

[54] **REGENERATIVE TILE FOR FUEL BURNER**

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[58] Field of Search **431/181-185, 351, 239/416.4, 416.5, 417.3, 424, 425**

[56]

References Cited

UNITED STATES PATENTS

3,007,512	11/1961	Te Nuyl et al.	431/183 X
1,024,347	4/1912	Light	431/181
3,368,605	2/1968	Reed	431/183 X

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[57]

ABSTRACT

A ceramic structure substantially encasing atomized liquid fuel with the ceramic structure retaining heat in the presence of ignited fuel and serving to control the movement of air as it moves into the combustion of the liquid fuel to prevent the development of coke within the ceramic structure.

5 Claims, 4 Drawing Figures

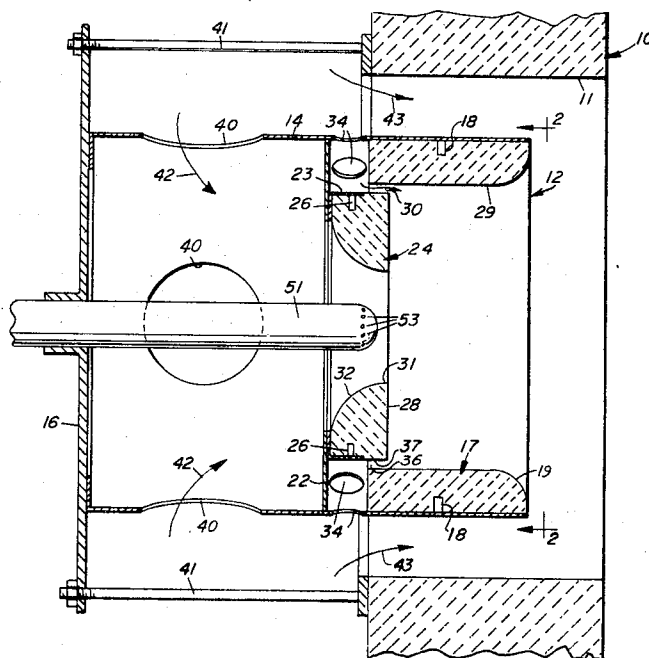


FIG. 1

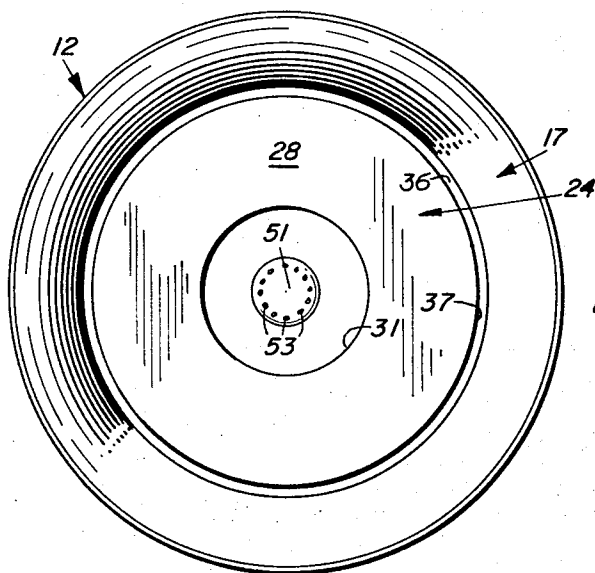
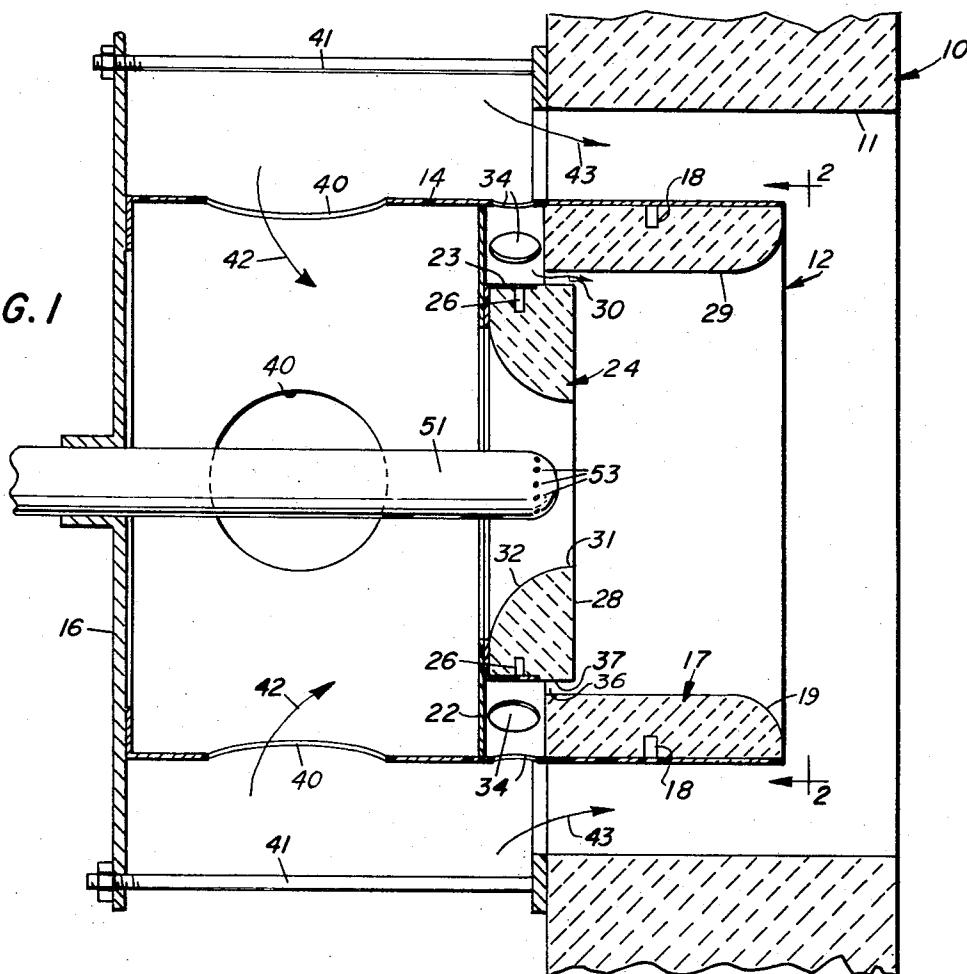


FIG. 2

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FIG. 3

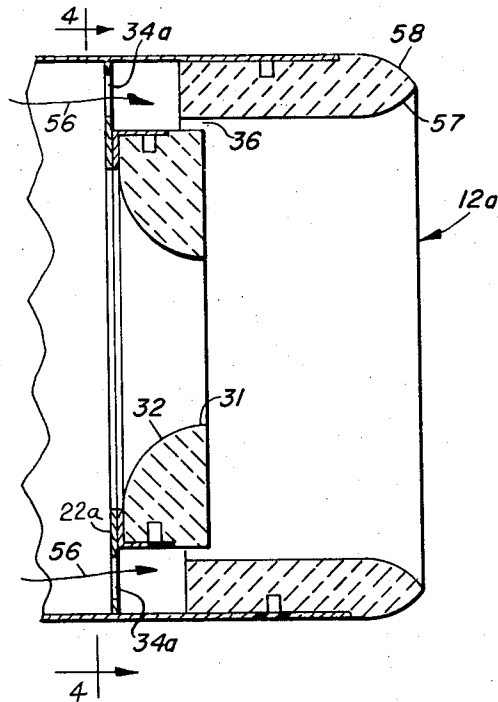
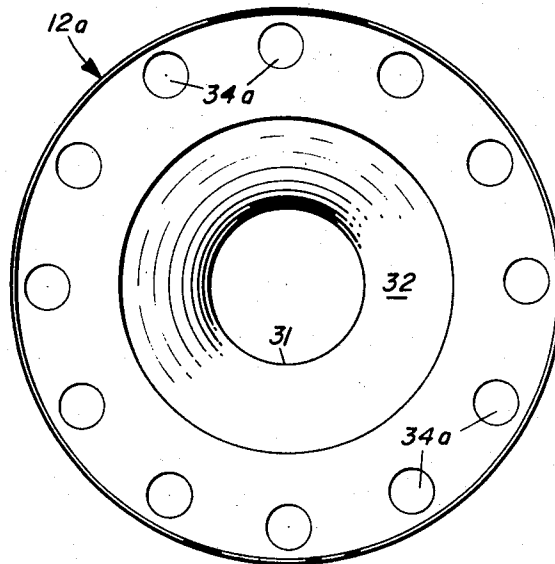


FIG. 4



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REGENERATIVE TILE FOR FUEL BURNER

The present invention relates to an annular casing having ceramic lined portions within which the burning of atomized liquid fuel is initiated and the invention more specifically pertains to the refractory structures in association with the shell for controlling the admission of air to the burning fuel.

An object of the invention is to provide structure often referred to as a regenerative tile for facilitating the burning of liquid fuels and a structure which will retain heat therein during the initial combustion of the fuel and structure for controlling the movement of air into the presence of the burning fuel so as to prevent carbon being deposited on the inner surfaces of the regenerative tile.

Other objects and features of the invention will be appreciated and become apparent as the present disclosure proceeds and upon consideration of the following detailed description taken in conjunction with the accompanying drawings wherein several embodiments of the invention are disclosed.

In the drawings:

FIG. 1 is an axial sectional view of a liquid fuel burner assembly illustrating the manner in which air is admitted to the presence of the burning fuel within the regenerative tile;

FIG. 2 is an elevational view of the downstream end of the tile and taken on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary axial sectional view of a modification of the regenerative tile, and

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3.

Referring to the drawings there is shown at 10 the wall of a furnace and which may be formed of refractory material. An opening 11 is provided in the furnace wall. A regenerative tile is shown generally at 12 in FIG. 1. It is formed of a substantially cylindrically shaped shell 14 which may be secured to an end wall 16 of the burner assembly in any suitable manner. An annular ceramic member 17 is supported within the shell 14 and a plurality of circumferentially spaced pins 18 may be employed for anchoring the annular member 17 in the downstream end portion of the shell 14. The downstream end of the ceramic member 17 may be of arcuate flared shape as indicated at 19 in FIG. 1.

A ring member 22 is supported by the shell 14 and is spaced from the upstream end of the ceramic member 17. The ring member 22 carries a flange 23 which forms a support for a second annular ceramic member 24. This ceramic member may be anchored in place by means of a plurality of circumferentially spaced pins 26 carried by the flange 23.

The second ceramic member 24 has a downstream face 28 which is disposed at right angles to the axis of the inner annular surface 29 of the first ceramic member 17. A relatively large opening 31 is provided in the ceramic member 24. An arcuate annular surface 32 forms the mouth of the opening 31.

The shell 14 is provided with a plurality of circumferentially spaced openings 34 disposed on the downstream side of the ring member 22. An annular passage 36 is formed between the inner annular surface 29 and the perimeter surface 37 on the ceramic member 24. Air entering through the openings 34 may move through the annular passage 36 in the direction of the arrows 30 shown in FIG. 1.

The end wall 16 may be supported on the furnace wall in any suitable manner such as by circumferentially spaced elements 41. Air may enter between these elements and move into the regenerative tile through circumferentially spaced openings 40 as indicated by the arrows 42. Air entering between the elements 41 may move in the direction of the arrows 43 and over the exterior of the regenerative tile.

Any type of mechanism may be provided for developing a generally conical spray of atomized liquid fuel within the regenerative tile and a fuel gun 51 may be provided for this purpose. The liquid fuel is atomized by any suitable gaseous medium and issues from the ports 53 in a substantially conical pattern. Ignition in any suitable manner provides for initial burning of the fuel within the area encased by the ceramic member 17. Air entering through the large openings 40 and in the direction of the arrows 42 moves axially of the regenerative tile and avoids whirling of the burning fuel to thereby prevent the deposit of unburned liquid fuel on the wall surface 29. Air entering through the openings 34 and moving through the annular passage 36 tends to prevent the deposit of any incompletely burned fuel on the wall of the tile.

In the modification shown in FIGS. 3 and 4 the ring member 22a is provided with openings 34a. Thus some of the air moving through the openings 40 moves in the direction of the arrows 56 and escapes through the annular passage 36. The contour of the downstream end of the ceramic member 12a may have inner and outer flared annular surfaces 57 and 58.

While the invention has been shown and described with regard to an overall assembly it will be appreciated that changes may be made in the combination of elements as well as changes in the various components. Such modifications and others may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. A regenerative tile for a fuel burner comprising, a substantially cylindrical shaped shell, an annular ceramic member mounted within a downstream portion of said shell, said ceramic member having a substantially cylindrical shaped inner surface, a second ceramic member supported within said shell adjacent the upstream end of the first ceramic member by a ring member carried by the shell, said second annular ceramic member having a peripheral surface of smaller diameter than said inner surface providing an annular passage between the perimeter of the second ceramic member and the inner surface of the first ceramic member, said second ceramic member having a central opening therein through which atomized liquid fuel may be projected for combustion within the first ceramic member, and said ring member having circumferentially spaced openings therein for admitting air to said passage.

2. A regenerative tile for a fuel burner comprising, a substantially cylindrical shaped shell, an annular ceramic member mounted within a downstream portion of said shell, said ceramic member having a substantially cylindrical shaped inner surface, a second ceramic member supported within said shell adjacent the upstream end of the first ceramic member, said second annular ceramic member having a peripheral

3

surface of smaller diameter than said inner surface providing an annular passage between the perimeter of the second ceramic member and the inner surface of the first ceramic member, said second ceramic member having an arcuate shaped inner surface defining a central opening therethrough of continuously decreasing cross-section with it's smallest cross-section adjacent to the downstream face of said second ceramic member, means comprising circumferentially spaced ports located within said central opening through which atomized liquid fuel may projected for combustion within the first ceramic member, and means adjacent the perimeter of said second ceramic member for ad-

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mitting air for movement through said passage.

3. A regenerative tile according to claim 2 wherein the means for admitting air for movement through said passage includes circumferentially spaced openings in the shell adjacent the upstream end of the first ceramic member.

4. A regenerative tile according to claim 2 wherein a ring member carried by the shell supports the second ceramic member.

5. The regenerative tile of claim 3 wherein said ring carries a flange and the second ceramic member is secured to the flange.

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