Dec. 9, 1952 M. L. MUELLER 2,620,786

AIR-HEATING FURNACE

Filed May 26, 1950 2 SHEETS—SHEET 1

FIG. 1

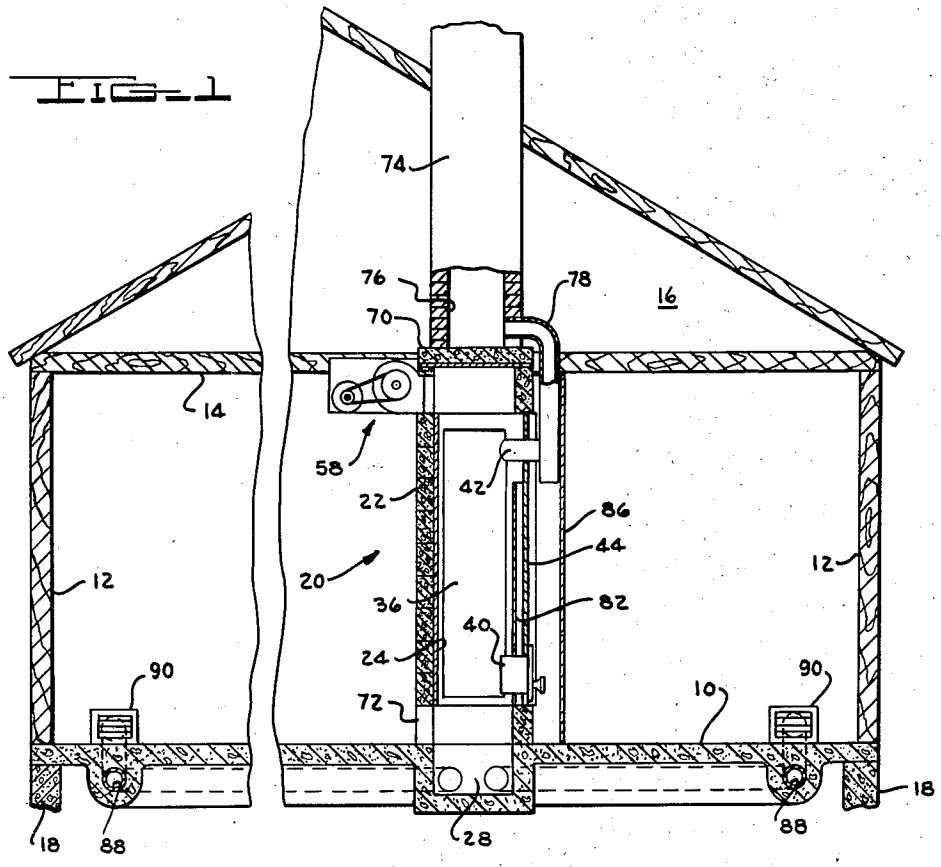


FIG. 8

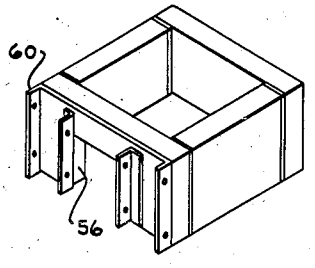
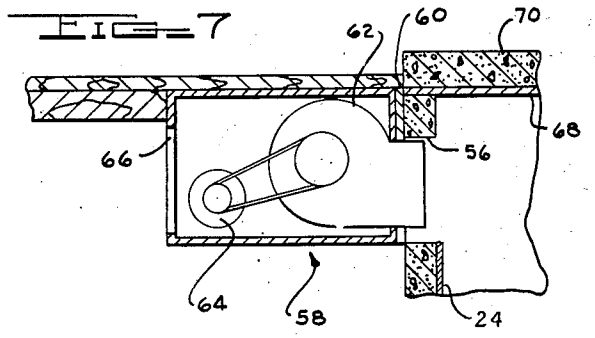


FIG. 7



INVENTOR.
MORITZ L. MUELLER

BY E. J. Ballaf
ATTORNEY

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FIG. 2

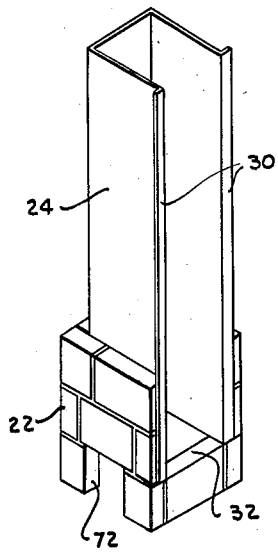


FIG. 3

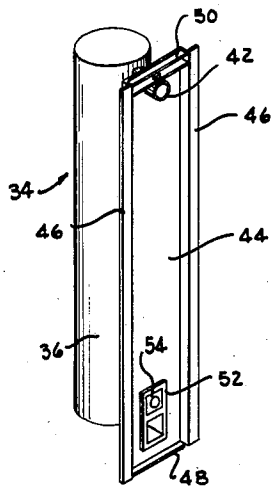


FIG. 4

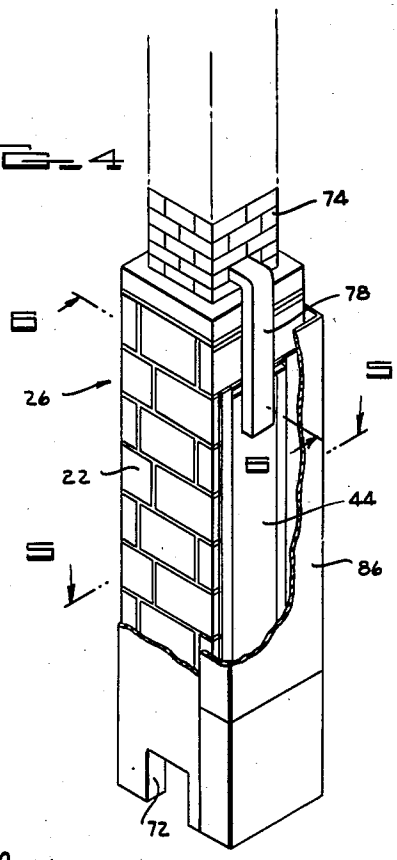


FIG. 5

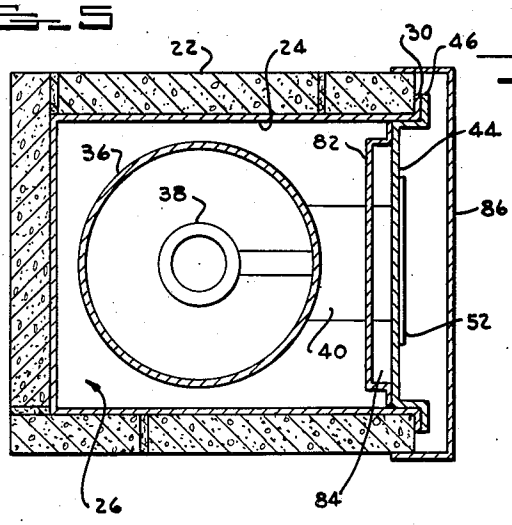
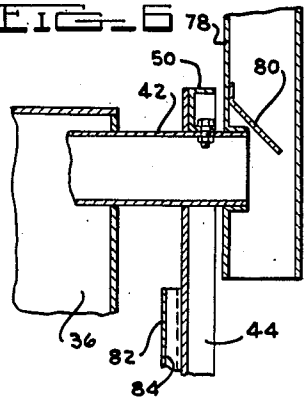


FIG. 6



INVENTOR.
MORITZ L. MUELLER
BY
E. J. Ballaff
ATTORNEY

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AIR-HEATING FURNACE

Moritz L. Mueller, Silver Spring, Md.

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7 Claims. (Cl. 126—110)

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This invention relates to heating apparatus and has particular reference to low cost heating apparatus for supplying heated air to a space in a building.

A principal object of the invention is to provide a new and improved type of heating apparatus which is efficient in operation and simple in construction.

Another object of the invention is to provide an inexpensive furnace structure which is particularly adapted for use in low cost homes and buildings having no basement therein.

Another object of the invention is to provide a furnace structure which may be built into one or more of the walls of the building in which it is used without detracting from the appearance of the room in which it is located.

A further object of the invention is to provide a furnace which occupies a minimum amount of space within the building in which it is to be used.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are two sheets, which by way of illustration show a preferred embodiment of the invention and what I now consider to be the best mode in which I have contemplated applying the principles of my invention. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view of the heating apparatus embodied in this invention;

Fig. 2 is a perspective view of a partially completed masonry structure and liner therefor which comprises the furnace chamber;

Fig. 3 is a perspective view of the furnace unit;

Fig. 4 is a perspective view of a completed furnace embodying this invention and with certain portions thereof broken away;

Fig. 5 is a horizontal sectional view taken along the lines 5—5 of Fig. 4;

Fig. 6 is a sectional view taken along lines 6—6 of Fig. 4;

Fig. 7 is an enlarged sectional view showing the mounting of the air blower unit on the furnace chamber; and

Fig. 8 is a perspective view of the upper end of the furnace chamber showing the mounting plate for the blower unit.

Referring more particularly to the drawings, in Fig. 1 there is disclosed a one-story house having a floor 10, side walls 12, ceilings 14, and an attic 16 thereabove. The house may be of the usual basementless type supported on concrete footings 18, although the furnace disclosed herein is not limited to use in such buildings.

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The furnace indicated at 20 is provided for supplying heated air to the space within the building, and the furnace 20 comprises a masonry structure 22 which is adapted to be built up about a vertically extending, U-shaped steel liner 24. The liner 24 is left in position within the masonry structure 22 after the masonry is built up about the liner. The furnace chamber 26 provided by the masonry 22 and the liner 24 may be built into or adjacent one or more of the walls of the building and extends from the floor to the ceiling thereof. A warm air pit or plenum 28 is provided directly below the furnace chamber 26 for a purpose to be more fully described hereafter.

In constructing the furnace chamber 26 a single row of cement blocks is placed about the plenum 28 and the liner 24 is suitably secured thereto in the position shown in Fig. 2. The masonry structure is then built up about the steel liner 24 which provides a form or casing for the masonry 22. The liner 24 has flanges 30 which overlap the vertical edges of the cement blocks adjacent the opening 32 provided therein. The structure thus defined provides a furnace chamber having an opening in one wall thereof.

The furnace unit 34 includes a vertically extending cylindrical heat exchanger member 36 having suitable fuel burning means such as a gas burner 38 therein at the lower end thereof. The heat exchanger member 36 is closed at the top and bottom thereof and is provided at its lower end with a sheet metal conduit 40 which is in communication with the interior of the heat exchanger 36. A vent pipe 42 communicates with the interior of the heat exchanger 36 at the upper end thereof and projects laterally therefrom. The pipe 42 and the conduit 40 are rigidly secured to the heat exchanger 36.

The heat exchanger member 36 is secured to a steel panel 44 by means of the pipe 42 and the conduit 40 which are rigidly secured to the panel 44. The panel 44 is a U-shaped panel having flanges 46 which are adapted to fit against the flanges 30 on the liner 24. The furnace unit 34, which includes the heat exchanger, the fuel burner and the front panel 44, may be inserted into the furnace chamber 26 as a unit. Suitable means, such as screws (not shown), may be provided for detachably securing the flanges 46 to the flanges 30 of the liner 24. An L-shaped strip

48 is secured to the panel 44 at the bottom thereof for providing an air-tight seal between the panel 44 and the bottom row of cement blocks, and a channel-shaped metal strip 50 is secured to the panel 44 between the parallel sides thereof for completing the seal about the opening 32 in the furnace chamber 26. The conduit 40 is provided with a mounting flange 52 through which the fuel burner 38 may be inserted into the chamber 36, and a door 54 is provided therein for providing access to the controls (not shown) for the fuel burner.

When the furnace unit 34 is assembled within the furnace chamber 26, the heat exchanger member 36 is positioned within the chamber in spaced relation to the sides of the liner 24 so as to provide an air passageway therebetween. The upper row of cement blocks is provided with an opening 56 in one wall there of providing an air inlet to the chamber 26. An air blower unit 58 is secured to the masonry structure by means of a mounting flange 60 which extends around the opening 56. The blower unit includes a fan 62 driven by an electric motor 64 and an air inlet 66 for the fan 62. The blower unit may be built into the ceiling of the building, as shown in Fig. 7. A steel plate 68 extends across the top of the masonry structure and a cement block 70 is secured thereto.

An opening 72 is provided at the lower end of the furnace chamber 26 and defines an outlet for discharging heated air into the space in the building to be heated.

A chimney 74 is mounted on the top of the furnace chamber 26 and has an opening 76 therein providing an atmospheric outlet. A sheet metal conduit 78 is in communication with the opening 76 and extends downwardly through the ceiling 14 and is connected to the vent pipe 42. The conduit 78 is open at the lower end thereof and is provided with a baffle plate 80 which extends at an angle across the end of the vent pipe 42, as shown in Fig. 6.

The fuel burner 38 generates heated products of combustion which flow upwardly through the heat exchanger 36 and through the vent 42 into the conduit 78. The conduit 78 conducts the products of combustion into the chimney 74 where they are discharged into the atmosphere. The baffle plate 80 is arranged within the conduit 78 so as to prevent a gust of air blowing downwardly through the chimney 74 and conduit 78 from entering the vent pipe 42 and heat exchanger 36, which gust of air might extinguish the pilot light for the burner 38 if a pilot light is used with such burner.

The fan 62 supplies air to the inlet 56 to the furnace chamber, and such air is forced downwardly over the outer surface of the heat exchanger 36 and through the outlet 72 into the building. Since the height of the heat exchanger member 36 is very nearly equal to the height of the room in which the furnace is located, the air passing through the furnace chamber is exposed to a very considerable heat exchange surface. It is apparent that the steel liner 24 will also become very hot due to radiation from the heat exchanger 36, and the interior surface of the liner 24 therefore provides an additional heat exchange surface over which the air to be heated passes. The air delivered through the outlet 72 is directed downwardly and over the floor of the building, and thereafter circulates throughout the space into which it is discharged. The blower unit 58 draws air from the interior of the space to be heated and returns it to the furnace chamber.

In order to prevent the front panel 44 from becoming too hot due to radiation from the heat exchanger member 36, a channel-shaped shield 82 is secured to the inside of the panel 44 between the heat exchanger and the panel. The shield 82 in conjunction with the panel 44 provides an air space 84 therebetween which extends downwardly along the inside of the panel 44. The air passageway 84 is in communication with the inlet 56 to the furnace chamber and air at room temperature is supplied through the inlet 56 by the fan 62 and flows downwardly through the air passageway 84 as well as over the heat exchanger 36. Therefore the panel 44, due to the layer of air within the passageway 84, is shielded from radiant heat from the heat exchanger 36.

A channel-shaped metal cover 86 may be provided for enclosing the front of the masonry structure. The sides of the cover fit against the side walls of the furnace chamber and the cover encloses the conduit 78 and the controls for the fuel burner so as to improve the appearance of the furnace structure. The lower half of the cover may be removable so as to provide an access to the fuel burner and controls therefor.

The exterior surface of the cement blocks may be covered with plaster, as shown in Fig. 4, or any other wall finish which may be desired so that the exterior finish of the furnace conforms to the wall finish provided in the room in which the furnace is located.

When the furnace disclosed herein is used in a building having a cement floor, suitable conduits 88 may be embedded in the floor to provide radiant heating for the building. The conduits 88 are in communication with the warm air pit 28 below the furnace and the heated air is discharged into the conduits 88 as well as through the opening 72. The conduits 88 may discharge into suitable registers 90 which may be located in rooms remote from the furnace so as to provide heat thereto. The openings 72 in the furnace chamber may provide the sole means of distributing heated air to the building, if desired, or the conduits 88 may be used in conjunction therewith. An opening 72 may be provided in more than one wall of the furnace chamber so as to discharge heated air into a plurality of rooms.

It is apparent that other types of fuel burning means may be used with the heating apparatus disclosed herein, such as an oil burner, in which event certain changes may be made in the structure as desired without departing from the principles of the invention. It is also contemplated that the conduit 78 may extend directly up through the roof of the building so as to discharge the products of combustion therefrom rather than conducting the combustion gases into the chimney 74 in the event that the building is not provided with the usual chimney.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A furnace for supplying heated air to a space in a building, comprising a masonry structure and a vertically extending, three-sided, steel liner open at the ends thereof providing a form about which said masonry is built up, said liner

and masonry structure providing a furnace chamber having an opening in one wall thereof, heating means insertable into and removable from said furnace chamber as a unit and comprising a panel for closing said opening, a heat exchanger member secured to said panel in spaced relation thereto and positioned within said furnace chamber in spaced relation to the sides of said liner so as to provide an air passageway therebetween, and fuel burning means in said heat exchanger member at the lower end thereof for generating heated products of combustion therein, means for venting said products of combustion from said heat exchanger member to atmosphere, said furnace chamber extending above and below said liner and having an opening above said liner providing an inlet to said chamber for air to be heated and having an opening below said liner providing an outlet for heated air, means including a blower for supplying air to said inlet and downwardly over said heat exchanger member to said outlet, and means on said panel for shielding said panel from radiant heat from said heat exchanger member.

2. A furnace for supplying heated air to a space in a building, comprising a masonry structure and a vertically extending, three-sided, steel liner open at the top and bottom thereof providing a form about which said masonry is built up, said masonry structure including a base portion on which said liner is seated and said liner terminating at its upper end below the top of said masonry structure, said liner and masonry structure providing a furnace chamber having an opening in one wall thereof of substantially the same size as the connecting side of said liner, a panel for closing said opening, a heat exchanger member mounted solely on said panel in spaced relation thereto and positioned within said furnace chamber in spaced relation to the sides of said liner so as to provide an air passageway therebetween, fuel burning means in said heat exchanger member at the lower end thereof for generating heated products of combustion therein, means for venting said products of combustion from said heat exchanger member to atmosphere, said furnace chamber having an opening adjacent one end of said liner providing an inlet to said chamber for air to be heated and having an opening at the other end of said liner providing an outlet for heated air, means including a blower for supplying air to said inlet and through said air passageway to said outlet, and means on said panel for shielding said panel from radiant heat from said heat exchanger member.

3. A furnace for supplying heated air to a space in a building, comprising a masonry structure and a liner therefor providing a form about which said masonry is built up, said liner and masonry structure providing a furnace chamber having an opening in one wall thereof, a removable panel adapted to close said opening, a heat exchanger member mounted solely on said panel so as to be positioned within said furnace chamber in spaced relation to the sides of said liner and removable therefrom with said panel, fuel burning means in said heat exchanger member at the lower end thereof for generating heated products of combustion therein, means for conducting said products of combustion from said heat exchanger member to the exterior of said building, said last-mentioned means including a vent pipe secured to said heat exchanger member adjacent the top thereof and projecting through and secured to said panel, said pipe providing a part of the means for securing said heat exchanger member to said panel, said furnace chamber having an opening adjacent the top thereof providing an inlet to said chamber for air to be heated and having an opening at the bottom thereof providing an outlet for heated air, and means including a blower for supplying air to said inlet and downwardly over said heat exchanger member to said outlet.

4. Heating apparatus for use in dwellings of the basementless type comprising a masonry structure and a vertically extending U-shaped liner therefor providing a form about which said masonry is built up, said liner being open at the top and bottom thereof and terminating below the top and above the bottom of said masonry structure, said liner and said masonry structure providing a furnace chamber having an opening in one wall thereof, a furnace unit including a heat exchanger member positioned within said chamber in spaced relation to the walls thereof, a panel for closing said opening in said chamber and to which panel said heat exchanger member is secured, said chamber extending above and below said liner and having an air inlet thereto above said liner and an air outlet therefrom below said liner, and means for circulating air through said inlet and over said heat exchanger member and through said outlet.

5. Heating apparatus comprising a masonry structure and a vertically extending, three-sided liner therefor providing a form about which said masonry is built up, said liner and said masonry structure providing a furnace chamber having an opening in one wall thereof, said liner having portions thereof overlapping the edges of said opening, a furnace unit including a heat exchanger member positioned within said chamber in spaced relation to the walls thereof, a panel for closing said opening in said chamber and to which panel said heat exchanger member is secured, said panel being adapted to be detachably secured to said overlapping portions of said liner whereby said furnace unit is insertable into and removable from said chamber, said chamber having an air inlet thereto and an air outlet therefrom, and means for supplying air to said inlet over said heat exchanger member to said outlet.

6. Heating apparatus comprising a masonry structure and a vertically extending U-shaped liner open to the top and bottom thereof providing a form about which said masonry is built up, said liner and said masonry structure providing a furnace chamber having an opening in one wall thereof, the opposing sides of said liner having laterally turned flanges overlapping the edges of said opening, a panel for closing said opening in said chamber, said panel being adapted to be detachably secured to the overlapping flanges of said liner, a furnace unit mounted solely on said panel and including a heat exchanger member positioned within said chamber in spaced relation to the walls thereof, said chamber having an air inlet thereto at one end of said liner and an air outlet therefrom at the other end of said liner, and means for supplying air to said inlet and over said heat exchanger member to said outlet.

7. Heating apparatus comprising a masonry structure and a vertically extending, U-shaped liner open at the top and bottom thereof about which said masonry is built up, said liner and

masonry structure providing a furnace chamber extending above and below said liner and having an opening in one wall thereof, a panel for closing said opening, a furnace unit mounted on said panel, said furnace unit including a heat exchanger member positioned within said furnace chamber in spaced relation to the walls thereof, said chamber having an opening above said liner providing an inlet to said chamber for air to be heated and an opening at the lower end thereof providing an outlet for heated air, a blower adjacent said inlet for supplying air to said chamber and downwardly over said heat exchanger member to said outlet, and a plate secured to said panel for providing, in conjunction with said panel, an insulating air passageway communicating at its upper end with said air inlet and extending from below the top of said liner downwardly along the inside of said panel thereby providing a path for the flow of

relatively cool air from said inlet for shielding said panel from radiant heat from said heat exchanger member.

MORITZ L. MUELLER.

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