Oct. 16, 1934. G. H. MEINZER 1,977,196

ORCHARD HEATER

Filed July 25, 1932

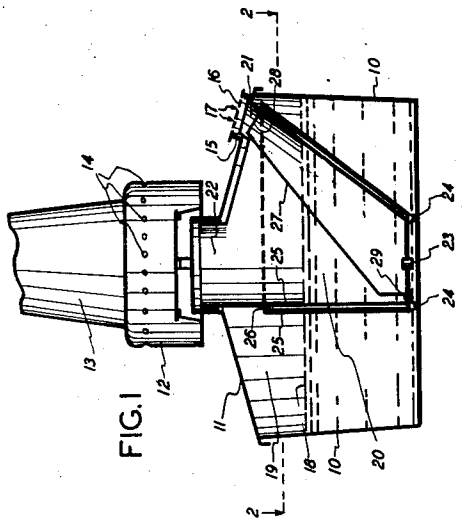


FIG. 1

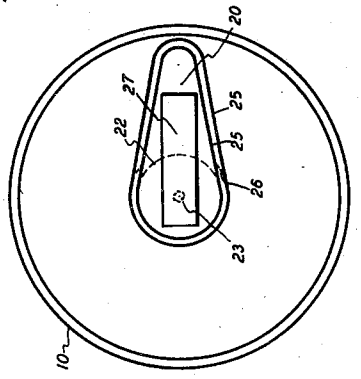


FIG. 2

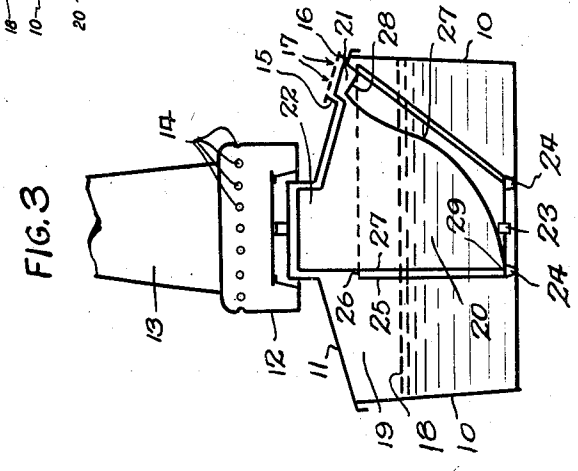


FIG. 3

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Patented Oct. 16, 1934

1,977,196

UNITED STATES PATENT OFFICE

1,977,196

ORCHARD HEATER

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Application July 25, 1932, Serial No. 624,419

4 Claims. (Cl. 158—91)

The object of my invention is to provide an orchard heater capable of burning the ordinary petroleum fuel without producing smoke, soot or tarry residues and which can be operated indefinitely with a minimum of attention.

Orchard heaters, as is well known, are devices for burning heavy petroleum distillate or light crude oil in the open air for the purpose of preventing damage to citrus groves by frost. They consist, essentially, of a pot which contains a supply of the fuel and in which the fuel is progressively vaporized, and a stack in which the vapors are admixed with air and burned. In the more modern types of heater an attempt is made to separate the zone of vaporization from the zone of combustion, heat being radiated from the combustion zone to the supply of fuel to convert it into vapor.

The best examples of this type of heater of which I have knowledge have two outstanding and very serious faults which it is the object of my invention to correct. The first of these faults is that combustion, instead of being confined to the stack takes place, at least in part and with a highly insufficient air supply, over the entire surface of the fuel contained in the pot.

This results in the formation of a heavy black smoke, sometimes continuously but more often intermittently, and the accumulation inside the pot of large quantities of soot which fall back into the oil supply and ultimately render it thick and highly unmanageable.

The second outstanding fault of all types of heaters heretofore produced has been that the oil is fractionated in the supply pot, the lighter fractions burning away first while the heavy fractions and an asphaltic residue formed by the heating of these fractions is continuously concentrated until finally there is left in the pot a tarry or asphaltic residue which cannot be burned and which is very difficult to dispose of.

A third, and almost equally serious, objection to heaters of the present type is that as the oil level in them becomes lowered, the rate of vaporization progressively changes so that the air supply has to be adjusted at frequent intervals to prevent the formation of an excessive amount of smudge.

The objects and advantages of my invention may best be appreciated on reference to the attached drawing and the following description thereof, in which:

Fig. 1 represents a preferred form of my invention, in vertical section;

Fig. 2 is a horizontal section of the same form on the line 2—2 of Fig. 1, and

Fig. 3 is a vertical section through a form of my invention in which the shape of reflector plate 27 is modified.

Referring to Figs. 1 and 2, 10 is a pot adapted to retain oil and having a slip cover 11. From this cover is supported a stack 12 having an extension 13, which may be open at the top or may be shielded. In the lower portion 12 of this stack are placed a plurality of air inlets 14—14. The cover 11 is provided with a nozzle 15 having a cap 16 which is provided with air inlets 17.

Up to this point I have described a conventional heater of the distillation type which is not of my invention. This heater, lacking the improvement about to be described, is filled with oil to some preferred level as suggested at 18, the oil is ignited at the surface, the air required for burning a small amount of vapor entering through the opening 17, the cover 11 is thus heated and the heat radiated back to the surface of the oil causes the evolution of vapor. This vapor passes upwardly to the stack 12 and extension 13, taking in secondary air through the openings 14 and burning within or at the end of the stack with a more or less smokeless flame. Smokeless combustion, however, takes place only when the amount of heat radiated back to the oil is in such relation to the volatility of the oil in the pot that only such quantity of vapor is generated as can be burned completely within the stack and when no material combustion takes place in the space 19 between the surface of the oil and the cover 11. This condition, as said, usually obtains for only very short periods in a heater so constructed.

My invention consists primarily in producing vaporization from only a small portion of the fuel in the pot, concentrating this vaporization, and the primary combustion by which it is maintained, within a small area to which sufficient primary air may be admitted to make combustion complete and avoid the collection of soot on the under side of the cover. At the same time I avoid fractionation of the fuel supply by substantially preventing vaporization of the main supply and admitting fuel from this supply to the vaporizing zone only as it is consumed. These ends I accomplish in the following manner.

Within the pot 10 I place a vaporizing chamber generally indicated at 20, preferably of the form shown in Figs. 1 and 2. This consists of a substantially closed vessel having an air inlet nozzle 21 projected into the corresponding nozzle 15, a vapor outlet tube 22 projected into the lower end

of the stack 12, a relatively small opening 23 in the bottom, and means such as the feet or bosses 24 to provide room for oil to pass into the opening 23. This opening should be of such area as to permit oil to flow freely from the supply in the pot into the chamber while preventing diffusion of hot oil into the pot—for example, it may be ½ inch in diameter, or it may be materially larger and be covered with wire gauze, or it may be substantially the entire bottom of the chamber.

An object of my invention being to prevent any material vaporization from the surface of the main supply of oil in the pot, it is important (though not entirely essential) to insulate the chamber against free transference of heat, and to this end I prefer to construct it with a double wall as at 25, the interspace 26 being an air or vapor space or being filled with suitable heat insulating material.

Another important feature of my invention is the heat reflector 27 which is a metal plate or strip placed more or less as shown in Figs. 1 and 2 and bent at the ends to rest within the chamber, as at 28 and 29. This plate becomes highly heated by primary combustion taking place within the chamber and both radiates and conducts heat to the relatively small amount of fuel therein, thereby producing vapors which pass through the nozzle 22 into the stack 12—13 when they are burned in the usual manner.

The rate at which vapors are evolved is to a large extent controlled by the shape and location of this plate. For example, by making the plate materially wider at the bottom than at the top, or by bending it to the contour indicated by the line 27 of Fig. 3, the vaporization rate may be maintained constant as the fuel level in the pot subsides.

I claim as my invention:

1. In an orchard heater having a covered reservoir for a supply of liquid fuel and a stack for burning vapors evolved from said fuel, the improvements comprising: a nozzle extending upwardly from the cover of said reservoir into the base of said stack; a substantially closed combustion and vaporizing chamber within said reservoir, said chamber communicating with said reservoir only at points adjacent the bottom of said chamber; a second nozzle extending upwardly from said chamber within first said nozzle into the base of said stack, said second nozzle fitting loosely within first said nozzle; means for admitting air into said chamber and for directing said air downwardly onto the surface of fuel within said chamber, thereby to produce limited combustion and the evolution of vapors within said chamber, and means for excluding air from that portion of said reservoir exterior to said chamber.

2. In an organization as defined in claim 1: means for insulating said wall against the transfer of heat from said chamber to the fuel supply exterior said chamber.

3. In an organization as defined in claim 1: means for insulating said chamber against the transfer of heat from said chamber to the fuel supply in said reservoir exterior said chamber, said means comprising double walls with an air space therebetween.

4. In an organization as defined in claim 1: a heat reflecting plate of which at least a part is situated in the combustion space within said chamber, said plate being arranged to direct reflected heat in a generally downward direction onto the surface of the fuel within said chamber.

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