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3,064,638

FURNACE

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2 Sheets-Sheet 1

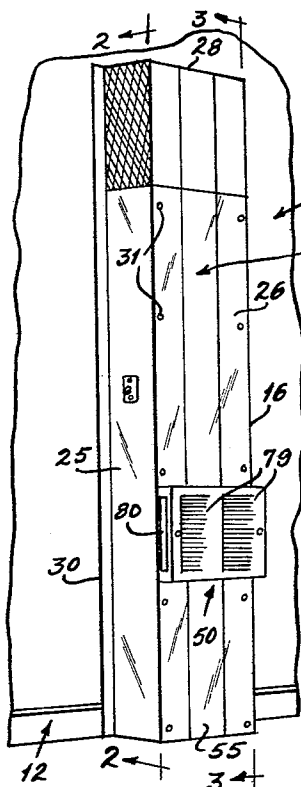


FIG. 1

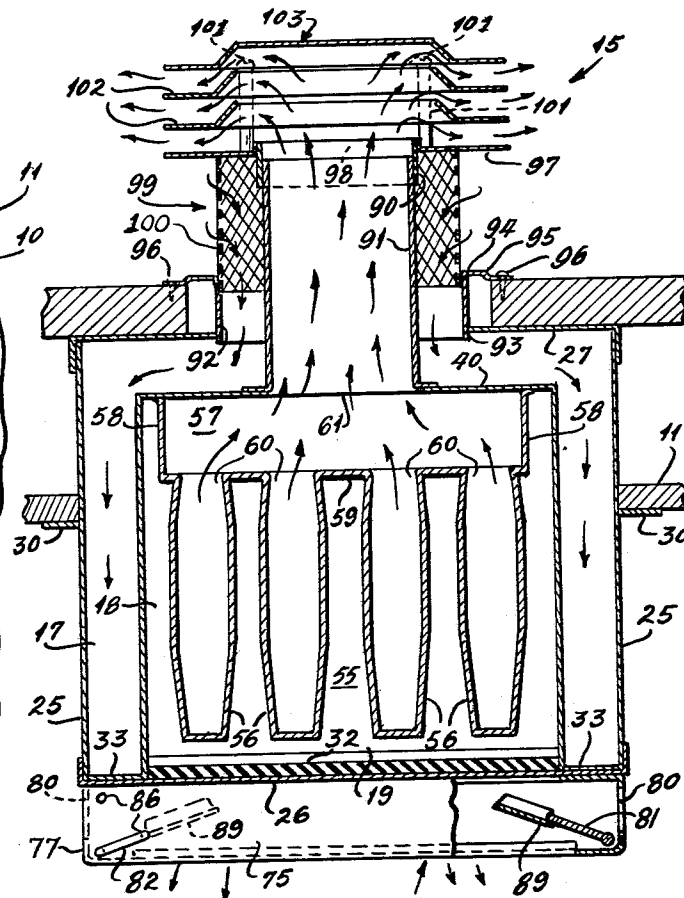


FIG. 4

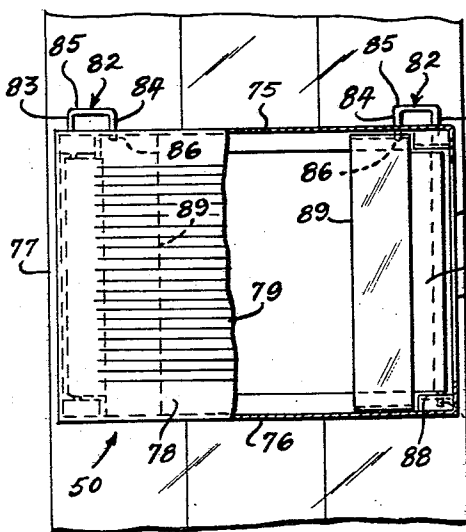


FIG. 5

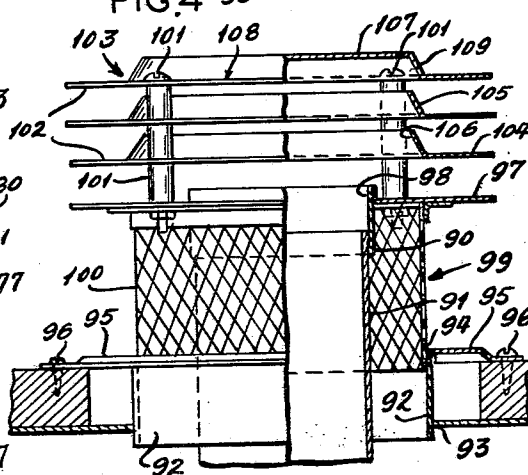


FIG. 6

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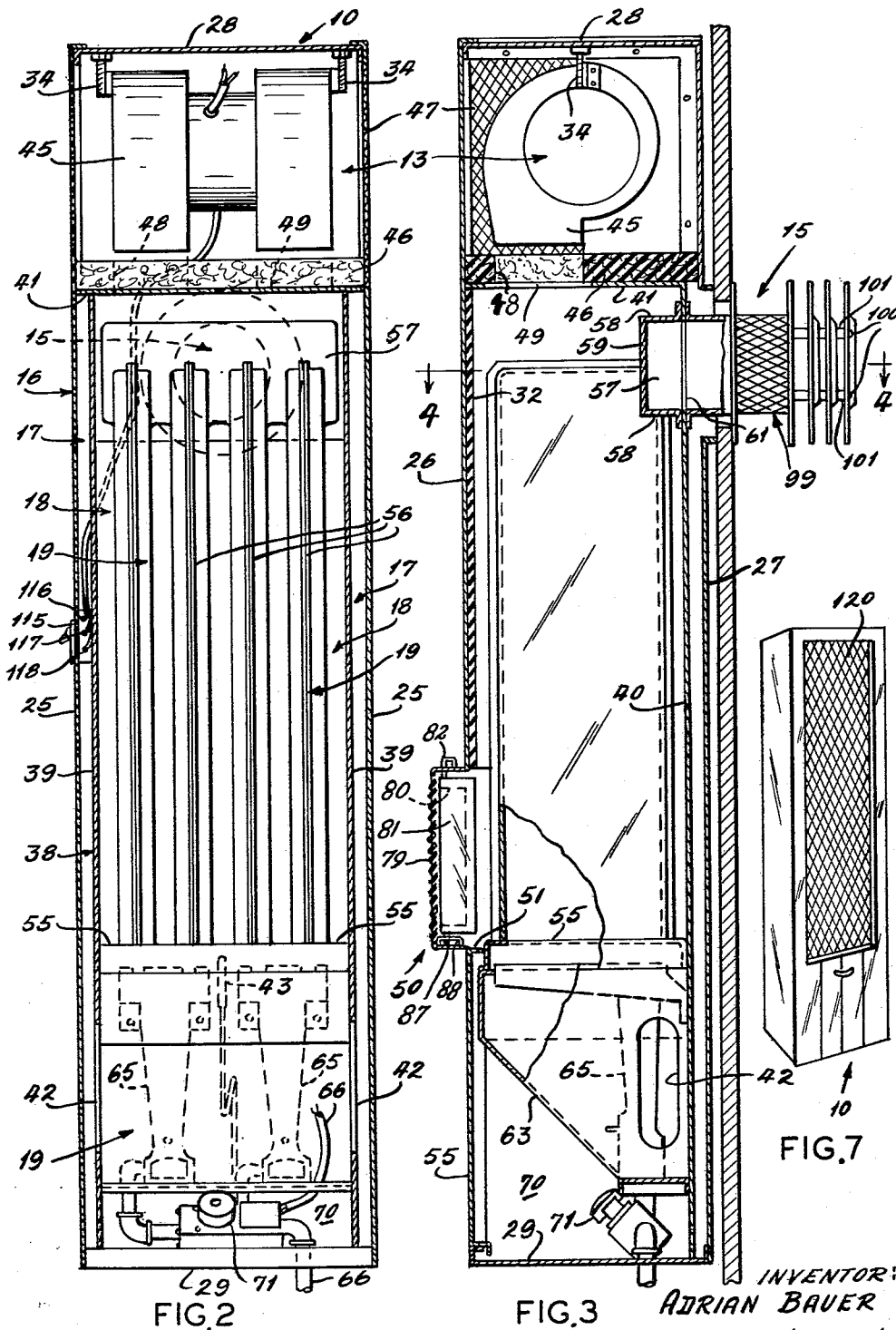


FIG. 2
FIG. 3
FIG. 7
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FURNACE

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10 Claims. (Cl. 126—110)

This invention relates generally to furnace constructions and more particularly to vented recessed heaters having a sealed combustion system.

Conventional vented recessed heaters are self-contained heating systems designed for incorporation in or attached to a wall, floor, ceiling or partition. These heaters are vented through the roof and use room air for combustion.

The heaters include a combustion chamber where the fuel, usually gas, is burned with room air to give off heat and form products of combustion. There may be some arrangement for forcing air from the room around the combustion chamber where it is heated and returned to the room.

The products of combustion are exhausted from the combustion chamber to the outside of the enclosed space through the roof or through an outside wall. The air for combustion can be taken from the outside or from the room. It is much more desirable to use only outside air for combustion, since this eliminates the possibility of contaminating the room air with the products of combustion. This arrangement is known as a sealed combustion system.

Present heaters simply bring outside air for combustion from around the flue pipe by means of a duct behind the combustion chamber to the burner compartment. The duct is generally the same width as the combustion chamber. Since the air is subject to variants such as the force and direction of wind flow, temperature, etc., a complicated venting arrangement or draft protecting unit are needed with the heater to protect the pilot. The walls of the heater tend to become heated, and unless special precautions are taken, if the heater is in the room serious burns can result, or if the heater is recessed in the wall, fire may be a hazard.

Present sealed gas heaters are inefficient in operation because of a limited supply of air for combustion resulting in a limited B.t.u. capacity. This is undesirable because a large number of heaters of small capacity increase the initial cost of the equipment and also the cost of installation and upkeep. The separate undersize chamber used to bring in combustion air to the present sealed systems results in an unstable pilot flame and loss of efficiency during a strong wind condition. The small individual duct allows cold air to enter the combustion area when the heater is started, and causes excessively high temperatures in the air entering the combustion chamber after continuous operation.

It is an object of the present invention to provide a novel sealed combustion system which obviates the hereinbefore mentioned difficulties. The principal object is to provide a heater wherein both the products of combustion and the air for combustion are sealed from the room air which is to be heated. Another object is to provide a more efficient furnace having a B.t.u. rating more than twice as large as present furnaces of the same size. Another object is to provide a means for controlling air for combustion such that gust effects are neutralized and the pilot and flame are protected at all times.

Another object is to provide a sealed combustion system that does not have a separate duct or chamber to bring in combustion air, but has a casing constructed so as to provide this function as well as strengthen the overall design and insulate the outer surface.

Still another object is to provide a system for moving

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the air for combustion from the outside to the combustion area using a natural draft, thereby eliminating the need for forced draft blowers in connection with the air for combustion.

Another object is to provide a furnace which is tall relative to its width, thereby eliminating turbulence in the air for combustion and providing flame stability. Still another object is to provide a recessed wall heater having a major portion of the outer surface cooled by contact with the air for combustion. Still another object is to provide a heater wherein differences in the flow rate of the air for combustion do not affect the pilot and flame.

Another object is to provide a novel vent means which eliminates differences in air flow rates ordinarily caused by changes in wind direction and magnitude at the point where the products of combustion are exhausted from the system and intake air is taken into the system.

Still another object is to provide a means for delivering warmed air from the heating chamber of the furnace to the wall area of the room housing the furnace to provide a blanket of heated air along the wall which insulates the center of the room from the wall area where heat losses occur.

These and other objects and advantages will become apparent hereinafter.

The present invention comprises a sealed furnace construction having the intake air and the products of combustion sealed from the room air. The invention further consists in a furnace construction and vent arrangement which provides all the objects and advantages hereinbefore set forth.

In the drawings:

FIG. 1 is a perspective view showing the heater installed in a room,

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1,

FIG. 3 is an enlarged sectional view taken along line 3—3 of FIG. 1 with the fixed louver in the air discharge vent not shown to more clearly show the adjustable door in its closed position,

FIG. 4 is an enlarged sectional view taken along 4—4 of FIG. 3 showing the right hand portion of the air discharge vent partially broken away and with the burner ports at the lower ends of the heat exchange tubes not shown,

FIG. 5 is an enlarged partially broken view of the exhaust vent attached to the front of the heater for discharging heated air into a room,

FIG. 6 is an enlarged partially broken view of the combined vent and air inlet means for admitting air for combustion and discharging the products of combustion, and

FIG. 7 is a perspective view showing a modification of the present invention.

FIG. 1 shows a recessed heater 10 placed in a wall 11 of an enclosed space or room 12. The heater 10 (FIG. 2 and FIG. 3) comprises a blower area 13, a combined vent and air inlet means 15, an outer casing 16, a duct 17 for combustion air, an air heating chamber 18, and a combustion chamber 19.

The outer casing 16 includes opposed side walls 25, a front wall 26, a rear wall 27, a top plate 28, and a bottom plate 29. Part of the heater 10 is recessed in the wall 11 and part of it extends into the room 12. There is a flange member 30 on each of the side walls 25 to locate the furnace against the inner surface of the room wall 11.

The front wall 26 is removable from the heater 10 to provide access to the blower area 13 and the air heating chamber 18, and may be attached to the side wall 25 by screw fasteners 31. Insulating material 32 is attached

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to the inside of the front wall 26 to keep it cool when the heater 10 is operating.

Spaced from the outer casing 16 is an inner casing 38 including side walls 39 and a rear wall 40. The inner casing 38 and the outer casing 16 define the duct 17 which carries air for combustion from the vent means 15 to the combustion chamber 19. The front of the air duct 17 is sealed by members 33 and the bottom is sealed by the bottom plate 29. The top of the air duct 17 is defined by a common top plate 41 which also separates the blower area 13 from the air heating chamber 18. The inner casing side walls 39 are provided with opposed openings 42 which admit air for combustion from the air duct 17 to the combustion area 19.

Thus the air for combustion enters from the outside through the vent means 15 (which will be hereinafter more fully described), into the air duct 17, through the openings 42 to the combustion area 19 where it is mixed with the fuel, preferably gas, and burned. The air for combustion is sealed from contact with the room air and the air to be heated and also from the products of combustion. The openings 42 open to the combustion area 19 from opposite sides of the air ducts 17 to provide a balanced flow of combustion air thereto. This balancing of the combustion air flow through the opposed openings 42 stabilizes the pilot 43 against any gusts of air that may enter the burner 10 through the vent means 15. The air is spread around the air duct 17 and enters the combustion area 19 with approximately equal velocity through each opening 42.

A greater volume of air for combustion can enter the combustion chamber 19 because the duct 17 extends on both sides and the back of the inner casing 38. This results in a higher efficiency of operation and a greater B.t.u. capacity for the furnace 10. The greater air travel from the vent means 15 to the openings 42 smooths out the air flow pattern and causes less turbulence in the combustion area 19.

The cold air for combustion forms an insulating area on both sides and at the rear of the inner casing 38 which keeps the outer casing 16 cool to the touch even with the doubled B.t.u. capacity of the present furnace. Heretofore, furnaces with a B.t.u. rating of up to about 70,000 B.t.u. could not be recessed in a room because the outer surface became heated and would cause the wall of the room to catch fire. The present furnace can be recessed into the room wall thereby giving more efficient heating along the walls of the room and also taking up less room space which is often at a premium. The cool outer casing 16 also decreases the danger of small children and even adults being burned if they accidentally touch the furnace.

The large volume of air for combustion is heated as it passes counter-current to the products of combustion. Heat from the combustion chamber 19 passes through the inner casing 38 and into the air for combustion.

The blower area 13 is defined by the outer casing side walls 25, the front wall 26, the rear wall 27, and the top plate 28. It is separated from the air duct 17 and the air heating chamber 18 by the common top plate 41 which forms the bottom of the blower area 13. The blower area 13 houses blowers 45 and an insulating material 46 which serves to insulate the blowers 45 from the heat in the combustion chamber 19. The insulating material 46 also cushions the blowers and helps prevent undesirable noise from blower vibration on the top 41. The blowers 45 are suspended in the blower area 13 by springs 34 attached to the top plate 28. The springs 34 dampen vibration of the blowers 45.

Inlets 47 which are provided in the outer casing side walls 25 admit room air to the blower area 13. The blowers 45 force the air through openings 48 and 49 in the insulating material 46 and the top plate 41 respectively into the air heating chamber 18. The air is heated in the chamber 18 and exhausted back into the

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room 12 through a vent means 50 (more fully described hereinafter) on the outer casing front wall 26.

The heating chamber 18 is defined by the inner casing side walls 39, the inner casing rear wall 40 and the outer casing front wall 26. The common top plate 41 forms the top of the heating chamber 18 and the bottom is formed by the combustion chamber 19.

A heat exchange portion of the combustion chamber 19 fits in the air heating chamber 18 and includes a bottom pan 55, which opens to the remainder of the combustion area 19, and heat exchange tubes 56 which extend into and are sealed from the air heating chamber 18. The heat exchange tubes terminate in a header 57 having four side walls 58 and a front wall 59 having sealed openings 60 into the heat exchange tubes 56. The rear wall 40 of the inner casing 38 forms the rear wall of the header 57. The header 57 is sealed against the inner casing rear wall 40 to prevent products of combustion from mixing with the room air in the air heating chamber 18. An opening 61 in the rear wall 40 is connected to the vent means 15 to provide an exit to the outside for the products of combustion.

The air for combustion and the fuel are burned in the combustion chamber 19. The hot products of combustion pass up the heat exchange tubes 56, are collected in the header 57 and pass through opening 61 out the vent means 15. The air to be heated enters through the inlets 47, is forced by the blower 45 between and around the heat exchange tubes 56 where it is heated, and passes out through vent means 50 into the room 12.

The bottom of the combustion area 19 is defined by a bottom front plate 63, which seals the combustion area 19 from the room 12. The air for combustion from the ducts 17 enters the combustion area 19 through the openings 42. The lower portion of the combustion area 19 houses the burner supports 65, the gas line 66, and the pilot 43. A chamber 70 in the bottom of the furnace 10 houses controls 71 for regulating the flow of gas to the combustion area 19. These controls are regulated through a thermostat in the room 12. The controls and burner arrangement form no part of the present invention and are well known to those skilled in the art.

The hot air vent 50 constitutes an important element of the present invention, and is fitted to the outer casing front wall 26 over a hot air outlet 51 provided therein. The vent 50 (shown in FIG. 4 and FIG. 5) includes a top 75, a bottom 76, opposed side walls 77 and a front plate 78. The front plate 78 is provided with an open grillework 79 to admit hot air from the heating chamber 18 to the room 12. The side walls 77 are provided with openings 80 which channel hot air along the wall of the room 12. The openings 80 are provided with adjustable doors 81 which can be opened to direct a portion of the flow of hot air along the walls of the room 12 or can be closed to direct the hot air flow through the grille 79 into the center of the room 12.

The doors 81 are attached to the vent 50 by adjustable handles 82. The handles are U-shaped with an elongated leg 83 and a foreshortened leg 84 connected by a member 85. The elongated leg 83 is rigidly attached to the top edge of the door 81 and is pivotally mounted in the vent top 75. The foreshortened leg 84 fits into the openings 86 to position the door 81 in the desired position. A bottom leg 87 is attached to the bottom of the door 81 and is pivotally mounted in a bracket 88 provided on the vent bottom 76. When it is necessary to change the position of the door 81, the handle 82 is lifted to remove the foreshortened leg 84 from an opening 86, the handle 82 is turned to the desired position thus also turning the door 81, and the leg 84 is then inserted into another opening 86 to lock the door 81 in the desired position.

A louver 89 is fixed in the vent 50 at an angle of about 30° to the front plate 78. When the door 81 is open, the free end of the door 81 is against the louver

89, and when the door 81 is closed, the free end of the door 81 is positioned against the side wall 77, blocking the opening 80 therein.

When the door 81 is in open position, the hot air is deflected by the louvers 89 and the door 81 through the openings 80 in the vent side walls 77, and is directed along the side walls of the room 12 providing an insulating layer of hot air between the occupants of the room and the outside walls. This is important when there are windows in the room since most of the heat escapes through the window glass. The present invention gives an effect much the same as modern central heating wherein outlet vents are located directly below windows and a curtain of air is shot up in front of the window. The present invention forms the curtain of heated air from the side, but the effect is the same. With the present invention, the occupants of the room are comfortable at a much lower temperature than is possible if all of the heat is directed into the center of the room.

The blowers 45 must be running to cause this flow of air through the vent openings 80 because the flow is counter to the normal flow of heated air which is upward. The flow in the present invention brings the cool air in at the top and forces it downward over the heat exchange tubes where it is heated and then forced through the vent openings 80. The blowers 45 provide the force necessary to overcome the natural flow of air and also to force the heated air to all parts of the house. The 70,000 B.t.u. furnace of the present invention will heat a five or six room house with only about 2 or 3 degrees difference in temperature over the total area.

The vent means 15 whereby the products of combustion are exhausted from the combustion chamber and whereby air for combustion is drawn into the system from the outside comprises concentric intake and outlet ducts and a vent cap system which protects the ducts from variations in wind conditions.

The vent means (FIG. 4 and FIG. 6) includes an outlet duct 90 fitted to a duct 91 which is attached to the opening 61 in the combustion chamber header 57, and an inlet duct 92 which is larger in diameter than the outlet duct 90 and is concentric therewith. The inlet duct 92 is connected at one end to an opening 93 in the outer casing rear wall 27 and at the other end to an opening 94 in a plate 95 which is adapted to be secured to the outer surface of a building by means such as the screws 96. The length of the duct 91 is adjustable to compensate for varying wall thicknesses of the buildings in which the furnace is located.

Spaced outwardly of the plate 95 is a plate 97 provided with an opening 98 located adjacent the end of the outlet vent 90. The plate 97 also is attached to the end to the outlet vent 90 and with the plate 95 defines a passageway 99 into the inlet duct 92. A screen 100 covers this passageway to protect it from being obstructed.

The plate 97 is flat and supports legs 101 which carry intermediate plates 102 and a top cover plate 103. The intermediate plates 102 include a flat rim 104 at the outer periphery and a raised frusto-conical portion 105 at the inner edge of the rim 104. The raised edge of the portion 105 defines an opening 106 generally over the end of the exhaust duct 90.

The top cover plate 103 has a generally pan-shaped portion including a flat bottom 107, a flat annular rim 108 and a frusto-conical portion 109 connecting the bottom 107 and the rim 108. The plate 103 covers the end of the exhaust duct 90.

The vent and combined air inlet means 15 is constructed and arranged to neutralize wind gusts hitting the vent and prevent the flame being disturbed by outside wind conditions. It is not known exactly how the vent functions in balancing the wind flow, but the vent and the heater system give superior results in flame stability. The exhaust duct 90 extends outwardly of the intake duct 92 and with

the plate 97 prevents the mixing of the exhaust gases with the incoming air for combustion.

A safety system for controlling operation of the furnace and blower is contained in a recess 115 provided in the outer casing side wall 25. These controls include a primary control 116 which starts the blowers 45 when the temperature reaches a predetermined point and turns the blowers 45 off when the temperature falls to a predetermined point. A limit control 117 turns off the gas if the blowers 45 fail to operate. This keeps the furnace from overheating. A secondary control 118 starts the blowers 45 at a low speed and increases the speed as the air temperature is increased.

The height of the heater defined from the center of the inlet duct 92 to the bottom of the combustion air inlet openings 42 in the inner casing 38 should be more than 2 times as large as the width of the combustion chamber defined by the inner casing 38. Preferably, the height is about 3 times the width as hereinbefore defined. Present heaters generally are low so as to fit under a window and have a height to width ratio of about 1 to 1 or less. The large height to width ratio of the present invention smooths out any turbulence in the entering air for combustion and gives a smooth flow of air to the combustion area 19. This keeps the flame and pilot from being snuffed out by outside wind gusts.

A modification of the present invention shown in FIG. 7 does not have a blower or hot air vent means, but has a grille 120 which covers the entire front of the furnace. The room air to be heated travels by convection through the grille 120 and around the heat exchange pipes and back into the room. There is also some heating by radiation. The other structural features of this furnace are similar to those hereinbefore described for the preferred embodiment of the present invention shown in FIGS. 1-6. This type furnace has a small B.t.u. capacity, usually about 30,000 B.t.u. or less and is usually used to heat only one room.

Thus it is seen that the present invention provides all of the objects and advantages sought therefor.

The invention is intended to cover all changes and modifications of the examples chosen for purposes of disclosure, which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A forced air furnace construction comprising a combustion chamber sealed from contact with room air, a chamber for heating room air sealed from said combustion chamber, means of impelling room air to be heated through said heating chamber, air intake means, conduit means communicating the air intake means with the combustion chamber, said conduit means being positioned on opposed sides of the air heating chamber and substantially the entire width thereof to insulate the outside of the furnace from the chamber for heating room air and to discharge the air for combustion in a balanced flow from opposed sides into the combustion chamber, means for burning a gaseous fuel with the intake air and means to discharge the products of combustion from the combustion chamber.

2. A forced air furnace construction comprising a chamber for heating room air, a combustion area contained in the room air heating chamber constructed and arranged so that the room air in the heating chamber is sealed from contact with the products of combustion in the combustion area, air impelling means positioned in the furnace separate from said air heating chamber to force a counter current flow of room air through said air heating chamber, vent means including concentric inlet and outlet ducts, means connecting the outlet duct to the combustion area, means for burning a gaseous fuel in intake air, and conduit means communicating the intake duct with the combustion area, said conduit means being positioned on opposed sides of the air heating chamber and extending substantially the entire width thereof to in-

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ulate the outside of the furnace from the air heating chamber and to discharge the air for combustion in a balanced flow from opposed sides into the combustion area.

3. A forced air furnace construction adapted to be housed adjacent to an outside wall of an enclosed space comprising a chamber for heating room air having an air inlet and an air outlet, a sealed combustion chamber contained in said air heating chamber separating the products of combustion from the room air in said air heating chamber, air impelling means in association with the air inlet of the air heating chamber, air discharge means in association with the air outlet of the air heating chamber comprising a box having front and side walls having air passing openings therein, doors fitted to the side wall openings, and means for selectively moving said doors from an open position for directing a portion of the heated air along an outside wall of the space adapted to house the furnace to a closed position for directing heated air from the air outlet into the center of the space adapted to house the furnace, vent means including concentric air intake and products of combustion outlet ducts, means connecting the outlet duct to the combustion chamber, and conduit means positioned on opposed outer sides of said furnace and communicating with the intake duct for conveying air for combustion from the intake duct and discharging said air in a balanced flow from opposed sides into the combustion chamber.

4. A furnace construction adapted to be recessed in an outside wall of a room comprising a chamber for heating room air having an air inlet and an air outlet, a sealed combustion chamber in the air heating chamber separating the products of combustion from contaminating the room air being heated in the air heating chamber, air impelling means cooperating with the air inlet to the heating chamber to force cool air through the heating chamber, air discharge means cooperating with the air outlet for selectively discharging at least a portion of the heated air from the heating chamber along the outside room wall when the furnace is recessed therein comprising a discharge box in communication with the heating chamber air outlet, said box having a front wall with air passing means therein, opposed side walls extending outwardly of the room wall when the furnace is recessed therein, said side walls being provided with vetrical air passing openings, doors fitted to the openings, means for selectively moving the doors from an open position whereby heated air is directed along the room walls to a closed position whereby the heated air is directed away from the room wall, and means of locking said doors in said open and closed position, vent means including concentric air intake and products of combustion outlet ducts, means connecting the outlet duct to the combustion chamber, and means for conveying air for combustion from the intake duct to the combustion chamber.

5. A furnace construction adapted to be recessed in an outside room wall comprising a sealed combustion chamber, an inner casing having opposed side walls enclosing the combustion chamber and defining a chamber for heating room air with the heating chamber sealed from the combustion chamber so that the products of combustion do not contaminate the room air, means in association with the heating chamber to selectively direct heated air from said heating chamber along the inside surface of the outer wall or toward the center of the room, vent means including concentric intake and outlet ducts, a header topping the combustion chamber and communicating with the outlet duct where the products of combustion are collected from the combustion chamber and discharged through the outlet duct, and means for conveying outside air for combustion to the combustion chamber including an outer casing in communication with the inlet duct of the vent means and spaced outwardly from the side walls of the inner casing to form air ducts extending substantially across both sides of the heating chamber whereby air for combustion can pass from the inlet duct to the

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combustion chamber in a balanced flow from both sides and the air ducts insulate the outside of the furnace.

6. An upright furnace construction comprising an inner casing including opposed side walls, a front wall, and a back wall defining a rectangular chamber for heating room air, a sealed combustion chamber housed in the inner casing, the heating chamber sealed from the combustion chamber so that the products of combustion do not contaminate the room air, means in association with the heating chamber to deliver a flow of heated air to a predetermined location, combined air intake and vent means including concentric intake and outlet ducts, the outlet duct communicating with the combustion chamber whereby the products of combustion are discharged from the combustion chamber, and an outer casing in communication with the intake duct including side walls and a back wall spaced from the corresponding walls of the inner casing forming a duct whereby combustion air is traveled to the combustion chamber, the side walls of the inner casing provided with opposed openings to the combustion chamber whereby a balanced flow of air for combustion is delivered to the combustion chamber, the height of the furnace being more than about 2 times as large as the width of the combustion chamber.

7. An upright furnace construction comprising a sealed combustion chamber defining a combustion area, a chamber for heating room air having a front wall, back wall and opposed side walls enclosing the combustion chamber, the heating chamber sealed from the combustion chamber so that the products of combustion do not contaminate the room air, vent means including concentric intake and outlet ducts, the outlet duct connected to the combustion chamber to exhaust products of combustion, said vent comprising means attaching the vent to an outside building wall, plate means separating the inlet and outlet ducts and attached to the smaller outlet duct, the outer periphery of the plate means extending outwardly of the outer periphery of the inlet duct, the plate and the outside surface of the building wall defining an air inlet passageway to the inlet duct, intermediate plates spaced outwardly of the plate means and provided with openings in the center over the end of the outlet duct, the intermediate plates having outwardly skirt shaped portions adjacent the center opening to protect the outlet duct from sideward gusts of wind, and an outer cap member spaced outwardly of the intermediate plates and being generally pan shaped with an outwardly dished portion covering the end of the outlet duct, and an outer casing defining duct means for conveying outside air to the combustion chamber including a back wall and a pair of opposed side walls spaced outwardly from the corresponding walls of the heating chamber, the back wall communicating with the inlet duct and the side walls provided with opposed openings to the lower portion of the combustion chamber whereby a balanced flow of air enters the combustion area.

8. An upright furnace construction adapted to be installed in a room wall comprising a sealed combustion chamber defining a combustion area, a chamber for heating room air including an air intake, an air outlet, and front, back, top, bottom, and side walls enclosing the combustion chamber, the heating chamber sealed from the combustion chamber so that the products of combustion do not contaminate the room air, vent means comprising concentric intake and outlet ducts, the outlet duct connected to the combustion chamber to exhaust products of combustion, means adapted to attach the vent to the outside surface of said wall, plate means separating the inlet and outlet ducts and attached to the smaller outlet duct, the outer periphery of the plate means extending outwardly of the outer periphery of the inlet duct, the plate and the outside surface of the building wall adapted to define an air inlet passageway of the inlet duct, intermediate plates spaced outwardly of the plate means and provided with openings in the center over the end of the outlet duct, the intermediate plates having outwardly skirt

shaped portions adjacent the center opening to protect the outlet duct from sideward gusts of wind, and an outer cap member spaced outwardly of the intermediate plates and being generally pan shaped with an outwardly dished portion covering the end of the outlet duct, an outer casing defining duct means for conveying outside air to the combustion chamber including a back wall and a pair of opposed side walls spaced outwardly from the corresponding walls of the heating chamber, the back wall communicating with the inlet duct, the side walls provided with opposed openings to the lower portion of the combustion chamber whereby a balanced flow of air enters the combustion area, air impelling means cooperating with the air inlet of the air heating chamber, and means of selectively discharging heated air from the air heating chamber including a discharge box communicating with the air heating chamber outlet, said discharge box comprising top, bottom, front, and opposed side walls provided with openings therein, doors fitted to the side wall openings, and means for selectively moving the doors from an open position whereby heated air may be directed along the room wall to a closed position, the height of the furnace measured from the intake duct of the vent means to the openings into the combustion area being more than 2 times as large as the width of the combustion chamber.

9. A furnace construction adapted to be recessed in an outside room wall comprising a sealed combustion chamber, an inner casing having opposed side walls enclosing the combustion chamber and defining a chamber for heating room air with the heating chamber sealed from the combustion chamber so that the products of combustion do not contaminate the room air, vent means including concentric intake and outlet ducts, means communicating the combustion chamber with the outlet duct to discharge the products of combustion from the combustion chamber through the outlet duct, and means for conveying outside air for combustion to the combustion chamber including an outer casing in communication with the inlet duct of the vent means and spaced outwardly from the side walls of the inner casing to form air ducts extending substantially across both sides of the heating chamber whereby air for combustion can pass from the inlet duct to the combustion chamber in a balanced flow

from both sides and the air ducts insulate the outside of the furnace.

10. A forced air furnace construction adapted to be recessed into a room wall separating the inside room area from the outside exposed area, comprising a combustion chamber sealed from contact with room air, a chamber for heating room air, said chamber surrounding said combustion chamber and sealed therefrom, heated air discharge means communicating with the room air heating chamber for selectively discharging a portion of the heated air from the chamber along the inside surface of the room wall in which the furnace is adapted to be recessed, air impelling means housed in said furnace to force room air through said heating chamber and said discharge means, vent means connected to concentric intake and outlet ducts to convey products of combustion from the combustion chamber to a discharge means adapted to be located outside the room and admit air for combustion from an inlet means adapted to be located outside the room, conduit means communicating the intake duct with the combustion area, said conduit means being positioned on opposed sides of the air heating chamber and extending substantially the entire width thereof to insulate the outside of the furnace from the air heating chamber and to discharge the air for combustion to the combustion chamber from opposed sides thereof in a balanced flow, and means to burn a gaseous fuel in the outside air.

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