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OIL BURNING MECHANISM

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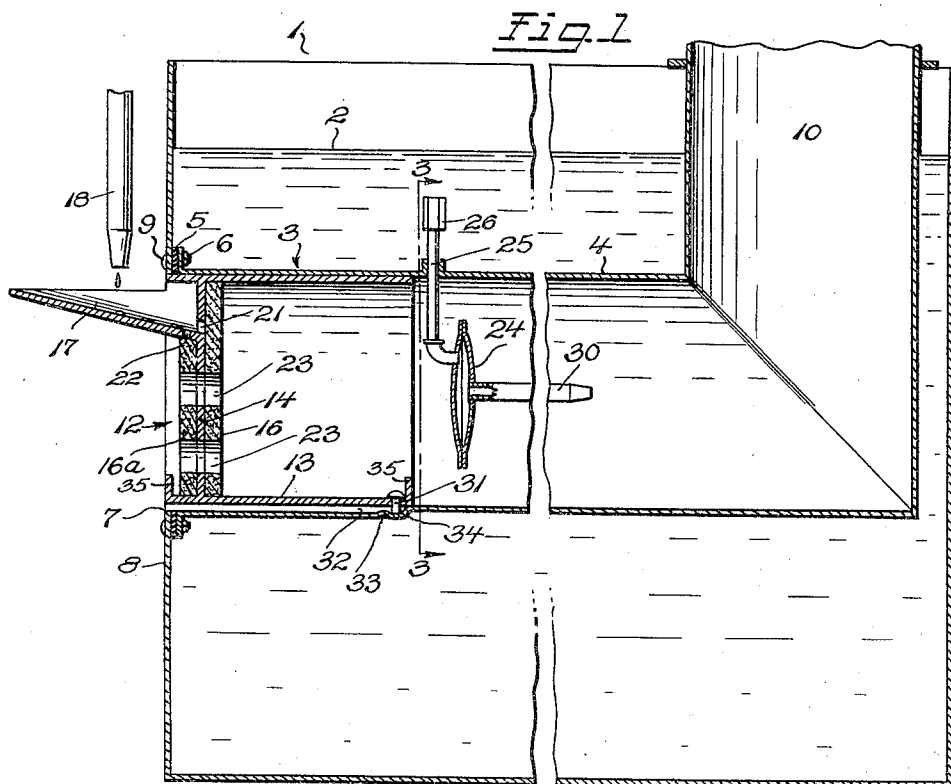


Fig. 2

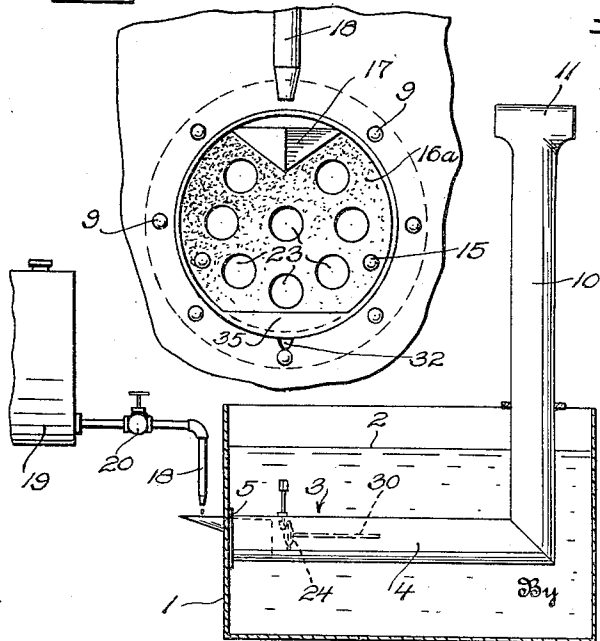


Fig. 3

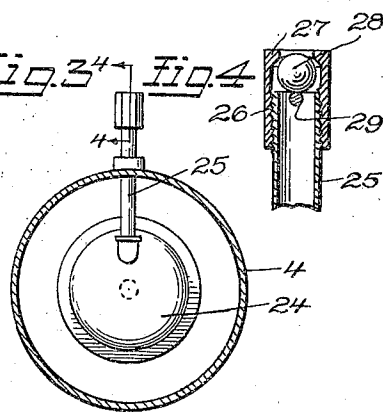


Fig. 4

Fig. 5

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OIL BURNING MECHANISM

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This invention relates to improvements in oil burners and has for an outstanding object the provision of a structurally simple yet highly efficient burner useful in the generation of heat for any purpose.

It is another object of the invention to provide an oil burner which is formed to include a longitudinally extending combustion chamber, one end of which is provided with a removable perforated vaporizing unit and wherein the other end of the chamber communicates with an outlet or draft flue, and wherein the removable vaporizing unit is adapted to substantially close the end of the combustion chamber which it occupies in operation except for the provision of a plurality of draft orifices or perforations formed in said unit and which provide for the formation of an efficient combustion mixture by the intermingling of air passing through the orifices with a vaporized fuel released from an absorption pad carried by said unit, the fuel carburization secured being such as to effect highly efficient combustion in the combustion chamber with minimum carbon formation.

It is a further object of the invention to provide means for delivering a constant or intermittent stream of oil to the absorption pad or pads of the removable vaporizing unit situated in the combustion flue or chamber so that the air, passing either under natural or forced draft through the orifices of the vaporizing unit may be intimately and thoroughly commingled with the vaporized fuel to produce efficient and substantially smokeless combustion with no accompanying deposit of harmful carbon.

It is another object of the invention to introduce into the combustion flue or chamber regulated quantities of steam preferably in a super-heated state bordering on elemental dissociation and to accomplish this result in such a manner as to promote combustion within the chamber, minimizing carbon deposit therein and to effect an induced draft of air through said combustion chamber.

It is a still further object of the invention to provide a simple, reliable and efficient burner which may be employed for heating

water in farm stock drinking troughs and which, when used in such outdoor locations under exposed conditions of service, will operate steadily and uniformly independently of wind conditions or other disturbances produced by the elements.

With these and other objects in view, which will appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a vertical sectional view taken through the improved oil burner comprising the present invention illustrating the same in an operating position when used in a stock watering tank or trough,

Figure 2 is a front elevation of the burner,

Figure 3 is a vertical transverse sectional view taken on the line 3—3 of Figure 1,

Figure 4 is a similar view on the line 4—4 of Figure 3,

Figure 5 is a vertical sectional view taken through a water containing tank and illustrating the operating position of the burner therein.

Referring more particularly to the drawing, especially to Figure 5, the numeral 1 designates a tank which is adapted to contain a body of liquid 2 such as water. This tank may be employed in the watering of farm stock or in the heating of water for any other purpose, and it is to be understood that the invention is not limited in its scope to the provision of an oil burner for any particular purpose, since the burner may be used in any capacity wherein the generation of heat is required. The burner mechanism is indicated generally by the numeral 3 and in the specific embodiment thereof disclosed in the drawing the said burner comprises a combustion chamber or flue 4 composed of the desired length of sheet metal tubing. One end of the flue 4 is provided with a flange 5 which engages with a packing ring 6 surrounding an opening 7 formed in the front wall 8 of the tank 1, the flange 5 being positioned to the wall 8 by means of bolts

and nuts 9, which when tightened compress the packing 6 to prevent the seepage of water from the interior of the tank to the exterior thereof through the opening 7.

5 The opposite end of the flue 4 with respect to the flange 5 is connected with a vertical draft flue 10, which extends upwardly from the tank 1 and terminates a material distance above the upper portion of said tank.
10 The upper end of the flue 10 is provided with a ventilating hood 11 of suitable design so shaped as to provide for the passage of air longitudinally through the flues 4 and 10 and to minimize down or back drafts through these flues. The combustion flue 4
15 is located below the liquid level 2 in the tank 1 whereby when the mechanism is in active operation efficient heat transfer will take place between the walls of the flue 4 and the liquid contained in the tank 1.

20 Adapted to be removably positioned in the open end of the combustion chamber 4 is a vaporizing unit indicated generally by numeral 12. This unit comprises a metallic sleeve 13 of such diameter that it may be
25 loosely positioned within the chamber 4. The forward end of the sleeve 13 includes a stationary wall 14 arranged perpendicularly and intermediate of the length of the sleeve 13. The opposite surfaces of the web
30 or wall 14 have secured thereto by rivets or the like 15 absorbent pads 16 and 16a which are preferably formed from sheet asbestos or other equivalent material. The upper
35 portion of the sleeve is provided with a forwardly extending trough or handle 17 which is adapted to be positioned immediately below an oil feeding pipe 18 through which
40 oil passes by gravity from an oil tank 19, the pipe 18 being provided with a valve 20 to regulate the flow of the oil through said pipe. In practice, the valve is so adjusted that the oil flows by drops onto the inclined
45 surfaces of the trough 17 and from the trough the oil passes by way of a port 21 into the pad 16 arranged on the inner side of the wall 14. The trough is also provided, contiguous to the port 21, with a port 22
50 of small diameter which permits a portion of the oil to flow onto the outer pad 16a. This method of delivering oil to the pads provides for their saturation with the oil and at the same time provides for complete
55 vaporization of the oil.

60 To effect such vaporization, the wall 14 together with the pads 16 and 16a are provided with registering horizontally disposed orifices 23 permitting of passage of air from the atmosphere through the communicating
65 flues 4 and 10, the latter flue providing a natural draft or positive passage of air through the orifices to the combustion chamber 4 without employing supplemental means such as fans or blowers, heretofore largely

used in such apparatus. Passage of the air through the orifices 23 effects vaporization of the oil contained on the pads to produce a combustible mixture, combustion then taking place in the chamber 4. The heat of such
70 combustion, of course, facilitates vaporization of the oil on the pads and an efficient carburetted mixture is secured by the commingling of the air drawn through the orifices 23 with the vaporized oil.
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In operation the fuel mixture is completely consumed in the combustion chamber and a very high temperature obtains in this zone to the burner. The walls of the chamber are
80 protected, however, by being surrounded with the liquid 2 so that the rate of heat transfer between the walls of the chamber 4 and the liquid is sufficiently high and efficient to prevent injury to the walls 4 by reason of the high temperatures produced in the combustion zone.
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To further aid combustion and the forced passage of air through the combustion zone, and at the same time to minimize carbon formation and deposit, I have provided the combustion chamber with a steam super-heater
90 24. This super-heater consists of a metallic shell located axially in the chamber 4 and supported therein by means of a vertically extending pipe 25 carried by the walls of the
95 flue 4. As shown in Figure 4, the upper end of the pipe 25 is provided with an internally threaded ferrule 26 which is adjustably carried by the open upper end of the pipe 25. The upper end of the ferrule 26 is provided
100 with a valve seat 27 with which engages a ball valve 28, the latter being mounted for slight movement between the seat 27 and a pin 29 carried by the upper end of the pipe 25. The extent of movement of the valve
105 28 may be regulated by adjusting the positions of the ferrule 26 with relation to the pipe 25. When the valve 28 is opened a small amount of water is permitted to pass into the super-heater 24, and the walls of this super-heater are maintained at a temperature providing for the instantaneous generation of steam and likewise the super-heating of the steam, as the relatively small
110 quantities of water pass into the super-heater. The development of steam in the super-heater produces a pressure sufficient to close the valve 28 to prevent further inflow of the liquid 2, and further expansion of the steam permits of its discharge from the super-heated through an injector nozzle 30 which
115 extends longitudinally of the chamber 4. The construction and operation of the super-heater is such as to produce the intermittent discharge of steam blasts from the end of the nozzle 30, increasing thereby the flow of air through the combustion chamber and at the same time permitting associated steam to combine with the combustion mixture in the combustion zone to produce more efficient
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combustion of said mixture and to minimize carbon deposition.

The sleeve 13 may be provided at one end with a pin 31 which is positioned in a longitudinal groove 32 formed in the inner wall of the flue chamber 4. The pin 31 serves to insure proper registration between the trough 17 and the feed pipe 18 when the vaporizing unit is in its proper position within the flue 4. The inner end of the groove 32 is provided with a resilient portion 33 which engages with the pin 31 to prevent accidental longitudinal movement of the vaporizing unit in an outward direction, movement thereof in an inward direction being limited by a shoulder 34 formed in the chamber 4. By providing the pads 16 and 16a on both sides of the wall 14, strong back drafts through the combustion chamber are not apt to extinguish combustion and I, therefore, prefer to use the pads as disclosed, although the outer pad 16a is not strictly necessary. The ends of the sleeve 13 are provided with upstanding lips 35 which prevent loss of liquid oil which may flow from the pads.

To initiate combustion a limited quantity of oil is released from the pipe 18 and by means of an igniting primer (not shown) combustion within the vaporizing unit may be started. Within a short interval combustion becomes so active that the valve 20 may be regulated to supply the desired amount of oil to the burner to effect its sustained operation. The heat generated within the chamber 4 is intense so that the desired vaporization of the oil is insured as well as an effective draft through the combustion chamber and admixture of oxygen with the vaporized oil. The developed heat is extracted by the liquids surrounding the thin walls of the combustion chamber as indicated by the low temperature of the gases discharged from the hood 11 of the draft flue 10.

The present invention is particularly advantageous for use in connection with outdoor heaters, such as in connection with campers' outfits, stock watering troughs and other types of water heaters and in other localities and conditions where natural drafts only are available. The burner is particularly inexpensive in construction and does not involve the employment of motor driven fans and other costly apparatus. The burner may be readily kept in a clean condition for efficient operation, since the removal of the vaporizing unit 12 provides complete access to all parts thereof.

What is claimed is:

1. In oil burning mechanism, a horizontally disposed combustion flue, an upright draft flue communicating with the discharge end of the combustion flue, a removable vaporizing unit situated in the inlet end of the combustion flue, said unit being formed with a perforated wall having a perforated pad

of a refractory and adsorptive material mounted thereon, and means for delivering regulated quantities of oil to the padded surface of the vaporizing unit.

2. In oil burning mechanism, a longitudinally extending combustion flue provided at one end with an upright draft flue, a vaporizing unit removably positioned in one end of said combustion flue, said unit being formed to embody a perforated wall having a perforated pad of asbestos applied to the inner surface thereof, the perforations of said wall and pad being in registration with one another to form communicating passages between the interior of the vaporizing unit and the atmosphere and means for delivering regulated quantities of oil to said asbestos pad to permit such oil to combine with air passing through the perforations in said wall to produce a combustion mixture in said combustion flue.

3. In oil burning mechanism, a conduit formed to provide a combustion chamber, a vaporizing unit removably positioned in one end of said conduit, said vaporizing unit embodying a sleeve of smaller diameter than said conduit, a perpendicular wall formed with said sleeve and provided with a plurality of perforations establishing communication between the combustion chamber and the atmosphere, an asbestos containing pad mounted upon at least one of the surfaces of said wall and having perforations formed therein registering with the perforations in said wall, and means for delivering regulated quantities of oil to said pad to provide for the vaporization of said oil and the commingling thereof with air drawn through said perforations to produce a combustible mixture in said chamber.

4. In oil burning mechanism, a longitudinally extending conduit formed to provide a combustion chamber, a vaporizing unit comprising a tubular body removably positioned in said combustion chamber, a perpendicular wall formed with said body and provided with perforations, a pad secured to at least one of the surfaces of said wall, said pad being provided with perforations arranged in registration with the perforations in said wall, a trough connected with said wall, and means for delivering regulated quantities of liquid to said trough for application to said pad, whereby air passing through said perforations may be combined with the vaporized oil released from said pad to produce a combustible fuel mixture in said chamber.

5. A vaporizing unit for oil burners comprising a substantially tubular body, a perpendicularly disposed perforated wall positioned in said body, a pad secured to at least one of the surfaces of said wall and having perforations therein in registration with the perforations in said wall, and a trough ex-

tending from said wall and adapted to register with a source of oil supply, whereby said trough serves to direct oil onto said pad for vaporization with air passed through the perforations in said wall and pad.

6. A vaporizing unit for oil burners comprising a tubular body member formed at one end with a transversely extending perforated wall, asbestos-containing pads applied to the opposite surfaces of said wall, said pads being formed with perforations registering with the perforations in said wall, and a trough extending longitudinally from said wall and adapted to register with a source of oil supply, the discharge end of said trough being provided with ports for delivering oil to said pads.

7. A vaporizing unit for oil burners comprising a tubular body, a stationary wall extending transversely across said body adjacent to one end thereof, said wall being provided with a plurality of perforations, pads of compressible material applied to the opposite surfaces of said wall, said pads being perforated to align with the perforations in said wall, and a trough extending longitudinally from said wall and projecting beyond the confines of said body, said trough being arranged to register with a source of oil supply, whereby oil passing into said trough is delivered to said pads for vaporization from the surfaces thereof.

8. A vaporizing unit for oil burners comprising a tubular body, a stationary wall extending transversely across said body adjacent to one end thereof, said wall being provided with a plurality of perforations, pads of compressible material applied to the opposite surfaces of said wall, said pads being perforated to align with the perforations in said wall, a trough extending longitudinally from said wall and projecting beyond the confines of said body, said trough being arranged to register with a source of oil supply whereby oil passing into said trough is delivered to said pads for vaporization from the surfaces thereof, and upturned lips formed with the lower portions of said body to retain within the confines of said body liquid oil released from said pads.

9. In oil burning apparatus, the combination with a liquid-containing tank, of a combustion flue positioned in said tank below the liquid level thereof, a stack flue communicating with one end of said combustion flue and terminating above the liquid level of said tank, one of the walls of said tank being provided with an opening with which the open end of the combustion flue registers, a removable vaporizing unit positioned in the open end of the combustion flue, said unit being formed to embody a perforated wall having a perforated pad carried by one of the surfaces thereof, and means for delivering regulated quantities of oil to said pad for pro-

ducing a combustible mixture in the combustion flue.

10. In oil burning apparatus, a longitudinally extending combustion chamber, a transversely arranged pad positioned in said chamber, said pad being formed with a plurality of passages extending therethrough establishing communication between said chamber and atmosphere, and means for delivering regulated quantities of oil to said pad to provide for the vaporization of said oil and the commingling thereof with air engaging directly with the walls of said passages in the pad as the air is drawn there-through to produce a combustible mixture in said chamber.

In testimony whereof I affix my signature.
CHARLEY BURNETT.

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