June 20, 1933. E. B. KAY 1,914,746

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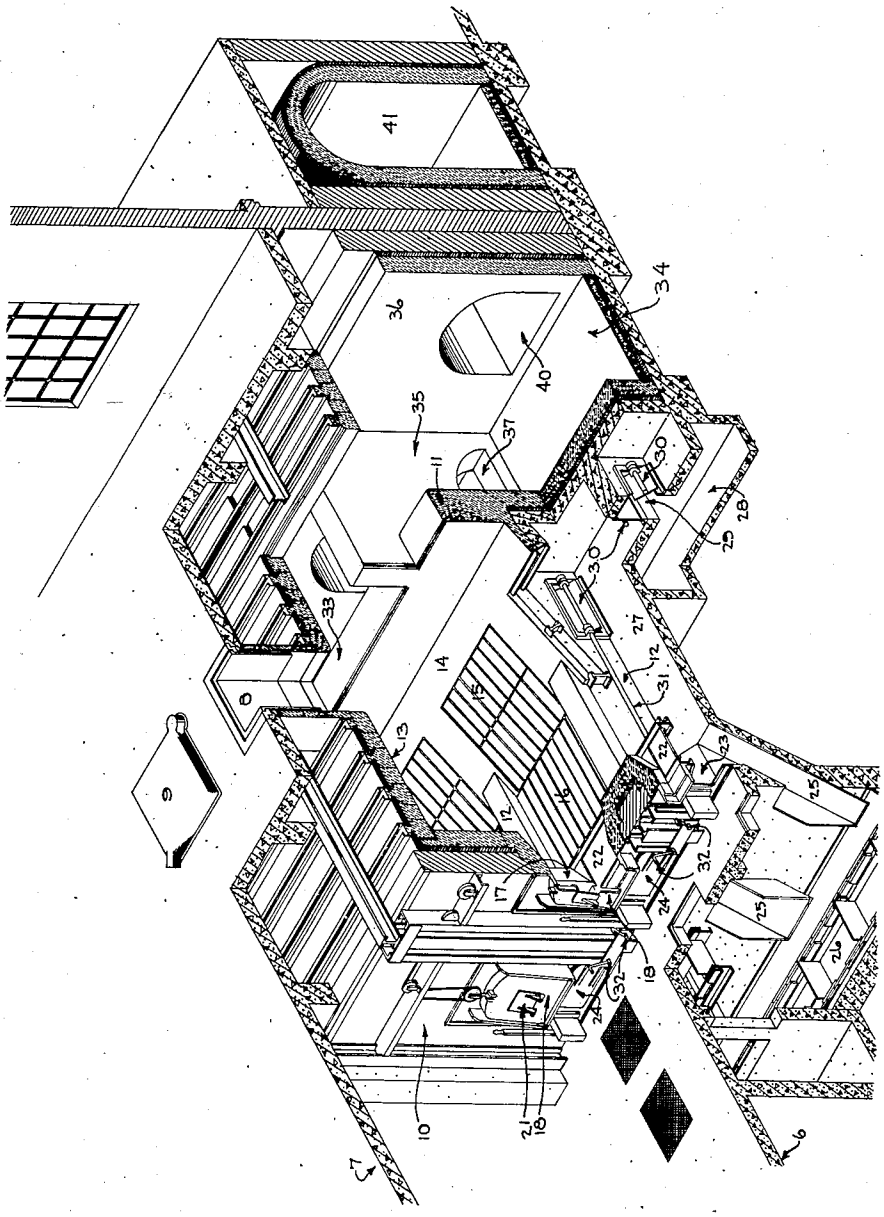


Fig. 1

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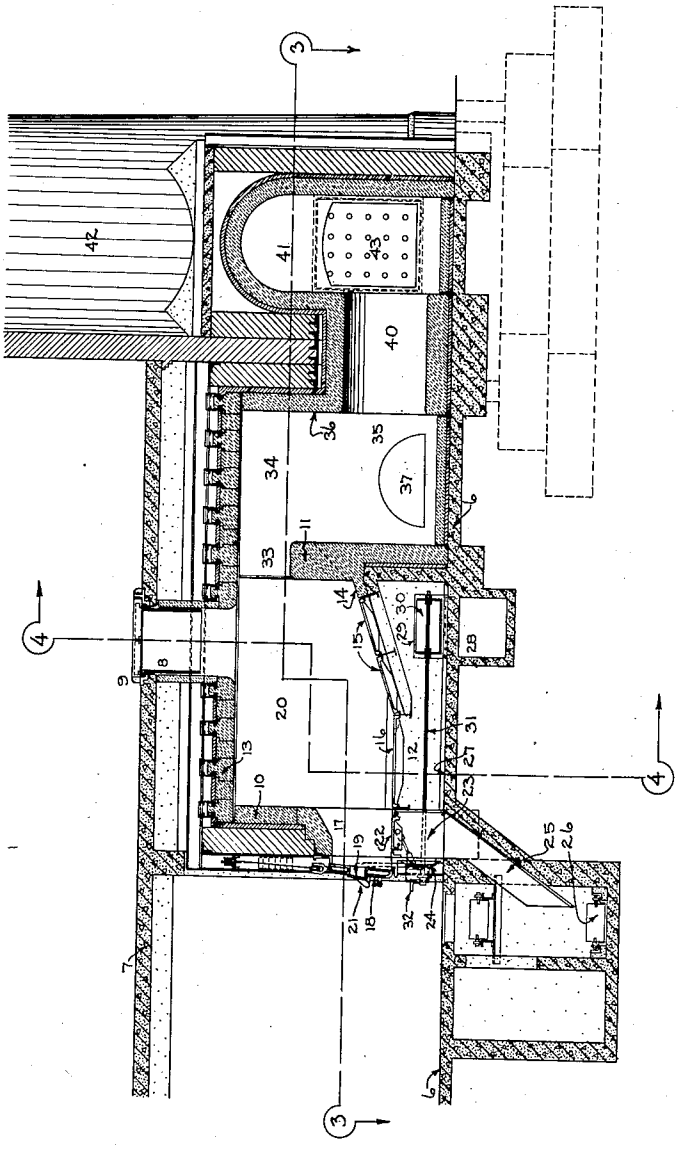


Fig. 2

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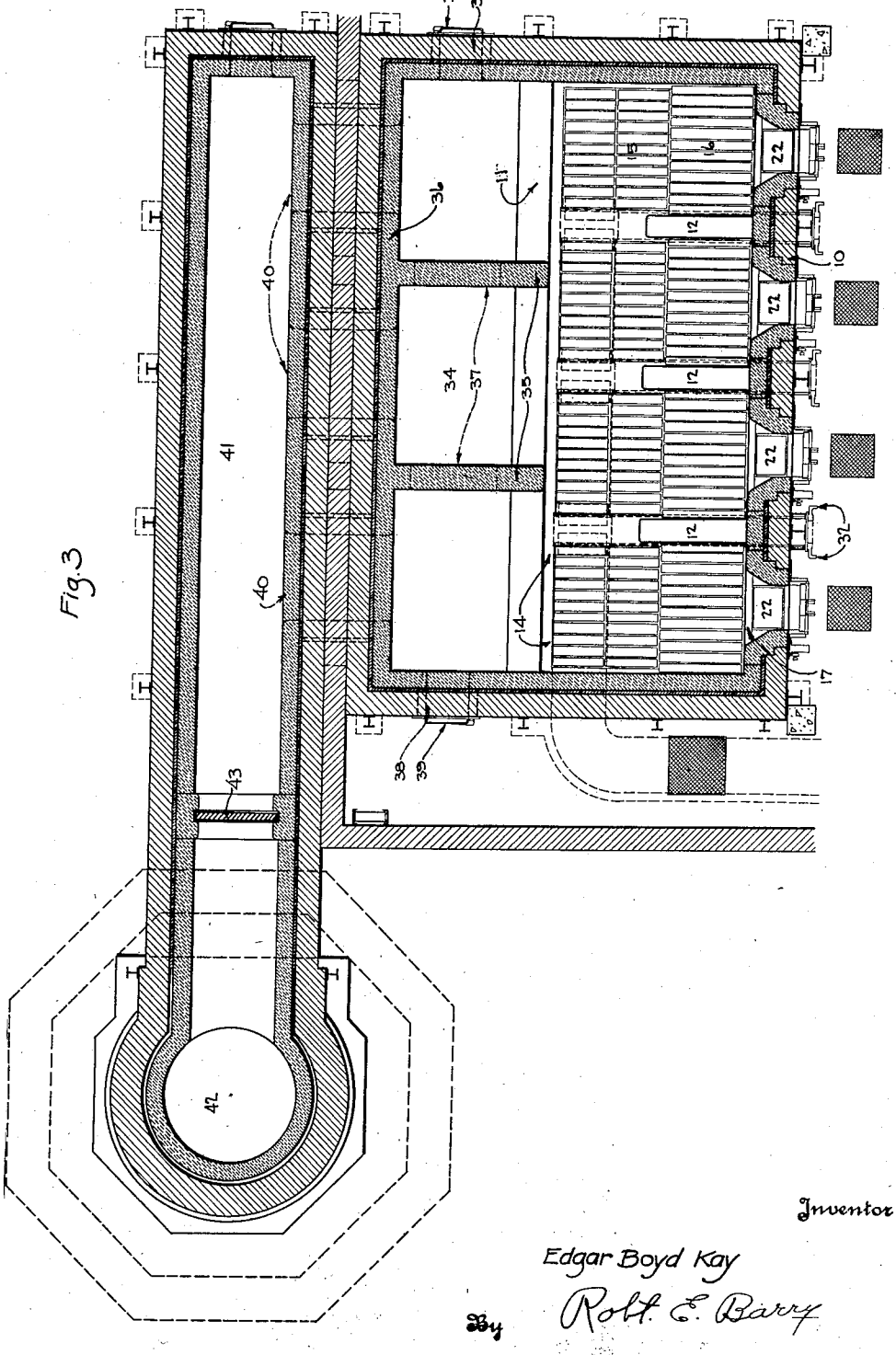


Fig. 3

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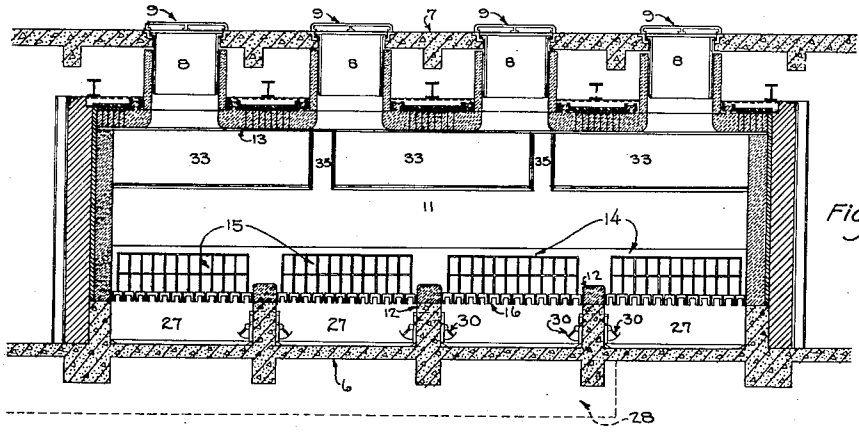
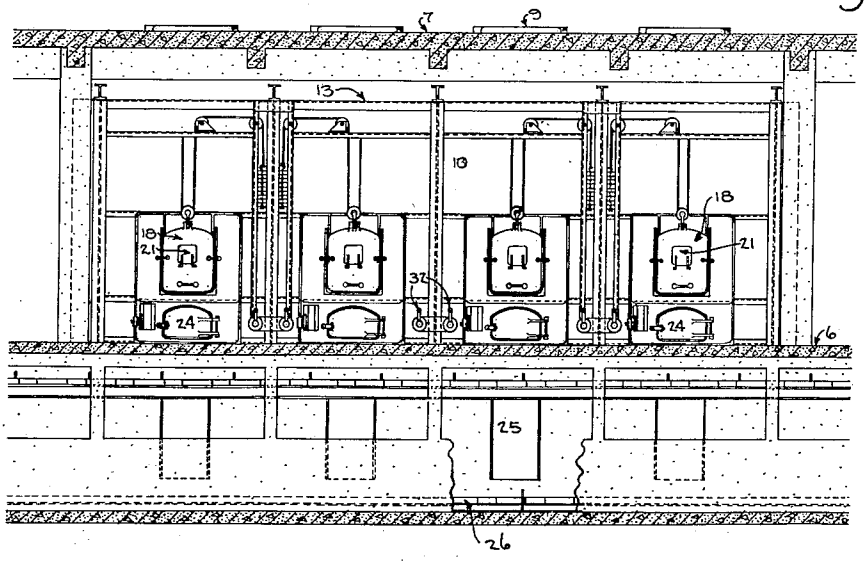


Fig. 4

Fig. 5



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UNITED STATES PATENT OFFICE

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FURNACE

Application filed September 19, 1930. Serial No. 483,071.

This invention relates to improvements in incinerators, and more especially to large capacity incinerators which operate continuously for handling the refuse of large cities and the like.

Heretofore, it has been proposed to incorporate the "mutual cell" principle in such incinerators. In accordance with that principle, the fire chamber is divided into a series of cells that communicate with one another, and each of these cells has its own hatchway for depositing the material to be burned into the cell. Consequently, when the furnace is in operation, heat from a brightly burning cell will radiate into adjoining cells and tend to augment the heat in the latter cells in case green or wet materials are being handled in the latter cells.

In the prior proposals, the rear wall of all of the cells prevents any exit of gases at the rear, and all discharge of gases takes place at one end of the compartment forming the cells. Consequently, when it is necessary to clean an intermediate cell, flames from cells which are spaced farther away from the gas exit than the cell being cleaned, will pass over the cell being cleaned, and not alone interfere with the cleaning operation, but the heat will be dissipated, as the gases will be travelling over a zone where a lower temperature is desirable.

Furthermore, in the known constructions, cleaning and stoking is interfered with, and the means of introducing and controlling a force draft is not entirely practical.

The primary object of the present invention is to provide a multi-cell type of incinerator, in which there is a bridge wall at the rear end of each cell, over which the gases from the cells pass into a common combustion chamber which communicates with the stack or flue. With this arrangement, heat from each cell is radiated into adjoining cells, and assists in burning materials in the adjoining cells, but there is no direct passage of flames from one cell over another, and consequently, when it becomes necessary to clean a cell, this can be accomplished without interfering with the intense heat desired in adjoining cells, and without the flames interfering with the cleaning operation.

Another object of the invention is to furnish an incinerator of this kind, in which a cell may be perfectly cleaned without the necessity of opening the main door of the cell, for a drop dead plate is built into the front wall of each cell, and acts to lengthen the fire box as well as permits discharge of materials from the fire box into the ash conveyor by manipulation of the dump plate from the exterior of the incinerator.

A further object is to provide an incinerator of this type, in which each cell has its own ash pit, each of these ash pits being cleanable for discharging ashes from the pit on to the ash conveyor without the necessity of entering the ash pit.

Another object is to associate a force draft duct with the ash pit of all of the cells, the duct communicating by way of ports in the partition walls, with the various ash pits, and these ports having separate control valves or dampers, whereby the draft may be cut off from opposite sides of each cell without interfering with the force draft admitted to adjoining cells.

A still further object is to provide such an incinerator, including means to permit cleaning of the combustion chamber without interfering with the operation of the furnace.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is an isometric view partly in vertical and horizontal section, to clearly illustrate the construction of my improved incinerator.

Fig. 2 is a vertical sectional view of the same.

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a transverse vertical sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a front elevation partly in vertical section.

Referring to the drawings, 6 is the stoking floor and 7 the charging floor of the masonry structure associated with the incinerator. As is usual, the charging floor forms a platform on which the material to be incinerated may be deposited to be fed into the furnace through the hatches 8. Each of these hatches has a door 9 that may be opened and closed by any suitable mechanism.

Between the charging and stoking floors, the front wall 10 of the mutual cells is arranged, and extending rearwardly from this wall to a rear wall or bridge 11 are relatively low partition walls 12 which extend only part way up to the roof 13 of the cells, in order that these cells may communicate. Each cell has a hearth 14 to receive the material dumped through its hatch opening 8, and the hearth has an inclined drying grate 15 from which a horizontal grate 16 extends forwardly to the front wall 10.

Main stoking doorways 17 are positioned in the front wall, and there is one of these doorways for each cell, and each doorway cooperates with a main stoking door 18. These doors have relatively small openings 19 near their centers to permit the introduction of a stoking tool into the fire box 20 without the necessity of opening the main door 18. This feature allows stoking without interfering with the high heat that is necessary to be maintained in the furnace. If the large door was opened, flames are not only liable to rush out due to the force draft, but cold air may enter in large volume and reduce the temperature.

A small door 21 is provided for closing the small doorway or port 19.

For the purpose of dumping materials which cannot be burned, without opening the door 18, I provide each fire box with a hinged dead plate 22 that may be actuated from the exterior of the front wall by any suitable means. Ordinarily, such a dump plate would necessitate the lengthening of the incinerator, but to eliminate this difficulty, I arrange the same within the opening 17 formed in the front wall, and this opening is extended downwardly as well to form an ash pit doorway 23 that is closed by a door 24.

The lower portion 23 of the main doorway is provided at its bottom with a chute 25 which dumps the material on to an ash conveyor 26.

From the foregoing it will be understood that when the door 21 is opened, a stoking tool may be inserted into the fire box to move incombustible materials on to the dead plate 22, and then such plate can be swung downwardly by control means at the exterior of the furnace, and such incombustible materials will drop through the chute 25 on to the conveyor 26, and all of this is accomplished without interfering with the high heat maintained in the fire box during burning periods.

Furthermore, when it is necessary to clean out the burning and drying grates, and the corresponding ash pit 27, the doors 18 and 24 may be opened, and these parts may be rapidly cleaned and the material dumped into the chute 25 without any real interference with the burning action taking place in adjoining cells.

For the purpose of forcing air into the ash pits, a duct 28 extends transversely beneath the floor 6, and each partition wall 12 is provided with a transverse port 29 that places the duct 28 in communication with the adjacent ash pits. The ends of each of these ports is controlled by a rocking damper or louvre gate 30, fixed to a rock shaft 31, which extends forwardly through the front wall and is provided with a handle 32.

It will be understood that when all of the cells are in operation, all of the dampers 30 will be in open position, but when it is desired to clean a cell, the dampers 30 at opposite sides of the ash pit of the latter will be closed, so that the force draft will be cut off from that particular cell.

As best shown in Fig. 2, the bridge wall 11 being spaced from the roof of the fire chambers, provides an opening 33 through which the gases directly pass from the rear of the fire chamber into a combustion chamber 34 after they have passed over the drying hearth 14. Consequently, the flames issuing from the burning material will be forced to first pass over the drying hearth to heat up the material on the latter, and will then flow into the combustion chamber without flowing over adjacent cells as was the custom in the past. Therefore, while heat from each cell will radiate into adjoining cells, there will be no direct passage of flames over such adjoining cells, and this will materially facilitate the cleaning of the cell. On the other hand, just as soon as a cell has been cleaned and fresh material is fed into the same through its hatch 8, the heat from adjoining cells will radiate into the freshly charged cell and assist the latter in heating up to the working temperature.

For reinforcing the bridge wall 11, to better control and direct the flow of gases, and to divide the combustion chamber into a number of compartments to facilitate cleaning of the combustion chamber, vertical walls 35 extend upwardly from the floor to the roof of the fire chambers, and these walls also act to support said roof. Each wall 35 also extends rearwardly from the bridge wall to the rear wall 36 of the combustion chamber, and each wall 35 has a clean-out opening 37 near its lower end. These openings are in line with similar openings 38, positioned at the ends of the combustion chamber, and through

the latter openings, tools may be inserted for cleaning purposes. Each opening 38 is normally closed by a door 39.

Ports 40 in the wall 36 place the compartments of the combustion chamber in communication with the discharge passageway 41 which leads to the stack or flue 42. As this passageway has a damper 43, the latter acts to control the suction draft in all of the cells.

In Fig. 3 it will be seen that the incinerator illustrated comprises four cells which communicate at their rear ends with a combustion chamber that is divided into three compartments, but I desire it to be understood that any number of cells may be used, and the combustion chamber may be divided into any number of compartments, depending on the capacity of the plant in which my improvements are incorporated.

The present incinerator has been designed to meet the growing demand for refuse and garbage incinerators or destructors in units of large capacity, which can be efficiently and economically operated, in continuous service, without the necessity of shutdown for removal of incombustible material.

From the foregoing it is believed that the construction, operation and advantages of the invention may be readily understood by those skilled in the art, and I am aware that changes may be made in the details disclosed, without departing from the spirit of the invention, as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. An incinerator comprising a floor and roof, front, rear and side walls, a bridge wall extending transversely between said side walls and dividing the interior of the incinerator into a front fire box chamber and a rear combustion chamber, longitudinal partition walls in the fire box rising from the floor and extending between the front wall and the bridge wall but spaced from the roof, grates arranged between the partition walls and positioned above the floor to provide ash pits beneath the grates, drying hearths inclined upwardly and rearwardly from the rear ends of the grates to the bridge wall, doors arranged in the front wall forwardly of said grates and corresponding in number to said grates, and hatches in the roof, each hatch being arranged directly over one of said drying hearths and the hatches being equal in number to the number of the drying hearths, the top of the bridge wall being spaced from the roof to provide passageway means at the rear ends of the drying hearths for placing the rear end of the fire box in direct communication with the combustion chamber.

2. An incinerator comprising a floor and roof, front, rear and side walls, a bridge wall extending transversely between said side walls and dividing the interior of the incinerator into a front fire box chamber and a rear combustion chamber, longitudinal partition walls in the fire box rising from the floor and extending between the front wall and the bridge wall but spaced from the roof, grates arranged between the partition walls and positioned above the floor to provide ash pits beneath the grates, drying hearths inclined upwardly and rearwardly from the rear ends of the grates to the bridge wall, doors arranged in the front wall forwardly of said grates and corresponding in number to said grates, hatches in the roof, each hatch being arranged directly over one of said drying hearths and the hatches being equal in number to the number of the drying hearths, the top of the bridge wall being spaced from the roof to provide passageway means at the rear ends of the drying hearths for placing the rear end of the fire box in direct communication with the combustion chamber, ports in the partition walls positioned beneath the drying hearths and opening through opposite sides of each partition wall, said ports communicating with said air duct, dampers for controlling the flow of air from the ports through either side of each partition wall, and means manipulatable from the front of the incinerator for separately controlling said dampers.

3. An incinerator comprising a floor and roof, front, rear and side walls, a bridge wall extending transversely between said side walls and dividing the interior of the incinerator into a front fire box chamber and a rear combustion chamber, longitudinal partition walls in the fire box rising from the floor and extending between the front wall and the bridge wall but spaced from the roof, grates arranged between the partition walls and positioned above the floor to provide ash pits beneath the grates, drying hearths inclined upwardly and rearwardly from the rear ends of the grates to the bridge wall, doors arranged in the front wall forwardly of said grates and corresponding in number to said grates, hatches in the roof, each hatch being arranged directly over one of said drying hearths and the hatches being equal in number to the number of the drying hearths, the top of the bridge wall being spaced from the roof to provide passageway means at the rear ends of the drying hearths for placing the rear end of the fire box in direct communication with the combustion chamber, other partition walls dividing the combustion chamber into a number of compartments, and aligned doorways in the last mentioned partition walls and the side walls of the combustion chamber for use in cleaning the combustion chamber.

4. An incinerator comprising a floor and roof, front, rear and side walls, a bridge wall

extending transversely between said side walls and dividing the interior of the incinerator into a front fire box chamber and a rear combustion chamber, longitudinal partition walls in the fire box rising from the floor and extending between the front wall and the bridge wall but spaced from the roof, grates arranged between the partition walls and positioned above the floor to provide ash pits beneath the grates, drying hearths inclined upwardly and rearwardly from the rear ends of the grates to the bridge wall, doors arranged in the front wall forwardly of said grates and corresponding in number to said grates, hatches in the roof, each hatch being arranged directly over one of said drying hearths and the hatches being equal in number to the number of the drying hearths, the top of the bridge wall being spaced from the roof to provide passageway means at the rear ends of the drying hearths for placing the rear end of the fire box in direct communication with the combustion chamber, forwardly and rearwardly extending partitions dividing the combustion chamber into a number of compartments, said compartments communicating at their lower ends, a main flue, and ports in the rear wall constantly placing all of said compartments in communication with said flue.

In testimony whereof, I hereto affix my signature.

EDGAR BOYD KAY.