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[54] SMOKELESS TRASH INCINERATOR
14 Claims, 7 Drawing Figs.

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110/18, 110/72, 110/179
[51] Int. Cl. F23g 5/12
[50] Field of Search 110/7, 8,
179, 182, 18, 72, 75

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ABSTRACT: An incinerator for trash and other waste material having a lower trash-receiving chamber, an upper smoke-incinerating chamber in communication therewith, an air supply system for feeding air into selected regions of the chambers in accordance with certain preselected temperatures as measured in both chambers, and a burner in the upper chamber supplied by liquid or gaseous fuel.

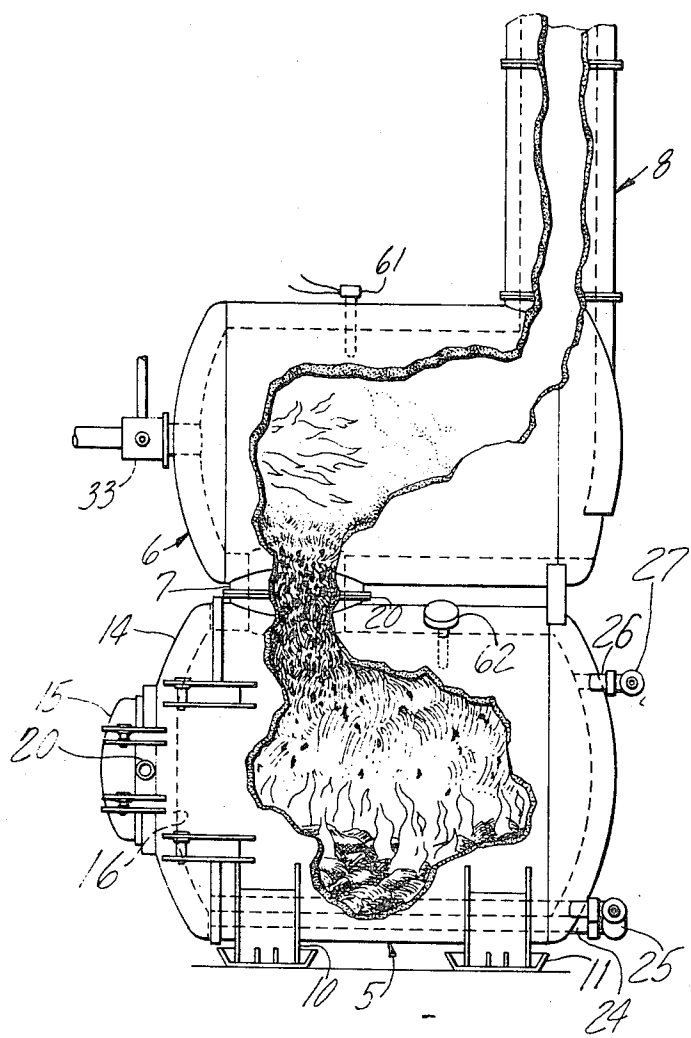


Fig. 1

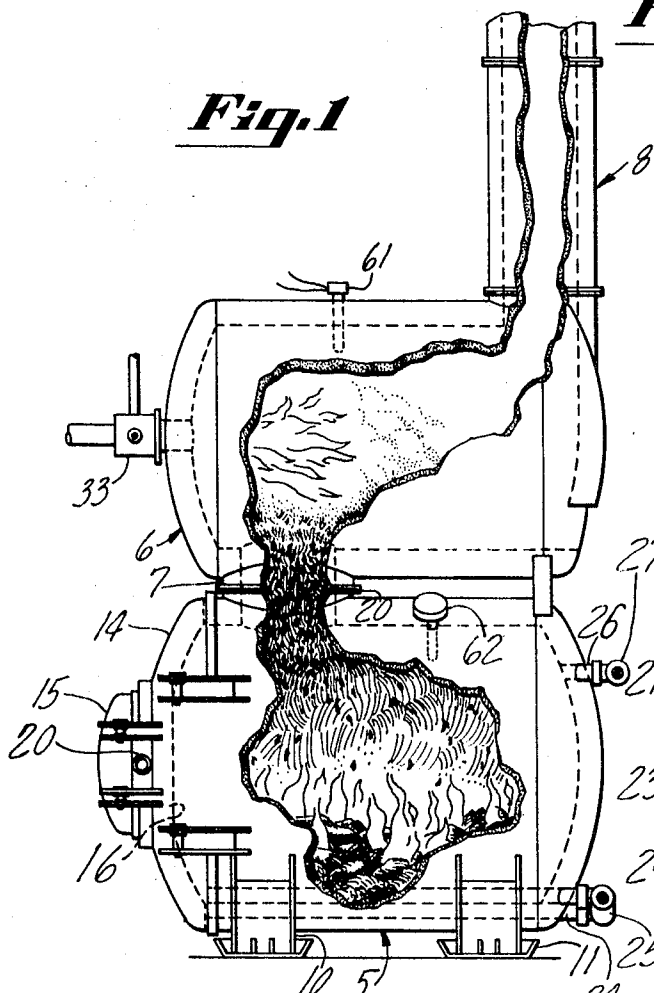


Fig. 2

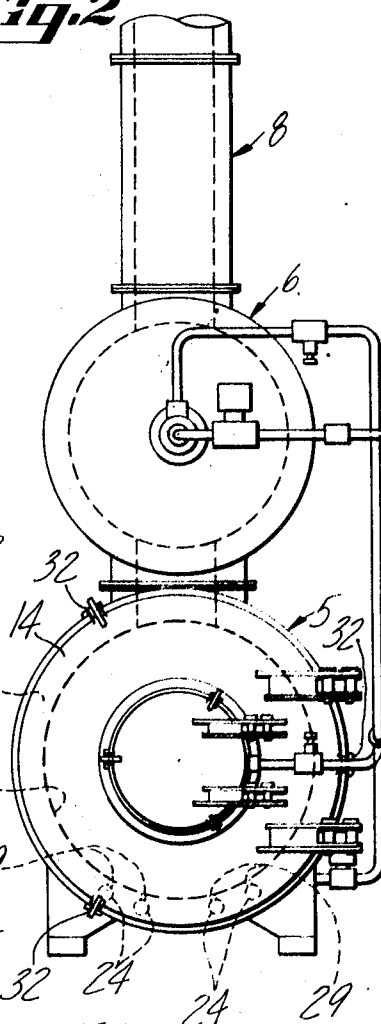


Fig. 3

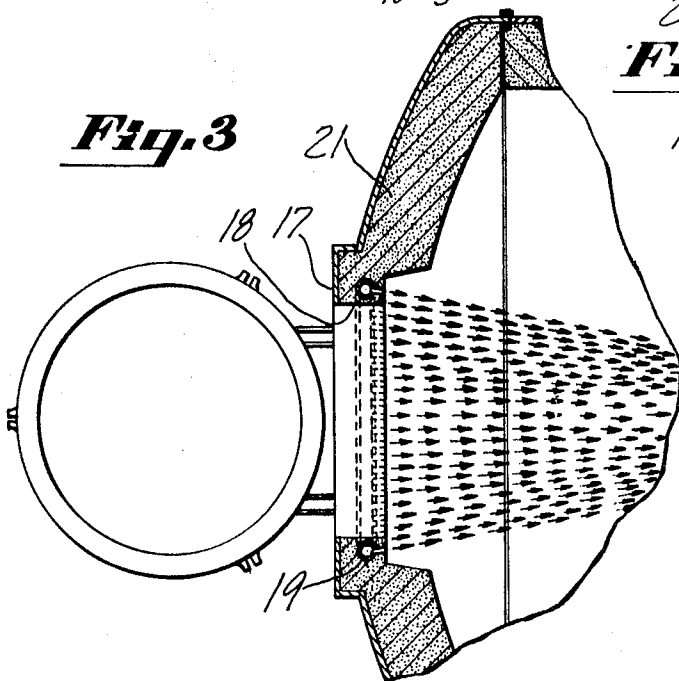
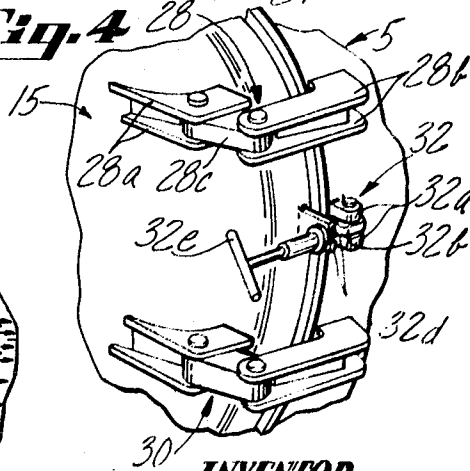


Fig. 4



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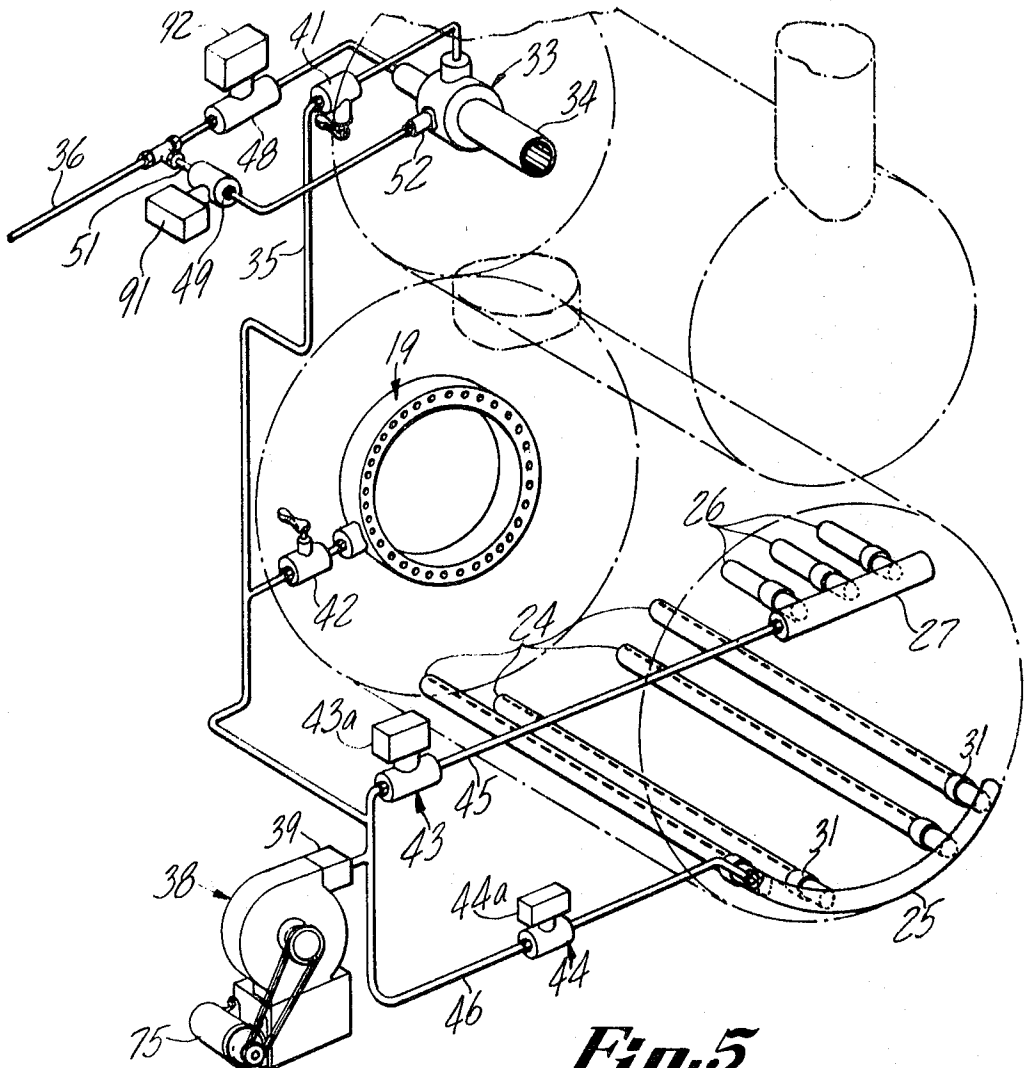


Fig. 5

NUMERAL	INDIUM	DESCRIPTION
75	M	BLOWER MOTOR
79	APS	AIR PRESSURE SWITCH
56	PCR	PRIMARY CONTROL RELAY
93	MGRS	MAIN GAS RELAY SWITCH
92	MGVS	MAIN GAS VALVE SOLENOID
88	IT	IGNITER TRANSFORMER
91	PBVS	PILOT BURNER VALVE SOLENOID
101	LR	LOAD RELAY COIL
43a	O-FVM	OVER FIRE AIR VALVE MOTOR
44a	U-FVM	UNDER FIRE AIR VALVE MOTOR
110	AOR	AUTOMATIC OFF RELAY COIL
97	ILR	INDICATOR LAMP RELAY COIL
98	R	RED LAMP
95	G	GREEN LAMP
57	TCTC	TOP CHAMBER TEMPERATURE CONTROLLER
58	BCTC	BOTTOM CHAMBER TEMPERATURE CONTROLLER

Fig. 6
TABLE OF INDICIA

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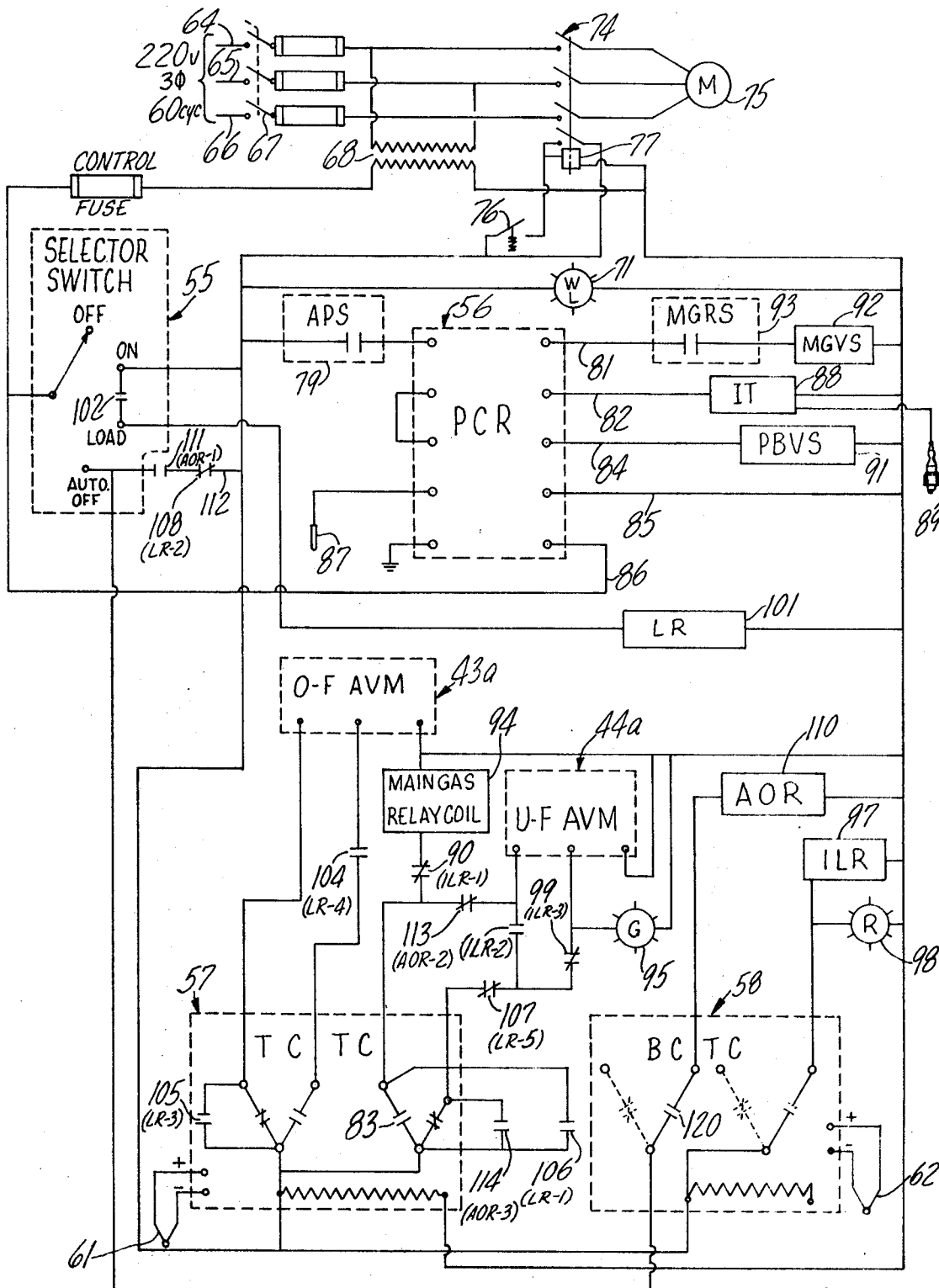


Fig. 7

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SMOKELESS TRASH INCINERATOR

DESCRIPTION

The present invention is concerned with trash-burning equipment of the type and size suitable for use in connection with commercial or industrial activity in which the disposal of waste materials becomes economically important. Currently, special efforts are being made in the trash-incinerating art to provide equipment capable of smokeless operation. Smokeless trash incinerators of present designs have such disadvantages as development of high temperatures which are destructive of portions of the incinerator or exhaust equipment therefor, tendency to discharge fine solids, and the use of amounts of fuel considered excessive in view of the present invention.

The present invention is also made in consideration of the rapidly developing body of local codes and ordinances which are directed to waste disposal and incinerator design, and in conformity with incinerator standards as developed by the Incinerator Institute of America headquartered at 60 East 42 Street, New York, N. Y. 10017.

In incinerator practice, smoke and fume formation is easily avoided under conditions of sufficient air for combustion and high temperatures. As one aspect giving rise to the present invention, excessively high temperatures are objectionable because of accelerated deterioration of equipment, and fire hazard from stack gases. Under some circumstances, high stack temperatures indicate excessive consumption of auxiliary fuel.

It is an important object of this invention to provide a grateless trash incinerator which may be operated without smoke or odor formation at temperatures generally under 2,000° F. throughout the incinerator.

It is another object to provide a grateless incinerator capable of relatively high rate of trash consumption, e.g., 500 to 1,000 pounds per hour, which is easily charged without hazard or annoyance to the operator, and provides facile and convenient ash removal. It is especially desirable to be able to open the charging door of an incinerator without any discharge of smoke and hot gas therethrough, or the scattering of trash about the region adjacent the front of the incinerator.

A further object is to provide an incinerator so designed as to minimize damage thereto which results from local dimensional changes in response to drastic changes of temperature, such as warping and cracking in the outer shell of the incinerator and its refractory lining.

Another object is to provide an incinerator of trouble-free design in which all auxiliary elements are easily accessible for maintenance, e.g., the cleaning of air ducts which are supported in the hearth of the incinerator.

Such objects are substantially achieved in a trash incinerator constructed according to the invention to operate at internal temperatures which avoid overheating of the incinerator components without the production of smoke or fumes in the stack gases discharged therefrom. The incinerator comprises two vertically spaced chambers, preferably formed of cylindrical tanks, connected adjacent their front ends by a vertical flue. A stack is attached to the upper back portion of the upper chamber. In a preferred embodiment, the front end of the lower chamber is formed partially by a charging door mounted on the front wall or mounted on a larger cleanout door which may in itself constitute the front wall. A burner for a fluid fuel, included or associated with a suitable supply duct, projects through the front wall of the upper chamber.

An essential feature of the incinerator resides in its air distribution system which, in a preferred embodiment, includes an electrically powered air pump, a plurality of hearth ducts disposed interiorly of the lower chamber along its bottom portion or hearth and provided with openings for directing air upwardly from the hearth, an excess air duct projecting into an upper rear portion of the lower chamber, a circuitous air

dispenser surrounding the charging door opening for discharging an inwardly directed conical air stream, the above-mentioned air supply duct for the burner, and lines with control valves in each for connecting the air pump with the ducts and the dispenser. While the valves in lines to the dispenser and the burner may be adjusted to a permanently open or partially open setting, the valves to the excess air duct and hearth ducts, and a valve for controlling passage of fuel to the burner are controlled, e.g., by solenoids, and other electrical control equipment therefore provided for the purpose of sensing certain preselected temperatures at which air and fuel are to be supplied or denied to the chambers.

In the drawings with respect to which the invention is described:

FIG. 1 is a side elevation of an incinerator with auxiliary equipment omitted and wall portions broken away to illustrate interior regions thereof;

FIG. 2 is an end elevation of the incinerator shown in FIG. 1;

FIG. 3 is a fragmentary view with a wall portion removed illustrating a component functioning as a charging door frame and air dispenser adapted to discharge air in a conical pattern;

FIG. 4 is a fragmentary perspective view of structure for supporting and sealing a door in respect to a supporting chamber body;

FIG. 5 is a perspective schematic view of the air supply system of the incinerator;

FIG. 6 is a table of indicia as applied to FIG. 7; and

FIG. 7 is an electrical circuit diagram including components for controlling the passage of gas and air into the incinerator.

Principal components of the incinerator as illustrated in FIGS. 1 and 2 are a lower chamber or tank 5, an upper chamber or tank 6, a vertical flue 7 joining and placing the chambers in communication adjacent respective front ends, and a stack 8 having its passageway contiguous with the interior of the upper rear portion of chamber 6. The lower chamber is provided with legs 10, 11 adapting the incinerator to stand on any reasonably level platform without attachment. The lower chamber, preferably of steel shell construction, comprises a cleanout door 14 forming the front end of wall of the chamber, and a charging door 15 which normally covers a central aperture 16 of the door 14. Such aperture is defined by the inner periphery of an annular flat raised wall portion 17. An annular dispenser 19 is supported generally concentrically to the flange 18 and, for protection against heat, is embedded with a refractory material 21 which lines the entire inner surface of both chambers 5, 6, the flue 7, and the stack 8. The dispenser 19 is perforated along an annular portion thereof facing along a conical surface having its axis of generation extending in the lengthwise direction of the chamber with the apex of such conical surface disposed inwardly of the chamber away from the charging door. The flue 7 may be constructed as shown in two separable parts, each integrally attached to its associated tank, and separable along a flange joint 20.

The chamber 5 has a hearth 23 formed of the lining 21 along the bottom portion of the chamber 5. Air-discharging means for directing air upwardly into the charge of trash is provided along the bottom portion of chamber 5. For this purpose, hearth ducts or tubes 24 are embedded in the lining forming the hearth and extend longitudinally in the lengthwise direction of the chamber to protrude as shown in FIG. 1 through and beyond the back end wall of the chamber 5 to join with a manifold 25 (see FIG. 5). Three shorter ducts 26 extend through the rear wall of the chamber 5 from an exterior manifold 27 and terminate inwardly of an upper rear region of the chamber 5 as open ends. Preferably the ducts 26 terminate in flush relation with, or protrude slightly beyond, the inner surface of the refractory wall lining at the rear end of the chamber.

The hearth duct 24 may extend as shown to the end surface of the circumferential wall lining at the front end of the chamber 5 and terminate the ends which are exposed and open to the atmosphere whenever the door 14 is open for accessibility for cleaning by rod or vacuum or pressure tube

when inserted into one of the ducts 24. The ducts 24 are perforated or otherwise foraminous along upper portions in registry with slots 29 in the lining 14 which permit air to be directed upwardly through the lining from the ducts into material supported on the hearth 23. The tubes 24 are detachably connected with the manifold 25 by sleeves 31 to implement cleaning of the tubes and other service or maintenance operations. The manifold 27 is connected in a similar manner with the short excess air tubes 26.

The door 14 is supported by the cylindrical shell of the chamber 5 by hinges 28 and 30. These hinges are of a double-fulcrum type wherein twin brackets 28a on the door and twin brackets 28b on the chamber body are connected by a link 28c. The hinge 30 is constructed in a similar manner. Such hinge construction permits adjustability of the door toward and away from its seat on the door frame provided by the chamber body. The door, when swung into its chamber-enclosing position, is tightly sealed against its seat on the chamber body by three clamp devices 32 located 120° apart along the periphery of the door 15. In the form illustrated, each device 32 comprises a clevis 32a secured to the chamber shell 5, a hinge bolt 32b pinned pivotally to the clevis, twin lugs 32d secured to the periphery of the door 15, and a handle nut 32e in threaded relation with the bolt 32b adapted to bear on the twin lugs.

The charging door 15 is supported on the door 14, as shown, by hinges of construction similar to hinges 28, 30 and is secured in its closed position by fastening devices similar to the clamp device 32.

Doors 14 and 15 are preferably of outwardly domed contour, as shown in order to minimize warping of the outer metallic shell and damage to the nonmetallic refractory lining 21. In like manner, the closed ends of both chambers 5 and 6 are of outwardly domed contour.

Under certain conditions, incompletely burned gases issuing from the lower chamber 5 are incinerated in the upper chamber 6 by a burner 33 of commercial manufacture having a heating capacity consistent with the overall incinerating capacity of the entire apparatus. For example, an incinerator capable of consuming 600 pounds per hour of types 0 and 1 as defined by the Incinerator Institute of America would use a burner having a heat output of 1 million B.t.s.'s per hour. The burner 33 is mounted with its body secured to the exterior side of the front end of the upper chamber with its nozzle 34 extending through the front wall of the chamber and interiorly thereof. As the conventional burner comprises the usual air and fuel ducts leading to a mixing chamber for carburetion of a fuel air mixture, the burner is connected directly with an air supply line 35 and a fuel supply line 36.

As shown more clearly in FIG. 5, the air distribution system comprises a motor-blower unit 38 having its discharge port 39 connected with supply lines leading to the burner 33, the circuitous air dispenser 19, the hearth ducts 24, and the excess air ducts 26. Air to the burner 33 and the dispenser 19 is regulated e.g., by valves 41, 42, respectively, which may be adjusted to a constant setting since it is intended that air shall pass continuously to the burner and the dispenser whenever the blower unit 38 is operated. The air supplied to the excess air ducts 26 and the hearth ducts 24 is, on the other hand, regulated in accordance with a pattern hereinafter described by temperature responsive valves, e.g., solenoid valves, 43, 44, which are disposed in supply lines 45, 46, respectively, and regulate air independently of each other to the excess air ducts and the hearth ducts.

As operation of the burner 33 is required only under certain temperature conditions, fuel to the burner is regulated in an off and on basis by a valve, such as the solenoid valve 48 in a fuel supply line 36. The line 36 also contains a pilot burner valve 49 for supplying fuel to bypass line 51 leading to a pilot light burner 52 and to the burner 33. As all valves for controlling the air supply to various components of the air distribution system, and the fuel to the burner, are adjusted in respect to the blower output to obtain desired output rates of

the various components, there will necessarily be some fluctuation in the air output of the burner and the dispenser depending upon whether or not air is being discharged from either or both the excess air ducts and the hearth ducts.

FIG. 7 depicts one example of an electrical system which has been used to operate the various devices illustrated in FIG. 5 for providing fuel and air in accordance with the various positions of a selector switch 55. It should be understood that the diagram includes units 56, 57, and 58 which are proprietary products readily and commercially available to electrical system designers to accomplish electrical control functions.

These units include internal wiring, relays, resistors, and other elements arranged in circuits of which diagrams are readily obtainable and not deemed necessary for the description of this invention other than to indicate the positions thereof in an electrical circuit such as provided by FIG. 7. For example, unit 56 may consist of a control unit manufactured by the Honeywell, Inc. of Minneapolis, Minnesota and identified as "Protectorelay" Model No. R A 890 E. Units 57, 58 are responsive to temperatures sensed by the top chamber thermocouple 61 and the bottom chamber thermocouple 62, respectively and may consist, e.g., of identical units manufactured by the API Instruments Company of Chesterland, Ohio and having the model identification "COMPACT I." As shown in the present diagram, only portions of the potentially usable internal circuits of these units are incorporated in the present diagram.

Unit 57 is sensitive to temperatures as measured in the top portion of the upper chamber 6 to control an actuating motor 43a of the overfire valve 43 through which air passes to the overfire ducts 26, and the actuating motor 44a of the underfire air valve 44 through which air passes to the underfire ducts 24.

The unit 58, responsive to temperature measured by the thermocouple 62 located in the upper part of the lower chamber 5, has the function of operating a switching relay which shuts off the gas supply to the main burner and lights a warning light as a high temperature is reached, and automatically shuts down the incinerator as a selected low temperature is reached in completing consumption of a load when the selector switch is set in AUTO-OFF position.

In the diagram of FIG. 5, various solenoid or relay coils are indicated by rectangles with certain initial or letter indicia which are identified more fully by the table of indicia provided in FIG. 6. To facilitate comprehension of the diagram of FIG. 7, and the disclosure, switches included in the same relay or solenoid device are indicated with the same initial as the associated coil plus a numeral. In addition, regular numerals are used to simplify this text.

The various elements shown in FIG. 7 are in the condition which they normally assume at complete shutdown, i.e., complete disconnection from power supply lined 64, 65, 66. If a main power supply switch 67 is moved to its closed position, power is available through a transformer 68 to the circuit system connected therewith when the selector switch 55 is moved to the ON terminal. At the ON position of the switch 55, a white indicator lamp 71 becomes illuminated and indicates that the incinerator is prepared from an electrical stand point for being operated; that is to say, that the air-blowing unit 38 may be started up.

By the present electrical arrangement, the operation of the fuel burners is contingent upon operation of the blower unit. A motor 75 of the unit is put into operation by closing the button switch 76 of a conventional motor-start apparatus 74 including a solenoid 77. As the blower of unit 38 establishes a predetermined pressure in the manifold system for feeding the various air-discharging elements, a switch operated by air pressure from the manifold system closes and thereby causes power to be available in lines 81, 82, and 84 relating to the operation of the main burner 33 and the pilot burner 52. A line 86 in conjunction with line 85 supplies continuous power to amplification means within the relay unit 56 for a flame rod 87 associated with the main burner and a tube within the relay

unit 56 (not shown) for warming the unit. Line 81 contains a main gas valve solenoid 92 which operates the valve and becomes operative when a relay switch 93 is closed. Through line 82 an igniter transformer 88 is activated to cause continuous sparking at a spark plug 89 located in the burner 33.

However, switch 93 closes as the selector switch 55 is set at its ON position since relay coil 94 for operating this switch 93 is energized by the top chamber temperature controller through a switch 90 normally closed at the ON position of the selector switch and a switch 83 in the top chamber temperature controller which closes at any temperature of the top chamber under a temperature of e.g., 1,400° when power is applied to the controller.

As mentioned before, air is constantly discharged from the air dispenser 19 and the main burner 33 during operation of the blower unit 38 at rates determined by the settings of valves 41 and 42. However, air is discharged by the "overfire" ducts 26 or the "underfire" ducts 24 in an off-and-on fashion by the operation of valves 43 and 44 respectively as determined by the controller 57 in response to control temperatures sensed by the thermocouple 61. The controller 57 is adjusted to prevent operation of the overfire and underfire air valves until some predetermined moderate temperature of the top chamber is reached, for example 600° F. After the initial stage of heating the incinerator to 600° F. is reached, the controller 57 energizes the overfire air valve motor 43a to place valve 43 in open condition. The underfire air valve remains closed. The main gas burner remains in operation in order to incinerate smoke, and odorous or other unburned gases capable of further oxidation.

As the top chamber reaches a higher temperature, e.g., 1,400° F., suitable for supporting combustion of practically all oxidizable gases without the aid of combustion of an auxiliary fuel provided by the main gas burner, the controller 57 is arranged and adjusted to maintain the overfire air valve in its open position and to energize through relay operation the underfire air valve motor 44a to obtain open condition of the valve 44. At this stage, the controller 57 interrupts power to the main gas valve relay coil 94 to stop further combustion of auxiliary fuel by the burner 33. A green light 95 is energized by the controller 57 contemporaneously with the ON position of the underfire air valve. This light indicates optimum incinerating conditions within the incinerator.

When the combustion within the incinerator is sufficiently vigorous, the temperature throughout the incinerator will exceed a desired level. Undesirable hot temperatures are measured by the thermocouple 62 in the bottom chamber. As this chamber reaches a temperature regarded as a maximum control temperature, e.g., 1950° F., the bottom chamber controller 58 senses the high temperature through its thermocouple 62 and energizes an indicator light relay coil 97 to open the switch 90, thereby interrupting the power to main gas valve relay coil 94, and opening a switch 99 which interrupts power to the underfire air valve motor 44a and the green lamp 95. The switches 90 and 99 are components of a relay switch including the relay coil 97 and are operated by this coil. As the coil 97 becomes energized, a red lamp 98 is illuminated since the lamp is connected in parallel with coil 97 to the same terminal. As the temperature of the bottom chamber drops below 1950° F. the controller 58 deactivates the solenoid 97 and the lamp 98 and permits repositioning of the underfire air valve motor 44a to an open position. The incinerator should not be loaded when the red lamp is illuminated.

Loading of the incinerator entails the opening of the smaller door 15. However, before opening the door, the selector switch 55 is turned to LOAD position whereupon a load relay coil 101 is energized. As the selector switch 55 contains internal mechanism for closing a switch 102 in a line connecting the ON and LOAD terminals of the switch, all facilities energized at the ON position of the switch are energized except for those affected by the relay switch of which the coil 101 is a component. From the diagram, it may be seen that, as coil 101 is energized, switches 104, 105, 106, 107, and 108 are either

open or closed depending on their normally closed or open conditions. The operation of these switches at LOAD setting of switch 55 effects a condition of the incinerator characterized by (1) the main gas burner being ignited and operating; (2) the overfire air valve being closed, (3) the underfire air valve being closed, and (4) air being discharged from the doorframe air dispenser 19 to form a conical air curtain inwardly of the door which keeps heat and smoke from escaping through the doorway, and draws air-buoyant pieces of paper, etc. into the chamber.

After loading operation is completed, the selector switch is returned to the ON position whereby the load relay coil 101 is deenergized whereupon switches 104 to 108 return to their normal settings.

The electrical system of FIG. 7 enables the incinerator to be automatically shutdown after a load of material to be incinerated has burned out. Such an arrangement will enable an operator to leave the incinerator unattended after loading has been completed as following a final loading of any workday. In using the electrical system of FIG. 6 for automatically terminating operation of the incinerator, use of the AUTO-OFF position of the selector switch is limited to loading the incinerator only after it has incinerated one or more previous loads which have heated it to a normally hot operating condition.

In AUTO-OFF position of the selector switch 55, an AUTOMATIC-OFF relay coil 110 is energized to close an associated relay switch 111 in the line 112 enabling the electrical system of the incinerator to be energized in the same manner as if the selector switch was moved to the ON position, except that the main gas burner is turned off. Other switches associated with and operated by relay coil 110 are switches 113 and 114. As a result of the operation of the switches which are associated with coil 110, all electrical components operate in the usual manner except that relay coil 94 for the main gas valve solenoid 92 is deenergized and will not operate at this setting of the selector switch by operation of the internal circuitry of the control 58. The red lamp 98 is illuminated. As the temperature in the incinerator drops, the normal responses of the controller 57 to decreasing temperatures are eliminated by operation of the coil 110 and associated switches. The temperature in the incinerator as measured by thermocouple 62 continues to descend until a predetermined temperature, e.g., 900° F., is reached. The controller 58 is internally constructed with heat-responsive mechanism such that a switch 120 is opened. As the relay coil 110 becomes deenergized, the previously closed switch 111 now opens to cause cessation of power to all elements of the electrical system including the starter solenoid 77 whereupon the motor switch 121 associated therewith opens to cause the motor 75 to stop.

It will be noted from the above that during a LOAD operation, the burner 33 is operated. Fuel is supplied to the burner in order that the burner may be operating when the door is opened. As also indicated above, air is discharged continuously, through the burner and the air dispenser 19 but fuel is supplied to the burner only at certain temperature conditions. As the likelihood of smoke production is greatest during the loading of the main incinerating chamber, for example, with wet or highly carbonaceous refuse, it is essential to incinerate gas or gas-suspended materials carbonaceous within the incinerator at loading time. The air dispenser produces a conical curtain or stream of air which serves at this time to overcome any pressure above atmospheric pressure produced in the chamber 5 as the result of the operation of the burner or the dispenser itself.

What is claimed is:

1. A smokeless trash incinerator comprising:

- a lower chamber with ends thereof spaced horizontally at opposite ends of its length, said chamber having a bottom interior portion for receiving material to be incinerated, and a front end wall having an opening;
- a top chamber disposed above said lower chamber with a front portion thereof immediately over a front portion of the lower chamber;

a vertical flue extending between both of said front chamber portions wherethrough gas may pass from one chamber to the other;

a stack attached to an upper rear wall portion of the top chamber in communication with the front portion of the top chamber;

an air supply means disposed exteriorly of said chambers;

air-discharging means disposed along the bottom of said lower chamber and extending through a wall portion of the lower chamber into connection with said air supply means and constructed for venting of air from the ducts upwardly into any material supported in said bottom portion;

a charging door mounted on said front wall to uncover and close said opening;

a fluid fuel burner mounted in a front end wall portion of the upper chamber to discharge flame toward the back end of the top chamber, and a fuel supply line thereto;

an excess air duct having an outlet port in the upper portion of said lower chamber extending through a wall portion into connection with said air supply means;

an air duct connecting said air supply means with said burner;

burner control means including temperature-sensing means inside the incinerator, valve-means in said line, and igniting means for said burner;

air control means including temperature-sensing means inside the incinerator, and valve means between the air supply means and said excess air duct and between the air supply means and said hearth ducts;

said burner control means and air control means being constructed and arranged to actuate said valve means and igniting means:

1. to pass air continuously to said burner at all stages of operation;
2. during an initial stage, to pass fuel to, and ignite the burner;
3. during a second stage beginning as the top chamber reaches a preselected low temperature, to pass air through the excess air duct, and to continue passage of fuel to the burner;
4. during a third stage beginning as the top chamber reaches a preselected intermediate temperature, to shut off fuel to the burner, to continue passage of air to the excess air duct, and to turn on air to said air-discharging means; and
5. during a fourth stage beginning as the lower chamber reaches a preselected temperature between said intermediate temperature and a predetermined high temperature, to continue passage of air through the excess air duct, to shut off air to said air-discharging means, and to maintain shutoff condition of the burner.

2. The incinerator of claim 1 comprising:

a hollow air dispenser encircling said opening in fixed relation with the front wall and provided with apertures aligned for discharging air in a conical pattern inward of the lower chamber toward an apex point, said air dispenser being connected to said air supply means.

3. The incinerator of claim 2 comprising:

continuously open means connecting the air supply means and the dispenser.

4. The incinerator of claim 1 wherein:

said front wall is substantially constituted of a cleanout door having said opening and hinge means pivotally connecting said charging door with the cleanout door.

5. The incinerator of claim 1 wherein:

said burner control means and air control means include thermocouples in the upper parts of both chambers.

6. The incinerator of claim 1 wherein:

said lower chamber has a bottom wall portion constituting a hearth and said air-discharging means comprises a plurality of transversely spaced ducts extending lengthwise of said hearth;

said chambers and flue are lined with a refractory lining and all exterior surfaces of ducts within said chambers are embedded in said lining, said lining being open in an upward direction immediately over foraminous portions of said hearth ducts to enable said venting of air supplied thereto.

7. The incinerator of claim 4 wherein:

said hinge means comprises double-fulcrum link means and said cleanout door having similar hinge means enabling said doors to adjustably seat against seating surfaces defining the respective openings closed by the doors, and adjustable clamp means for securing said doors against respective seating surfaces.

8. The incinerator of claim 4 wherein:

the end walls of said chambers including said doors are of outwardly domed contour.

9. The incinerator of claim 4 wherein:

said cleanout door constitutes said end wall to a level below said hearth whereby open ends of said hearth ducts are exposed when the cleanout door is opened, and said hearth ducts extend in substantially straight lines entirely throughout the length of the hearth to facilitate the cleaning thereof.

10. The incinerator of claim 1 wherein:

said burner control means and said air control means are merged in a single electrical system including thermocouples exposed within the upper parts of both chambers, said system being arranged to respond to said preselected temperature as measured by the thermocouple of the lower chamber to effect said fourth stage operation.

11. The incinerator of claim 10 wherein:

said system is arranged to respond to a predetermined shutdown temperature less than said intermediate temperature as measured by the thermocouple of the lower chamber to effect automatic cessation of power to all elements of said system.

12. The incinerator of claim 10 wherein:

said system is arranged to respond to said low temperature and said intermediate temperature as measured by the thermocouple of the upper chambers.

13. A smokeless trash incinerator comprising:

main incinerating chamber having an end wall defined by a cleanout door, which defines an opening;

an annular air dispenser mounted on said door in encircling relation with said opening, said dispenser being foraminous along a surface thereof facing inwardly of the chamber and in a pattern adapted to form a generally conical stream of air converging inwardly of the chamber away from said opening;

a charging door for closing said opening; and

air supply means for the incinerator supplying air to the dispenser at sufficient pressure providing a conical air curtain or stream preventing the discharge of any gas or suspended material from said opening as the result of internal pressure of the chamber when said charging door is open.

14. The smokeless trash incinerator of claim 13 comprising:

a second chamber in communication with said main chamber, said second chamber having a burner operable therein to incinerate gas and gas-suspended materials, said air curtain by said dispenser being of sufficient strength to overcome any pressure in said main chamber caused by operation of said burner.