Jan. 30, 1951 S. C. TOWAR 2,540,018

VAPORIZING OIL BURNER

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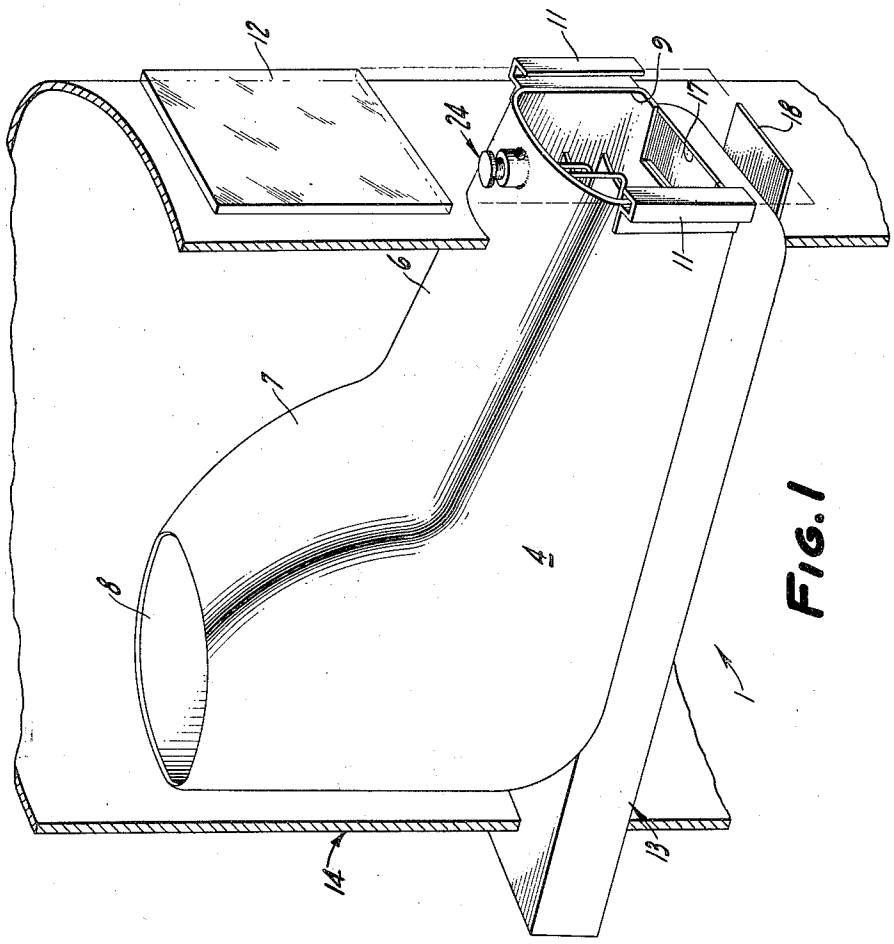


FIG. 1

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FIG. 2

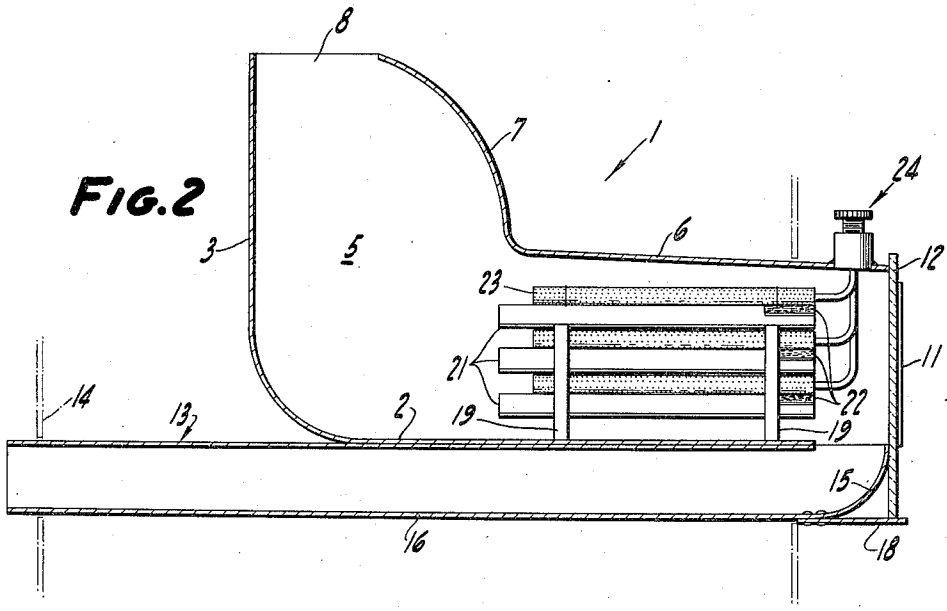


FIG. 3

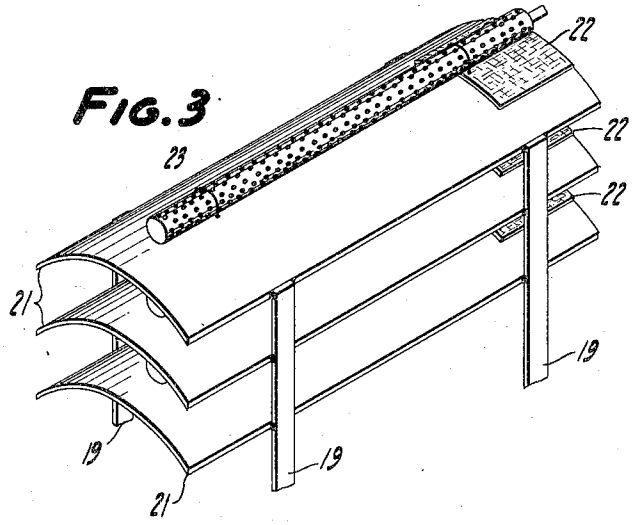
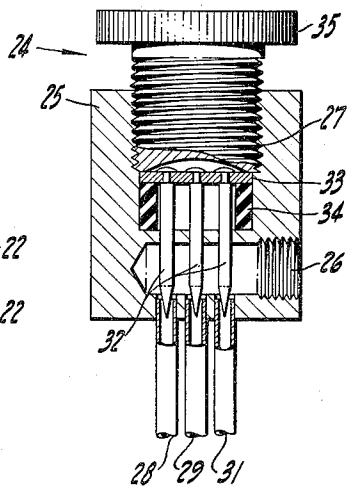


FIG. 4



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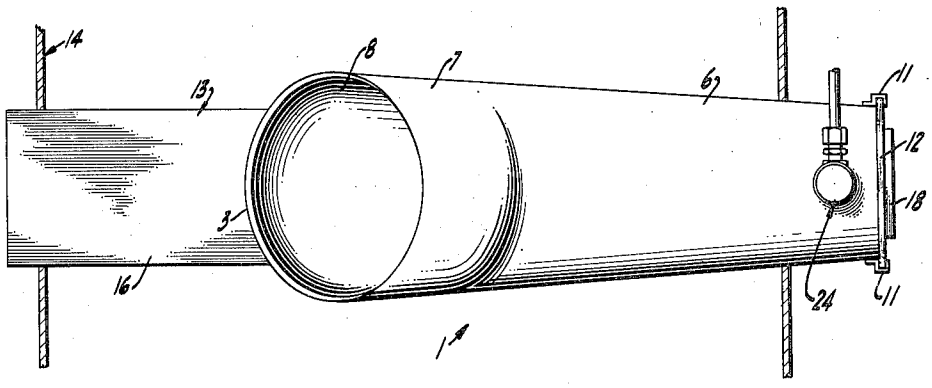


FIG. 5

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VAPORIZING OIL BURNER

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Application February 24, 1947, Serial No. 730,260

2 Claims. (Cl. 158—4)

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This invention relates in general to a burner unit designed for use in furnaces, space heaters and the like, and has for its object the provision of a compact oil burner unit including a burner shell, an air preheater formed as an integral part of the shell, a stack of fuel distributors mounted within the shell and valve means for controlling the fuel delivered to each of the distributors.

A further object of the invention is the provision of a burner shell and air preheater of such form as to produce a venturi action at the juncture thereof and a high degree of turbulence in the air as it passes through the shell and over the fuel distributing units.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where that form of the invention which has been selected for illustration in the drawings accompanying and forming a part of the present specification is outlined in full. In said drawings, one form of the invention is shown, but it is to be understood that it is not limited to such form, since the invention as set forth in the claims may be embodied in a plurality of forms.

Referring to the drawings:

Fig. 1 is an isometric projection of an oil burner unit embodying the objects of my invention.

Fig. 2 is a vertical longitudinal mid-section taken through the burner unit illustrated in Fig. 1.

Fig. 3 is an isometric projection of the stack of fuel distributors forming part of my burner unit.

Fig. 4 is a vertical mid-section of the multiple needle valve used for controlling the delivery of oil to the distributors.

Fig. 5 is a top plan view of the burner illustrated in the above figures.

The burner unit illustrated in these various figures comprises a shell or combustion chamber of elbow form generally designated by the numeral 1 and including a floor 2, a back wall 3, opposed side walls 4 and 5, an arched, rearwardly inclined top wall 6 and, an arch 7. The side walls 4 and 5 diverge rearwardly and merge with the back wall 3, top wall 6 and arch 7 to form a streamlined combustion chamber devoid of sharp corners.

Defined by the terminating edges of the arch 7, back wall 3 and side walls 4 and 5 is a generally circular outlet 8. And defined by the forward edges of the bottom wall 2, side walls 4 and 5 and top wall 6 is a generally rectangular opening 9. Fastened along the forward edge of

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each of the side walls 4 and 5 is a channel 11 and slidably disposed within these channels across the opening 9 is a Pyrex glass window 12.

Fastened to the lower face of the bottom wall 2 is a forwardly converging air preheating duct 13 of generally rectangular cross-section. The rear open end of the duct 13 preferably extends rearwardly of the back wall 3 and through the rear wall 14 of the furnace or space heater within which my burner unit is designed to be mounted so as to serve as a cold air intake. The forward end 15 of the bottom wall 16 of the air duct is upturned so that its forward edge is in alignment with the forward end of the burner unit. Communication between the duct 13 and the combustion chamber is effected through a rectangular opening 17, defined by these two members. Since the air duct 13 converges forwardly and communicates through the restricted opening 17 with the rearwardly divergent combustion chamber 1, a high degree of turbulence takes place in the preheated air as it passes through the combustion chamber.

Secured to and extending forwardly from the bottom of the air duct 13 is a ledge 19 serving as a support for the window 12 when the window is in its closed position.

Mounted within the combustion chamber 1 on legs 19 welded or otherwise secured to the bottom wall 2 is a stack of vertically spaced longitudinally extending arcuate vaporizing plates 21. Seated on the forward end of each plate 21 is an arcuate mineral wick 22 conveniently made of fire brick and wired to the upper face of each plate 21 and its associated wick is a vaporizing tube 23 having about 729 perforations per square inch.

Mounted on the forward end of the top plate 6 is a multiple needle valve generally designated by the reference numeral 24. The valve 24 includes a cylindrical valve body 25 formed with a threaded lateral oil intake bore 26 and with a threaded vertical bore 27. Sealed to and extending through the lower wall of the bore 26 are three oil feed pipes 28, 29 and 31, the free ends of which terminate just within the open forward ends of the perforated vaporizing tubes 23. Extending with close clearance through openings formed in the common wall of the valve body 25 which separates the bores 26 and 27 are three needles 32, one in vertical alignment with the upper end of each of the pipes 28, 29 and 31. The upper ends of the needles 32 are fastened to a disc 33 and disposed within the bore 27, between the bottom thereof and the disc 33 is a resilient

seal ring 34. Threaded into the bore 27 in contact with the disc 33 is a headed adjusting screw 35. It will be seen that as a result of this construction the clearance between the needles 32 and the valve seats constituted by the upper ends of the pipes 28, 29 and 31 can be adjusted at will by rotating the screw 35 in the required direction.

A burner unit of character above described should be so installed within a furnace or space heater that its forward end, including the valve 24, lies just forward of the front wall of the furnace or heater and the rear end of the air duct 13 extends through the rear wall of furnace or heater. The bore 26 should of course be connected with a suitable source of oil under-pressure.

To start the burner the valve 24 is opened to thereby cause oil to flow through the pipes 28, 29 and 31 into the forward end of each of vaporizing tubes 23 and through the small perforations therein onto the upper surfaces of the wicks 22 and vaporizing plates 21. This having been done, a light is applied to one or all of the wicks 22 to ignite the film of oil formed thereon. As soon as the air within the combustion chamber has become heated and consequently less dense than the external air, cold air will flow inwardly through the air duct 13 thereby causing a draft through the burner. When the vaporizing tubes 23 become hot the oil will pass through the perforations therein in the form of vapor and will ignite in such form without first forming an oil film over the plates 21. In a short time the combustion chamber will be filled with a solid flame passing outwardly through the opening 18.

Since the combustion chamber and the air duct 13 are made of steel a heat exchange from the walls thereof to the air passing inwardly through the duct will be effected, this exchange being sufficient to heat the air to at least the temperature of the stack gases of the furnace or heater with which the burner is associated. This of course results in a very efficient combustion of the oil vapor and materially decreases stack heat losses. The efficiency of the burner is further increased by the more complete admixture of fuel and air resulting from the turbulence imparted to the air in passing through the restricted opening 17.

I claim:

1. An oil burner adapted to be placed partially within a furnace combustion chamber comprising: walls defining a rearwardly diverging burner combustion chamber; a forwardly converging air preheating duct extending along and in surface contact with a wall of said burner combustion chamber and communicating at its forward end with the forward end of said burner combustion chamber; a plurality of parallel vertically spaced and superposed plates mounted in said burner combustion chamber and providing a plurality of fuel vaporizing surfaces; and means including a manually operable valve for delivering equal quantities of oil to said fuel vaporizing surfaces.

2. A natural draft, gravity fed, manually operated vaporizing oil burner adapted to be placed partially within a furnace combustion chamber comprising: walls defining a rearwardly diverging burner combustion chamber; a forwardly converging air preheating duct extending along and in surface contact with a wall of said burner combustion chamber and communicating at its forward end with the forward end of said burner combustion chamber; a plurality of superposed, vertically spaced plates mounted in said burner combustion chamber and providing a plurality of fuel vaporizing surfaces; a fuel supply pipe extending from a point immediately above each of said plates to a point external to said furnace combustion chamber; and a metering valve connected to the outer ends of said pipes for delivering equal and metered quantities of fuel oil simultaneously to each of said plates.

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