

[54] HEAT EXCHANGER FOR FIREPLACES

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[51] Int. Cl.F24b 1/18
[58] Field of Search126/120, 121

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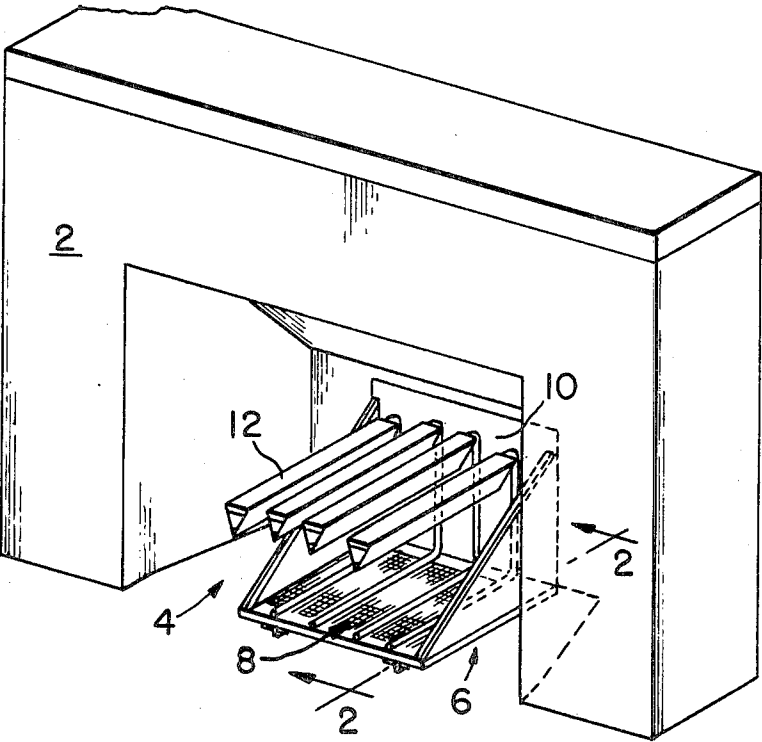
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[57] ABSTRACT

A heat exchanger for an existing fireplace which includes a grate means and air-transporting means in communication with the grate means. The exchanger further includes a blower whereby when the air within the grate means is heated, the blower will move the heated air either outwardly into the room where the fireplace is located or alternatively blow it to another section of the structure. Alternatively, the structure could include within one section of the air-transporting means a supplemental heating means whereby the heat exchanger is useable for heating purposes even in the absence of a fire within the fireplace.

3 Claims, 4 Drawing Figures



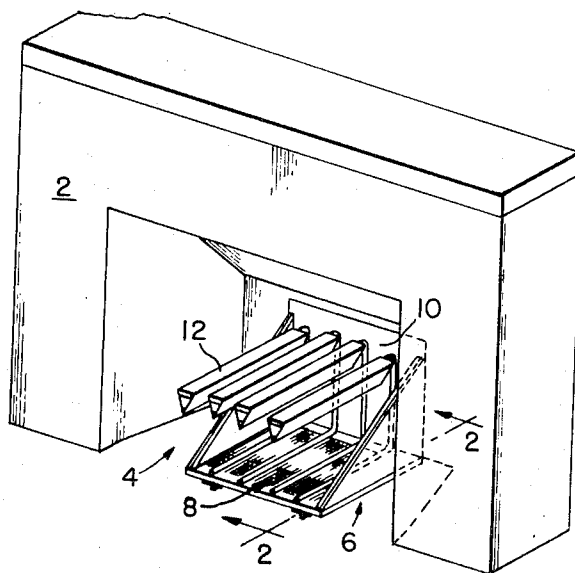


FIG-1

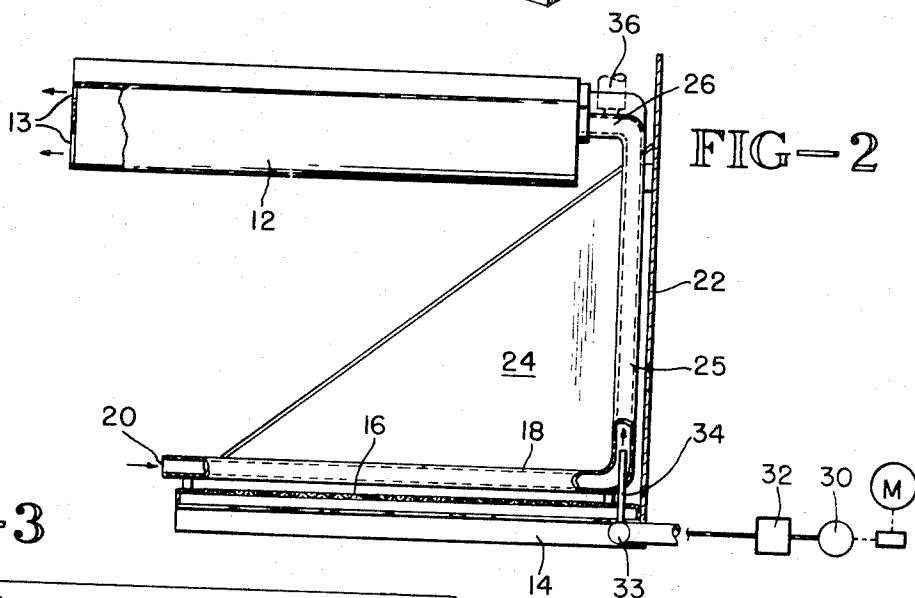


FIG-2

FIG-3

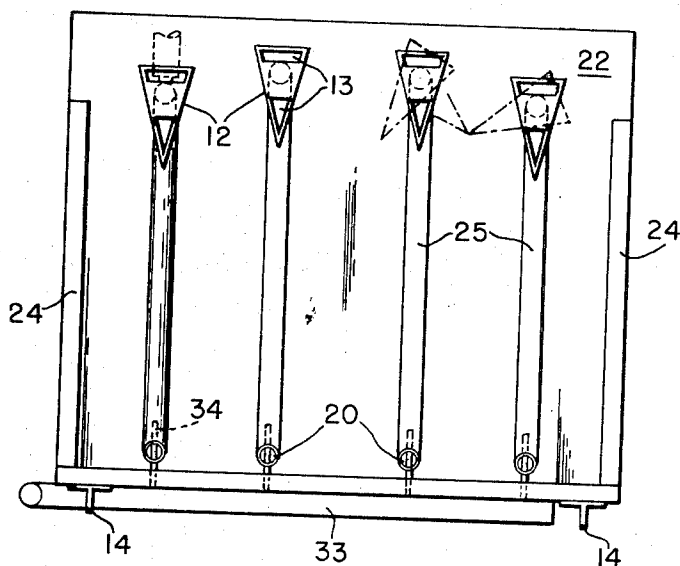
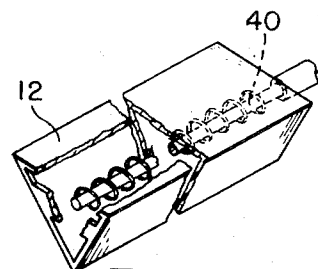


FIG-4

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HEAT EXCHANGER FOR FIREPLACES

BACKGROUND OF THE INVENTION

Whereas an open fire within a fireplace may be extremely warming to the soul and atmospheric within the room, it is well known that the heating efficiency of such a device is extremely low. There have been many attempts to capitalize upon the intense heat generated within the fireplace containing an open fire through the use of a metal lining within the fireplace surrounded by an area of air and a blower means to remove the heated air from behind the metal lining and force it into the room. This has proven to be satisfactory but is not adaptable to those fireplaces which were built before the metal lining concept.

It is an object of the present invention to provide a heat exchanger for use within existing fireplaces which will not alter the fireplace structure and yet will greatly increase the heating efficiency of the fireplace.

With this object in mind and as a feature of the present invention, there is provided a fireplace grate including hollow portions into which air from the room may be drawn and expressed outwardly into the room in a heated condition.

It is another object of the present invention to provide a heat exchanger for use in existing fireplaces wherein the exchanger has the added benefit of providing a means for retarding the rate of burn of the fuel.

In accordance with this object and as a feature of the present invention, there is provided a heat exchanger for use in an existing fireplace wherein the heated air is moved upwardly within the fireplace and then transported forwardly within the firebox over the fuel to be expressed into the room, and the means which extends over the burning fuel has as an integral part thereof, a plurality of fins which may be used as dampeners to slow the rate of the combustion.

Yet another object of the present invention is to provide a heat exchanger for use within existing fireplaces wherein the heat exchanger may be used as a source of heat even when there is no fire within the firebox.

In accordance with this object and as a feature of the present invention, there is provided a heat exchanger for use in existing fireplaces further incorporating within the air-transporting means separate and independent heating elements which may be used for heat without the need for forcing the artificially heated air out into the room.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a fireplace having the inventive heat exchanger positioned therein;

FIG. 2 is a sectional view along lines 2—2 of FIG. 1 showing a general configuration of the preferred embodiment of the inventive heat exchanger;

FIG. 3 is a front elevation of the preferred embodiment of the heat exchanger showing in detail the fire-dampening fins; and

FIG. 4 is an enlarged view of one of the fins of the heat exchanger showing how a secondary heating element can be used therein.

DETAILED DESCRIPTION OF THE DRAWINGS

As can be seen in FIG. 1, there is shown a fireplace generally denoted as 2 having a standard firebox 4 wherein a combustible fuel would be burned providing atmosphere and heat to the room. Resting within the fireplace there is a heat exchanger 6 which comprises a base or grate means 8, an up-standing back portion 10, and a plurality of forwardly extending fins 12.

Referring now to FIGS. 2 and 3, wherein the basic structural elements may be more easily distinguished, it can be seen that the preferred embodiment comprises a pair of metallic beams 14 each adapted to support one end of the heat exchanger device. Mounted upon the top of the beam 14 is a screen 16 adapted to keep the heated coals up around the air-transporting pipes 18 which are mounted above the screen and extend

backwardly into the fireplace. The fuel supporting and air-transporting pipes 18 have an open forward end 20. Extending upwardly from the back of the beams 14 is a metallic plate 22 which is held in vertical position by a pair of triangularly shaped sideplates 24 which extend from the front of the heat exchanger apparatus upwardly and backwardly as best seen in FIG. 2. Each of the structural elements being made of sheet metal have reinforcing bends upon their forwardly projecting surfaces as seen in FIG. 3. These reinforcing portions also present a smooth, safe edge to those placing fuel in the fireplace.

The rearward ends of the heat-transporting pipes 18 bend perpendicularly upwardly generally parallel to the plate 22 and form a vertical heat-transporting pipe 25 which again bends perpendicularly and extends forwardly as best seen in FIG. 2.

Mounted upon the forwardly extending upper portion 26 of the heat-transporting pipe is a plurality of rotatable mounted elongated fins 12 having a generally triangular shape as best seen in FIG. 4. The fins 12 serve to both transport the heated air forwardly into the room as depicted by the arrows in FIG. 2 and likewise serve as a dampener means whereby the combustion within the firebox may be regulated. The means whereby the heat exchanger fins 12 may be used as dampening devices is most clearly shown in FIG. 3 wherein the dotted portions show how the triangular-shaped fins are designed such that when rotated towards each other they will close off the portion of the updraft to the chimney, thus limiting the rate of combustion.

The heat exchanger will operate by means of natural convection once a fire is in a state of combustion upon the lower heat-transporting pipes 18. The air coming in through the open end 20 is heated and will automatically rise through the section 25 and having no place else to go will be expelled forwardly, as shown by the arrows in FIG. 2, out through the forward open portion 13 of the fins 12. However, it has been found that the entire heating system may be operated more efficiently with the assistance of an additional blower means. As seen in FIG. 2, mounted distally from the heat exchanger, there will be a motor M, an appropriate blower 30 and an equalization chamber 32 leading to a transverse connecting pipe 33 assuring that the same approximate air movement will reach all of the air-transporting tubes.

With the addition of the supplemental blower described above, the heat exchanger is more efficient for transporting heated air into the room adjacent the fireplace. The output of the blower is expressed into each of the upright tubes 24 by means by a single upright tube 34 from the blower means extending into the interior of the upright tube 25 thus causing, when in operation, a definite vacuum condition within the forward or lower portion of the heat exchanger mechanism. The use of the auxiliary blower means likewise permits the heated air to be transported to other portions of the house by means of an auxiliary air transport tube 36 which is tapped into the upper portion of one or more of the heat exchange transporting tubes.

Referring now particularly to FIG. 4, there is shown a heating fin identical to that depicted in FIGS. 2 and 3 with the exception that mounted within the heat exchanger fin which is hollow is an electrical heating element 40. The mounting of the heating element 40 within the fin 12 allows the blower to be run and the heat exchanger unit to be used for heating the room adjacent the fireplace even where there is no fire within the firebox.

The supplemental heating element is shown as electrical but is not limited thereto and may be operatively connected by any means well known in the art.

Thus, it can be seen that with the use of applicant's inventive device, the efficiency of a presently existing fireplace may be increased through the use of either natural convection or alternatively auxiliary forced air. Further, it can be seen that applicant's device may be used for supplementing the heat within a room even without the need for a fire within the firebox.

It is understood, of course, that the applicant's device is not limited to use with a wood fire within the firebox, but could equally well be used with a gas fire or charcoal since the main purpose of the heat exchanger is to pass heat into the room and each of these fuels will provide sufficient heat to serve this function. 5

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A heat exchanger for placement in the firebox of an existing fireplace and increasing the heat output thereof comprising; 10

a base portion for supporting the burning material and including a plurality of generally parallel hollow tube sections open at one end and adapted to be placed generally parallel to the floor of the firebox with the open ends extending toward the front, 15

a back portion comprising a plurality of hollow tubes in gaseous communication with the tubes in the base portion and adapted to carry the air heated in the base portion 20

upwardly by convection, a top portion including a plurality of elongated hollow elements in gaseous communication with the tubes of the back portion, said hollow elements pivotable about a substantially horizontal axis and adapted to substantially close the top of the heat exchanger when in a closed position and allow free flow of the combustion gas when open whereby convection will force heated air upwardly through the tubes and out into the room and if it is desired to suppress the fire, the top elements may be pivoted to slow the draught.

2. A heat exchanger as in claim 1 wherein the top elements are of a substantially isosceles triangular cross section having a narrow base allowing relatively unrestricted airflow when the top elements are in the open position.

3. A heat exchanger as in claim 1 wherein the top elements enclose an auxiliary heat source whereby the heat exchanger may be used to heat the room when the fire is not ignited.

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