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APPARATUS FOR BURNING GAS OIL

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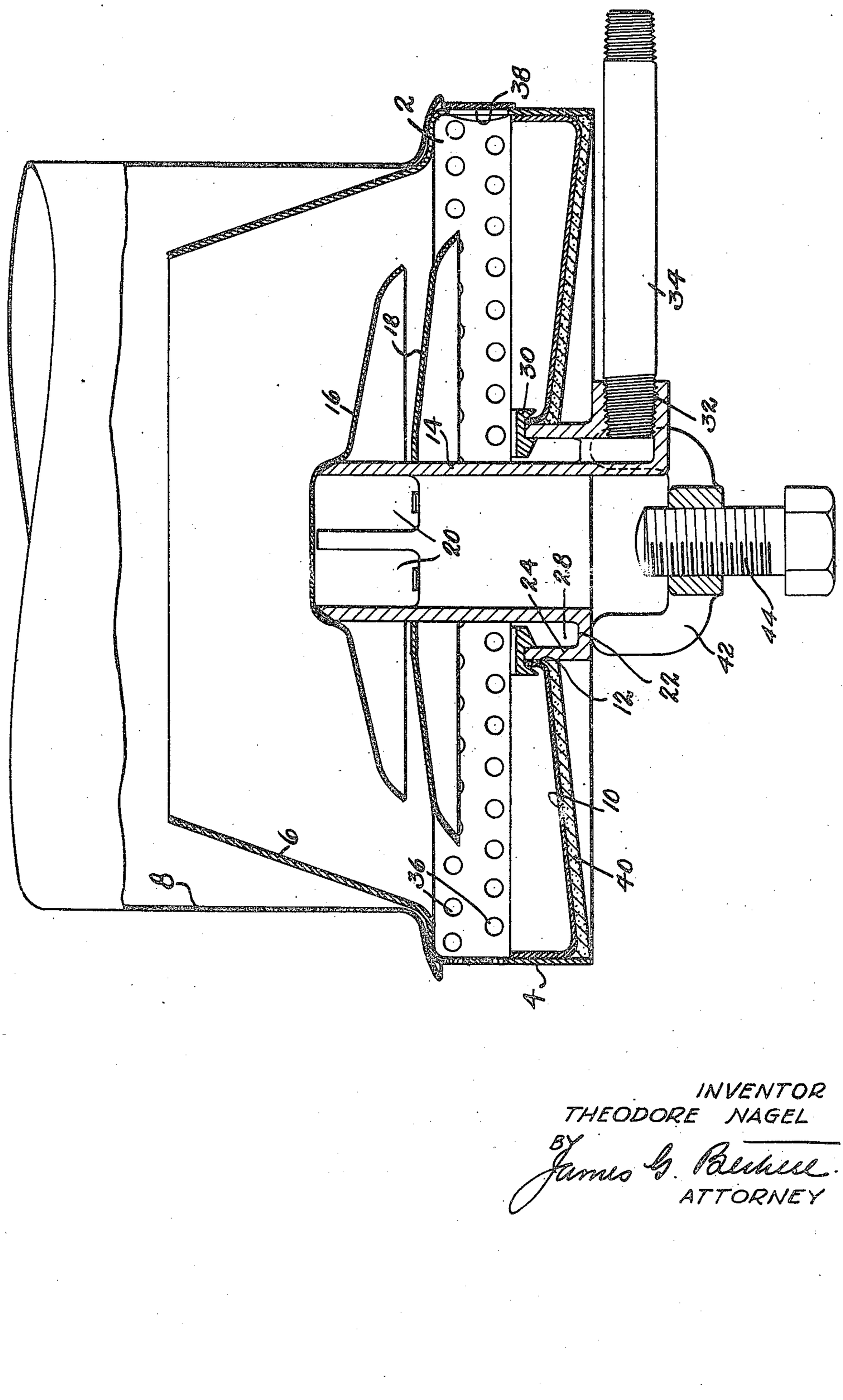

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APPARATUS FOR BURNING GAS OIL

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3 Claims. (Cl. 158—91)

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My invention relates to the burning of gas oil and has for one of its objects to provide a method whereby carbon deposition is eliminated and soot-free combustion products will be produced.

A further object of my invention is to provide a vaporizing pot of new and novel construction, suitable in the practice of my invention.

In a general sense, my invention provides for the burning of the gas oil in a vaporizing pot which is so constructed and arranged that the oil is rapidly heated—approaching flash-heating—to and above the end boiling point temperature of the oil, the oil vapor thus produced being caused to flow between two continuously flowing streams of air converging upon the oil vapor and sufficient in volume to support combustion. The hydrocarbon vapor is ignited on contact with the air and is caused to flow through a narrow channel to accelerate mixing of the ignited vapor and air.

The accompanying drawing is a sectional elevational view of a vaporizing pot, suitable for use in the practice of my improved method.

Referring to the drawing in detail, 2 designates the vaporizing pot. The sides 4 of the pot extend vertically, parallel to each other, and then converge, as seen at 6, to form a frusto-cone. This tapering portion of the pot extends into stack or flue 8.

10 designates the hearth of the pot which slopes downwardly from a point adjacent the axis of the pot to the outer edge and, in effect, constitutes the bottom of the pot. This hearth is provided centrally with a hole 12 for the reception of a vertically extending fitting 14. This fitting is tubular and at its upper end supports deflectors 16 and 18, disposed in superimposed spaced relation, the upper deflector 16 closing the upper end of the fitting. The upper part of the wall of the fitting 14 is provided with air outlets 20, through which air flowing into the lower end of the fitting will flow in a stream into the pot and therefrom into the stack, as will be more fully explained hereinafter.

The lower end of the fitting 14 extends outwardly as shown at 22 and then upwardly in the form of annular flange 24, thereby to provide an annular space or chamber 28 between the body of the fitting and the flange 24.

The inner edge of the hearth 10 at the flange 24 is bent upwardly flush with the upper end of the flange, and a saw-toothed weir ring 30 rests upon the surface thus provided. This ring constitutes the oil feed lip to the hearth.

It will be seen from the drawings that a segment of the flange 24 of the tubular fitting 14 extends below the bottom of the pot and is provided with threaded bore 32 for receiving oil supply pipe 34.

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The vertically extending side walls 4 of the pot are provided with air inlet ports 36 in staggered rows, while 38 designates a torch hole for lighting off the burner initially.

40 designates non-conducting heat insulation for the hearth 10.

The pot is held in sealed relation to the furnace by spider 42 and bolt 44. The pot is placed in position with the spider beneath the same and with the head of bolt 44 resting upon the floor, the bolt is turned to force the pot into sealed engagement with the furnace.

As above pointed out, my invention is directed to the burning of gas oil. Gas oil, in accordance with my invention, is those grades of distillate known in the trade as No. 1 and No. 2 and the lighter weight catalytic cracked No. 2 distillate end, B. P. 650° F., not heavier than approximately 26° A. P. I.; these distillates are known also as kerosene, Diesel oil, and gas oil, and the expression "gas oil" throughout this description and the claims of this application is to be so interpreted.

In the practice of my invention, with the vaporizing pot subjected to draft, oil is continuously fed to the pot through oil supply pipe 34 and flows over the lip at weir ring 30 to the hearth, flowing by gravity down the same. Initially, the burner is lighted off through torch hole 38. When the burner has become sufficiently heated, operation becomes automatic. The side walls 4 of the pot and the upturned periphery of the sloping hearth 10 are heat conducting, and, inasmuch as the hearth is insulated by the insulation 40 beneath it, heat will be conducted to the bottom surface of the oil film continuously flowing down the hearth. It will be apparent also that heat will be radiated continuously from the flame to the upper surface of the oil film. This rapid heat transfer to the oil film approaches flash-heating and effects vaporization of the oil film. The hydrocarbon vapor thus produced rises and flows continuously in a stream into the air stream converging upon it through the ports 36 and the diverging air stream admitted to the pot through the central tube fitting 14. The volume of air is sufficient to support combustion, and as the hydrocarbon vapor contacts the air, the vapor is ignited, the ignited vapor and air streams flowing upwardly through the relatively narrow channel between the deflectors 16 and 18 and the side

wall of the vaporizing pot into the gradually converging space provided by the converging wall 6 of the pot, whereby, as compared with conventional pot type vaporizing burners, more rapid mixing of the fuel and air is provided, which speeds up the rate of combustion effected in a more restricted space, thereby producing a higher-temperature heat release zone in which carbon of the fuel is oxidized, thereby inhibiting soot and smoke contamination of the combustion products.

It will be seen from all of the foregoing that the gas oil is so rapidly heated as to approach flash-heating to above the end boiling point temperature, so that the heavy ends of the oil are vaporized, thereby inhibiting carbon deposition accumulating on the hearth. It will be also appreciated that the low-hydrogen-content hydrocarbon vapor produced from catalytic cracked distillate, subjected to rapid heat release combustion, will yield soot-free combustion products.

It is to be understood that apparatus other than that illustrated in the drawing may be employed in the practice of my invention and that the apparatus shown is purely illustrative and not definitive.

What I claim is:

1. A gas oil burner comprising, in combination, a vaporizing pot having a bottom sloping downwardly from a point adjacent the axis of the pot to the outer edge thereof, constituting the burner hearth; a tubular fitting extending through the hearth vertically of the pot; a flange forming an annular chamber about the lower end of said fitting; means for supplying oil to said chamber and flowing the same over the upper edge of the flange, whereby the oil will flow by gravity over the hearth to form a thin film; deflectors supported in superimposed relation by said fitting; air openings through the wall of the fitting to permit air to flow through the fitting and out of the same between the deflectors into the vaporizing pot, and air inlets in the side wall of the vaporizing pot between the level of the air openings in the fitting and the hearth.

2. A gas oil burner comprising a vaporizing pot having a bottom of heat conducting material sloping downwardly from a point adjacent the axis of the pot to the outer edge of the bottom, a vertically extending flange of heat conducting material about the periphery of the said bottom providing the pot side wall, a tubular member extending vertically of the pot through said bottom centrally thereof and terminating above the bottom, the wall of the tubular member being provided with openings whereby air passing upwardly through the member will be discharged

outwardly into the pot in an annular stream, the side wall of the pot being provided with air inlets for the flow of air into the pot in an annular stream, oil-conducting means for continuously conducting oil upwardly between the tubular member and the pot bottom to the upper surface of the bottom, to provide a film of oil spread over the upper surface of the bottom and flowing toward the outer edge thereof, the air openings in the tubular member and in the wall of the pot being so disposed relatively to the bottom of the pot that hydrocarbon vapors rising from the oil film must pass between the air streams discharging from said openings.

3. A gas oil burner comprising a vaporizing pot having a bottom of heat conducting material sloping downwardly from a point adjacent the axis of the pot to the outer edge of the bottom, a flange about the periphery of the bottom, said flange extending vertically from the bottom and then converging in the form of a frusto-cone, a tubular member extending through the pot bottom to a point above the base of the frusto-conical portion of the pot wall, horizontally extending deflectors supported in superimposed spaced relation by the tubular member adjacent the upper end thereof, said tubular member being provided with air openings in its side wall between said deflectors for permitting air passing upwardly through the tubular member to discharge into the pot in an annular stream, the vertically extending portion of the pot side wall being provided with openings for admitting air to the pot from the exterior thereof in an annular stream, a flange at the base of the tubular member providing a chamber terminating at the upper surface of the pot bottom, a toothed weir ring about the upper edge of said flange and means for continuously flowing oil to said chamber to cause the same to flow over said weir and to spread out in a thin film over the upper surface of the pot bottom and continuously to flow toward the outer edge thereof.

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