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WICK-TYPE OIL BURNING HEATER

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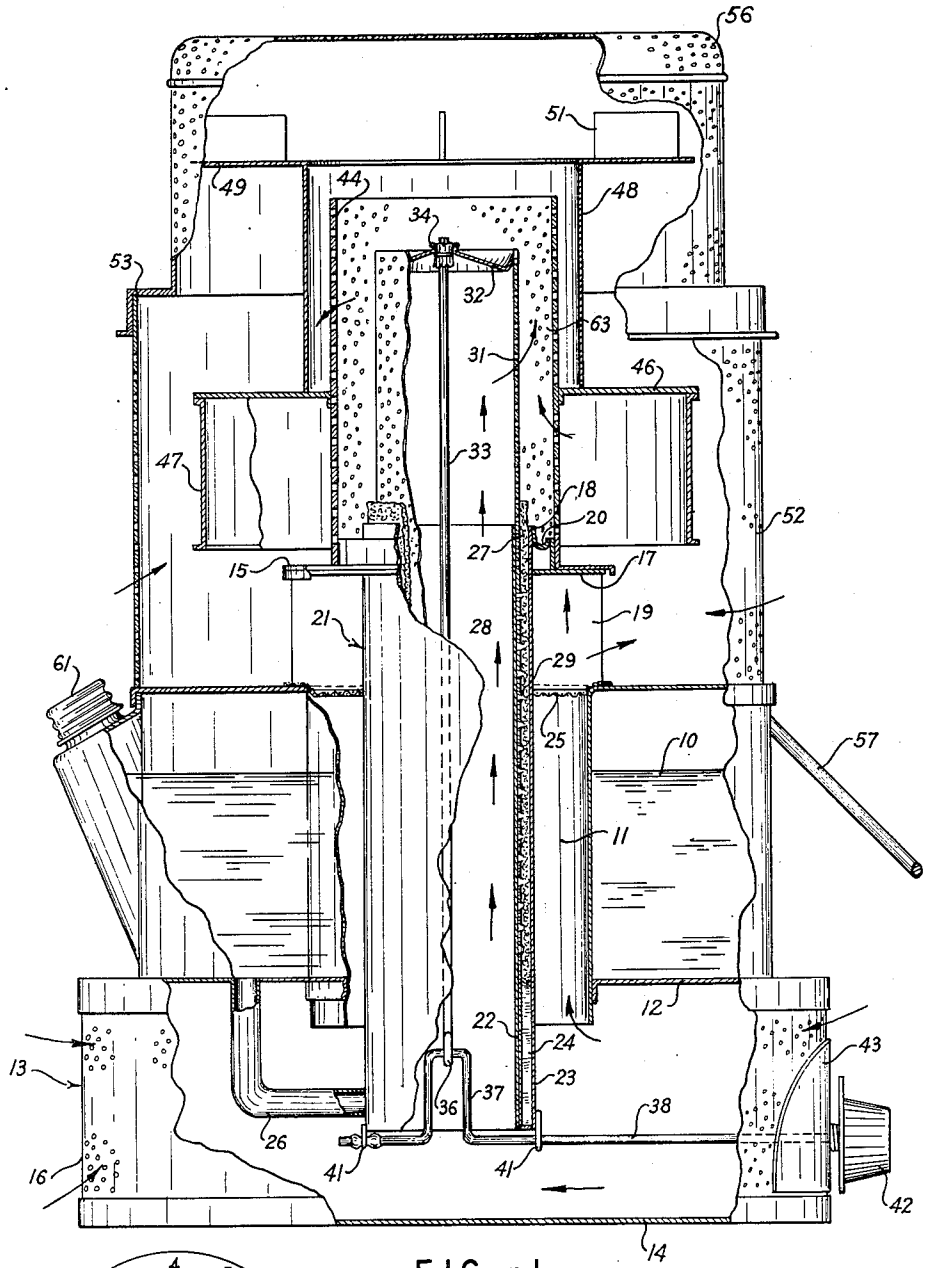


FIG.—1

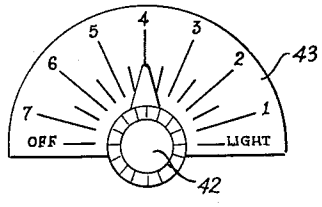


FIG.—2

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WICK-TYPE OIL BURNING HEATER

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4 Claims. (Cl. 126—96)

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Our invention is directed principally to portable heaters of the type using kerosene or similar fluid hydrocarbons as fuel.

Prior art devices of this general type, for convenience herein termed oil heaters, have been available for several years, but have failed to attain efficient operation. Despite the relatively high heat content of the fuel, which is usually kerosene, high combustion temperatures have not been attained by the burner assemblies, and in almost every instance, objectionable fumes and odors have developed during operation. Neither has there been generally available an efficient, low cost oil heater which was truly explosion proof, or which could be used efficiently for both cooking and heating.

A primary object of our invention is to overcome these and other shortcomings of conventional oil heaters through the provision of a portable heater using kerosene or similar fluids as fuel which is highly efficient in operation, produces high flame temperatures, is substantially free from objectionable fumes and odors, is explosion proof, is easily ignited without the use of highly volatile fuels, and which may be employed for both cooking and heating.

Further objects include the provision of a heater of the type described which is easily operated, durable, inexpensive to produce and operate, which may be easily extinguished at the will of the operator and which includes a new and efficient disposition of parts for creating adequate draft, thus obtaining better combustion and circulation of heat.

The construction and operation of our device, which attains the foregoing as well as further subsequently apparent objects, will be best understood by reference to the following detailed description and appended drawings in which:

Fig. 1 is a partially sectioned elevation of our improved heater drawn to a scale of approximately ¾" to 1"; and

Fig. 2 is a partial elevation of our regulator knob and dial.

Construction

Our heater includes a cylindrical fuel reservoir 10 having an axially disposed cylindrical passageway 11 formed therein and supported on a top plate 12 of a hollow cylindrical base, generally designated 13. An imperforate circular bottom plate 14 is secured as by welding to a cylindrical perforated wall 16, the upper edge of which is secured to the top plate 12. A horizontal baffle plate 17, having a centrally disposed upwardly extending boss 18 is supported above

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the passageway 11 by vertical radially disposed baffles 19 secured at their lower ends to the reservoir 10, and at their upper ends to the baffle plate 17. A groove 20 is formed in the plate 17 near the boss 18 to receive and hold the small quantity of fuel which occasionally escapes over the boss 18.

A combined wick channel and draft tube, generally designated 21, projects through the passageway 11 and is spaced from the walls thereof, a gauze washer 25 extending from the reservoir 10 to the tube to prevent possible flashing. The wick channel and draft tube 21 includes concentric inner and outer cylinders, 22 and 23 respectively, joined at their lower extremities to define a wick channel 24, which communicates with the interior of the reservoir 10 through a tube 26. The upper extremity of the outer cylinder 23 is secured as by welding to boss 18 on the baffle 17. A cylindrical wick 27 of woven highly absorptive material such as cloth or asbestos is telescoped over a metal liner 28 having sharp wick-engaging projections 29, and secured thereto as by a wire, not shown. A cylinder 31 of mesh or perforated metal is secured to the upper end of the liner 28 near the top of the wick 27, the wick 27 and liner 28 being formed for sliding vertical movement within the wick channel 24.

A domed plate 32 is fastened across the upper end of the cylinder 31 and is provided with a central aperture through which a rod 33 fits loosely. The upper end of the rod 33 is attached to the plate 32 by suitable means, such as nuts 34 disposed on either side of the plate 32, while the lower end is looped, as at 36 to engage the throw 37 of a crank 38. The crank 38 is supported by spaced journals 41 secured to the base of the draft tube 21 and extends outwardly through the wall 16.

A knob and pointer assembly 42 is attached to the outer end of the crank 38 in reference relationship to a plate 43 secured to the wall 16 and upon which suitable indicia may be formed to indicate the burner adjustment.

An outer cylinder 44 of perforated metal concentric with and spaced from the cylinder 31 is slidably received by boss 18 and extends upwardly beyond the movable cylinder. A circular flange 15 may be secured to the lower extremity of cylinder 44 for engagement with baffle 17 beyond groove 20. A ring baffle 46 is secured at about the midpoint of the cylinder 44 and extends laterally therefrom beyond the baffle 17, terminating in a depending peripheral skirt 47,

the lower extremity of which is somewhat above baffle 17. An imperforate cylinder 48, concentric with cylinder 44 and spaced therefrom is secured to the ring baffle 46 and supports a ring 49 having struck up portions 51 adapted to support a cooking implement above the upper end of cylinder 44.

A fixed outer shield 52 extends upwardly from the reservoir 10 around the above described assembly and terminates somewhat below the plane of the ring 49. A removable cover 56 of perforated metal having an imperforate peripheral flange 53 fits snugly over shield 52. A bail 57 may be pivotally secured to the fixed outer shield 52 in any suitable manner.

Operation

To operate our device, the reservoir 10 is filled through a suitable cap 61 with a fuel such as kerosene, which flows through the tube 26 into the wick channel 24, saturating the wick 27. The knob 42 is then turned to force the cylinder 31 upwardly, thus raising the wick carrier 28 exposing the upper end of the wick 27. The cover 56 and the assembly, which includes cylinders 44 and 48 are removed, exposing the wick 27 for easy access. When the wick has been lighted, said assembly and cover 56 may be replaced, the wick being allowed to remain in raised position until the cylinders 31 and 44 have been well heated, after which it may be lowered to the desired position.

The heat from the cylinders 31 and 44, plus the heat conducted from these cylinders to the cylinders 22 and 23 around the wick and to the wick carrier 28, volatilize and ignite the fuel carried upwardly by the wick in a combustion chamber 63 defined by the cylinders 31 and 44.

Currents of air, indicated in Fig. 1 by arrows, enter through the perforate wall 16 and are drawn upwardly through the center of the draft tube 21 and outwardly into the combustion chamber 63. Air currents also rise through the space between the draft tube 22 and the reservoir 10, mingling with air drawn in through the fixed shield 52 and pass inwardly through the lower portion of cylinder 44 into the chamber 63.

It should be noted that the drafts entering the combustion chamber are preheated by contact with several parts of heated metal, such as cylinders 31 and 44, skirt 47, baffle 46 and wick 27, and diverge immediately above the wick 27 or wick channel 24, creating a suction effect for rapidly conveying volatilized fuel. As a result, the end of the wick need not project above the cylinders 22 and 23 except in cases where extremely high temperatures are required, or when lighting. The wick does not burn appreciably, since combustion apparently occurs above the wick, particularly when the upper end is drawn downwardly a short distance into the wick channel 24.

If employed for cooking, the cover 56 may be removed and a cooking utensil placed on the struck up portions 51. The wick is raised or lowered to obtain the desired degree of heat, which is available in adequate quantity, since the flame temperature may be increased to 1300° F. if desired. The remarkable freedom from the fumes and odors usually associated with oil burners is due not only to the high efficiency of combustion but also to the fact that all vapors are drawn into the combustion chamber by the induced air currents. For example, fuel spilled during filling or by careless handling on reservoir 10 generates fumes which are picked up by currents of air entering through the shield 52 and carried to the combustion chamber 63 with the air where they are oxidized to odorless gases. Similarly fuel seeping from the wick along the sides of the draft tube 21 will be carried by the currents rising through and around the tube to the chamber 63.

The proportions employed in constructing our device are important, and for the purposes of illustration certain of these dimensions will be given, it being understood that these may be varied as to actual size in order to increase or decrease the heat output of the burner. In practice, we employ a wick 27 having an over all diameter of one inch and three-quarters and a wall thickness of approximately one-eighth inch. The cylinder 31 for this wick should be an inch and one-half in diameter and may extend approximately an inch and three-eighths above the wick. Cylinder 44, which defines the outer wall of the combustion chamber, may be two inches in diameter with an over all height of about four and one-half inches, while the skirt 47 may be approximately five inches in diameter with a total depth of one and three-quarters inches. The baffles 15 and 17 should be approximately three and one-quarter inches in diameter and spaced about one-quarter inch below the lower extremity of the skirt 47, while the interior of the cylindrical member 48 preferably will have a diameter of two and three-quarters and a height of about two and one-eighth inches.

The foraminous material employed in forming our burner is preferably perforated metal, since this material has considerably more strength than screen or gauze, and may contain uniformly spaced openings one thirty-second inch in diameter, spaced fifteen openings per inch. We prefer this particular form of material, since the openings are sufficiently fine to prevent passage of any flame through the material, but at the same time provide adequate draft for combustion. Using the proportions herein designated our heater will develop approximately 2400 B. t. u.'s per hour in normal operation using ordinary white kerosene as a fuel. One quart of fuel will operate the burner for approximately twelve hours. A greater heat output may of course be obtained by increasing the size of the wick, provided corresponding increases are made in the other proportions of the burner to retain the proper draft for combustion.

In compliance with R. S. 4888, we have described in detail the presently preferred embodiment of our invention, but it should be understood that this description is primarily for purposes of illustration and is not to be construed as limiting our invention except insofar as defined in the appended claims.

We claim:

1. An oil burning heater comprising a pair of spaced hollow concentric cylinders, the inner one thereof defining a draft tube open at its lower end to the atmosphere and with the outer cylinder a wick channel between the cylinders, a cylindrical wick carrier extending upwardly from within the wick channel and having a foraminous upper portion, a cap closing the upper end of the wick carrier, an annular wick on the carrier adapted to extend from within said channel, a foraminous cylindrical member concentric with and extending around the upper portion of the wick carrier and defining there-

with a combustion chamber above the wick open to the atmosphere at its upper end, a cylindrical metal skirt around the foraminous cylindrical member open at its lower end to the atmosphere, an imperforate, generally horizontal baffle extending between the skirt and the foraminous cylindrical member for directing substantially all air drawn into the skirt inwardly to the combustion chamber, and means for supplying fuel to the wick.

2. An oil burning heater comprising a pair of spaced hollow concentric cylinders, the inner one thereof defining a central draft tube open at its lower end to the atmosphere and with the outer cylinder a wick channel between the cylinders, a cylindrical wick carrier slidably telescoped into the open upper end of the wick channel and having a foraminous upper portion, a cap closing the upper end of the wick carrier, an annular wick on the carrier adapted to extend from within said channel, means for reciprocating the wick carrier and wick in the wick channel, a foraminous cylindrical member concentric with and extending around the upper portion of the wick carrier and defining therewith a combustion chamber above the wick open to the atmosphere at its upper end, a cylindrical metal skirt around the foraminous cylindrical member open at its lower end to the atmosphere, an imperforate, generally horizontal baffle extending between the skirt and the foraminous cylindrical member for directing substantially all air drawn into the skirt inwardly to the combustion chamber, and means for supplying fuel to the wick.

3. An oil burning heater comprising a pair of hollow concentric metal cylinders joined at their lower ends to form a cylindrical wick channel and the inner of said cylinders defining a centrally disposed draft tube, means for supplying fuel to the wick channel, a metal wick carrier slidably mounted in the wick channel and having a foraminous upper portion extending upwardly beyond said metal cylinders, a cap closing the upper end of the wick carrier, a cylindrical foraminous metal member over the wick carrier and defining therewith a combustion chamber immediately above the wick channel and open at its upper end, said foraminous metal member being in heat conducting contact with the outer of said metal cylinders, an annular wick on the carrier adapted to extend from within said channel, a cylindrical imperforate skirt over the foraminous metal member and communicating at its lower end with the atmosphere, and an

imperforate baffle disposed between the skirt and the foraminous metal member for directing substantially all air drawn into the skirt inwardly into the combustion chamber.

4. An oil burning heater comprising a base having upwardly extending walls provided with means forming air inlet openings, a fuel reservoir mounted on the base, a fixed outer metal shield extending upwardly from the reservoir, a pair of hollow concentric metal cylinders, the inner one thereof defining a central draft tube open at its lower end to the atmosphere and disposed within said base and with the outer cylinder a wick channel between the cylinders, said draft tube having its upper end located within the outer shield, means for passing fuel into the wick channel from the reservoir, a cylindrical metal wick carrier slidably mounted in the wick channel and extending upwardly above said metal cylinders, the upper portion of the wick carrier being formed of foraminous metal, a wick on said carrier, a cap closing the upper end of the wick carrier, a rod extending downwardly from the cap through the draft tube, means for raising and lowering the rod, a foraminous metal cylinder in spaced concentric relation to the upper end of the wick carrier, said foraminous cylinder being open at its upper end and defining a combustion chamber immediately above the wick channel, an imperforate metal skirt in spaced concentric relation to the foraminous cylinder, the lower end of said skirt being in communication with the atmosphere, and an imperforate baffle extending transversely between the skirt and the foraminous cylinder for directing air drawn into the skirt inwardly into said combustion chamber whereby said air is preheated by contact with the skirt and foraminous cylinder to cause substantially complete burning of the combustible formed in the combustion chamber.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
419,417	Converse	Jan. 14, 1890
668,587	Smith	Feb. 19, 1901
1,074,688	Boekenkamp	Oct. 7, 1913
1,420,003	Wegman	June 20, 1922
2,019,646	Barhoff	Nov. 5, 1935
2,199,826	Scott-Snell	May 7, 1940