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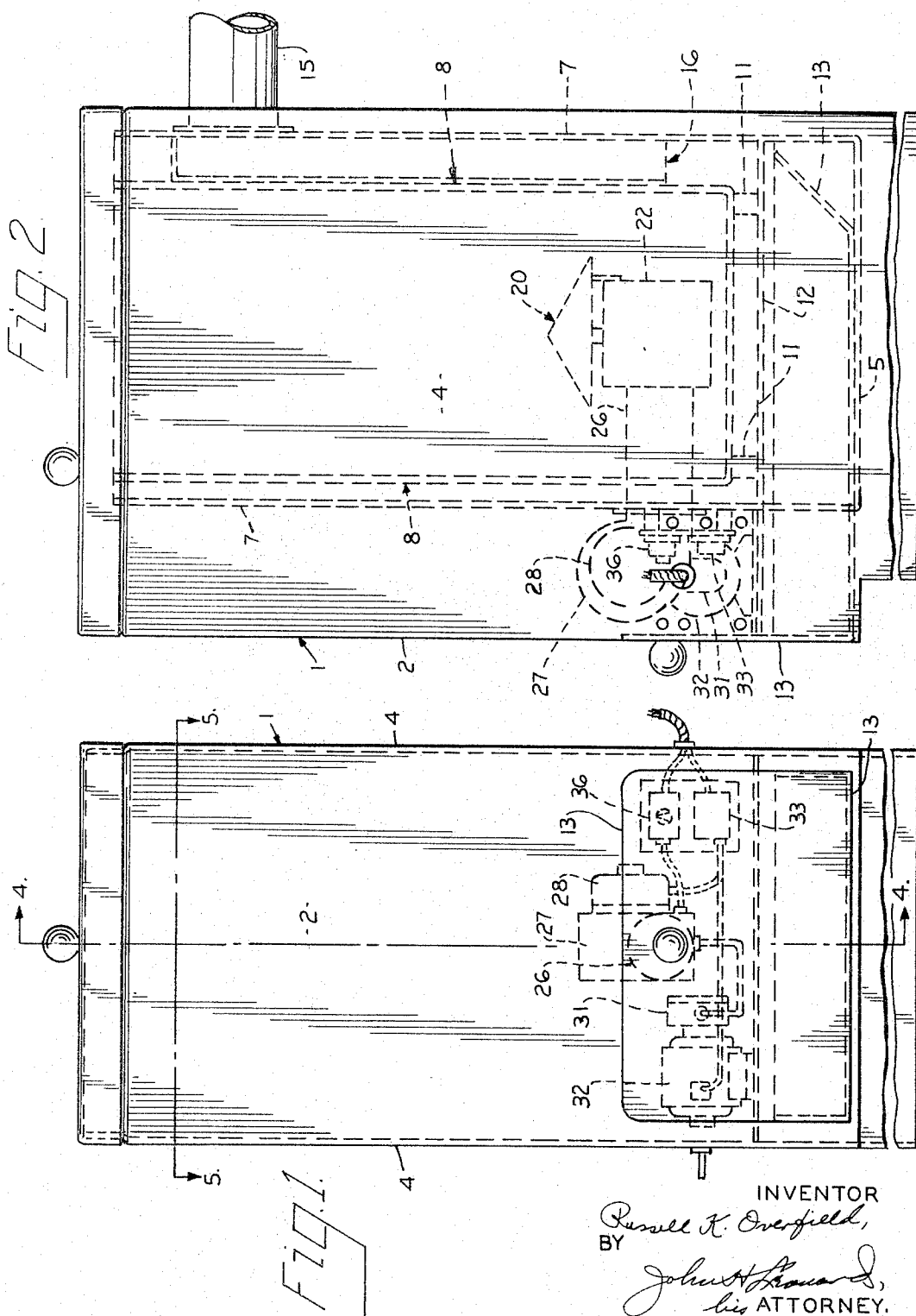
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3,334,598

OIL FIRED HOUSEHOLD GARBAGE INCINERATOR

Filed Sept. 28, 1964

3 Sheets-Sheet 1



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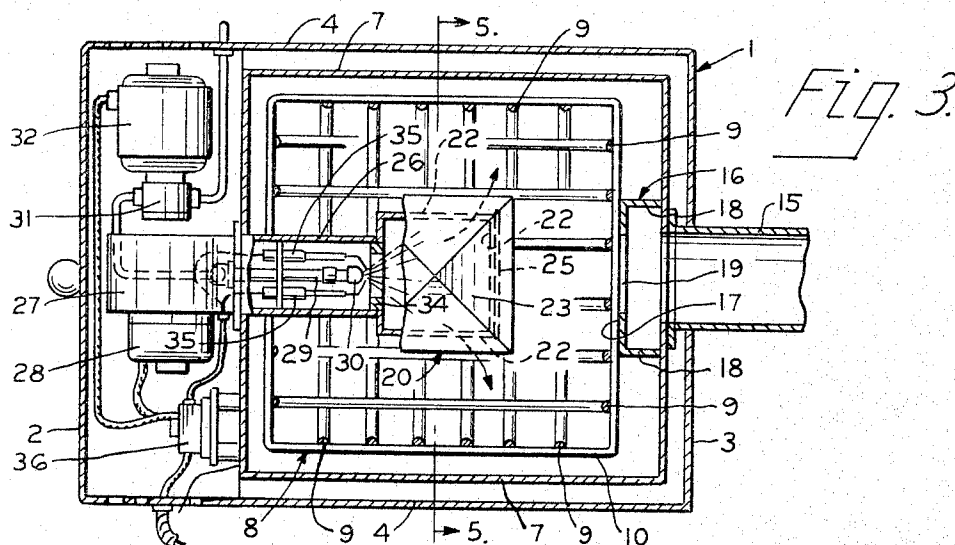
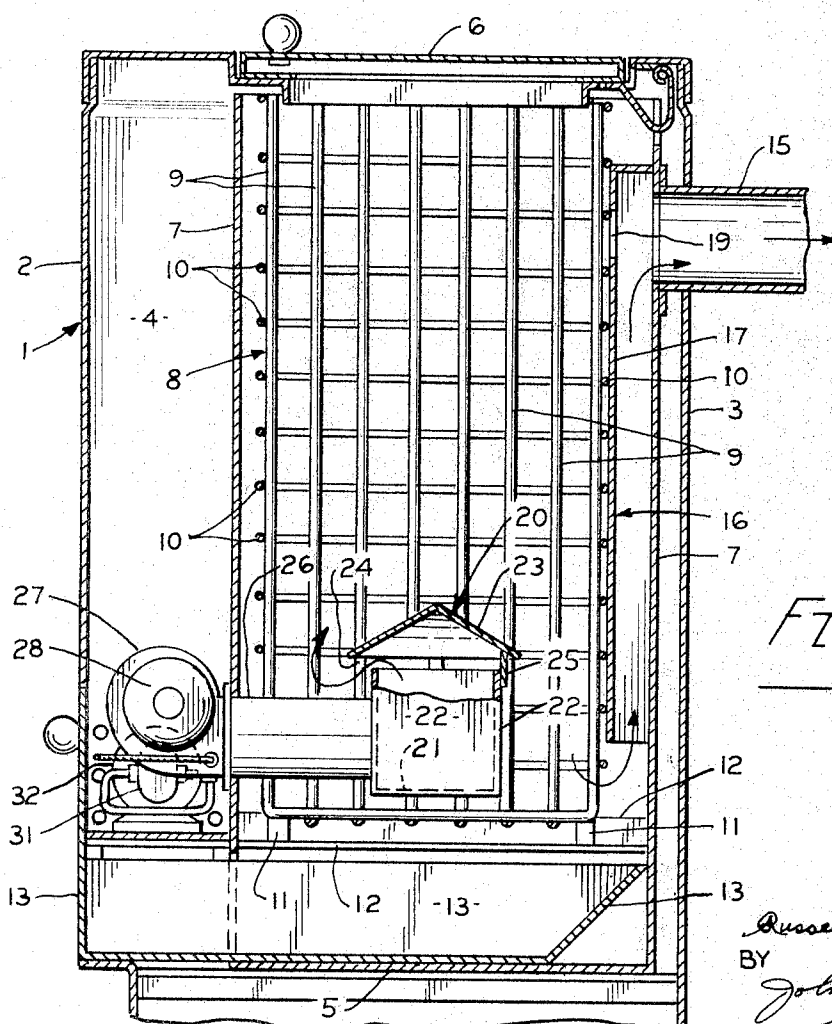
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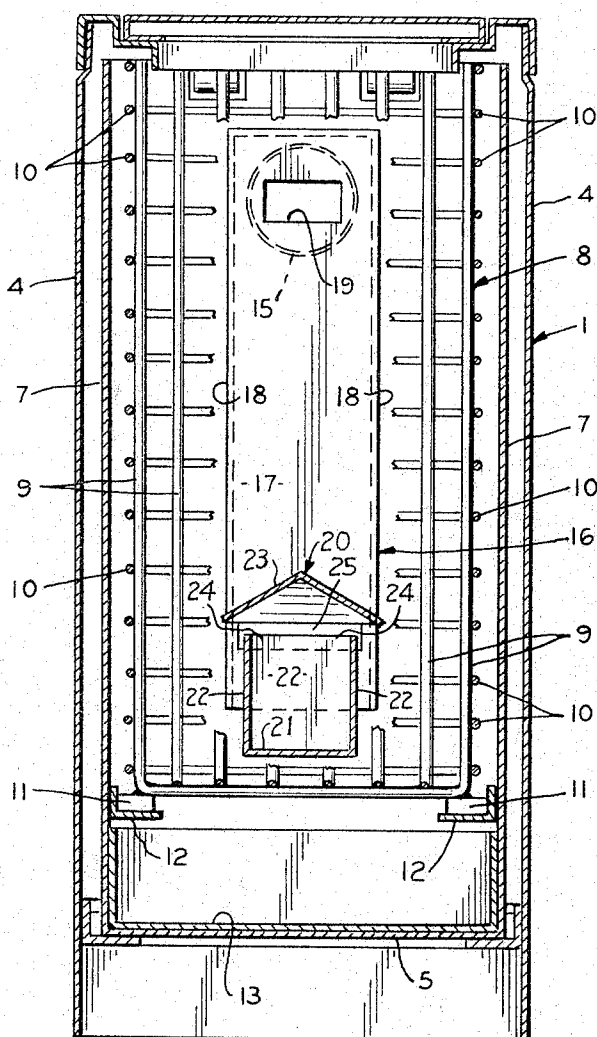


Fig. 5.

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**OIL FIRED HOUSEHOLD GARBAGE
INCINERATOR**Russell K. Overfield, 5555 Sullivan Road,
Hudson, Ohio 44236Filed Sept. 28, 1964, Ser. No. 399,597
17 Claims. (Cl. 110-18)

This invention relates to oil fired garbage incinerators and particularly to oil fired garbage incinerators for household use, and to oil burners therefor.

Heretofore, in oil fired garbage incinerators of sizes suitable for household use, sufficiently high temperatures for acceptable garbage incineration have been obtained, but only by employing oil burners operating at oil pressures of a minimum of 100 pounds per square inch. Pressures of such magnitude make it extremely difficult to prevent very pronounced exfiltration of products of combustion and gases from the incinerator into the room in which the incinerator is located. Likewise, the flame temperatures created in the incinerator at the combustion zone become higher than required for garbage incineration, thus overheating the equipment with consequent rapid deterioration, danger to personnel, and radiation of heat to an objectionable degree during the warmer months of the year.

In accordance with the present invention, a new burner and precombustion device combination is provided and is, in turn, so combined in a novel manner with a conventional household incinerator cabinet and garbage supporting grating therein so that effective combustion of admixed air and oil is obtained and the resultant heat is applied so as to cause efficient incineration of the garbage while eliminating the above objectionable features of prior incinerators.

The present incinerator has a very low oil consumption in relation to the quantity of garbage incinerated and the rate of incineration, and is characterized in that the oil is discharged not only at a very low rate, but also at very low pressure compared to prior incinerators.

The incinerator of the present invention can incinerate rapidly and efficiently a full charge of wet garbage, even when the full charge as introduced is wrapped in relatively thick layers of wet newspapers. It operates to dehydrate the charge of garbage sufficiently, preparatory to incineration, so that the garbage can ignite and burn, and thereby contribute to its own consumption.

Various objects and advantages of the invention will become apparent from the following description, wherein reference is made to the drawings, in which:

FIG. 1 is a front elevation of an oil fired garbage incinerator embodying the principles of the present invention;

FIG. 2 is a right side elevation of the incinerator illustrated in FIG. 1;

FIG. 3 is a horizontal sectional view of the incinerator illustrated in FIG. 1, and is taken on line 3-3 thereof;

FIG. 4 is a vertical sectional view of the incinerator illustrated in FIG. 1, and is taken on the line 4-4 thereof; and

FIG. 5 is a vertical sectional view of the incinerator and is taken on the line 5-5 of FIG. 3.

Referring to the drawings, the incinerator comprises a conventional upright household incinerator cabinet, indicated generally at 1, having outer walls including a front wall 2, a rear wall 3, and side walls 4. The cabinet is closed at the bottom by a bottom wall 5 and at the top by a lid 6 hinged near the rear wall 3 so as to swing upwardly to open position for affording charging access to the interior thereof.

In order to maintain the outer walls of the cabinet at a relatively low temperature, an inner peripheral wall 7

2

is provided, this wall being spaced from the front, rear, and side walls so as to provide a dead air heat insulating space therebetween.

Within the cabinet and spaced inwardly from the inner peripheral wall 7 thereof, is an upright basket grate 8 having its upright walls and bottom wall in the form of a grating affording free access of air. The side walls are formed of laterally spaced half round upright rods 9, and laterally spaced transverse rods 10. The bottom of the basket is similarly formed and provides a supporting grate for the garbage.

The basket grate 8 is open at the top and is supported at the bottom on suitable legs 11 which rest on a marginal flange wall 12 on the inner wall of the cabinet. The legs support the basket with the bottom wall of the basket spaced above the bottom wall 5 of the cabinet.

Between the flange wall 12 and the bottom wall 5 is a removable drawer 13 which is adapted to receive the ash from the incinerated garbage and accumulate the same for subsequent removal and disposal.

The incinerator is provided near the top of its rear wall with a flue outlet 15 which is adapted to be connected to the conventional stack for venting the products from the interior of the cabinet.

Within, and at the rear of, the cabinet is an afterburner 16 in the form of an upright channel. The channel is open rearwardly of the cabinet and is disposed with its bottom wall 17 spaced forwardly of the cabinet from the rear portion of the inner peripheral wall 7. The edges of the flanges 18 are disposed against the wall 7 at the rear of the cabinet. The channel is closed at the top end and is open at the bottom end. The top end is spaced a short distance above the flue outlet 15 and the open bottom end a short distance above the bottom of the basket grate 8. The sides of the basket 8 are spaced inwardly from the peripheral wall 7 so that there is a free passage for air and gases around the basket. The structure thus far described is conventional in a number of incinerators on the market.

The present invention resides in the burner and precombustion device combination and the new combination of burner and device with respect to the cabinet and the basket.

Referring particularly to FIG. 4, the wall 17 of the afterburner is provided near its upper end with a bleeder port 19 aligned with the flue outlet 15, for assuring prompt discharge of gases and fumes during starting.

The precombustion device, indicated generally at 20, is disposed at the transverse center of the basket near the bottom thereof. The combustion device 20 comprises an open top cup having a bottom wall 21 and a side wall 22 which is polygonal, preferably square, in horizontal cross section, as such a shape results in better turbulence of the air and fuel mixture within the chamber than would a cylindrical side wall. Mounted on the cup in spaced relation above the open top thereof is an upright pyramidal hood 23, the outer peripheral margin of which extends outwardly beyond the peripheral wall 22 of the cup, thus providing, between the margin of the hood and the top edge of the cup, a passage 24, which extends along both sides and the front of the cup for discharging burning gases and products of combustion from the interior of the cup. However, at the rear of the cup, this passage is blocked by a baffle 25 so that the burning gases and products of combustion from the cup must issue forwardly and laterally of the interior of the cabinet, and thus will have to traverse a considerable distance through the garbage therein before reaching the afterburner. For supplying oil and air into the combustion chamber of the precombustion device 20, an air tube 26 is connected to the device near the bottom of the chamber and extends forwardly therefrom and through the wall 7 and front wall 2.

An air blower 27 driven by a motor 28 is connected to the outer end of the tube for blowing air therethrough. An oil pipe 29 extends through the tube, in spaced relation to the walls thereof and at its inner end, adjacent the inner end of the tube, carries a spray nozzle 30, the spray nozzle preferably being one which discharges spray as a cone having about an 80° vertex angle.

Oil is supplied from a suitable source under pressure by a pump 31 driven by a motor 32.

The motors 28 and 32 are connected to a timer 33 which can be set to turn off the power at the end of a selected period of operation.

After the motors are turned off, the then ignited portion of the garbage can sustain combustion and incinerate the remainder, air for such combustion being drawn through the blower housing and tube 26 by natural draft. The blower may be operated for supplying the air for this self-incineration, if desired.

An annular restricting flange 34 may be provided at the outlet end of the tube 26 for assuring an effective mixture of the air and oil.

The peripheral wall 22 of the cup preferably is of sheet metal such as stainless steel which can well withstand oxidation under the temperatures encountered and is resistant to corrosion by acids and alkalies commonly present in garbage. The hood 23 and tube 26 are preferably of like sheet metal. The sheet metal has distinct advantages over heavier castings and the like in that, upon initial operation of the burner, it heats up to high temperature so rapidly that it assures efficient combustion within a very few seconds after the burner is ignited. Further, due to its rapid heating, it initiates the dehydration of the contiguous garbage almost immediately upon starting of the burner.

The nozzle 30 is preferably placed closely adjacent the outlet end of the tube 26 so that the cone of oil being sprayed passes through the central opening of the annular flange 34 without touching the flange. The tube 26 leading to the combustion chamber 20 assures that the air being supplied is warmed before being mixed with the oil, hence a warm-up period of appreciable extent for the incinerator and garbage is not necessary for efficient combustion. The pipe 29 is sufficiently warm so that the oil in the small volume fed is relatively warm and can be atomized readily. The burner is provided with a conventional electrical spark type igniter which discontinues firing after the oil is ignited. The electrodes of the igniter is indicated at 35 and the transformer therefor at 36.

As a specific example of the present incinerator, the cabinet is a conventional size of about 36 inches depth inside. The space within the wall 7 is about 16 by 18 inches. The front and side basket walls are spaced about one to one and a half inches from the wall 7 at the front and sides, respectively. The rear wall of the basket is spaced about 4½ inches forwardly from the rear portion of the wall 7 and is juxtaposed against the afterburner 16. As to the novel feature, the bleeder port may be about 2 inches high and 3 inches wide and the flue outlet 4 or 5 inches in diameter.

The tube 26 may be about 3 inches in diameter, with the central passage defined by the flange 34 about 2 inches in diameter. The cup of the chamber 20 is preferably cubical, and about 5 x 5 x 5 inches.

As mentioned, the prior practice has been to supply oil to incinerators under a minimum pressure of 100 pounds per square inch. However, in the present structure, the oil is supplied at the much lower pressure of from 32 to 38 pounds per square inch, 35 pounds per square inch being preferred. The oil is supplied at about one quarter of a gallon per hour.

Air is supplied through the tube 26 in an amount of approximately 15 to 25 cubic feet per minute, preferably at 20 cubic feet per minute, at a pressure of about 0.1 inch of water or less. The burner supplies about 29,900 B.t.u.'s. The incinerator, when fully loaded with a charge

of wet garbage, heats up within 30 seconds, and incinerates the entire charge in 10 to 15 minutes.

In operation, the garbage is dumped into the basket from the top and rests on and surrounds the combustion chamber 20. The hood 23 assures that the passage 24 does not become choked with garbage or residue. The chamber heats almost instantly, thus assuring efficient combustion from the start. It radiates heat rapidly to the charge to initiate dehydration. The burning gases and products also discharge directly into the garbage, thus drying and igniting it. They are well distributed as they are introduced so that a large amount of garbage is heated concurrently. Consequently, the tendency toward heating and charring of localized portions while the remainder of the charge is wet are reduced to a minimum. These heated gases, together with generated steam, promptly establish a good stack draft.

The burning fuel is thus used efficiently, yet the basket and cabinet are protected from the destructive effects of direct impingement thereon of forceful jets of highly heated and burning media.

Having thus described my invention, I claim:

1. A household garbage incinerator comprising:

an upright cabinet having a charging opening, a door for said opening,

a basket grate having a bottom wall and a peripheral wall,

means supporting the grate in the cabinet with its peripheral wall in spaced relation to the interior peripheral wall of the cabinet for free circulation of gaseous media between the grate and interior wall, said cabinet having an outlet in communication with the space between the grate and interior wall,

a precombustion device within the grate disposed near the bottom thereof in spaced relation to the side wall thereof,

said device having a combustion chamber and discharge passage means connecting the chamber with the interior of the basket grate at a location spaced above the bottom of the basket grate and spaced inwardly from the peripheral wall of the basket grate and arranged so as to discharge substantially all of the products from the combustion chamber directly within the basket grate and outwardly toward the side wall thereof at a substantial distance above the level of the bottom wall of the grate,

an air inlet tube having an inner end discharging into the chamber and an outer end disposed at the exterior of the cabinet,

a fuel nozzle near the inlet end of the tube and directed to discharge into the chamber,

means connected to the nozzle for supplying fuel under pressure to the nozzle,

blower means connected to the outer end of the tube for blowing air through the tube into the chamber in a sufficient amount to sustain combustion of the fuel and of garbage supported in the basket grate,

a generally upright afterburner tube at the rear of the grate and having an opening at its lower end opening into the space between the side wall of the grate and the cabinet side wall for receiving through said opening gaseous products discharged from the basket grate, said tube being connected at its upper end with said outlet so that a flue draft can be made effective at said lower end of the afterburner tube in said space, and said opening in the lower end being below the level of the discharge passage means of the precombustion device.

2. A structure according to claim 1 wherein said discharge passage means are near the upper end of the chamber and are directed outwardly toward the side walls of the grate.

3. A structure according to claim 2 wherein the device is positioned so that the chamber is at the horizontal

midportion of the basket grate and the passage means discharge directly into the lower half of the basket grate.

4. A structure according to claim 2 wherein the pre-combustion device includes a hood disposed above said passage means and extending outwardly beyond said passage means in overhanging shielding relation to said passage means and terminating at its lower end above the level of the bottom of the basket grate a substantial distance such as to direct the products discharged through the passage means directly into the contents of the basket grate.

5. A structure according to claim 1 wherein a bleeder passage is provided in the afterburner tube near to the level of the outlet opening.

6. A structure according to claim 1 wherein the passage means are limited in extent peripherally of the device so as to prevent the discharge of products from the rear of the device directly toward the afterburner.

7. A structure according to claim 1 wherein the chamber is provided by a portion of the device in the form of an open top receptacle and a hood mounted above, and in spaced relation to, the upper ends of the side walls of the receptacle, said hood has a peripheral margin extending outwardly beyond the lateral limits of the receptacle and spaced at its lower edge a substantial distance above the bottom wall of the basket grate, and the passage means is the space between the hood and upper end of the walls of the cavity.

8. A structure according to claim 1 wherein the means for supplying fuel to the nozzle is a motor driven fuel oil pump so related to the discharge orifice of the nozzle as to constrain the delivery of fuel oil thereto continuously to a pressure of substantially less than 100 p.s.i.

9. A structure according to claim 8 wherein said pump is constrained to deliver said oil at a pressure of from 32 p.s.i. to 38 p.s.i.

10. A structure according to claim 1 wherein the portion of the device providing the chamber is an open top cup of sheet metal, an upright hood is mounted on the device in alignment with the open top, and the margin of its base is spaced outwardly beyond the sides of the cup.

11. A structure according to claim 1 wherein the upper end of the device is peaked at the top and slopes downwardly and outwardly so as to be operable to deflect garbage falling thereon outwardly beyond the outer ends of the passage means.

12. A structure according to claim 1 wherein the bottom wall of the precombustion device is in spaced relation to, and above, the bottom of the basket grate.

13. A structure according to claim 1, wherein the device is disposed, transversely of the basket, at the central portion thereof, and each of its lateral dimensions is less than one half of the corresponding lateral dimensions of the basket.

14. A household garbage incinerator comprising: an upright cabinet having an internal peripheral wall, a bottom wall, and a charging opening, a door for the opening,

a basket grate within the cabinet for supporting garbage to be incinerated in spaced relation to the internal peripheral wall and bottom wall of the cabinet, said cabinet having an outlet,

a precombustion device in the basket grate disposed near the bottom thereof, and in spaced relation to the peripheral wall thereof,

said device comprising an upright open top cup member, a tube connected thereto near the bottom thereof and extending laterally therefrom, said tube hav-

ing its inner end in communication with the interior of the member,

said cup member being disposed within the basket grate and having its open top a substantial distance above the bottom of the basket grate and spaced from the sides of the basket grate,

a hood mounted on the cup member in spaced relation above the open top and aligned therewith, said hood extending outwardly transversely of the cup member beyond the open top and defining with the upper end of the cup member passage means for discharging into the space within the basket grate burning fuel and secondary air for combustion of material supported by the basket grate,

a fuel oil nozzle in the tube and directed to discharge through the inner end thereof into the cup member, means to supply fuel oil continuously to the nozzle at pressure substantially below 100 p.s.i.,

blower means to supply air through the tube under low pressure in a volume adequate for combustion of the oil and combustible garbage material supported by the basket grate,

said cabinet being arranged to substantially exclude, from the interior, air other than that supplied by the blower means,

a generally upright afterburner tube between the side of the basket grate and the side of the cabinet, said afterburner tube having an opening at its lower end and being disposed with its open lower end at a location between the basket grate and cabinet side walls for receiving gaseous products discharged from the basket grate, and being connected at its upper end with said outlet,

said open lower end of the afterburner tube being below the level of the open top of the cup member, and

said hood terminating in inwardly spaced relation to the sides of the basket grate for discharging the burning fuel and secondary air directly within the grate above the bottom wall thereof.

15. A structure according to claim 14 wherein the tube has an annular restriction near its inner end and extending from its periphery inwardly and defining a central passage of less diameter than the tube, the nozzle is spaced from the inner end of the tube in a direction toward the outer end of the tube, and the restriction is spaced toward the inner end of the tube from the nozzle.

16. A structure according to claim 14 wherein the cup member, tube, and hood are sheet metal, and the cup member is polygonal in horizontal cross section.

17. A structure according to claim 16 wherein the cup member is substantially cubical and the hood is pyramidal and its base is substantially square with sides of greater length than the sides of the open top of the cup member.

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