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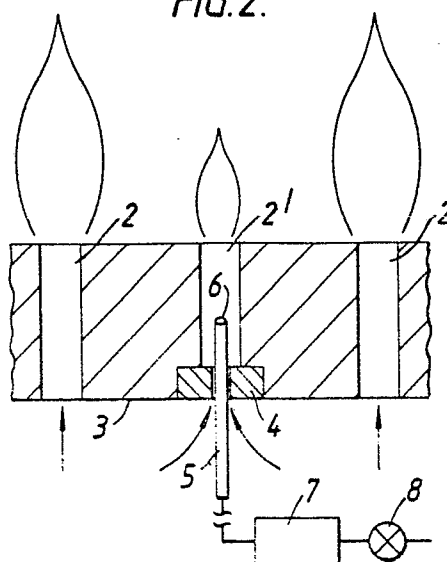
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54 **Premix type multiport burner.**

57 A premix multiport burner in which one port 2' has a bore portion formed by an aperture restricting means 4, which bore portion is smaller in area than that of the remaining ports 2 and a thermocouple probe 5 extending through the aperture restricting means 4 into the port 2' to detect the presence of a flame within the port 2'.

FIG.2.



The present invention relates to a premix type multiport burner.

Such burners comprise a plenum chamber for receiving fuel and air for mixing within the chamber before passage to the burner outlet. The outlet is formed by one of the walls of the chamber, which wall will contain a multitude of ports through which the fuel/air mixture can pass for combustion.

A problem with this type of burner is that the surfaces surrounding the ports may overheat and become damaged or can cause the combustion flame to propagate back through the ports into the burner with disastrous results.

It is an object of the present invention to provide a premix type multiport burner in which this problem can be mitigated.

According to the present invention we provide a premix type multiport burner in which one or more selected ports has or have a bore which at least in part is smaller in area than that of the remaining ports and in which means are provided for detecting the presence of a flame within the or each selected port.

With this arrangement, should overheating of the surfaces begin to occur a safe controlled propagation (lightback) of the flame in the selected port or ports will be induced before the surfaces surrounding the remaining ports are overheated. The lightback flame is detected and a signal may be sent to a control box to close a fuel valve so protecting the burner against excessive overheat of the combustion surface and ultimately against lightback occurring in the remaining ports.

Preferably the means for detecting the presence of a flame in the selected port or ports is an elongate thermocouple probe.

The selected port or ports is or are contrived such that following the controlled lightback, the flame is contained within the port and cannot proceed upstream into the space from which the remaining ports receive their supply of air/gas mixture.

The selected port or ports may have their smaller area bore portion formed by an aperture restricting means located adjacent to the upstream end of the port and the probe may extend through the restricting means with its tip located between the restricting means and the downstream end of the port.

The thermocouple is suitably located not less than eight orifice diameters downstream of the selected port or ports.

The size of the restricting means is such that the selected port or ports receives or receive a rate of flow of mixture sufficiently lower than the normal ports to ensure that it or they will experience a higher working temperature and so lightback sooner than the remaining ports.

Embodiments of the invention will now be particularly described with reference to the accompanying drawings, in which :-

Figure 1 is a plan view of the combustion face of a typical multiport burner in which the ports are in the form of slots in the outlet wall of the burner,

Figure 2 is a section through the wall shown in Figure 1, showing normal combustion occurring,

Figure 3 is a similar view to that shown in Figure 2 showing the induced lightback phenomenon occurring in a selected port,

Figure 4 is a plan view of the combustion face in the outlet wall of a typical ribbon type multiport burner modified in accordance with the present invention, and

Figure 5 is a section through the wall shown in Figure 4,

Referring to Figures 1 to 3, only the outlet wall 1 of the burner is shown, this forming part of a plenum chamber (not shown) for receiving fuel and air for mixing within the chamber.

The outlet wall 1 comprises a slotted plate of for example a ceramic in which each slot 2 forms an outlet for the fuel and air mixture, each slot 2 having an identical bore area.

Located in a recess adjacent to the upstream end 3 of one selected port 2' is an apertured bore restrictor 4, the aperture area being less than that of the rest of the port 2' and indeed of the remaining ports 2. Extending into the port 2' by way of the restrictor 4 is a thermocouple probe 5 whose tip 6 terminates about six restrictor aperture hydraulic diameters from the upstream end 3 of the port 2'. The diameter of the probe 5 is such that there is an annular clearance between the periphery of the probe 5 and the wall of the restrictor aperture to permit the fuel/air mixture to enter the port 2'.

The probe 5 is connected to a control box 7 which is activated on receiving a signal from the probe 5 to close a valve 8 which controls the supply of fuel to the plenum chamber of the burner.

When combustion is occurring normally as shown in Figure 2, there is no signal from the probe 5 and the valve 8 is held open by the control box 7.

However, when overheating of the combustion surface begins to occur possibly as a result of a reduction in the proportion of air in the fuel/air mixture, lightback will occur in the port 2' as shown in Figure 3 and the flame now contained within this port 2' will heat the probe 5, thus transmitting a signal to the control box 7 to close the fuel valve 8.

Referring to Figures 4 and 5 where components similar to those shown in Figures 1 to 3 bear similar reference numerals, the burner outlet wall

10 is generally formed by a number of undulating metal strips 11, each strip 11 being held between a pair of metal spacing elements 12 so that the ports 13 can be formed in the spaces between the strip 11 and the elements 12.

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In this case however, one strip 12 comprises two distinct portions 14 and 15 which are spaced apart to form the selected port 16 with adjacent spacing.

Secured at the upstream end of the port 16 to the strip portions 14 is an apertured bore restrictor 17, the aperture area being smaller than that of the selected port 16 and of the remaining ports 13.

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Extending into the port 16 by way of the restrictor 17 is the thermocouple probe 5. As with the embodiment previously described, the thermocouple tip 6 also terminates about six restrictor aperture hydraulic diameters from the upstream end of the port 16 and forms an annular clearance between the periphery of the probe 5 and the wall of the restrictor aperture to permit the fuel/air mixture to enter the port 16.

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Claims

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1. A premix type multiport burner in which one or more selected ports has or have a bore which at least in part is smaller in area than that of the remaining ports and means for detecting the presence of a flame within the or each selected port.

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2. A burner as claimed in claim 1 in which the means for detecting the presence of a flame comprises an elongate thermocouple probe.

3. A burner as claimed in claim 2 in which the smaller area bore portion is formed by an aperture restricting means located adjacent to the upstream end of the port and the probe extends through the restricting means with its tip located between the restricting means and the downstream end of the port.

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4. A burner substantially as hereinbefore described with reference to Figures 1 to 3 or 4 and 5.

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FIG. 1.

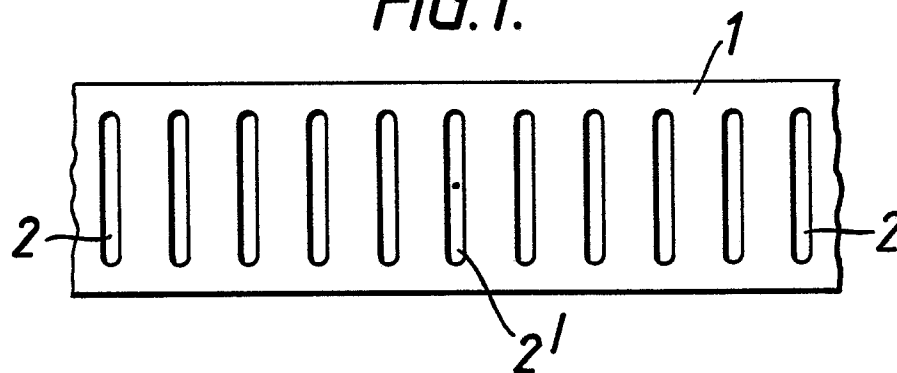


FIG. 2.

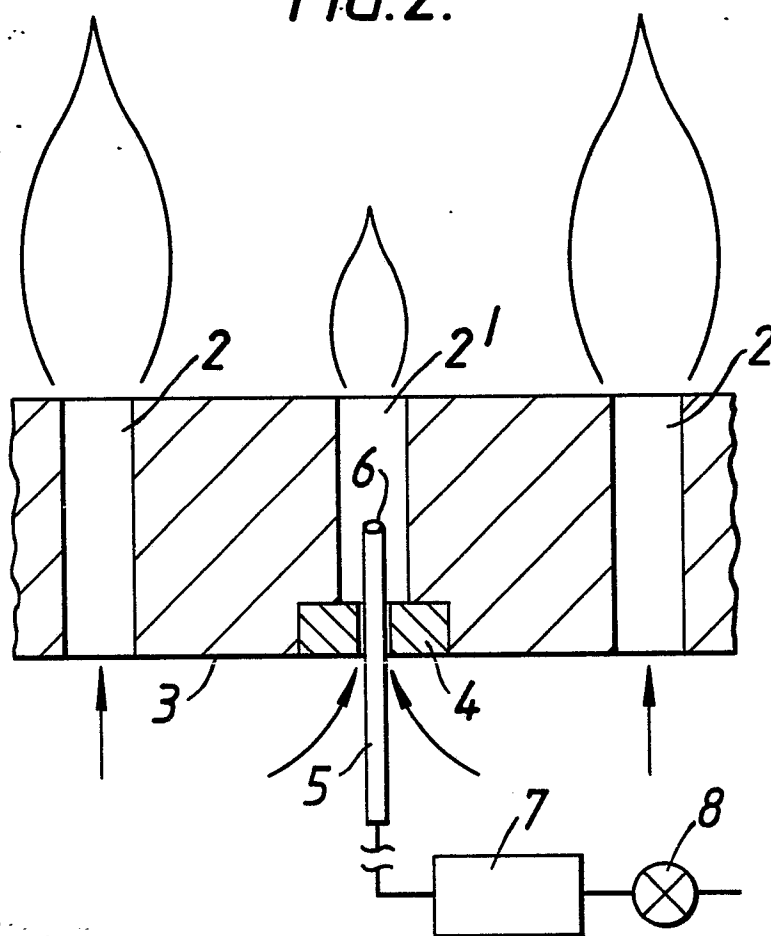


FIG. 3.

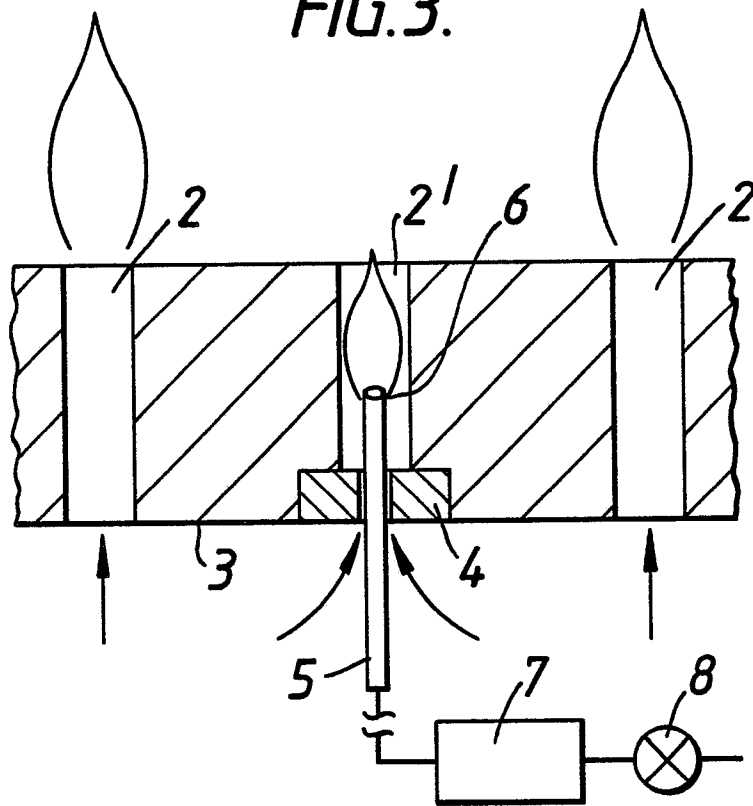


FIG. 4.

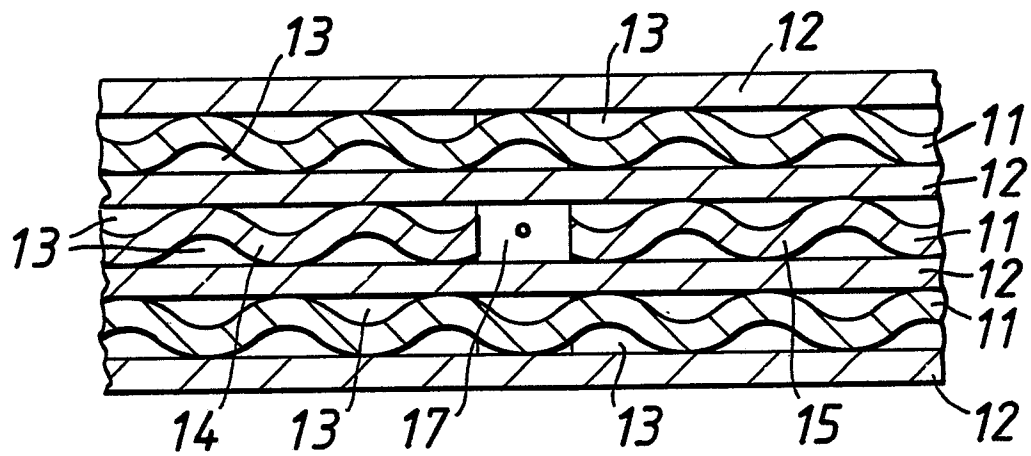
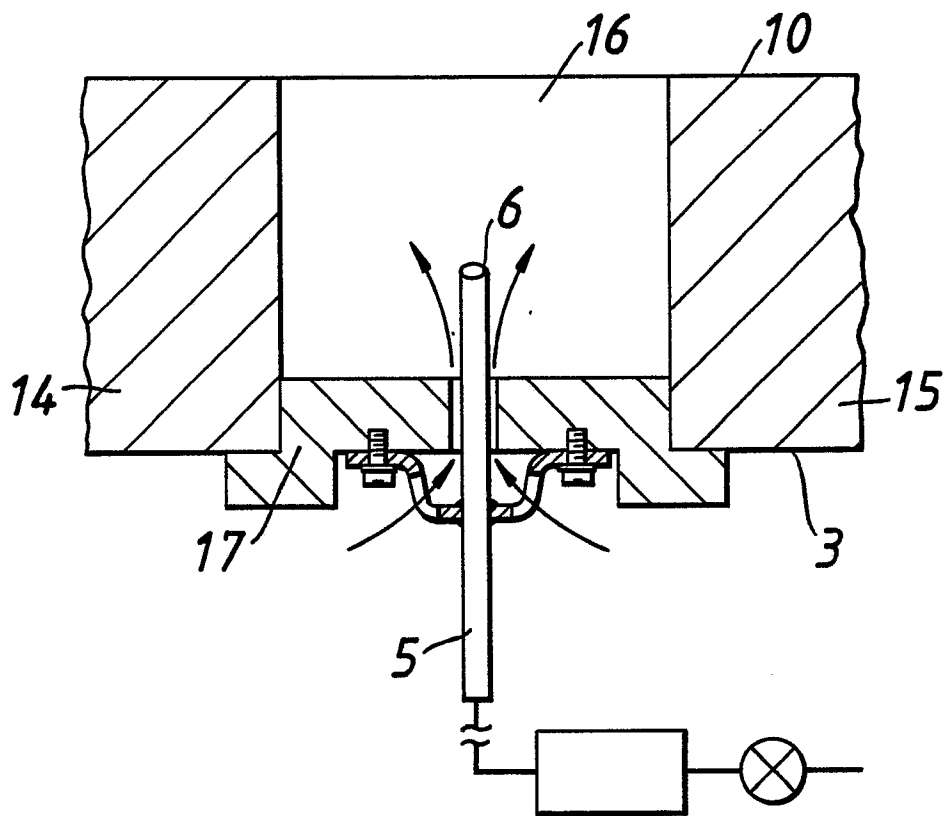


FIG. 5.





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 89305507.9
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	<u>US - A - 2 340 899</u> (RAY) * Fig. 1 * ---	1, 2	F 23 D 14/72 F 23 N 5/10
A	<u>DE - B2 - 2 614 708</u> (CHAFFOTEAUX & MAURY) * Fig. 1 * ---	1, 2	
A	<u>DE - A1 - 3 636 294</u> (RINNAI) * Fig. 6,7 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			F 23 D 14/00 F 23 N 5/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 09-11-1989	Examiner TSCHÖLLITSCH
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	