

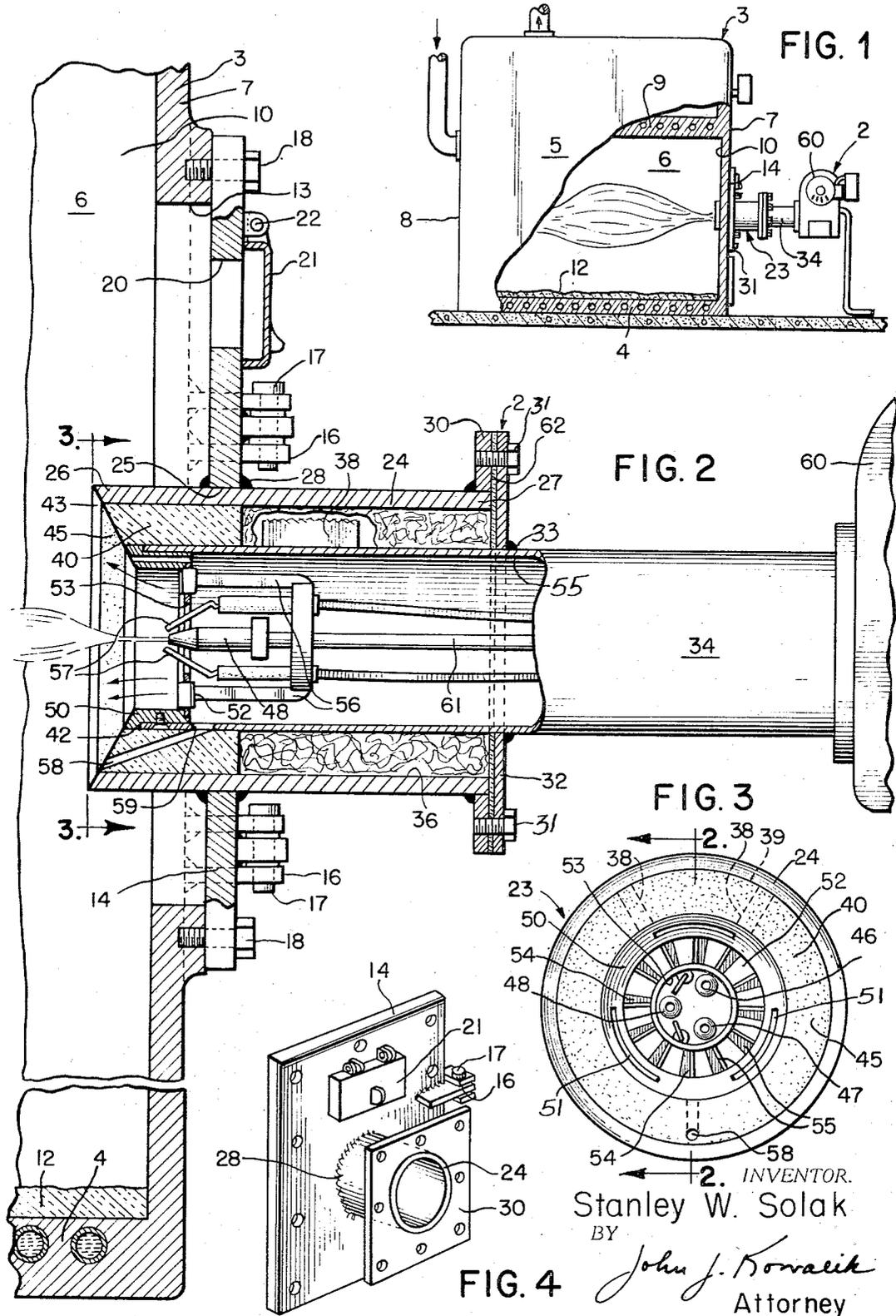
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FORCED DRAFT BURNER

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FORCED DRAFT BURNER

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ABSTRACT OF THE DISCLOSURE

A fuel air mixture burner having a frustoconical head and a fuel injector atomizing fuel through the head and an air system having a diffuser swirling air about the fuel and a choke directing axial air streams about the swirling mixture between the same and the interior of the cone of the burner head and a mounting of the burner from a boiler in the upper portion of the combustion chamber.

This invention relates to burners and more specifically to oil burners.

Forced draft oil burners have been heretofore used with refractory lined combustion chambers. These burners had been placed at the bottom of the boiler and the burner projected slightly into the combustion chamber through an opening in the refractory. In order to effect a heat transfer it was required that the refractory, which of itself is a poor thermal conductor, be heated to transmit radiant heat into the boiler coils and most of the heating was accomplished by convection air currents passing through the boiler out of the top thereof.

Contrary to prior practices I have devised a system for heating the boiler through the fire door and injecting the flame into the upper end of the combustion chamber in which the refractory is entirely eliminated whereby the flame directly emanates radiant heat as well as hot gases. Thus, particularly in wet base boilers, a 360° dispersal of the heat is obtained and in actual practice such an arrangement has reduced the fuel consumption from 40-60 percent and the heat exchange medium would be heated directly to desired temperature within a few minutes of operation of the burner as contrasted with previous firings which would take up to half an hour or even longer to bring the boiler up to operating temperatures.

To this end, it is my primary object to provide a novel burner having an insulated nozzle mechanism and which functions to spread the flame and obtain improved combustion of the oil. I have used my novel burner in experimental installations extensively and have found the fuel to burn clean so that the boiler nor the burner had to be cleaned.

A more specific object is to provide a novel burner comprising a tube encasing a vaporizing nozzle, the tube functioning to support the burner in the combustion chamber and having a frusto-conical outlet functioning to swirl the air-entrained liquid fuel to obtain an efficient highly volatile mixture.

The invention comprehends a novel mounting for a burner through the fire doors wherein the burner may be swung with the doors to permit quick inspection of the boiler.

These and other objects and advantages inherent in and encompassed by the invention will become more readily apparent from the specifications and the drawings, wherein:

FIGURE 1 is a side elevational view of a boiler partially broken away and in section with the invention applied thereto;

FIGURE 2 is an enlarged sectional view of the novel burner taken substantially on the line 2-2 of FIGURE 3;

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FIGURE 3 is an end view of the burner tube taken substantially on line 3-3 of FIGURE 2; and

FIGURE 4 is a perspective view of the novel mounting arrangement.

Description of the invention

The novel burner device generally designated 2 is shown in association with a typical wet base boiler 3 which includes a base 4, sides 5, 6 and front and rear sides 7 and 8. These sides together with the flue structure 9 define a combustion chamber 10.

This chamber 10 has a thin layer of refractory 12 applied to the top of the base 4 interiorly of the combustion chamber since the typical thick refractory lining has been eliminated and if such thin lining were not provided, the water or fluid in the base, which is relatively thin, would vaporize too rapidly and turn to steam.

As best seen in FIGURE 2, the front side wall 7 of the boiler comprises an opening 13 closed by a fire door structure 14 which is provided with a pair of hinges 16, 16 connected to the wall 7 and providing pivoting for the door 14 about pins 17, 17 on a vertical axis. The door 14 may be bolted as by bolts 18, 18 to the wall 7 and may be provided with an inspection port 20 with a cover 21 hinged at its upper edge as at 22 to the door 14 for gravitational swinging movement about a horizontal axis to closed position over port 20.

The door structure is provided preferably medially thereof with an outer tube 24 of a burner 23 which extends through an opening 25 in the door and has an inner end portion 26 within the combustion chamber and an outer end portion 27 projecting externally of the boiler. This outer tube or cylinder 24 is secured preferably as by welding at 28 to the door 14. It will be understood that the tube 24 could be clamped otherwise such as by a ring or bolts to the door 14.

The outer end portion 27 of tube 24 is provided with a mounting plate 30 to which is secured as by bolts 31 a companion plate 32 which in turn is secured as by welding at 33 to the inner burner tube 34.

The plates 30, 32 may have an asbestos gasket interposed therebetween to insure a tight connection.

In the space 36 between the tubes and preferably within the outer portion 27, there is packed rock wool insulation to minimize heat transfer between the tubes. Also there are provided within this space a pair of circumferentially spaced support lugs 38, 38 welded to the upper portion of tube 34 and abutting against the interior surface 39 of the outer tube 24.

The forward end portion 26 of the outer tube 24 is provided with a refractory cement or a molded asbestos ring 40 which is molded into the space between the inner and outer tubes, said inner tube having an inner edge 42 terminating short of the inner edge 43 of the outer tube. I have found that in larger installations the outer tube may extend as much as two inches beyond the inner tube and in smaller installations this spacing may be as small as one half inch. In the large installations the outer tube may be eight or ten inches in diameter and the inner tube about four or five inches. The inner edge 45 of the ring 40 must be frusto-conical in order to provide a proper dispersal of the volatile fluid and air and to cause the same to swirl as it is being atomized by the injection nozzles 46, 47 and 48. This surface 45 is rough textured to provide an air turbulating condition for properly mixing the air with the fuel.

In the present instance a three-nozzle burner is illustrated, however one or two nozzles may be used in other applications.

The front end of the inner tube is provided with a choke ring 50 which is chosen for the particular applications to be used. Such choke ring restricts the flow of the

air by providing axial openings 51 therethrough of predetermined dimensions and arrangements. The appropriate choke ring having the required openings is chosen for each application.

It will be noted that within the choke ring 50 there is provided a vaned diffuser 52 which has a central opening 53 through which the nozzles 46-48 project and intermediate its inner and outer peripheries the diffuser is provided with a plurality of axial openings 54 therethrough with a vane at each opening angled circumferentially and serving to cause the air which issues from the air chamber 55, defined by the interior of the inner tube, to swirl about the atomized fuel and to entrain such fuel and carry the same in ever increasing cockshell-like orbits into the combustion chamber.

It will be realized that the nozzles which are associated with a conventional spark igniter 57 and the diffuser which is a preferably annular plate mounted via stand-off supports 56 to the nozzles, are adjustable axially within the inner tube so as to obtain the proper relation of the air and flame front whereby to utilize the novel burner head construction in an optimum manner.

Since at times there are oil drippings accumulating in the inner tube, I customarily position the burner with a slight downward incline into the boiler and I provide a drain 58 in the lower end of the ceramic or refractory ring 40 which communicates with an opening 59 in the lower side of the inner tube as best seen in FIGURE 2.

The inner tube communicates with an air pump or fan 60 and the nozzles are connected via tubing 61 to a suitable pump which delivers the fuel from a suitable tank as well known to those skilled in the art. The tubes are axially adjustable by changing the thickness of the gasket 62 between the plates 30 and 32.

It will be understood that a preferred form of the invention has been described in the foregoing specification. However, other forms will become readily apparent to those skilled in the art within the scope of the appended claims.

I claim:

1. A burner comprising a burner head having an inner tube and an outer tube, means for atomizing flammable fluid mounted in said inner tube, means mounted in said inner tube for diffusing and entraining the atomized fluid to provide a volatile mixture including means for developing a swirling volume of said mixture, heat resistant cone means providing a frusto-conical surface between said inner and the outer tubes for controlling the diffusion of said mixture as it exits from the burner, and means for directing a stream of air axially of the tubes within the cone means between said swirling volume of said mixture and said frusto-conical surface, and said means for di-

recting a stream of air axially comprising choke means in said inner tube adjacent to said surface providing axially directed air openings into said cone means and said diffuser means comprising an apertured structure concentric with said choke means and having a plurality of circumferentially directed vanes oriented to swirl the air about the means for atomizing the fuel.

2. A burner comprising a burner head having an inner tube and an outer tube, means for atomizing flammable fluid mounted in said inner tube, means mounted in said inner tube for diffusing and entraining the atomized fluid to provide a volatile mixture, and heat resistant means providing a frusto-conical surface between said inner and the outer tube for controlling the diffusion of said mixture as it exits from the burner and means for mounting said burner to a boiler through the fire door thereof and providing the sole support thereof, means including air and fuel pump means mounted on the outer end of said inner tube, said outer tube terminating at its outer end intermediate the ends of the inner tube, means removably interconnecting the outer end of the outer tube to said inner tube, mounting means connected to said outer tube intermediate its ends, and means for removably connecting said mounting means to the boiler wall, said burner having the inner ends of said tubes projected into the boiler adjacent to the upper end of the combustion chamber thereof.

3. The invention according to claim 1 and said tubes oriented substantially horizontally and means between said inner tube and said outer tube for adjusting the radial spacing therebetween, and insulation in the space between said tubes.

4. The invention according to claim 1 and means mounting said burner from the boiler for swinging movement about a vertical axis for positioning the burner at various angles within the boiler.

References Cited

UNITED STATES PATENTS

40	1,733,499	10/1929	Klemm	158—2
	1,743,674	1/1930	Johnson	158—1.5
	2,513,645	7/1950	Hallinan	158—76
	3,153,438	10/1964	Brzozowski	158—76
45	3,202,197	8/1965	Knoblock	158—4
	3,221,797	12/1965	Wall	158—76
	3,267,984	8/1966	Reed et al.	158—1.5

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