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(54) Gas fire assembly

(57) A gas fire assembly (14) is provided for location in a fire surround (12) such as a mantelpiece. The assembly (14) defines a combustion chamber (16), and includes a gas fire burner (36) located in the combustion chamber, an air inlet (30) through which in use a flow of air is drawn into the chamber and an outlet (32) for combustion products through which in use a flow of combustion products exits the combustion chamber. The assembly (14) includes means (40, 44, 46, 50, 68, 70) to reduce the transmission of heat from the fire assembly to the fire surround.

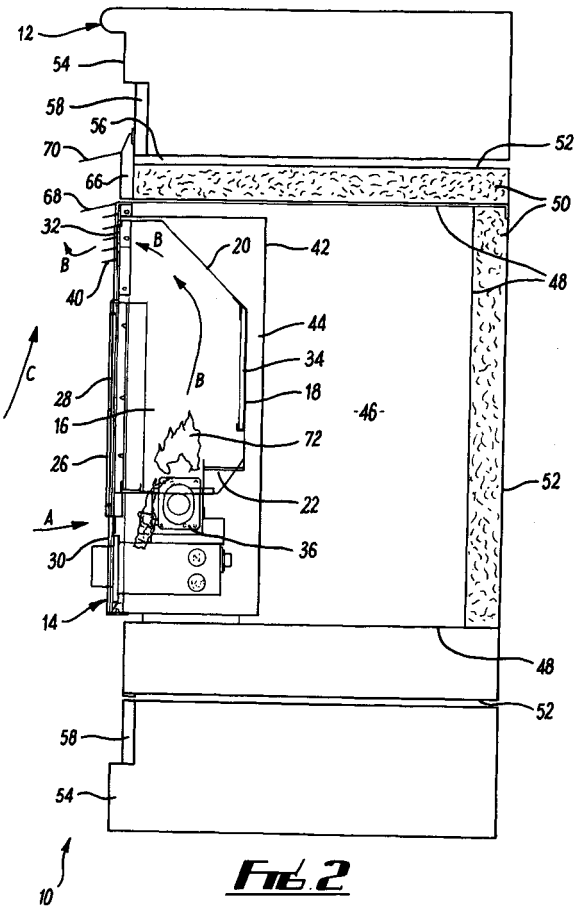

FIG.2

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Description

[0001] The present invention relates to gas fire assemblies, particularly but not exclusively gas fire assemblies for location in a fire surround such as a mantelpiece.

[0002] Conventionally, gas fire assemblies which are located in fire surrounds are provided with flues for the removal of hot combustion products, the flues conveying the hot combustion products to the outside of a building, usually up a chimney or through a wall. The provision of such flues makes the cost of installation of a gas fire assembly in a fire surround relatively expensive, since specialist tradesman must usually be employed. Also, a significant proportion of the heat produced by the fire assembly is lost through the flue. Attempts to provide flueless gas fire assemblies have generally been unsuccessful due to the high temperature of the combustion products produced by the fire, which is damaging to the fire surround. Regulations place strict limits on the increase in temperature due to a fire assembly which can be experienced by a fire surround.

[0003] According to the present invention, there is provided a gas fire assembly for location in a fire surround such as a mantelpiece, the assembly defining a combustion chamber, the assembly including a gas fired burner located in the combustion chamber, an air inlet through which in use a flow of air is drawn into the chamber and an outlet for combustion products through which in use a flow of combustion products exits the combustion chamber, the assembly including means to reduce the transmission of heat from the fire assembly to the fire surround.

[0004] Preferably the heat transmission reduction means include deflector means, which may be arranged to reduce the temperature of the combustion products flow.

[0005] Preferably the deflector means include a first deflector plate, which may be located substantially at or within the outlet. The deflector means may include a plurality of parallel, spaced first deflector plates. The or each first deflector plate may be arranged to deflect the combustion products flow downwardly. Preferably the or each deflector plate is oriented at an oblique angle to the combustion products flow.

[0006] Preferably the deflector means include a second deflector plate, which may be located above the outlet, and may be adjacent to the outlet. Preferably the second deflector plate is arranged to deflect the combustion products flow downwardly. Preferably the second deflector plate extends outwardly beyond the vertical plane of the outward end of the or each first deflector plate. Preferably the second deflector plate extends outwardly at an angle of between 90° and 135° to the upward vertical.

[0007] Preferably the deflector means include a third deflector plate, which may be spaced from and located above the second deflector plate. Preferably the third deflector plate extends outwardly at least as far as the second deflector plate. Preferably the third deflector plate extends outwardly at an angle of between 90° and 135° to the upward vertical.

[0008] Preferably the or each first deflector plate and/or the second deflector plate and/or the third deflector plate extends outwardly further over the centre of the combustion chamber than at the sides of the combustion chamber.

[0009] Preferably the inlet is located on an outward wall of the combustion chamber relative to the fire surround. Preferably the outlet is located on an outward wall of the combustion chamber relative to the fire surround. Preferably the outlet is located substantially above the inlet.

[0010] Preferably the heat transmission reduction means include heat insulation means, which may be located around the top and sides of the combustion chamber. Preferably the heat insulation means include a layer of insulation material such as glass fibre wool. Alternatively or additionally, the heat insulation means include one or more layers of air.

[0011] Further according to the present invention, there is provided a gas fire assembly for location in a fire surround such as a mantelpiece, the assembly defining a combustion chamber, the assembly including a gas fired burner located in the combustion chamber, an air inlet through which in use a flow of air is drawn into the chamber and an outlet for combustion products through which in use a flow of combustion products exits the combustion chamber, the outlet being located on an outward wall of the combustion chamber relative to the fire surround.

[0012] Preferably the assembly includes means to reduce the transmission of heat from the fire assembly to the fire surround. Preferably further features of the assembly are as set out above in the preceding statements.

[0013] Still further according to the present invention, there is provided a fire surround assembly, the fire surround assembly including a fire surround, the fire surround defining an aperture for receiving a fire assembly, and further defining a storage space for a gas container.

[0014] Preferably the fire surround assembly includes a gas fire assembly according to the preceding statements. Preferably the gas fire assembly is arrangeable to use with a liquefied gas fuel such as liquefied petroleum gas. Preferably the fire surround assembly is arranged as a module for installation against a plain wall.

[0015] An embodiment of the present invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a fire surround assembly according to the invention; and

Fig. 2 is a sectional view of the fire surround assembly of Fig. 1.

[0016] Fig. 1 shows a fire surround assembly 10 according to the invention, the fire surround assembly 10

including a fire surround 12 and a fire assembly 14. The fire assembly 14, as shown in Fig. 2, includes a combustion chamber 16, the combustion chamber 16 being defined by a combustion chamber rear wall 18, a combustion chamber upper wall 20, a combustion chamber floor 22, combustion chamber side walls (not shown) and a combustion chamber outward wall 26. The combustion chamber outward wall 26 includes a window 28 and below the window 28 an air inlet 30. Above the window 28, the outward wall 26 includes a combustion product outlet 32. The rear wall 18 and the side walls include ceramic liners 34.

[0017] The fire assembly 14 includes a burner assembly 36 which is located in a lower part of the combustion chamber 16.

[0018] The fire assembly 14 includes a first enclosure 42 which extends from the outward wall 26 to enclose the combustion chamber rear, upper and side walls 18, 20 and floor 22 and the burner assembly 36. A first air layer 44 is located in a gap defined between the first enclosure 42 and the walls and floor of the combustion chamber 18, 20, 22.

[0019] The fire assembly 14 includes a second enclosure 48 which extends from the outward wall 26 around and spaced from the first enclosure 42, a second air layer 46 being located in a gap defined between the second enclosure 48 and the first enclosure 42.

[0020] The fire assembly 14 includes a third enclosure 52 which extends substantially from the outward side of the assembly 14 around and spaced from the second enclosure 48. A gap defined between the second enclosure 48 and the third enclosure 52 is filled to the rear, the sides and above with heat insulating material 50 such as glass fibre wool.

[0021] The fire surround 12 defines an aperture 56 in which the fire assembly 14 is located. The fire surround 12 includes a mantelpiece 54 which can be formed of any suitable material such as wood, marble, or granite. The fire surround 12 includes inset panels 58 in the front face of the mantelpiece 54 around the aperture 56. The inset panels 58 can be formed of a material resistant to high temperatures such as marble, granite or ceramic tiles.

[0022] The fire assembly 14 includes means to reduce the transmission of heat from the fire assembly 14 to the fire surround 12, the means including deflector means. The deflector means include a plurality of spaced, parallel, first deflector plates 40 which are located at the outlet 32. The first deflector plates 40 extend laterally across the outlet 32 and are each oriented at a generally downward angle. In one example, the first deflector plates 40 could be at an angle of approximately 105° to the upward vertical, and extend outwardly from the outward wall 26 of the fire assembly for between approximately 10 to 15mm.

[0023] The deflector means include a second deflector plate 68, which is located adjacent to and above the outlet 32. The second deflector plate 68 extends outwardly beyond the vertical plane of the outward end of each of the first deflector plates 40, in a generally downward direction, at an angle of between 90°and 135° to the upward vertical. In one example, the second deflector plate 68 extends at an angle of approximately 110° to the upward vertical, outwardly from the outward wall 26 of the fire assembly for a distance of approximately 45 to 50mm.

[0024] The deflector means includes a third deflector plate 70 which is spaced from and located above the second deflector plate 68. The third deflector plate 70 extends at an angle generally downwardly from a decorative trim 66, which is located adjacent to and coplanar with the outward wall 26 and extends to overlap the inset panel 58. The third deflector panel 70 extends generally downwardly at an angle to the vertical. In one example, the third deflector plate extends at a similar angle and for a similar distance to the second deflector plate, and is spaced from the second deflector plate by a distance of approximately 70mm.

[0025] Each of the first deflector plates 40, the second deflector plate 68 and the third deflector plate 70 extend outwardly further over the centre of the combustion chamber than at the sides of the combustion chamber, since the flow of combustion products is greater at the centre than the sides.

[0026] The fire surround 12 includes a storage space 62 for a gas container 60 and an access door 64 located on a side of the mantelpiece 54 for access to the storage space 62.

[0027] In use, the fire surround assembly 10 can be provided as a modular unit for assembly against a plain wall ie a wall having no existing chimney or flue. Alternatively, the fire surround 12 can be located against a plain wall, and the fire assembly 14 located in the aperture 56 of the fire surround 12. A gas container 60 containing, for instance, liquefied petroleum gas is located in the storage space 62 and appropriate connections made between the gas container 60 and the burner assembly 36 to provide a supply of gas to the burner assembly 36.

[0028] The burner assembly 36 is operated to produce a flame 72. A flow of air as indicated by arrow A on Fig. 2 is drawn into the combustion chamber 16 through the inlet 30. A flow of combustion products rises from the flame 72 as indicated by arrows B and exits the combustion chamber 16 through the outlet 32. On exiting through the outlet 32, the flow of combustion products is deflected downwardly by the first deflectors 40, into the path of an upwardly moving convection flow of air as indicated by arrow C. The downwardly deflected flow of the combustion products causes turbulence which promotes mixing of the combustion products flow with the flow of cooler air, thus cooling the combustion products flow. The combustion products flow is still at this point hotter than the surrounding air and will therefore tend to rise upwardly. The rising flow is further deflected downwardly by the second deflector plate 68, and then the third deflector plate 70. Each of the second and third deflector plates 68, 70 causes further turbulence and mixing of the com-

bustion products flow with cooler air, dispersing and cooling the combustion products flow. In one example, the temperature of the combustion products flow at the outlet 32 could be in the region of 250° to 300°C while the temperature of the air flow above the third deflector plate 70 could be less than 60°C above the ambient temperature, which complies with regulatory requirements and does not cause damage to the fire surround.

[0029] The first air layer 44, the second air layer 46 and the insulation material 50 each form means to reduce the transmission of heat from the fire assembly to the fire surround.

[0030] Various modifications may be made without departing from the scope of the invention. The length, orientation angle and spacing of the deflector plates may be varied, depending on the arrangement of the fire assembly, including factors such as the power rating and size of the fire assembly. The arrangement and number of the different insulation layers could be varied from that shown and described. The arrangement of the fire surround assembly and in particular the arrangement of the storage space within the fire surround could be varied from that shown and described. The fire assembly could include a powered means for providing and/or controlling the flows of air and/or combustion products.

[0031] There is thus provided a fire surround assembly which can be provided substantially as a module, enabling a relatively unskilled person to install a working gas fire against a wall relatively simply, quickly and cheaply. The heat transmission reduction means allow the gas fire to be located in a fire surround of wood or similar material, and further allow the use of a flueless fire in which the combustion products exit the fire assembly outwardly relative to the fire surround, the installation meeting regulations with regard to the heat of the combustion products flow. A purpose built flue either in the form of a chimney or a flue which is provided through a wall is not required, and when the burner is arranged to use gas from a gas container, the plumbing of gas from a gas supply is also not required.

[0032] 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 gas fire assembly (14) for location in a fire surround (12) such as a mantelpiece, **characterised in that** the assembly defines a combustion chamber (16), the assembly including a gas fired burner (36) located in the combustion chamber, an air inlet (30) through which in use a flow of air is drawn into the chamber and an outlet (32) for combustion products through which in use a flow of combustion products exits the combustion chamber, the assembly including means (40, 44, 46, 50, 68, 70) to reduce the transmission of heat from the fire assembly to the fire surround.

2. An assembly according to claim 1, in which the heat transmission reduction means include deflector means (40, 68, 70) which are arranged to reduce the temperature of the combustion products flow.

3. An assembly according to claim 2, in which the deflector means include a first deflector plate (40) which is located substantially at or within the outlet.

4. An assembly according to claim 3, in which the deflector means include a plurality of parallel, spaced first deflector plates (40).

5. An assembly according to claims 3 or 4, in which the or each first deflector plate is arranged to deflect the combustion products flow downwardly.

6. An assembly according to claim 5, in which the or each deflector plate is oriented at an oblique angle to the combustion products flow.

7. An assembly according to claim 7, in which the deflector means include a second deflector plate (68) which is located above and adjacent to the outlet.

8. An assembly according to claim 7, in which the second deflector plate is arranged to deflect the combustion products flow downwardly.

9. An assembly according to claims 7 or 8 when dependent on any of claims 3 to 6, in which the second deflector plate extends outwardly beyond the vertical plane of the outward end of the or each first deflector plate.

10. An assembly according to any of claims 7 to 9, in which the second deflector plate extends outwardly at an angle of between 90° and 135° to the upward vertical.

11. An assembly according to any of claims 2 to 10, in which the deflector means include a third deflector plate (70).

12. An assembly according to claim 11 when dependent on any of claims 7 to 10 in which the third deflector plate is spaced from and located above the second deflector plate.

13. An assembly according to claim 12, in which the third deflector plate extends outwardly at least as far as the second deflector plate.

14. An assembly according to any of claims 11 to 13, in which the third deflector plate extends outwardly at an angle of between 90° and 135° to the upward vertical.

15. An assembly according to any of claims 3 to 14, in which the or each first deflector plate and/or the second deflector plate and/or the third deflector plate extends outwardly further over the centre of the combustion chamber than at the sides of the combustion chamber.

16. An assembly according to any of the preceding claims, in which the inlet is located on an outward wall (26) of the combustion chamber relative to the fire surround.

17. An assembly according to any of the preceding claims, in which the outlet is located on an outward wall (26) of the combustion chamber relative to the fire surround.

18. An assembly according to any of the preceding claims, in which the outlet is located substantially above the inlet.

19. An assembly according to any of the preceding claims, in which the heat transmission reduction means include heat insulation means (44, 46, 50) which are located around the top and sides of the combustion chamber.

20. An assembly according to claim 19, in which the heat insulation means include a layer of insulation material (50) such as glass fibre wool.

21. An assembly according to claims 19 or 20, in which the heat insulation means include one or more layers (44, 46) of air.

22. A gas fire assembly (14) for location in a fire surround (12) such as a mantelpiece, **characterised in that** the assembly defines a combustion chamber (16), the assembly including a gas fired burner (36) located in the combustion chamber, an air inlet (30) through which in use a flow of air is drawn into the chamber and an outlet (32) for combustion products through which in use a flow of combustion products exits the combustion chamber, the outlet being located on an outward wall (26) of the combustion chamber relative to the fire surround.

23. An assembly according to claim 22, in which the assembly includes means (40, 44, 46, 50, 68, 70) to reduce the transmission of heat from the fire assembly to the fire surround.

24. An assembly according to claim 23 having any of the features defined in claims 2 to 21.

25. A fire surround assembly (10), **characterised in that** the fire surround assembly includes a fire surround (12), the fire surround defining an aperture (56) for receiving a fire assembly (14), and further defining a storage space (62) for a gas container (60).

26. A fire surround assembly according to claim 25, in which the fire surround assembly includes a gas fire assembly (14) as defined in any of claims 1 to 24.

27. A fire surround assembly according to claim 26, in which the gas fire assembly is arrangeable to use with a liquefied gas fuel such as liquefied petroleum gas.

28. A fire surround assembly according to any of claims 25 to 27, in which the fire surround assembly is arranged as a module for installation against a plain wall.

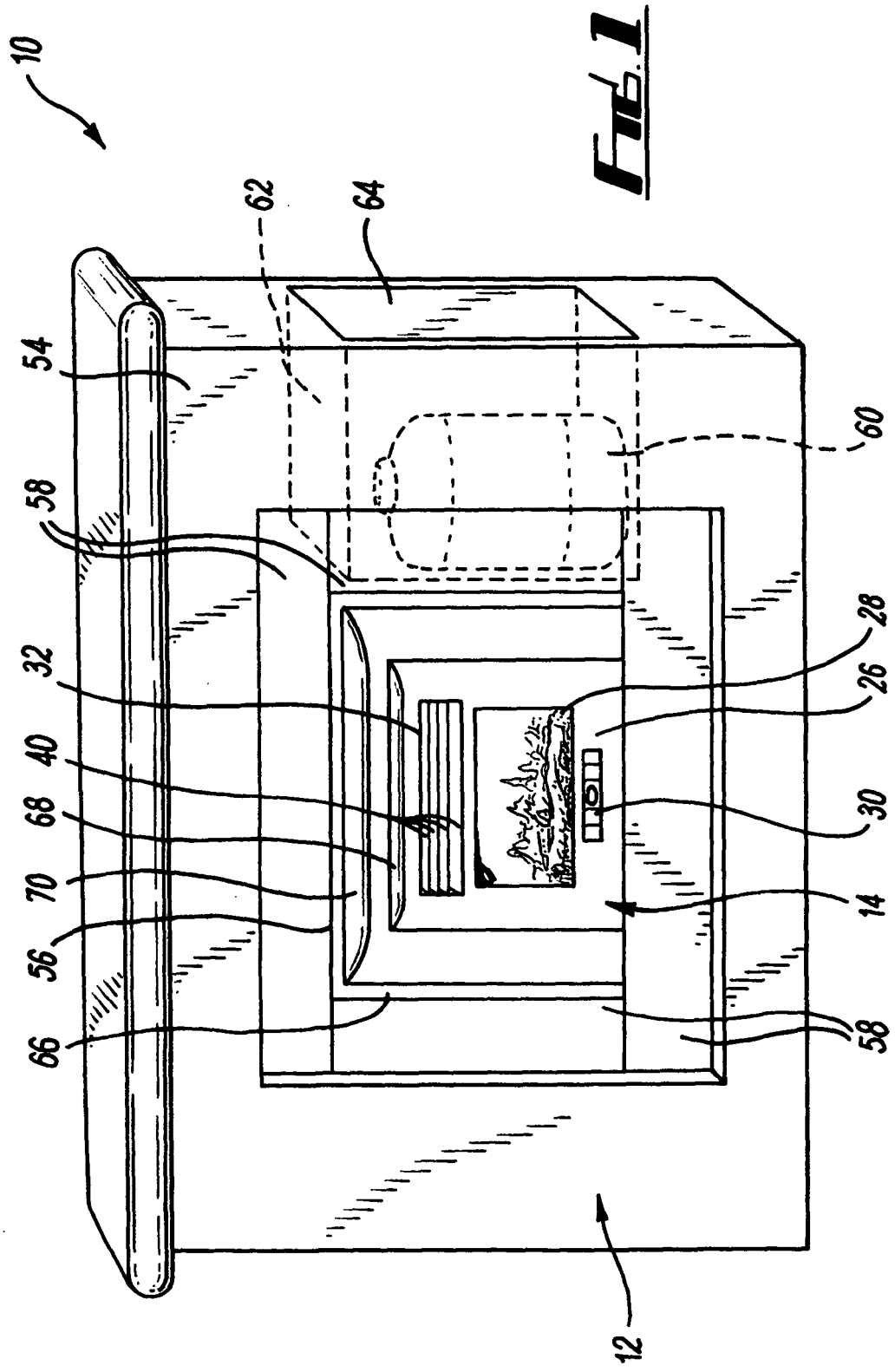

Fig. 1

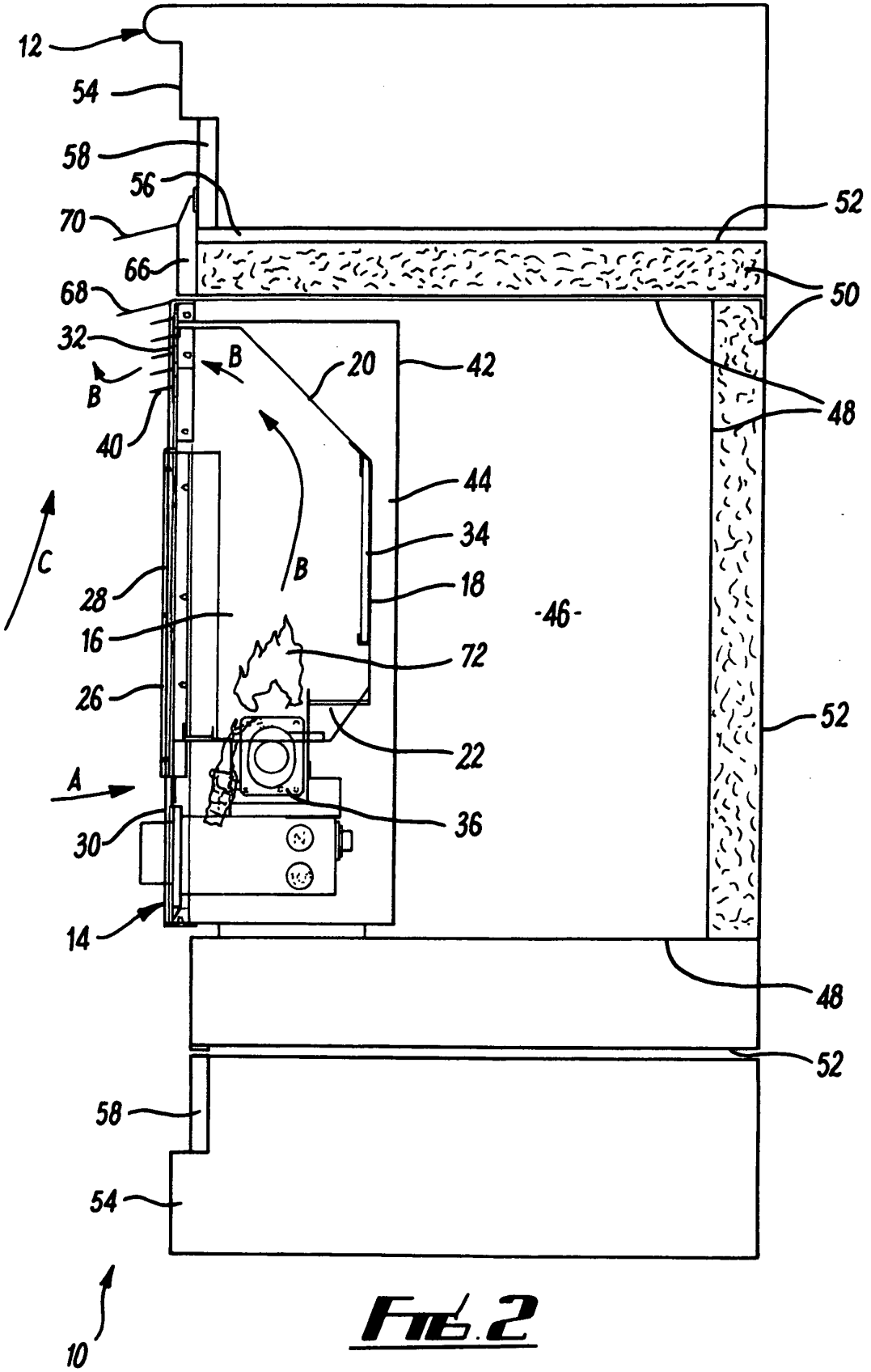
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FIG. 2