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2,932,712

INCINERATOR

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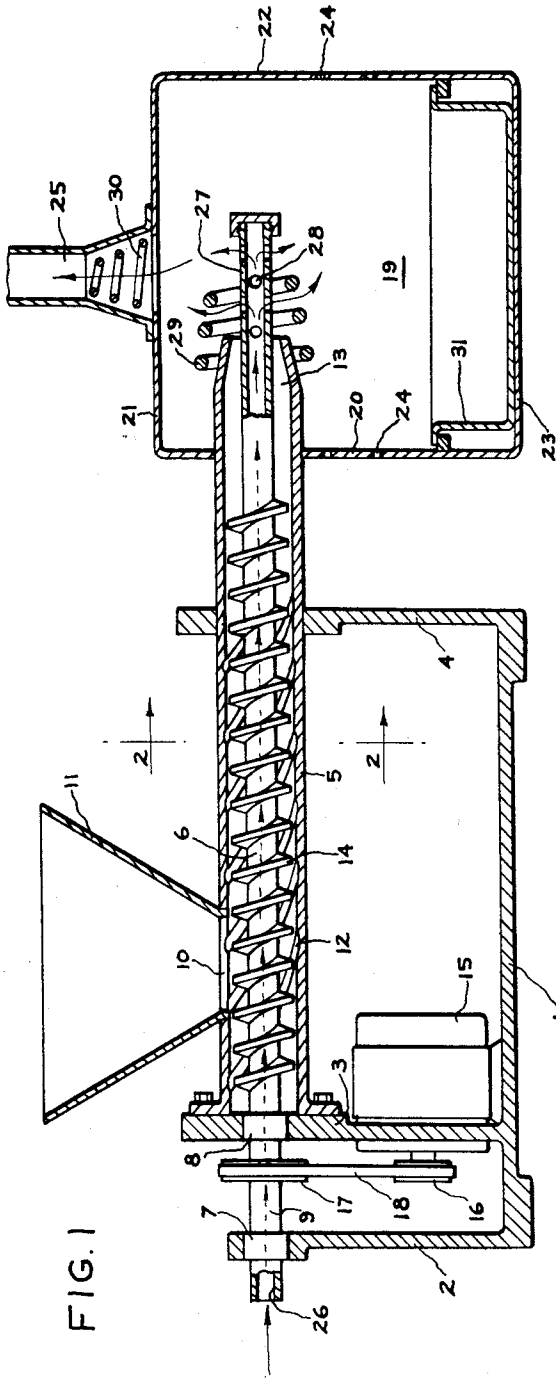


FIG. 1

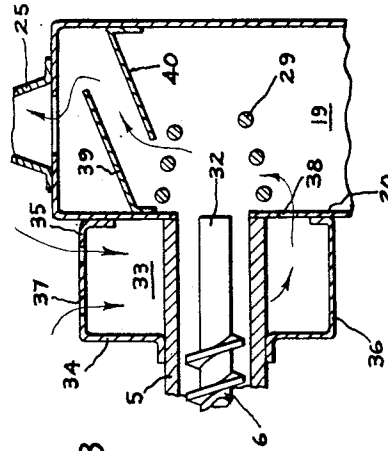


FIG. 3

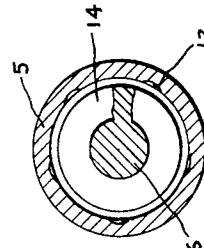


FIG. 2

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INCINERATOR

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4 Claims. (Cl. 219—19)

This invention relates to incinerators, and more particularly to an incinerator especially suited for household use.

While various types of incinerators have heretofore been developed and placed on the market for domestic use, those of which I am aware have as a common feature a combustion compartment adapted to receive successive batches of waste material, each of which must be burned before the next batch is deposited in the combustion compartment. The operation temperatures for which such incinerators are designed are quite high (to make possible combustion of the waste material within a reasonable period of time) and the total heat output which must be dissipated in some manner is likewise of a relatively high order.

Thus the incinerators currently known in the art must be heavily insulated and carefully constructed so as to maintain the exterior surfaces within safe practical temperature limits. Careful installation, both with respect to choice of location and to the mounting and venting of the appliance are also required. Consequently, relatively few homes are equipped with a domestic incinerator although the need for a home installed appliance adapted to dispose of all combustible waste material is widely recognized.

Accordingly, an important object of this invention is to provide an improved incinerator suitable for use in homes and the like which overcomes, to a substantial degree, the disadvantages of currently known incinerators.

Another object of this invention is to provide an improved incinerator of the domestic type in which high peak outputs are avoided without sacrifice of efficient combustion performance.

Another object of this invention is to provide an improved incinerator including means for extruding and burning waste material at a relatively slow continuous rate.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In accordance with one aspect of this invention there is provided an incinerator including means for shredding waste material and conveying it to a combustion compartment, means for discharging the material into the combustion compartment in the form of a compressed hollow rod having a high surface-area-to-mass ratio, and means for heating the material to its combustion temperature as it is discharged into the combustion compartment.

For a better understanding of the invention, reference may be made to the following description and the accompanying drawing in which:

Fig. 1 is a side elevation view, in section, of an incinerator embodying the present invention.

Fig. 2 is a cross-sectional view taken along the lines 2—2 in Fig. 1.

Fig. 3 is a fragmentary cross-sectional view of a modified form of my invention.

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Referring to Fig. 1 of the drawing, the numeral 1 designates a base frame having upright supporting portions 2, 3 and 4 arranged to support a tubular housing 5 forming an elongated tubular chamber and an elongated rotor 6 within the chamber. Tubular housing 5 is horizontally disposed and is secured to upright member 3 by bolts or other suitable means and extends through an opening in upright supporting member 4. Elongated rotor 6 is supported for rotation within the chamber formed by housing 5 by a pair of bearings 7 and 8 mounted in upright members 2 and 3 respectively, and arranged to rotatably support a projecting end portion 9 of rotor 6. Tubular housing 5 is provided with an inlet opening 10 adjacent one end thereof with which a hopper 11 is associated so that waste material placed in the hopper passes into the tubular chamber formed by housing 5 through the opening.

Formed on the inner surface of tubular housing 5 are fixed shredding surfaces which may be formed by the edges of a helical groove 12 extending from the end of the housing adjacent opening 10 to the discharge opening 13. Elongated rotor 6 is provided with a helical blade 14 along the length thereof and arranged to convey waste material deposited in chamber 5 through opening 10 to the discharge opening 13. Helical blade 14 is also formed with sharp cutting or shredding edges adapted to cooperate with the fixed shredding surfaces on the interior of chamber 5 so that waste material is shredded as it is conveyed to the discharge opening 13 upon rotation of rotor 6. Suitable means for driving rotor 6 are provided, such as an electric motor 15 drivingly connected to the rotor by means of pulleys 16 and 17 and a belt 18 for transmitting power from the motor shaft to the rotor 6.

The end of tubular chamber 6 forming discharge opening 13 is enclosed in a combustion chamber 19 having a plurality of walls 20, 21, 22 and 23, some of which have air apertures 24 in the lower portion of the chamber. Combustion chamber 19 is provided with a flue 25 through which the products of combustion are discharged.

In accordance with my invention air may also be supplied to combustion compartment 19 through a hollow passage 26 within rotor 6, the projecting end portion 27 of the rotor having a plurality of openings 28 therein. Also, inasmuch as end portion 27 of rotor 6 extends beyond the open end 13 of tubular chamber 5 the waste material extruded through this opening by the rotor will be in hollow rod form, the projecting portion of the waste material being similar in shape to a doughnut.

From the description thus far it will be understood that when waste material placed in hopper 11 passes through opening 10 into the chamber formed by tubular housing 5 and is there shredded and conveyed along the length of the tubular chamber to discharge opening 13 where it is discharged in compressed hollow rod form into combustion compartment 19. An electric heating element 29 mounted within combustion compartment 19 adjacent the discharge opening 13 is arranged to heat the emerging rod of waste material to its combustion temperature and to completely burn the waste material as rapidly as it is discharged from tubular chamber 5. Preferably, heating element 29 is of the tubular sheath type and is coiled in helical form around the space occupied by the hollow rod-like waste material. Thus, the rod of waste material is heated from all sides by high intensity radiation and quickly brought to its combustion temperature. Air for combustion is admitted through openings 28 as well as apertures 24 and hence all surfaces of the extruded waste material are supplied with sufficient oxygen to promote substantially complete combustion. If desired, smoke and other products of combustion not completely con-

sumed in compartment 19 may be further burned by means of a second electric heating element 30 positioned in flue 25. It will be understood that some ash and perhaps non-combustible materials may remain, and accordingly it is desirable to provide a removable ash drawer 31 in the lower portion of combustion compartment 19.

Referring to the embodiment of my invention shown in Fig. 3, in which parts common to the form of Fig. 1 are identified by the same numerals, the rotor 6 is not hollow but nevertheless includes an end portion 32 extending to the open end of tubular chamber 5 so that waste material extruded therefrom is in hollow rod form. Thus the surface area of the waste material is much larger than the surface area of a solid rod of the same diameter, and the rate of combustion may be substantially increased.

Air is admitted to combustion chamber 19 through an air chamber 33 formed by a plurality of walls 34, 35, 36 (some of which have openings 37 therein), surrounding the end portion of tubular chamber 5 and one or more openings 38 in wall 20 of the combustion compartment. By this means incoming air passes in heat exchange relation with the end portion of tubular chamber 5, so as to cool it and lessen sticking of the waste material therein, and the air admitted to the combustion area through opening 38 is pre-heated to some extent. Also, if desired, suitable baffles 39 and 40 may be positioned in combustion compartment 19 so as to further promote combustion therein.

In operation, both of the illustrated embodiments of my invention provide relatively slow continuous combustion of waste material placed in the hopper 11. It will be understood, that such waste material may be deposited in the hopper from time to time, and that the incinerator is adapted to run continuously so that while the rate of combustion of waste material is relatively low as compared with incinerators now available, continuous operation permits large quantities of waste material to be disposed of during each day of operation. Elongated rotor 6 is driven at a relatively slow rate of speed, such as 20 r.p.m., it being understood that the optimum speed is one which will result in the discharge of a compressed hollow rod of waste material from opening 13 at a rate sufficient to permit substantially complete combustion of the material while it is within the space surrounded by heating unit 29. While the temperature within the zone of combustion formed by heater 29 is quite high, the total heat produced within combustion compartment 19 per hour is relatively low as compared with the heat output from conventional incinerators, and consequently fewer insulation and installation problems are presented by my invention. Furthermore, waste material may be deposited in hopper 11 from time to time as it accumulates, it being unnecessary to set aside one batch of waste material while a second batch is being burned as in a conventional incinerator chamber.

My invention is an improvement over the prior invention disclosed and claimed in application Serial No. 737,649 filed by James H. Powers on May 26, 1958, and assigned to the assignee of the present application, and therefore I do not claim as my invention the claimed subject matter of the aforesaid Powers application.

While I have shown and described two particular embodiments of my invention, I do not desire the invention to be limited to the particular construction disclosed, and I intend by the appended claims to cover all modifications within the true spirit and scope of my invention.

What I claim is:

1. An incinerator comprising a hopper, an elongated generally tubular chamber having an inlet opening adjacent one end thereof communicating with said hopper and a discharge opening at the other end thereof, a combustion compartment enclosing said other end of said tubular chamber, fixed shredding means within said chamber, an elongated rotor within said chamber, means for rotating said rotor, said rotor having a helical blade adapted to cooperate with said fixed shredding means to shred waste material introduced into said hopper and to convey said material through said discharge opening, the end portion of said rotor adjacent said discharge opening being an elongated rod of smaller cross-sectional area than the cross-sectional area of said opening whereby said waste material is discharged from said tube in continuous hollow rod-shaped form, and a helically coiled tubular sheath electric heating unit mounted within said combustion compartment adjacent said discharge opening so as to surround the hollow rod shaped material discharged therefrom.

2. An incinerator as defined in claim 1 in which said rotor is formed with an air passage extending longitudinally therein from an inlet aperture adjacent said one end of said tubular chamber to an outlet aperture adjacent said discharge opening, whereby air for the combustion of said waste material may be supplied to the interior of said material as it is discharged in hollow rod form.

3. An incinerator as defined in claim 1 in which said other end of said tubular chamber is surrounded by wall means forming an air chamber adjacent said combustion compartment, said wall means having an air inlet aperture for admitting atmospheric air and an outlet aperture communicating with said combustion compartment, whereby air entering said combustion chamber through said air chamber passes in heat exchange relation with said other end of said tubular chamber.

4. An incinerator comprising means for shredding waste material, means for conveying said material to a combustion compartment including means defining an annular opening in said compartment, said conveying means also including means for compressing and discharging said waste material through said annular opening in continuous hollow rod form, and means for heating said material to its combustion temperature as it emerges into said compartment, said heating means comprising a helically coiled tubular sheath heating unit mounted so as to surround the hollow rod shaped material discharged into the combustion compartment by said compressing and discharging means.

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