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(54) Title of the Invention: **Fire constructions**
Abstract Title: **A stove with a panel supplying air to a gap around a baffle**

(57) A solid fuel stove has a baffle plate 3 that extends over a firebox 2 and defines a gap 11 between the baffle plate 3 and a side of the stove (e.g. front panel 4), with an air panel 13 extending across the gap to define an air chamber 14 and air outlets 16 near and in the gap 11. The air panel 13 also provides an air wash C to viewing panel 4a and a valve 15 controls airflow into the chamber 14. An air panel could be retrofitted to existing stoves. The air panel may be angled or shaped, define a second chamber (14bb, fig 3; 14bb, fig 4; 14dd, fig 5), or have a separate second chamber with its own valve (50, fig 5). The additional air in the gap 11 results in improved combustion.

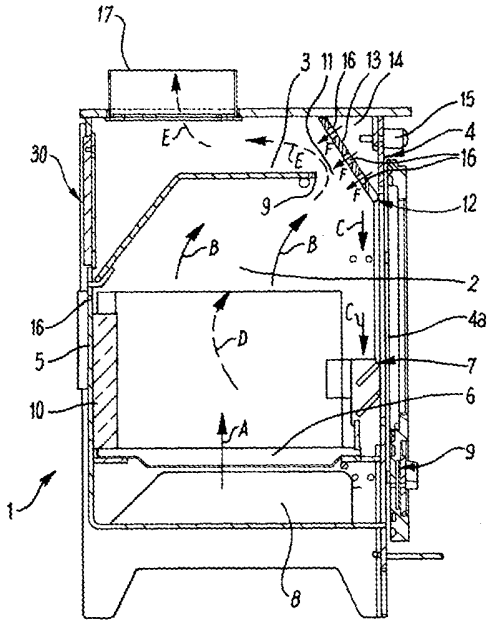

Fig 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

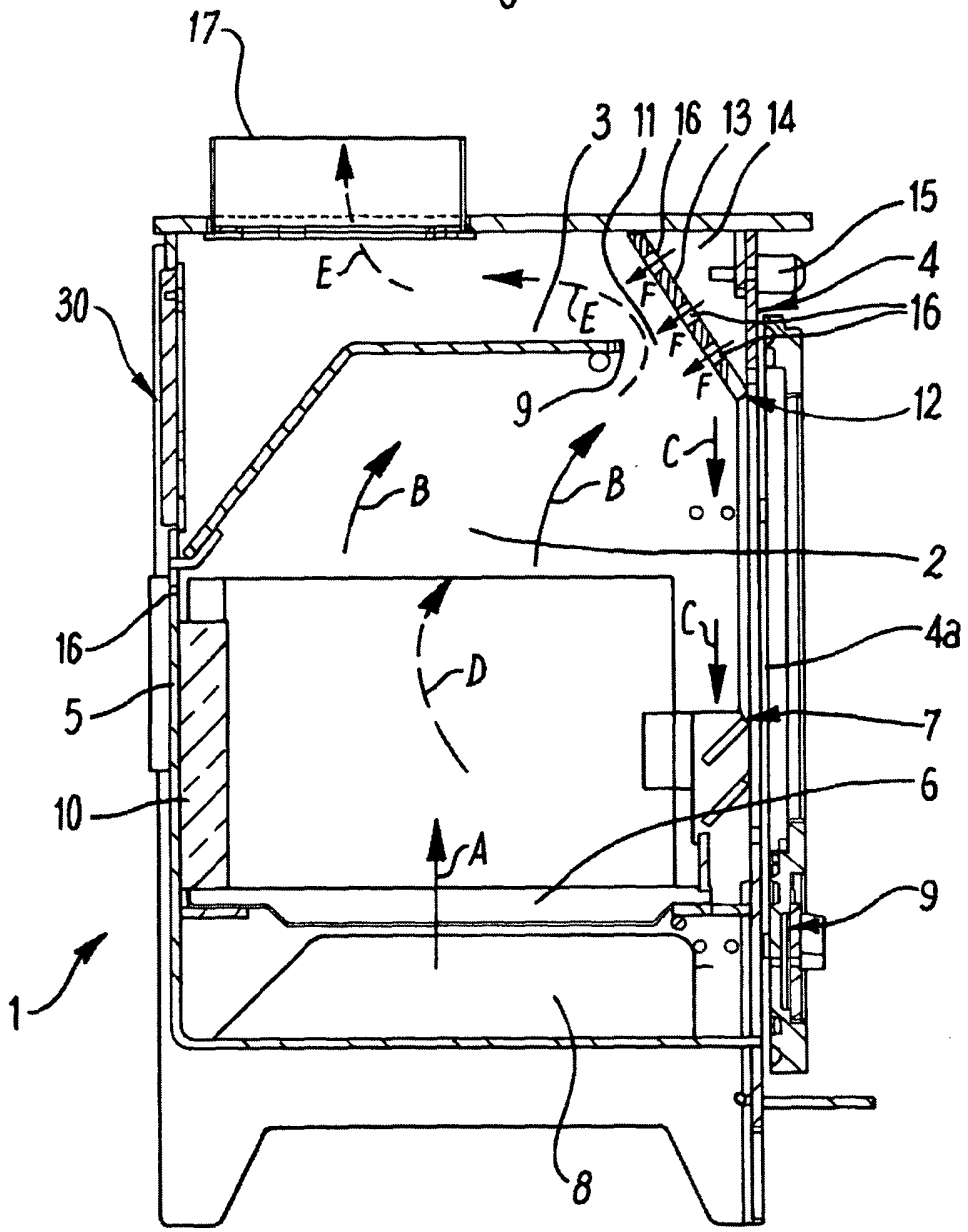

FIG. 1

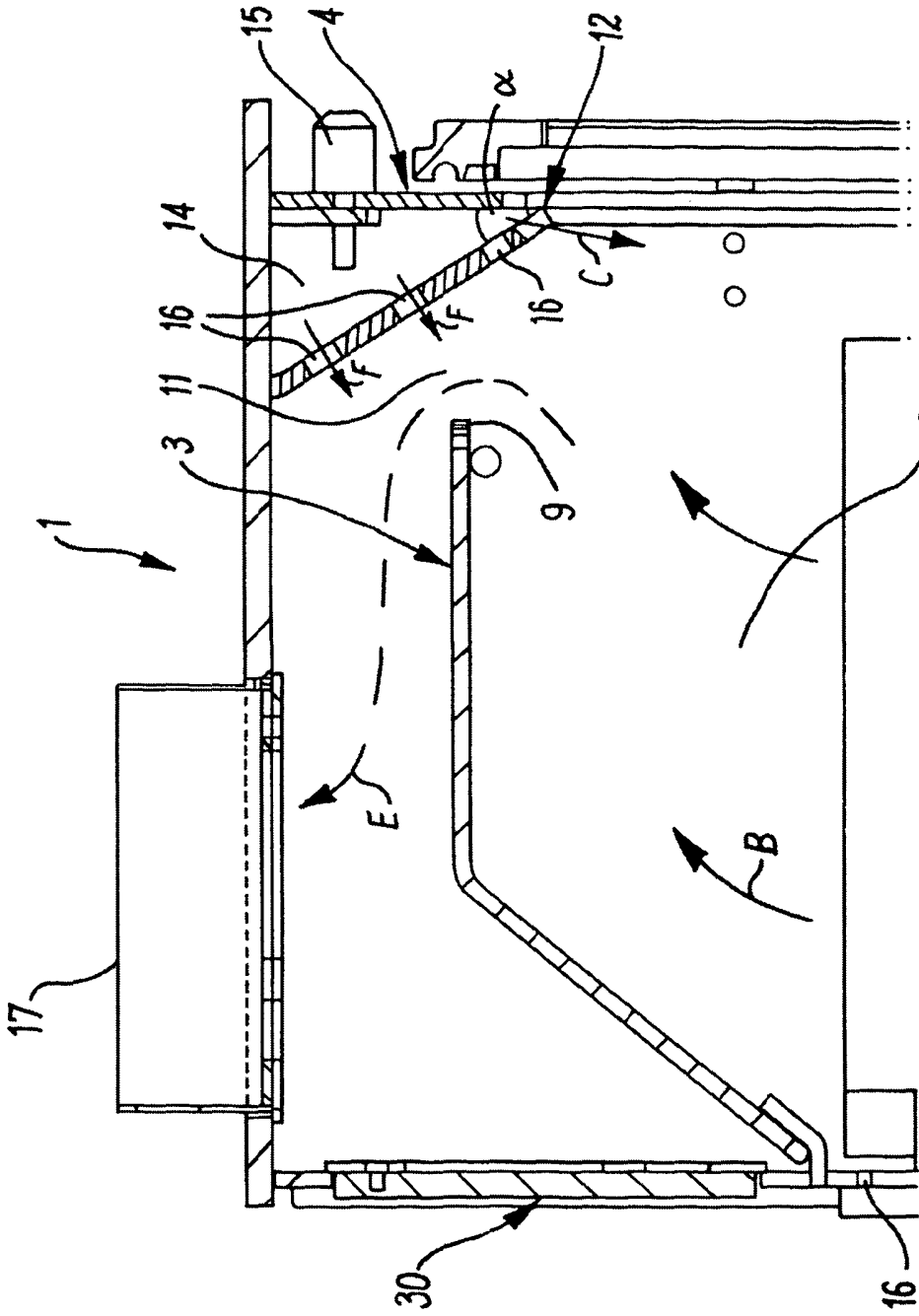

FIG.2

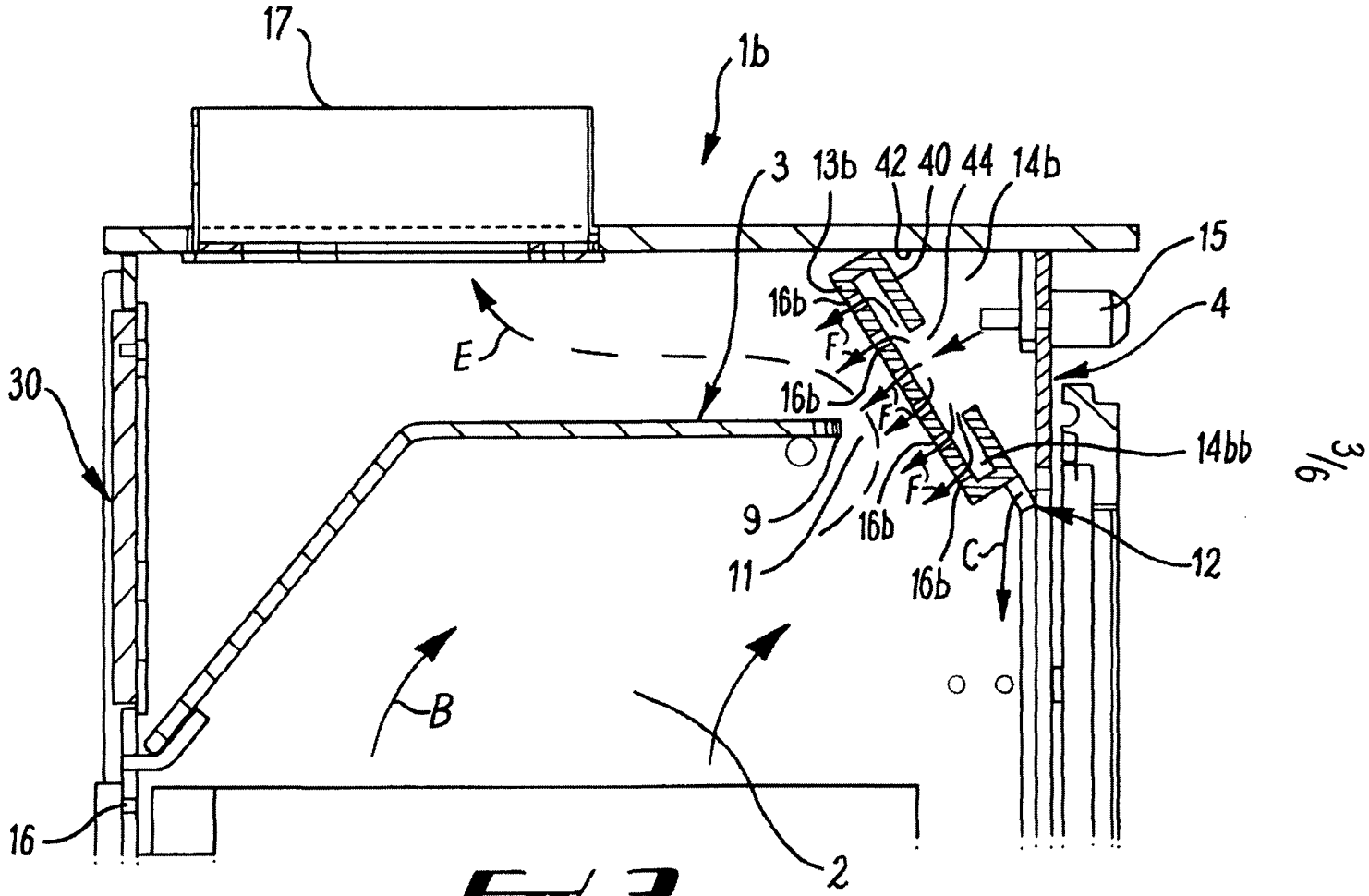

FIG. 3

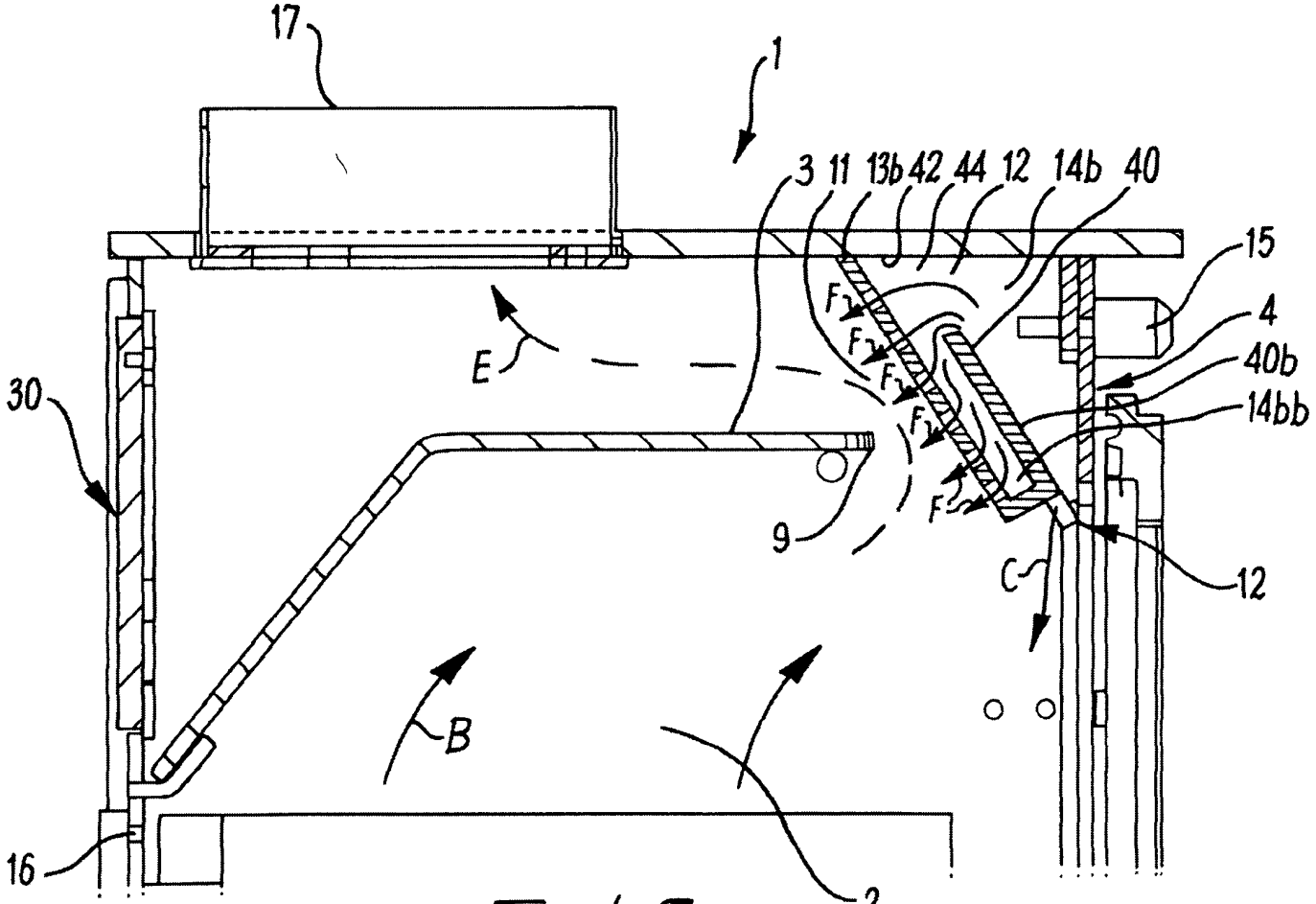
17
1
3 11 13b 42 44 12 14b 40
15
4
40b
14bb
30
E
F1
F2
F3
F4
F5
9
C
12
B
16
2

FIG.4

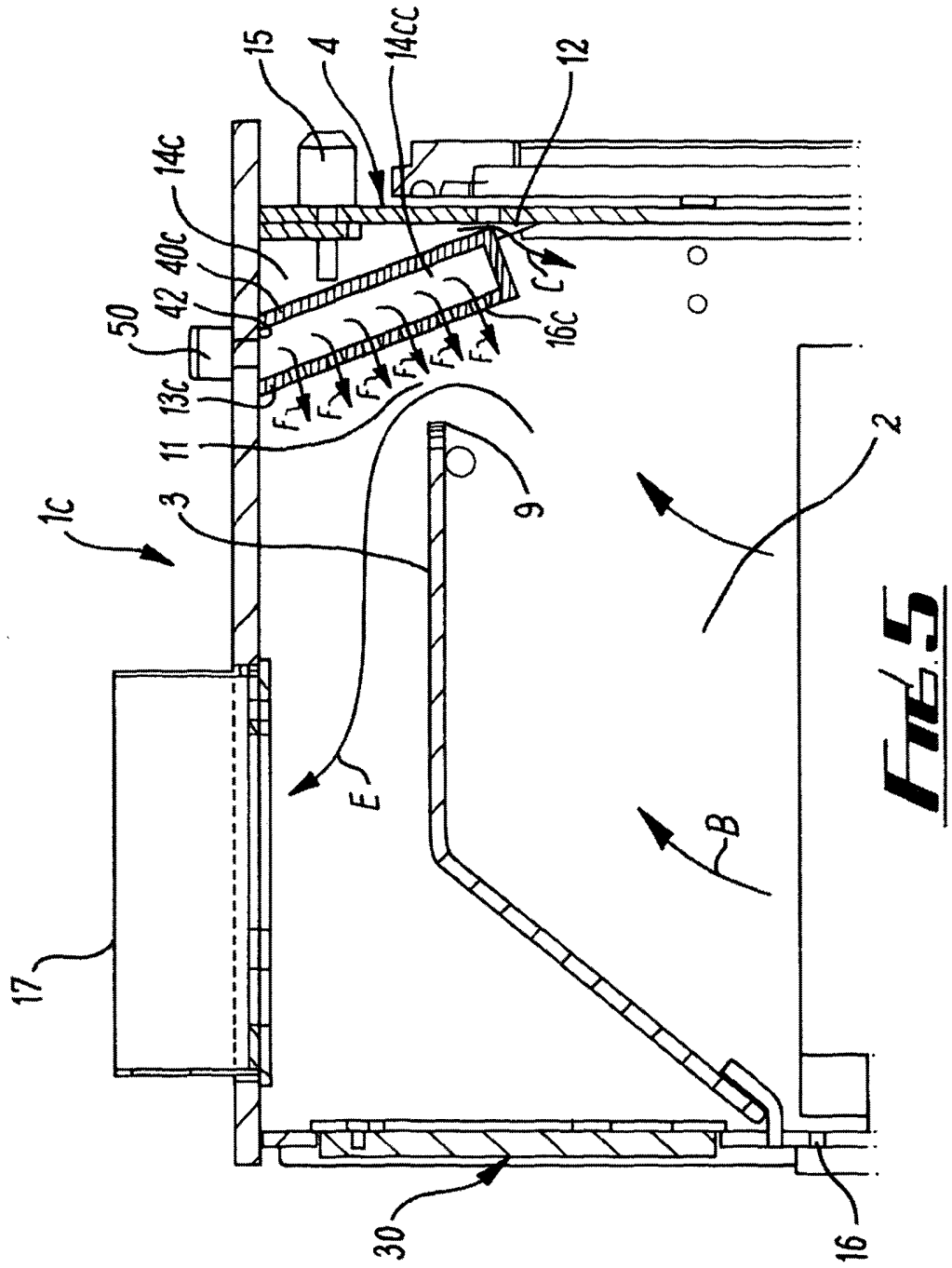

FIG.5

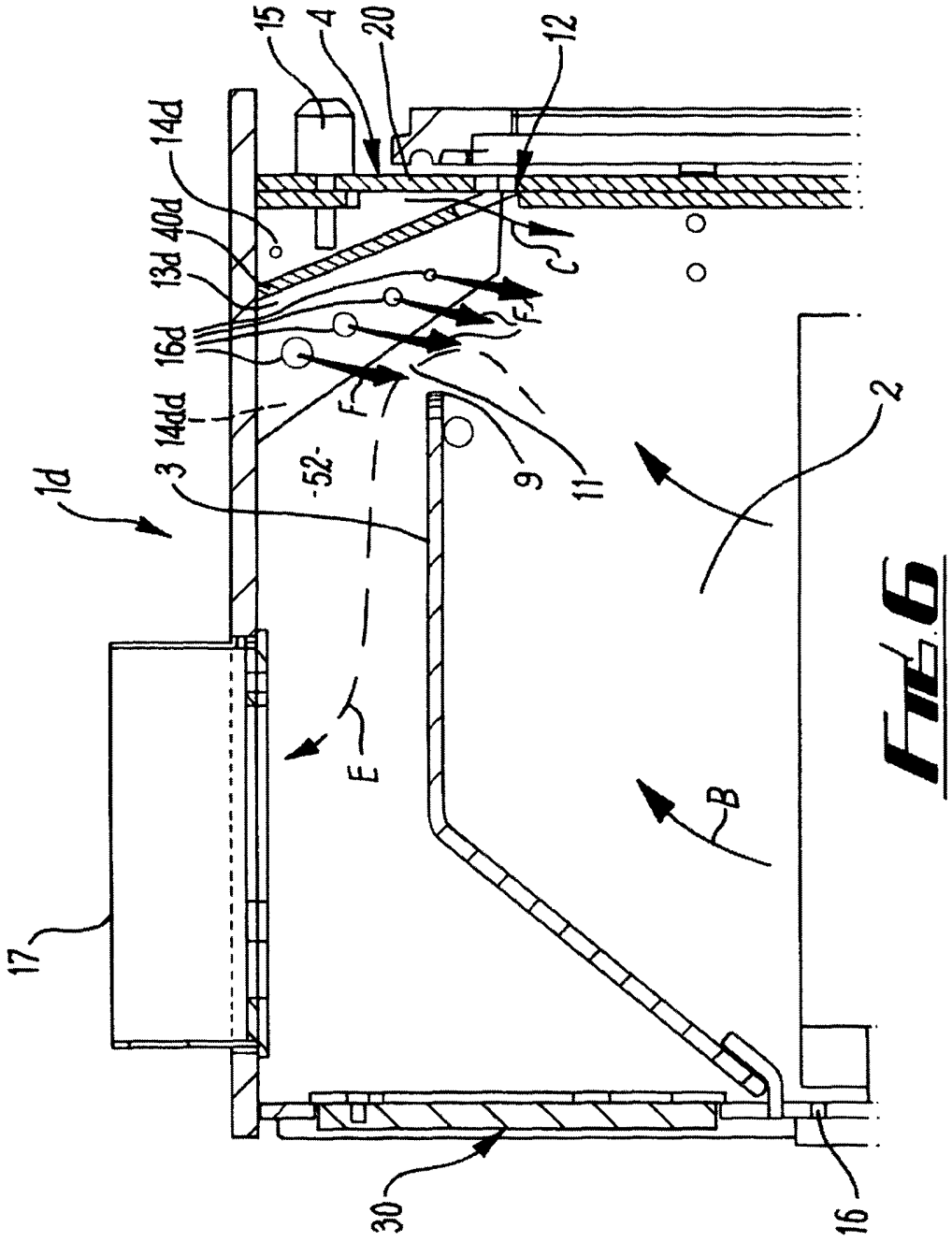

FIG.6

FIRE CONSTRUCTIONS

The present invention relates to fire constructions and more particularly to fire constructions or stoves utilised to burn solid fuels such as coal or wood.

Fire constructions and in particular fires referred to as stoves are often designed to provide a multi-fuel capability. In such circumstances both wood and coal as well as potentially other solid fuels such as peat, recovered condensed cardboard bricks, etc can be utilised within the fire construction. Such multi-fuel stoves are particularly popular with regard to heating a living or working space and more recently particularly when used with regard to wood fuel are considered to be relatively carbon neutral and therefore more environmentally acceptable.

Combustion of wood or other solid fuel inside a closed combustion chamber or firebox within a stove as a fire construction is one of the best ways to produce useful heat from the fuel. Efficiencies obtained can be in excess of 80% with regard to conventional multi-fuel stoves burning wood and typically higher than this with regard to other solid fuels. Nevertheless, there are limitations with regard to existing stove combustion processes and ideally further reductions in carbon monoxide or gases and particulates, that is to say reduced carbon and ash emissions would be desirable whilst improving combustion and therefore thermal efficiency.

It will be understood that the efficiency of combustion is generally dependent upon an adequate supply of air to allow combustion efficiently within the fire construction. It is well known to introduce or draw air for combustion from underneath the fuel and this is the typical process when burning coal. Such air presented beneath the fuel is known as primary air. In order to enable more fully complete combustion generally a further or secondary air supply is presented often as an "air wash" over a front panel which is typically a glass viewing panel for the firebox. It is also known for

further air to be offered into the firebox often through the rear or sides of the firebox, which is often termed tertiary air.

Aspects of the present invention relate to the positioning of secondary or tertiary air flow to achieve improved overall combustion efficiency of solid fuels, such as wood and coal-based fuels within the fire construction of the present invention.

In accordance with aspects of the present invention there is provided a fire construction in the form of a stove, the fire construction comprising a firebox in which fuel to be burnt is locatable, baffle means extending over the firebox to define at least in part a gap between the baffle means and a side of the fire construction and an air panel located at least partially across the gap and defining in part a chamber, the air panel defining one or more openings located to provide air flow from the chamber into the firebox at a location generally about the gap.

The gap may be defined, at least in part, between the baffle means and a front side of the fire construction. The said one or more openings may be located in the air panel to provide air flow therethrough about an edge of the baffle means defining, in part, the gap.

The air panel may extend through the gap into the firebox and may provide an outlet for air to flow from the chamber at a position below the edge of the baffle means. The outlet may be configured to direct air to flow over the front side, preferably to help prevent the build up of debris on the front side from the combustion of fuel within the firebox.

A second chamber may be provided within the fire construction which may be in communication with the said chamber to provide air to the chamber for dispersion through the opening(s). The second chamber may be generally defined between a chamber member and one or more sides of the fire

construction. The outlet may be provided in the chamber member, which chamber member may extend through the gap into the firebox to provide the outlet below the edge of the baffle means.

The air panel and/or chamber member or at least the lower portion thereof, may be angled relative to the side of the fire construction. The angle may be no greater than 65° relative to the front side. The angle may be between 30° to 40° relative to the front side. Means may be provided for the angle of the air panel and/or chamber member to be adjusted relative to the said side. The air panel and/or chamber member may be pivotally adjustable about a pivot through which the air panel and/or chamber member is/are attached to the front side. Alternatively, the air panel and/or chamber member is/are pivotally adjustable about a pivot through which the air panel and/or chamber member is/are attached to an upper, rear or other side of the fire construction.

The openings within the air panel may all be of the same size. The openings may be evenly distributed and may be generally circular.

The number and/or distribution and/or proportion and/or size of openings open to allow air to pass therethrough may be varied depending upon operational requirements. A slidingly movable plate or other cover means may be provided for selective movement relative to the air panel to provide selective variability in the proportion and/or distribution and/or number and/or size of the openings through which air can pass through the air panel.

The chamber may have an air access valve. The second chamber may have an air access valve. The chamber and second chamber may share an air access valve, or one or both of the said chamber and second chamber may have an air access valve. The air access valve(s) may be selectively variably openable to vary the air flow into the chamber and/or second chamber and/or dwell time for air within the chamber and/or second chamber

for preheating prior to flow through the opening(s) into the firebox. The air access valve(s) may be located to enable selective opening of the chamber and/or second chamber to receive air from outside of the fire construction.

The air panel may be configurable in terms of orientation and/or size of air outlet and/or openings dependent upon fuel type to be burnt in the firebox.

The air panel may be substantially flat. The air panel may be curved. The chamber member may be substantially flat. The chamber member may be curved.

The firebox may be configured to have mountings to allow different sizes and/or shapes of air panel and/or chamber member to be located for operation within the fire construction.

The firebox comprises a grate located below the baffle means to hold fuel and to provide means for primary air flow from beneath the fuel into the firebox.

Side parts of the firebox, particularly side parts located towards the end of the baffle means generally opposite the said edge defining the gap, may have secondary air inlets.

A flue may be provided above or to the side of the baffle means.

In accordance with a further aspect of the present invention there is provided an air panel for fitment into a firebox, the air panel comprising means to enable the air panel to be attached to the inside of the firebox at a location to extend partially across a gap defined between baffle means and a side of the firebox and to define in part a chamber, the air panel further comprising one or more openings located to provide for air flow from the chamber into the firebox generally about the gap.

The said means may comprise a hinge arrangement to enable pivotal attachment of the air panel to the firebox. Alternatively, or in addition, the air panel may be fixed to the firebox using threaded fasteners, rivets and suchlike. The said means may provide for selectively releasable mounting of the air panel within a firebox.

The air panel may be as described in any of paragraphs six to nineteen above.

Aspects of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure1 is a diagrammatic cross-sectional side illustration of a fire construction in the form of a stove in accordance with aspects of the present invention;

Figure 2 is a diagrammatic cross-sectional side illustration of aspects of the stove depicted in Figure 1 in enlarged detail;

Figure 3 is a diagrammatic cross-sectional illustration similar to that of Figure 2, of an alternative embodiment of the present invention;

Figure 4 is a diagrammatic cross-sectional illustration similar to that of Figure 2, of a further embodiment of the present invention;

Figure 5 is a diagrammatic cross-sectional illustration similar to that of Figure 2, of another embodiment of the present invention; and

Figure 6 is a diagrammatic cross-sectional illustration similar to that of Figure 2, of a still further embodiment of the present invention.

As indicated above combustion processes within fire constructions are well known. Essentially, provision of air appropriately conditioned in terms of temperature facilitates efficient and generally allows more complete combustion in order to provide an overall high level of performance for a fire construction such as a stove. Stoves are essentially closed fire constructions in which primary, secondary and possibly tertiary air are provided in different positions within the firebox in order to facilitate combustion efficiency. Unfortunately with regard to solid fuels there is variability in calorific content, volatiles and residual ash/non-combustible mineral elements. There is a considerable differential between solid fuels such as coal or coke and wood, not least in terms of volatiles and residuals. Nevertheless, as indicated above there is a desire to provide more efficient multi-fuel stoves in view of their greater capability with regard to particularly domestic heating in living and working spaces. In order to achieve such variability and capability with regard to multiple fuels greater consideration has been given to the air supply to the combustion process. Different levels of air supply and input positions will be required for different fuel types.

The invention provides a fire construction 1 in the form of a stove, the fire construction comprising a firebox 2 in which fuel (not shown) to be burnt is located, baffle means in the form of a baffle plate 3 extending over the firebox 2 to define in part a gap 11 between the baffle plate 3 and a side 4 of the construction 1, and an air panel 13 located at least partially across the gap 11 and defining in part a chamber 14, the air panel 13 defining one or more openings 16 located to provide air flow from the chamber 14 into the firebox 2 at a location generally about the gap 11.

In more detail, Figure 1 provides a diagrammatic cross-sectional illustration of a fire construction 1 in the form of a stove which incorporates prior air supply arrangements, that is to say primary and secondary air supply along with the further features of additional air supply in accordance with aspects of the present invention. The basic fire construction 1 comprises a

firebox 2 generally below the baffle plate 3 with a front panel 4, a rear panel 5, and two opposing side panels (one of which is shown at 52). The firebox 2 includes a grate 6 to support fuel in use. Front retainers 7 are provided to retain the fuel (not shown) whilst primary air is presented through an ash box section 8 and a primary air inlet 9. In such circumstances with regard to coal based fuels and for facilitating ignition of wood based fuels primary air passes from outside the stove, in through the inlet 9 to circulate through the grate 6 and through the fuel (not shown) into the firebox generally in the direction of arrowhead A. The volume of primary air is determined by the primary air inlet 9 and can be controllably adjusted dependent upon the rate of combustion required, etc. With regard to solid fuels such as coal or coke, primary air flow may be utilised in order to maintain combustion due to the generally longer combustion consumption periods (lower combustion rates) for such coal or coke in comparison with wood. Wood or compressed cardboard blocks if used as a solid fuel will generally be too quickly consumed if significant primary air is maintained and in such circumstances, as with coal and coke, if lower rates of combustion are required the primary air flow may be regulated and reduced to negligible or non-existent levels through a value associated with the primary air inlet 9.

It will be appreciated that the front panel and in particular the front panel 4a may be formed from a fire glass to provide a viewing panel such that the aesthetically pleasing flicker of flames from the solid fuel (not shown) supported upon the grate 6 can be seen externally of the fire construction 1. It will be understood that the firebox 2 generally also incorporates insulation shown representatively by insulation block 10 to accommodate the temperatures expected within a fire construction such as a stove.

It will be further understood that generally there will be a movement or draw in terms of combustion gases/air generally in the direction of arrowheads B in the firebox 2. This is generally carried by the natural convectional movement of the gases within the firebox 2 during combustion and the draw

of air and gases up the flue 17 (shown diagrammatically by arrowheads E). The combustion gases will pass up around the baffle plate 3 and through the gap 11, to eventually be expelled through the flue 17.

As has been previously indicated, it is known to have secondary and sometimes often termed tertiary air inlets to supplement the primary air flow to provide for more complete combustion. However, it has been established that in accordance with the present invention particularly efficient and improved combustion (particularly of volatiles and particulates that rise from combusting fuels) is achieved by providing additional air flow generally about the gap 11 defined generally between the baffle plate and generally an edge 9 of the baffle plate and the front of the firebox 2. Improved combustion provides improved heat generation and also a reduction in undesirable pollution exiting through the flue 17. The precise location of the air panel, the openings therein and the provision of the air flow in relation to the gap can be engineered according to the fuel being burnt, but generally the air flow would be presented over and/or through the gap, in the close vicinity of the edge 9 of the baffle plate.

In the particular embodiment illustrated in Figures 1 and 2, the air panel 13 extends at an angle from the front side 4 of the firebox 2 to an upper surface 42, to define the chamber 14. A series of openings 16 is provided through the panel 13 to provide for the movement of air from within the chamber 14 therethrough, into the firebox at the region generally about the gap 11. Such flows of air from the chamber 14 are illustrated diagrammatically by arrows marked F. The location of the chamber 14 is such that air therewithin is generally preheated prior to entry into the firebox 2, thus helping with the further combustion. An air flow valve 15 is selectively operable to control the ingress of air from outside the construction 1, into the chamber 14.

Without wishing to be bound by theory, the improved combustion that the present invention provides is believed to result from providing the additional air flow at the region of the gap 11 around the edge of the baffle plate 3, as this tends to be at or near the end of the flame path above the fuel.

Control valve 15 can be manually manipulated to provide suitable air flow into and thus generally out of the chamber, which can be controlled for example according to the fuel being burnt. The number and pattern of openings 16 within panel 13 can also be selected to help improve combustion and indeed it is within the scope of the present invention for the air panel 13 to be interchangeable with alternative air panels 13 and/or for the number and/or distribution and/or proportion and/or size of the openings 16 that are open for the passage of air therethrough to be selectively controlled (see later).

The angle α of the panel 13 relative to the front can be up to 60°, and more typically between 30° and 40°. The angle may be selectively variable. In one embodiment, the panel 13 may be attached to the firebox 2 through a pivotal arrangement (not shown) that provides for the pivotal movement of the panel 13 thereabout and thus the variation of the angle thereof relative to the front side 4 of the firebox 2.

In the embodiment of Figures 1 and 2, an air outlet 12 is provided generally at the bottom of the chamber 14. The outlet 12 provides for air to be drawn from the chamber 14 in a generally downward direction, as illustrated diagrammatically with arrows C, to provide an air wash over the front side 4 of the firebox 2. This secondary air flow not only assists in combustion, but also helps to prevent debris produced from the combustion of fuel within the firebox 2 from being deposited on a viewing panel 4a of the construction 1. The general flow of air from the air wash tends to circulate within the firebox 2 as illustrated diagrammatically with broken arrowhead D in Figure 1, with movement towards and through the gap 11 as depicted diagrammatically with broken arrowheads E.

In the embodiment shown in Figures 1 and 2, the air outlet 12 is located below the level of the baffle 3. This helps to ensure the desired flow of air through the outlet 12 down into and around the firebox and then up through the gap 11, to provide some secondary (or tertiary) air.

The angle of the panel 13 will dictate the angle to which the air flows F are presented and therefore entrained with the gaseous and particulate materials moving therepast in the convection flows E. Offering such additional air flow through such an angled air panel 13 in accordance with the present invention is found to offer considerably improved combustion. Optimising the number, size, distribution and degree of opening of the openings 16 within the panel 13 according to appropriate analysis and testing provides for still further combustion efficiencies. Variability in such parameters can be adjusted to accommodate different fuel types.

It will be understood that the baffle plate 3 is positioned in order to ensure that the combustion process is most efficient under expected combustion conditions. The baffle plate 3 will contribute to the mixing of the fuels and the positioning and movement of gases and particulates through the firebox 2 and thus through the air flows F.

Conventional secondary or tertiary air holes in the rear or sides of the firebox 2 may be retained or dispensed with in a fire construction in accordance with aspects of the present invention.

In certain embodiments of the present invention a row of specifically sized openings 16 in the form of holes or perforations are positioned in the panel 13. Jets of fresh preheated air are drawn into the top of the combustion firebox 2 through the openings 16 by the naturally convected draw of the flue 17 or other chimney system.

Figure 2 provides an enlarged illustration of the air panel 13 in accordance with aspects of the present invention to provide further secondary and tertiary air.

A fire construction 1 may be optimised for a preferred fuel type to be burnt in the stove or a number of configurations made possible dependent upon the predominant fuel used or to allow flexibility between fuels dependent upon current usage. In such circumstances, when windfall wood fuel is freely available, such as in the autumn and winter, the fire construction can be configured for that fuel type whilst at other times of the year, for example during a summer period when coal may be more predominantly used, the fire construction altered accordingly or vice versa. It will be appreciated that the air in terms of secondary and tertiary supply can be determined according to the present invention, with reference to the content of combustible materials in the fuel and in order to minimise CO and particulates and volatiles produced by the combustion process.

A particular advantage of providing secondary air injection in accordance with aspects of the present invention is good clean combustion performance with a variety of fuels and under varied combustion rates. Further advantages relate to low alteration costs to existing fire construction designs. An air panel 13 according to the present invention can be provided as a fitment to an existing fire construction. For example, an air panel 13 as generally described could be fitted to the inside of the firebox of an existing fire construction by any suitable fire resistant fitments. For example, the air panel 13 could be secured by way of threaded metal fasteners, or similar such arrangements. The air panel 13 could be attached by a hinged arrangement to provide for pivotal movement and adjustment of the air panel 13 within the firebox. Such retro-fit air panels 13 would of course be located, in accordance with the present invention, to extend partially across a gap defined between a baffle plate in the construction and a side of the fire construction, and to define in part a chamber to provide for the movement of air from that

chamber, through the openings in the air panel 13 into the firebox generally about the gap between the baffle plate and the side of the firebox.

It will be further appreciated that the air panel according to the present invention may be removed from location within the fire for maintenance, repair or for replacement by the same or an interchangeable air panel of different design such as different shape, configuration of openings and so on.

Adaptability is a core requirement with regard to achieving multi-fuel operation. As illustrated in Figure 1 and Figure 2 the flue 17 can be presented above the baffle plate 3. Alternatively, a flue outlet 30 can be provided to the side of the baffle if required. Clearly, positioning of the flue 17, 30 will be such that an appropriate flow draw will be achieved such that secondary and tertiary air is drawn into the firebox 2 appropriately for combustion efficiency.

As indicated above, the openings 16 will typically be distributed in a regularly spaced row or other pattern, although non-uniform or non-regular patterns can be employed, dependent upon requirements. Generally the openings will be round but could be shaped, for example oval or otherwise, dependent upon operational requirements. Furthermore, openings 16 of different sizes may be presented at different parts of the air panel 13.

As illustrated, the panel 13 is generally flat and angled to the front panel 4. As an alternative, the panel 13 which forms the cavity or chamber 14 may be curved, either convex or concave, in order to alter the flow E and therefore entrainment through an air drawn out process into the combustion zone in the firebox 2. It will be understood that the chamber 14 provides an area for preheating of the secondary or tertiary air presented through the openings 16 and therefore the sizing and location of this chamber 14 particularly through the angle or shaping of the panel 13 may be important with regard to achieving operational requirements.

As indicated, angling of the secondary and tertiary air flows through the openings 16 as well as through the air wash outlet 12 will be important in terms of achieving appropriate combustion efficiency and performance. Directing and jetting will be dependent in part upon the projection jet length which in turn may be dependent upon the thickness of the panel 13. Alternatively, each opening 16 may be formed in a raised portion to accentuate the length of the openings 16 and therefore enhance the jetting effect of the tertiary or secondary air flows into the firebox 2.

In terms of altering the secondary air flow it will be understood that the openings may be variable in terms of size and distribution. This variation may be achieved by providing a plate (not shown) which is selectively slidingly moveable to one side of the air panel 13 to open or vary the size of the openings and therefore control the secondary flow provided through the openings in accordance with aspects of the present invention.

It will be noted that the openings 16 in accordance with aspects of the present invention are generally smaller than the air wash outlet 12, which as described above is designed to provide the flow in the direction of arrowhead C adjacent to the front panel and in particular the glass viewing section of the panel 4a. The openings 16 are sized to provide specific additional secondary air flow adjacent to the end of the flame path as additional air for final combustion and efficiency with respect to the volatiles and particulates from the fuel supported by the grate 6. The openings 16 act within the fire construction 1, that is to say the stove design, to provide secondary or tertiary air flow into the firebox 2 where required and as indicated above can act in cooperation with existing secondary or tertiary outlets if required.

Figure 3 illustrates a further embodiment of the present invention. The features of the firebox 1b of this embodiment shared with firebox 1 as described above are given the same reference numerals.

In this embodiment, the air panel 13b is associated with a chamber member in the form of an air wash panel 40. The air wash panel 40 extends between an upper inside surface 42 of the firebox and the front side 4 to define a chamber 14b. A second or further chamber 14bb is defined between the panel 13b and the air wash panel 40 and is in communication with the chamber 14b via an opening 44 in the air wash panel 40. The opening 44 may be a single opening or may comprise a plurality of openings. Towards the lowermost edge of the panel 40 is an air wash opening 12, generally as described above.

In this embodiment, the air panel 13b and the openings 16b are located such that air from the chamber 14b is drawn generally by the convection of the gases in the firebox 2b into the chamber 14bb and then out through the openings 16b as shown diagrammatically by the arrows F. The location of the panel 13b and thus the introduction of the air flows F into the firebox are carefully determined to be generally adjacent to the end of the flame path and about the gap 11 between the end of the baffle plate 3 and the side 4. The regulating valve 15 is used to regulate the rate of air that can be drawn into the chamber 14b from outside the construction 1b.

Figure 4 shows a further embodiment of the present invention, which is generally similar to the embodiment of Figure 3, but wherein the opening (or openings) 44 is/are defined between the upper side 42 and the air wash panel 40b.

Figure 5 shows an alternative embodiment of the present invention. Again, features of the fire construction shared with the previous embodiments are referenced with the same numerals. In this embodiment, the air panel 13c defines a second chamber 14cc with an air wash panel 40c and a portion of an upper surface 42. The chamber 14cc is in selective communication with the exterior of the fire construction 1c via an air flow regulating valve 50. In this embodiment, the chambers 14c and 14cc are not in communication. Air

from the chamber 14c is drawn into the firebox through the air wash outlet 12a in the direction of arrows C. The airflow is regulated by the regulating valve 15.

Air within the chamber 14cc is introduced into and over the gap 11 through the openings 16c in the panel 13c generally in the direction of arrows F. Air within both the chambers 14c and 14cc is generally heated prior to entry into the firebox, to facilitate combustion.

In this embodiment, the air flow from the respective chambers 14c and 14cc can be independently regulated by the valves 15 and 50.

Figure 6 illustrates a further embodiment according to the present invention. In this embodiment there is provided an air wash panel 40d generally as provided and described in relation to the embodiment of Figure 5. However, in the present embodiment, the air panel 13d extends at an angle from a side 52 of the firebox towards the front side 4 and at an angle to define a chamber 14dd between the side wall 52 and the front side 4 or the panel 40d. A regulating valve (not shown) provides for communication of the chamber 14dd with the exterior of the fire construction 1 either through the side 52 and/or the upper side 42. The regulating valve (not shown) would be similar in design and function to the valves 15 and/or 50. In this particular embodiment the panel defines a series of openings 16d through which is drawn into the firebox about the region of the gap 11 as illustrated diagrammatically by the arrows F.

In certain embodiments, the chamber 14dd is not in communication with the chamber 14d defined in part by the air wash panel 40d. In alternative embodiments, the chambers 14d and 14dd may be in communication in which case air may be drawn from the chamber 14dd into the chamber 14d for expulsion into the firebox.

It will be appreciated that various modifications can be made within the scope of the present invention. For example, a number of air panels can be provided within a firebox. An air panel 13d as illustrated in Figure 6 can be used in combination with one or more air panels of Figures 1 and 2. An air panel 13d as illustrated in Figure 6 could be provided on either side of the front side inside of the firebox.

The invention has been illustrated in the above embodiments with the baffle plate 3 defining the gap 11 with a front side of the construction. This would be the typical arrangement of a conventional firebox, but it is within the scope of the present invention for the baffle plate 3 to define the gap 11 with the rear side, in which case the air panel of the present invention would be attached to the rear side and/or towards the rear of the upper side to provide for the secondary air flow over the gap defined between the baffle 3 and the rear side 5.

Air panels of the present invention may be adjustably positioned within the firebox. The angle of the air panel may be selectively adjustable. Such adjustment may be provided by a pivotal arrangement of connection of the air panel to the inside of the firebox. The other end of the air panel could then be associated with a slide displacement mechanism to allow for adjustment of the angle of the panel while still maintaining a generally enclosed chamber defined by the air panel.

In embodiments where the air panel and air wash panel are discrete formations or members, then selective movement of one or both to provide for pivotal and/or other adjustment can be provided.

There may be just a single opening 16, 16a, 16b, 16c, 16d within an air panel or a plurality. The relative sizes of openings within an air panel may differ. The baffle means may be other than in the form of a plate and could comprise any suitable means, member or number of members that regulate(s)

and/or check(s) the flow of gases and/or flames within the firebox, generally to lengthen the flame and/or hot gas path within the firebox.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A fire construction in the form of a stove, the fire construction comprising a firebox in which fuel to be burnt is located, baffle means extending over the firebox to define at least in part a gap between the baffle means and a side of the fire construction and an air panel located at least partially across the gap and defining in part a chamber, the air panel defining one or more openings located to provide air flow from the chamber into the firebox generally about the gap.

2. A fire construction as claimed in claim 1, in which the gap is defined, at least in part, between the baffle means and a front side of the fire construction.

3. A fire construction as claimed in claim 1 or claim 2, in which the said one or more openings are located in the air panel to provide air flow therethrough about an edge of the baffle means defining, in part, the gap.

4. A fire construction as claimed in any preceding claim, in which the air panel extends through the gap into the fire box to provide an outlet for air to flow from the chamber at a position below the edge of the baffle means.

5. A fire construction as claimed in any preceding claim, in which the outlet is configured to direct air to flow over the front side to help prevent the build up of debris from the fuel combustion on the front side.

6. A fire construction as claimed in any preceding claim, in which a second chamber is defined within the fire construction to be in communication with the said chamber to provide air to the chamber for dispersion through the opening(s).

7. A fire construction as claimed in claim 6, in which the second chamber is defined between a chamber member and one or more sides of the fire construction.

8. A fire construction as claimed in claim 6 or claim 7, in which the outlet may be provided in the chamber member which is in the form of an air wash panel.

9. A fire construction as claimed in any of claims 7 to 8, in which the chamber member extends through the gap to provide the outlet below the edge of the baffle means.

10. A fire construction as claimed in any of claims 7 to 9, in which the air panel and/or the chamber member or at least the lower portion thereof, is angled relative to the side of the fire construction.

11. A fire construction as claimed in claim 10, in which the angle in relation to the front side is no greater than 65°.

12. A fire construction as claimed in claim 10 or claim 11, in which the angle is between 30° to 40° relative to the front side.

13. A fire construction as claimed in any of claims 10 to 12, in which means is provided for the angle of the air panel and/or the chamber member to be adjusted relative to the said side.

14. A fire construction as claimed in claim 13, in which the air panel and/or chamber member is/are pivotally adjustable about a pivot through which the air panel is attached to the front side.

15. A fire construction as claimed in any preceding claim, in which the openings are all of the same size.

16. A fire construction as claimed in any preceding claim, in which the openings are evenly distributed.

17. A fire construction as claimed in any preceding claim, in which the opening(s) are circular.

18. A fire construction as claimed in any preceding claim, in which the number and/or distribution and/or proportion and/or size of openings open is variable dependent upon operational requirements.

19. A fire construction as claimed in claim 18, in which a slidingly movable plate member is provided for selective movement relative to the air panel to provide the variability in the proportion and/or distribution and/or number and/or size of openings in the air panel through which air can pass.

20. A fire construction as claimed in any preceding claim, in which the chamber has an air access valve.

21. A fire construction as claimed in any of claims 6 to 20, in which the second chamber has an air access valve.

22. A fire construction as claimed in claim 20 or claim 21, in which the air access valve is variably openable to vary the rate of air flow into the chamber and/or second chamber and/or dwell time for air within the chamber and/or second chamber for preheating prior to flow through the openings into the firebox.

23. A fire construction as claimed in claim 22, in which the air access valve enables selective opening of the chamber and/or second chamber to receive air from outside of the fire construction.

24. A fire construction as claimed in any preceding claim, in which the air panel is configurable in terms of orientation and/or size of air outlet and/or openings dependent upon fuel type to be burnt in the firebox.

25. A fire construction as claimed in any preceding claim, in which the air panel is flat.

26. A fire construction as claimed in any of claims 1 to 24, in which the air panel is curved.

27. A fire construction as claimed in any of claims 7 to 26, in which the firebox is configured to have mountings to allow different sizes and/or shapes of air panel and/or chamber member to be associated with the fire construction.

28. A fire construction as claimed in any preceding claim, in which the firebox has a grate located below the baffle means to hold fuel and to provide means for primary air flow beneath the fuel to the firebox.

29. A fire construction in which side parts of the firebox particularly located towards an end of the baffle means generally opposite the said edge defining the gap have secondary air inlets.

30. A fire construction in which a flue is provided above or to the side of the baffle means.

31. An air panel for fitment into a firebox, the air panel comprising means to enable the air panel to be attached to the inside of a firebox at a location to extend partially across a gap defined between baffle means and a side of the

firebox, and to define in part a chamber, the air panel further comprising one or more openings located to provide for air flow from the chamber into the firebox generally about the gap.

32. An air panel as claimed in claim 31, in which the said means comprises a hinge arrangement to enable pivotal attachment of the air panel to the firebox.

33. An air panel as claimed in claim 31 or claim 32, in which the means comprises threaded fasteners, rivets and suchlike.

34. An air panel as claimed in any of claims 31 to 33, in which the said means provides for selectively releasable mounting of the air panel within the firebox.

35. An air panel as claimed in any of claims 31 to 34, in which the air panel is as described in any of claims 1 to 30.

36. A fire construction substantially as hereinbefore described with reference to the accompanying drawings.

37. An air panel substantially as hereinbefore described with reference to the accompanying drawings.

38. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

Application No:	GB1002037.8	**Examiner:**	Terence Newhouse
Claims searched:	1-28	**Date of search:**	4 May 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5 at least	US5341794 A ALADDIN, see col 6 lines 21-35 and figs 3 & 4 noting baffle 34 and panel 65
X	1,2 at least	US5357941 A DUERICHEN/BRUCE, see fig 3 noting baffle 42,44, panel 46, chamber between baffle and panel, and opening 52
X	1,2 at least	US2006/231089 A1 MEEKER, see figs noting baffle 11 and airflow 4 past panel above door 9
X	1 at least	WO93/16331 A1 PATRAM, see fig 6 noting baffle 44, panel 39, chamber 33 and opening 35

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

F24B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
F24B	0005/02	01/01/2006