June 10, 1952 J. T. LANDGRAF 2,599,563

VAPORIZING TYPE OIL BURNER FOR BROODERS AND THE LIKE

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Fig. 1

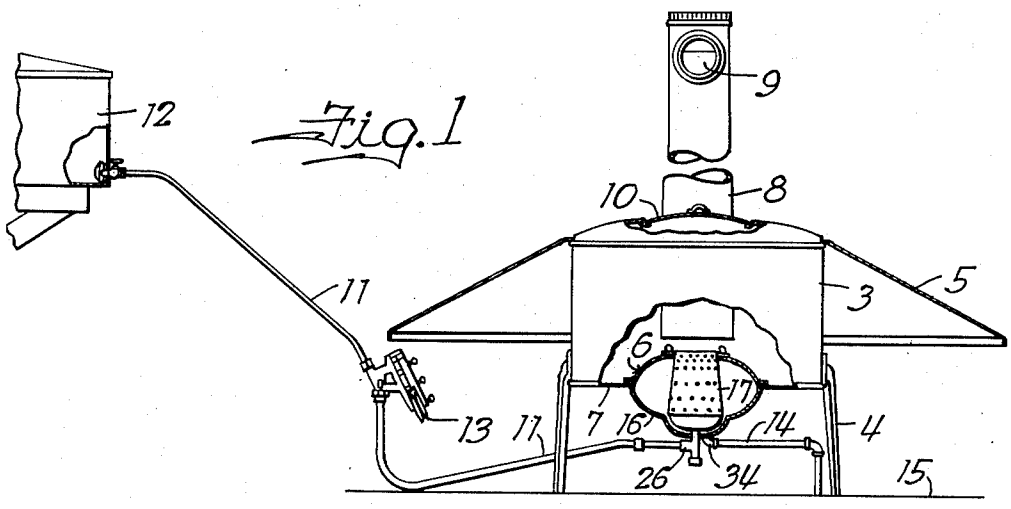
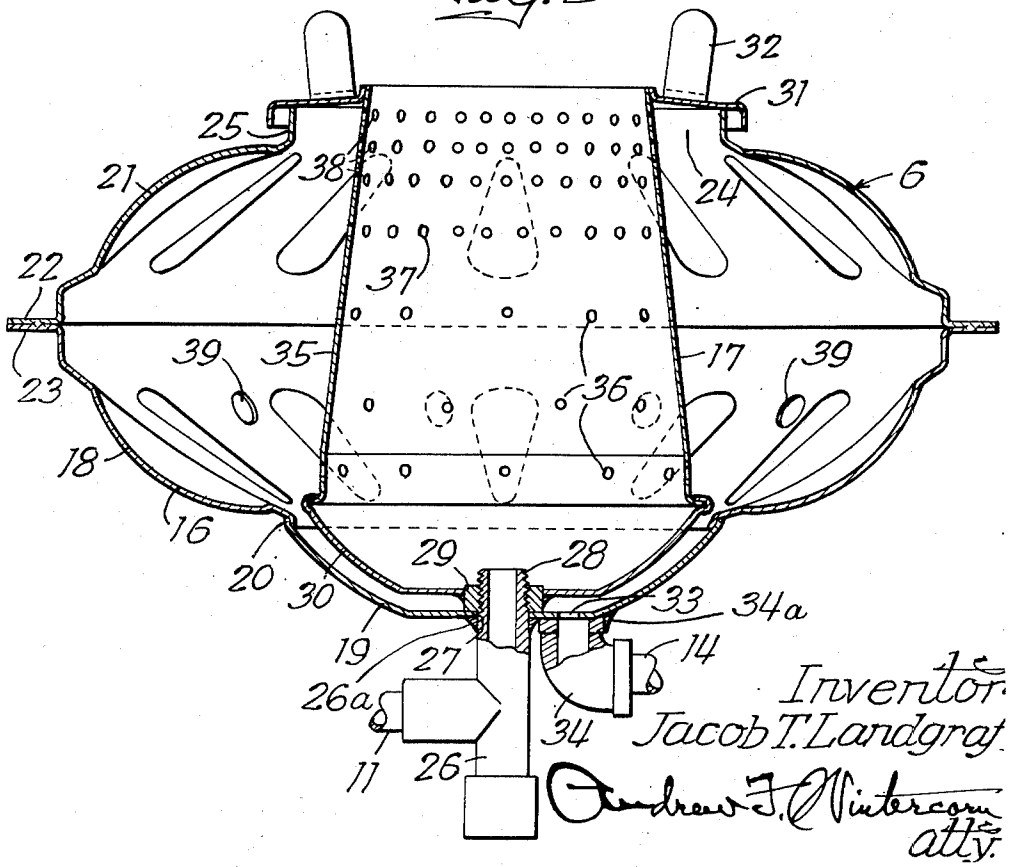



Fig. 2




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## VAPORIZING TYPE OIL BURNER FOR BROODERS AND THE LIKE

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5 Claims. (Cl. 158—91)

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This invention relates to an improved oil burner and is more particularly concerned with one designed for use in a brooder.

The principal object of my invention is to provide a burner which is not only economical to manufacture and designed for quick and easy replacement in and removal from its supporting housing or drum so that it may be easily inspected and cleaned from time to time, but is also designed for more efficient operation so that it will not require as frequent attention and cleaning as such burners have required in the past.

In the burner of my invention, the perforated open ended shell or screen in which the oil is burned has on its lower end a dished bottom into which the raw oil is delivered, and this bottom is disposed in a dished central bottom portion in the bottom of the enclosing and supporting drum in closely spaced relation thereto so that oil may be drained from the bottom of the drum in the event the burner is extinguished accidentally, and the dished bottom of the burner will always be shielded from cooling air currents during the normal operation of the burner and will be maintained at the desired high temperature for most efficient vaporization of the oil. Air intake openings are provided in the wall of the enclosing drum at a predetermined elevation with respect to the bottom of the burner, so that the air entering the enclosing drum through the perforations for mixture with the oil vapors will be preheated in the drum to form a good mixture without letting any of the incoming air come into contact with the hot bottom portion of the burner which must be kept at the necessary high temperature to insure good vaporization of the oil. Incandescent carbon that collects on the inside of the side wall of the burner shell around the openings gives off radiant heat which is believed to be an important factor also in insuring good vaporization of the oil, and the frusto-conical shape of the side walls of the shell is believed to increase this effect by exposing a greater area of the bottom of the burner to the radiant heat.

The invention is illustrated in the accompanying drawing, in which

Fig. 1 is a view partly in side elevation and partly in vertical section through a brooder in which the burner is made in accordance with my invention, and

Fig. 2 is a central vertical section through the burner assembly.

The same reference numerals are applied to corresponding parts in these two views.

The brooder, briefly stated, comprises a large

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cylindrical sheet metal stove casing 3 supported on legs 4 and carrying a frusto-conical sheet metal hood or canopy 5. The burner assembly indicated generally by the reference numeral 6, is mounted on the sheet metal bottom 7 of the casing 3 which is suitably perforated to admit the air to mix with the oil vapors in the burner and support combustion. 8 is a smoke pipe extending through the top wall of the casing 3 to conduct the waste products of combustion from the burner, and this pipe has an automatic draft regulator 9 provided therein. 10 is a removable lid fitting in an opening provided therefor in the center of the top wall of the casing 3 over the burner assembly 6. When this lid is removed, the operator may observe the operation of the burner and note whether it requires cleaning. The burner can also be lighted through the opening upon removal of this lid. Oil is supplied to the burner through the pipe 11 by gravity from a fuel tank 12, the flow of oil being regulated by a thermostatic device indicated at 13, whereby to maintain a fairly constant temperature under the hood 5 adjacent which the thermostat is located as shown. In the event the burner is accidentally extinguished, raw oil overflowing from the burner is drained through a pipe 14 which discharges through the floor 15 or into a suitable receptacle.

The burner assembly 6 with which my invention is particularly concerned comprises an outer unit in the form of a sheet metal drum 16 to support and enclose the sheet metal burner or inner unit 17. The drum 16 is generally of oblate speroidal shape and made up of a lower cup-shaped or hemispherical member 18 having a depressed or dished central bottom portion 19 welded thereto, as at 20, or formed integral therewith, and an upper inverted cup-shaped or hemispherical member 21 welded or otherwise suitably secured by its annular flange 22 to the annular flange 23 provided on the lower member 18. The upper member 21 has a central opening 24 in the top thereof defined by an annular upwardly projecting flange 25 to admit the burner 17. A T-fitting 26 provided on the discharge end of the pipe 11 is welded or otherwise suitably secured as at 26a in the center hole 27 provided in the depressed or dished central bottom portion 19 of the lower member 18, and provides a threaded nipple portion 28 onto which a nut 29 welded or otherwise suitably secured in a center hole provided in the dished bottom 30 of the burner 17 is arranged to be threaded to mount the burner in the enclosing and supporting drum 16. A sheet metal ring 31 welded or otherwise suitably secured to the upper

end of the burner 17 has lugs 32 welded or otherwise suitably secured thereto to facilitate unscrewing the burner from the nipple 28, the ring 31 serving as a closure for the opening 24 in the top of the drum 16 when the burner 17 is disposed in operative position therein. A drain hole 33 is provided in the depressed or dished central bottom portion 19 of the drum 16 and communicates with an elbow fitting 34 that is welded or otherwise suitably secured as indicated at 34a to the dished central bottom portion 19 of the drum 16 and is connected with the drain pipe 14 previously mentioned. Now, special attention is called to the fact that the burner 17 comprises an open ended perforated hollow shell 35 of frusto-conical shape mounted on the dished bottom 30 as a base, so that the burner is smaller at the upper end than at the lower end. There are three series of holes 36 in the lower half of the shell 35 which are rather widely spaced vertically of the burner and rather widely spaced circumferentially of the burner, and a single intermediate series of holes 37 in rather closely spaced relation circumferentially of the burner, but spaced above the uppermost series of holes 36 at the same distance as the distances between the series of holes 36, and there are three other series of holes 38 above the series 37 in closely spaced relation vertically of the burner and closely spaced relation circumferentially. All of the holes 36 serve to admit air for mixture with the oil vapors to form a combustible mixture, but the holes 37 and 38 are mainly for admitting air to support combustion, air being admitted to the drum 16 through a series of rather large holes 39 that are provided in circumferentially spaced relation in the lower hemispherical member 18 of the drum 16, approximately in the same horizontal plane with the middle one of the three series of holes 36.

In operation, the burner is lighted with a loose wad of paper that is dipped in the fuel and lighted and dropped into the bottom of the burner 17, after which the lid 10 is replaced, the burning of the oil on this paper serving to start the draft through the stove and to heat and ignite the oil in the burner. The oil burns slowly at first, gradually burning higher and higher as the burner heats up. After the burner is operated for anywhere from fifteen to thirty minutes, the stove and room should be warm enough so that the thermostatic valve 13 can be regulated for the desired temperature to be maintained. The oil used is No. 1 furnace oil or distillate, the gravity of which usually ranges from 38–40, the end point being below 600° F. Kerosene is also a satisfactory fuel and under adverse draft conditions will burn cleaner than distillate. After the stove is thoroughly heated and properly regulated, the flame should be clean and without any dark smoke issuing from the smoke pipe. The lid 10 need not be removed to observe the flame, because a small hole is provided in the center of the lid through which the flame may be observed. Ordinarily it is not necessary to remove the burner 17 to clean out the carbon at an intermediate point of a brood, as it is with other burners, because this burner actually operates better with this carbon in it. The carbon gets red hot and super-heats the gases as they are being consumed, and the radiant heat from the red hot or incandescent carbon playing upon a greater area of the dished bottom 30, by virtue of the frusto-conical shape of the shell 35, greatly improves vaporization of the incoming raw oil, thus facilitating the formation of a good combustible mixture that will burn with a clean flame and accordingly reduce the tendency for carbon to form. It is, of course, clear that the burning mixture within the burner accounts for an even greater amount of radiant heat for vaporization of the liquid fuel in the bottom of the burner. The frusto-conical form of the burner shell 35 is also thought to be of some advantage in retaining the flaming mixture at an elevation near enough to the dished bottom 30 to insure good vaporization of the fuel. Burning of mixture occurs upwards from the level of the second and third rows of ports 36, the mixture below that level being more or less incombustible. Combustibility is attained by the time the mixture reaches the level mentioned because of the addition of sufficient air. The glowing and incandescent carbon referred to before forms on the inside of shell 35 in a ring or band usually at about the level of the upper row of ports 36. The addition of air to the mixture in the burner in greater and greater amounts upwards from the ports 36 through ports 37 and 38 insures substantially complete combustion so that there is very little if any carboning in the burner above the ports 36 and very little if any smoke issuing from the pipe 8. An important factor in the efficient vaporization of the oil is the form and disposition of the dished bottom 30 in the depressed or dished bottom portion 19 of the drum 16, which accounts for this part staying hotter because it is so well shielded against contact with the incoming cooler air that enters through holes 39. It will be seen that there is little more than enough space between the dished bottom 30 and the depressed or dished bottom portion 19 to allow overflow oil from the burner to be drained from the bottom of the drum 16 at 33—34.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In a burner assembly of the type in which liquid fuel is delivered onto the hot bottom of a burner and vaporized on said bottom and the vapors are mixed with air admitted to the burner at elevations above the bottom and the combustible mixture so formed burns more or less within the burner so that radiant heat from the combustion vaporizes liquid fuel in the bottom portion of the burner, the combination of a burner comprising a dished bottom and a perforated, open ended, hollow shell extending upwardly from the rim of said burner bottom, an enclosing and supporting drum for said burner which is open at the central portion of the top for escape of burning gases and products of combustion from the upper end of the burner shell and is generally of oblate spheroidal shape and large in diameter in relation to the burner shell and has air inlet holes provided in the lower hemisphere thereof, said lower hemisphere portion of said drum having a dished central bottom portion of slightly larger diameter than the dished bottom of said burner in which the latter is received in closely spaced relation so as to be substantially shielded from air currents in said drum while allowing drainage of overflow liquid fuel from said burner into the dished bottom portion of the drum in the event the flame in the burner is extinguished, means for delivering liquid fuel into the dished bottom of the burner, an overflow drain pipe communicating with the

bottom of the dished bottom portion of said drum, the burner shell being secured at its lower end to the dished burner bottom and extending up to the approximate level of the open top of said drum, said shell being tapered upwardly and its smaller open upper end being disposed centrally of the opening in the top of said drum, and a closure ring around the top of the burner shell projecting radially outwardly therefrom closing the opening in the top of said drum, the opening in the top of said drum being slightly larger in diameter than the bottom portion of the burner and the burner being removable from said drum through said opening.

2. In a burner assembly of the type in which liquid fuel is delivered onto the hot bottom of a burner and vaporized on said bottom and the vapors are mixed with air admitted to the burner at elevations above the bottom and the combustible mixture so formed burns more or less within the burner so that radiant heat from the combustion vaporizes liquid fuel in the bottom portion of the burner, the combination of a burner comprising a dished bottom and a perforated, open ended, hollow shell extending upwardly from the rim of said burner bottom, an enclosing and supporting drum for said burner which is open at the central portion of the top for escape of burning gases and products of combustion from the upper end of the burner shell and is generally of oblate spheroidal shape and large in diameter in relation to the burner shell and has air inlet holes provided in the lower hemisphere thereof, said lower hemisphere portion of said drum having a dished central bottom portion of slightly larger diameter than the dished bottom of said burner in which the latter is received in closely spaced relation so as to be substantially shielded from air currents in said drum while allowing drainage of overflow liquid fuel from said burner into the dished bottom portion of the drum in the event the flame in the burner is extinguished, means for delivering liquid fuel into the dished bottom of the burner, an overflow drain pipe communicating with the bottom of the dished bottom portion of said drum, the burner shell being secured at its lower end to the dished burner bottom and extending up to the approximate level of the open top of said drum, the dished bottom of said burner being concentrically arranged with respect to the dished bottom portion of said drum, the means for delivering liquid fuel into the dished bottom of the burner comprising a fuel pipe extending vertically through and fixed in liquid-tight relation to the central portion of the dished bottom portion of said drum and detachably threadedly engaged in liquid-tight relation to the central portion of the dished bottom portion of the burner, the opening in the top of the drum being large enough to permit removal of the burner therethrough.

3. In a burner assembly of the character described, a burner comprising a dished burner bottom and an open ended, perforated, hollow burner shell fixed to and extending upwardly from the rim of said burner bottom, an enclosing drum for said burner closed at the bottom and open at the top so that the burner can be lowered into the drum through the open top, a liquid fuel inlet fitting projecting upwardly through the bottom of said drum and threadedly received in an opening provided in the dished bottom of said burner, said burner shell being of frusto-conical form smaller at its upper end, said top opening in said drum being large enough to permit the lower end of said burner to pass freely through it, said burner shell having an annular projection on the top closing the open top of said drum when the burner is installed, and said drum having air inlet holes provided therein intermediate the top and bottom thereof and spaced above the burner bottom, the bottom portion of said drum having a depression in which the dished bottom of said burner is housed in closed spaced relationship for shielding from cooling contact with air entering said inlet holes in said drum, the spacing permitting overflow liquid fuel from the burner to drain into the bottom portion of said drum, and a drain outlet for the bottom portion of said drum.

4. In a burner assembly of the character described, a burner consisting of a dished bottom and a perforated, open ended, hollow burner shell extending upwardly from said burner bottom, and an enclosing drum for said burner closed at the bottom and open at the top, a liquid fuel inlet fitting projecting upwardly through the bottom of said drum and threadedly received in an opening provided in the dished bottom of said burner, said burner shell being of frusto-conical form smaller at its upper end, said top opening in said enclosure being large enough to permit the lower end of said burner shell to pass freely through it, said burner shell having an annular projection on the top closing the open top of said drum, and said drum having air inlet holes provided therein, the bottom portion of said drum having a depression spaced below the level of the inlet holes in which depression the dished bottom of said burner is housed for shielding from cooling contact with air entering said inlet holes in said drum.

5. In a burner assembly of the character described, a burner consisting of a dished bottom and a perforated, open ended, hollow burner shell extending upwardly from said bottom, an enclosing drum for said burner closed at the bottom and open at the top, a liquid fuel inlet fitting projecting upwardly through the bottom of said drum and threadedly received in an opening provided in the dished bottom of said burner, said burner shell being of frusto-conical form smaller at its upper end, the top opening in said drum being large enough to permit the lower end of said burner to pass freely through it, said burner shell having an annular projection on the top closing the open top of said drum, and said drum having air inlet holes provided therein, the bottom portion of said drum having a depression spaced below the level of the inlet holes in which depression the dished bottom of said burner is housed for shielding from cooling contact with air entering said inlet holes in said drum, and there being a drain outlet for overflow liquid fuel communicating with said depression.

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