

Feb. 4, 1969

G. M. BITTERLICH

3,425,781

BURNERS

Filed Sept. 18, 1967

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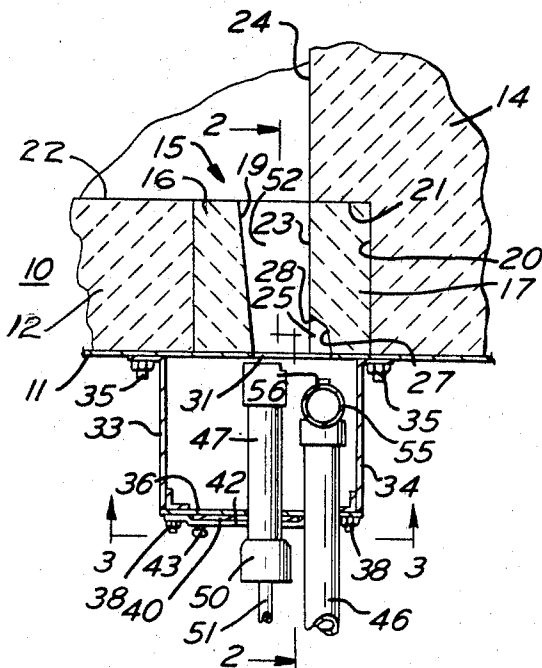
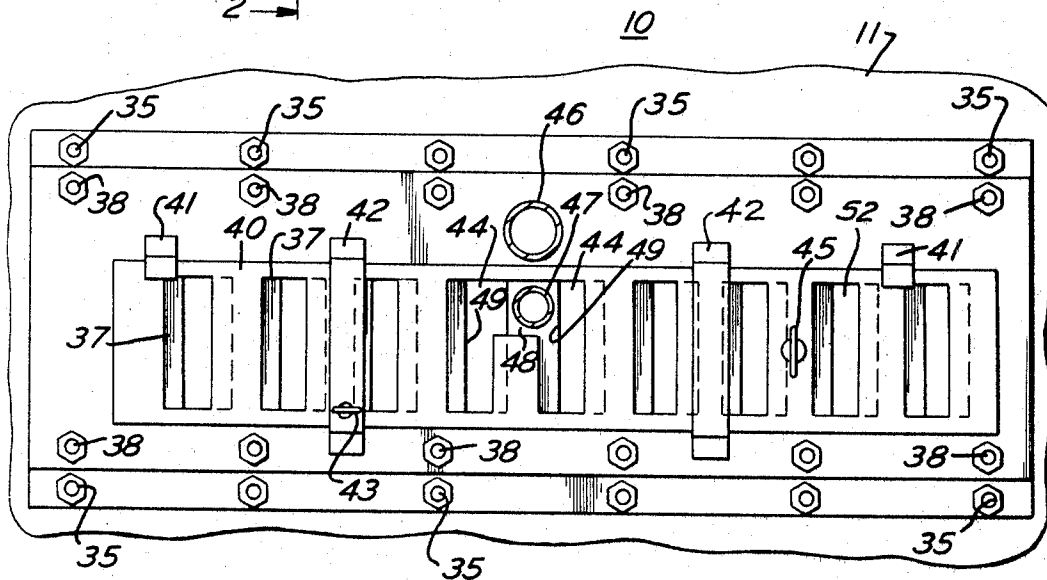


FIG. 1

FIG. 3



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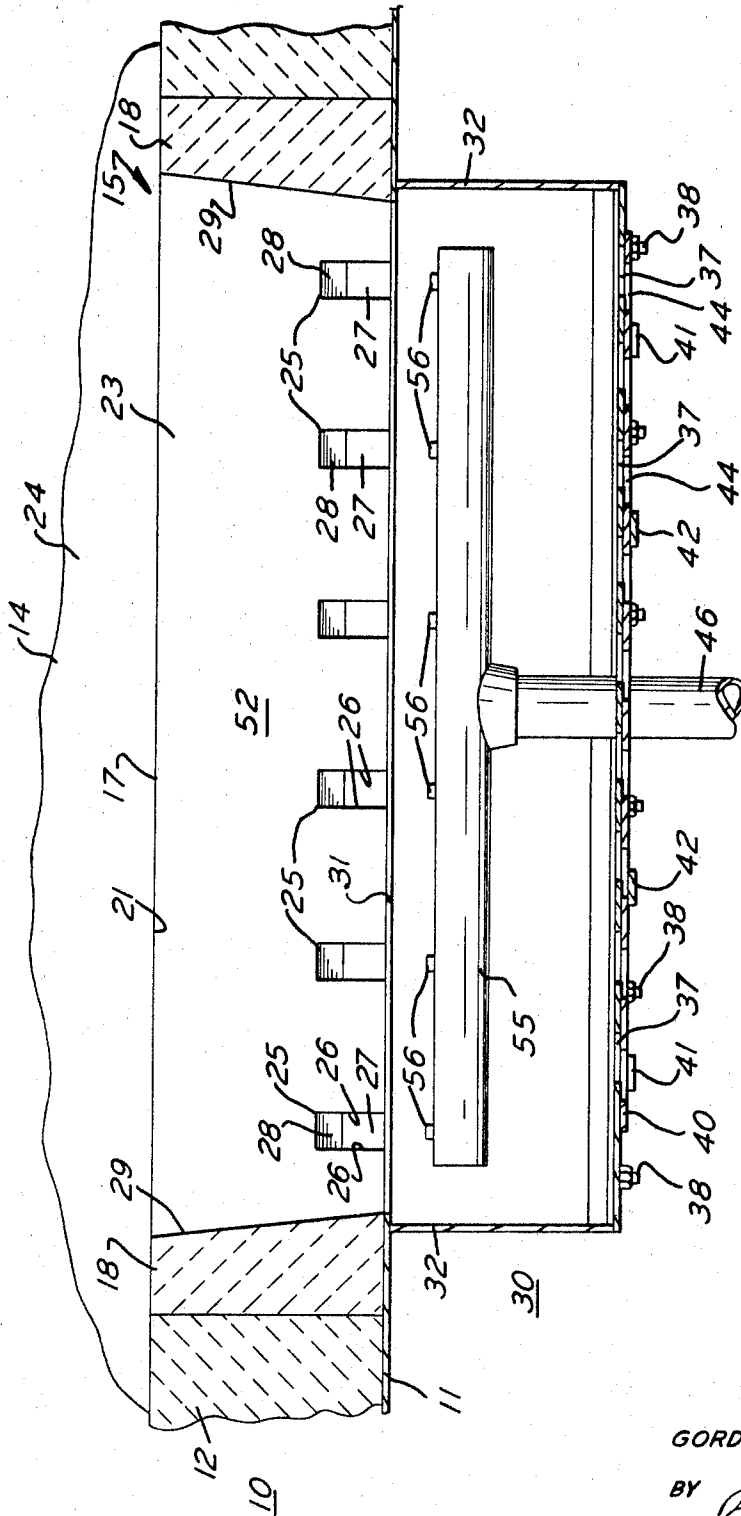


FIG. 2

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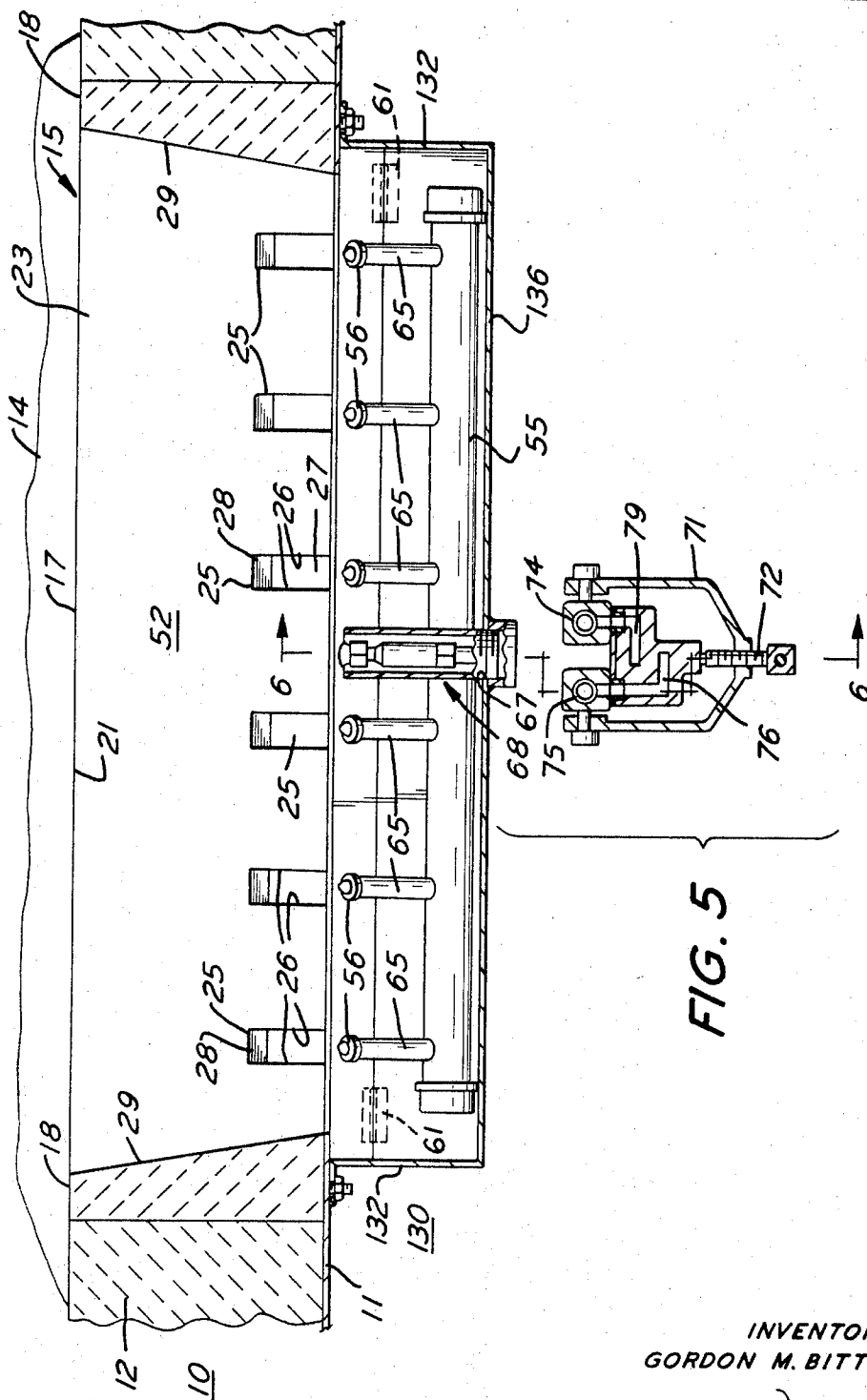


FIG. 5

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3,425,781
BURNERS

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Filed Sept. 18, 1967, Ser. No. 668,609

U.S. Cl. 431-178
Int. Cl. F23c 5/08

10 Claims

ABSTRACT OF THE DISCLOSURE

Heating apparatus for furnace walls comprising a gas burner in a well outside a burner block in a furnace wall and along a wall to be heated, the gas burner having a plurality of spaced gas delivery ports, and the burner block having an inclined slot for each gas delivery port. The well has a register in one wall thereof for regulating the induction of air for combustion. The burner block may optionally have an oil burner removably mounted with respect to a common passageway in the burner block with which the slots are also in communication.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to heaters and more particularly to heaters for furnace walls which are to supply radiant heat for petroleum refinery processes and the like.

Description of the prior art

It has heretofore been proposed to provide center and single wall up-draft heaters. In the U.S. Patent No. 2,659,424 to William Ferguson, there is shown combustion apparatus for such heaters. A gas burner unit, as there shown in which the gas and air are mixed before delivery through the burner imposes limitations on the total fuel input at each burner.

The heaters heretofore available did not provide uniform heating of the wall this being readily observable in the vari-colored appearance of the wall in use.

It has also heretofore been proposed to provide selectively or tandem fired oil and gas burners but the available structures involve complexities in the burner blocks or have other shortcomings.

SUMMARY OF THE INVENTION

It is the principal object of the present invention to provide burners for heating furnace walls which permit of high combustible input and proper control of air supplied for combustion of the fuel, while maintaining uniformity of heating of the wall from end to end.

It is a further object of the present invention to provide burners for heating furnace walls in which an improved relation between the burners and burner block is established to attain uniformity of heating of the wall.

It is a further object of the present invention to provide burners for heating furnace walls in which a gas burner with spaced gas delivery openings therealong is disposed in a well beneath a passageway in a burner block in the floor and in the wall, the well having an air register for controlling the air induced for combustion of the gas, and the gas burner being offset beneath the wall to be heated.

It is a further object of the present invention to provide burners of the character aforesaid in which an oil burner is optionally provided for selective or tandem operation for the oil burner being in direct communication with the burner block passageway.

It is a further object of the present invention to provide burners for heating furnace walls, one burner being

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gas fired and the other being oil fired, the burners being capable of selective operation or operation in tandem, and the burners being separately removable for inspection and cleaning so that operation may be continued with the remaining burner.

Other objects and advantageous features of the invention will be apparent from the description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part thereof, in which:

FIG. 1 is a vertical sectional view of one unit of a wall heating burner in accordance with the invention;

FIG. 2 is a vertical sectional view taken approximately on the line 2-2 of FIGURE 1;

FIG. 3 is a horizontal sectional view taken approximately on the line 3-3 of FIGURE 1;

FIG. 4 is a vertical sectional view of another unit of a wall heating burner in accordance with the invention having an oil burner associated with a gas burner;

FIG. 5 is a vertical sectional view taken along the line 5-5 of FIG. 4; and

FIG. 6 is a fragmentary sectional view of the base of the oil burner.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to FIGS. 1 to 3 of the drawings, a fragmentary portion of a furnace is illustrated which includes a bottom wall or floor 10, which preferably includes a metallic floor plate 11 and ceramic refractory lining 12, and a vertical wall 14, of ceramic refractory material, which may be the side or rear wall or the center wall of an up-draft heater or furnace of conventional type, or which may be a horizontal wall.

At spaced locations along the wall 14, a burner block assembly 15 is provided which includes a front block 16, a rear block 17 and end blocks 18 carried on the floor plate 11. The front block 16 has an inner upwardly and forwardly inclined face 19.

The rear block 17 is preferably inserted in an opening 20 beneath the wall 14. The upper face 21 of the opening 20 may be level with the upper face 22 of the lining 12. The rear block 17 has a vertical face 23 which is preferably aligned with the vertical face 24 of the wall 14 and at a plurality of locations therealong corresponding to burner tips, as hereinafter pointed out, has spaced slots 25 with substantially parallel side faces 26, a rear inclined face 27 and an upper inclined face 28 in a plane which, if extended, would intersect the face 19 about one third of the distance down from the top thereof. In a specific embodiment the width between the side faces 26 will be about one inch, the maximum depth about one inch and the height about two inches.

The end blocks 18 have inner outwardly inclined faces 29. A passageway 32 is provided in the burner block assembly bounded by the faces 19, 23 and 29 and with which the slots 25 are in communication and in which combustion can occur as pointed out below.

Beneath the burner block assembly 15, and at an opening 31 in the bottom wall 10 below the passageway 32, an air register 30 provides a well. The register 30 has end walls 32, a front wall 33 and a rear wall 34 connected to

the end walls 32 and secured by studs 35 to the floor plate 11, and a bottom wall 36 connected to the end walls 32, the front wall 33 and the rear wall 34. The wall 36 has a plurality of spaced air inlet openings 37 and is detachably connected to the front and rear walls 33 and 34 by studs 38.

Slidably mounted on the bottom wall 36, a shutter plate 40 is provided, held by edge brackets 41 and by cross brackets 42. One of the cross brackets 42 is preferably provided with a locking screw 43 which is adapted to engage the shutter plate 40 and hold it in a selected position of adjustment.

The shutter plate 40 has a plurality of spaced air inlet openings 44 movable with respect to the openings 37 from closed to open position, thereby to determine the admission of air manually operable positioning handle 45 extends downwardly from the shutter plate 40.

A main fuel gas supply pipe 46 is provided which extends through the bottom wall 36 offset from the shutter plate 40.

A pilot gas-air pipe 47 also extends through the bottom wall 36 and a slot 48 connecting two central air inlet openings 44 permits sliding movement of the shutter plate 40 and the edges 49 of those openings provide limit stops by engaging the pipe 47.

The gas-air pipe 47 can have a venturi 50 for air mixing and a fuel gas supply pipe 51 extending into the venturi 50.

The fuel gas supply pipe 46 has a horizontally disposed longitudinally extending manifold 55 carried thereon with spaced nozzles or burner tips 56, which may be of any desired type each with a gas delivery port. The manifold 55 is below the rear block 17 and the openings of the nozzles or burner tips 56 are inset with respect to the face 23 and also with respect to the face 24 (see FIG. 1).

The nozzles or burner tips 56 are each centrally located along the manifold 55 with respect to the slots 25 (see FIG. 2).

The mode of operation will now be pointed out.

A flame from the combustion of gas delivered through the pipe 51 with air admixed in the venturi 50 is available for ignition.

Combustible gas, such as raw gas, supplied through the pipe 46 and manifold 55 is discharged through the nozzles or burner tips 56 which discharges gas for an air inspirating effect. The gas thus comes into immediate contact with air supplied through the air inlet openings 37 as controlled by the positioning of the air inlet openings 44 with respect thereto. The shutter plate 40 may be positioned as desired and to permit of the desired air inflow by the induced draft within the furnace.

The flame attendant upon the burning of gas from the nozzles or burner tips 56 in confined within the space or passageway 52 and extends from just above the upper ends of the slots 25 beyond the passageway 52 and upwardly along the face 24. The heat from that flame, as well as that transferred directly to the wall 14 from the burner block 17 and the rear ends of the burner blocks 18 beneath the wall 14 is effective for heating the wall 14. The movement of the flame upwardly along the wall 14 has a scrubbing action due to the Coanda effect.

The slots 25 are effective for directing the gas and air for combustion against the face 19 with reflection therefrom toward the upper part of the block 17 and the lower part of the wall 14.

It has been found in practice that substantially uniform heating of the wall 14 is effected and that this occurs upwardly in the wall 14 for a substantial distance.

Referring now more particularly to FIGS. 4, 5 and 6, in place of the register 30, a register 130 is provided having end walls 132, a front wall 133 and a rear wall 134 connected to the end walls 132 and secured by studs 35 to the floor plate 11, and a bottom wall 136 connected to the end walls 132, the front wall 133 and the rear wall 134. The rear wall 134 has a damper plate 60 carried by hinges 61 on the rear wall 134, with a quadrant 62 of well known

type at each end permitting of adjustment to the desired extent of opening for air inlet control.

The main fuel gas supply pipe 146 extends through an opening 63 in the damper plate 60 and has a quick detachable connection 64 interposed thereon so that the manifold 55 may be disconnected, and withdrawn for servicing. The positioning of the manifold 55 may require connector pipes 65 between the manifold 55 and the burner tips 56 to properly locate the burner tips 56 with respect to the slots 25.

The bottom wall 136 has an opening 67 through which an oil burner assembly 68 can be inserted. The assembly 68 is detachably connected to a manifold 70 and held in assembled relation by a pivoted yoke 71 which carries a clamping screw 72.

The manifold 70 has an oil supply pipe 74 and a steam supply pipe 75 connected thereto. The manifold 70 has an oil passageway 76 therein for detachable connection to an oil passageway 77 in the burner assembly 68. The passageway 77 extends to the oil burner nozzle 78 for delivery of oil thereto.

The manifold 70 also has a steam passageway 79 therein for detachable connection to a steam passageway 80 in the burner assembly 68. The passageway 80 extends to the oil burner nozzle 78 for supplying steam to atomize the oil in a well known manner.

It will be noted that the oil burner nozzle 78 is centrally located at the inlet of the passageway 52 for delivery of atomized oil thereinto, preferably in a flat diverging or fan pattern.

The mode of operation will now be pointed out.

If gas is to be burned it is supplied to the manifold 55 and discharged through the burner tip 56 as previously explained.

If oil is to be burned it is supplied through the oil supply pipe 74 and through the passageways 76 and 77 to the oil burner nozzle 78. Steam, supplied through the pipe 75 and passageways 79 and 80, is employed to atomize the oil, and discharge it preferably in a flat diverging pattern into the passageway 52 for combustion. The combustion will be initiated within the passageway 52 a short distance from the oil burner nozzle 78 and will continue within the passageway 52 beyond the block 17 and upwardly along the face 24 of the wall 14.

Air for combustion is supplied through the register 130, the induction being controlled by the positioning of the damper plate 60.

If only a limited supply of combustible gas is available at a particular time, or if maximum heating effect is desired both gas and oil may be supplied for combined or tandem operation.

The combustion of the respective fuels will be initiated as previously explained in the passageway 52 and continue therebeyond as previously explained.

The burner constructions heretofore described can, of course, be employed in multiples, dependent upon the horizontal dimensions of the wall 14.

Either the gas manifold 55 and burner tips 56, or the oil burner assembly 68 may be disconnected and removed for servicing, if desired, with the remaining burner being available for continued operation.

I claim:

1. Combustion apparatus for a furnace having a first wall in meeting relation to a second wall to be heated which second wall has an exposed face comprising
 - a burner block assembly in said first wall,
 - said burner block assembly having a first block portion in said second wall with an outer face aligned with the face of the second wall,
 - said burner block assembly having a second block portion in said first wall in spaced parallel relation to said first block portion,
 - said block portions having an interior passageway therebetween,

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- a gas manifold in parallel relation to said first and second block portions,
 a combustible gas delivery pipe connected to said manifold for the supply of gas thereto,
 said manifold having a plurality of spaced gas delivery ports located outwardly of said first block portion and discharging gas into said passageway, and
 a well member in enclosing relation to said manifold, said well member having portions for the supplying of air into the interior of said well member.
2. Combustion apparatus as defined in claim 1 in which said first block has a slot in said outer face interiorly of each of said gas delivery ports.
3. Combustion apparatus as defined in claim 1 in which said first block portion has a slot in said outer face interiorly each of said gas delivery ports, and each of said slots has an angularly disposed face in a plane in intersecting relation to said second block portion.
4. Combustion apparatus as defined in claim 1 in which said well member includes an air register, and said register has a movable portion for regulating the combustion air delivery thereinto and to and beyond said manifold into said passageway.
5. Combustion apparatus as defined in claim 1 in which said first wall is a floor and said second wall is a vertical wall, said exposed face of said second wall is vertically disposed, and said manifold is horizontally disposed.

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6. Combustion apparatus as defined in claim 5 in which said floor has an upper face, and said first block portion is beneath said second wall.
7. Combustion apparatus as defined in claim 6 in which said gas delivery openings are below said first block, and said first block portion has a slot above each of said gas delivery openings.
8. Combustion apparatus as defined in claim 7 in which each of said slots has an upper inclined face in a plane in intersecting relation to said second block portion below the top thereof.
9. Combustion apparatus as defined in claim 1 in which an atomizing oil burner nozzle is provided in said well member, and discharging atomized oil into said passageway, and an oil supply pipe is provided connected to said nozzle.
10. Combustion apparatus as defined in claim 9 in which said oil supply pipe and said gas delivery pipe have detachable connections therein.

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