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(54) **Improvement relating to burners for gas appliances.**

(57) The present specification discloses a burner for a gas fired appliance. The burner comprises a gas/air mix supply passage (13) which connects with at least two burner passages (9,11), said passages (9,11,13) being formed between two sections (3,5) of sheet material which are secured together. Each burner passage (9,11) ends in a burner port (21,23), said burner ports (21,23) being spaced apart from each other and interconnected by an open groove (27), which is formed by spaced apart adjacent edge regions (25) of said sections (3,5) of sheet material. The gas/air mix supply passage (13) formed by said sections (3,5) of sheet material, at least partially defines a primary aeration port (19).

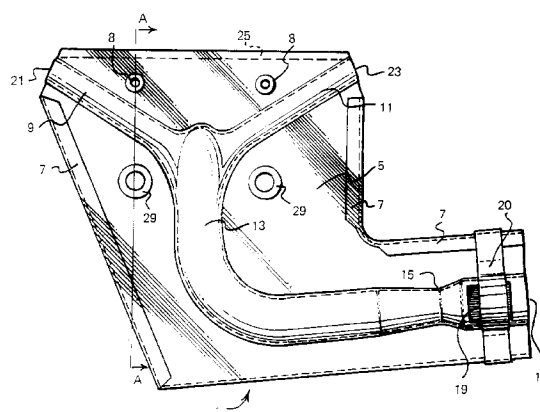


FIG. 1

The present invention relates to a burner for use in a gas appliance.

More particularly the present invention relates to a pilot burner for use in a gas-fired heater, the pilot burner being used to light one or more main gas burners of the gas-fired heater.

In one known gas-fired heater a pair of parallel elongate ribbon burners are provided across the width of the gas-fired heater, each ribbon burner comprising a generally horizontally arranged hollow tubular member with a row of burner ports provided in an upper region of the tubular member, along the major part of the length of the tubular member. One ribbon burner is located towards the front of the heater and the other towards the rear of the heater and at a higher level than the front burner. A pilot burner which can be ignited by, for example, a piezo electric spark device, is located towards one end region of the front burner and is designed to burn a gas/air mix and provide a single flame across the ribbon burner ports at said one end region of the front burner. Thus, by turning on the supply of gas/air mix to the front ribbon burner, the gas/air mix issuing from the ports at said one end region is ignited and thus as gas/air mix sequentially issues from the other ports along the length of the front burner, it is ignited. To enable the rear burner to be ignited as and when required, a cross-lighting burner extends from a point part way along the rear burner as a lateral, hollow tubular extension of the rear burner, to a point adjacent the front burner. This cross-lighting burner has a series of ports along its length so that when the gas/air mix is applied to the rear burner, the gas/air mix issues from the ports of the cross lighting burner and the flames of the front burner ignite the gas/air mix issuing from the ports of the cross-lighting burner to then ignite the rear burner. Ignition is not, however, as efficient as might be desired.

According to the present invention there is provided a burner for a gas fired appliance, the burner comprising a gas/air mix supply passage which connects with at least two burner passages, said passages being formed between two sections of sheet material which are secured together, each burner passage ending in a burner port, said burner ports being spaced apart from each other and interconnected by an open groove, which is formed by spaced apart adjacent edge regions of said sections of sheet material, the gas/air mix supply passage formed by said sections of sheet material, at least partially defining a primary aeration port.

In a preferred embodiment of the present invention for use as a pilot burner, two burner passages are provided with the burner being constructed as a one-piece metal pressing which is folded and then secured by clinching outer flanges. Alternatively, manufacture could be achieved by two generally planar pressings secured together. In either construction

the open groove is formed by spaced apart adjacent end edge regions of the folded or two-part construction. The pressing(s) is preferably manufactured from stainless steel, the pressed construction allowing the formation of a venturi in a cost effective manner in the gas/air mix supply passage, which in conjunction with primary aeration apertures in the form of slots around a neat gas injector ensures the required gas/air mix is achieved to ensure the desired flame pattern and combustion performance.

Preferably, the pilot burner is secured to a mounting bracket in a gas-fired heater together with an igniter, thermocouple and the neat gas injector. The two burner ports are preferably each located adjacent to an end region of a respective elongate ribbon burner of the gas-fired heater, said ribbon burners extending generally horizontally and parallel to each other. The burner of the present invention can, of course, be used as a pilot burner to ignite other types of burner. Preferably, the spark igniter is located adjacent to one burner port and the thermocouple is located adjacent to the other burner port so that any flame issuing from said other burner port will embrace the thermocouple. Initial gas flow to the pilot burner is preferably achieved by manually de-pressing a flame failure magnet valve via a control spindle of a gas supply valve. The gas thus flows to the neat gas injector, the gas issuing therefrom collecting air and the gas/air mix flowing along the supply passage of the pilot burner to the said burner passages and ports. By actuating the igniter the gas/air mix issuing from said one burner port is ignited and the resultant conical flame whilst continuing to burn, runs along the open groove to ignite the gas/air mix issuing from the other burner port. This second pilot flame embraces the thermocouple which then holds the flame failure magnet valve open so that the two pilot flames continue to burn. The main ribbon burners of the gas-fire heater can thus be positively ignited as and when desired, the respective pilot flames playing directly on the end regions of the respective ribbon burners.

In a modified form of the present invention, four burner passages are provided, the burner passages being connected with a common gas/air mix supply passage and being arranged such that their respective burner ports are spaced apart from each other, preferably equi-spaced apart, and in a line. Alternatively, where three or more burner ports are provided, the ports can be arranged in any desired arrangement, e.g. on a curve.

The burner of the present invention is thus cost-effective, as it can provide both a pilot and for cross-lighting between any number of main burners in a gas-fired heater or other gas appliance. Also the burner of the present invention may be used as a flame effect burner.

Further, by utilising the pressed construction of the preferred embodiment of the present invention,

this results in a relatively slim cross-sectional unitary design which allows the complete burner construction to remain relatively cool. Thus performance is not variable, as can happen with other pilot burner designs, due to their high heat sink nature. Further, by providing the venturi and aeration in this relatively cool construction, natural and LP gases can be accommodated by simply changing the neat gas injector.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:-

Fig.1 is a front view of a preferred embodiment of the present invention;

Fig.2 is a cross-sectional view, taken along line A-A in Fig.1;

Fig.3 is a cross-sectional view of part of a gas-fired heater with the embodiment of the present invention illustrated in Figs. 1 and 2 installed;

Fig.4 is a plan view of the part of the gas-fired heater illustrated in Fig.3;

Fig.5 is a front view of an alternative embodiment of the present invention; and

Fig.6 is a plan view of a further embodiment of the present invention.

The preferred embodiment of a pilot burner constructed in accordance with the present invention, and illustrated in Figs. 1 and 2 of the accompanying drawings, comprises a one-piece metal pressing which is folded at 1, with the sections or halves 3,5 being secured together by outer edge flanges 7 in one half 3 being folded over and clinched to the edge regions of the other half 5 and by rivets 8. Additionally, the two halves 3,5 are correctly located against each other via two holes 29 provided in each half, the corresponding holes 29 in the respective halves 3,5 being coaxially aligned with each other. To facilitate alignment of the holes the rims of the holes in said one half 3 are extruded so as to extend through the aligned plain holes in the other half 5. The extruded rims are then flattened over the outer face of said other half 5 to ensure that inner faces of the halves 3,5 are held together in a gas-tight manner (see Fig.2). As seen in Fig.2, said other half 5 is pressed to form burner passage 9 with generally planar half 3, the halves 3,5 being secured together so as to make burner passage 9 gas-tight. Alternatively, the said one half 3 could be deformed instead of or in addition to said other half 5 to form burner passage 9. Additionally, as seen in Fig.1, another burner passage 11 is likewise formed, the burner passage 9,11 connecting with a common gas/air mix supply passage 13, also formed between the halves 3,5. The supply passage 13 is formed with a venturi 15 formed by the pressed deformation of one or both of the halves 3,5, and an inlet 17 into which a neat gas injector (not shown) is, in use, inserted, primary aeration apertures in the form of side slots 19 cut in the halves 3,5,

providing the required primary aeration of the injected gas. To facilitate aeration adjustment an adjustable aeration collar 20 is provided, this collar being slidable along edges X and Y to adjust the size of the slots 19. In an alternative embodiment (not shown) a neat gas injector together with the inlet 17 of the gas/air mix supply passage 19 form an annular primary aeration aperture.

The burner passages 9,11 each terminate at a burner port 21,23, the burner ports 21,23 being located at opposite ends of an upper edge 25 of the preferred embodiment of the present invention, and directed in generally opposite directions. This upper edge 25 is formed with an open groove 27 (see Fig.2) which is formed between the halves 3,5, rivets 8 and secured holes 29, holding the halves 3,5 together in a gas-tight manner below the open groove 27, this open groove 27 interconnecting the two spaced-apart burner ports 21,23, and being formed by the holes through which the rivets 8 pass in said one half 3, being provided in indented portions in said one half 3, said indented portions being indented to provide the desired width for slot 27.

The preferred embodiment of the present invention illustrated in Figs. 1 and 2 can be installed in a gas-fired heater as shown in Figs. 3 and 4 of the accompanying drawings. To install the pilot burner, screws are located through the holes 29, which enable the pilot burner to be screwed to a mounting bracket 31, to which an igniter 33, a thermocouple 35 and a gas-injector (not shown) are likewise attached. As evident from both Fig.3 and Fig.4, burner port 23 is arranged so that a flame produced at this point will embrace thermocouple 35 and also the burner ports 37 of a main burner 39 of the heater, and burner port 21 is arranged adjacent to igniter 33 and so that a flame produced at this point will pass across the burner ports 41 of another main burner 43.

In use, initial gas flow to the pilot burner is achieved by manually depressing a flame failure magnet valve (not shown) via a control spindle 45 of a gas supply tap 47. Gas is thus injected into the supply passage 13 of the pilot burner and aerated via slots 19, the resulting gas/air mix being homogenised by the venturi 15 and passing along supply passage 13 into respective burner passages 9,11. The igniter 33 is then actuated to ignite the gas/air mix issuing from burner passage 9 via port 21, the resulting flame passing over main burner 43. This flame also travels along the open groove 27 which connects the burner passages 9,11 and burner ports 21,23 to ignite the gas/air mix issuing from port 23, the further pilot flame thus produced embracing the thermocouple 35 which then holds the said flame failure magnet valve open to thus sustain the pilot flames. With the pilot flames playing over the respective main burners 39,43, either or both main burners can be positively ignited as and when desired.

Whilst the construction of the preferred embodiment of pilot burner is constructed as a one-piece metal pressing which is folded and clinched together, the pilot burner can alternatively be manufactured as two halves, which are each pressed and then secured together, e.g. by clinching or welding.

The above construction of the burner of the present invention as a single folded pressing or as two pressed halves secured together, results in a slim cross-sectional design for the whole burner, which allows the construction to remain relatively cool. Thus performance is not variable as can happen with other pilot burner designs due to their high heat sink nature. Further, by providing the venturi and aeration in this relatively cool construction, natural and LP gases can be accommodated by simply changing the neat gas injector.

Whilst the above preferred embodiment of the present invention has two burner passages 9,11, an alternative embodiment of the present invention, illustrated in Fig.5, has two additional intermediate burner passages 49,51, the respective ports 21,53,55,23 being spaced apart from each other in a line, and interconnected by the open groove 27. This construction thus provides for easy lighting of the four pilot flames and positive ignition of one or more of four main burners, as and when required, each pilot flame being associated with a particular main burner.

Whilst the burner ports 21,23; 21,53; 55,23 of the above described embodiments of the present invention are located on a straight line, the ports interconnected by the open groove 27 can alternatively be located on a curved or angled path if desired for a particular installation (see ports 57,59,61 in Fig.6).

The present invention can thus allow prominent view of the pilot flames therefore clearly showing the consumer that ignition has been achieved. Also, the very narrow cross-lighting passage, i.e. groove 27, ensures that overlying simulated fuel beds do not have a tendency to soot and improved combustion is achieved. Further, a larger proportion of the gas input can be directed to achieve the desired output and visual appearance of the fire, as the cross-lighting section of the present invention requires less gas input than the previously used arrangement.

Whilst the burner of the present invention is described hereinabove as a pilot burner, the burner can alternatively be used as a flame effect burner, used to enhance the realism of a simulated solid fuel gas fired heater.

The present invention thus provides a burner which has, in use, a number of cross-lit flames, with the pressed construction described hereinabove having a number of further advantages in respect of manufacturing cost and stable performance.

Claims

1. A burner for a gas fired appliance, the burner comprising a gas/air mix supply passage (13) which connects with at least two burner passages (9,11), said passages (9,11,13) being formed between two sections (3,5) of sheet material which are secured together, each burner passage (9,11) ending in a burner port (21,23), said burner ports (21,23) being spaced apart from each other and interconnected by an open groove (27) which is formed by spaced apart adjacent edge regions (25) of said sections (3,5) of sheet material, the gas/air mix supply passage (13), formed by said sections (3,5) of sheet material, at least partially defining a primary aeration port (19).
2. A burner as claimed in claim 1, wherein each said passage (9,11,13) is formed by facing deformed regions in both of said sections (3,5) of sheet material.
3. A burner as claimed in claim 1, wherein each said passage (9,11,13) is formed by a deformed region in one of said sections (3,5) of sheet material and a facing non-deformed region of the other of said sections (3,5) of sheet material.
4. A burner as claimed in any one of claims 1 to 3, wherein the gas/air mix supply passage (13) is formed with a venturi (15).
5. A burner as claimed in claim 4, wherein a side slot (19) provided in a said section (5) of sheet material in said gas/air mix supply passage (13), forms said primary aeration port.
6. A burner as claimed in claim 5, wherein an adjustable aeration collar (20) is provided to adjust the size of said side slot (19).
7. A burner as claimed in any one of claims 1 to 6, wherein two holes (29) are provided in each said section (3,5), corresponding holes (29) in the respective sections (3,5) being coaxially aligned with each other.
8. A burner as claimed in claim 7, wherein the holes (29) in one said section (3) have an axially extended rim which extends through the corresponding holes (29) in the other section (5) and is peened over to further secure said sections (3,5) together.
9. A burner as claimed in claim 1, wherein one said section (3) has indented regions adjacent to said edge region (25), the indented region being se-

cured to the other said section (5) so that said edge regions (25) are spaced apart to form said open groove (27).

10. A burner as claimed in any one of claims 1 to 9, wherein said sections (3,5) are planar. 5
11. A burner as claimed in any one of the preceding claims, wherein said sections (3,5) are separately formed sections joined together to form the burner. 10
12. A burner as claimed in any one of claims 1 to 10, wherein said sections (3,5) are separate regions of a one piece construction that has been folded so that said sections (3,5) engage each other and are secured together. 15
13. A burner as claimed in any one of claims 1 to 8, wherein said sections (3,5) are curved. 20
14. A burner as claimed in any one of the preceding claims, wherein two burner ports (21,23) face generally in opposite directions. 25
15. A burner as claimed in any one of the preceding claims, wherein the burner is mounted in a gas fired heater towards one end region of two generally parallel elongate ribbon burners (39, 43), said burner having one burner port (21) positioned to provide a flame which can ignite one ribbon burner (39) and another burner port (23) which is positioned to provide a flame which can ignite the other ribbon burner (43). 30 35
16. A burner as claimed in claim 15, in which said one burner port (21) is positioned adjacent an igniter (33) and said other burner port (23) is positioned so that it can provide a flame which heats a flame failure device (35). 40

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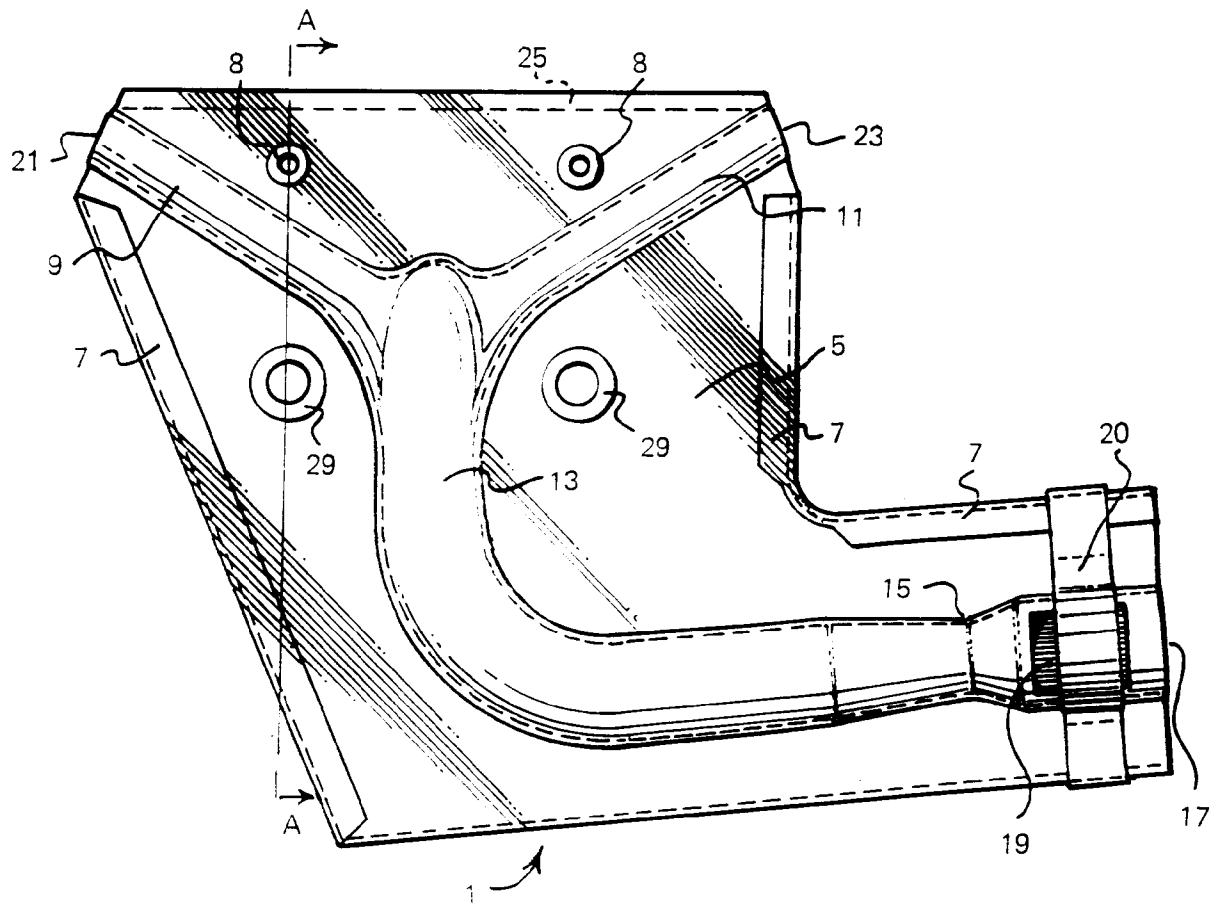


FIG. 1

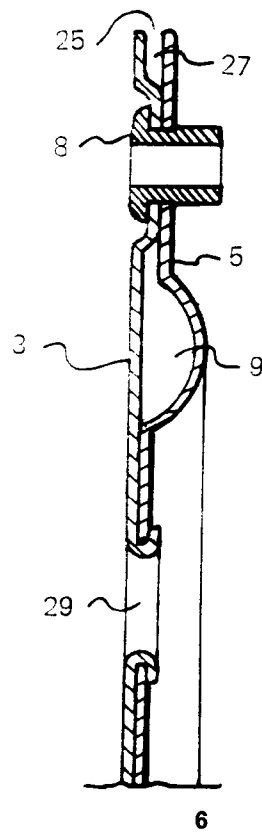


FIG. 2

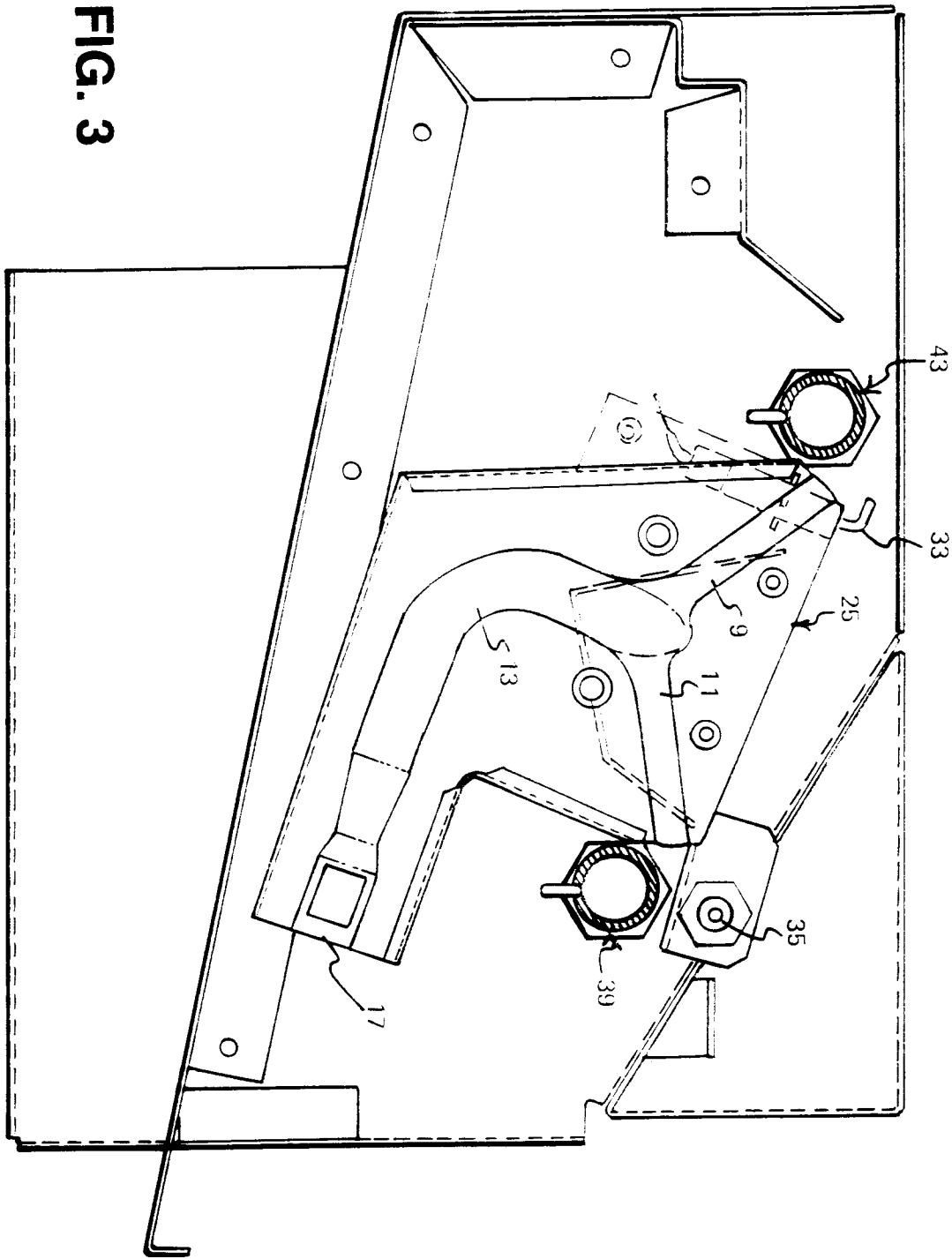


FIG. 3

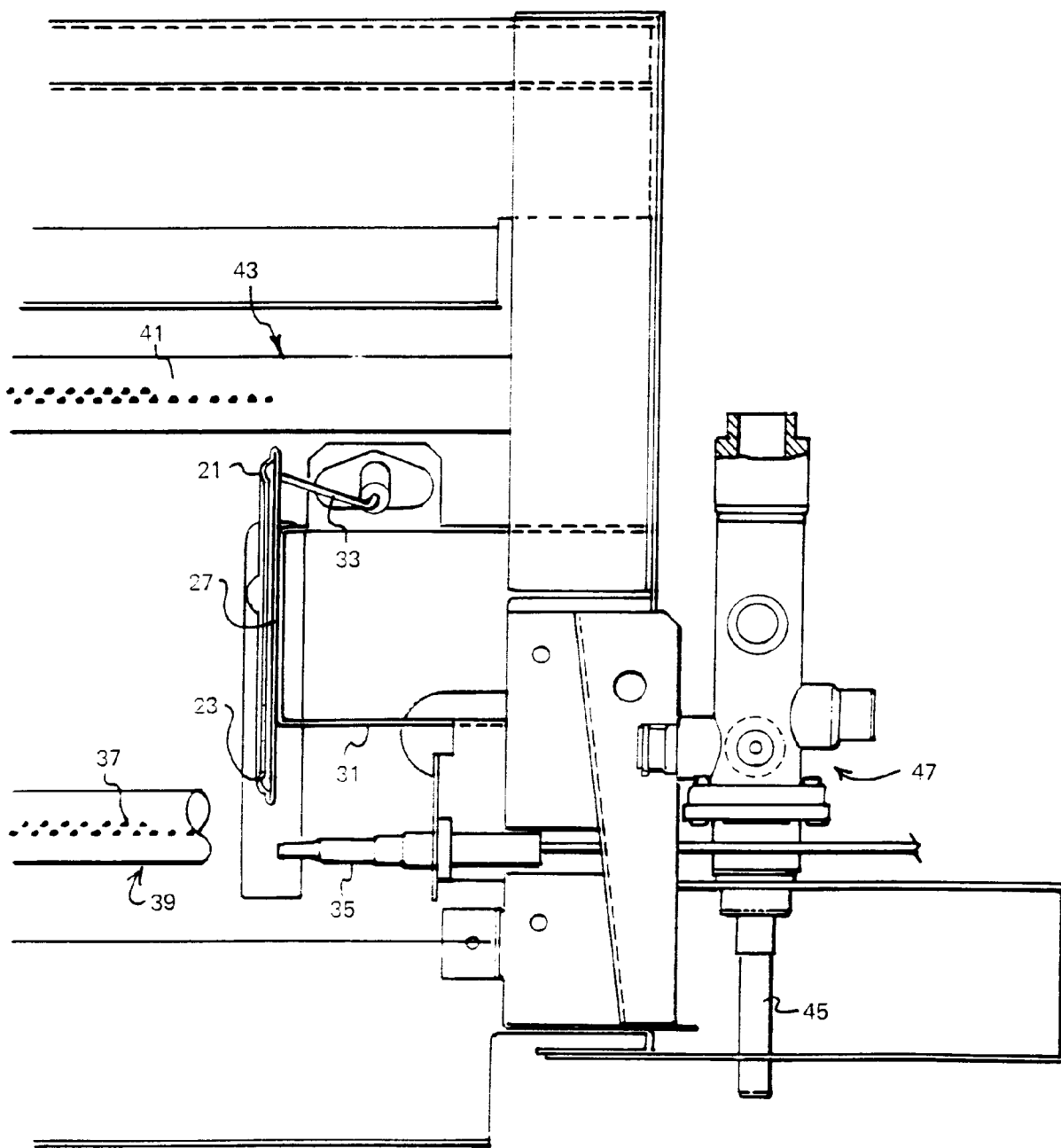


FIG. 4

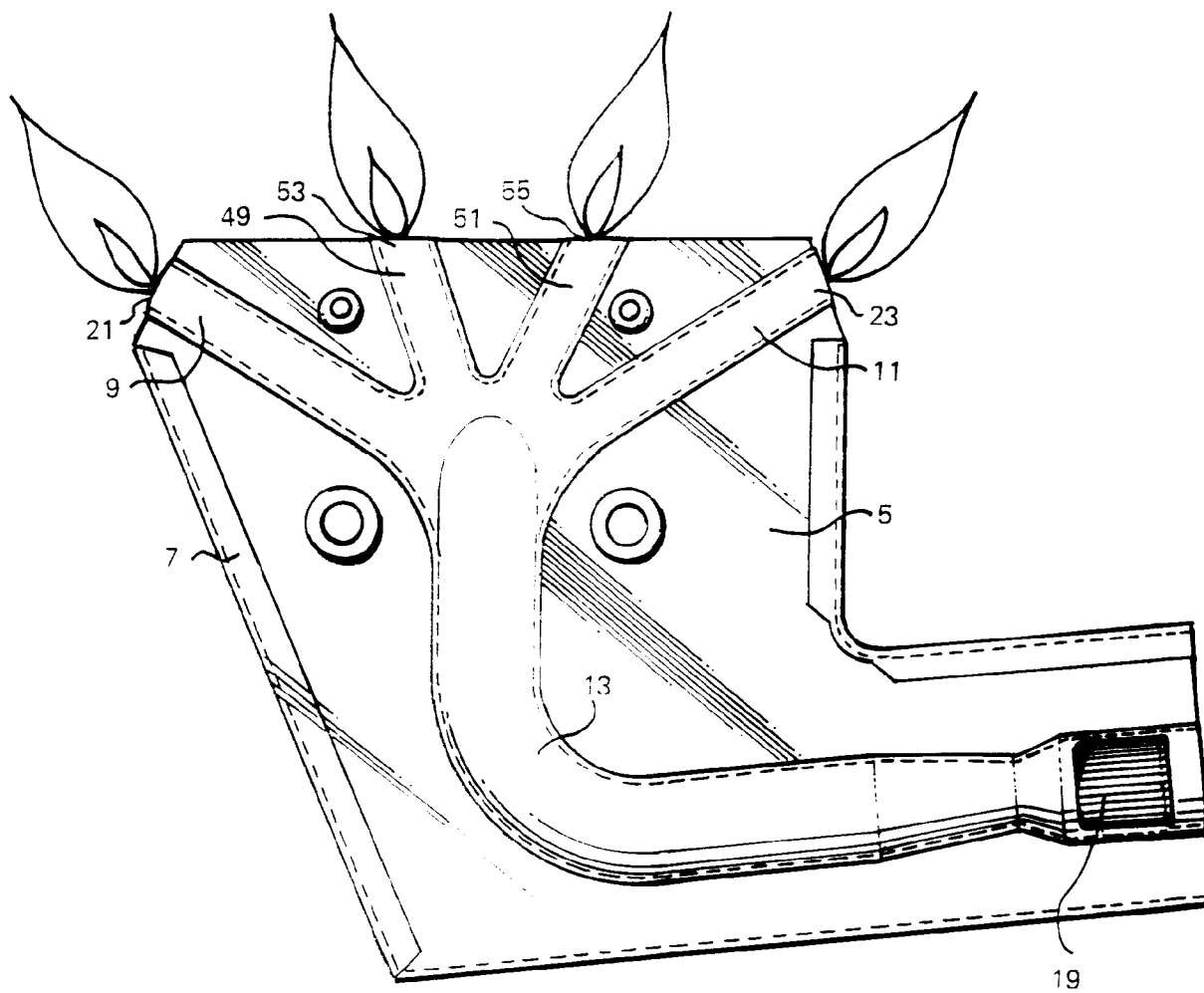


FIG. 5

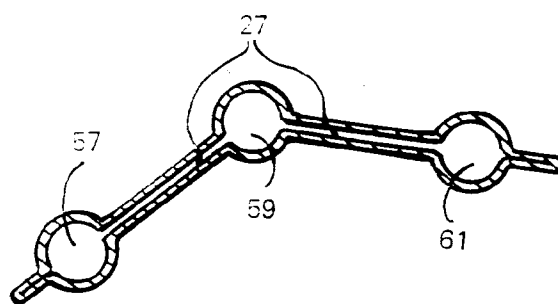


FIG. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 8880

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	GB-A-2 184 532 (GEO. BRAY & CO) * the whole document * ---	1-3, 10, 11, 13	F23D14/04 F23Q9/00
A	GB-A-1 331 186 (SAGARDUI) * the whole document * ---	1, 14	
A	DE-A-20 00 813 (SAUNIER DUVAL) * page 6, line 4 - line 22; figure 1 * ---	1, 15, 16	
A	US-A-3 259 170 (KOEHRER) * column 2, line 38 - column 3, line 46; figures 4-7 * ---	1, 4-6	
A	DE-B-12 64 364 (GUEREL) * the whole document * -----	1, 12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			F23D F23Q
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 January 1994	Examiner Vrugt, S
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