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OIL BURNER

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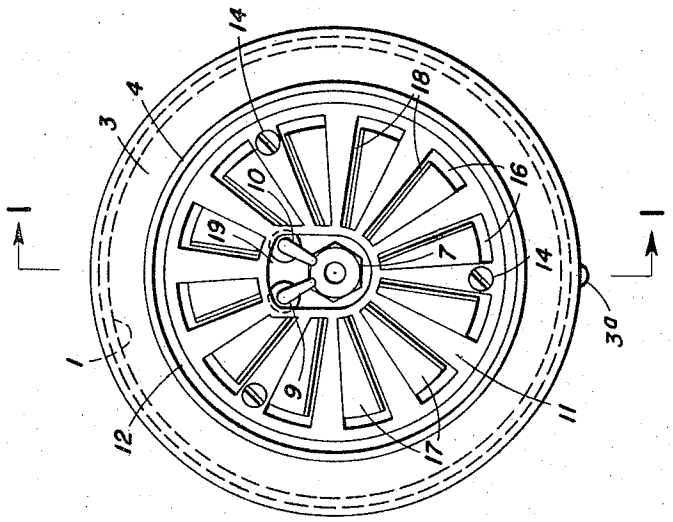


Fig. 2.

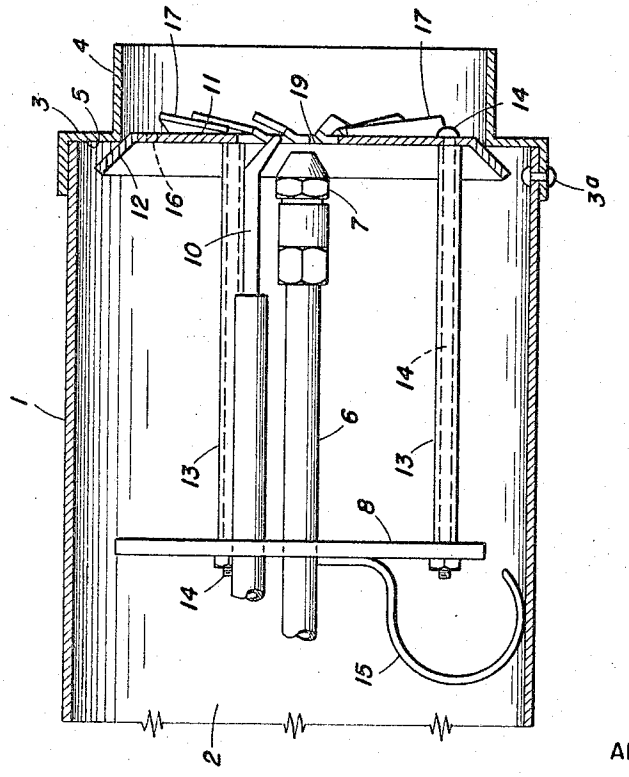


Fig. 1.

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OIL BURNER

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This invention relates to new and useful improvements in oil burners and more particularly to a flame retention burner.

With conventional burners, a combustion chamber is required to assure burning any of the oil that escapes the air pattern. By proper design of burners firing with flame retention characteristics, all the oil spray may be confined within the air pattern thus eliminating the need for a combustion chamber. For wet base boilers the elimination of the insulating effect of the combustion chamber may result in an increase of approximately twenty percent in the boiler output. In addition, flame retention firing greatly improves flame stability thus eliminating the pulsation problem commonly obtained with conventional burners. Accordingly, flame retention burners are able to increase boiler output, improve flame stability, and eliminate the need for a combustion chamber.

Flame retention firing is accomplished by producing a more rapid mixing of the oil spray with the combustion air such that a proper air-fuel ratio for combustion is attained at the end of the air tube. According to the present invention this rapid mixing is accomplished by increasing the air turbulence by a spinner attached to the inner assembly. Employed with the burner is a nose tube which helps establish the origin of the flame at the face of the spinner. The nose tube creates a low pressure area with eddy currents at the tip of the spinner blades. This in turn helps establish the origin of the flame and results in improved flame stability.

Also according to this invention an annulus is employed to provide air at the periphery of the flame to insure that the oil spray is confined within the air pattern. The spinner and annulus are fabricated as a unit to insure concentricity of the annulus while the mating nose tube is utilized to maintain spinner centering with respect to the air tube. This improved concentricity gives a more symmetrical flame with less smoke.

Accordingly, it is an object of this invention to provide an oil burner having an increased output and improved flame stability.

Another object is to provide a burner which permits elimination of the usual combustion chamber thereby improving the heat transfer.

Another object is to provide means for assuring concentricity of the air spinning plate member to the burner air tube.

The foregoing and other objects will become apparent from the following description of the invention.

In the accompanying drawings to be taken as a part of this specification, there is fully and clearly illustrated a preferred embodiment of the invention, in which drawings,

FIGURE 1 is a view in longitudinal vertical section through the air tube portion of a pressure type oil burner, and

FIGURE 2 is an end view of the burner, looking at its discharge end.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it

is to be understood that the phraseology or terminology employed is for the purpose of description and not of limitation.

Referring to the drawings by characters of reference, the numeral 1 designates an air tube which is a cylindrical metal casing extending at its inlet end 2 from an air blower or fan which is not shown as the construction is well understood in the art. The forward or front end portion of the air tube 1 terminates in a nose tube member 3 which fits on the end of the air tube 1 and is secured thereto such as by the fasteners 3a. The nose tube member 3 has its discharge end portion 4 of reduced diameter relative to the air tube 1 providing a forward extending cylindrical wall and an annular shoulder 5.

Within the air tube 1 is the oil supply tube or pipe 6 which leads from the usual fuel pump, not shown, and terminates at its discharge or front end in a spray nozzle 7. The pipe 6 is supported intermediate its ends by a plate member 8 having an aperture therethrough through which the pipe 6 extends. Also extending through apertures in the member 8 are a pair of ignition electrodes 9 and 10 terminating just forward of and above the nozzle 7.

The plate member 8 supports or carries an air spinning plate or spinner 11 having an outwardly and rearwardly flaring circumferential flange or edge portion 12. The plate members 8 and 11 are spaced apart by equispaced tubular spacers 13 and are secured together by bolts 14 passing through the plate members and the tubes. The nose tube shoulder 5 receives the flange 12 which abuts thereagainst, thus centering the plate member 11 and the unit assembly supported therewith relative to the nose tube wall 4. A foot member 15 rests on the inside bottom surface of the air tube 1 and supports the plate member 8.

The spinner 11 has an annular series of apertures 16 for the discharge of a hollow cylindrical air stream from the air tube 1. The elongated curved apertures 16 are spaced concentrically inwardly from the flange 12 and wall 4. Each of the apertures 16 is subtended by a vane or blade 17 formed by bent out portions of the plate member 11. Each vane is bounded by a radial slot 18 and by end slots which define the apertures 16.

An opening 19 in the spinner 11 surrounds the nozzle 7 which terminates closely adjacent thereto, for example one quarter inch from the plane of the spinner 11. Thus the blades 17 impart a swirling motion to the air exiting from the air tube 1 and the spraying oil is thus surrounded by a primary air stream into which the oil droplets discharge to mix therewith for ignition by the electrodes 9 and 10. The ignited fuel mixture burns adjacent the discharge or front face of the spinner 11.

Due to the air flowing through the apertures 16, a cylinder of air issues therefrom thereby providing air at the periphery of the flame to insure that the oil spray is confined within the cylindrical air pattern. Although the apertures 16 do not define a full and complete annulus, the blades 17 adjacent thereto gives the air a swirling action which will pull the air issuing from the apertures 16 around so that it will form a full cylindrical sheet of air around the flame.

With the construction as defined above, the cylindrical sheet of air will be of even force and magnitude all around because the spinner and apertures 16 are fabricated as a unit. Thus, even if the burner assembly became slightly misaligned in the air tube 1, the apertures 16 would still provide a uniform cylindrical curtain of air to confine the oil spray. This is contrasted to a more conventional construction where a spinner which does not have apertures 16 becomes misaligned in the air tube thereby providing an uneven gap about the periphery of the spinner relative

to the air tube, thereby resulting in an uneven air pattern.

In the present invention the flanged peripheral edge **12** of the spinner mates with the shoulder **5** of the nose tube to maintain centering of the spinner with respect to the air tube.

It will be observed that there will be an outwardly directed radial component of air at the ends of the spinner blades. This outwardly directed air flow hits the nose tube **4** and is redirected towards the center of the nose tube. As this air hits the nose tube it starts to recirculate setting up eddy currents which create a low pressure tending to pull oil droplets radially outwardly from the nozzle **7**. Thus the low pressure resulting from these eddy currents pulls the oil droplets through a turbulent area in front of the spinner **11** so that there is thorough mixing of air and oil resulting in combustion taking place across the full face of the spinner.

From the above description it will be seen that the apertures **16** provide a cylindrical curtain of air in which the oil spray is confined and that this cylindrical curtain of air is even all around since the apertures **16** are made in the spinner plate. The flanged periphery **12** of the spinner plate mates with the shoulder **5** of the nose tube to insure the concentricity of the spinner relative to the nose tube. Further the nose tube functions to create a reduced pressure adjacent the inner periphery thereof tending to pull oil drops from the oil spray thereby establishing origin of the flame across the face of the spinner.

While the instant invention has been illustrated and disclosed with reference to the particular embodiments thereof, it will be readily understood that variations and modifications thereof may be made without departing from the spirit and scope of the instant invention.

What is claimed is:

1. In an oil burner, an air tube, fuel nozzle means in said air tube, a nose tube at the discharge end of said air tube having a diameter less than that of the air tube to thereby provide an annular shoulder, a spinner plate having a substantially planar peripheral flaring portion seating against such shoulder so as to center said spinner plate relative to said nose tube, said spinner plate having radially extending vane members and cooperating openings to spin air discharging therefrom, said spinner plate also having a series of apertures radially out board of said vanes forming a substantial cylindrical air discharge opening, said apertures providing a cylindrical curtain of air which confines the oil spray issuing from said fuel nozzle, said nose tube having a cylindrical wall portion extending forwardly of said spinner plate, said wall portion providing a surface to deflect radial components of air leaving said vane members towards the center of the nose tube thereby creating eddy currents and creating a low pressure adjacent the inner surface of the nose tube tending to pull oil droplets radially outwardly from the fuel nozzle through the turbulent area in front of the spinner plate so that there is thorough mixing of air and oil resulting in combustion taking place across the face of the spinner plate.

2. In an oil burner, an air tube, a fuel nozzle means in said air tube, a nose tube at the discharge end of said air tube having a diameter less than that of the air tube to thereby provide an annular shoulder, a spinner plate having a substantially planar diameter less than that of said air tube but greater than that of the reduced internal diameter of the nose tube, said spinner plate having a peripheral flaring portion seating against such shoulder so as to center said spinner plate relative to said nose tube, said spinner plate having radially extending vane members and cooperating openings to spin air discharging therefrom, said spinner plate also having a series of apertures at the radial ends of said vanes forming a substantial cylindrical air discharge opening at the radial end of said vanes, said apertures providing a cylindrical curtain of air which confines the oil spray issuing from said fuel nozzle, said nose tube member having a cylindrical wall portion extending forwardly of said spinner plate, said wall portion providing a surface to deflect radial components of air leaving said vane members towards the center of the nose tube thereby setting up eddy currents and creating a low pressure adjacent the inner surface of the nose tube tending to pull oil droplets radially outwardly from the fuel nozzle through the turbulent area in front of the spinner plate so that there is thorough mixing of air and oil resulting in combustion taking place across the face of the spinner plate.

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