

[54] **FLUID FUEL BURNERS**

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[51] Int. Cl. **F23r 1/00**

[58] Field of Search..... **431/8-10, 158,**
431/182-185, 190, 351, 166, 238, 242

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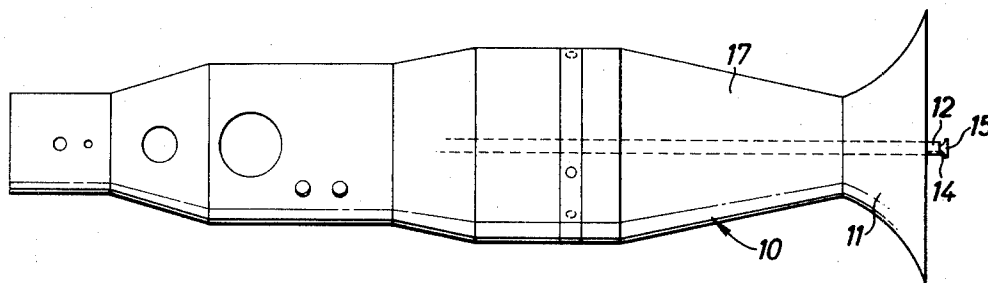
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[57] **ABSTRACT**

A burner casing defines a combustion chamber and a flared outlet nozzle. A compressed air tube extends through the combustion chamber and the outlet nozzle and terminates, at a point beyond the outlet nozzle, in a compressed air outlet orifice. An air spreader valve is mounted adjustably within the compressed air outlet orifice of the tube. Air fed to the combustion chamber to support combustion therein is fed preferably through an adjustable guide vane assembly. The hot gaseous products of combustion within the combustion chamber flow through the outlet nozzle with a spinning action and coact with an annular curtain of compressed air from the compressed air outlet orifice to emerge from the burner as a divergent stream.

5 Claims, 3 Drawing Figures



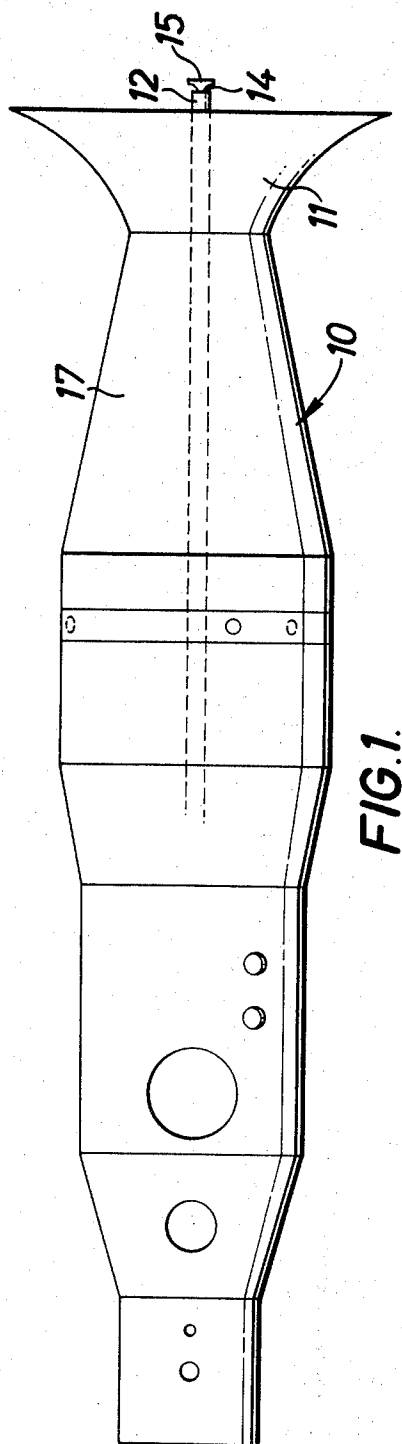


FIG. 1.

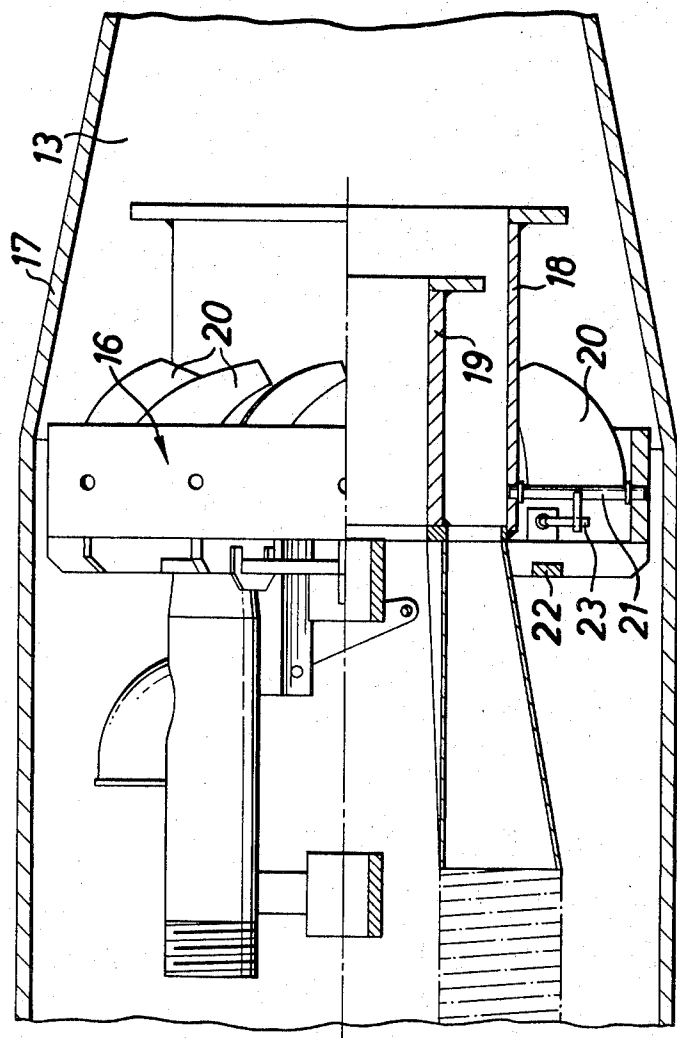


FIG. 2.

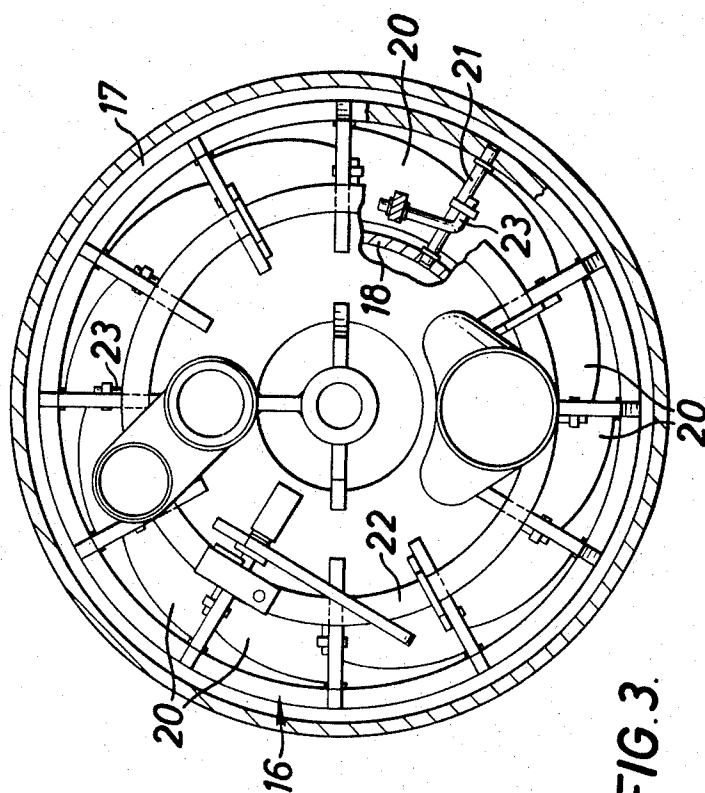


FIG. 3.

FLUID FUEL BURNERS

This invention relates to fluid fuel burners for providing a high velocity stream of hot gas to be used for heating the interior and structure of large vessels, or enclosures such as furnaces. The fluid fuel burners are of the kind which comprises a casing defining a combustion chamber to which air and the fluid fuel are arranged to be fed from one end, and an outlet nozzle arranged at the opposite end of the combustion chamber so that the products of combustion within the combustion chamber emerge from the burner, via the outlet nozzle, as a high velocity stream of hot gas.

In accordance with this invention, a fluid fuel burner of the kind described is provided with means arranged to coact with the products of combustion within the combustion chamber and/or fluid fed to the combustion chamber for supporting or maintaining combustion therein, so that the products of combustion within the combustion chamber emerge from the burner as a divergent stream of hot gas.

Means arranged to coact with the products of combustion within the combustion chamber may include a compressed air supply tube which is adapted for connection to a source of compressed air outside the burner, the compressed air supply tube extending through the combustion chamber and the outlet nozzle, and terminating, at a point beyond the end of the outlet nozzle remote from the combustion chamber, in a compressed air outlet orifice, and compressed air deflecting means arranged to direct, radially of the axis of the compressed air supply tube, compressed air which emerges from the compressed air outlet orifice so that the radially directed compressed air acts upon the products of combustion within the combustion chamber, which emerge from the outlet nozzle, so as to form said divergent stream of hot gas.

The compressed air deflecting means may comprise an air spreader valve member mounted adjustably within the compressed air outlet orifice of the tube.

The outlet nozzle may be flared outwardly so that the diameter of the end thereof remote from the combustion chamber is greater than the diameter of the end thereof nearer to the combustion chamber.

Means arranged to coact with fluid fed to the combustion chamber for supporting or maintaining combustion therein, may include guide vanes over which air fed to the combustion chamber is directed, the guide vanes being arranged to impart a spinning action to the air. The guide vanes may be arranged for adjustment during use of the burner.

One embodiment of this invention will be described now by way of example only with reference to and as illustrated in the accompanying drawings, of which:

FIG. 1 is a side elevation of a burner according to this invention;

FIG. 2 is a half sectional half elevational view of the annular adjustable vane assembly and adjacent pair of concentric tubes of the burner shown in FIG. 1; and

FIG. 3 is an end elevation of FIG. 2.

The burner 10 shown in the drawings is similar in its basic construction and operation to the burner described and illustrated in the complete specification filed in connection with our British Pat. No. 1,000,231, which corresponds to U.S. Pat. No. 3,275,057. Components of the burner which correspond to like parts of the burner described and illustrated in this specifica-

tion will not be described herein. The outlet nozzle of the burner is modified so as to comprise an outwardly flared outlet nozzle 11. A compressed air supply tube 12 extends coaxially through the combustion chamber 13 and the outlet nozzle 11 of the burner 10, extending beyond the end of the outlet nozzle 11 to define a compressed air outlet orifice 14. An adjustable air spreader valve 15 is mounted in the compressed air outlet orifice 11 of the compressed air supply tube 12.

FIGS. 2 and 3 illustrate an adjustable guide vane assembly 16 which is housed within the convergent casing portion 17 which encloses the combustion chamber 13, the guide vane assembly 16 being located within an annular space defined between the convergent casing portion and a tube 18 which is the outer of two concentric tubes 18 and 19. Each guide vane 20 is mounted upon a radially extending axle 21 so that its plane is parallel to the axis of the respective axle 21. Each axle 21 is connected to a rotatably mounted adjustment ring 22 by a respective linkage 23 so that rotation of the ring 22 results in rotation of each axle 21 about its axis and consequent movement of all the guide vanes 20.

During operation of the burner 10, air is fed into the combustion chamber 13 through the annular adjustable guide vane assembly 16, which causes air flowing there-through to follow a spiral path through the combustion chamber 13. Combustion is maintained within the combustion chamber 13 and the combustion gases form a stream which passes along a spiral path from the combustion chamber 13 through the outlet nozzle 11 and thus out of the burner 10.

Normally gaseous fuel is fed to the combustion chamber 13. A tubular oil burner may be used when higher heat outputs are required than can be obtained by burning gaseous fuel alone.

Compressed air is fed to the compressed air outlet orifice 14 through the compressed air supply tube 12. The compressed air emerges from the compressed air outlet orifice 14 in the center of the stream of combustion gases emerging from the burner 10. The action of the adjustable air spreader valve 15 on the compressed air results in the compressed air being directed in an annular stream radially of the axis of the compressed air supply tube 12. The effect of this compressed air on the spiral flow of combustion gases is to form a divergent stream of spirally flowing combustion gases.

Various modifications or refinements of the burner described above may be incorporated without departing from the scope of this invention. For example, the burner may be provided with a tangential air inlet for feeding air along a spiral path to the combustion chamber 13, in which case the guide vane assembly 16 may be dispensed with.

We claim:

1. A fluid fuel burner for providing a high velocity stream of hot gas to be used for heating the interior and structure of large enclosures such as furnaces, comprising a convergent casing defining a combustion chamber, means to supply air and means to supply fluid fuel to one end of the combustion chamber, an outwardly flared outlet nozzle coaxial with said combustion chamber and at the smaller end of the combustion chamber through which the products of combustion within the combustion chamber emerge from the burner as a high velocity stream of hot gas, and means which coact with the products of combustion which emerge from the combustion chamber through the outlet nozzle so that

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those products of combustion emerge from the burner as a divergent stream of hot gas, wherein the improvement comprises said means which coact with the products of combustion which emerge from the combustion chamber through the outlet nozzle including a compressed air supply tube which is adapted for connection to a source of compressed air outside the burner, the compressed air supply tube extending through the combustion chamber and the outlet nozzle, and terminating, at a point beyond the end of the outlet nozzle remote from the combustion chamber, in a compressed air outlet orifice, and compressed air deflecting means arranged to direct, radially of the axis of the compressed air supply tube, compressed air which emerges from the compressed air outlet orifice so that the radially directed compressed air acts upon the products of combustion which emerge from the outlet nozzle, so as to form said divergent stream of hot gas.

2. A fluid fuel burner as claimed in claim 1, wherein the compressed air deflecting means comprises an air

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spreader valve member mounted adjustably within the compressed air outlet orifice of the tube.

3. A fluid fuel burner as claimed in claim 1, wherein the improvement further comprises means which coact with fluid fed to the combustion chamber for supporting or maintaining combustion therein, said means including guide vanes over which air fed to the combustion chamber is directed, the guide vanes being arranged to impart a spinning action to the air.

4. A fluid fuel burner as claimed in claim 3, wherein the guide vanes are arranged for adjustment during use of the burner.

5. A fluid fuel burner as claimed in claim 3, further comprising flow-detecting means and means mounting the flow-deflecting means in the flow path of the air after it passes through the guide vanes and in the flow path of the fuel entering the combustion chamber to create a turbulence in both the air and fuel flows entering the combustion chamber.

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