United States Patent

Lang

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[54] **ANTI-POLLUTION SOLID WASTE BURNING INCINERATOR**

[72] Inventor: **Jerry M. Lang,** Lindale, Tex.

[73] Assignee: **Care, Inc.,** Tyler, Tex.

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[52] **U.S. Cl.** .....**110/8 A,** 110/18 C

[51] **Int. Cl.**.....**F23g 5/12**

[58] **Field of Search**.....110/7 S, 8 R, 8 A, 8 C, 18 R, 110/18 C, 160

[56] **References Cited**

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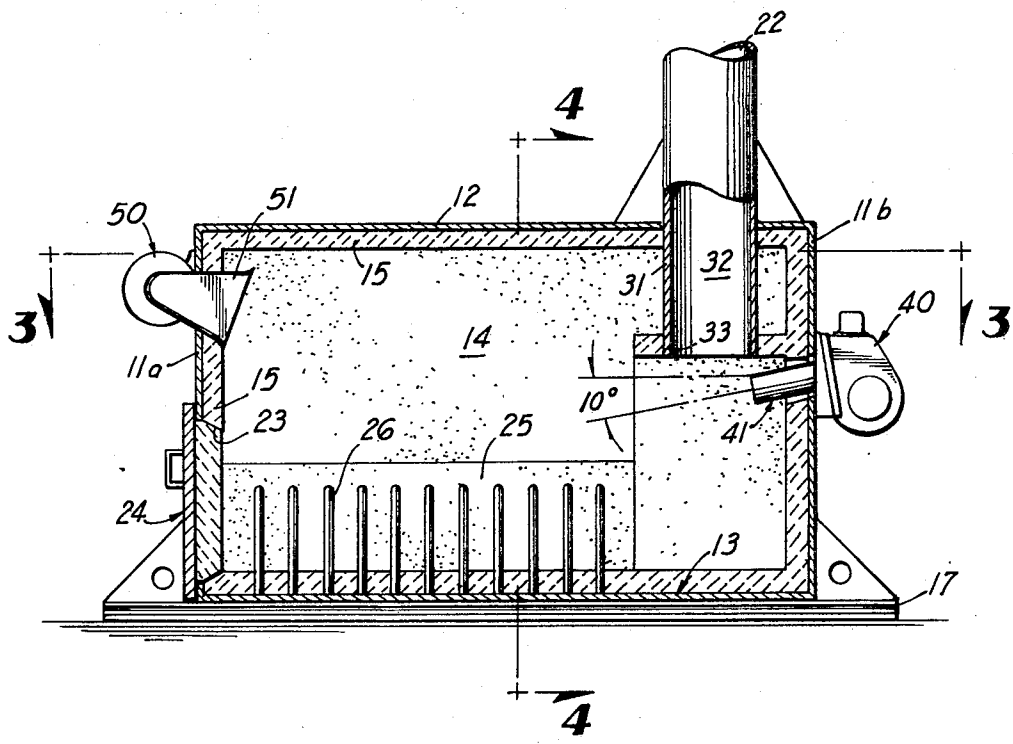
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Primary Examiner—Kenneth W. Sprague
Attorney—Newton, Hopkins & Ormsby

[57] **ABSTRACT**

An incinerator having a pressurized combustion chamber operable to effect a maximum combustion of material introduced therein with a minimum of by-products of combustion being exhausted therefrom. The incinerator includes a pressurized flame means directed across a flue entrance opening whereby the pressurized flame means produces a restrictive air block of the flue opening thereby increasing pressure within the combustion chamber.

5 Claims, 5 Drawing Figures



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SHEET 1 OF 2

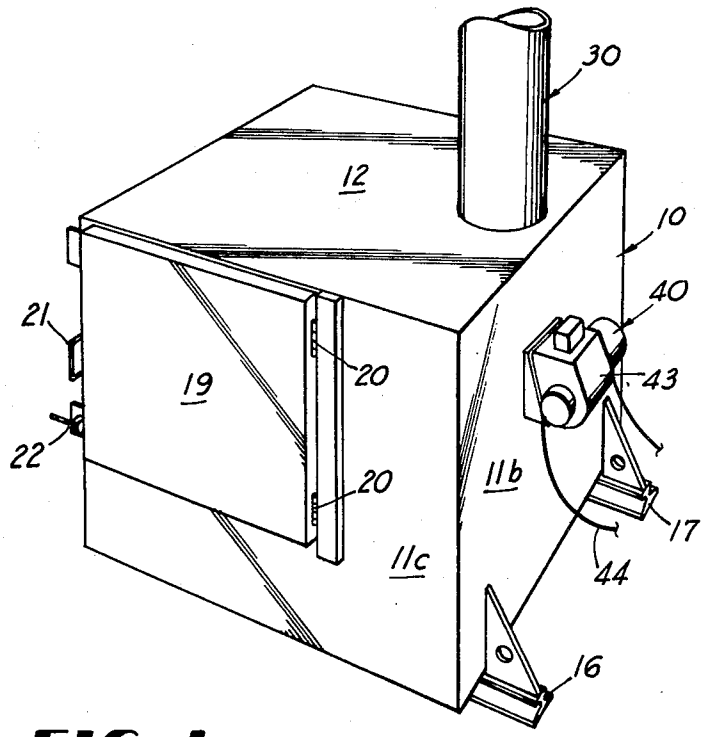


FIG 1

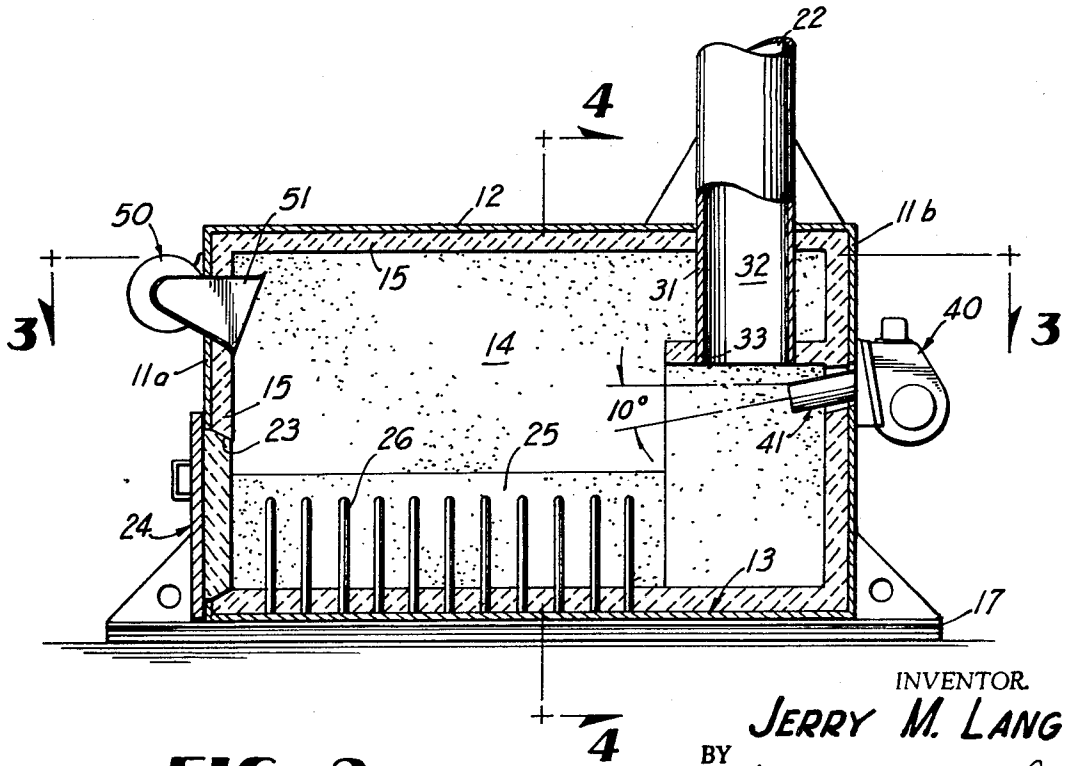


FIG 2

INVENTOR.
JERRY M. LANG
BY
Newton, Hopkins, & Ormsby
ATTORNEYS

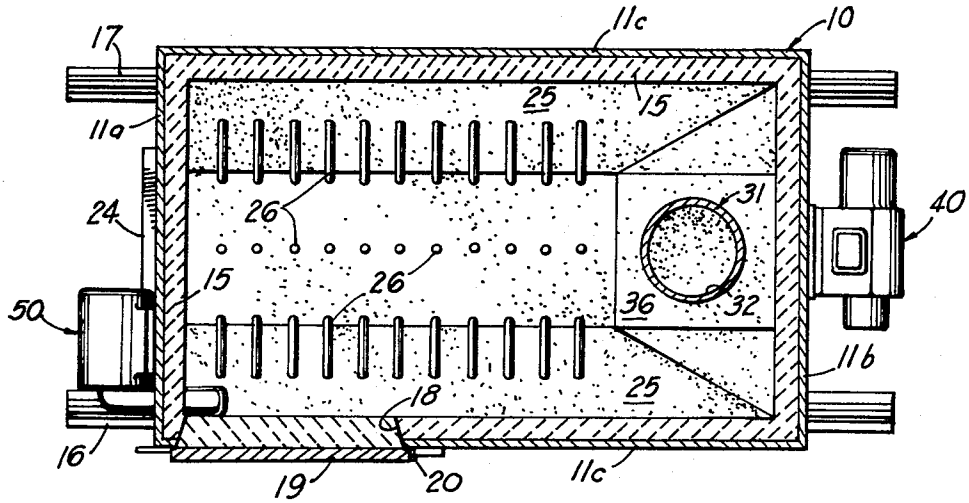


FIG 3

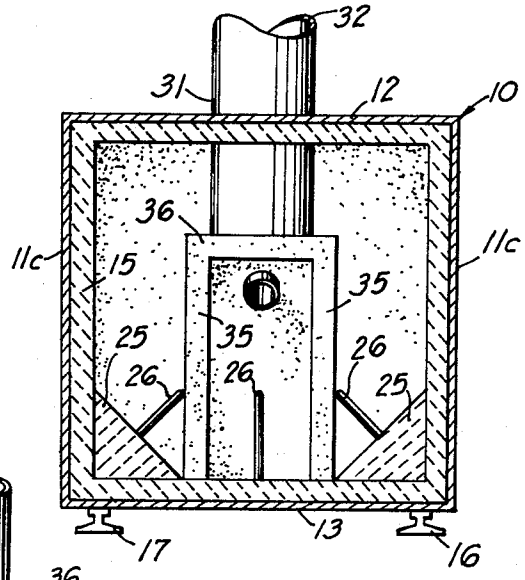


FIG 4

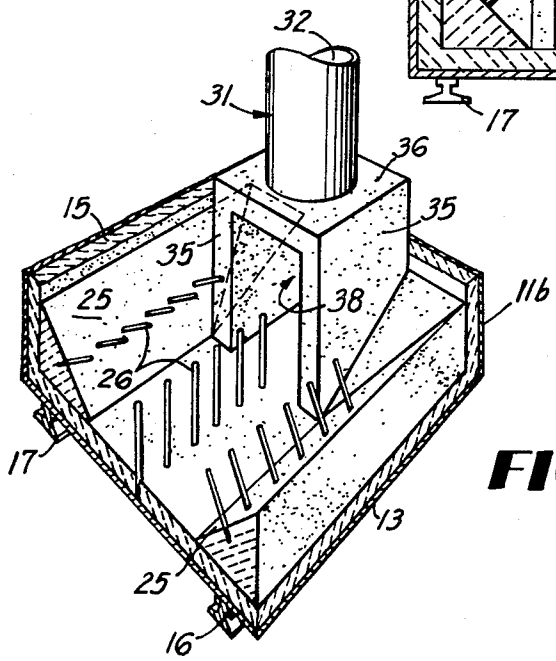


FIG 5

ANTI-POLLUTION SOLID WASTE BURNING INCINERATOR

BACKGROUND OF THE INVENTION

This invention relates to incinerators capable of burning waste material. More particularly, this invention involves an anti-pollution incinerator which is effective in controlling the amount of by-products of combustion introduced into the atmosphere.

Our expanding population produces more and more waste material which must be disposed of in order to maintain an uncluttered and safe condition around our areas of activity.

One industry in which an excessive amount of waste by-products is produced is in right-of-way clearing for construction jobs and power and communication transmission lines. In the past, undergrowth, bushes and limbs which have been removed from a right-of-way have been reduced to an aggregate material such as wood chips by passing the growth or limbs through a wood chipping apparatus. After the waste material has been reduced to an aggregate of wood chips, the material is removed to a remote location and burned. However, due to the increasing amount of combustion, our atmosphere is being heavily polluted causing many areas to adopt strict burning codes which prevent the burning of waste by-products.

Another source of waste by-products is created in the production and manufacture of the myriad of goods and products utilized in our daily activities. Most of these goods are placed within disposable containers which are utilized in shipping the goods from the source of origin or manufacture to the distribution outlets. Once these products reach their distribution outlets, the products are removed from their containers and the containers must be disposed of in order to provide a safe, uncluttered area of activity.

A number of attempts have been made to provide incinerator means which would burn the waste material produced as a result of our enjoyment of expanding products of civilization.

The prior art incinerator means produced an excessive amount of combustion by-products thereby contributing heavily to the pollustion of our atmosphere. Due to the excessive amount of pollution created by the present incinerator means, the combustion of waste material in a number of our communities has been stopped.

SUMMARY OF THE INVENTION

The above disadvantages of the prior art have been overcome by the present invention which basically includes a substantially enclosed housing defining an interior cavity operable as a combustion chamber. The housing includes a flue means operatively associated therewith for exhausting by-products of combustion therethrough. An important feature of the present invention is the detailed location of a pressurized flame means relative to an entrance opening into the flue means whereby a restrictive air block is produced relative to the flue entrance opening thereby increasing the pressure within the combustion chamber. The pressurization of the combustion chamber improves the combustion efficiency thereby reducing the amount of by-products of combustion exhausted into the atmosphere.

Another feature of the present invention is the provision of a shroud or shield means around the flue entrance opening to define an exhaust passageway into the flue means and the location of the pressurized flame means for directing a flame through the passageway.

An additional feature of the present invention is the provision of an entrance opening within the housing whereby material can be introduced therein for combustion and wherein a blower means is operatively associated with the entrance opening for producing an air block thereacross to prevent by-products of combustion from being exhausted through the entrance opening.

It is therefore a primary object of the present invention to provide an incinerator means capable of effecting a maximum combustion for material placed therein with a minimum amount of exhaust.

Another object of this invention is to provide an incinerator means which includes a pressurized combustion chamber.

A further object of this invention is to provide a pressurized flame means operable for producing a pressure within a combustion chamber.

A still further object of this invention is to provide a controlled entrance of exhaust into a flue means to reduce the amount of combustion by-products exhausted into the atmosphere.

Still another object of this invention is to provide an incinerator means having an entrance opening permitting material to be introduced therethrough during a burning operation without by-products of combustion being exhausted therethrough into the atmosphere.

Yet another object of this invention is to provide an incinerator means wherein the by-products of combustion not exhausted through the flue means can be effectively removed therefrom.

Another object of this invention is to provide an improved combustion chamber having means for producing void areas around portions of material introduced therein for combustion.

These and other objects in the details of construction will become apparent upon reading the following description of the illustrative embodiment with reference to the attached drawings wherein like reference numerals have been used to refer to like parts throughout the several figures, and wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an incinerator embodying the principles of the present invention;

FIG. 2 is a vertical sectional view taken substantially longitudinally through the incinerator of FIG. 1;

FIG. 3 is a horizontal sectional view taken along lines 3—3 of FIG. 2;

FIG. 4 is a vertical sectional view taken along lines 4—4 of FIG. 2; and

FIG. 5 is a fragmentary perspective view showing details of construction of the interior of the combustion chamber.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENT

Referring to the drawings, the incinerator will be described with reference to a housing 10, flue means

30, flame producing means 40 and an entrance opening air block means 50.

As shown in FIG. 1, the housing 10 is of substantially rectangular construction having a front wall 11*a*, a rear wall 11*b* and two side walls 11*c*. The walls 11*a*–11*c* are enclosed by a top wall structure 12 and a bottom wall structure 13. The wall structures 11–13 are joined together by conventional means, such as welding (not shown), to define an interior cavity 14 operative as a combustion chamber. The wall structures 11–13 are constructed of conventional metal stock material and are provided with a refractory lining 15. Incinerator 10 is supported by a pair of skid elements 16, 17. Skid elements 16, 17 are constructed of conventional I-beam material and are mounted in parallelly arranged relationship underneath the incinerator bottom 13. Skid means 16, 17 are operable for supporting the incinerator and for providing effective means for skidding or moving the incinerator from one location to another location.

As shown in FIG. 1 and 3, the incinerator housing 10 is provided with an entrance opening 18 formed in one of the side wall structures 11*c*. Entrance opening 18 is detailed in size to permit material capable of being burned within the incinerator combustion chamber to be introduced therethrough. The incinerator entrance opening 18 is provided with a closure means 19. Closure means 19 is hingedly connected by a conventional vertically oriented hinge member 20 to the upright side wall structure 11*c*. Hinge connection 20 will permit closure means 19 to be moved from an open position, whereby material can be inserted through opening 18 into the combustion chamber, to a closed position, as shown in FIG. 1 and 3 wherein the entrance opening 18 is effectively sealed during a burning operation. Closure means 19 is provided with a handle element 21 which will aid in moving the closure means between the open and closed condition. An operable latch element 22 is operatively associated with the closure means 19 and the housing 10 whereby the closure element can be latched in a closed position.

As shown in FIG. 2, an opening 23 is provided within front wall 11*a* adjacent bottom wall 13. Opening 23 is provided for removing by-products of combustion which collect on floor 13. The entrance opening 23 is provided with a closure means 24 having conventional connecting elements (not shown) for supporting the closure means in a sealed relationship with opening 23 during a burning operation.

Combustion chamber 14 is provided with a formed bottom surface including a pair of downwardly sloping inwardly converging surface portions 25. Surface portions 25 are located along a lower edge of opposite lateral side walls 11*c* and adjacent bottom 13. The sloping surfaces 25 are provided for directing the ash by-products of combustion to a central area whereby the ash by-products can be easily removed therefrom through opening 23. The angled wall surface portions 25 are constructed by filling the corner portions adjacent the bottom with a predetermined amount of refractory material. The angularly formed surface portions 25 will also aid in orienting the material to be burned relative to the burner flame during a combustion operation.

A number of spaced rod projections 26 are provided within the lower portion of the combustion chamber 14. The spaced projections 26 are formed as a first row extending substantially midway through the combustion chamber and extending vertically upward from bottom 13. The two angled wall surfaces 25 are also provided with a row of spaced rod-like projections 26.

The function of the rod-like projections 26 formed in the lower portion of the combustion chamber 14 is to provide an orientation means for maintaining material in a proper position for combustion within the combustion chamber. The rod-like projections 26 will provide means for producing air pockets or void spaces between material located within the combustion chamber to improve the burning thereof.

Incinerator 10 includes a flue means 30. The function of the flue means 30 is to exhaust unburned by-products of combustion from within the combustion chamber 14. The flue means 30 includes a flue stack 31 supported in top 12 of the incinerator housing 10. The flue stack 31 is supported in vertically oriented relationship adjacent rear wall 11*b*. Flue stack 31 is detailed to define an axially extending passageway 32 extending therethrough and having a lower depending end defining an entrance opening 33. Entrance opening 33 is directed into an exhaust passageway formed by a shroud or shield means 34. The shroud means 34 includes a pair of spaced vertically extending and parallelly arranged wall structures 35. The vertically oriented and parallelly arranged wall structures 35 extend from adjacent the bottom 13 upwardly to a position adjacent the flue stack entrance opening 33. A top wall structure 36 is provided adjacent the upper extended end of wall structures 35. Top wall structure 36 is oriented in substantially horizontal relationship and extends around the flue stack entrance opening 33. The wall structures 35, 36 extend from rear wall 11*b* forward to a point located slightly ahead of the flue stack entrance opening 33, as shown in FIG. 2.

The shroud means 34, including the wall structures 35 and 36 provide an effective shield means which will define an exhaust passageway 38 for directing exhaust fumes into the flue stack entrance opening 33.

As shown in FIGS. 1 and 3, the incinerator 10 includes a conventional incinerator flame producing means 40. The incinerator flame producing means 40 is mounted on the incinerator rear wall 11*b* and includes a nozzle 41 extending through rear wall 11*b* into the combustion chamber 14. The flame producing means 40 is detailed in location on the rear wall 11*b* such that the nozzle 41 is located within the exhaust passageway 38 and positioned substantially midway between the shroud wall structures 35. The burner nozzle 41 is detailed in angular location within the rear wall 11*b* whereby a flame directed therefrom will extend along a path which is disposed in angular relationship relative to the lower peripheral edge of flue stack opening 33. The angular relationship of the burner nozzle 41 relative to flue stack opening 33 is detailed such that a pressurized flame extending across opening 33 will produce an air block restricting the flow of air through exhaust passageway 38, opening 33 and into the flue stack passageway 32. The restriction of air flow into flue stack 31 will produce a pressure within the combustion chamber 14. The pressurization of the com-

bustion chamber **14** will improve the burning of material located therein and will effectively eliminate an expelling of unburned pollution material through the flue stack into the atmosphere.

The optimum angular relationship between the opening of flue stack **33** and the path of flame nozzle **41** is approximately 10° with an angular tolerance of plus or minus 3°. Should the angular relationship between burner nozzle **41** and flue stack opening **33** be decreased below a predetermined angle, the burner nozzle will have a tendency to direct a flame and an excessive amount of exhaust material up through the vent stack **31**. Should the angular relationship between burner nozzle **41** and flue stack opening **33** be increased beyond a predetermined angle, the burner nozzle **41** will have an effect of producing a down draft through flue stack **31** thereby decreasing the effective burning within combustion chamber **14**.

The flame producing means **40** includes a conventional electrically operable blower means **43** for producing a pressurized flame through nozzle **41**. A supply of gas is supplied to the burner nozzle **41** through a supply line **44**. The gas supply line **44** can either be connected to a portable supply tank (not shown) mounted on the incinerator or can be connected to a fixed supply line provided for supplying gas to a given area. The flame producing means **43** includes conventional pilot light means and conventional flame start means for igniting the gas in nozzle **41** prior to a combustion operation. The initiation of a pressurized flame from nozzle **41** is effected by means of operation of a conventional control switch (not shown).

Referring now particularly to FIGS. **2** and **3**, an air block blower means **50** is shown mounted on the front wall **11***a* of the incinerator housing **10**. The blower means **50** is operated by a conventional electric motor means and includes an air directing shroud **51** detailed for directing air currents across the incinerator entrance opening **18**. The blower **50** is effective to provide an air block across entrance opening **18** whereby material can be introduced through opening **18** into the combustion chamber **14** without combustion gases being exhausted therethrough into the atmosphere. The blower means **50** can be operated only when the closure means is open or can be operated during a combustion operation with the closure means **19** closed. Operation of the blower means **50** during a combustion operation with the closure means **19** closed will function to provide still additional means for pressurizing the combustion chamber **14**.

OPERATION

In utilizing the incinerator means employing the principles of the present invention, an operator would initiate a combustion operation by purging the combustion chamber **14** in a conventional manner. After the combustion chamber **14** has been effectively purged of unsafe gases which may be located therein, the material to be burned will be introduced through the opening **18** into the combustion chamber **14**. Material introduced into the combustion chamber **14** will be oriented relative to the burner nozzle **41** by the rod-like projections **26** whereby the material will be effectively burned during a combustion operation. The burner nozzle **41** can be ignited to produce a pressurized flame either prior to charging the combustion chamber with material to be burned or after the material has been placed within the combustion chamber. Should the burner nozzle **41** be ignited prior to charging the combustion chamber **14**, the blower means **50** will be turned on to produce an effective air block across entrance opening **18**. With the closure **19** moved to an open position, and with the blower means **50** operating, the material can be inserted through the opening **18** and through the air current produced by blower means **50** and into the interior cavity of combustion chamber **14**. After the combustion chamber **14** has been completely charged, the closure means **19** is again returned and latched in the sealed position relative to incinerator housing by latch means **22**.

In the operation of the incinerator **10**, the burner nozzle **41** will restrict a flow of exhaust material entering the opening **33** of flue stack **31** thereby increasing the pressure within the combustion chamber **14**. The pressurization of combustion chamber **14** will increase the effective combustion of material placed therein and thereby eliminate the expelling of undesirable fumes and by-products of combustion through the flue stack passageway **32** into the atmosphere.

After a charge of material placed within the combustion chamber **14** has been effectively burned, additional material can be placed within the combustion chamber by opening closure means **19** with blower means **50** operating and inserting material in the same manner as described herein above.

After a number of combustion operations have been completed, any buildup of ash by-products on the incinerator floor **13** can be removed therefrom by removing closure means **14**. The ash by-products on floor **13** are removed through entrance opening **23** by means of conventional scrapper tool means.

It now becomes apparent that the above described illustrative embodiment employing the principles of the present invention is capable of obtaining the above stated objects and advantages. It is obvious that those skilled in the art may make modifications in the details of construction without departing from the spirit of the invention which is to be limited only by the scope of the appended claims.

What is claimed is:

1. An incinerator capable of effecting combustion of material inserted therein comprising, in combination:

a. housing means defining an internal cavity operable as a combustion chamber;

b. flue means operatively associated with said combustion chamber for conveying the unburned by-products of combustion from within said combustion chamber, said flue means including an exhaust opening and wherein shield means is positioned within said combustion chamber to define an exhaust passageway; and

c. pressurized flame means supported on said housing, said pressurized flame means being located on said housing for directing a flame through the exhaust passageway associated with said flue means, said pressurized flame means detailed in location relative to said exhaust opening of said flue means whereby said pressurized flame means will produce restrictive movement of air into said exhaust opening thereby increasing the pressure

within said combustion chamber to produce a maximum burning of the by-products of combustion.

2. An incinerator capable of effecting a combustion of material introduced therein comprising, in combination:

a. housing means defining an internal cavity operable as a combustion chamber;

b. means in said housing defining an entrance opening for permitting material to be introduced therethrough into said combustion chamber;

c. blower means operatively associated with said entrance opening for producing an air block across said entrance opening to prevent by-products of combustion from being exhausted through said entrance opening;

d. flame means operatively associated with said combustion chamber for effecting a burning of material introduced into said combustion chamber; and

e. flue means operatively associated with said combustion chamber for conveying the by-products of combustion from said combustion chamber.

3. An incinerator capable of effecting a maximum consumption of material introduced therein with a minimum amount of exhaust comprising, in combination:

a. means defining a combustion chamber;

b. flame means operatively associated with said combustion chamber for effecting a burning of material introduced into said combustion chamber;

c. flame means operatively associated with said combustion chamber for conveying the unburned by-products of combustion from said combustion chamber; and

d. means operatively associated with said combustion chamber for developing a pressure within said combustion chamber during said material burning operation whereby said by-products of combustion will be maintained in said combustion chamber until they have been reduced to a minimum; said combustion chamber including shield means operatively associated with said flame means for defining a flame entrance passageway, and said flame means being operatively associated therewith for directing a flame through said entrance passageway in a direction opposing movement of exhaust into said passageway.

4. An incinerator capable of effecting a maximum combustion of material introduced therein with a minimum amount of exhaust comprising, in combination:

a. means defining a combustion chamber;

b. flame means operatively associated with said combustion chamber for effecting a burning of material introduced into said combustion chamber;

c. flame means operatively associated with said combustion chamber for conveying the unburned by-products of combustion from said combustion chamber; and

d. means operatively associated with said combustion chamber for developing a pressure within said combustion chamber during said material burning operation whereby said by-products of combustion will be maintained in said combustion chamber until they have been reduced to a minimum; said combustion chamber including a number of projections located therein, said projections detailed in dimensions and location for producing void areas within said combustion chamber.

5. An incinerator capable of effecting a maximum combustion of material introduced therein with a minimum amount of exhaust, comprising, in combination:

a. means defining a combustion chamber;

b. flame means operatively associated with said combustion chamber for effecting a burning of material introduced into said combustion chamber;

c. flame means operatively associated with said combustion chamber for conveying the unburned by-products of combustion from said combustion chamber;

d. means operatively associated with said combustion chamber for developing a pressure within said combustion chamber during said material burning operation whereby said by-products of combustion will be maintained in said combustion chamber until they have been reduced to a minimum; said combustion chamber including an entrance opening allowing material to be inserted therethrough into said combustion chamber, said entrance opening including cover means operatively associated therewith and movable between an open material introducing position and a cloud sealing position, whereby said cover will produce an effective sealing of said entrance opening when moved to said closed position to thereby prevent an escape of exhaust material therethrough; and

e. blower means operatively associated with said entrance opening, said blower means being operable for directing a flow of air across said entrance opening within said combustion chamber and operative when said cover means is moved to said open position to produce an effective air block to prevent exhaust means from passing through said entrance opening.

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