July 19, 1938. H. W. EWING 2,124,447

GARBAGE BURNER

Filed Aug. 30, 1934

Fig. 2.

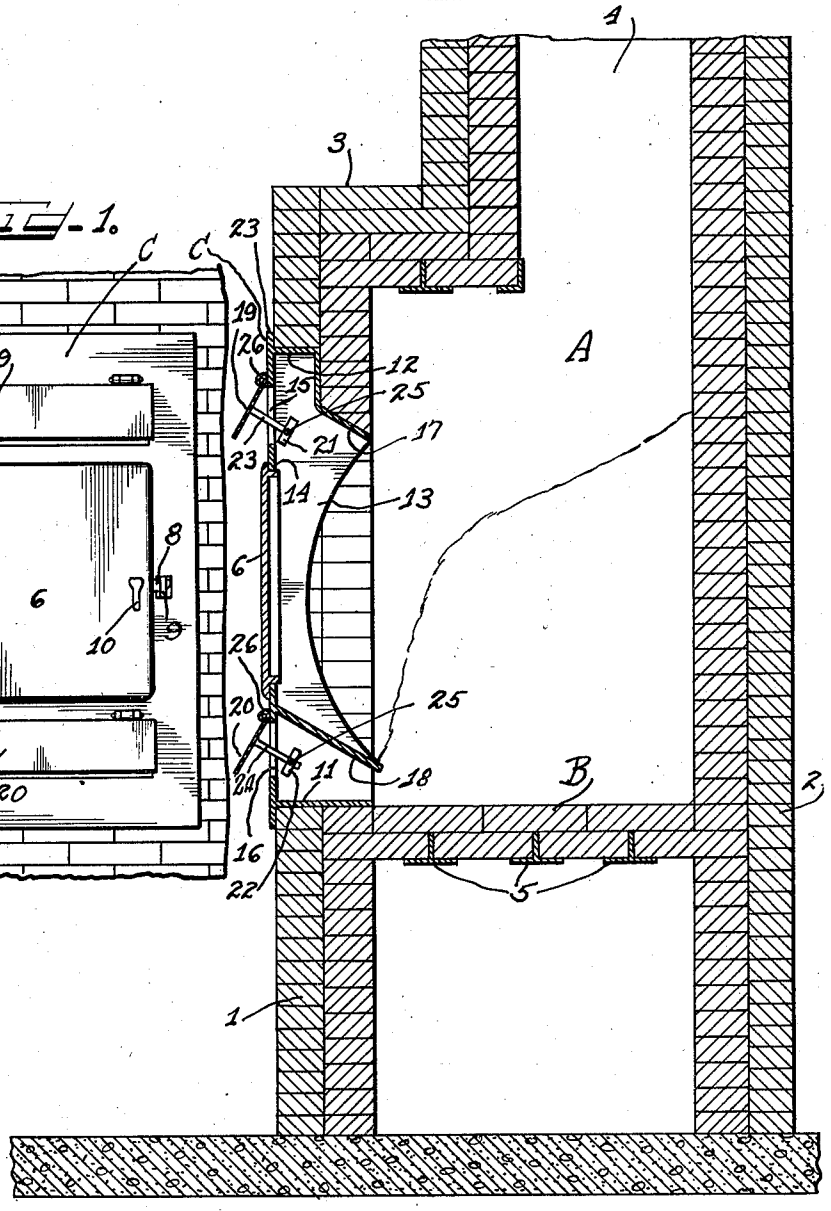


Fig. 1.

Inventor

Hugh W. Ewing.

by Atty's.

Patented July 19, 1938 2,124,447

UNITED STATES PATENT OFFICE

2,124,447

GARBAGE BURNER

Hugh W. Ewing, Chicago, Ill.

Application August 30, 1934, Serial No. 742,054

8 Claims. (Cl. 110—182)

The present invention relates to a garbage burner, and more particularly to a novel garbage burner or incinerator, so called, as well as to a method of burning garbage.

It has been found from experience that garbage may be more successfully burned, than otherwise, by a method of eliminating air from below the mass of garbage, and at the same time by the utilization of a garbage burner having a hearth, impervious to air passage, forming the bottom of the combustion chamber of the burner.

It is a well recognized fact that draft conditions, in garbage burners, vary, due to weather, climatic, and other conditions, thereby affecting the combustion of the garbage in the incinerator or burner. The stack draft must be considered, in connection with the successful operation of incinerators and garbage burners, and therefore the present invention contemplates the utilization of the stack draft for controlling the amount of air supplied to the burner.

The admission of air, for combustion, to the combustion chamber of a garbage burner, must be regulated in accordance with the stack draft. Preferably such regulation should be automatic, to thus eliminate the necessity of an attendant or operator, and at the same time to facilitate proper burning of the garbage.

An object of the present invention is to provide a novel method of burning garbage by utilization of air supplied only above the base of the mass of garbage.

Another object of the invention is to provide a novel method of burning garbage in a combustion chamber, to which air for combustion purposes is supplied only above the bottom of such chamber, and wherein the amount of air so supplied is made a function of the draft through the chamber in such manner that the amount of air supplied is in inverse order with respect to the draft conditions.

Another object of the present invention is to provide a garbage burner or incinerator so constructed as to exclude air admission to the combustion chamber, except above the bottom of said chamber.

A further object of the present invention is to provide a garbage burner having as the bottom of the combustion chamber a hearth through which air passage is prevented.

A still further object of the invention is to provide garbage burners wherein grates and ash pits are eliminated.

Another and yet further object of the invention is to provide a garbage burner so constructed as to efficiently and quickly burn garbage, and which may be constructed at low cost.

The above, other, and further objects of the present invention will be apparent from the following description, accompanying drawing, and appended claims.

The accompanying drawing illustrates a garbage burner constructed in accordance with the principles of the present invention, and which is capable of carrying out the novel method of the present invention, and the views thereof are as follows:

Figure 1 is an elevational view of a fragmental portion of a garbage burner wall, showing installed therein a door construction embodying principles of the present invention; and

Figure 2 is longitudinal vertical sectional view taken through a garbage burner or incinerator, constructed in accordance with the principles of the present invention, and in which the method of the present invention may be practiced.

The drawing will now be explained.

An incinerator, or garbage burner, of familiar form, is illustrated in Figure 2, and as there illustrated includes a front wall 1, a rear wall 2, a top wall 3, the usual side walls, and a flue 4, which serves the double purpose of a passageway for the discharge of the products of combustion, and also for delivering garbage to the burner from openings in the flue at various vertical heights in the same, as is common practice.

The incinerator is constructed to provide a combustion chamber A, the bottom of which consists of a hearth B, preferably constructed of refractive material, such as fire brick or the like, and supported on T-irons 5. The ends of the T-irons 5 are supported in the side walls of the incinerator. The hearth B, as before stated, is constructed of brick or like material, and is so constructed as to be impervious to air passage. The construction of the hearth B in the manner described prevents admission of any air to the combustion chamber A from below the hearth.

Inasmuch as the hearth B is impervious to air passage, it cannot of course permit passage of ash through it. Consequently, there is no ash pit and no ash pit door. The hearth B is positioned in the incinerator, at a point so that the door opening will be at a convenient height for the removal of ash, by means of a shovel, from the hearth B.

Built or set into a wall of the combustion chamber A, is a door frame structure C, which, in the present instance, has a fire door 6 secured to the frame by hinges 7, and maintained in closed position by a latch 8 engaging a keeper 9 on the frame.

A handle 10 may be provided to actuate the latch 8. The door frame structure C has an inwardly extending bottom flange 11 which is adapted to rest on the brick of the wall 1, preferably above the upper surface of the hearth B. The frame has also a top flange 12, side flanges 13, of which only one is shown, and a door opening 14. In order to supply air to the combustion chamber A, for combustion purposes, air admission means are provided, one of these being preferably disposed above the door 6, and another preferably disposed below the door 6.

The air admission means illustrated in the accompanying drawing consists of openings 15 and 16 in the door frame, respectively above and below the door opening.

Formed as a part of the door frame structure C, near the upper end thereof, is an inwardly inclined shelf 17. Near the lower portion of the frame structure C is another inwardly inclined shelf 18, the latter being connected to the frame structure, adjacent the lower margin of the door opening 14. The shelves 17 and 18 are so disposed with respect to the openings 15 and 16 as to direct inwardly any air entering through said openings. The inclined shelf 18 serves to direct inwardly the air admitted through the opening 16, in the lower portion of the frame structure, and it directs such incoming air inwardly towards the hearth B. The shelf 17, disposed near the upper portion of the frame structure, directs inwardly air admitted through the opening 15, and directs it toward the hearth B. The shelf 18 is extended slightly to protect entry of garbage or other matter into the space immediately between the shelf and the lower flange member 11 of the frame structure.

The admission of air through the openings 15 and 16 must be regulated in accordance with the stack conditions within the combustion chamber A. The disclosed means for regulating air admission comprises flap valves 19 and 20, hinged to the frame structure adjacent the openings 15 and 16 respectively. The openings 15 and 16 are herein illustrated as being elongated rectangular openings, and the flap valves 19 and 20 shaped to correspond. However, it is to be understood that these openings may be of any suitable size and shape, in which event the flap valves will be made in accordance with such size and shape.

The flap valves 19 and 20 are normally maintained in open position, that is, away from the door frame structure C, by means of counterweights 21 and 22, secured respectively to the flap valves 19 and 20 by means of rods 23 and 24, along which the counterweights are slidable for adjusting the responsiveness of the flap valves to stack conditions. The counterweights are secured in adjusted position on the rods by means of set screws 25.

The flap valves 19 and 20 are normally maintained in outermost position, that is, a position to open the air admission means 15 and 16 to air admission from the outside of the incinerator. As the stack draft within the incinerator increases, these valves tend to move toward the door frame structure, thus reducing air admission in accordance with increased draft, until such time as these valves close tightly against the door structure, which occurs when the stack draft has reached a predetermined point. The closing of the flap valves in the manner stated, is regulated by the adjustment of the counterweights to govern the action of the flap valves in response to draft conditions in the incinerator chamber. It is to be noted that the flap valves are moved in a closing direction, by draft conditions in the chamber, in opposition to the effort of the counterweights to maintain the valves open.

The actuation of the flap valves 19 and 20, in the manner stated, is, as will be observed, in inverse order to the intensity of the stack draft conditions. That is to say, maximum air is admitted when the stack draft is at minimum and the fire in the chamber needs it most for proper combustion. As the stack draft increases, the amount of air supplied is curtailed until such time as the draft reaches a predetermined point, whereupon the valves close air admission through the openings 15 and 16, the valves remaining closed until the stack draft decreases to a point where the counterweights may open the valves because of the reduction of such draft.

A series of tests, utilizing a garbage burner as herein constructed, and employing the method herein described, has satisfactorily demonstrated that wet garbage is more readily and quickly consumed than in an incinerator of the type wherein air is admitted to the combustion chamber through the grate, that is, through the ash pit. The tests conducted were made during the summer, and included, in the garbage, many watermelon and cantaloup rinds, corncobs, and other wet garbage particularly pertinent to summer time.

The garbage together with all sorts of combustible waste which normally accumulates in a home or apartment is delivered into the combustion chamber by being emptied into the flue 4 through suitable doors at various heights or floors above the basement, where the incinerator is installed, which garbage falls into the combustion chamber. When the chamber is about two-thirds full, the mass is ignited by igniting the trash, such as paper, rubbish and the like, which is in the garbage, and the fire door 6 closed. There is sufficient draft through the combustion chamber, because of the fact that the flap valves 19 and 20 are open, to cause immediate combustion of the combustible matter which is dry, which draft draws in air from the outside, such air tending to dry the mass of garbage because the air is passed through it and above it and under it, being admitted to the combustion chamber through the air admission means 15 and 16.

The hearth B, during combustion of the garbage, becomes heated and retains the heat for a considerable period of time. The retained heat in the hearth, tends to dry the garbage at the bottom of the pile, and also tends to dry garbage emptied into the combustion chamber after the previous amount has been burned.

The ash resulting from the burning of the garbage is removed from the combustion chamber by means of a shovel inserted through the door opening and emptied into a suitable container, such as an ash can.

The ordinary incinerator, of the grate type, has no means, automatically operable, controlling air admission to the ash pit. It has been found, that when stack draft is high, air is drawn into the combustion chamber through the ash pit and chiefly through the fire door, in such large quantities as to stir up a considerable amount of fly ash in the combustion chamber with the result that much dust, dirt, and particles of unburned matter are drawn up the stack and strewn over the landscape.

Operation of the incinerator herein described, developed the fact that there was no fly ash

stirred up at all, and that no foreign matter of any kind was drawn up the stack and blown over the landscape.

Adjustment of the operation of the flap valves 19 and 20 is simple, so that the actuation of these in response to draft conditions in the combustion chamber, may be readily effected to readily adjust the operation of the incinerator to all climatic and other conditions, thereby securing efficient operation of the same under all conditions.

It will be observed that the incinerator of the present invention is simple to manufacture and install, and involves few kinds of articles necessary to erect. The door frame structure may be readily manufactured at a foundry, and the T-iron bars, or similar structural materials necessary to support the hearth, and the overhanging portion 3 of the roof may be bought in the open market. The structure of the present incinerator is such that it may be very readily erected without highly skilled labor, and without technical supervision.

It is within the contemplation of the present invention that the upper and lower air admission means may be made separately from the door frame structure, if desired. However, applicant has shown these as fashioned as a part of the door frame structure, for the purpose of simplicity and expedition in explanation.

The drawing shows the bottom flange 11 of the door frame structure as supported substantially flush with the hearth B, although such arrangement is not essential to successful combustion. In practice there are at least two courses of brick between the bottom flange 11 and the plane of the hearth.

It is to be understood it is not essential that the hearth be elevated above the floor level, as successful garbage burning has been accomplished in a burner wherein the garbage was put on the floor level, within the burner, and air admitted thereabove, as herein described. The hearth is shown as elevated, simply as a matter of convenience in enabling ash removal through the door opening.

Any air admitted through the fire door, due to ordinary leakage, with the flap valves closed, is enough to support combustion but not enough to stir up fly ash in the burner.

The counterweights 21 and 22 may be threaded onto threaded rods or bolts 23 and 24, and adjustable therealong, by rotation.

The invention has been described herein more or less precisely as to details, yet it is not to be limited thereby, as changes may be made in the arrangement and proportion of parts, and equivalents may be substituted, without departing from the spirit and scope of the invention.

The invention is claimed as follows:

1. In a garbage burner, in combination, means forming a combustion chamber, said chamber having as its bottom a hearth impervious to air passage, a fire door frame structure set into a wall of said chamber, said frame structure having air admission means to the chamber opening to the outside air above the door opening, and other air admission means to the chamber opening to the outside air below the door opening, flap valves hinged to said frame in position to close said air admission means to air entrance when moved against the frame, and means on said flap valves to normally maintain the same swung away from closing position.

2. In a garbage burner, in combination, means forming a combustion chamber, said chamber having as its bottom a hearth impervious to air passage, a fire door frame structure set into a wall of said chamber, said frame structure having air admission means to the chamber opening to the outside air above the door opening, and other air admission means to the chamber opening to the outside air below the door opening, flap valves hinged to said frame in position to close said air admission means to air entrance when moved against the frame, and means on said flap valves to normally maintain the same swung away from closing position, the arrangement being such that said flap valves are moved towards the frame structure as the stack draft increases, and moved against the frame structure to close air admission when the stack draft reaches a predetermined point.

3. In a garbage burner, in combination, means forming a combustion chamber, said chamber having as its bottom a hearth impervious to air passage, a fire door frame structure set into a wall of said chamber, said frame structure having air admission means to the chamber opening to the outside air above the door opening, and other air admission means to the chamber opening to the outside air below the door opening, flap valves hinged to said frame in position to close said air admission means to air entrance when moved against the frame, and means on said flap valves to normally maintain the same swung away from closing position, the arrangement being such that said flap valves are moved towards the frame structure as the stack draft increases, and moved against the frame structure to close air admission when the stack draft reaches a predetermined point, said frame having means for directing air from said air admission means downwardly towards said hearth.

4. A garbage burner comprising a combustion chamber having walls and a hearth through which no air passes, one wall having an opening therein, and a door unit mounted in the opening, said door unit having an ash removal opening, a door for closing such opening, and air ducts above and below the opening and adapted to direct air from outside downwardly in the chamber toward the hearth.

5. A garbage burner comprising a combustion chamber having walls and a hearth, one wall having an opening therein, a downwardly and inwardly slanted shelf at the top of such opening, an air duct in line with such shelf, whereby air from outside passing through said duct is deflected by the shelf downwardly in the chamber toward the hearth, an ash removal door below said air duct, a downwardly and inwardly slanted shelf below said ash removal door, and an air duct below said shelf and at the bottom of such opening, air from outside passing through such duct being deflected by the shelf downwardly in the chamber toward the hearth.

6. In a garbage burner, in combination, means forming a combustion chamber, said chamber having as its bottom a hearth through which no air passes during combustion, a fire door frame structure set into the wall of the said chamber, a fire door in said structure, and a plurality of air admission means to the chamber cooperatively associated with the fire door, each of said air admission means being located at different levels above the hearth.

7. In a garbage burner, in combination, means forming a combustion chamber adapted to receive garbage to be burned, a fire door frame structure

set into the wall of said chamber, and a plurality of air admission means to the chamber cooperatively associated with the fire door structure for directing the air downwardly against the garbage received in the combustion chamber, each of said air admission means being located at different levels respectively from the bottom of the chamber, said chamber during operation being closed to the admission of combustion-supporting air except through the said air admission means.

8. In a garbage burner, in combination, means forming a combustion chamber, said chamber having a bottom portion closed during burning operations against the passage of combustion-supporting air therethrough, an opening in one of the side walls of the chamber, and closure means for said opening, said closure means having air admission means to the chamber opening to the outside air at a point relatively contiguous to the top of the closure means and other air admission means to the chamber opening to outside air at a point contiguous to the bottom portion of the combustion chamber.

HUGH W. EWING.