Aug. 15, 1950 B. E. HOGER 2,518,689

ORCHARD HEATER

Filed July 20, 1945

Fig. 1

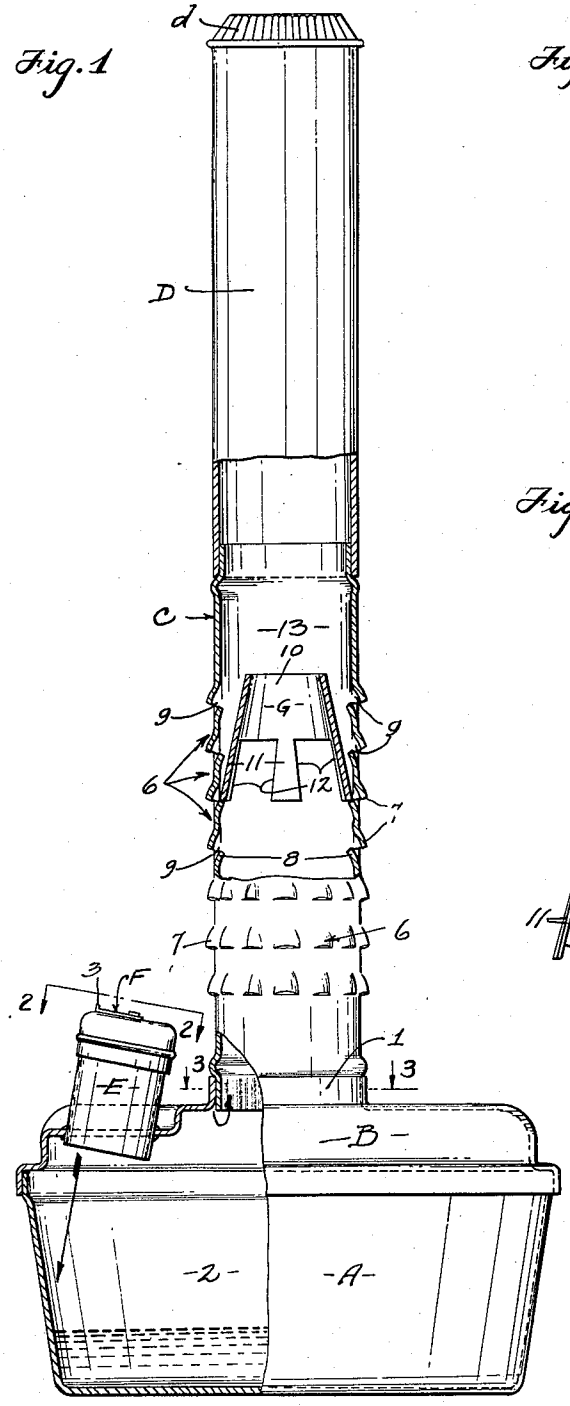


Fig. 2

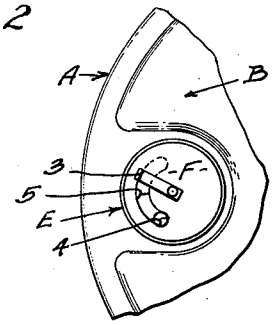


Fig. 3

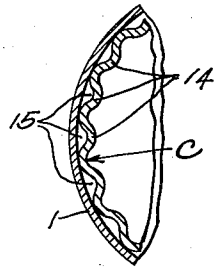


Fig. 4

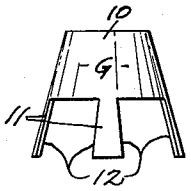
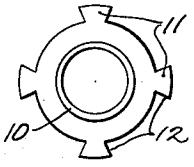


Fig. 5



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ORCHARD HEATER

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1 Claim. (Cl. 158—91)

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This invention relates to orchard heaters and has for an object the provision of a heater of extreme simplicity, economy of manufacturing cost and in operation and adapted to generate a maximum of heat with a minimum of smoke and smudge.

It is well known that oil which is burned in a standard heater while producing a substantial heat around and above a heater also produces a disadvantageous smoke or smudge in the vicinity of the heater. Hence, it is an object to provide a heater which will be as free of smoke and smudge as possible, while at the same time providing a maximum heat zone around and above the heater.

I have ascertained by experimentation that an orchard heater of relatively simple character can be produced which will be of low initial cost and maximum effect, and it is an object of this invention to provide such a heater which, briefly, includes the usual fuel receptacle with a stack superimposed thereon which is operated as a combustion chamber and also for discharging the products of combustion, and embodying a localized gas generating zone within the receptacle to which oxygen from the atmosphere is freely admitted in regulated volume and a pilot flame for igniting the locally generated gas.

An object also is to provide means within the stack and adjacent a combustion chamber in which the volatile elements are consumed and which is effective for, first, restricting the effective area of the stack and for retarding the outflow of the products of combustion; second, for centralizing the gases in the stack so as to effect more perfect combustion thereof before their discharge; third, to accelerate and increase combustion in the secondary stage by reason of the added heated surfaces of the said element; and, fourth, to provide means at the junction of the stack and the receptacle for admitting a downstream of air into the central portion of the stack, which will rise through the stack and will constitute an air wash inwardly of the wall of the stack so that the annular column of air will be interposed between the wall and burning gases.

It is an object also to so tilt the air inlet on the top of the fuel receptacle that air will be admitted to the receptacle at a high velocity and the air stream will be directed against the wall of

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the receptacle in such a manner and at such an angle that, regardless of the level of the fuel, a pilot burning of the fuel may be maintained for releasing the higher fractions of the fuel for secondary and final combustion in the stack. Hence, satisfactory operation of the heater is possible when the fuel level is low.

Generally, it is an object to combine with a fuel receptacle whereby the heat from a primary or pilot burning of the fuel may be transmitted by radiation and convection to the remainder of the receptacle and associated parts for the purpose of heating the fuel to a point at which all of the fuel is volatilized, and a secondary combustion chamber within the lower portion of the stack for burning the released gases, and in or adjacent which I provide an element for retarding, centralizing and accelerating the burning of the gases released from the fuel. Other objects will appear as the description of my heater progresses.

I have shown a preferred form of heater embodying my improvements in the accompanying drawing, subject to modification, within the scope of the appended claim, without departing from the spirit of my invention.

In said drawing:

Fig. 1 is an elevation, partly in section;

Fig. 2 is a fragmentary plan of the same on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary section of the lower portion of the stack on line 3—3 of Fig. 1;

Figs. 4 and 5 are, respectively, a side elevation and a top plan view of one form of an element insertible in the stack for retarding, diffusing and accelerating the combustion of the generated gases.

Briefly described, an orchard heater constructed in accordance with my invention includes a receptacle A forming a base and adapted to contain a suitable quantity of fuel, a top B adapted to tightly fit the upper portion of the receptacle so as to provide a substantially air proof joint, a stack composed of lower and upper sections C and D telescopically arranged, an air inlet E carried by top B, an air control device generally represented as F, and an element G adapted to be supported in the portion C of the stack.

Receptacle A is of usual form and size and is arranged to contain a suitable volume of fuel

oil of desired gravity. Top B is of inverted pan-like cross section and is adapted to telescopically fit the upturned annular neck 1 of the receptacle top B and to be held thereon in substantially air tight relationship. Air inlet E is of tubular form and is suitably affixed in tilted position to top B so that its lower extremity communicates with the fuel chamber 2 of the receptacle A.

Air regulator F snugly fits the top of inlet E and has an arm 3 extended therefrom for manual operation so that the regulator may be moved relative to the top of inlet E in order to vary the inflow of air from the atmosphere to the interior of the receptacle A. To such end the top of the inlet E and the web of the regulator F are provided with apertures 4 and 5, one of which is in the inlet E and the other in regulator F, one of said apertures being elongated, as shown, or otherwise formed so that in any event the movement of member F relative to inlet E will afford a complete or restricted inflow of air to the receptacle, as may be required for satisfactory operation of the heater.

Portion C of the stack is formed with a plurality of rows of louvres 6 which, as shown in Fig. 1, are formed with overhanging outwardly disposed portions 7 and inwardly projecting lower portions 8, between which air passages 9 are provided.

Now, referring to Figs. 1, 4 and 5, wherein I have shown the combined retarding, centralizing and heating element G, it will be observed that the preferred form of said element as shown is substantially frusto-conical (but not necessarily) with a restricted circular end portion 10 and a plurality of alternating legs 11 and slots 12 extended from said circular portion. Such a form of device is provided for the purpose of readily inserting the element into the stack at selected positions, inasmuch as the legs thereof are reasonably and sufficiently yieldable for such purpose, and serves to direct air and generated gases into the central portion of the secondary combustion chamber 13 of the stack. The element G is inserted in the portion C of the stack from the bottom and then moved upwardly to a desired position whereat the lower ends of the legs may rest upon the inwardly turned portions 8 of the louvres 6 and, if desired, may be fixed in position by spot welding or otherwise. A purpose of element G, of which one or more may be employed in the stack, is to retard and centralize the volatile elements to an extent which will prevent the discharge from the stack D of any unburned quantities of the combustible elements of the fuel. This result is accomplished, at least in part, by the preheating of the element G to a red-hot state, due to local combustion which serves to almost, if not completely, effect combustion of the generated gases with but slight, if any, unburned carbon particles therein and thus to discharge hot gases instead of, or unaccompanied by, smoke or smudge from the heater.

Of course air is freely admitted to the secondary combustion chamber 13 through the apertures 9 in order to supply sufficient oxygen from the atmosphere, by means of which complete combustion is effected before the products are discharged from the stack.

The lower end of stack C is corrugated at 14 and thus provides alternating air passages 15 around and internally of neck 1 of the top B through which air is admitted downwardly to the fuel receptacle above the level of the fuel and thence upwardly in an annular stream adjacent

the inner surface of the stack and forms an air wash outwardly of the burning gases.

It will be obvious, from a consideration of the foregoing detailed description, that the operation and use of my orchard heater is as follows:

When the receptacle A is supplied with a suitable fuel and ignited at a point below air inlet E, as by means of a pilot flame, the metallic parts of the heater and the fuel oil are heated to a point which will effect release of readily combustible high fractions from the body of the fuel.

With the reference to the element G it may be understood that the particular form of element shown herein is not necessary to perform the functions herein named, inasmuch as such element may be of any of various forms so long as it tends to retard the outflow of the products of primary combustion, to centralize and direct the gases from a normally straight path toward the center of the stack for increasing combustion thereof, so as to thoroughly consume the combustible fractions thereof by reason of superheating through the added radiation and convection afforded by said element so that maximum consumption of the smoke creating elements is effected.

It is well known in the art that fuel used in orchard heaters will generate combustible gases upon the application of a flame thereto and, also, that in a closed receptacle, such as is shown at A, wherein the liquid fuel has a substantially large expanse, a primary burning of the generated gases will occur in that portion of the receptacle nearest the air inlet E, because the greatest volume of oxygen is present at such localized position. However, when the fuel is ignited, as by means of the introduction of a suitable priming fluid of highly volatile character, and a torch is applied, when the priming fluid has been consumed the primary combustion of the generated elements will continue in the restricted zone adjacent the air inlet, and through radiation of heat and convection the fuel will be sufficiently heated to give off fractional volatile elements which are drawn from the receptacle A upwardly in and through the stack, after having been mixed with air entering through louvre passages 9, and having been, of course, ignited by the pilot flame beneath or adjacent air inlet E.

Preferably, but not necessarily, inlet E is slightly tilted (to the right, as shown in Fig. 1) so as to direct the admitted air downwardly at a suitable angle and velocity against a portion of the wall of receptacle A, so as to confine the pilot flame as nearly as possible to a marginal area of the fuel receptacle.

Thus, when the pilot flame is instituted the heater will operate continuously in the manner stated until the fuel level reaches a too low level, or is exhausted.

It is emphasized that the purpose of my heater is to obtain a maximum combustion of fuel and resultant smudgeless products of combustion. To further contribute to such end I may provide on the top of stack D an inturned member *d* which restricts the stack outlet and retards discharge to a desired extent, so as to aid in directing the burning gases and products of combustion toward the center of the stack in a manner similar to the operation of member G.

Now, referring to Fig. 1, it will be observed that the receptacle is indicated as having a low fuel level and the inflow of air through inlet E directs the air against the wall of the receptacle above the fuel level where a pilot flame is main-

tained, but the area of the air inlet (about ¾ inch) and the volume of air being insufficient to supply oxygen for a general or widespread burning of the fuel is, however, sufficient to maintain combustion and generate enough heat for effecting a release of the lighter and more volatile fractions of fuel which rise in the stack and are mixed with air entering the stack through louvre passages 9 and are, of course, ignited by the pilot flame.

Element G operates to direct the gases during combustion toward the center of the stack and the rising air wash stream from passages 15 tends to confine the burning to the inner area of the stack and thereby, as far as possible, prevent unnecessary dissipation of heat laterally around the stack.

I claim:

An orchard heater comprising: a fuel receptacle, a stack supported thereon, an air inlet means provided in the top of the receptacle and adapted to direct inflowing air toward a portion of the wall of the receptacle whereby when the fuel adjacent to the air inlet is ignited a pilot flame may be maintained in the receptacle for heating the fuel and thereby releasing lighter fractional elements from the fuel, said stack having a plurality of louvres formed in the wall thereof through which air is admitted to the stack, and a frusto-conical baffle member positioned in the stack adjacent some of said louvres and formed with legs adapted to engage the wall

of the stack adjacent said louvres, whereby air admitted through said louvres is mixed with the fractional elements which rise through the frusto-conical member and burned in the stack instead of being exhausted as unconsumed products of combustion, the legs of said frusto-conical member being yieldable to permit insertion of said frusto-conical member in the stack and to support said member at different louvres in said stack.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,067,981	Hamilton	July 22, 1913
1,077,009	Smith et al.	Oct. 28, 1913
1,086,275	Chinn	Feb. 3, 1914
1,091,170	Smith et al.	Mar. 24, 1914
1,091,216	Hamilton	Mar. 24, 1914
1,100,101	Scheu	June 16, 1914
1,125,014	Dunn	Jan. 12, 1915
1,304,820	Stollberg	May 27, 1919
1,419,570	Keller	June 13, 1922
1,468,421	Sheldon	Sept. 18, 1923
2,050,760	Mahlstedt	Aug. 11, 1936
2,158,636	Pheysey	May 16, 1939
2,165,279	Lambert et al.	July 11, 1939
2,370,116	Anderson	Feb. 27, 1945