

[54] FIREPLACE UNITY WITH THIN REAR
FIREBOX WALL

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[52] U.S. Cl. 126/120

[51] Int. Cl. F24b 1/18

[58] Field of Search..... 126/121, 120

[56] References Cited
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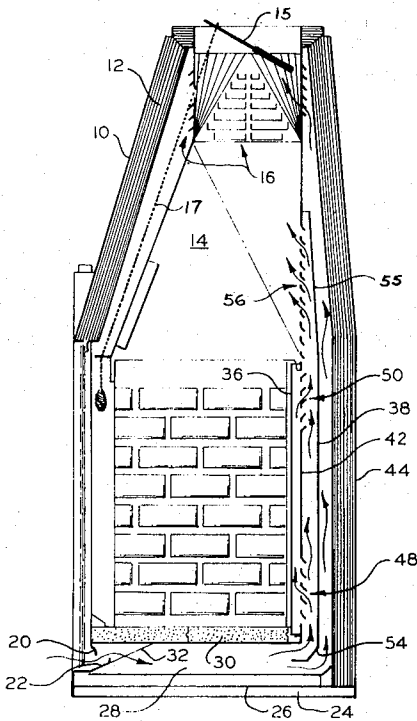
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[57] ABSTRACT

A fireplace unit adapted for permanent, fully enclosed installation wherein the rear wall of the firebox or combustion chamber is of thin, sheet metal. Passageways are provided outside the combustion chamber for the flow of cooling air to substantially eliminate the possibility of damage to the rear wall due to the intense heat concentrated thereon.

7 Claims, 8 Drawing Figures



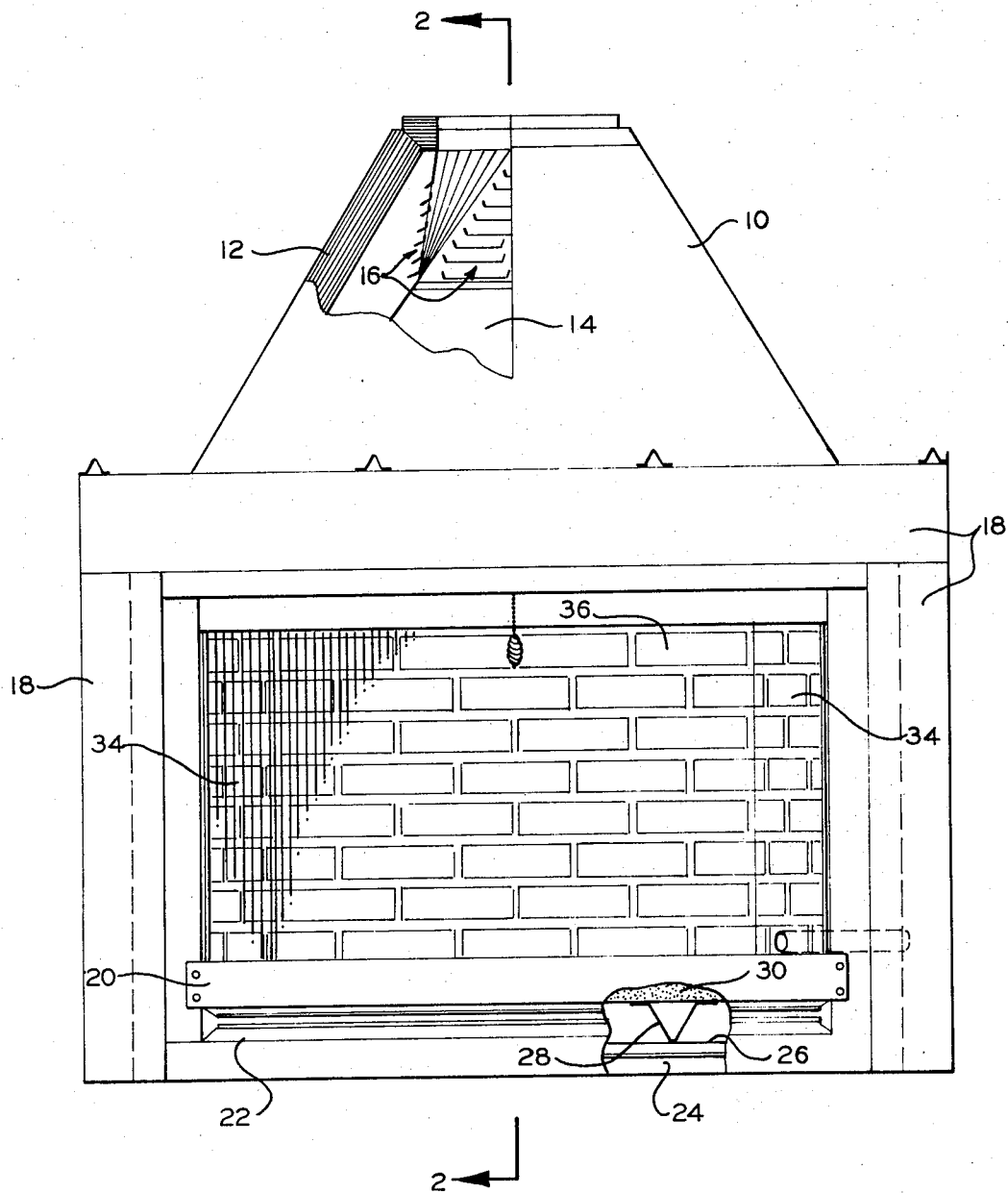


FIG. 1

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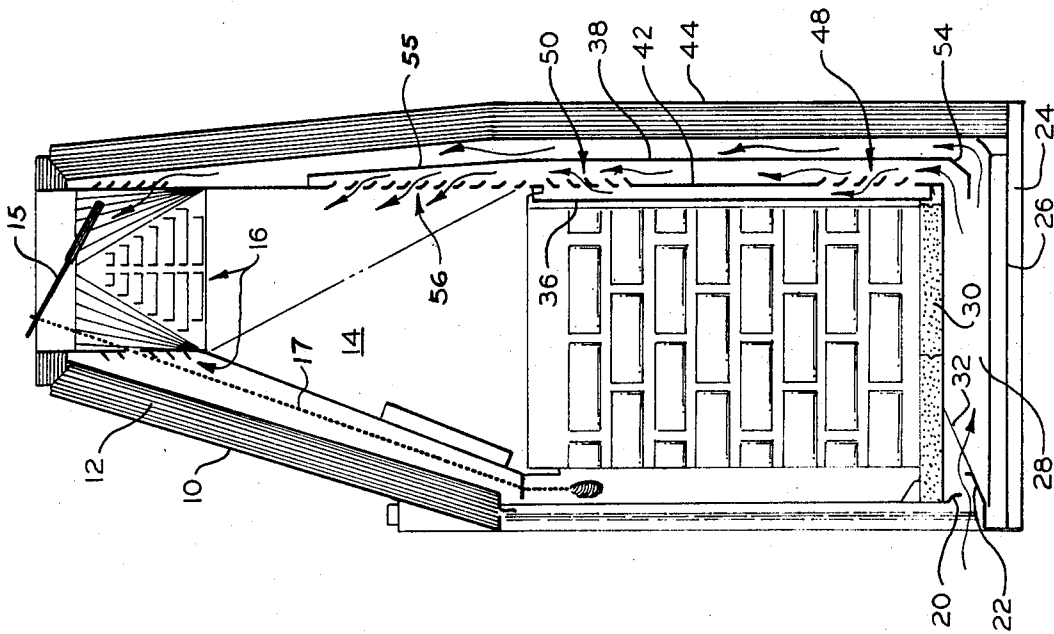


FIG. 2

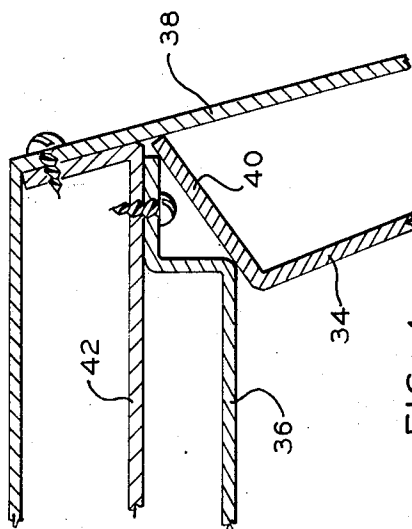


FIG. 4

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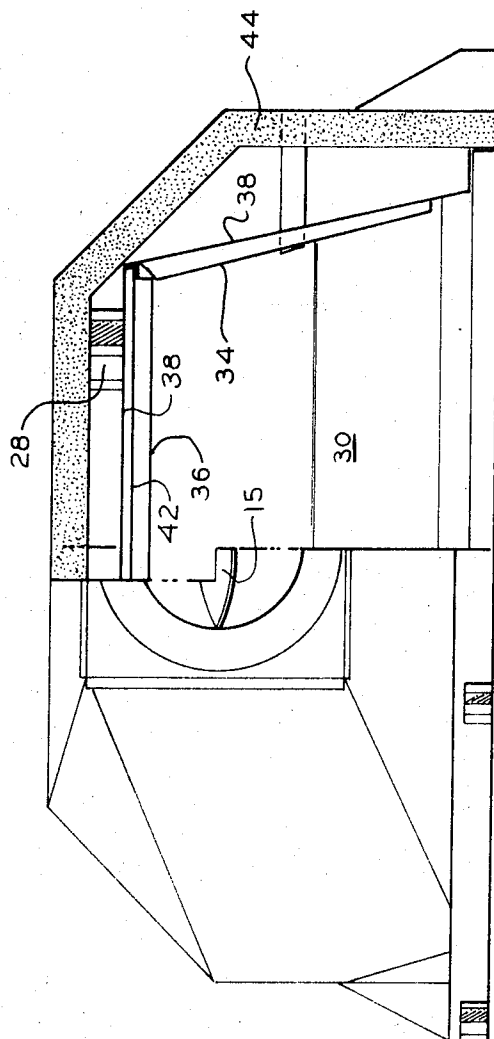


FIG. 3

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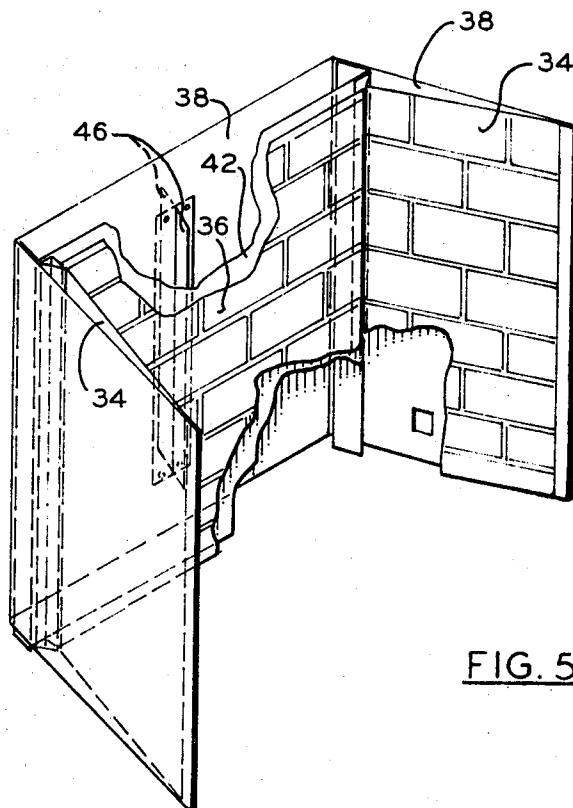


FIG. 5

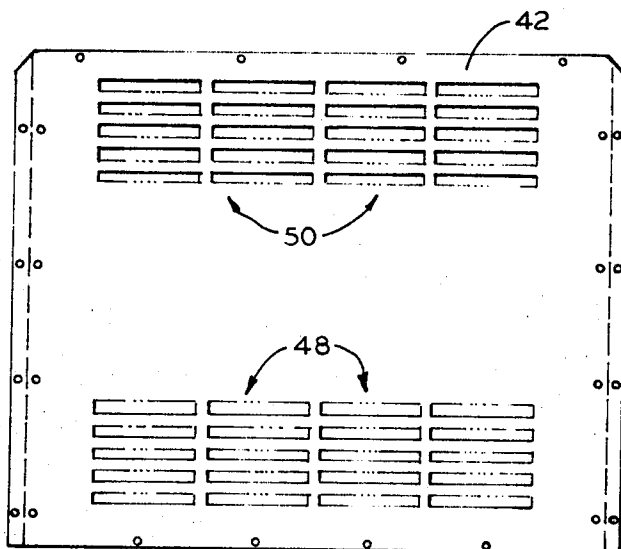


FIG. 6

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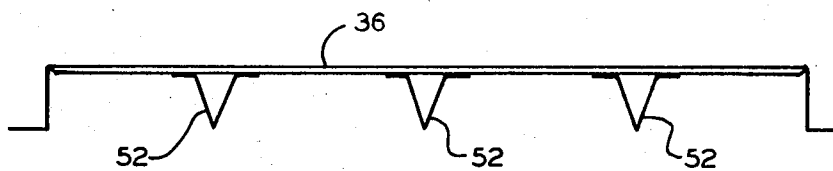


FIG. 8

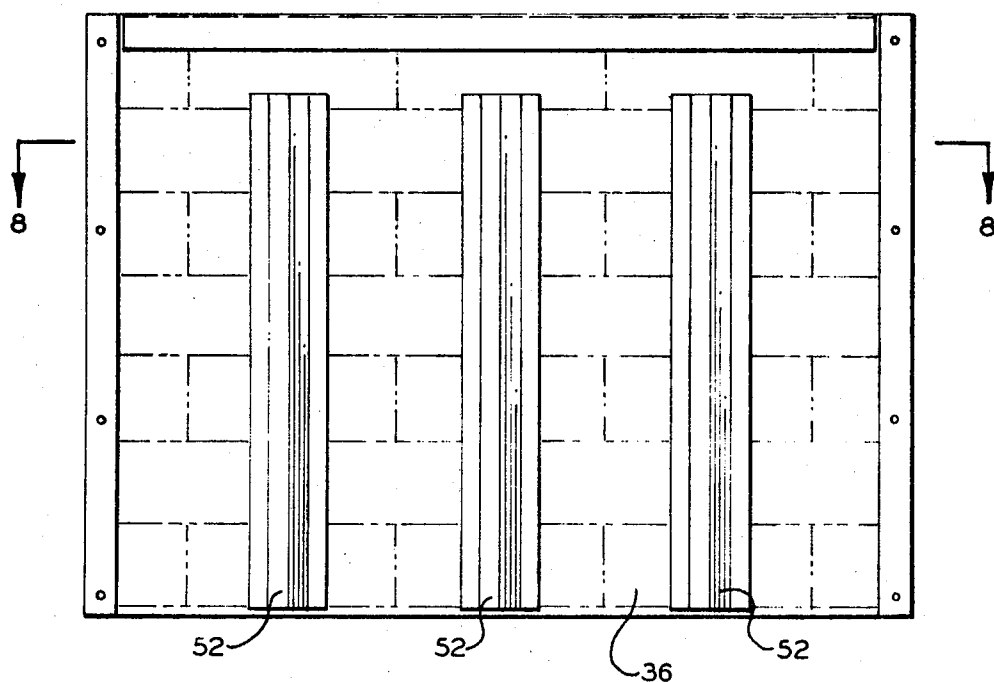


FIG. 7

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FIREPLACE UNITY WITH THIN REAR FIREBOX WALL

The present invention relates to prefabricated fireplace units and, more particularly, to a construction of such units wherein the rear wall of the combustion chamber may be of a relatively light gage metal.

In all conventional fireplace constructions the area of highest heat concentration is the rear wall of the combustion chamber. This is due to the fact that as the air within the combustion chamber is heated and rises through the flue, additional air is drawn in through the open front of the fireplace, passing over, around and under (when the usual grate is provided) the flames in a rearward direction and thence up the rear surface of the combustion chamber. It has therefore been necessary to construct the rear wall of materials which can withstand very high temperatures without damage which would require frequent repair or replacement. This is the case with so-called prefabricated or factory-built fireplaces which are installed in a permanent manner (i.e. fully encased with little or no clearance to combustible material), as well as those which are constructed integrally with the building. That is, while some free-standing room fireplaces of a decorative type intended to enclose only relatively small fires may be constructed of lighter, less durable materials, the permanently encased fireplace has required a rear wall of refractory material, or heavy steel plate.

The present invention has as a principal object the provision of a permanently installed fireplace which may have a relatively light gage sheet metal as a rear wall for the combustion chamber. This is made possible through the novel construction disclosed herein, which ensures that a sufficient amount of cooling air will be directed over the rear or inner surface of the rear wall to offset the intense heat on the forward surface sufficiently to prevent damage. This has the obvious advantage of eliminating the heavy rear wall of refractory or plate metal, thus being especially advantageous in factory-built fireplace units by simplifying and saving on fabrication, packing, shipping and installation.

A further object is to provide a prefabricated fireplace structure which may be permanently installed with little or no clearance to combustible materials, a circulation system for cooling air being provided behind, as well as in front of the rear wall of the combustion chamber.

In a more general sense, the object of the invention is to provide a fireplace unit which is faster and cheaper to make and install than previous units of similar size and design.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

FIG. 1 is a front elevational view of the fireplace unit of the invention, with portions broken away;

FIG. 2 is a side elevational view in section on the line 2-2 of FIG. 1;

FIG. 3 is a top plan view, partly in section;

FIG. 4 is an enlarged detail of a portion of FIG. 3;

FIG. 5 is a perspective view of certain elements of the unit with portions broken away;

FIG. 6 is an elevational view of one of the elements of FIG. 5;

FIG. 7 is a rear elevation of a portion of the unit; and

FIG. 8 is a plan view taken on the line 8-8 of FIG. 7.

As seen in FIG. 1, the exterior of the fireplace unit includes outer hood 10, comprising inner and outer layers of sheet metal enclosing a layer of insulation 12. An air space is provided between the inner layer of outer hood 10 and inner hood 14, having a system of louvers 16 in the upper portion thereof. Adjustable damper 15 is provided in the usual manner with chain 17 having an end portion or handle manually accessible at the front of the fireplace. The lower portion is enclosed on the front by outer shell 18 on the top and sides of the combustion chamber opening. Upper and lower hearth covers 20 and 22, respectively, are provided on the lower front side of the unit and cooperate to form an opening for the entry of room air, as best seen in FIG. 2.

The unit rests on a steel frame or skid 24 and is enclosed on the bottom by sheet metal skid cover 26. A pair of hearth supports 28 rest on skid cover 26. Hearth 30 serves as the floor of the firebox or combustion chamber, resting on hearth supports 28, and is formed of the usual cast refractory material. The hearth supports are generally V-shaped in front view with the central part open to permit rearward flow of air through as well as around the supports. Forward edges 32 of the hearth supports are sloped rearwardly, as shown in FIG. 2, to support lower hearth cover 22.

Wing panels 34 and liner 36 form the side and rear walls, respectively, of the combustion chamber. An embossed brick pattern on both the wing panels and liner provides a decorative effect and enhances structural rigidity. Wing panels 34 are attached by sheet metal screws along their forward edges to inner shell 38. The rear edges of the wing panels are bent over, as best seen in FIG. 4, to provide flange 40 which holds the wing panel apart from the inner shell, thereby absorbing the most intense heat on a separate, more easily replaceable element rather than the inner shell itself. The enlarged detail of FIG. 4 also shows how liner 36 is attached to liner control shield 42, which in turn is affixed to inner shell 38. Thus, an air space is provided between liner 36 and control shield 42 and between the control shield and the rear portion of inner shell 38. A further air space is provided, as seen in FIG. 2, between inner shell 38 and the inner metal layer of outer shell 44. The latter comprises inner and outer metal sheets with a layer of insulation therebetween, as in the structure of outer hood 10. As shown in the sectioned portion of FIG. 3, outer shell 44 extends along the sides, as well as the rear of the fireplace unit. A pair of vertically disposed, L-shaped spacer brackets 46 (FIG. 5) are affixed to inner shell 38, one on each side, at the center of the rear portion thereof, to maintain the proper spacing between the inner shell and control shield 42 on one side, and the inner layer of outer shell 44 on the other side.

Control shield 42 is shown separately in FIG. 6. A system of louvered openings 48 are provided in the lower portion of the shield and are directed downwardly toward the rear, i.e., the side facing inner shell

38. A second system of louvered openings 50 are provided in the upper portion and are directed upwardly toward the rear. The louvers are not shown in FIG. 5 in order to simplify the drawing, but may be seen in FIG. 2. FIGS. 7 and 8 illustrate the attachment, preferably by welding, of three V-shaped spacers 52 to the rear surface of liner 36. These maintain the proper spacing between the liner and control shield 42. It will be noted that the louvers of both the upper and lower groups of control shield 42 are arranged in four vertically disposed rows; the edges of spacers 52 are arranged to contact the control shield in the spaces between each row of louvers.

Referring again to FIG. 2, the air flow which maintains the temperatures of the various elements at a satisfactory level is indicated by arrows. When a fire is started the heated air and smoke rise through inner hood 14 to the chimney outlet. The air is replaced by room air drawn in through the open front of the fireplace. Liner 36 will thus be heated very rapidly since the air being drawn into the fireplace is moving rearwardly, thereby directing the flames and hottest air onto the rear surface of the combustion chamber. The air behind liner 36 will also be heated and tend to rise. As it does so, it must pass out of upper louvers 50 to the space between control shield 42 and inner shell 38. This air is replaced by air passing through lower louvers 48 which enters the space between the control shield and inner shell from the bottom after passing under hearth 30. The air enters through the opening between upper and lower hearth covers 20 and 22. A certain amount of the air passing under the hearth will be deflected upwardly by baffle 54 to the space between the control shield and inner shell, while another portion will pass under baffle 54 and rise between inner shell 38 and the inner layer of outer shell 44. Of the air which enters the space between control shield 42 and inner shell 38, a quantity sufficient to replace the heated air which leaves the space between liner 36 and the control shield via louvers 50 will enter this space through lower louvers 48. Additional air will continue to pass upwardly in the space between control shield 42 and inner shell 38 and rejoin the air which has passed between the control shield and liner 36 and out of louvers 50. An upper extension 55 of inner shell 38 is joined at the top and sides with inner hood 14. Louvers 56 on the rear side of the inner hood admit the air which has risen behind control shield 42, including that which has passed between the control shield and liner 36, thereby joining such air with the combustion products from the firebox for exhaust through the chimney.

The air which has risen between inner shell 38 and the inner layer of outer shell 44 passes over the back of upper extension 55 of the inner shell and also around the sides of inner hood 14. This air enters through louvers 16 for exhaust through the chimney and has a distinct cooling effect on the inner hood as it passes over the outer surface thereof. The air entering the inner hood through louvers 56 also has a cooling effect on the lower rear portion of the hood; although this air has picked up a considerable amount of heat in passing behind the liner and control shield, it is still cooler than the air inside the hood which is rising directly from the combustion chamber.

Thus, the structure and combination of the various elements provides a fireplace unit which has sufficient cooling air in passageways outside the combustion

chamber to permit the use of a relatively thin, sheet metal rear wall. The material of liner 36 is preferably a chromium alloy steel, e.g., ASTM type 430 stainless steel, or other corrosion resistant steel, which may be 0.020 inches in thickness. At least the rear part of inner hood 14 is also preferably of stainless steel. It will be noted that spacers 52 insure that the necessary space is maintained behind liner 36, when such space might otherwise be impaired by deformation of liner 36 due to being bumped by logs, a grate, etc.

What is claimed is:

1. A fireplace unit for permanent installation and enclosure as part of a structure, said unit comprising:

- a. an open front combustion chamber having a hearth floor, side and rear walls and a flue for exhaust of combustion products;
- b. said hearth floor being raised from the supporting structure to provide a passage for air thereunder;
- c. a second wall substantially parallel to and spaced rearwardly from said rear wall to define therebetween a space enclosed at the top, bottom and sides;
- d. a third wall substantially parallel to and spaced rearwardly from said second wall to define therebetween a space open at the bottom to communicate with said passage, whereby air may pass directly from said passage into the space between said second and third walls; and
- e. means defining a plurality of openings in said second wall to allow air to pass between the space between said second and third walls, and the space between said second and rear walls.

2. The invention according to claim 1 wherein said rear wall is constructed entirely of sheet metal on the order of 0.020 inches thick.

3. The invention according to claim 2 wherein said sheet metal is stainless steel.

4. The invention according to claim 1 wherein said openings in said second wall are provided both near the bottom and near the top thereof, whereby a first portion of the air passing from the space under said hearth to that between said second and third walls remains therebetween as it is heated and rises, and a second portion of said air passes through the openings near the bottom of said second wall into the space between said rear and second walls and is heated and rises therebetween and passes back to the space between said second and third walls through the openings near the top of said second wall.

5. The invention according to claim 4 and further including an inner hood disposed above said combustion chamber to enclose the combustion products rising therefrom, an outer hood enclosing said inner hood in spaced relation thereto, and means for directing the air which has passed beneath said hearth into the space between said inner and outer hoods and through openings in said inner hood into the interior thereof.

6. The invention according to claim 5 wherein said second wall is disposed below and contiguously with a portion of said inner hood, and said third wall extends into the space between said inner and outer hoods and is joined at the top and sides of said inner hood, whereby said first and second portions of air are directed into the space between said inner hood and the extension of said third wall and enter said inner hood through openings therein communicating with said last-named space.

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7. The invention according to claim 6 and further including a fourth wall disposed in a plane substantially parallel to and rearwardly spaced from said third wall, and below and contiguously with said outer hood, and

a portion of the air passing under said hearth is directed into the space between said third and fourth walls and thence between said inner and outer hoods.

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