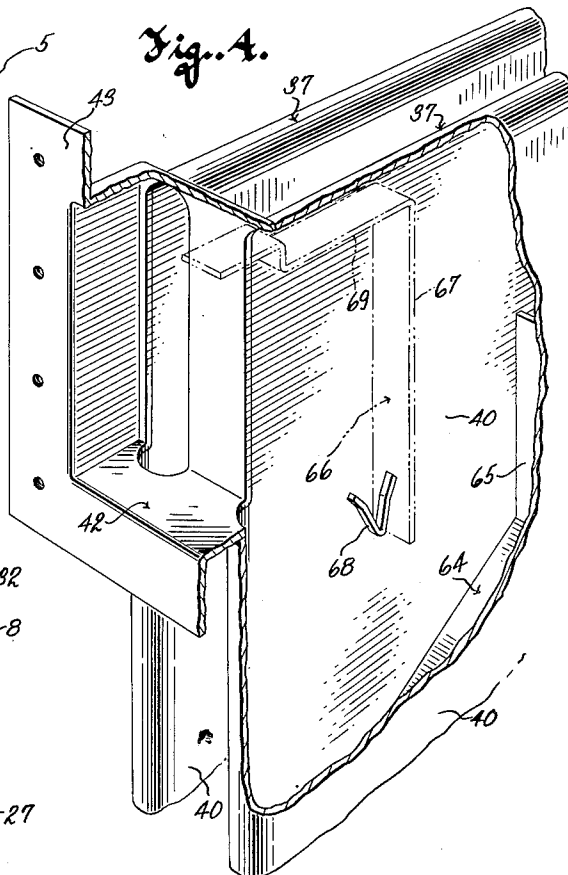
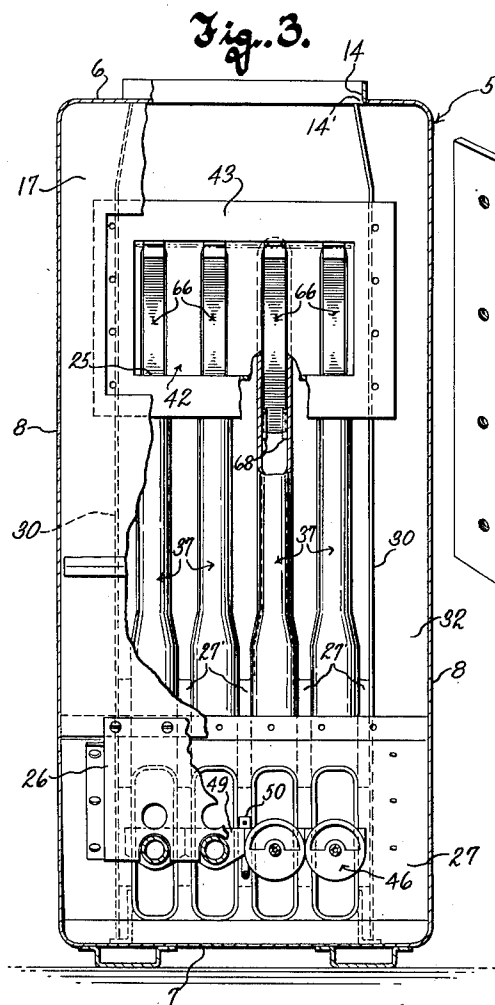
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,658,504

GAS FIRED FORCED AIR FLOW AIR
HEATING FURNACERichard C. Jaye and John F. Hirtz, Watertown,
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Application March 27, 1952, Serial No. 278,912

10 Claims. (Cl. 126-110)

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This invention relates to furnaces such as are commonly used in home heating installations and has more particular reference to furnaces of the gas fired type.

In general, it is the object of this invention to provide a gas fired furnace in which a unique construction and arrangement of its components achieves a heat transfer surface of relatively great area in an unusually compact unit.

According to this invention, a relatively large heat transfer surface occupying a minimum of space is obtained through the provision of a series or bank of upright elongated relatively flat duct-like combustion chambers disposed in closely spaced relationship to one another, and over which the air to be heated is circulated. Another factor contributing to the compactness of the furnace of this invention resides in the provision therein of an elongated gas burner for each of the duct-like combustion chambers, the burners being mounted closely adjacent to one another, in a bank, in the bottom of the furnace and having their burner sections projecting into the lower ends of the combustion chambers to supply heat thereto.

Another object of this invention resides in the provision of cooperating upper and lower baffles for each of the duct-like combustion chambers, which define a tortuous passageway along which the combustion gases rising in the combustion chambers must pass to reach a combustion gas discharge port in the side of the air heating chamber. In this connection it is a further object of this invention to provide easy access from one end of the furnace, to the upper ends of the combustion chambers through the combustion gas discharge port in the air heating chamber, to facilitate cleaning of the interiors of the combustion chambers.

More specifically it is a further object of this invention to provide a readily removable draft diverter connected to the exterior of the air heating chamber over the combustion gas discharge port therein in such a manner as to detachably hold the uppermost baffles in proper position in their combustion chambers.

Still another object of this invention resides in the provision of a slanting bottom wall portion for the air heating chamber which is disposed opposite the air inlet port of the air heating chamber to be impinged by the air blown into the air heating chamber and thus cooled to a temperature preventing damage thereto by the heat of the burners mounted in the space beneath said slanting bottom wall portion.

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With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereinafter disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of the furnace of this invention, portions being shown in section and other portions in elevation;

Figure 2 is a cross sectional view taken through Figure 1 along the plane of the line 2-2;

Figure 2A is a fragmentary sectional view taken through Figure 1 along the plane of the line 2A-2A and illustrating the bank of elongated gas burners;

Figure 3 is a vertical sectional view taken through Figure 1 along the plane of the line 3-3;

Figure 4 is a fragmentary perspective view showing portions of the upper ends of two combustion chambers at their areas of connection to the exhaust header, portions thereof being broken away and shown in section;

Figure 5 is a fragmentary sectional view substantially corresponding to the upper left hand corner of the furnace shown in Figure 1 and illustrating the manner in which the upper baffles in the combustion chambers, and the draft diverter which holds them in place, may be removed to facilitate cleaning of the combustion chambers; and

Figure 6 is a view similar to Figure 5 but showing a slightly modified manner of detachably holding the upper baffles in place in the combustion chambers.

Referring now particularly to the accompanying drawings in which like reference characters indicate like parts throughout the views, the numeral 5 generally designates the housing or outer shell of the gas fired furnace of this invention. The housing is generally of elongated rectangular shape, as viewed in horizontal section, and has sheet metal top and bottom walls 6 and 7 respectively, opposite relatively wide side walls 8 and relatively narrow front and rear walls 9 and 10, respectively. The front of the housing,

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per se, is open except for narrow flanges 11 bent inwardly from the side walls 8 and the top and bottom walls 6 and 7; and the front wall 9 comprises a readily detachable cover overlying these flanges. When the cover is removed, therefore, access may be had to the entire front end portion of the housing interior.

The top wall 6 of the housing has three openings therein 13, 14 and 15. The opening 13 is a relatively small hole adjacent to the front end of the housing and provides for the discharge of combustion gases from the furnace; the opening 15 is adjacent to the rear wall of the furnace and provides an inlet through which air to be heated may enter the furnace; and the opening 14 is a relatively large hole in the intermediate portion of the top wall 6 and provides for the discharge of heated air from the furnace.

Upright front and rear partitions 17 and 18 extend across the narrow dimension of the housing interior in spaced relation to the ends of the housing and to one another to define a front compartment 20 beneath the combustion gas outlet 13, an intermediate compartment 21 beneath the heated air outlet 14, and a rear compartment 22 beneath the air inlet 15. The rear partition extends vertically the full height of the furnace, and has a relatively large opening in its lower central portion to communicate the lower end portions of the intermediate and rear compartments 21 and 22, respectively.

The front partition 17 has a transversely elongated opening 25 in the upper portion thereof, spaced a short distance from the top wall 6 of the housing, and providing an outlet for the intermediate compartment in addition to the top outlet 14. Near its lower end, the front partition has a flame shield 26 thereon terminating a short distance above the bottom wall 7 of the furnace. The flame shield 26 may be an integral portion of the front partition 17, but as shown in Figures 1 and 3 comprises a separate sheet metal plate detachably secured by screws to the front partition at its junction with a diagonal wall portion 27 which extends entirely across the narrow dimension of the interior of the housing and slants downwardly and rearwardly from the front partition at an angle of approximately 45 degrees to the bottom wall 7 to join therewith on a line approximately half way between the front and rear partitions 17 and 18.

The slanting wall portion 27 actually comprises the forward portion of the bottom wall of an air heating chamber 29 located in the intermediate compartment 21 and defined by the front and rear partitions in cooperation with a pair of upright sheet metal walls 30 extending the full height of the housing, and disposed longitudinally between the front and rear partitions, each adjacent to but spaced from one of the sides of the housing. Though the opening 24 in the lower end portion of the rear partition 18 is confined to an area thereof between the upright walls 30, it will be seen that these latter walls cooperate with the sides 8 of the housing to provide insulative air spaces 32 in the furnace at opposite sides of the upright air heating chamber 29 since these spaces have restricted communication with the bottom of the air chamber 29 as at 32' and with the heated air outlet 14 as at 14' and thus provide for the circulation of relatively cool air over the side walls 8.

It is also important to note that the slanting bottom wall portion 27 of the air heating chamber is directly opposite the opening 24 in the

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rear partition 18, through which air to be heated is forced by a blower 33 in the rear compartment 22 arranged to direct such air horizontally against the inner surface of the slanting bottom wall portion 27. As will be seen later, the air thus blown against the slanting bottom wall 27 of the air heating chamber cools the same to a temperature precluding burn-out thereof.

It is understood, of course, that the air entering the rear compartment 22 through the opening 15 in the top wall of the housing is constrained to flow through one or more filters 35 in the upper portion of the rear compartment, ahead of the blower 33.

The air heating chamber 29 has a bank of relatively flat duct-like combustion chambers 37 disposed therein in side-by-side relationship. In the relatively small furnace shown, there are four such combustion chambers, but it will be understood that any desired number thereof can be employed and that the number of combustion chambers determine the heating capacity of the furnace. The lower front portions of the duct-like combustion chambers are cut diagonally to fit the slanting bottom wall portion 27 and are welded to the edges of appropriately shaped holes therein. Hence the space below the slanting wall portion 27 provides an inlet header communicated with each combustion chamber; and the wall portion 27 holds the bottom of the combustion chambers with their wide sides 40 in spaced parallel relationship to one another and to the upright walls 30.

The upper end portions of the combustion chambers have openings in their narrow front sides through which they communicate with an exhaust header 42 welded thereto. The header 42 thus coacts with the slanting wall portion 27 to hold the combustion chambers in proper spaced relation and a flange 43 surrounding the open front end of the header is secured to the front partition 17 by screws 44. The screws 44 also serve to detachably hold a draft diverter 71 in place in the upper part of the compartment 20 over the discharge port 25 and by projecting beyond the flange 43 directly outside the walls 30 hold the same against outward displacement. These screws 44 pass through flanges 72 extended from the sides of the draft diverter, the wall 17 and are threaded into the flange 43.

Referring to Figures 1 and 2 it will be noted that the wide-flat sides 40 of the combustion chambers lie longitudinally of the housing 5 and that the narrow ends of the combustion chambers are spaced from the front and rear partitions 17 and 18 respectively. Baffles 27' are preferably secured in the spaces between the combustion chambers and between the outermost combustion chambers and the walls 30 to assure better distribution of the incoming air over the heating surfaces. These baffles also assist in holding the combustion chambers in proper spaced relation.

It will be seen that the space beneath the slanting wall portion 27 communicates with the lower portion of the front compartment 20 beneath the lower edge of the flame shield 26; and that the upper ends of the combustion chambers are communicated through the exhaust header 42 and the discharge port 25 with the draft diverter 71 in the upper portion of the front compartment 20.

A bank of gas burners 46, one for each combustion chamber, is mounted in the lower portion of the furnace to supply heat to the combustion chambers. The burners illustrated are like

those forming the subject matter of the copending application of Richard C. Jaye and John F. Hirtz, Serial No. 247,716 filed September 21, 1951. As described in greater detail in said copending application, each of the gas burners comprises a straight burner section 47, a straight mixing tube 48, and a transversely enlarged portion 49 intermediate and connecting the burner and mixing sections.

The bank of gas burners, of course, is mounted in the lower part of the furnace with their burner sections 47 extending horizontally through the mouths of the combustion chambers provided by the holes in the slanting bottom wall portion 27 to occupy the bottom portions of the combustion chambers, and are close enough together in the bank that their enlarged medial sections 49 are closely adjacent to one another as shown best in Figure 2A. The purpose of this mounting is to facilitate the lighting of the burners from a single pilot light 50 which may be located to have its flame ignite gas issuing from the slit-like igniter port 51 of any one of the burners. Since the igniter ports extend entirely across the top of the transversely enlarged medial sections 49 of the burners and are in alignment with one another, they, in effect, provide a single igniter port extending substantially continuously across the bank of burners, to enable all of them to be ignited by the common pilot light 50.

The mixing sections 48 of the burners extend forwardly through notches in the lower edge of the flame shield 26 to connect with a supply header 53 extending transversely across the lower portion of the front compartment 20. In the usual manner, the supply header 53 supports the mixing sections of the burners while the rear or burner sections of the burners have studs 54 projecting from opposite sides thereof and received in V-shaped brackets 55 welded to the inner sides of the combustion chambers and cooperating with the supply header to hold the elongated burners in a horizontal position in the furnace.

From the description thus far it will be apparent that the lower portion of the front compartment 20 accommodates the fuel feeding means of the furnace, while the upper portion of the front compartment 20 provides for the discharge of combustion gases from the furnace through the draft diverter 71 located therein. These upper and lower portions of the front compartment are separated from one another by an intermediate shelf-like partition 57 extending transversely across the narrow dimension of the housing and having its back and its ends secured to the partition wall 17 and the sides of the housing in any desired manner. The front edge of this shelf abuts a rearwardly bent transverse flap 58 struck from the cover, and V-shaped flanges 59 therein and on the upper flange 11 of the housing receive downwardly bent transverse hook-like flanges 60 on the adjacent portions of the cover to thus provide for detachably holding the cover in place over the open front of the housing.

Combustion air is supplied to the furnace as well as to the bank of burners through a grill 62 formed in the lower portion of the cover 12, beneath the shelf-like partition 57; and the rearwardly struck flap 58 leaves a single large cut-out 63 in the cover, above the shelf 57 for a purpose now about to be described.

The combustion gases rising in each combustion chamber impinge the upwardly and rear-

wardly slanting leg of a fixed baffle 64 therein to be directed rearwardly of the upstanding leg 65 of the baffle. The upright leg 65, however, terminates a distance short of the top of the combustion chamber so that the combustion gases are constrained to flow forwardly over its upper end to reach the exhaust port 25 in the air heating chamber.

The fixed baffle, however, cooperates with a baffle 66 readily detachably mounted in the upper end of each combustion chamber to provide a tortuous passageway along which the gases must pass before entering the exhaust header 42. The baffle 66 has a vertical leg 67, extending downwardly from the top wall of the combustion chamber intermediate the upright leg 65 of the fixed baffle and the exhaust header 42, with its lower extremity resting in V-shaped brackets 68 secured to the opposite sides of the combustion chamber at its interior. The horizontal leg 69 of each detachable baffle extends forwardly along the top wall of its combustion chamber and passes forwardly into the exhaust header 42 to lie flatwise along the upper side thereof. A rearwardly directed horizontal flange 70 formed on the draft diverter 71 clamps the horizontal legs of all of the baffles against the upper side of the exhaust header.

The upper end of the draft diverter extends through the outlet 13 in the top wall of the housing to conduct combustion gases entering the draft diverter from the exhaust header 42 to the exterior of the furnace. As the combustion gas enters the draft diverter, however, it is constrained to flow downwardly around a baffle 73 in its interior and then upwardly for discharge from the top of the furnace.

The purpose of the baffle 73, of course, is given to prevent back draft from the stack or chimney from entering the upper ends of the combustion chambers and extinguishing the burners in their lower ends. Any back draft which is experienced is relieved through the open bottom of the draft diverter and forwardly through the cut-out 63 in the front cover.

As long as the draft diverter remains in place the upper baffles 66 in the combustion chambers are held in their proper positions cooperating with the fixed baffles 64 to provide a tortuous passageway which must be followed by the combustion gases before they can discharge into the draft diverter for travel to the stack.

In order to maintain efficiency of heat transfer between the relatively large surfaces provided by the walls of the combustion chambers and the air blown into the air heating chamber by the blower 33, it is necessary to clean the combustion chambers from time to time. This may be readily accomplished in the furnace of this invention by removal of the cover from the front of the furnace and detachment of the draft diverter 71 in the manner illustrated in Figure 5. This, of course, frees the horizontal legs of the upper baffle 66 so that they may be lifted out of the combustion chambers through the exhaust header 42, thereby providing access to the entire upper ends of the combustion chambers for cleaning of the same.

If necessary, the lower portions of the combustion chambers may likewise be cleaned, since access may be had thereto through the open front end of the furnace by removal of the flame shield 26 which normally blocks detachment of the burners 46 from the supply header 53.

It will be noted that the V-shaped brackets 68

are so proportioned that they hold their baffles in forwardly inclined positions when the draft diverter is removed. This facilitates replacement of the baffles and their securing by the attachment of the draft diverter.

In the operation of the furnace it will be noted that the flames issuing from those portions of the burners beneath the slanting bottom wall portion 27 have a tendency to overheat the same, with the resultant danger that the sheet metal from which it is made will soon burn out. Any damage to the slanting bottom wall portion 27 by heat is effectively precluded through the arrangement described, since the relatively cool air to be heated is forcefully directed by the blower 33 horizontally against the inner surface of the slanting bottom wall portion 27 to cool the same. Such air is deflected upwardly along the exteriors of each of the combustion chambers, in the spaces therebetween, to be heated during its passage toward the discharge opening 14 in the top of the air heating chamber.

It is also highly important to note the flat duct-like combustion chambers provide a relatively great heat transfer area for the furnace of this invention, but permit an extremely compact arrangement of the components comprising the furnace. At the same time the duct-like combustion chambers have the advantage that they can be subassembled by attachment to the slanting bottom wall portion 27 and the exhaust header 42, with any desired number of combustion chambers in a bank, depending upon the size of the furnace and the heating requirements of the installation, it being understood that the size of the header and the width of the wall 27 is determined by the number of combustion chambers in the bank.

Though the described manner of holding the upper baffles in place is undoubtedly to be preferred, the attachment shown in Figure 6 could be employed if desired. In this case the horizontal leg of each baffle is separately secured to the top of the exhaust header by screws 77 access to which is had upon removal of the draft diverter.

From the foregoing description taken together with the accompanying drawings it will be readily apparent to those skilled in the art that this invention provides an exceptionally compact gas fired furnace the high heating efficiency of which can be easily maintained by reason of the easy access to the combustion chambers for cleaning of the same.

What we claim as our invention is:

1. In a gas fired furnace: means defining an upright air heating chamber open at its top and having opposite upright front and rear walls, said chamber having a discharge port in an upper portion thereof, and one of said walls having an air inlet port in the lower portion thereof; means defining a bottom wall for said air heating chamber having a substantial portion thereof slanting upwardly away from said wall having the inlet port toward the wall of the chamber opposite thereto to provide a space beneath the air heating chamber along the entire underside of said slanting bottom wall portion; a bank of vertically elongated relatively flat duct-like combustion chambers mounted inside the air heating chamber with their wide sides opposing but spaced from each other and their longitudinal median planes intersecting said designated walls of the air heating chamber, the lower end portions of the combustion chambers

which lie adjacent to said slanting bottom wall portion terminating flush therewith and being secured thereto, said slanting bottom wall portion having a hole therein in line with each combustion chamber to provide an inlet thereto leading from said space beneath the air heating chamber; an exhaust header communicating the upper ends of the combustion chambers with the discharge port in the air heating chamber; an elongated gas burner for each combustion chamber having a burner section and a transverse igniter port in an enlarged medial section of the burner; means mounting said gas burners in the furnace, in a bank, with their enlarged medial sections in said space beneath the air heating chamber but adjacent to the underside of said slanting bottom wall portion, and their igniter ports in transverse alignment and collectively extending substantially continuously across the bank of burners, and with their burner sections projecting horizontally through the holes in the slanting bottom wall portion into the lower ends of the combustion chambers; and a blower in the furnace arranged to blow air to be heated horizontally into the lower portion of the air heating chamber through the air inlet port therein and against the inner surface of said slanting bottom wall portion to cool the same and so that such air is deflected upwardly thereby toward the open top of the air heating chamber to be heated by contact with the exteriors of the combustion chambers during travel of the air upwardly through the air heating chamber.

2. In a gas fired furnace: means defining an air heating chamber open at its top and having pairs of opposite upright flat side walls, one of said side walls having a discharge port in an upper portion thereof, and another of said side walls having an air inlet port in the lower portion thereof; means defining a bottom wall for said heating chamber having a substantial portion thereof slanting upwardly away from said other side wall toward the side wall of the chamber opposite thereto so as to provide a space in the furnace beneath the air heating chamber adjacent to the entire underside of said slanting bottom wall portion; a bank of flat duct-like combustion chambers mounted vertically inside the air heating chamber in flatwise adjacent spaced relation to one another and to the sides of the air heating chamber, with the flat sides of the combustion chambers substantially perpendicular to said other side wall and the wall opposite thereto, the portions of the lower ends of the combustion chambers which lie adjacent to said slanting bottom wall portion terminating flush therewith and being secured thereto; and said slanting bottom wall portion having spaced holes therein each aligning with one of said combustion chambers to provide an inlet thereto leading from said space beneath the air heating chamber; an exhaust gas header communicating the upper ends of said combustion chambers with the discharge port in the air heating chamber; an elongated gas burner for each combustion chamber having a burner section and a transverse igniter port in an enlarged medial section of the burner; means mounting said gas burners in the furnace, in a bank, with their enlarged medial sections in said space beneath the air heating chamber but adjacent to the underside of said slanting bottom wall portion, and their igniter ports in transverse alignment and collectively extending substantially continuously across the bank of burners, and with

their burner sections projecting horizontally through the holes in the slanting bottom wall portion into the lower ends of the combustion chambers, said mounting means including brackets secured to the combustion chambers in their interiors and upon which the extremities of the burner sections therein rest; and a blower in the furnace arranged to blow air to be heated horizontally into the lower portion of the air heating chamber through the air inlet port and against the inner surface of said slanting bottom wall portion to cool the same and so that such air is deflected upwardly thereby toward the open top of the air heating chamber to be heated by contact with the exteriors of the combustion chambers during travel of the air upwardly through the air heating chamber.

3. In a gas fired furnace: means defining an air heating chamber open at its top and having pairs of opposite upright flat side walls, one of said side walls having a discharge port in an upper portion thereof, and another of said side walls having an air inlet port in the lower portion thereof; means defining a bottom wall for said air heating chamber having a substantial portion thereof slanting upwardly away from said other side wall and joined with the side wall opposite thereto to define an obtuse angle therewith, said slanting bottom wall portion providing a space in the furnace beneath the air heating chamber adjacent to the entire underside of said slanting bottom wall portion, and said slanting bottom wall portion having a series of spaced elongated holes therein extending lengthwise towards said opposite side wall of the air heating chamber; a bank of elongated relatively flat duct-like combustion chambers supported on said slanting bottom wall portion in an upright position in the air heating chamber with the lower portion of each communicating with said space beneath the air heating chamber through one of the holes in the slanting bottom wall portion, the wide sides of said combustion chambers extending lengthwise between said other side wall and the wall opposite thereto but terminating in spaced relation thereto, and each combustion chamber having an outlet in its upper portion which is adjacent to the side wall having the discharge port therein; an exhaust header connecting the outlets of the combustion chambers with the discharge port; elongated gas burners mounted in said space beneath the air heating chamber, one adjacent to each of said holes in said slanting bottom wall portion, said gas burners having burner sections extending horizontally through said holes and into the lower ends of the combustion chambers, and having transversely aligning igniter ports in enlarged medial sections thereof collectively extending substantially continuously across the bank of burners; a flue gas diverter detachably mounted on the exterior of the air heating chamber over the discharge port therein and in open communication with said exhaust header to receive combustion gases issuing from the combustion chambers; baffle means fixed inside each of said combustion chambers and extending thereacross beneath its outlet in an upwardly inclined direction for deflecting rising hot combustion gases away from the exhaust header; and a substantially L-shaped baffle inside the upper end portion of each combustion chamber and above the inclined baffle means therein, each having a substantially horizontal leg clamped between portions of the draft diverter and the

exhaust header to detachably hold the L-shaped baffle in place in its combustion chamber with the substantially horizontal leg thereof adjacent to the top of the combustion chamber, and the vertical leg extending downwardly toward the inclined baffle means but terminating a distance therefrom, so that said baffles cooperate to define a tortuous passageway through which the hot combustion gases must pass to reach the exhaust header.

4. The gas fired furnace set forth in claim 3 wherein the means for holding said detachable L-shaped baffles in place in the combustion chambers further includes brackets fixed to the combustion chambers on their interiors and upon which the lower ends of the vertical legs of the baffles rest.

5. In a gas fired furnace: a housing having a detachable front end wall; means defining an upright air heating chamber in said housing, said means including an upright partition spaced rearwardly of said detachable front end wall and having a discharge port in an upper portion thereof; an upright combustion chamber inside the air heating chamber; means communicating the upper end portion of said combustion chamber with said space in front of the upright partition through the discharge port therein, said last named means including a substantially horizontal wall portion fixed with respect to the combustion chamber and extending forwardly therefrom to said partition to define a top wall for said communicating means; duct means detachably mounted on said partition in the space in front of it and communicated with the combustion chamber, through said discharge port in the partition, to receive combustion gases from the combustion chamber, said duct means having its upper portion opening to the exterior of the housing through an opening in the top thereof; a lower baffle mounted inside the combustion chamber and extending upwardly and rearwardly from the front thereof; an upper substantially L-shaped baffle in the top of the combustion chamber having a substantially horizontal leg underlying and contiguous to said fixed wall portion on the combustion chamber, and a substantially vertical leg extending downwardly therefrom a distance rearwardly of said discharge port; and means detachably holding said upper baffle in place in the combustion chamber, including a flange on said duct means cooperating with said fixed wall portion on the combustion chamber to confine a portion of the substantially horizontal leg of the upper baffle therebetween.

6. The gas fired furnace of claim 5, wherein said means detachably holding the upper baffle in place in the combustion chamber includes bracket means on the combustion chamber in which the lower end of said vertical leg of the upper baffle rests.

7. In a gas fired furnace: an elongated housing having top and bottom walls and upright opposite wide sides and narrow front and back ends; spaced upright front and rear transverse partitions defining front, intermediate and rear compartments in the interior of the housing, the lower portion of the front partition slanting downwardly and rearwardly to the bottom of the housing; a pair of upright longitudinal walls in said intermediate compartment spaced from the sides of the housing and cooperating with the partitions to define an upright air heating chamber in the intermediate compartment spaced from the

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housing sides, the air heating chamber having an air inlet port therein substantially horizontally opposite said downwardly and rearwardly slanting portion of the front partition, and said air heating chamber opening to the exterior of the housing through an opening in its top wall; a bank of vertically elongated relatively flat duct-like combustion chambers mounted on said slanting portion of the front partition with their lower front ends terminating flush therewith in line with access holes therein; the front partition having an opening in its upper portion providing a discharge port for the combustion chambers adjacent to their upper ends; an exhaust header communicating the upper ends of the combustion chambers with said discharge port; means in the upper portion of the front compartment for receiving the combustion gases issuing from said discharge port and for conducting the same to a stack; an elongated gas burner for each combustion chamber, said burners having burner sections extending horizontally rearwardly through the access holes in said slanting portion of the front partition, from the space therebeneath, into the lower ends of the combustion chambers; and a blower in the lower portion of the rear compartment arranged to blow air to be heated horizontally forwardly through the air inlet port in the air heating chamber against the inner surface of the slanting portion of said front partition to cool the same, such air being deflected upwardly thereby to be heated by contact with the exteriors of the combustion chambers during its upward travel therebetween.

8. In a gas fired furnace: an elongated box-like housing having a detachable front wall; front and rear transverse partitions dividing the interior of the housing into upright front, intermediate and rear compartments opening to the exterior of the housing through holes in the top thereof, the lower portion of the front partition slanting downwardly and rearwardly to the bottom of the housing; a pair of upright longitudinal walls in said intermediate compartment cooperating with the partitions to define an upright air heating chamber in the intermediate compartment spaced from the housing sides and having an air inlet port in its lower portion opposite said downwardly and rearwardly slanting portion of the front partition; a bank of spaced apart, vertically elongated duct-like combustion chambers mounted in the air heating chamber on said slanting portion of the front partition with the fronts of their lower ends terminating flush therewith and opening through holes therein to the space beneath said slanting portion of the front partition; an exhaust header connected with the upper ends of the combustion chambers and opening through the front partition to the front compartment; a duct-like draft diverter

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detachably mounted on the front partition in the compartment and communicating with the exhaust header to receive combustion gases therefrom, the open upper end of said duct-like draft diverter extending through one of the holes in the top of the housing; a substantially L-shaped baffle for each combustion chamber; means mounting said baffles in their respective combustion chambers with one leg of each extending substantially horizontally rearwardly along the upper end of its combustion chamber, and the other leg thereof extending substantially vertically downwardly a distance rearwardly of the exhaust header, said mounting means including a flange on the draft diverter clamping the horizontal legs of the baffles against the exhaust header; a separate gas burner for each combustion chamber mounted beneath the front partition and having a burner section extending horizontally rearwardly through one of the holes in said slanting portion of the front partition into the lower end of one of the combustion chambers; and a blower in the lower portion of the rear compartment for blowing air to be heated horizontally forwardly through the air inlet port in the air heating chamber and against the inner surface of the slanting portion of the front partition to cool the same.

9. The gas fired furnace set forth in claim 8 further characterized by the fact that the detachable front wall for the furnace has an air vent in a medial portion thereof adjacent to the lower end of the draft diverter; and cooperating means on the housing and said detachable front wall, beneath said air vent, for isolating the upper portion of the front compartment from the lower portion thereof.

10. The gas fired furnace set forth in claim 8 further characterized by the provision of a stationary baffle mounted in each of the combustion chambers beneath the L-shaped baffle therein and extending rearwardly and upwardly from the front of the combustion chamber beyond the plane of the vertically extending leg of the L-shaped baffle and above the level of the lower end of said L-shaped baffle to thus cooperate therewith to define a tortuous passageway along which the combustion gases must travel for discharge through the exhaust header.

RICHARD C. JAYE.
J. F. HIRTZ.

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