

July 28, 1953

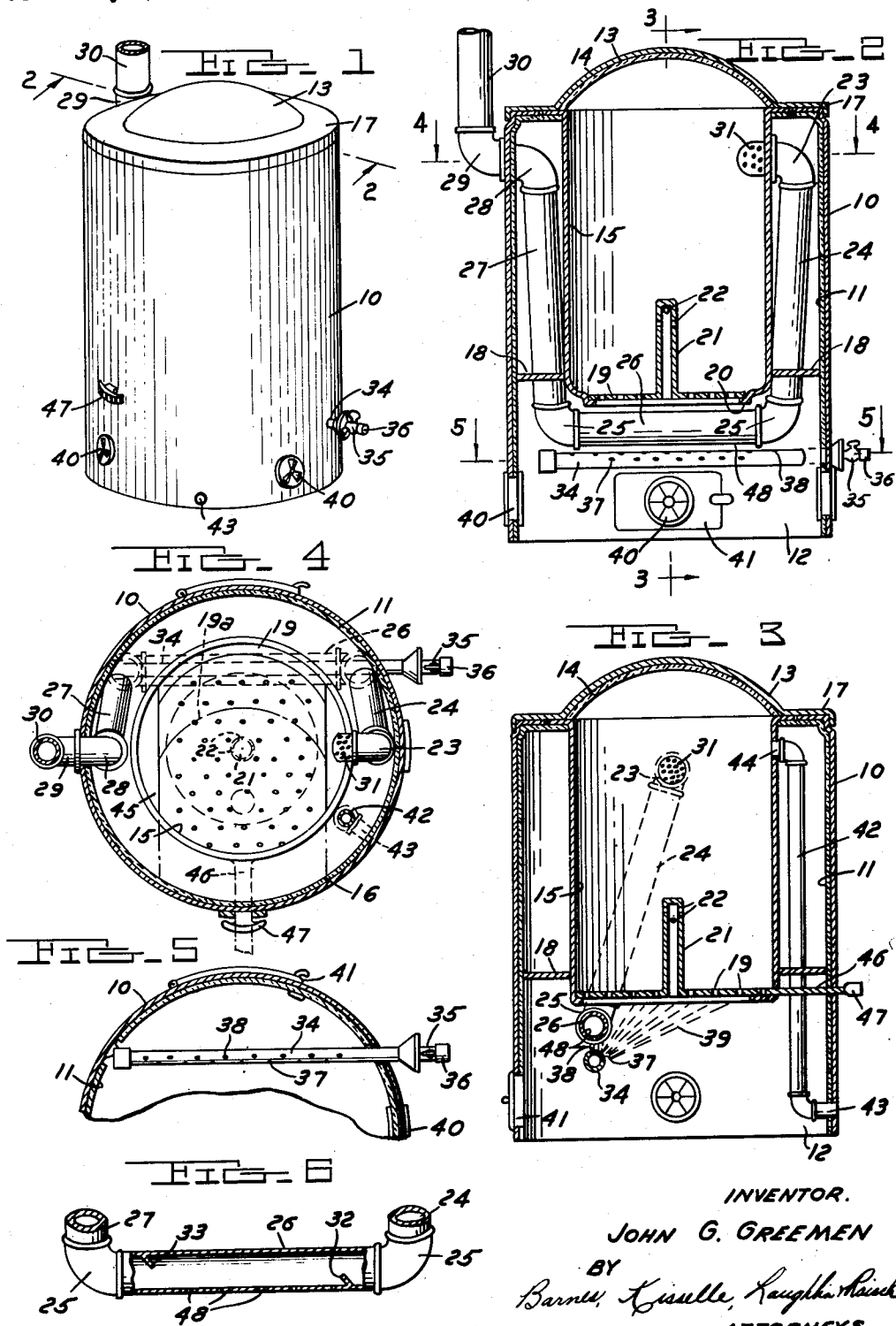
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INCINERATOR WITH SECONDARY COMBUSTION CHAMBER FOR VOLATILES

Filed July 1, 1950

2 Sheets-Sheet 1



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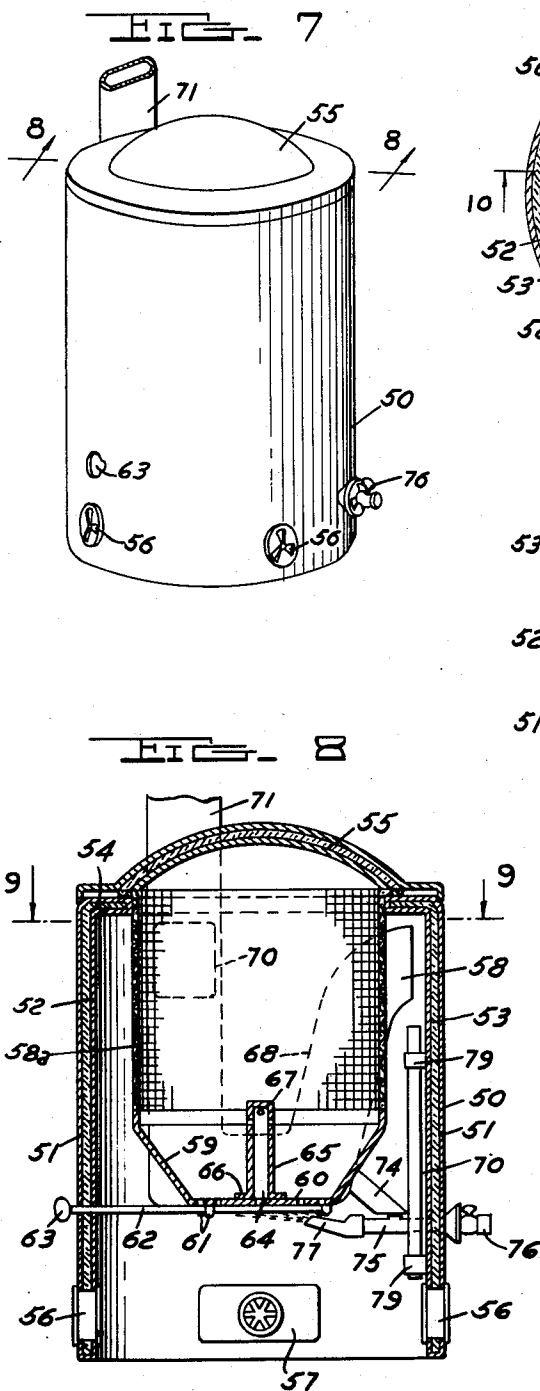
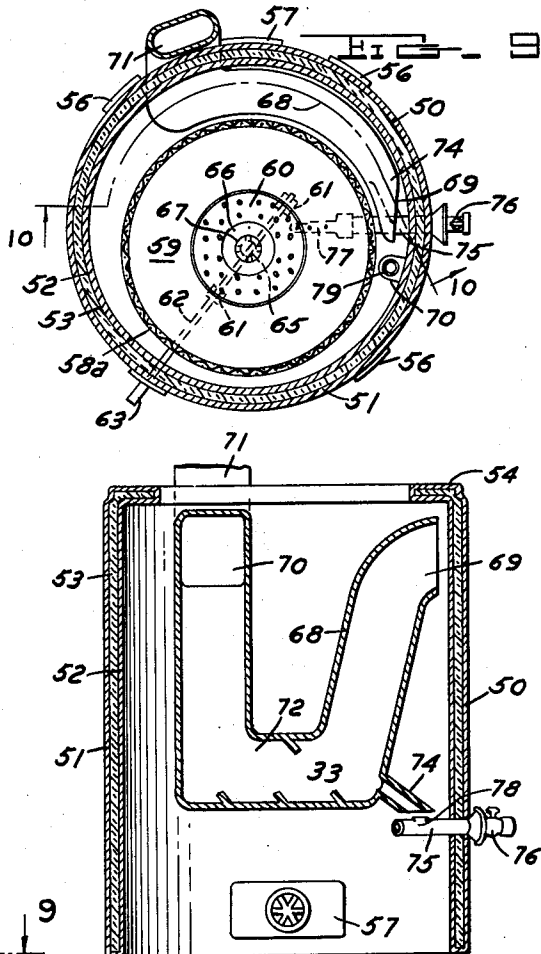
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2 Sheets-Sheet 2



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INCINERATOR WITH SECONDARY COMBUSTION CHAMBER FOR VOLATILES

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11 Claims. (Cl. 110—18)

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This invention relates to incinerators, and is a continuation-in-part of my prior applications Serial No. 5,423, filed January 30, 1948, and Serial No. 89,090, filed April 22, 1949, both of which applications are now abandoned.

More specifically, the object of the invention is to provide an incinerator including means adapted to eliminate or, at least, to reduce substantially the excessive smoke, fumes and odors. The presence of such odors and smoke is one of the objectionable features of the conventional incinerator now in use and presented a problem for a solution thereof. A more specific object of my invention is to provide an incinerator of simple construction, inexpensive in cost, and yet capable of accomplishing to a practicable degree the purpose for which it has been designed.

Further objects of my invention relate to the construction and operation of my improved incinerator as more clearly set forth in the accompanying drawings and specification wherein:

Figure 1 is a perspective view of my incinerator.

Figure 2 is an enlarged vertical sectional view thereof on line 2—2 of Figure 1.

Figure 3 is a vertical sectional view on line 3—3 of Figure 2.

Figure 4 is a transverse sectional view on line 4—4 of Figure 2.

Figure 5 is a fragmentary sectional view of a detail of construction on line 5—5 of Figure 2.

Figure 6 is a partly sectional view of another element included in the structure of my incinerator.

Figure 7 is a perspective view of a modified form of my incinerator.

Figure 8 is a vertical sectional view of the incinerator shown in Figure 7 on line 8—8 of Figure 7.

Figure 9 is a sectional view of said incinerator on line 9—9 of Figure 8.

Figure 10 is a vertical sectional view taken on line 10—10 of Figure 9 and showing a special combustion chamber within the casing of said incinerator.

The incinerator as shown in Figures 1 through 6 includes an outer casing 10 made of sheet metal and lined with an asbestos lining 11, and has the form of a large cylinder open at the bottom 12 and provided with a cover 13. The cover is made in the form of a shallow cupola lined with asbestos 14.

Axially disposed within the casing in a spaced relation to the walls thereof is a cylindrical retort 15 made of sheet metal and including at its

upper rim an outwardly turned flange 17 as best shown in Figure 2. At its lower portion, the retort is held in its spaced relation to the casing by means of an annular spacer 18. The latter is best made of sheet metal in the form of a flat, circular ring. A large circular opening 16 in the bottom of the retort is closed, normally, by a sliding perforated grate 19 having straight sides 45 fitting over underslug flanges 20 as best shown in Figures 2 and 4. A lug 46, affixed to said grate and terminating with a handle 47, extends outwardly through slot 48 in the wall of the casing and permits manual operation of the sliding grate so as to uncover said circular opening 16 for purposes which will be specified hereinbelow.

Located centrally upon said grate 19 is a tube 21 open at bottom, closed at top, and being provided with a plurality of apertures 22 in the wall thereof. At its upper portion, close to said flange 17, the retort opens into an elbow 23 connected to a straight tube 24 extending downwardly and slanting towards the front of the incinerator as best shown in Figure 3, where, by means of another elbow 25, Figure 2, it joins a straight, horizontally disposed metal tube 26. This is of special construction to form a heating chamber and is located on a line of a chord of the circular outline of the casing 10 as best shown in dotted lines in Figure 4. An elbow 25 at the opposite end of the tube 26 connects said last-named member with an upwardly extending pipe 27 leading to an elbow 28 on the inner side of the casing therefrom to an elbow 29 on the outer side of the casing and to a flue 30. A screen 31 covers the opening of the first-named elbow 23, said screen being located on the inner side of the retort 15.

Important details of construction of the tube or chamber 26 include baffles 32 and 33 as shown in Figure 6. The baffles, rising from the wall of the tube inwardly, have a purpose which will be described presently, the tube also being provided with a plurality of apertures 48 on the underside thereof. A gas burner 34, in the form of a straight pipe having a plurality of perforations 37 and 38 disposed in two rows along the length of the pipe as best shown in Figure 5, is located below said tube 26 in a parallel relation thereto. A nipple 36 on the outside of the casing serves as a means for connecting the burner to a gas supply tube, while the supply of gas to the burner is controlled by a conventional valve or cock 35. In order that the proper supply of air may be admitted into the casing below the level of the burner, I have provided the casing with a

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plurality of circular, adjustable registers 40, one of them being located in what is the front door 41, the latter being used as a means to afford access for removal of ashes from below the retort. Opening into the upper portion of the retort at 44, approximately at the level of the screen 31, is a vertical secondary air tube 42 disposed within the casing and having an intake nipple 43 in the lower portion of said casing.

In the operation of my incinerator as shown in Figures 1 through 6, access to the retort may be had simply by removing the cover 13. Assuming that the matter to be burned, whether it is of vegetable or animal origin, has been placed inside of said retort and that the cover has been closed, flame necessary for combustion of the contents of the retort is supplied by means of air from registers 43 and jets of flame 39 from gas burner 34. Directed against the grate 19 and entering into the interior of tube 21, said heat is immediately transmitted therefrom to said contents. It will be noted that the jets of flame are directed not only against the bottom of grate 19 but also against the underside of the horizontal tube or chamber 26 which is made of metal and which will be quickly heated to a relatively high temperature. It may be said here that the annular spacer 18 will help in keeping the heat below the level of said spacer.

As the contents of the retort are heated to a sufficiently high degree of temperature, they will combine with the oxygen. The fumes resulting from the combustion will rise towards the upper portion of the retort and will enter tube 24 through screen 31, then pass into the horizontal tube or chamber 26. The passage of the fumes therein will be slightly retarded by heated baffles 32 and 33, allowing said fumes to absorb heat from the walls of said tube. Particles of matter capable of being burned up and suspended in the heated gases will here be consumed before passing into the upwardly inclined tube 27 and into the flue 38. As additional oxygen will be needed for that purpose, this is supplied partly through small openings 48 in the bottom of said tube 26, but mostly through the means of tube 42 drawing in secondary air through inlet 43. The air so supplied through said pipe 42 will be drawn immediately towards the screen 31. Upon entry of fresh air into said retort, it will be mixed with the fumes passing into tube 24 and will provide the oxygen necessary to complete the combustion of matter suspended in the fumes but still unconsumed. Upon completion of the combustion, ashes which may remain in the retort may be released therefrom to the base supporting casing 10 by manipulation of the movable grate 19. This may be withdrawn partly to a position shown in dotted lines in Figure 4. The position of the grate in its partly withdrawn condition is shown by numeral 19a.

In the modifications illustrated in Figures 7 through 10, a cylindrical outer casing 50 is made of sheet metal and includes an outer wall 51, an inner wall 52, and an insulating filler 53 between the walls. The filler may be of asbestos or some other suitable material. At the top, the casing includes an inwardly disposed flange 54, the flange serving to support a hinged dome-shaped cover 55. The bottom of the cylinder is open in the sense that it contains no closing wall. However, as air is needed for the operation of the incinerator, the casing is provided with a plurality of registers 56, including means for control of the quantity of air to be admitted.

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A hinged door 57 is provided for removal of unburned residue which may accumulate within said casing.

Disposed within the casing in an eccentric position with respect to its axis, and depending from the flange 54, is a receptacle for matter to be burned. The receptacle, generally indicated by numeral 58, includes a cylindrical basket 58a of mesh wire construction, and a lower portion 59 of solid metal, the portion being made in the shape of an inverted truncated cone. The bottom or grate 60 of the lower portion of the receptacle is made in the form of a perforated disc and forms a separate element sustained in place by a diametrically aligned hinge 61. The disc is affixed to a rod 62 extending outwardly through the casing 50 and provided with a handle 63 for manual operation of the disc. The structure is analogous to what is known as a butterfly valve permitting the disc to be rocked by means of said rod 62 about the axis of the rod, as to permit release of unburned matter from receptacle 58. The disc is provided with a centrally located aperture 64. Mounted over the aperture 64 is a tubular member 65 including at its base a horizontal outer flange 66, the member being provided in its wall with a plurality of vents 67 for admission of air.

Disposed along the wall of the receptacle on one side thereof is a vertical chamber designed to complete combustion of matter both solid and gaseous and emanating from said combustion receptacle 58. The chamber has the form of a U-shaped flue or pipe 68, having an inlet 69 within the casing 50 and an outlet 70 leading to a smokestack 71 outside said casing 50. The inlet and the outlet are disposed substantially at the same level, while the bottom of the mid-portion 72 of the chamber is at the level of the bottom of the receptacle 58. Within said mid-portion 72 the chamber is provided with a plurality of baffles 73 extending from the walls of the chamber inwardly, and a plurality of openings. On the outside, the chamber is provided with an outwardly extending tubular member 74, the purpose of which will be presently explained.

Mounted within the lower portion of casing 50 is a gas burner 75, including a control valve 76, the burner having two nozzles, one marked 77 adapted to direct a jet of flame against the lower surface of grate 60, the other marked 78 being adapted to deliver a jet of flame into the chamber 68 through said tubular member 74. Mounted by means of clamps 79 within the casing 50 along its wall, on the side of the burner 75, is an upright tube 80 open at both ends and extending from a level above one of the registers 56 to a level just below the inlet 69 of chamber 58.

In the operation of the modified form of my incinerator, assuming that matter, such as rubbish, is to be burned within the incinerator, cover 55 is swung upwardly, the matter is deposited into the receptacle 58, and the cover closed, whereupon fuel gas, released at nozzles 77 and 78, is ignited. A jet of flame produced by nozzle 77 heats the grate bottom of the receptacle 58, penetrating into the interior of the receptacle. Additional air for assisting combustion enters through the tube 66. The jet of flame from nozzle 78 enters tube 74 and into the interior of chamber 68. Air for combustion of matter within the receptacle enters the casing through registers 56. Hot gases of combustion will rise upwardly and seek outlet 69. Here the gases, on

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their way out of the chamber, will pass through the mid-portion of said chamber, will be retarded by heated baffles 33, and will eventually reach the smokestack 71. While in the chamber said gases will be subjected to the heat of the flame released by nozzle 78 and as oxygen for combustion is needed, this will be supplied by said tube 80, opening just below the level of the inlet 69. It is herein this chamber 68 that matter partly burned in receptacle 58 will be thoroughly consumed.

While I have restricted myself in the specification to the use of gas as a heating medium, it will be understood that some other medium may be used, and that the incinerator may be just as effective when electrical heating means should be substituted for the gas burner shown by me.

What I claim is:

1. An incinerator comprising an outer casing, an inner receptacle for receiving contents to be burned positioned in spaced relation within said outer casing, said receptacle having a grate forming the bottom wall thereof and having an opening in the upper portion thereof, an outlet in said outer casing for conducting products of combustion away from said incinerator, a secondary combustion chamber having an inlet and an outlet, the inlet of said combustion chamber communicating with the opening in the upper portion of said receptacle and the outlet of said secondary combustion chamber communicating with the outlet in said outer casing, said combustion chamber having a downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate for combustion of the material in said receptacle, and means for supplying a separate flame to said secondary combustion chamber, means for supplying primary air to the grate for effecting combustion of the material in the receptacle and means for supplying secondary air to said secondary combustion chamber for effecting combustion of the ignitable gases and other products of combustion flowing through the combustion chamber to said incinerator outlet.

2. An incinerator comprising an outer casing, an inner receptacle for receiving contents to be burned positioned in spaced relation within said outer casing, said receptacle having a tiltable grate forming the bottom wall thereof and having an opening in the upper portion thereof, an outlet in said outer casing for conducting products of combustion away from said incinerator, a secondary combustion chamber having an inlet and an outlet, the inlet of said combustion chamber communicating with the opening in the upper portion of said receptacle and the outlet of said secondary combustion chamber communicating with the outlet in said outer casing, said combustion chamber having a downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate for combustion of the material in said receptacle, and means for supplying a separate flame to said secondary combustion chamber, means for supplying primary air to the grate for effecting combustion of the material in the receptacle and means for supplying secondary air to said secondary combustion chamber for effecting combustion of the ignitable gases and other products of combustion

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flowing through the combustion chamber to said incinerator outlet.

3. An incinerator comprising an outer casing, an inner receptacle for receiving contents to be burned positioned in spaced relation within said outer casing, said receptacle having a grate forming the bottom wall thereof and having an opening in the upper portion thereof, a hollow upright member mounted upon the upper side of the grate and communicating with the space below the grate provided with a plurality of apertures for feeding air from below the grate to the inside of said receptacle, an outlet in said outer casing for conducting products of combustion away from said incinerator, a secondary combustion chamber having an inlet and an outlet, the inlet of said combustion chamber communicating with the opening in the upper portion of said receptacle and the outlet of said secondary combustion chamber communicating with the outlet in said casing, said combustion chamber having a downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate for combustion of the material in said receptacle, and means for supplying a separate flame to said secondary combustion chamber, means for supplying primary air to the grate for effecting combustion of the material in the receptacle and means for supplying secondary air to said secondary combustion chamber for effecting combustion of the ignitable gases and other products of combustion flowing through the combustion chamber to said incinerator outlet.

4. An incinerator comprising an outer casing, an inner receptacle for receiving contents to be burned positioned in spaced relation within said outer casing, said receptacle having a tiltable grate forming the bottom wall thereof and having an opening in the upper portion thereof, a hollow upright member mounted upon the upperside of the grate and communicating with the space below the grate provided with a plurality of apertures for feeding air from below the grate to the inside of said receptacle, an outlet in said outer casing for conducting products of combustion away from said incinerator, a secondary combustion chamber having an inlet and an outlet, the inlet of said combustion chamber communicating with the opening in the upper portion of said receptacle and the outlet of said secondary combustion chamber communicating with the outlet in said outer casing, said combustion chamber having a downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate for combustion of the material in said receptacle, and means for supplying a separate flame to said secondary combustion chamber, means for supplying primary air to the grate for effecting combustion of the material in the receptacle and means for supplying secondary air to said secondary combustion chamber for effecting combustion of the ignitable gases and other products of combustion flowing through the combustion chamber to said incinerator outlet.

5. An incinerator comprising an outer casing, an inner receptacle for receiving contents to be burned positioned in spaced relation within said outer casing, said receptacle having a grate forming the bottom wall thereof and having an opening in the upper portion thereof, an outlet

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ondary combustion chamber having an inlet and an outlet, the inlet of said secondary combustion chamber being positioned within the upper end of said outer casing and adjacent the portion of said side wall of said inner receptacle of open construction so as to receive the products of combustion passing from said inner receptacle through said side wall portion of open construction, the outlet of said secondary combustion chamber communicating with the outlet in said outer casing, said combustion chamber having a downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate and to said portion of said combustion chamber extending adjacent said grate, means for supplying primary air to said grate for effecting combustion of the material in said receptacle, and means for supplying secondary air to said secondary combustion chamber for effecting the combustion of the ignitable gases and other products of combustion flowing through said combustion chamber to said outlet in said outer casing.

10. An incinerator comprising an outer casing, an inner receptacle for receiving the contents to be burned positioned in spaced relation within said outer casing, said receptacle having a grate forming the bottom wall thereof and having an opening in the upper portion thereof, said outer casing having an outlet therein for conducting products of combustion away from said incinerator, a secondary combustion chamber having an inlet and an outlet, the inlet of said combustion chamber communicating with the opening in the upper portion of said receptacle and the outlet of said secondary combustion chamber communicating with the outlet in said outer casing, said combustion chamber having a

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downwardly extending portion from the inlet thereof and having another portion extending adjacent said grate and communicating with the outlet thereof, means for supplying a flame to said grate and to said portion of said combustion chamber extending adjacent said grate, means for supplying primary air to said grate for effecting combustion of the material in said receptacle, and means for supplying secondary air to said secondary combustion chamber for effecting the combustion of the ignitable gases and other products of combustion flowing through said combustion chamber to said outlet in said outer casing.

11. The combination set forth in claim 10 wherein said portion of said combustion chamber which extends adjacent said grate is apertured, said means for supplying a flame to said grate being arranged to direct a flame at the perforations in said grate and to said aperture in said combustion chamber.

JOHN G. GREEMEN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
315,397	Engle	Apr. 7, 1885
329,302	Engle	Oct. 27, 1885
370,223	Vincent	Sept. 20, 1887
1,275,651	Borge	Aug. 13, 1918
1,528,816	Cummings	Mar. 10, 1925
2,044,085	Laghetto	June 16, 1936
1,995,723	VanDenburg	Mar. 26, 1935
2,171,535	Berg	Sept. 5, 1939

FOREIGN PATENTS

Number	Country	Date
107,337	Germany	Dec. 11, 1899