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(56) Documents Cited:
GB 2256268 A **EP 0903538 A**
FR 002711774 A **US 4940406 A**

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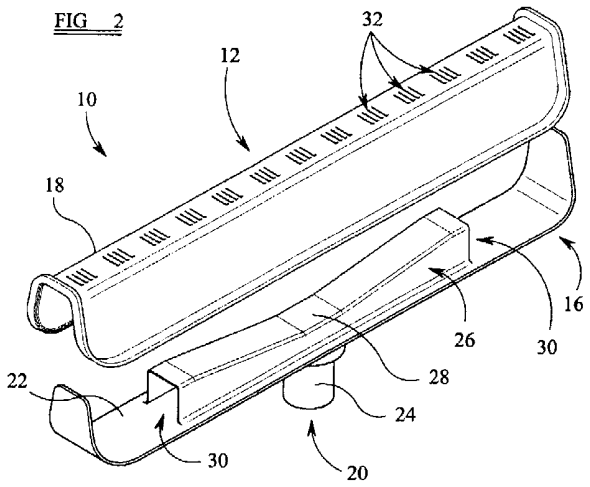
INT CL[7] **F23D**
Other
On-Line: WPI; EPODOC; JAPIO

(54) Abstract Title: **A burner with an internal venturi arrangement**

(57) A gas-fired burner 10 comprising a burner body 12, has a burner inlet 20 through which a gas can be fed and a plurality of burner outlets 32. A venturi 26 is disposed inside the burner body 12 and communicates with the burner inlet. The venturi 26 may split the inlet flow into two substantially even flows, or may extend from the inlet in opposite directions in order to distribute flow. The burner body 12 may be hollow and elongate. The venturi 26 may be symmetrical about the burner inlet 20, which is positioned central in the bottom of the burner body. The burner may have a mixing chamber (14 fig 1) to mix primary air, which may also include regulating means (51 fig 1) and acoustic damping material. The burner may be part of a flame-effect gas fire.

FIG 2



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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

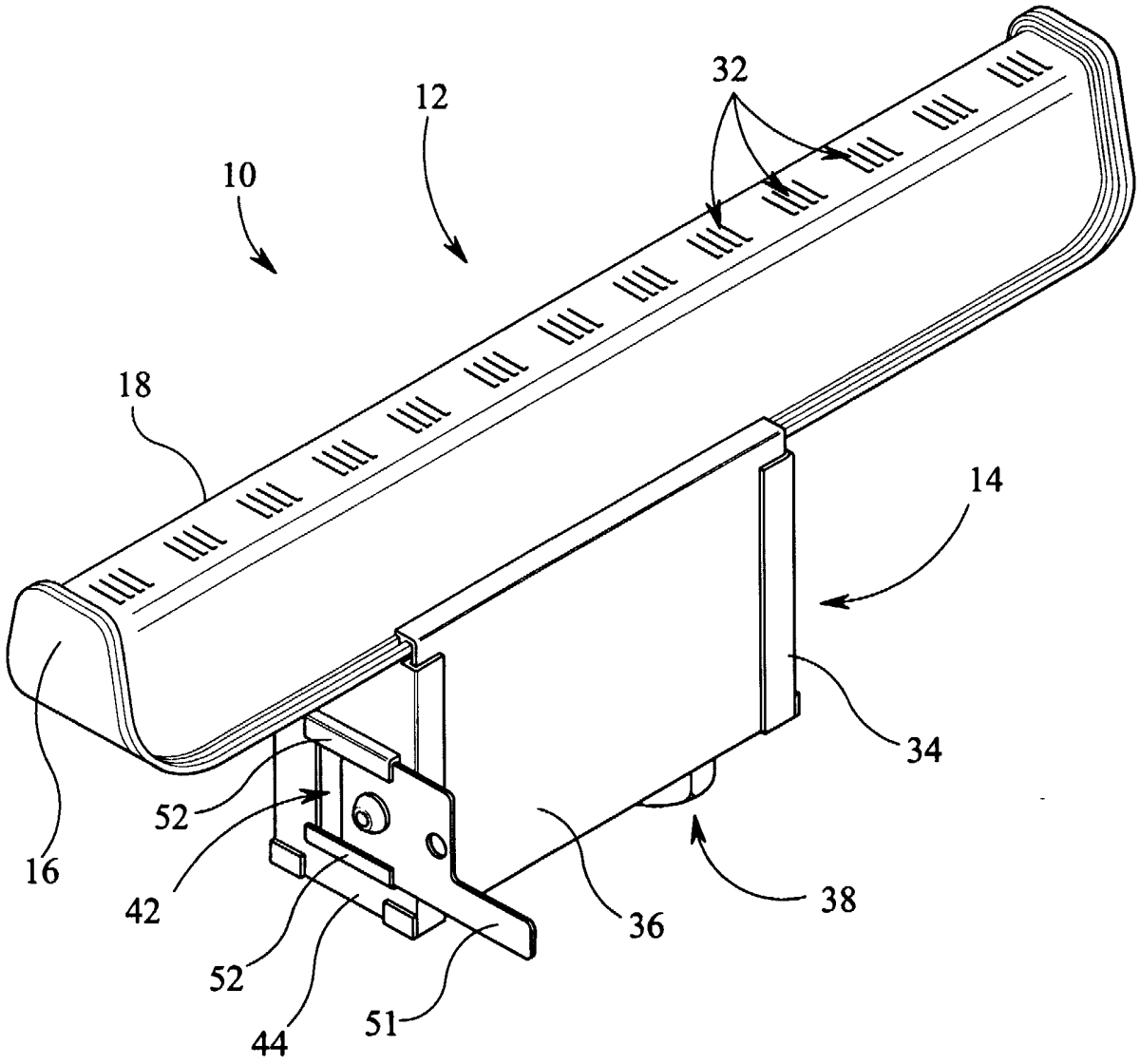
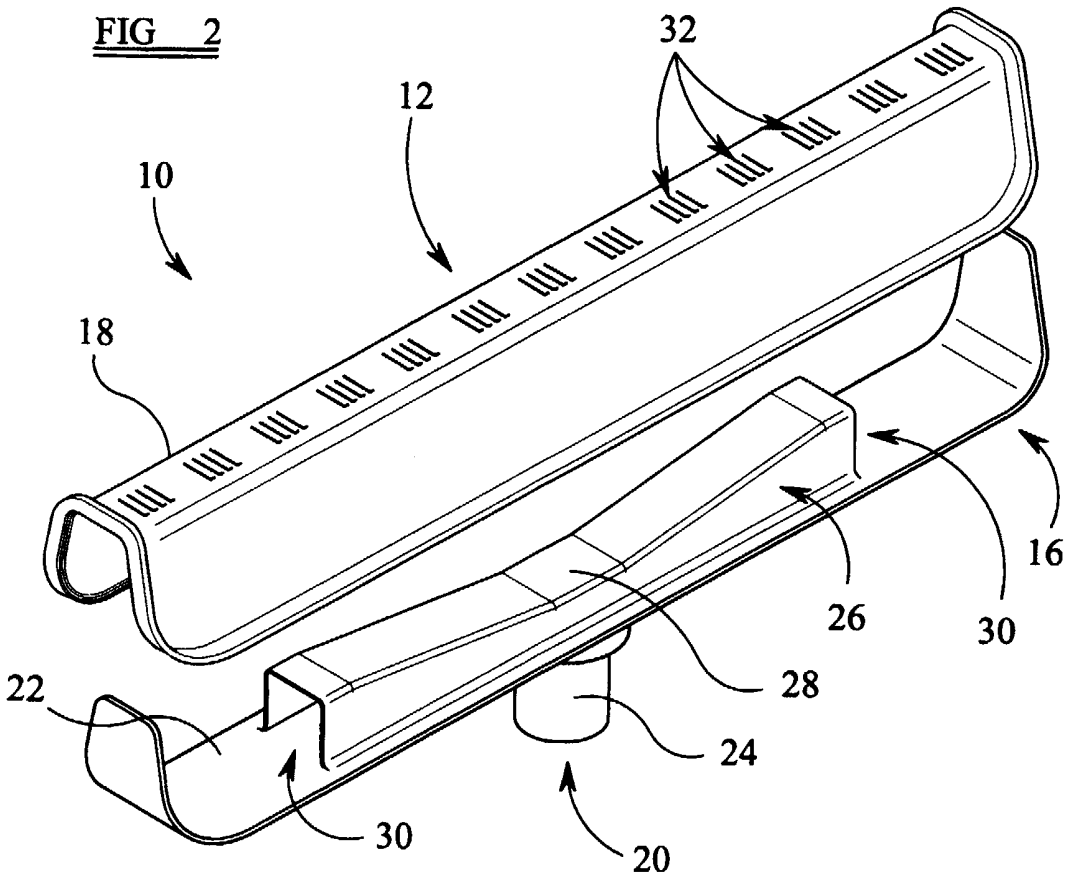


FIG 2



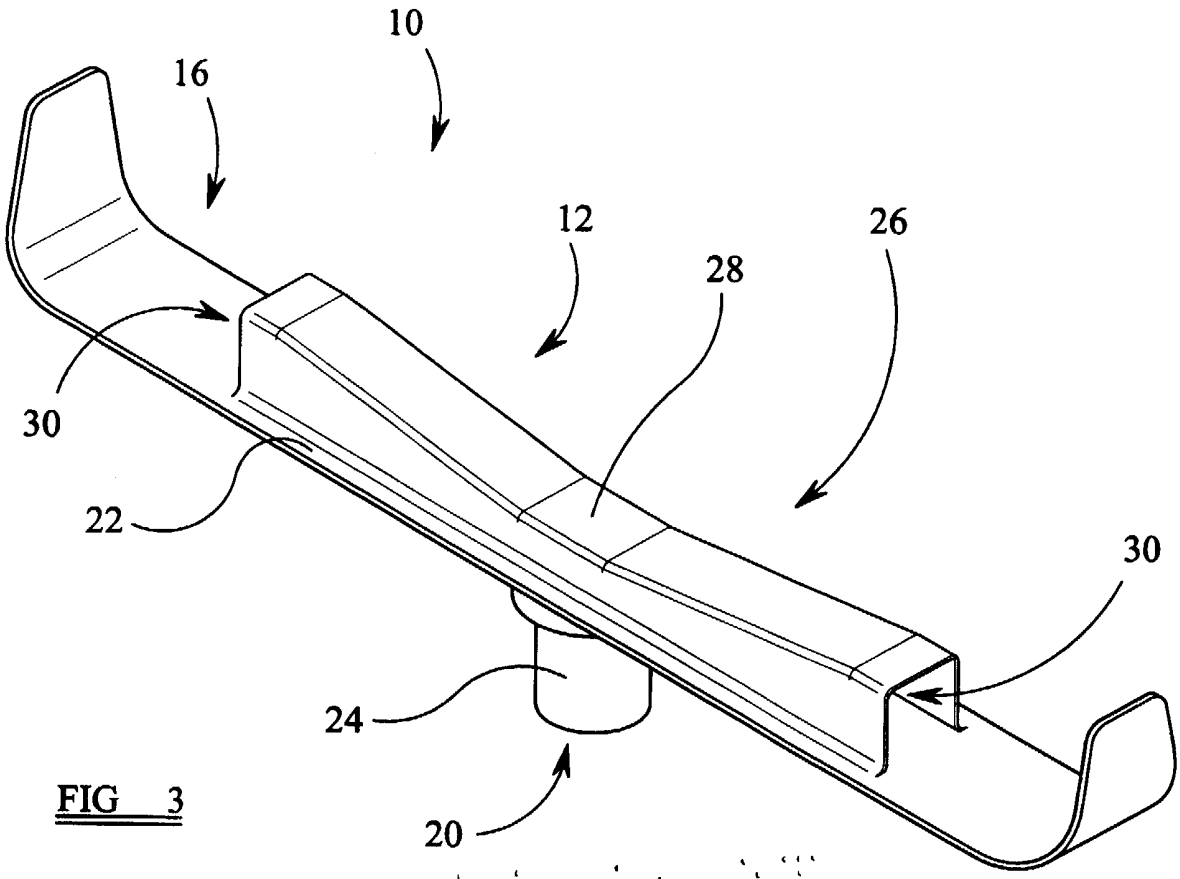


FIG 3

FIG 4

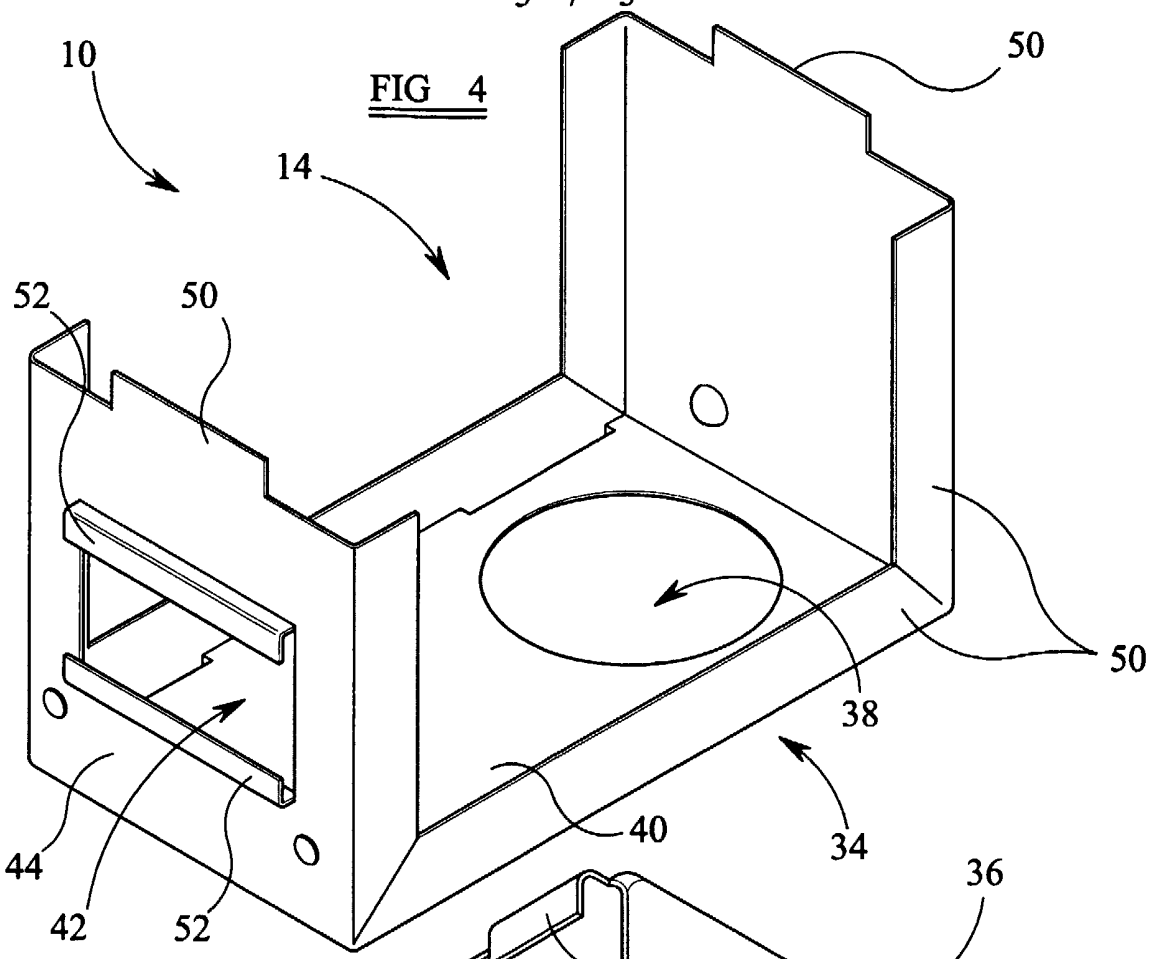
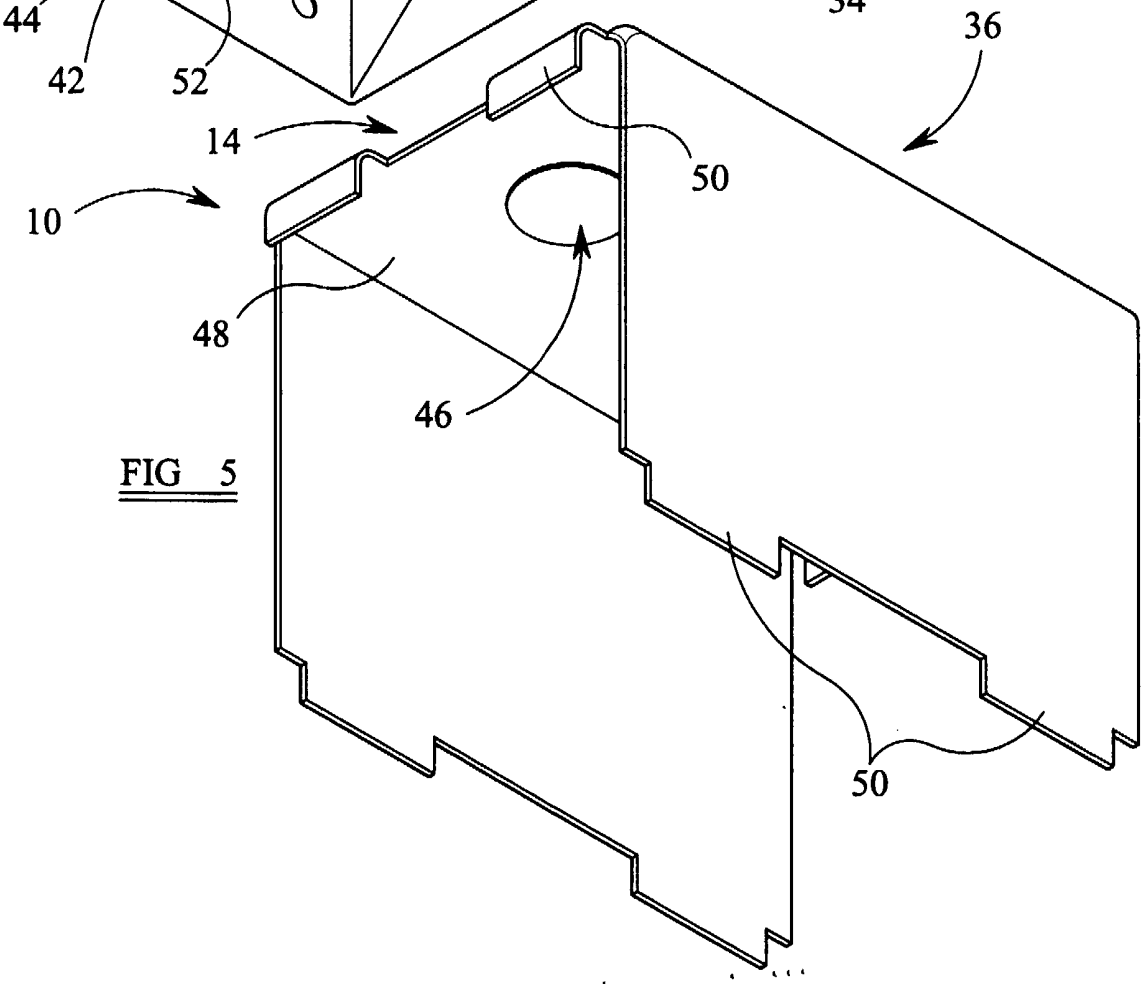


FIG 5



A BURNER

This invention relates to a gas-fired burner.

Gas-fired burners are known. They can be seen in numerous gas-fired appliances, including flame-effect fireplaces and flame-effect stoves which make use of elongate burners.

It is known that an elongate gas-fired burner without a venturi system results in poor combustion of the gas-air mixture.

An externally connected venturi system results not only in uneven combustion of the gas-air mixture occurring across the burner outlets but also in the burner being larger than is acceptable for many modern appliances or building recesses.

When placing the venturi system inside the body of the burner, the gas inlet has to be placed at one end to supply the venturi system with gas at its throat. This can cause a problem if the space in which the burner is to be housed is narrow.

Furthermore, with this type of internal venturi system, an adequate pressure distribution across the burner outlets is difficult to achieve, which results in flames of uneven height.

To alleviate this problem, baffles and other components or devices are

incorporated into the burner body. However, this increases the cost and size of the burner.

The present invention seeks to overcome these problems.

According to a first aspect of the present invention, there is provided a gas-fired burner comprising a burner body, having a burner inlet through which a gas-air mixture can be fed and a plurality of burner outlets from which combustion of the gas-air mixture occurs, and a venturi member which is disposed inside the burner body, in fluid-communication with the burner inlet, and which acts to in use split the inflowing gas-air mixture into two flows so that the burner outlets are evenly or substantially evenly supplied with the gas-air mixture.

Preferable and/or optional features of the present invention are set forth in claims 2 to 13, inclusive.

According to a second aspect of the present invention, there is provided a gas-fired burner comprising an elongate hollow burner body, a gas inlet in a base of the body, a plurality of gas outlets in an upper surface of the body, and a venturi member within the body, the venturi member communicating with the gas inlet and extending from the gas inlet in opposite directions to distribute gas flow over the longitudinal extent of the body.

According to a third aspect of the present invention, there is provided a flame-

effect gas fire equipped with a gas-fired burner in accordance with the first and/or second aspects of the present invention.

The present invention will now be described, by way of example, with reference to the accompanying drawings, wherein :

Figure 1 is a perspective view of one embodiment of a gas-fired burner, in accordance with the first and second aspects of the present invention;

Figure 2 is an exploded perspective view of a burner body and venturi member of the burner;

Figure 3 is a slightly enlarged perspective view of one part of the burner body;

Figure 4 is a perspective view of one part of a mixing chamber of the burner; and

Figure 5 is a perspective view of another part of the mixing chamber.

Referring to the drawings, a burner 10 is shown which comprises an elongate hollow burner body 12 and a mixing chamber 14, both typically formed from press-moulded metal.

The burner body 12 has a bottom part 16 and a top part 18. These two parts 16 and 18 are crimped together, which reduces the cost associated with welding.

A burner inlet 20 is centrally formed in the bottom surface 22 of the bottom part 16, and a gas-air mixture inflow pipe 24 extends externally from the burner inlet 20.

A venturi member 26 is provided along the interior of the bottom surface 22 of the bottom part 16, and has a single throat constriction 28 mid-way between two opposing outlet openings 30 which face opposite ends of the burner body 12. The venturi member 26 is symmetrical about the throat constriction 28 and is positioned over the burner inlet 20 so that the throat constriction 28 coincides, and is in direct fluid-communication, with the centrally placed burner inlet 20.

The top part 18 of the burner body 12 includes a plurality of burner outlets 32 from which, in use, combustion of the gas-air mixture occurs. The burner body top part 18 is configured so that it is spaced from the venturi member 26.

The mixing chamber 14 is generally box-shaped and is formed from an outer liner 34 and an inner liner 36 which can be received in the outer liner 34.

The outer liner 34 has a U-shaped longitudinal cross-section with a gas inlet opening 38 formed in its bottom surface 40 and an air inlet opening 42 formed in one side 44.

The inner liner 36 has an inverted U-shaped transverse cross-section with a gas outlet opening 46 formed in its upper surface 48.

The inner and outer liners 34 and 36 are both formed with tabs 50 which extend from their free-edges and which enable the liners 34, 36 to be fixed to one another.

When assembled, the outer liner 34 forms two sides and the bottom of the mixing chamber 14, while the inner liner 36 forms the remaining two sides and the top.

The outer liner 34 has an air-flow regulating element 51 which can be slid along runners 52 to open or close, to varying degrees, the air inlet opening 42.

The mixing chamber 14 is attached, typically by welding, to the exterior of the bottom surface 22 of the burner body 12, so that the burner inlet 20 is covered and the inflow pipe 24 extends into the interior of the mixing chamber 14.

The mixing chamber 14 enables acoustic damping. To improve the acoustic damping, the mixing chamber 14 may include acoustic damping material (not shown). The material is positioned internally within the mixing chamber 14, typically lining the sides while not obstructing the gas inlet / outlet openings 38 and 46 and the air inlet opening 42, and is resistant to temperatures at which the burner 10 operates.

A gas injector (not shown), which feeds a gas supply to the burner 10, is fixed at one end to the outer liner gas inlet opening 38 and at the other end, for example, to a control valve and an isolation valve through which the gas supply has to flow.

The gas from the gas injector flows firstly into the mixing chamber 14 where primary aeration of the gas flow is set by the position of the air-flow regulating element relative to the air inlet opening 42.

The gas-air mixture is then drawn into the burner body 12, through the inflow pipe 24 and burner inlet 20, by the venturi member 26. On entering the venturi member 26 at the throat constriction 28, the gas-air mixture is split into two flows which flow from the throat constriction 28 to the opposing venturi outlet openings 30. Since the outlet openings 30 are of identical or substantially identical size, the pressure differentials between the two outlet openings 30 and the throat constriction 28 are equal or substantially equal, resulting in the split gas-air mixture flows having equal or substantially equal volume-flow rates.

On exiting the venturi member 26, the split gas-air mixture flows disperse and move towards the burner outlets 32. Since equal or substantially equal volumes of the gas-air mixture move from the sides of the burner body 12 towards the centre, the pressure distribution of the gas-air mixture across the burner outlets 32 is constant or substantially constant. This results in an even or substantially even flame height.

The venturi member can be asymmetrical about the throat constriction. In this

case, the venturi outlet openings need to be sized so that the equal or substantially equal pressure differentials between the outlet openings and the throat constriction are maintained. This enables the equal or substantially equal volume-flow rates of the split gas-air mixture flows to be maintained. Consequently, the burner inlet can be positioned off-centre, if necessary.

The venturi member may also have more than two outlet openings.

The mixing chamber acts to suppress or eliminate undesirable noise caused by primary aeration while regulating the gas-to-air ratio of the mixture. However, the acoustic damping material is only typically required if the burner is sized to have an approximately 6 kW or greater output.

By press-moulding the top and bottom parts of the burner body, various lengths of burner can be obtained from one base die by inserting or removing sections from between the ends of the die. Tooling costs can therefore be significantly reduced.

It is thus possible to provide a quiet gas-fired burner which, in use, produces a uniform or substantially uniform flame across the burner outlets, has good combustion performance, and does not require additional internal components or devices to evenly disperse the gas-air mixture flow across the burner outlets.

The embodiments described above are given by way of example only and

various modifications will be apparent to persons skilled in the art without departing from the scope of the present invention as defined by the appended claims. For example, the gas-fired burner may be used as part of a flame-effect gas fire or any other suitable gas-fired appliance.

CLAIMS

1. A gas-fired burner comprising a burner body, having a burner inlet through which a gas-air mixture can be fed and a plurality of burner outlets from which combustion of the gas-air mixture occurs, and a venturi member which is disposed inside the burner body, in fluid-communication with the burner inlet, and which acts to in use split the inflowing gas-air mixture into two flows so that the burner outlets are evenly or substantially evenly supplied with the gas-air mixture.

2. A gas-fired burner as claimed in claim 1, wherein the venturi member has two outlet openings through which the split gas-air mixture flows can exit, respectively.

3. A gas-fired burner as claimed in claim 2, wherein the venturi member is symmetrical about the burner inlet.

4. A gas-fired burner as claimed in claim 2 or claim 3, wherein the pressure differentials of the split gas-air mixture flows between the inlet of the venturi member and the respective venturi member outlet openings are equal or substantially equal.

5. A gas-fired burner as claimed in any one of the preceding claims, wherein the burner inlet is disposed in the bottom of the burner body and directly supplies the venturi member.

6. A gas-fired burner as claimed in claim 5, wherein the burner inlet is

positioned in the centre of the bottom of the burner body.

7. A gas-fired burner as claimed in any one of the preceding claims, wherein the burner body is formed from two parts which are crimped together.

8. A gas-fired burner as claimed in claim 8, wherein one of the said parts of the burner body includes the burner inlet and the other said part includes the burner outlets.

9. A gas-fired burner as claimed in any one of the preceding claims, further comprising a mixing chamber positioned to cover the burner inlet of the burner body, the mixing chamber in use acting to regulate the gas to air ratio of the gas-air mixture.

10. A gas-fired burner as claimed in claim 9, wherein the mixing chamber includes an air inlet opening and an air-flow regulating element by which the air inlet opening can be opened or closed to varying degrees so that the gas-to-air ratio of the gas-air mixture is regulated.

11. A gas-fired burner as claimed in claim 9 or claim 10, wherein the mixing chamber acts to in use suppress undesirable noise due to the inflow of air into the burner.

12. A gas-fired burner as claimed in any one of claims 9 to 11, wherein the

mixing chamber includes acoustic damping.

13. A gas-fired burner as claimed in claim 12, wherein the acoustic damping is positioned within the mixing chamber and is resistant to temperatures at which the burner operates.

14. A gas-fired burner comprising an elongate hollow burner body, a gas inlet in a base of the body, a plurality of gas outlets in an upper surface of the body, and a venturi member within the body, the venturi member communicating with the gas inlet and extending from the gas inlet in opposite directions to distribute gas flow over the longitudinal extent of the body.

15. A gas-fired burner substantially as hereinbefore described with reference to the accompanying drawings.

16. A flame-effect gas fire equipped with a gas-fired burner as claimed in any one of the preceding claims.

Application No: GB 0209849.9 **Examiner:** Brian A Woods
Claims searched: 1-16 **Date of search:** 28 November 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): F4T(TEA,TEB,TEC,TED,TEE,TEH,TEJ,TGBX)

Int Cl (Ed.7): F23D

Other: On-Line: WPI; EPODOC; JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	US 4940406	(SAMSUNG) See figures noting gas supply nozzle 1, air duct 2 and mixing chamber 3. Specifically note in fig 2A the venturi 8 which splits the flow to outlets 4, crimping of the two halves of the burner 6, the inlet 2 positioned in the centre of the bottom of the burner body. Also see column 2 lines 27-68, which discloses uniform flow paths and regulating means to control gas/air mixing.	1,2,3,4,5,6, 7,9,
A	GB 2256268 A	(ZANUSSI) See figs noting burner with venturi tube 9.	
A	EP 0903538	(SABAF) See figs noting burner with venturi effect chamber 18.	
A	FR 2711774	(SOURDILLON) See fig 1 noting the annular venturi 8, formed between faces 5 and 7 of the burner body 1, having multiple outlets 10.	

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.