

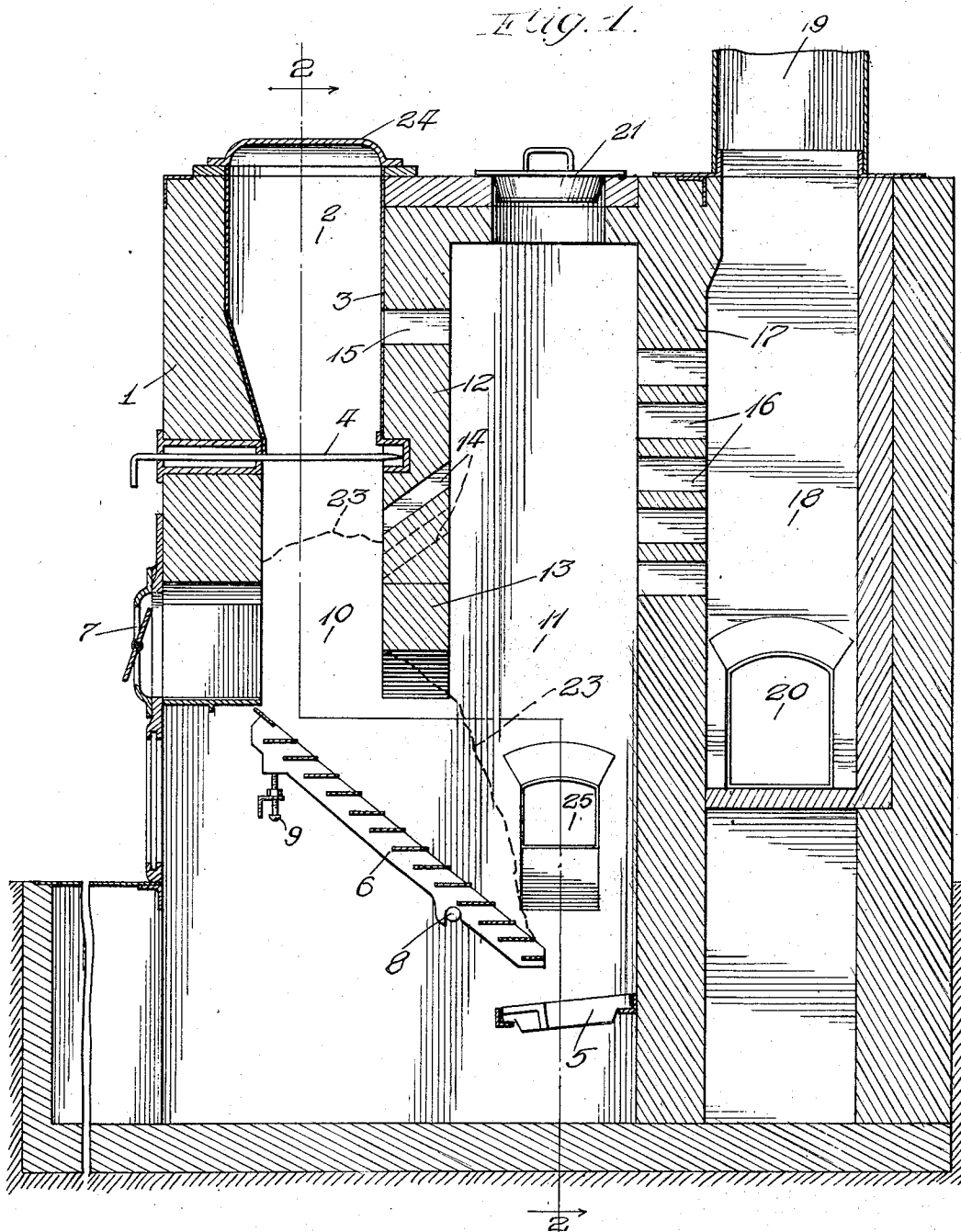
J. GODER.
INCINERATOR.

APPLICATION FILED DEC. 13, 1917.

1,398,718.

Patented Nov. 29, 1921.

4 SHEETS—SHEET 1.



Inventor:

Joseph Goder

Witness:

R. L. Farrington

by Albert Scheith,
Attorney

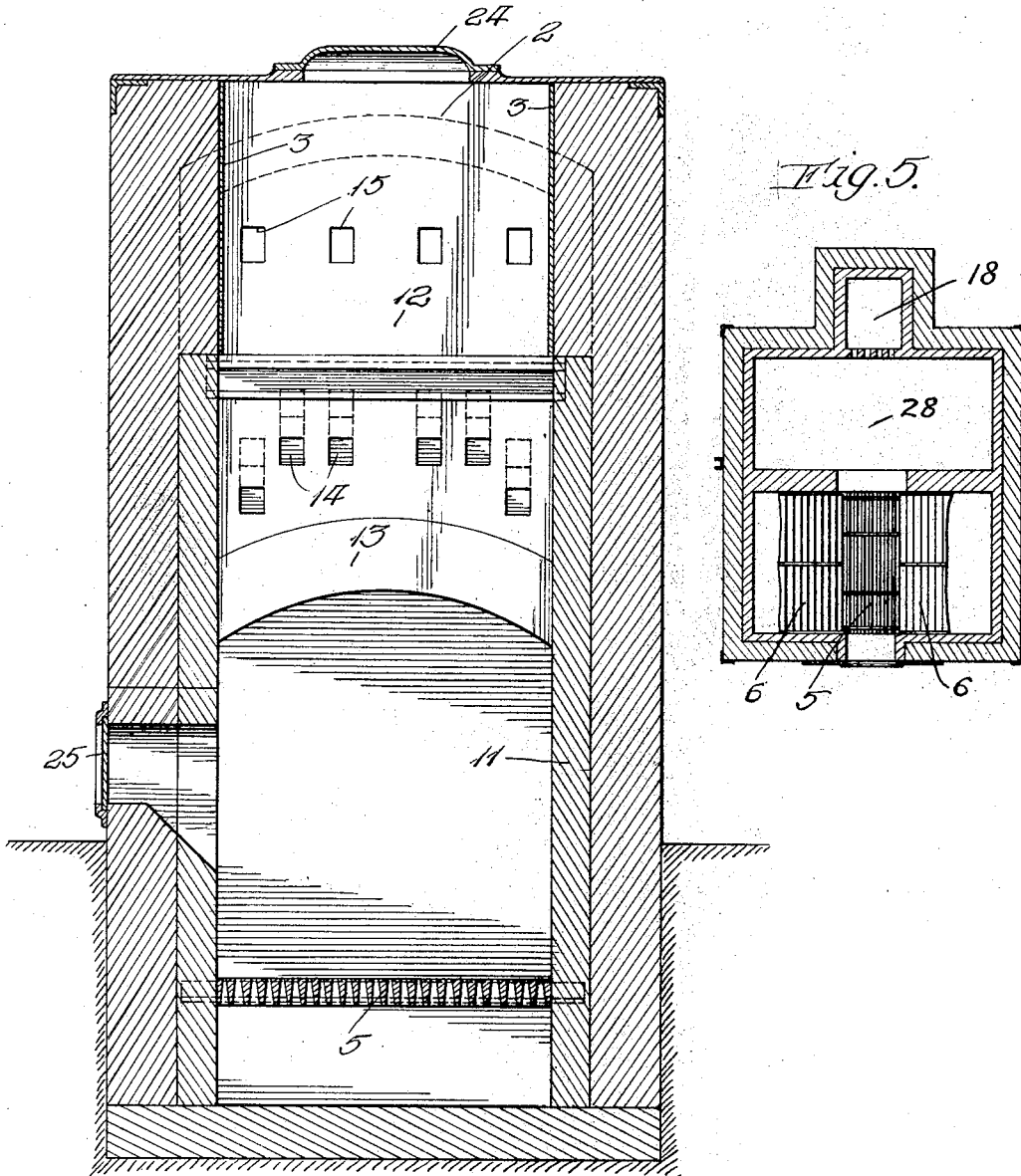
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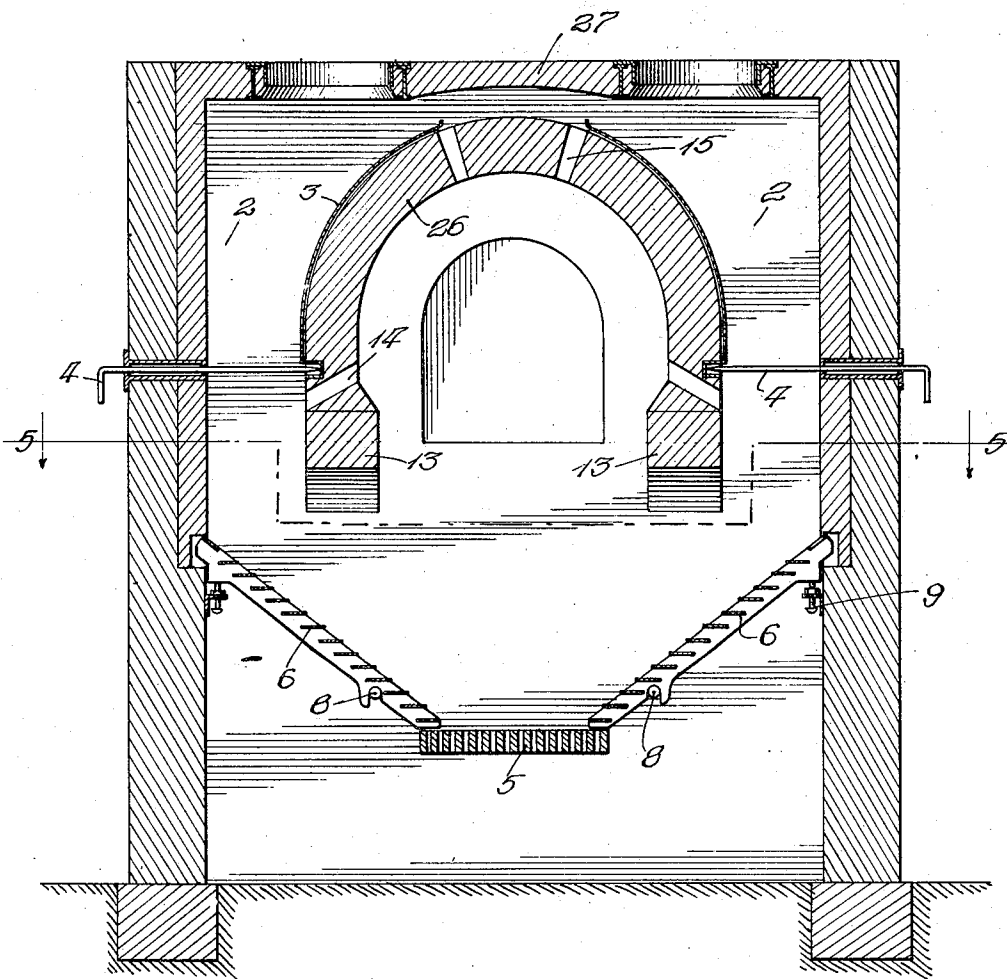
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4 SHEETS—SHEET 3.

Fig. 3.



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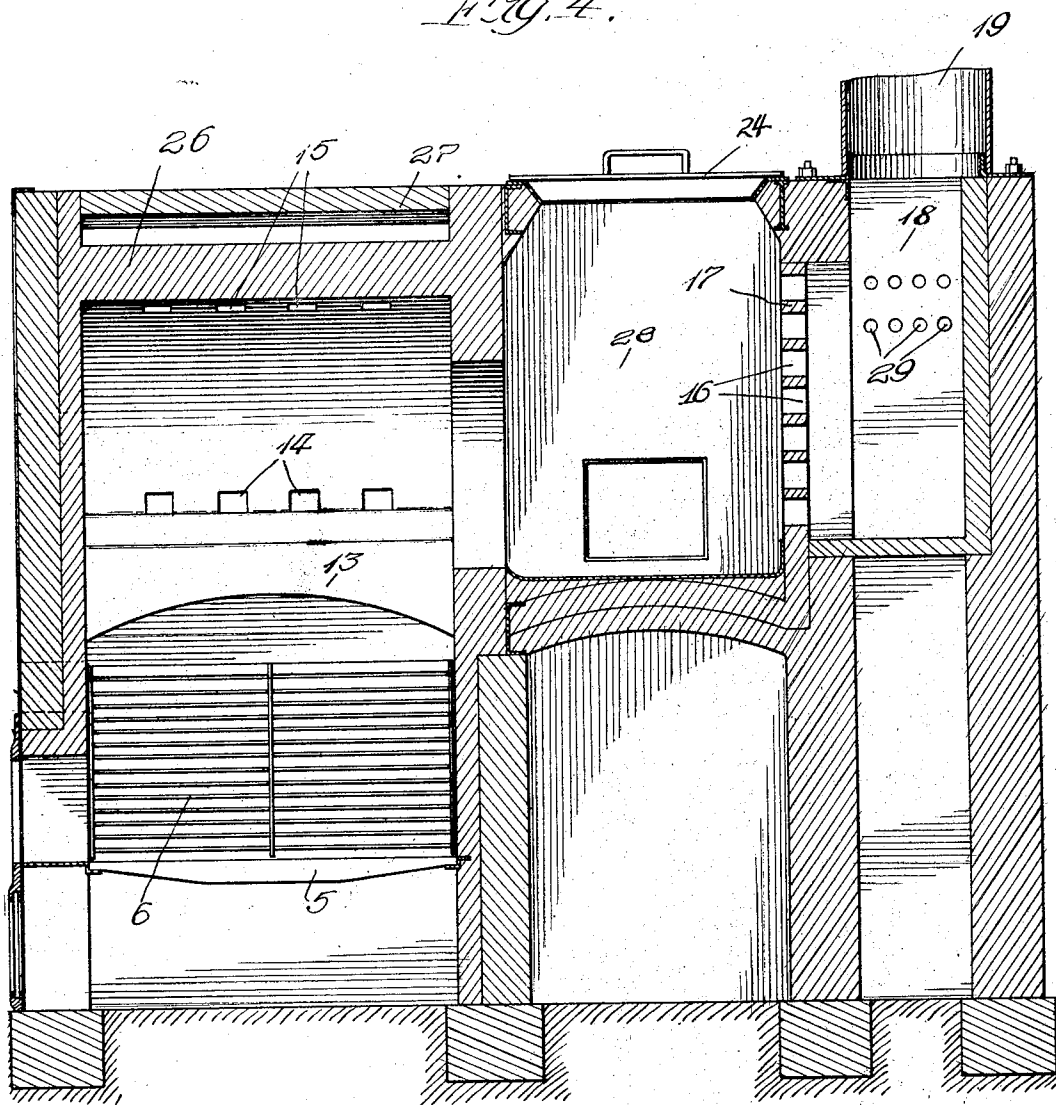
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Fig. 4.



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UNITED STATES PATENT OFFICE.

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INCINERATOR.

1,398,718.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH GODER, citizen of Germany, residing at Chicago, Illinois, have invented certain new and useful improvements in an Incinerator; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to incinerators for garbage and other refuse matter, its general objects being to provide a compact, comparatively inexpensive and unusually effective incinerator and one which will require very little added fuel for starting and operating the same. More particularly, my invention aims to construct an incinerator in which the garbage is preheated, and in which the distillates from the wettest part of the garbage will pass directly to that portion of the combustion chamber which has the highest temperature; also, to provide simple means for producing a continuous suction from the garbage hopper to the combustion chamber, so as to prevent the escape of odors from this hopper to the outer air. Furthermore, the incinerator of my invention aims to dispose both the drying and the combustion chambers over the same main grate, and to avoid the tortuous path into which the combustion products rising from the material on the grate are forced when a bridge is used in the incinerator after the manner of construction heretofore in use, so as to provide a short and direct passage for the products of combustion and to permit the successful operation without the use of a forced draft; also, to provide simple and effective means for supplying air for the combustion of the solid refuse matter on the grate without first passing this air through the fuel grate, whereby I prevent a cooling of the fire by the excess of air. Moreover, my invention aims to provide ports connecting the distillation chamber with the combustion chamber, so that the distillates may readily pass from the former to the latter chamber without being drawn under the partition separating the chambers; to provide a combustion chamber in which the highest temperature will be attained before the gases enter the flue, thus insuring complete combustion and odorless destruction; to provide simple means for adjusting the inclination of a portion of

the grates so as to vary the angle of slope and the consequent rate of feeding the matter on the grate; also, to provide an incinerator of the semi-producer type in which no heat absorbing surfaces are present in the furnace proper, and one having simple means for introducing added fuel when needed. Furthermore, my invention aims to dispose the hottest part of the combustion chambers directly adjacent to the distillation and refuse drying chambers so as to utilize the heat generated in the combustion chamber both for drying and for distillation. In some of its more highly developed embodiments, my invention also aims to provide an incinerator of a multiple type, in which a single combustion chamber serves for consuming the distillates from several grates, thus permitting the attainment of higher temperatures and of lower construction and operating costs than with a single unit type; also, to provide a single secondary combustion chamber for receiving the combustion products from the numerous grates, and to provide interconnected means for leading the vapors and distillates from the several hoppers and distillation chambers to the secondary combustion chamber. Still further objects, together with some of the particular advantages gained by my construction will appear from the following specification and from the accompanying drawings, in which drawings—

Figure 1 is a central and longitudinal vertical section through a single unit incinerator embodying my invention.

Fig. 2 is a transverse vertical section taken along the zigzag line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical section through a twin type of incinerator embodying my invention.

Fig. 4 is a central vertical and longitudinal section through the incinerator of Fig. 3.

Fig. 5 is a horizontal section, on a reduced scale, through the twin type incinerator of Figs. 3 and 4, taken along the line 5—5 of Fig. 3.

Referring first to a single unit type of my incinerator, or one designed to be fed from a single hopper, Figs. 1 and 2 show vertical sections of a desirable embodiment. In these drawings, the bulk of the walls as well as the roof are desirably built of firebrick, though common brick may be used for the wall portion 1 surrounding the drying cham-

ber 2 into which the garbage or other refuse is first introduced. This drying chamber 2 desirably has a lining 3 of a suitable cement or the like, which lining prevents the moisture in the garbage from entering the pores of the brick and thereby deteriorating the latter. The chamber 2 has a movable bottom composed of a plurality of handle bars 4 slidably mounted in the walls and arranged so that they can be independently drawn out by grasping the outer ends of the bars, thus permitting any desired portion of the contents of the hopper to be dropped upon the grates. These grates preferably are composed of two separate portions, namely a lower grate 5 disposed slightly above the rear of the ash pit and inclined upwardly toward the rear face of this pit, and a main grate 6 inclined in the opposite direction and extending downwardly from the entrance way of a door 7 down to an incline to a point overhanging the forward end of the lower grate 5. The main grate 6 preferably has grate bars in the form of steps disposed substantially horizontally and spaced from each other so as to present channels of considerable height, through which air may pass. This main grate is desirably so mounted that it may be adjusted somewhat as to its angle, thereby causing the effect of gravity to vary and thus causing this material to feed with greater or less rapidity down the grate. For this adjustment, I may pivot the grate on a bar 8 extending transversely of the fire-box and then rock the grate on this pivot by means of a bolt 9.

The main grate 6 as above described preferably extends both under the drying chamber 2 and the distillation chamber 10 which forms a substantially vertical continuation for the lower end of the drying chamber, and under a portion of the combustion chamber 11, as well as under the partition 12 which separates the combustion chamber 11 from both the hopper and the distillation chamber. The partition wall 12 is desirably carried by a fire brick arch 13 disposed at some distance above the grate 6 as shown in Fig. 1. However, I do not depend on having the distillation products of the garbage or other refuse pass under this arch when these distillates are generated within the chamber 10, otherwise the distillation would follow the easier path of escaping through the top of the hopper. Instead, I equip the partition 12 with a plurality of ports or bores 14 desirably located at several different heights and desirably sloping upward from the chamber 10 to the chamber 11. By so doing, I provide passages through which the distillation products generated in the chamber 10 may pass directly to the chamber 11, which chamber is normally maintained at such a temperature as to ignite the vapors or gases issuing from the ports 14. To facilitate

this passage of the vapors or gases from one chamber to the other, the ports 14 are preferably sloped upward as pictured, thereby also preventing garbage from permanently lodging in these ports.

I also provide suitable connections such as ports 15 between the upper portion of the hopper 2 and the combustion chamber, thereby affording passages through which the vapors distilled from the least dry portion of the garbage may pass directly to the upper portion of the combustion chamber, or to the part which logically will have the highest temperature since it is disposed both above the grates and above the point of combustion of the distillates issuing through the ports 14. The upper or secondary combustion chamber 11 is desirably connected by ports 16 in a checkerwork partition 17 to a chamber 18 which forms both a third combustion chamber and the base of a flue 19. This chamber 18 desirably has a door 20 through which trays containing pathogenic matter may be introduced for evaporation and combustion. Likewise, the secondary combustion chamber 11 preferably has at its upper end an opening normally closed by a cover 21 through which opening solid pathogenic waste or the like may be dropped directly into the chamber 11.

In operation, garbage or other refuse is fed into the drying chamber 2 through the opening normally closed by the cover 24 and left upon the handle bars 4 while a fire is started with suitable fuel on the grates 5 and 6, thereby warming the brick work on the incinerator and somewhat drying the contents of the chamber 2. When the fire is well started, some of the refuse in the chamber 2 is dropped upon the inclined grate by temporarily drawing out one or more of the bars 4, and the amount of refuse on the inclined grate is gradually increased until it reaches the arch 13, and is heaped up somewhat as indicated by the dotted line 23. Then as the gradually drying refuse adds its fuel value to that of the initial fuel on the grates, distillates are expelled from the same and issue through the ports 14 into the chamber 11, where they are ignited so as to consume them, whereupon the combustion products pass through the ports 16 to the flue. In so doing, the heat of combustion also heats the partition 12 and the refuse in the drying chamber 2, driving off vapors which are drawn by the suction of the chimney through the port 15 into the top of the secondary combustion chamber 11, where they may also be ignited if of a combustible nature. To facilitate this movement of the vapors from the drying chamber 2 to the combustion chamber and the chimney, I desirably arrange the cover 24 of the hopper so that it will not afford an airtight closure, but will allow some of the

outer air to enter the hopper 2 and to afford a continuous current of air over the top of the refuse in the chamber 2, thereby effectively preventing the issuing of any odors from the hopper and also supplying the necessary secondary air for final combustion.

To afford the desired primary air supply, I preferably space the steps of the main grate 6 so far apart that air entering through the ashpit will pass between each step and the refuse piled on the step below the latter. Then I also equip the door 7 with a suitable flap or the like for controlling admission of air through the same. Consequently, I can supply air to the refuse on the main grate in three different ways, namely through the door 7 and over the top of the heap of refuse, through the openings between the steps, and through the opening between the two grates. At one side of the incinerator I preferably provide a window or the like 25 through which the combustion may be viewed, and if necessary, I adjust the gravity actuated feeding of the heap of refuse on the main grate by adjusting the bolt 9 and thereby varying the inclination of the grate 6. Ashes and clinkers are removed between the step grate and the lower or flat grate, so that when once started the incinerator may be maintained continuously in operation.

For operating on a larger scale, I desirably arrange a plurality of hoppers and drying chambers adjacent to a single secondary combustion chamber, thereby reducing the relative amount of possible radiation toward the outer air and increasing the temperature obtainable in the secondary combustion chamber. Likewise, I desirably connect the upper ends of the drying chambers to each other, so as to equalize the temperatures and pressures within the same. For example, Figs. 3 and 4 show sections of a two-unit or twin type of incinerator in which two inclined step grates 6 both feed down upon a single lower grate 5, and in which the secondary combustion chamber has an arched roof 26 spaced from the top 27 of the incinerator by a passage connecting the drying chambers 2 at opposite sides of the arch. In this case, the ports 15 leading from the drying chambers to the secondary combustion chamber may slope downward through the arch as shown in Fig. 3, and the secondary combustion chamber may open into a continuation chamber 28 arranged for receiving carcasses, pathogenic matter or the like and connected through checker work openings with the flue 19. In either case, it will be noted that the refuse is first introduced into a chamber heated by direct radiation from the combustion chamber and directly connected with the latter so that any vapors arising from this refuse while being

dried will pass directly to the hottest portion of the combustion chamber. Also, that there are no flame ports between the point of primary combustion at the grates and the lower end of the secondary combustion or distillation chamber. Moreover, the highest temperature is attained before the gases enter the flue, thus assuring the completeness of combustion and an entirely odorless destruction, although still affording surplus heat which may be utilized for heating water or the like in pipes associated with the flue, such as the pipes 29 of Fig. 4. Should additional fuel be required at any time, this may readily be introduced through the door 7, while the circulation through the passages 15 may be varied by shifting the lid 24 and thereby altering the amount of the barometric depression within the hopper due to this air draft.

In practice, I have found that by arranging my incinerators in the manner above described I can secure a rapid and complete combustion and reduction of refuse of various kinds entirely without resorting to forced draft, and even with a relatively short height of chimneys, thus adapting my incinerator for use in army camps or the like where tall chimneys are objectionable. However, while I have pictured and described my invention in certain desirable embodiments, I do not wish to be limited to the details of the construction and arrangement thus disclosed, it being obvious that the same might be modified in many ways without departing from the spirit of my invention.

I claim as my invention:

1. In a furnace of the class described, an inclined grate, a substantially vertical distillation chamber disposed above the upper portion of the grate, a drying chamber above the distillation chamber, a combustion chamber extending vertically alongside of both of the aforesaid chambers and disposed above a lower portion of the grate and including a partition wall between itself and the other two chambers, said wall extending downwardly toward the grate to cooperate with material on the grate in forming a closure for the lower end of the distillation chamber, movable means for separating the drying and distillation chambers, and separate means directly and continuously connecting the combustion chamber respectively with the other two chambers.

2. In a furnace of the class described, an inclined grate, a substantially vertical distillation chamber disposed above a portion of the grate, a drying chamber disposed above the distillation chamber, and a combustion chamber disposed above another portion of the grate and separated from both of the aforesaid chambers by a partition wall terminating at a distance above

the inclined grate, the said partition wall being equipped with ports leading respectively from the combustion chamber to the other two chambers.

5 3. A furnace as per claim 2, in which the partition wall is equipped with a plurality of ports leading from the combustion chamber to the distillation chamber and disposed at varying heights above the grate.

10 4. In an incinerator, an inclined grate having steps spaced for admitting air therebetween, a distillation chamber over one portion of the grate, a drying chamber over the distillation chamber, and a combustion chamber disposed over a lower portion of the grate and extending vertically adjacent to both of the aforesaid chambers and separately connected to both of the latter.

5. An incinerator as per claim 4, in combination with a second grate disposed below the lower end of the inclined grate and below the combustion chamber and spaced from the step grate to permit the free passage of air therebetween.

25 6. In a furnace for burning wet material, a drying chamber, a distillation chamber below the drying chamber, a combustion chamber common to and extending alongside each of said drying and distillation chambers and extending to adjacent the top of the drying chamber so as to heat the latter, a grate for the lower end of the combustion chamber alined therewith, a grate for the lower end of the distillation chamber, combined feeding and separating means between the drying and distillation chambers, means to convey vapors from the drying chamber to the combustion chamber, and means to convey vapors from the distillation chamber to the combustion chamber at points in the latter alined with the hottest heat area therein.

7. In a furnace for burning wet material, a drying chamber, a distillation chamber below the drying chamber, a combustion chamber common to and extending alongside each of said drying and distillation chambers and extending to adjacent the top of the drying chamber so as to heat the

latter, a grate for the lower end of the combustion chamber alined therewith, a grate for the lower end of the distillation chamber, combined feeding and separating means between the drying and distillation chambers, means to convey vapors from the drying chamber to the combustion chamber, means to convey vapors from the distillation chamber to the combustion chamber at points in the latter alined with the hottest heat area therein, said means being horizontally movable and forming the bottom of the drying chamber and the top of the distillation chamber to support the material to be dried.

8. In a furnace for burning wet material, a drying chamber, a distillation chamber below the drying chamber, a combustion chamber common to and extending alongside each of said drying and distillation chambers and extending to adjacent the top of the drying chamber so as to heat the latter, a grate for the lower end of the combustion chamber alined therewith, a grate for the lower end of the distillation chamber, means forming the bottom of the drying chamber and the top of the distillation chamber to support the material to be dried in a fixed plane, and means to allow of adjustment of said means to enable adjustable feed of the material to the distillation chamber without varying the plane of the mass of material supported.

9. In a furnace for burning wet material, a grate, a combustion chamber, superposed drying and distillation chambers, a vertical wall extending above the grate in spaced relation thereto and between the grate ends and forming one wall of the combustion chamber and one wall of the drying and distillation chamber, a support for the material to be dried forming the bottom of the drying chamber and the top of the distillation chamber, ports in the wall above the support, and ports in the wall below the support, each of the ports leading into the combustion chamber.

Signed at Chicago, December 1st, 1917.
JOSEPH GODER.