

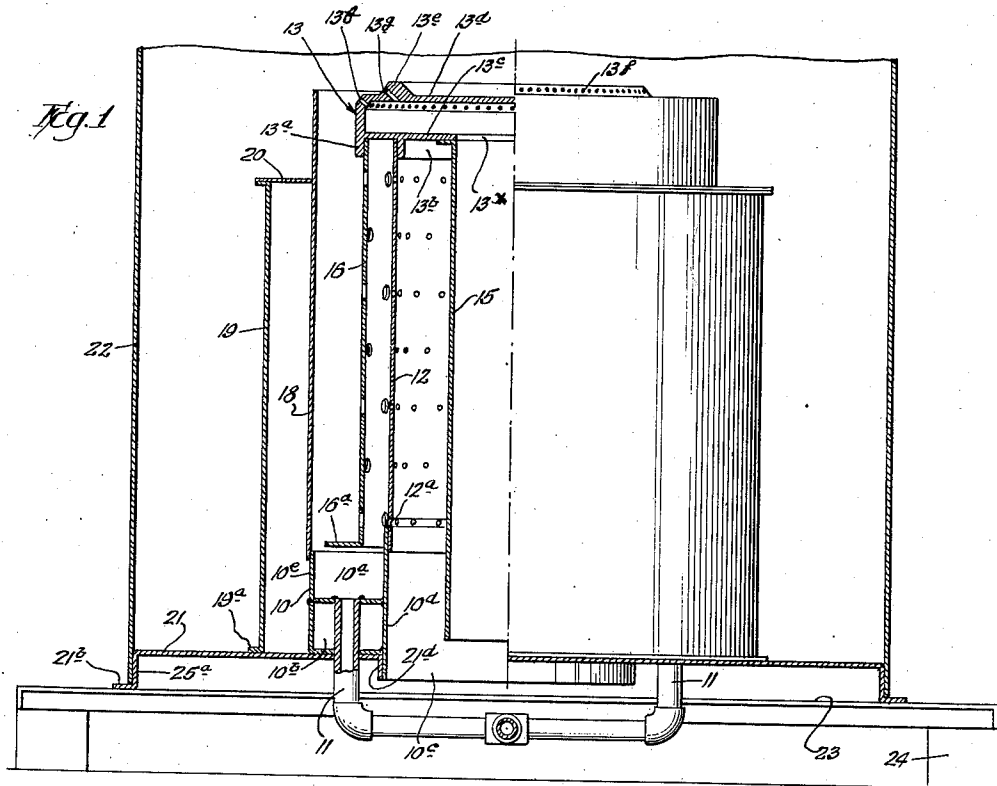
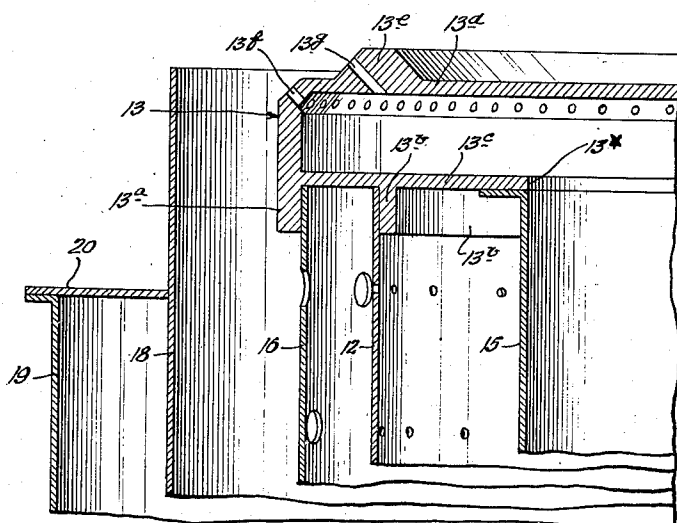
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OIL BURNING DEVICE

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OIL BURNING DEVICE

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1 Claim. (Cl. 158—91)

This invention relates to improvements in oil burning devices and is in the nature of an improvement upon the invention disclosed in our earlier filed application, Serial No. 390,670, filed April 28, 1941.

It has for an object to provide a device for burning oil which is simple and economical of manufacture and efficient and economical in its operation. A particular object is to provide for clean, efficient low and intermediate fires, the low fire ordinarily serving as a pilot.

Another object is to provide novel secondary or scavenging air delivery in combination with the primary air and gas deliveries and combustion.

Other objects will be set forth and made apparent in the following description.

In the accompanying drawing, we have illustrated one embodiment of our invention. In such drawing,

Fig. 1 is a vertical section of such embodiment, a portion thereof being shown in elevation; and

Fig. 2 is an enlarged vertical section of an upper portion of the device.

Like numerals refer to like elements throughout the drawing, in which 10 designates generally a fuel-receiving base, preferably constructed of highly conductive sheet metal or the like having an annular channel or trough 10a formed therein and an underlying air chamber 10b. Oil supply ducts 11 extend upwardly through the chamber 10b for delivery of fuel oil to the bottom of the trough or channel 10a. While we have illustrated two of these ducts diametrically opposed, it should be recognized that the number may vary as desired for rapid distribution of oil supplied to the trough 10a. The base 10 is preferably annular in form and provided with a central air inlet 10c defined by the inner wall 10d of the base member 10. Extending upwardly from this wall 10d is the inner sleeve 12 having spaced rows of apertures, and being suitably secured to the wall 10d, as by welding, brazing or the like, and shown as having a beaded connection at 12a (see Fig. 1). It is desirable to have intimate contact between the sleeve 12 and the wall 10d for heat conduction as will be hereinafter pointed out.

Removably mounted upon the sleeve 12 at the top thereof is a cap 13 having depending flanges 13a, 13b, the latter of which fits snugly within and against the upper end of the sleeve 12. The outer flange 13a is located at the outer periphery of the cap 13. Formed integrally with the flanges 13a and 13b and extending inwardly of the lat-

ter is a horizontal base flange 13c centrally apertured at 13x. Located above the flange 13c and entirely closing the upper end of the cap is the closure portion 13d having an enlarged rim portion 13e near its outer periphery. At the juncture of the closure portion 13d and the flange 13a is provided a row of peripheral, upwardly-inclined, secondary air holes 13f and inwardly thereof and extending through the rim portion 13d is a second concentric row of secondary air holes 13g.

Suitably secured to and carried by the flange 13c is a depending, cylindrical partition member 15, flanged at the top for attachment to the flange 13c. This partition member terminates at its lower end short of the bottom of the sleeve 12 and serves as a duct for the flow of the so-called secondary air to the apertures 13f and 13g. The partition 15 is spaced inwardly of and co-axial with the sleeve 12 so that an annular duct is provided between 12 and 15 for the flow of the so-called primary air.

Located outwardly of and spaced from the sleeve 12 is a co-axial shell 16, fitting snugly within and secured to the inner face of the flange 13a from which it depends. This shell is also provided with rows of spaced apertures, each being in alignment with a corresponding aperture in the sleeve 12 but larger in diameter as illustrated in the drawing. At its lower end, the shell 16 is provided with an outwardly directed flange 16a overlying and spaced from the bottom of the trough or channel 10a. Intimately attached to the upper end of outer wall 10e of the base member 10 near the top thereof and projecting upwardly therefrom, is a casing member 18, open at the top to provide an outlet for the gases of combustion. In the embodiment shown in the drawing, this casing terminates slightly above the rim of the apertures 13f. This casing 18 with the shell 16 forms a combustion chamber and an annular duct for the passage of the gases of combustion and serves to hold them relatively compacted for introduction of secondary or scavenging air thereinto from the apertures 13f, 13g as will be readily understood.

Surrounding and spaced from the casing 18, is the jacket member 19, forming with the casing 18 an air jacket which is closed at the top by the plate 20 extending between members 18 and 19.

Preferably secured to and supporting the base member 10 and jacket member 19, is the horizontal base member 21, terminating at its outer periphery in a downwardly inclined flange 25a

with an outwardly directed supporting flange 21b. This base plate is centrally apertured to accommodate the inner flange 10d of the base 10 and is complementally flanged at 21d for attachment thereto. Suitable apertures are provided for accommodation of the oil ducts 11 as illustrated in Fig. 1.

Snugly fitting and preferably secured to the flange 25a of the base plate 21 and extending upwardly therefrom, is the main housing 22 of the stove or heater in which our heating device may be installed. The entire apparatus is supported on transverse base members 23 having feet or legs 24 of any suitable construction, these being arranged to permit unobstructed flow of air to and through the oil burning apparatus. Also it is to be noted that the jacket member 19 is provided with an outwardly directed flange 19a at the bottom which rests upon and is secured to the base plate 21, whereby substantially hermetic sealing of the jacket formed by members 18, 19 and 20 is obtained.

In the operation of the apparatus, illustrated and described, we prefer to obtain immediate gasification of the fuel oil and to operate it as a "dry bottom" burner so that whether the device is operating with low fire (i. e. a pilot fire) or intermediate fire or high fire, fuel oil admitted to the trough 10a will be almost immediately converted into gas in normal operation, i. e., after the burner has operated beyond the starting period. The flow of fuel to the trough 10a is automatically regulated by any suitable control, either manual or automatic, whereby the delivery of the fuel is regulated to obtain the character of fire desired as is well known in the art. So far as we can determine and as described in our earlier application identified above, if normal operation has been reached, air flowing into the space between the partition 15 and the inner sleeve 12 flows outwardly through the apertures in the sleeve 12 into what constitutes a mixing chamber between the sleeve 12 and shell 16. Such air we describe for convenience as primary air and it would appear that it develops a velocity of flow which not only carries it into, but through the mixing chamber and jets outwardly through the apertures in the shell 16. In normal operation, as described, fuel oil flowing into the trough 10a is almost immediately gasified and the gas flows upwardly into the mixing chamber, we believe, because of the ejector or aspirating action of these air jets which mix with and aspirate the gas outwardly into the combustion chamber formed by the shell 16 and the casing 18. It is to be noted that as stated above the apertures in shell 16 are materially larger than those in the sleeve 12 which contributes to the efficient aspiration of the gas and air mixture. It would further appear from observation of our device in operation that at low fire, for example, the visible combustion occurs in the combustion chamber formed by the shell 16 and the casing 18. The formation of the sleeve 12 and the casing 18 of sheet metal or other highly conductive material and their intimate securement to the walls of the trough 10a, result in the rapid transmission of heat by conduction to the trough 10a to effect a rapid and efficient gasification of the fuel oil.

The flange 16a serves to confine or obstruct this gas against direct flow upwardly into the combustion chamber and thereby contributes to the flow of the expanding gas into the mixing chamber and it will be apparent that any gas

flowing into the mixing chamber will be automatically picked up and aspirated no matter how high it may rise in that mixing chamber.

With an increase in the supply of oil to the trough 10a, the intermediate fire may be obtained because of the generation of a greater volume of oil-gas and the air jets are always functioning to pick up and aspirate as well as to mix with this oil-gas at any level in the mixing chamber. With the delivery of oil in effective quantity to support a high fire and possibly at low and intermediate fires, a certain amount of unburned gas may flow entirely through the combustion chamber into the upper end thereof in which event the so-called secondary or scavenging air flowing through the air holes 13f, 13g would be directed into it and insure its final combustion and at the same time impart an outward and upward movement to any gases flowing out of such combustion chamber.

It may be possible in some instances that during operation of our burner, hydroxylated gas is formed and flows into the combustion chamber between the shell 16 and the casing 18 in which event this gas will be consumed with visible combustion when it encounters the air flowing through the apertures 13f, 13g. In short, such air functions as a scavenging medium to effect or complete combustion of any unburned fuel mixture or combination flowing upwardly out of the combustion chamber and thereby contributes to the efficiency of operation as well as to the cleanness thereof.

The base flange 13c of the cap 13 serves as a closure for the top of the mixing chamber and also for the primary air space between the apertured inner sleeve 12 and the partition 15, thereby insuring first that all primary air from said space will flow through the apertures in the sleeve 12 and second, that all of the admixed or hydroxylated gases will flow from the mixing chamber into the combustion chamber. Likewise the base flange 13c in conjunction with the partition 15 demarks the secondary or scavenging air from the primary air and insures its flow through the cap 13 and out of the apertures 13f, 13g.

In the embodiment shown, partial disassembly is readily effected by lifting the cap member 13 which carries with it the partition 15 and shell 16 without disturbing the other elements of the apparatus.

By providing the air chamber 10b, the bottom of the trough 10a is insulated to reduce dissipation of heat downwardly therefrom, which protection contributes to the rapidity of the gasification of oil fed therein.

The jacket formed by member 19 and the casing 18 serves in part to prevent radiation of heat outwardly from the combustion chamber at the lower and intermediate parts thereof which is desirable particularly at low or pilot fire when it is desirable to maintain in the trough, a suitable temperature for rapid gasification of the fuel oil. In such case and in all operation, of course, the hot gases flow upwardly into the main heating chamber and are utilized.

As illustrative of one embodiment of our invention, we have constructed and operated a device having the following dimensions:

The distance from the base plate 21 to the top of the casing 18, approximately 10 inches with the diameter of the casing 18 approximately 8 inches; the shell 16, approximately 8 inches high and 6 inches in diameter with 126 holes $\frac{1}{16}$ inch in diameter; the height of the wall 10d, approximate-

ly 3 inches; the height of the sleeve 12, approximately 8 inches and its diameter 5 inches and provided with 126 No. 41 drill holes (.096 inch diameter); 60 holes 13f, .096 inch in diameter; 60 holes 13g, .096 inch in diameter.

It should be noted that variation in the dimensions and details may be readily made in order to vary the capacity of the burner and we are merely citing such specifications as one concrete embodiment of our invention.

It will also be apparent that the device as described and illustrated may be modified without departing from the scope of our invention as defined in the appended claim.

What we claim is:

In a device of the class described, an annular base member, said member being provided with an oil receiving trough, means to supply oil thereto, a perforated sleeve extending upwardly from

said trough, a perforated shell surrounding and spaced from said sleeve, the perforations in said shell and sleeve being in alignment, means forming a combustion chamber for oil-air gases flowing from said shell, said base member being centrally apertured for flow of air for combustion to the perforations in said sleeve and shell, a cap member mounted upon said sleeve and provided with a base flange extending across and between said shell and sleeve at the top thereof, said cap being apertured for flow of air from said central aperture into gases flowing upwardly through said combustion chamber and a partition member extending downwardly from said cap and forming a conduit between the aperture in said base member and the aperture in said cap.

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