Nov. 21, 1967 W. W. CROWE 3,353,508

GARBAGE DESTROYER

Filed Aug. 19, 1965 2 Sheets-Sheet 1

FIG. 1

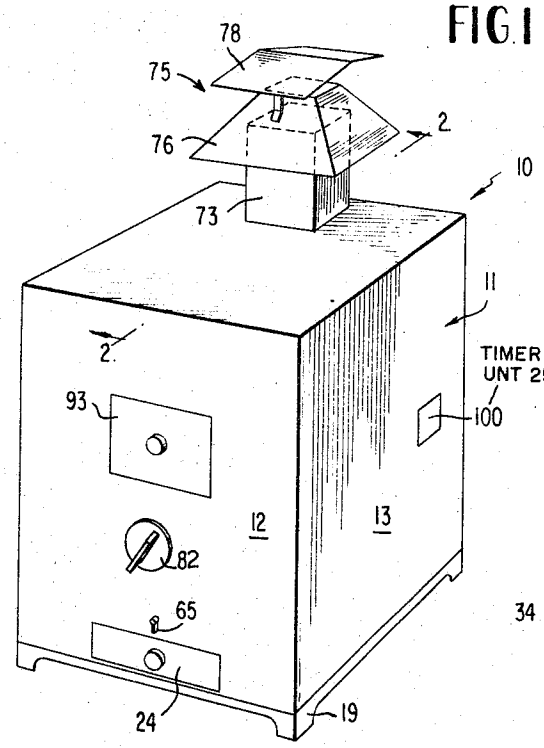
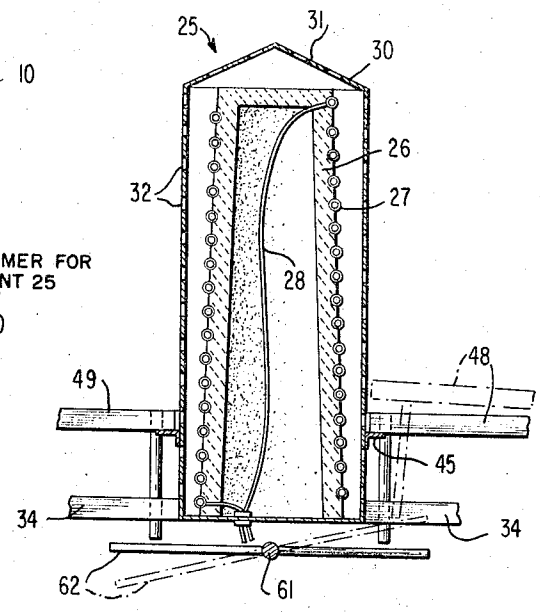
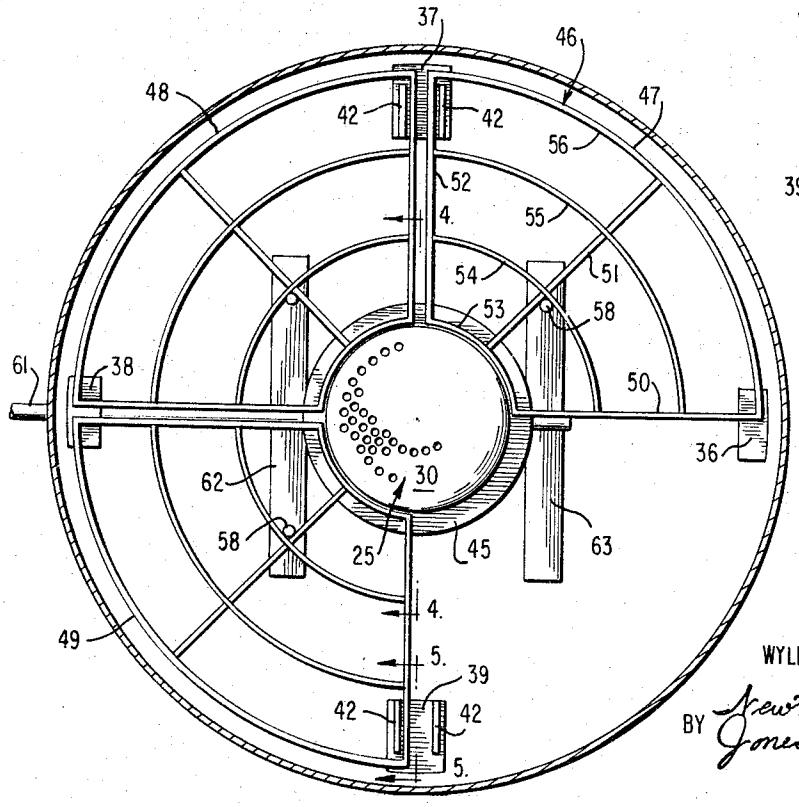


FIG. 4





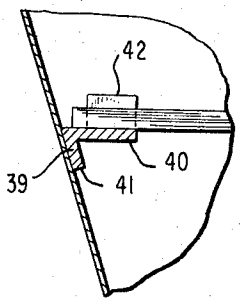


FIG. 5

FIG. 3

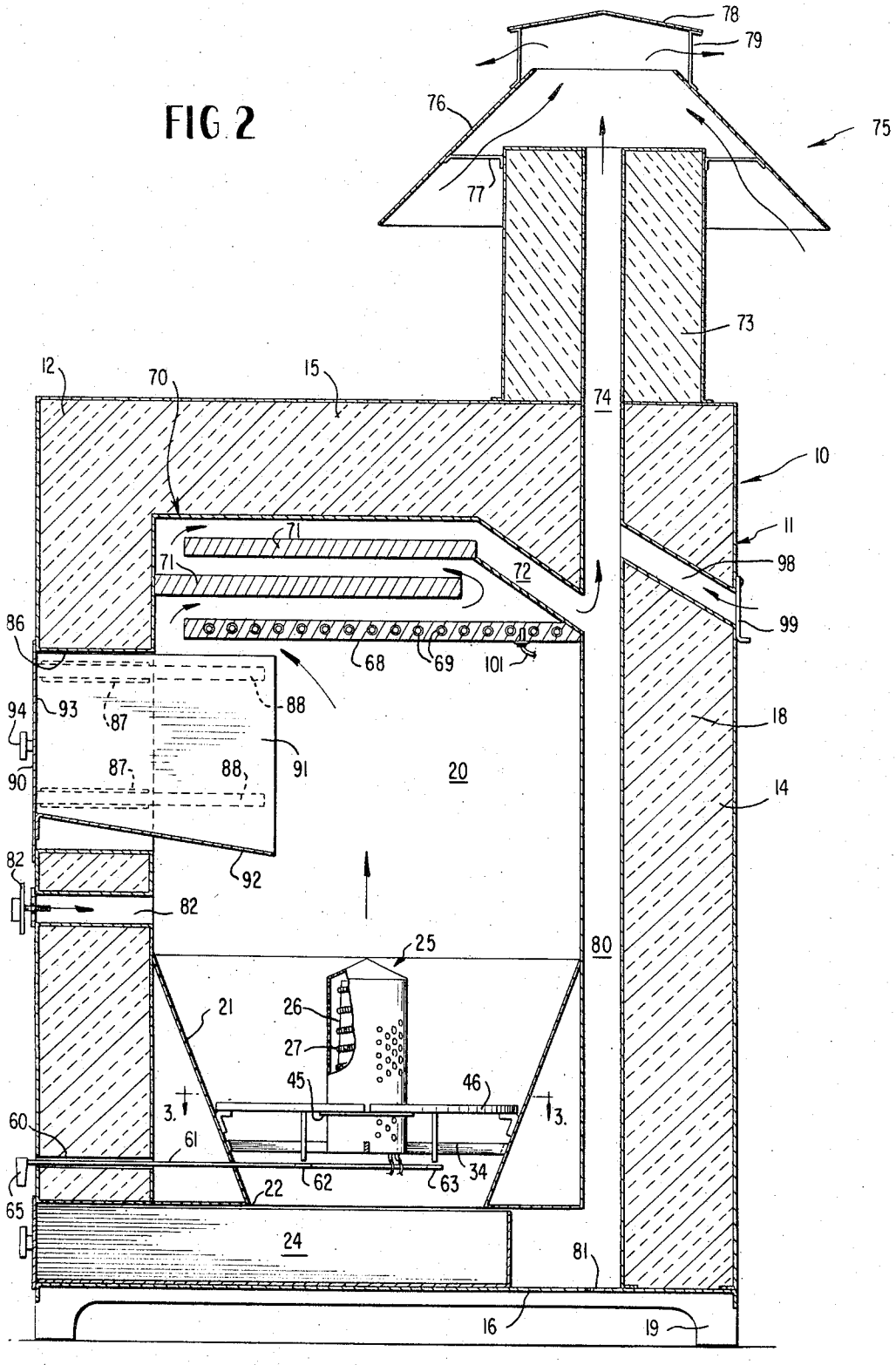
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GARBAGE DESTROYER

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FIG. 2



United States Patent Office 3,353,508 Patented Nov. 21, 1967

3,353,508

GARBAGE DESTROYER

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Filed Aug. 19, 1965, Ser. No. 480,879
6 Claims. (Cl. 110—8)

ABSTRACT OF THE DISCLOSURE

A garbage destroyer having a housing provided with an ignition unit for destroying garbage and a heating unit above the ignition unit for heating the gases to destroy the same.

This invention relates to a garbage destroyer, and more particularly is directed to a method and apparatus for burning garbage, in rural areas on a prescribed schedule, in a manner that eliminates the generation of smoke and heat.

In rural areas where garbage pick up by governmental agencies is unavailable, disposal of garbage is a problem because of its rapid accumulation and because of its unsightliness and unpleasant odors after accumulation. The most successful method of eliminating garbage has been found to be the destruction by burning. Of course, manually burning garbage is probably as undesirable as the manual removal thereof to a dump, or the like.

While garbage incinerators have been developed in the past, these previously known incinerators have developed problems in creating a balance between complete and expedient destruction of the garbage and the initial cost of the incinerator. While some of the previously known incinerators have been able to completely destroy the garbage placed therein, with a fair amount of expediency, the cost of these incinerators has been almost prohibitive to the consumer. Furthermore, these previously known incinerators have functioned in a manner so that a substantial amount of heat utilized to destroy the garbage is wasted to the atmosphere, which is costly to the operator.

Thus, this invention comprises a garbage destroyer which is economically constructed, yet completely and expediently destroys garbage with a minimum amount of heat. The garbage destroyer or incinerator includes a combustion chamber having a truncated conical lower portion that funnels the substance to be burned to an annular grate which surrounds an elongated ignition unit which has its longitudinal axis disposed approximately co-axial with the longitudinal axis of the conical portion of the combustion chamber. The ignition unit extends above and below the grate so that the heat radiated therefrom is transmitted directly to, below and above the substance to be burned so that the substance remote from the ignition unit will not be shielded from the heat radiated therefrom by other substance interposed therebetween. Also, a flat heating element is disposed in a horizontal plane above the ignition unit which heats the gases given off from the burned substance so as to further destroy the gases and particles entrained therein before they enter the atmosphere.

Accordingly, an object of this invention is to provide an incinerator for destroying garbage, or the like, wherein the garbage is heated from above and below the surface on which it rests, and where the products of combustion from the burning garbage are heated before they enter the atmosphere.

It is another object of this invention to provide a method for destroying garbage by burning the garbage, and when the products of combustion have reached a predetermined temperature, heating the products of combustion before they enter the atmosphere.

Another object of this invention is to provide an apparatus for burning garbage that channels garbage to an area surrounding an ignition unit, igniting the garbage from above and below said area with the ignition unit, and for causing the products of combustion to travel a tortuous path during which they are heated before they enter the atmosphere.

Other objects, features and advantages of the present invention will become apparent upon reading the following specification, taken into conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of the incinerator;

FIG. 2 is a cross sectional view of the incinerator, taken along lines 2—2 of FIG. 1, and showing the internal components of the incinerator;

FIG. 3 is a plan view of the grate of the incinerator, taken along lines 3—3 of FIG. 2;

FIG. 4 is a cross sectional view of the ignition unit of the incinerator, taken along lines 4—4 of FIG. 3;

FIG. 5 is a detail of the juncture of the grate and the combustion chamber, taken along lines 5—5 of FIG. 3.

Referring now more particularly to the drawings, in which like numerals indicate like parts throughout, the incinerator **10** comprises a housing **11** of generally rectangular configuration. The walls of the housing **11** comprise a front wall **12**, side walls **13**, rear wall **14**, top wall **15**, and bottom wall **16**. The front, side, rear and top walls are of double thickness and a conventional insulating material **18** is placed between the thicknesses so as to minimize the heat loss from the housing **11**.

The housing **11** is supported on a stand **19** so that the bottom wall **16** of the housing **11** is elevated above the ground, or other support, so that it will not be flooded with water from a rain, or the like. The walls of the housing **11** define a combustion chamber **20** which is substantially rectangular in configuration in its upper portion, but which has a truncated conical lower portion **21**. The truncated conical lower portion **21** of the combustion chamber **20** has its smaller circle **22** disposed immediately above an ash collector **24** which rests on the lower wall **16**. The ash collector **24** is rectangular in configuration and extends through the front wall **12** of the housing **11**, so that the operator can merely slide it out through the front wall when he desires to remove the ashes from the incinerator **10**.

A dehydrating and ignition unit **25** is mounted centrally of the lower conical portion **21** of the combustion chamber **20**. The ignition unit comprises a hollow ceramic cone **26**, and electrical coil **27** wound in a spiral manner around the cone **26**, and the electrical leads **28**. The ceramic cone is covered with a sheld **30** which conforms substantially to the shape of the ceramic cone **26**, in that it is cylindrical in shape and closed at its top with a conical portion **31**. The cylindrical shield **30** has a plurality of ports **32** therein so that air can freely circulate therethrough.

The ceramic cone **26** and cylindrical shield **30** are supported by the supports or arms **34** which are attached to the lower portion **21** of the combustion chamber **20** at 90° intervals therearound. The supports **34** support the ignition unit **25** so that its longitudinal axis is substantially co-axial with the longitudinal axis of the lower conical portion **21** of the combustion chamber **20**.

The lower conical portion **21** of the combustion chamber **20** has connected thereto support means **36**, **37**, **38** and **39**, which are disposed in a common horizontal plane at 90° intervals around the axis of the cone. Support elements **36** and **38** are merely angle irons that are similar to that shown in FIG. 5 in that they have a horizontal portion **40** and an angled portion **41** which extend parallel to the side wall of the lower conical portion **21** of the combustion chamber **20**. The support elements

37 and 39 are similar to the support elements 36 and 38 except that the support elements 37 and 39 have upward extending tabs 42 thereon. The shield 30 of the ignition unit 25 has a support ring 45 attached thereto and disposed in the same horizontal plane occupied by the horizontal surfaces 30 of the support elements 36–39.

A grate 46 is supported on the support elements 36–39 and the support ring 45. The grate 46 is annular in configuration and constructed in four quarter sections, sections 47, 48 and 49 being shown in FIG. 3. Each quarter section of the grate 46 comprises support bars 50, 51 and 52 extending radially outwardly from the ignition unit 25 and curved bars 53, 54, 55 and 56 extending between each of the radially outwardly extending bars. The quarter sections of the grate 46 are supported by the support elements 36–39 and the support ring 45 by having the curved bars 53 rest on the support ring 45 and the juncture of the radially extending bars 50 and 52 with the curved bar 47 resting on the support elements 36–39. The quarter sections of the grate 46 are maintained in their proper position by the upwardly extending tabs 42 of the support elements 37 and 39 so that the grate quarter sections will not be inadvertently turned in the combustion chamber 20 and become lodged in the lower conical portion 21.

Each quarter section of the grate 46 has a downwardly extending pin 58 attached to the juncture of the radially extending bar 51 and the curved bar 54.

The front wall 12 of the housing 11 has an aperture 60 extending in a horizontal plane therethrough. A rod 61 extends through the aperture 60 and is rotatably supported thereby. The rod 61 has a pair of bars 62 and 63 disposed in parallel relationship with each other, and extending perpendicularly from the rod 61. The bars 62 and 63 are disposed immediately beneath the rods 58 of the quarter sections of the grate 46. A lever 65 is attached to the rod 61 outside the housing 11 so that the operator can twist the rod 61 by manipulation of the lever 65, whereupon the bars 62 and 63 will oscillate, as indicated in FIG. 4. Twisting the rod 61 will cause the bars 62 and 63 to contact the rods 58 of the quarter sections of the grate 46 so that the grate will be lifted from its original position and agitated, and any refuse lying thereon will be shaken down into the ash collector 24.

The upper portion of the combustion chamber 20 has a substantially flat heating unit 68 which is disposed in a horizontal plane immediately above the ignition unit 25. The heating unit 68 comprises a series of heating coils 69 that are disposed in parallel relationship with each other so that a broad heating surface is created over the whole surface of the heating unit 68.

A passageway or flue is located in the upper portion of the combustion chamber 20, immediately above the heating unit 68. The flue 70 is defined by a series of metal plates 71 that extend parallel to each other and which are attached at opposite alternate sides of the combustion chamber 20 to form a tortuous or zig-zag path. The flue 70 leaves the combustion chamber 20 at the downwardly extending portion 72 and joins a chimney 73 with an upwardly or vertically extending passage 74.

The chimney 73 is constructed in a manner similar to the housing 11 in that it is of a double wall thickness and insulated.

A deflector or weather cap is positioned on the chimney 73 and comprises a truncated conical section 76 mounted on supports 77 extending from the chimney 73, and a rain shield 78 mounted on supports 79 extending from the conical portion 76.

A drain and air vent 80 is positioned between the combustion chamber 20 and the rear wall 14 of the housing 11, which is an extension of the vertical portion 74 of the flue 70. The drain and air vent 80 extends down to the lower wall 16 and allows any water leaking in from the deflector and any moisture collecting in a flue to drain down to the lower wall 16 where it is allowed to lead out through holes 81 in the lower wall 16. Also, a small amount of air that leaks in through the various openings in the housing 11 can find its way through the various elements of the system to travel up through the drain and air vent 80 and supplement the gases passing through the flue 70, to dissipate the heat in these gases.

The front wall 12 defines an air vent 82 that supplies the main portion of the air introduced to the combustion chamber 20. The vent 82 has an adjustable damper 83 mounted thereon that controls the flow of air through the vent 82 so that the oxygen supply to the combustion chamber 20 is controlled. The front wall 12 has another opening 86 through which the garbage is inserted to the combustion chamber 20. The opening 86 has a pair of horizontal slots 87 on each side which support the runners 88 of a garbage shute 90. The garbage shute 90 has side walls 91, a slanted bottom wall 92, and a front wall 93, to which is attached a pull 94. The operator merely opens the shute 90 by pulling it outwardly of the combustion chamber 20 until the slanted bottom wall 92 contacts the edge of the opening 86 to prevent further easy removal. Garbage is then placed in the shute, some of the garbage falling into the combustion chamber 20, and some of the garbage possibly remaining on the slanted lower portion 92 of the shute 90. When the operator closes the shute the abrupt bang of the closing motion of the shute 90 will cause any garbage remaining on the slanted lower portion 92 to tumble into the combustion chamber 20, whereupon it will come to rest on the grate 46, surrounding the ignition unit 25.

Air vent 98 is located through the back wall 14 of the housing 11, slightly above the entrance of the downwardly slanting portion 72 of the flue 70 with the vertical portion 74. The air vent 98 has a damper 99 pivotally attached to the housing 11 so that it can be moved partially over the air vent 98 and restrict the air passing therethrough.

Operation

When the operator desires to burn garbage, or any burnable substance, he opens the shute 91 and inserts the substance into the combustion chamber 20. After the substance has been inserted in the combustion chamber the shute 91 is closed whereupon the odors from the garbage will, for the most part, be contained in the housing 11. Over a predetermined period of time it is anticipated that the operator will eventually fill, or partially fill the combustion chamber 20 with a substantial amount of substance that he wishes to destroy. After a predetermined period of time, a timing element 100, which is mounted in a side wall 13 of the housing 11, actuates a conventional electrical circuit (not shown) that energizes the ignition unit 25. The vent 82 supplies the proper amount of oxygen to the combustion chamber 20 so that when the ignition unit 25 reaches the temperature of combustion of the substance in the combustion chamber the substance will be ignited and will burn. The fire in the combustion chamber heats the thermostat 101 located in the heating element 68. When the thermostat 101 has been heated to a predetermined temperature the heating element 68 will be energized so that the products of combustion passing through the flue 70 will be heated to an even higher temperature so that any particles entrained in the air passing through the flue will be further burned and destroyed before passing up the vertical portion 74 of the flue 70 and escaping to the atmosphere. The downward sloping portion 72 of the flue 70 causes any unburned portion of the substance passing through the flue to travel in a downward direction so that these particles, which are heavier than air, will tend to pass by the forces of inertia down to the drain and air vent 80, where they will continue to travel down toward the bottom wall 16

of the incinerator **10**, while the lighter hot gases will tend to travel up the vertical portion **74** of the flue **70**. This, of course, prevents any of these smaller particles that were not completely destroyed by the heating element **68** from entering the atmosphere.

The tortuous path created by the parallel plates **71** that define the path of travel of the air in the flue **70** causes the products of combustion to travel a long distance in an area of high temperature so that the turbulent, long, heated flow insures that substantially all of the particles entrained in the gases passing through the flue will be completely destroyed before entering the vertical portion **74** of the flue, or the drain and air vent **80**.

The lower conical portion **21** of the combustion chamber **20** channels all the substance to be burned from a relatively large area toward a relatively small area immediately surrounding the ignition unit **25** so that the substance to be burned will be heated on the grate **46**. This allows a large volume of substance to be inserted into the large combustion chamber **20**, yet only the small ignition unit **25** is required in the burning process to completely destroy the substance since it is centrally located at the bottom portion of the combustion chamber and the area that it must heat is small in size and completely surrounds the ignition unit. Furthermore, since the grate **46** is positioned intermediate the ends of the ignition unit **25**, it can be seen that the heat radiated from the lower portion of the ignition unit **25**, below the grate **46**, will be free to travel the full width of the grate **46**, beneath the substance to be burned so that it is radiated outwardly over the full bottom surface of the grate and the substance resting thereon. This feature prevents any of the substance resting immediately adjacent the ignition unit **25** from completely shielding other substance resting outwardly thereof from the heat radiated from the ignition unit, so that the material will be rapidly ignited with a minimum amount of electrical energy expended.

Furthermore, it should be noted that the ignition unit **25** extends vertically above the grate **46** so that a large portion thereof extends upwardly into the combustion chamber **20**. This vertical projection into the combustion chamber allows the ignition unit **25** to heat and ignite garbage above the grate **46** so that substance lying above the grate **46** will also be ignited. Thus, it can be seen that the ignition unit **25** will ignite substance lying on the grate due to its projection below the grate, and substance lying above the grate due to its projection above the grate.

When the products of combustion from the substance being burned pass through the flue **70** the long, tortuous, hot path through the flue will further tend to burn and break up any particles entrained in the products of combustion so that the gases passing through the vertical portion **74** of the flue **70** will be clear.

The deflector or weather cap **75** is constructed so that as the heated gases pass upwardly through the vertical portion **74** of the flue **70** atmospheric air will be drawn in between the conical section **76** and the chimney **73** so as to cool the gases before they enter the atmosphere. Since the deflector **75** is open on all sides beneath the shield **78**, and since the shield **78** defines an opening of large area between it and the conical section **76**, the gases will be exhausted at a comparatively low velocity and low temperature whereby the deflector **75** will not be unduly heated to a temperature that would burn a bystander if he came into contact therewith. Furthermore, the low velocity and low temperature of the exhaust gases eliminates any offsensive blast of hot air that might be felt by a bystander. This construction therefore allows the use of a foreshortened chimney instead of the commonly known elongated chimneys that are required to elevate offensive gases from the vicinity of the operator and bystanders.

Furthermore, the damper **99** of the air vent **98** can be adjusted to admit an additional quantity of air to the vertical portion **74** of the flue **70** to further cool the gases being exhausted from the combustion chamber **20**. Of course, since the air vent **98** is positioned at an angle there is no danger of moisture from the atmosphere entering the housing **11**.

It will be obvious to those skilled in the art that many variations may be made in the embodiments chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

What is claimed as invention is:

1. An incinerator comprising:

(A) an insulated housing defining a combustion chamber,

(1) said combustion chamber having a truncated conical lower portion;

(B) an elongated ignition unit supported by said conical lower portion of said combustion chamber with its longitudinal axis being coaxial with the longitudinal axis of said conical lower portion;

(C) an annular grate supported by said conical lower portion and surrounding said ignition unit intermediate its ends;

(D) an exhaust flue in the upper portion of said housing and extending outwardly thereof,

(1) said exhaust flue defining a series of horizontal passageways connected together in series at their alternate ends;

(E) a flat heating element disposed in a horizontal plane immediately below said exhaust flue in said housing forming a heated extension of said flue;

(F) heat responsive means responsive to a rise in temperature of the combustion chamber for energizing said flat heating element, and

(G) means for energizing said ignition unit at predetermined periods of time.

2. In an incinerator of the type utilized in burning garbage, the combination therewith of a combustion chamber having a large volume upper portion and a truncated conical lower portion joined at its larger opening to said upper portion, an elongated ignition unit disposed centrally of said conical lower portion of said combustion chamber and having its longitudinal axis disposed substantially coaxial with the longitudinal axis of said conical lower portion, said ignition unit comprising a truncated conical ceramic core, an electrical heating element spirally wound around said core, and a perforated cylindrical shield surrounding said core; an annular grate surrounding said ignition unit intermediate its ends, said grate being formed in independent quadrants each being supported by said ignition unit and said conical portion of said combustion chamber, each said quadrant having a bar attached thereto and extending downward therefrom, a rod, rotatably extending through the wall of the conical lower portion of said combustion chamber in a plane substantially parallel to said grate and having a pair of bars connected and disposed perpendicularly thereto, said pair of bars normally being located immediately below said quadrant bars whereby rotation of said rod causes said bars to contact said quadrant bars, and an ash collector disposed immediately below the smaller opening of said conical lower portion.

3. In an incinerator of the type utilized in burning garbage, a housing defining a combustion chamber, an ignition unit in said combustion chamber, a series of parallel plates each disposed in a substantially horizontal plane in the upper portion of said combustion chamber and being connected to the sides and at alternate ends to the front and rear of housing to form a serpentine path therebetween, a substantially flat heating unit disposed in a horizontal plane immediately below the lowest of said parallel plates and being connected to said housing in a manner similar to said plates to form an extension of said serpentine path, means for energizing said heating unit when

the combustion chamber exceeds a predetermined temperature.

4. An incinerator including an insulated housing defining a combustion chamber, said combustion chamber having a truncated imperforate conical lower portion, an elongated electrical ignition unit mounted in said lower portion with its longitudinal axis approximately coaxial with the longitudinal axis of said conical lower portion; and a substantially flat apertured annular grate mounted in said lower portion, surrounding said ignition unit intermediate its ends and extending approximately perpendicular to the longitudinal axis of said ignition unit between said ignition unit and the lower portion of said combustion chamber.

5. An incinerator comprising an insulated housing defining an interior combustion chamber with an inwardly tapered lower portion; an ignition unit mounted centrally of said lower portion, a perforated horizontal surface surrounding said ignition unit at a level intermediate the height of said ignition unit and extending between said igniton unit and the lower portion of said combustion chamber, a temperature responsive heating element responsive to a rise in temperature in the housing and disposed in a horizontal plane directly above said ignition unit.

6. Apparatus for burning a substance comprising an annular grate disposed in a horizontal plane, heating means positioned centrally of said grate and extending above and below said grate for heating the substance from below and above said grate, and temperature responsive heating means responsive to a rise in temperature adjacent the temperature responsive heating means disposed in a horizontal plane above said grate, said temperature responsive heating means being of a dimension larger than said grate for heating the products of combustion given off from said substance.

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