United States Patent [19]

Dahar

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[54] **AIR SUPPLY FOR INCINERATOR**

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[73] Assignee: **The Air Preheater Company, Inc.,** Wellsville, N.Y.

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[21] Appl. No.: **528,530**

[52] **U.S. Cl.** ..... **110/8 R;** 110/8 A; 110/72 B; 110/75 R

[51] **Int. Cl.²** **F23G 5/00;** F23L 3/00

[58] **Field of Search** ..... 110/8 R, 8 A, 8 C, 18 R, 110/18 C, 72 R, 72 B, 75 R

[56] **References Cited**

UNITED STATES PATENTS

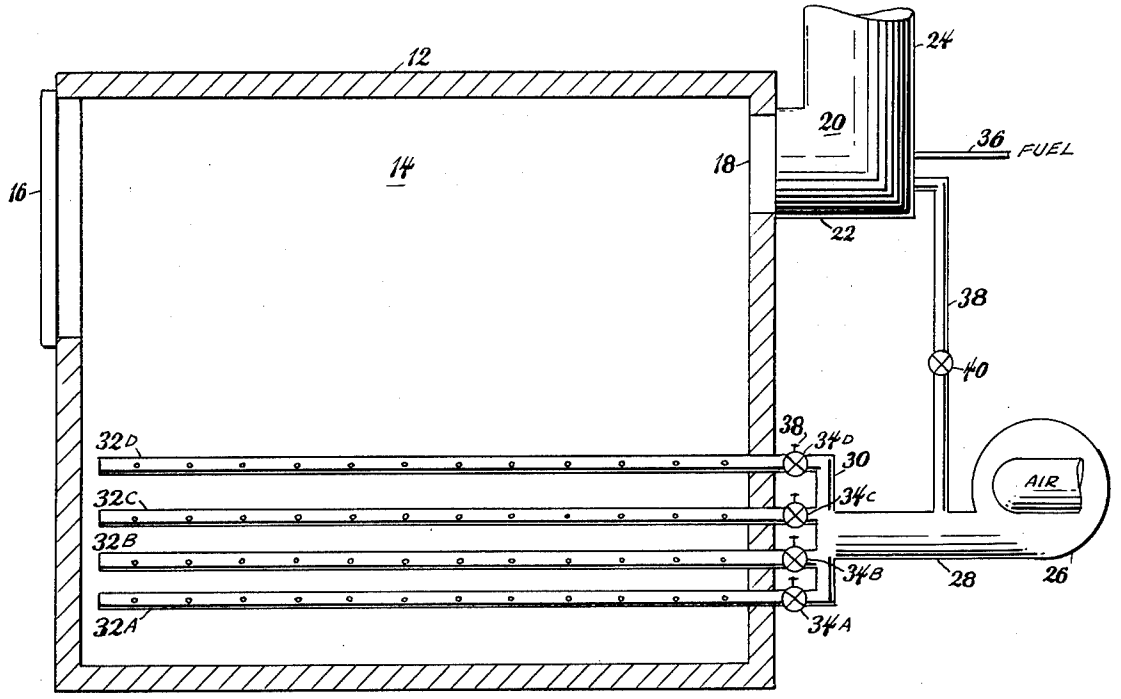
2,483,946	10/1949	Touton	110/75
3,599,609	8/1971	Sams et al.	110/8
3,664,277	5/1972	Chatterjee et al.	110/8
3,678,870	7/1972	Bakker	110/8

Primary Examiner—Kenneth W. Sprague
Attorney, Agent, or Firm—Wayne H. Lang

[57] **ABSTRACT**

A gateless incinerator having an inlet for air required for combustion of organic matter therein that includes a plurality of vertically spaced ports. The ports are positioned at the lower portion of the incinerator in vertically spaced relation to have an air supply port that lies constantly adjacent the underside of the charge of organic matter placed therein. When an accumulation of ash from the burning organic matter covers an inlet port, air flowing therethrough is curtailed whereby conditions that promote oxidation of the carbon in the ash and vaporization of other residual material therein are terminated. Inasmuch as combustion is terminated in the ash it is permitted to cool thereby eliminating the volatilization of inorganic elements in the ash and the production of haze forming gases.

6 Claims, 3 Drawing Figures



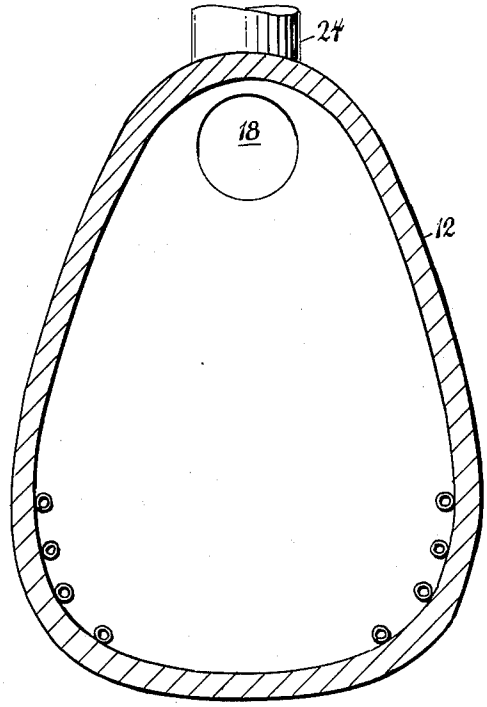
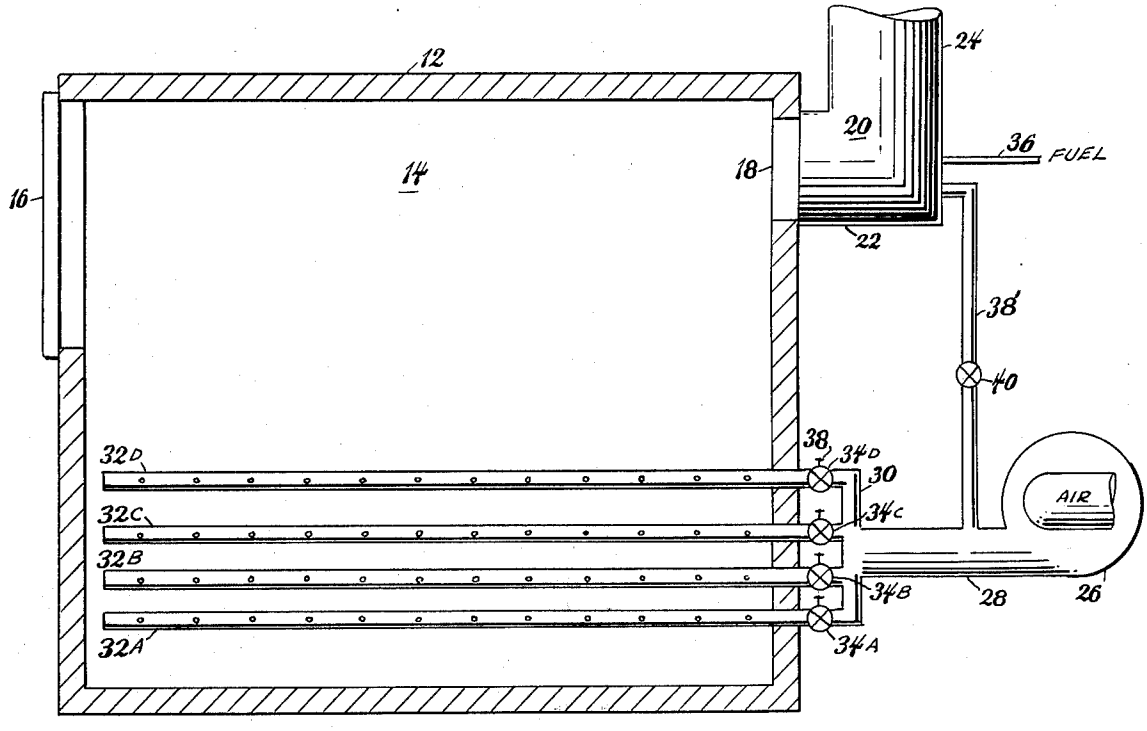

24
18
12

Fig. 1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38'
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26
32A
34A

Fig. 2

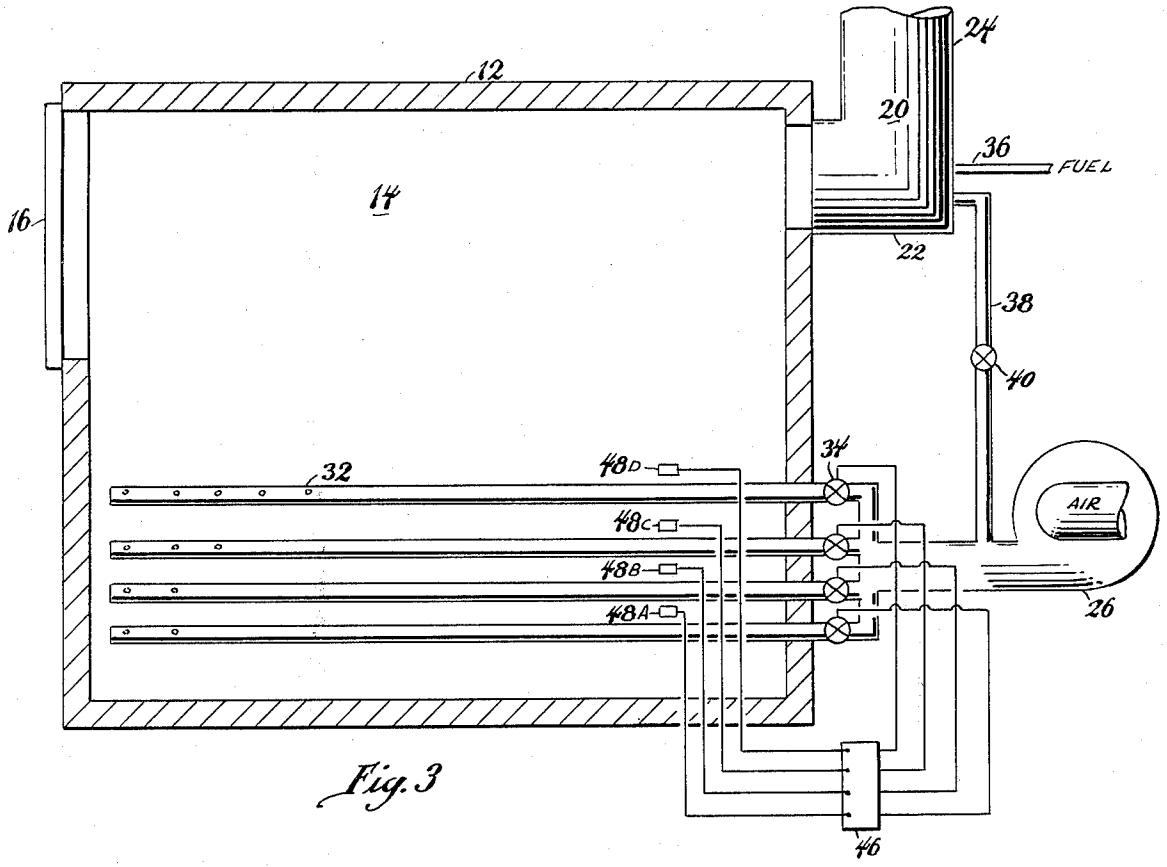

Fig. 3

AIR SUPPLY FOR INCINERATOR

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

An incinerator for trash and other waste material that includes organic and inorganic matter having an air supply arrangement that controls combustion to preclude the temperature of ash from the burning trash from rising to the point where it volatizes the inorganic constituents thereof and produces haze forming gases.

2. DESCRIPTION OF PRIOR ART

Incinerator devices that reduce waste material to ash are well known and shown generally by the U.S. Pat. of Bakker, No. 3,491,707. Such devices regularly have one feature in common, that being that they are operated at high temperatures to obtain maximum gasification of solids therein. While operating at high temperature, most of the organic matter and some of the inorganic matter in the charge of waste material therein is reduced to gaseous form, with the organic matter being burned in an afterburner and the volatized inorganic material being exhausted to the atmosphere to become the basis of a haze forming gas. Some inorganic material, such as glass, is only melted, and on fusing with other residue in the ash forms a clinker which is removed from the incinerator with difficulty.

SUMMARY OF THE INVENTION

This invention, therefore, relates to an incinerator for trash, garbage, and other waste material having both organic and inorganic values wherein the organic matter thereof is effectively driven off as a combustible gas while the inorganic matter is prohibited from being excessively heated and vaporized. Therefore, the inorganic matter remains relatively cool and is not permitted to be vaporized so it may be exhausted to become the basis of a haze forming atmosphere.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of my invention may be had by reference to the drawing in which:

FIG. 1 shows a sectional elevation of my invention,

FIG. 2 shows a side view of my invention in section 1, and

FIG. 3 shows a sectional elevation of the device having a system of automatic controls.

SPECIFICATIONS

In the drawing of the present invention, the reference numeral **12** defines a housing that encloses a pyrolyzing chamber **14.** The chamber **14** has a loading door **16** for loading a charge of waste material therein and an outlet opening **18** through which gases generated in chamber **14** are directed to an afterburner **20.**

A duct **22** connected to the opening **18** directs the gas to afterburner **20** and to the stack **24** which in turn directs the exhaust gases to the atmosphere.

A source of air for combustion is directed from fan **26** via duct **28** to a manifold **30** which supplies the air through vertically spaced apertured ducts **32** to the lower portion of chamber **14.** Each duct **32** is similarly sized and provided with a control valve **34** whereby air flow through a particular duct **32** may be terminated when it is determined that it lies beneath the current level of the residual ash that remains after reduction of the waste material in the pyrolyzing chamber. A branch duct **38** having a control valve **37** supplies air as required to the afterburner **20.**

In operation a charge of waste material is inserted through the loading door **16** into combustion chamber **14.** All valves **34** are normally closed; however, valve **34A** is moved to an "open" position to admit air for pyrolysis from the source **26** through air supply duct **32A** at the bottom of chamber **14,** while ducts **32B, 32C,** and **32D** remain closed to the flow of combustion air. Inasmuch as the combustion chamber **14** is free of ash at the beginning of a "burn," air from apertured duct **32A** combines with the burning waste and thence passes as the gas of pyrolysis to the exhaust opening **18** and the afterburner **20.** In afterburner **20** pyrolyzed gas from chamber **14,** together with auxiliary fuel from a source of supply **36** and combustion air from supply line **38** controlled by valve **40,** provide complete combustion before being exhausted through stack **24** to the atmosphere as completely burned exhaust gas.

As ash from the burning waste material settles to the bottom of chamber **14** and collects around and over elongate duct **32A,** valve **34A** is "closed" and valve **34B** "opened" so that combustion air is permitted to be directed through valve **34B** and duct **32B** to the burning waste material and thence exhausted to the afterburner and the atmosphere.

Combustion air, consequently, is no longer being forced to flow through the ash and other residual matter in the combustion chamber to increase its temperature and oxidize elements thereof.

Control valves **34** may be actuated manually by handwheels **38** in accordance with the depth of ash at the bottom of chamber **14** as seen by an operator when viewed through the open loading door **16.** Otherwise, automatic control means **42** may be adapted to open and close the valves **34** in response to various conditions within the combustion chamber **14** brought about by the collection of residual matter at the bottom thereof in the manner shown by FIG. **3.** Here, a control means **46** is responsive to thermocouples **48** in the chamber **14.** As one of air supply ducts **32** becomes covered with ash, combustion air being forced out therefrom flows through the ash and burns out the residual carbon thereof to produce a "blast-furnace effect" that raises the temperature considerably. As the temperature rises, the controller **46** is programmed to close the appropriate air supply valve **34** so that combustion at all residual carbon in the ash ceases. However, the supply of air to the duct **32** lying above the ash will continue so that pyrolyzation of waste in the space lying above the ash also will continue until it too is covered with ash.

Thus, combustion of residual carbon remaining in the ash is terminated and the ash cools while the air for pyrolyzation of the waste material in chamber **14** is supplied continuously along the bottom of charge where maximum burning effectiveness may be performed.

As the charge of waste material in chamber **14** continues to burn and be reduced to ash, it continuously falls to the bottom of chamber **14** and progressively covers duct **32B.** When duct **32B** becomes covered with ash, valve **34B** is closed and **34C** opened, and the pyrolyzation of the waste in chamber **14** is continued. If ash collects at the bottom of chamber **14** in an amount that would cover duct **32C,** said duct would be closed off by turning valve **34C** and opening valve **34D**

to continue the supply air for combustion above the level of the residual ash.

By this arrangement an adequate supply of air is continuously provided at the bottom of the charge of burning waste, but it is never forced through the ash. Thus, the air supply is cut-off and combustion of residual carbon within the ash is eliminated completely while air for pyrolyzation of the waste above the ash is continuously supplied in an amount that permits effective pyrolyzation of the waste material to proceed at a constant rate.

Inasmuch as combustion in the ash ceases, the ash naturally assumes a relatively cool temperature that is considerably below the temperature at which the inorganic constituents thereof are vaporized. Therefore, an incinerator, according to this invention, may be used in locations heretofore denied because of the haze forming potential of the gases being exhausted therefrom.

The invention described herein and illustrated in the accompanying drawings is known to admit to various modifications. Thus, other control means could readily be adapted to modulate the valves controlling the flow of combustion air to the combustion chamber in response to a variable condition in the combustion chamber effected by the collection of residual matter therein. Other modifications could be made by persons skilled in the art, and all such modifications are considered to lie within the spirit and scope of the appended claims.

I claim:

1. An incinerator for the incineration of organic matter in a charge of waste material that contains organic and inorganic values comprising in combination a combustion chamber including a loading opening for the admission of waste material therein and an outlet opening for the exhaust of pyrolyzed gas therefrom, means for the collection of ash at the bottom of the combustion chamber, a source of air for combustion, means supplying combustion air from said source to the combustion chamber including a plurality of vertically spaced passageways at the lower portion of the combustion chamber, and means controlling air flow through each of said passageways whereby the flow of air may be curtailed through the passageways that lie subjacent the level of ashes at the bottom of the combustion chamber to thereby terminate combustion of residual matter in the ash and the volatilization of inorganic matter that produces a haze forming gas.

2. An incinerator for the incineration of waste material as defined in claim **1** wherein the vertically spaced inlet passageways are of equal size to permit a constant rate of air flow therethrough.

3. An incinerator for the incineration of waste material as defined in claim **1** wherein the vertically spaced inlet passageways extend horizontally between ends of the incinerator.

4. An incinerator for the incineration of waste material as defined in claim **1** wherein the vertically spaced inlet passageways are formed with a series of horizontally spaced openings that exhaust into the combustion chamber.

5. An incinerator for the incineration of organic matter in a charge of waste material that contains organic and inorganic values comprising in combination a combustion chamber having a loading opening for the admission of waste material therein and an outlet opening for the exhaust of pyrolyzed gas therefrom, an afterburner adapted to receive exhaust gases from said outlet opening, a source of combustion air, means supplying the combustion air to the combustion chamber and to the afterburner, said means supplying combustion air to the combustion chamber, comprising duct means having a plurality of vertically spaced openings, and control means for the air flow through each of said openings whereby the flow of air therethrough may be limited to a predetermined opening to closely control the pyrolization of waste material in the combustion chamber.

6. An incinerator for the incineration of waste material as defined in claim **5** wherein said control means is responsive to a condition effected by the collection of residual matter at the bottom of the combustion chamber.

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