Jan. 3, 1967 F. SCHOLER 3,295,479

INCINERATORS OR THE LIKE

Filed July 31, 1964 4 Sheets-Sheet 1

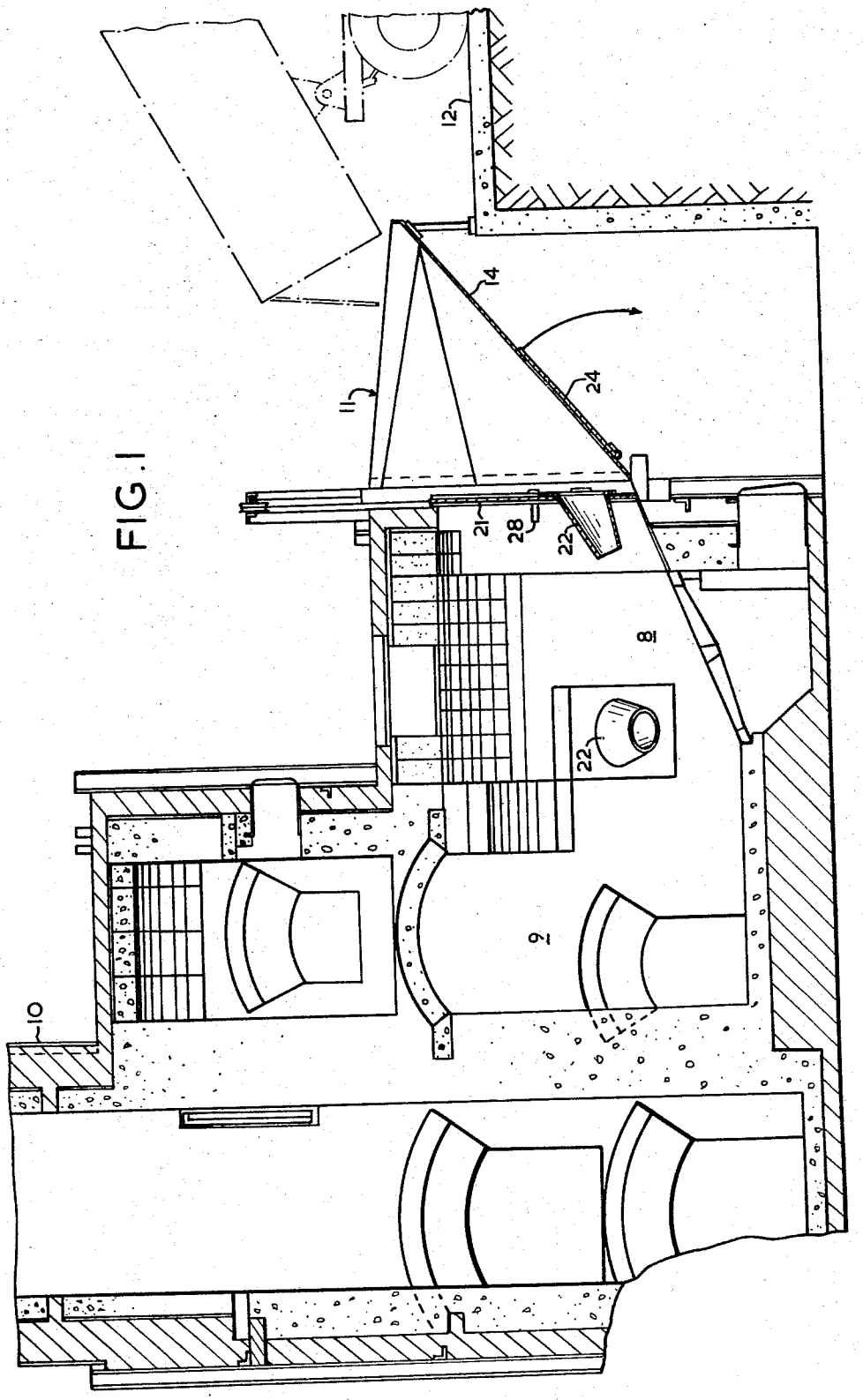


FIG. 1

INCINERATORS OR THE LIKE

Filed July 31, 1964 4 Sheets-Sheet 2

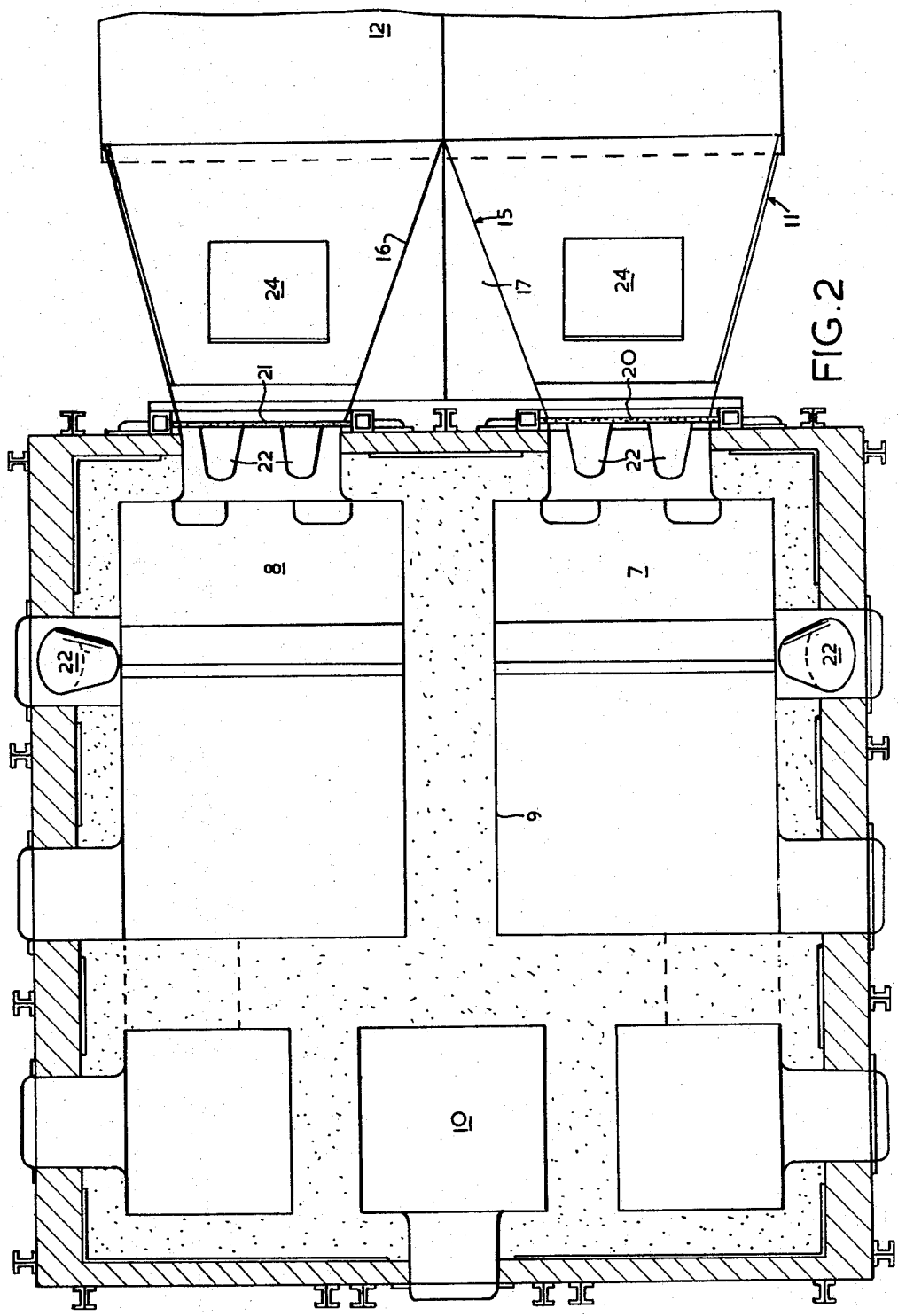


FIG. 2

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INCINERATORS OR THE LIKE

Filed July 31, 1964 4 Sheets-Sheet 3

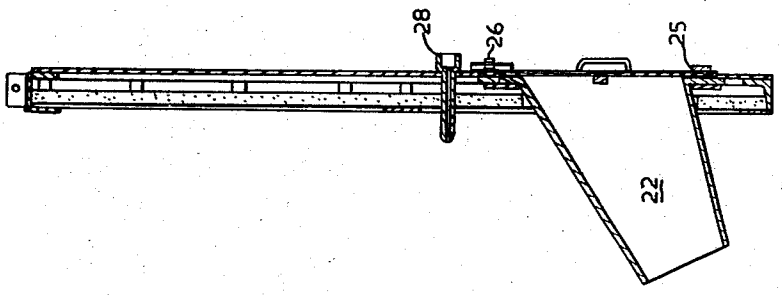


FIG. 4

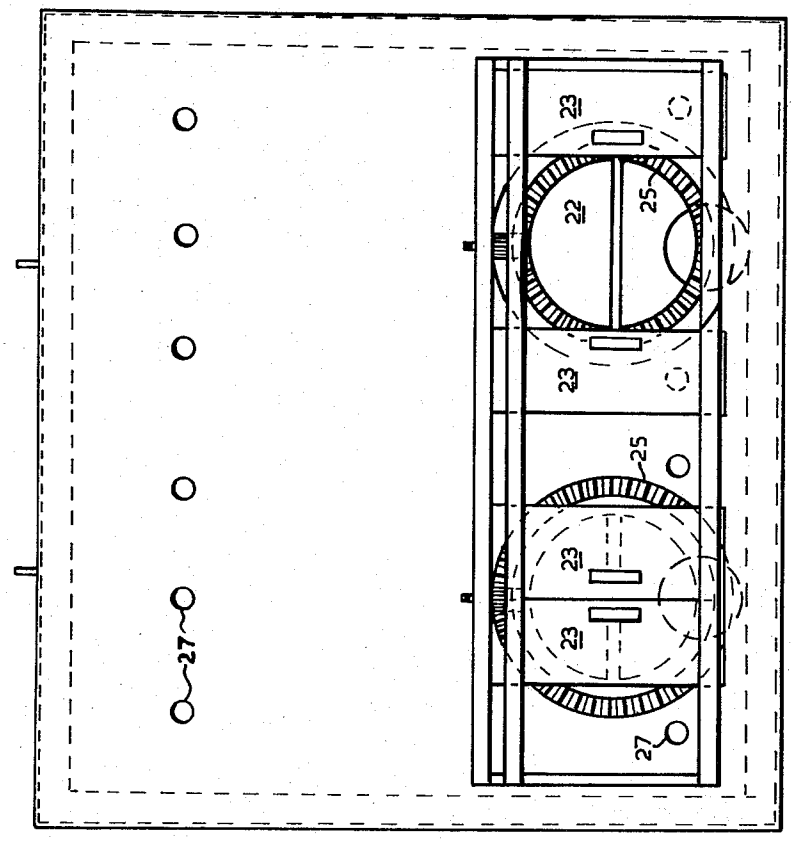


FIG. 3

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INCINERATORS OR THE LIKE

Filed July 31, 1964 4 Sheets-Sheet 4

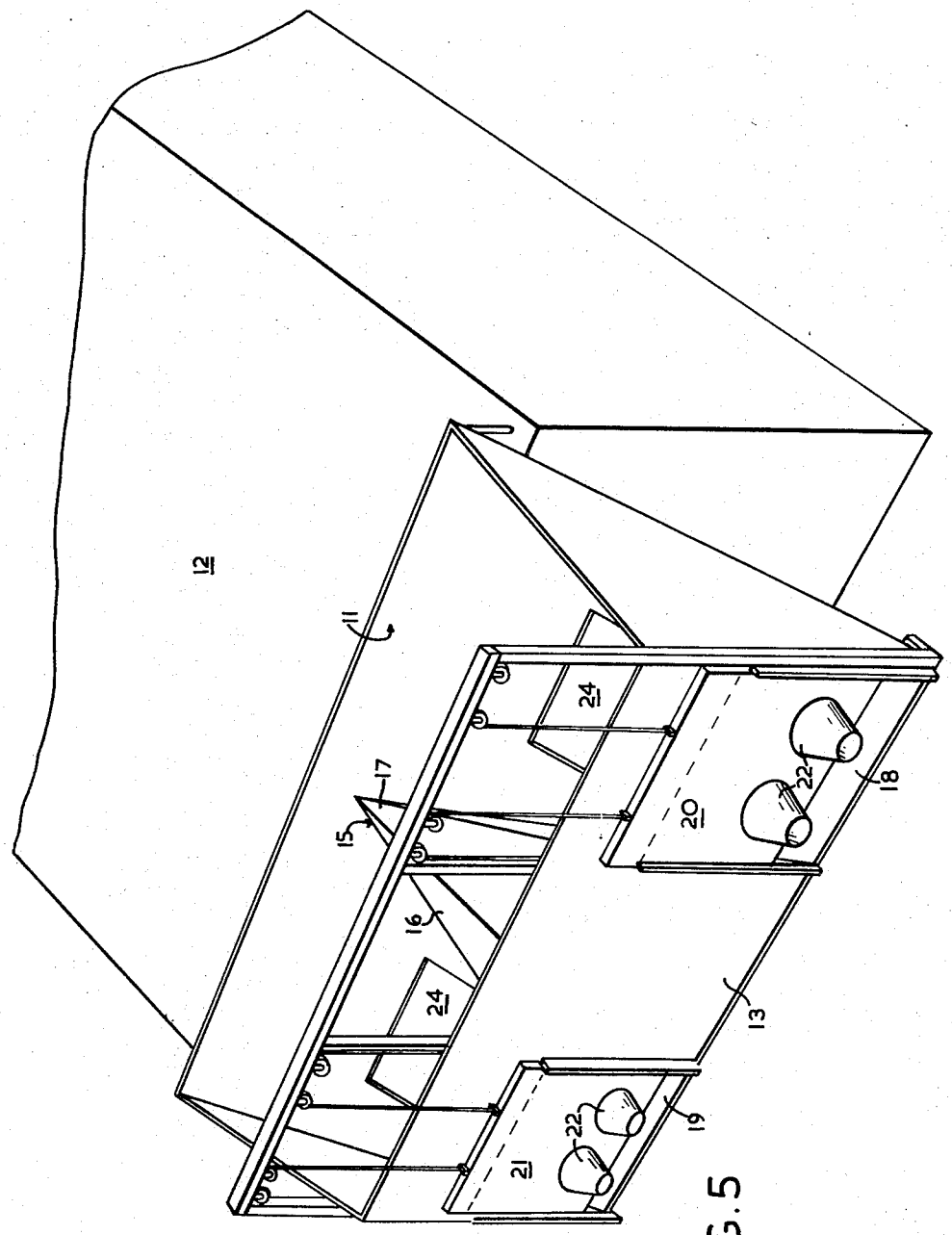


FIG. 5

United States Patent Office

3,295,479

Patented Jan. 3, 1967

3,295,479

INCINERATORS OR THE LIKE

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Filed July 31, 1964, Ser. No. 386,541
12 Claims. (Cl. 110—18)

The present invention relates generally to improvements in furnaces such as incinerators or the like, for example of the type used by municipal councils and other bodies for the large scale disposal of refuse, and in particular relates to the provision of new and improved means for the loading and firing of such incinerators.

Incinerators as presently used are manually or mechanically loaded and also require stoking during the firing of the load in order to expose fresh material to be burnt. Furthermore, because these incinerators employ a forced up-draught, there is a limit to the amount of material which can be loaded into the burning cells, this being normally limited to a depth of two feet.

An object of the present invention is to overcome these defects in incinerators as currently used and to thereby provide an incinerator which can be directly loaded from a vehicle or from a conveyor, which can be fully loaded to the limit of its capacity, and which during the firing thereof is self-stoking.

In accordance with the present invention there is, provided an incinerator having one or more firing cells, a loading chute adapted to receive material directly from a vehicle or conveyor and feed it into the firing cell or cells, said loading chute having an opening or openings therein communicating with the firing cell or cells, said openings being closable by a counterweighted door having one or more damper-controlled tapered air inlets extending into the firing cell or cells.

It is preferred to have two of the tapered air inlets for each firing cell door since this number provides an adequate flow and distribution of the air across the width of the firing cell. However, one, or three or more, of these air inlets could be used in the front and/or side walls of the cell or cells of the incinerator if so desired, the size of the inlets being proportioned in relation to the number thereof so as to provide adequate air flow. The tapered air inlets provided in the incinerators of this invention are designed to be used all around the furnace in any number proportional to the size of the unit, including the use of same underneath the grates.

In a preferred embodiment the tapered air inlets provided in the incinerators of this invention are such as are capable of universal movement, either intermittent or continuous, so as to direct the incoming high velocity streams of air to all parts of the charge to be burned.

In a particularly preferred embodiment of the present invention the air inlets are frusto-conical and are mounted with the largest diameter vertically disposed with the axis of the air inlet angularly disposed with respect to the horizontal axis of said largest diameter, said inlets being rotatable about such axis. The angle of inclination of such rotatable air inlets may conveniently be 25° with the inlets being capable of rotation through 360° by either manual, mechanical or electrical means, for example, by means of a pinion driving a ring gear mounted externally of the inlets about their largest diameter. In this embodiment the incinerator may additionally be provided with a spray nozzle, adapted to spray water in an atomized condition into the firing cell, mounted above the or each air inlet.

It is also preferred to have a number of counterbalanced hinged doors, corresponding in number to, and aligned with, the counter-weighted firing cell doors, provided in the sloping front wall of the loading chute so that after the load has been fed into the incinerator the operator can open these doors and trim the load in the firing cell or cells prior to firing same.

Where the incinerator has two firing cells it is preferred that the loading chute has a divider in the center thereof to ensure even distribution of the load between the two cells. A suitable form of such divider being one wherein the two side walls thereof, which respectively define one side of the openings into the firing cells, are vertical and are surmounted by sloping walls which converge to form a central ridge so that material which during discharge into the chute falls onto such ridge will be divided between each of the two cells.

A preferred form of the invention is illustrated in the accompanying drawings in which:

FIG. 1 is a side elevation of an incinerator in section through an air inlet cone and the loading chute;

FIG. 2 is a plan view in section on a plane passing through the loading chute just above the level of the air inlet cones;

FIG. 3 is a front elevation of one of the loading doors showing two air inlet cones and their associated dampers;

FIG. 4 is an end elevation in section through one of the air inlet cones shown in FIG. 3 and

FIG. 5 is a perspective elevation of the loading chute assembly and ramp with the incinerator omitted for clarity.

As shown in the drawings the incinerator has a firing cell 7 and 8 on each side of a central partition 9, with the products of combustion passing by way of fire-brick arches to a single, centrally situated smoke-stack 10 at the rear thereof. At the front of the incinerator where the loading chute 11 is situated, there is provided in the case where the vehicles are to unload directly into the loading chute, a ramp 12 of suitable size and shape to enable vehicles to drive or back up the ramp and discharge their loads directly into the chute. Alternatively, a conveyor of suitable form (not shown) could be provided in which case the vehicles would discharge their loads onto the conveyor which would then transport the material up into the loading chute.

The loading chute 11 has a vertical rear wall 13, an inwardly sloping front wall 14 and a central divider 15 having vertical side walls surmounted by sloping walls 16 and 17 which converge to form a central ridge to apportion the load equally between the two firing cells. The rear wall of the chute has openings 18 and 19 therein communicating with the firing cells 7 and 8, these openings being normally closed by means of the vertically sliding counter-weighted doors 20 and 21 which are opened when required to enable material to be fed into the firing cells. In the embodiment depicted each of the counter-weighted doors is provided with two frusto-conical air inlets 22 having sliding dampers 23 for controlling the entry of the combustion air. Also in this embodiment the front of the loading chute is provided with two downwardly opening counterbalanced hinged doors 24, each of which is aligned with the normally closed openings 18 and 19 to the firing cells, and which hinged doors are normally closed by sliding bolts.

The frusto-conical air inlets may be installed with their axes either horizontal or with their axes inclined (as shown in FIGS. 1 and 4). Where the air inlets are of the inclined type it is preferred that they be provided with means to rotate them, such as ring gear 25 and pinion 26. Such rotatable air inlets are adapted to be rotated either continuously or intermittently during the firing of the load and may be driven by manual, mechanical or electrical means.

With the inclined air inlets, the axis of which may be inclined at an angle of about 25°, the orifice will describe a circle upon rotation thus providing a much larger zone of combustion than is provided by stationary inlets. Where two rotatable air inlets are provided in each sliding door these may be rotated in identical or different manner in order to vary the combustion zone, for example, the speed of rotation of one inlet could be varied in relation to that of the other or the two inlets could be rotated in opposite directions.

In addition to the damper controlled frusto-conical air inlets the vertical sliding doors would normally be provided with vent holes **27** at the top and bottom thereof.

The incinerator may also be provided with spray nozzles **28** as shown in FIG. 4, which are situated above the rotary air inlets and which are designed to spray water in an atomized condition into the firing cells. These water sprays would be used where carbonaceous materials such as plastics, rubber, carbon paper, bituminous impregnated papers or waste and the like are being burned, the steam formed from the water reacting with any incompletely burned carbonaceous matter (by the "water gas" reaction) to form carbon dioxide and hydrogen thus allowing such matter to be completely destroyed before passing to atmosphere.

In the operation of the incinerator embodying the improved loading and firing means of this invention the material to be burnt is discharged, either directly from a vehicle or from a conveyor, into the loading chute while all the doors of the chute are closed. The material is fed into the firing cells by raising the counter-weighted doors thus allowing the material to slide down the sloping front wall of the chute into the cells. When the firing cells have been filled to capacity the hinged front doors on the loading chute can be opened to allow the operator to inspect and trim the load if necessary. The operator can then light the load, close the counter-weighted doors and adjust the dampers on the frusto-conical air inlets to provide sufficient draught through the firing cells.

By using the tapered air inlets, and particularly the inclined rotary air inlets, there is set up within the incinerator a strong, swirling, cross-current of air which, by burning a channel through the load and thereby allowing the upper material to fall down into the burning zone, enables the incinerator to become self-stoking. Consequently, once the incinerator has been fired it becomes automatic in its operation and thus there is no need for the operator to stoke the furnace during the burning period. Also because of this self-stoking action there is no limit, except that imposed by the dimensions of the firing cells, to the amount of material which can be loaded into the cells prior to firing same.

What I claim is:

1. An incinerator having two firing cells; a loading chute for receiving material and feeding it into the firing cells; said loading chute having an inwardly sloping front wall, a vertical rear wall with two openings therein each communicating with one of said firing cells, a central divider having side walls each defining one side of the openings into said firing cells and surmounted by sloping walls converging to form a central ridge; a vertically sliding counterweighted door for closing each of said firing cell openings; and two tapered air inlet members on each sliding door extending into the firing cells for directing high speed streams of air into the charge to be burned; each said air inlet member being frusto-conical with the largest end thereof lying in a vertically disposed plane with the flow axis of the air inlet members being angularly disposed with respect to the horizontal axis of said largest end and being rotatable about said horizontal axis.

2. An incinerator as claimed in claim **2** comprising a spray nozzle adapted to spray water in an atomized condition into the firing cells mounted above each air inlet member.

3. An incinerator as claimed in claim **2**, comprising at least one additional tapered air inlet member in each of the firing cells in a wall thereof.

4. An incinerator as claimed in claim **3**, comprising at least one additional tapered air inlet member underneath the gates of each of the firing cells.

5. An incinerator having two firing cells; a loading chute for receiving material and feeding it into the firing cells; said loading chute having an inwardly sloping front wall, a vertical rear wall with two openings therein each communicating with one of said firing cells, a central divider having side walls each defining one side of the openings into said firing cells and surmounted by sloping walls converging to form a central ridge; a vertically sliding counterweighted door for closing each of said firing cell doors; a counter-balanced downwardly opening hinged door aligned with each of the firing cell doors in the inwardly sloping front wall of said loading chute; two tapered air inlet members extending into the firing cells from each sliding door for directing high speed streams of air into the charge to be burned; each said air inlet member being frusto-conical with the largest end thereof lying in a vertically disposed plane with the flow axis of the air inlet member being angularly disposed with respect to the horizontal axis of said largest end and being rotatable about said axis; and a spray nozzle adapted to spray water in an atomized condition into the firing cells mounted above each air inlet.

6. An incinerator having at least one firing cell, a loading chute adapted to receive material and feed it into the firing cell, said loading chute having an opening therein communicating with the firing cell, a door operatively associated with said cell for closing said opening, a damper-controlled tapered air inlet member supported from the door and extending into the firing cell for directing high speed streams of air into the charge to be burned in said cell, and means supporting the air inlet member from the door for angular rotation with respect to the door to vary the position at which the inlet air is directed against the charge and enable the inlet air to contact substantially all portions of the charge.

7. An incinerator having at least one firing cell, a loading chute for receiving material and feeding it into each of the firing cells, said loading chute having an inwardly sloping front wall and a vertical rear wall having an opening therein communicating with a respective firing cell, a vertically sliding counterweighted door operatively associated with each cell for closing the opening therein, at least one tapered air inlet member supported from each door and extending into the associated firing cell for directing high speed streams of air into the charge to be burned, each said air inlet member being angularly and rotatably disposed with respect to the associated vertically sliding door and a ring gear mounted on each door and engaging each air inlet member thereof for rotating the same about their largest diameter, and a spray nozzle adapted to spray water in an atomized condition into each firing cell mounted above the air inlet member.

8. An incinerator having at least one firing cell, a loading chute for receiving material and feeding it into each of the firing cells, said loading chute having an inwardly sloping front wall and a vertical rear wall having an opening therein communicating with a respective firing cell, a door operatively associated with each cell for closing the opening therein, at least one damper-controlled air inlet member supported from each door and extending at an angle into the associated firing cell for directing high speed streams of air into the charge to be burned, means for rotating each air inlet member with respect to the door to vary the angle at which the inlet air is directed against the charge so that all portions of the charge are contacted and a counter-balanced downwardly opening hinged door aligned with each firing cell door in the inwardly sloping front wall of said loading chute.

9. An incinerator having at least one firing cell, a loading chute adapted to receive material and feed it into each of the firing cells, said loading chute having an opening therein communicating with a respective firing cell, a door operatively associated with each cell for closing the opening therein, at least one damper-controlled tapered air inlet member rotatably supported from each door and extending into the associated firing cell to direct a high speed stream of air to the charge to be burned, and means coupled to each air inlet member for rotating the same with respect to the associated door and vary the direction of the air stream to enable contact with substantially the entire charge.

10. An incinerator as claimed in claim 9 comprising a spray nozzle adapted to spray water in an atomized condition into each firing cell mounted above the respective air inlet member.

11. An incinerator as claimed in claim 10 comprising at least one additional tapered air inlet member in each firing cell in a wall thereof.

12. An incinerator as claimed in claim 11 comprising at least one additional tapered air inlet member in each of the firing cells underneath the grates thereof.

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