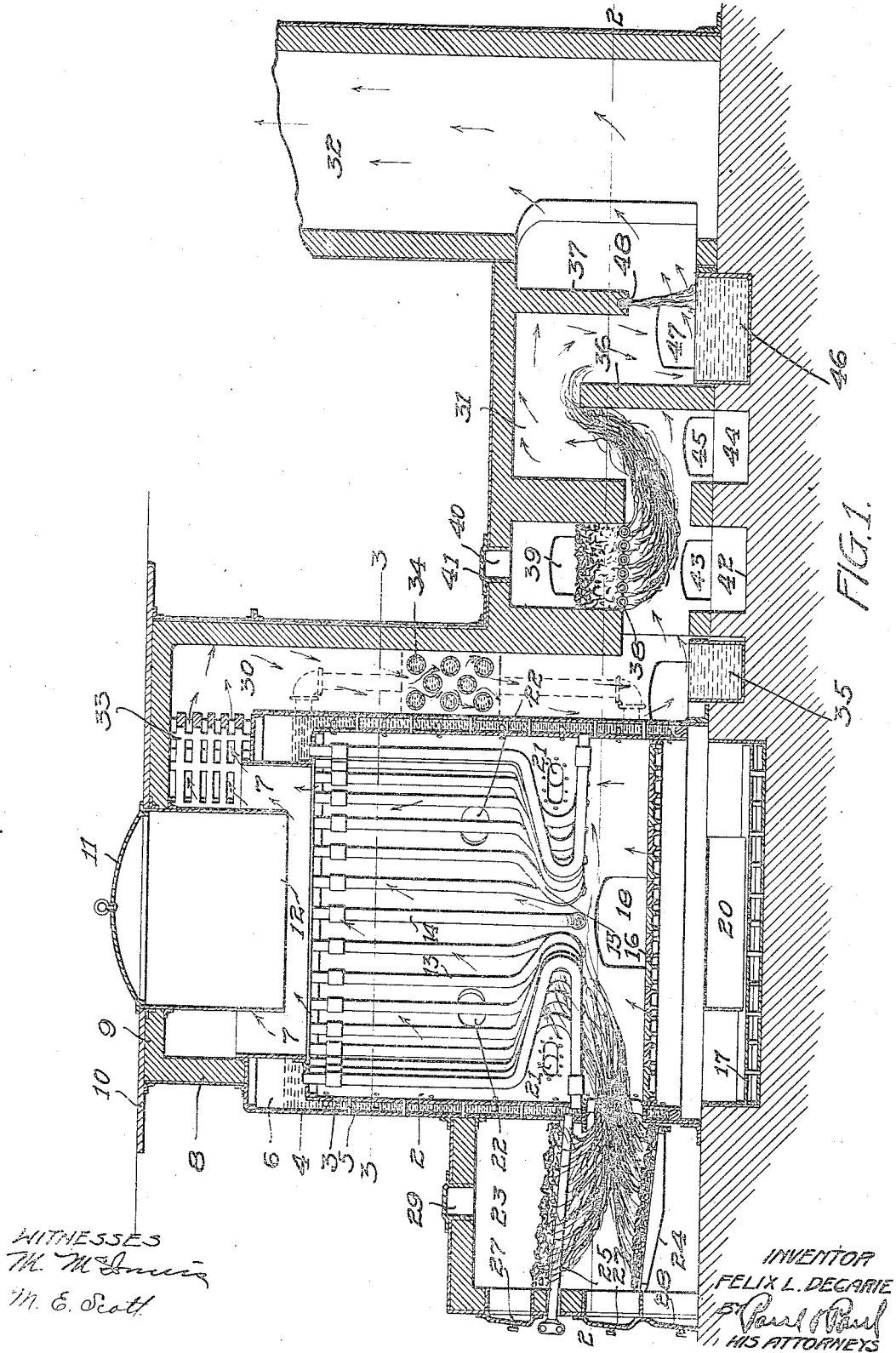


954,855.

F. L. DECARIE.
GARBAGE EVAPORATOR AND CREMATORY.

Patented Apr. 12, 1910.

4 SHEETS—SHEET 1.

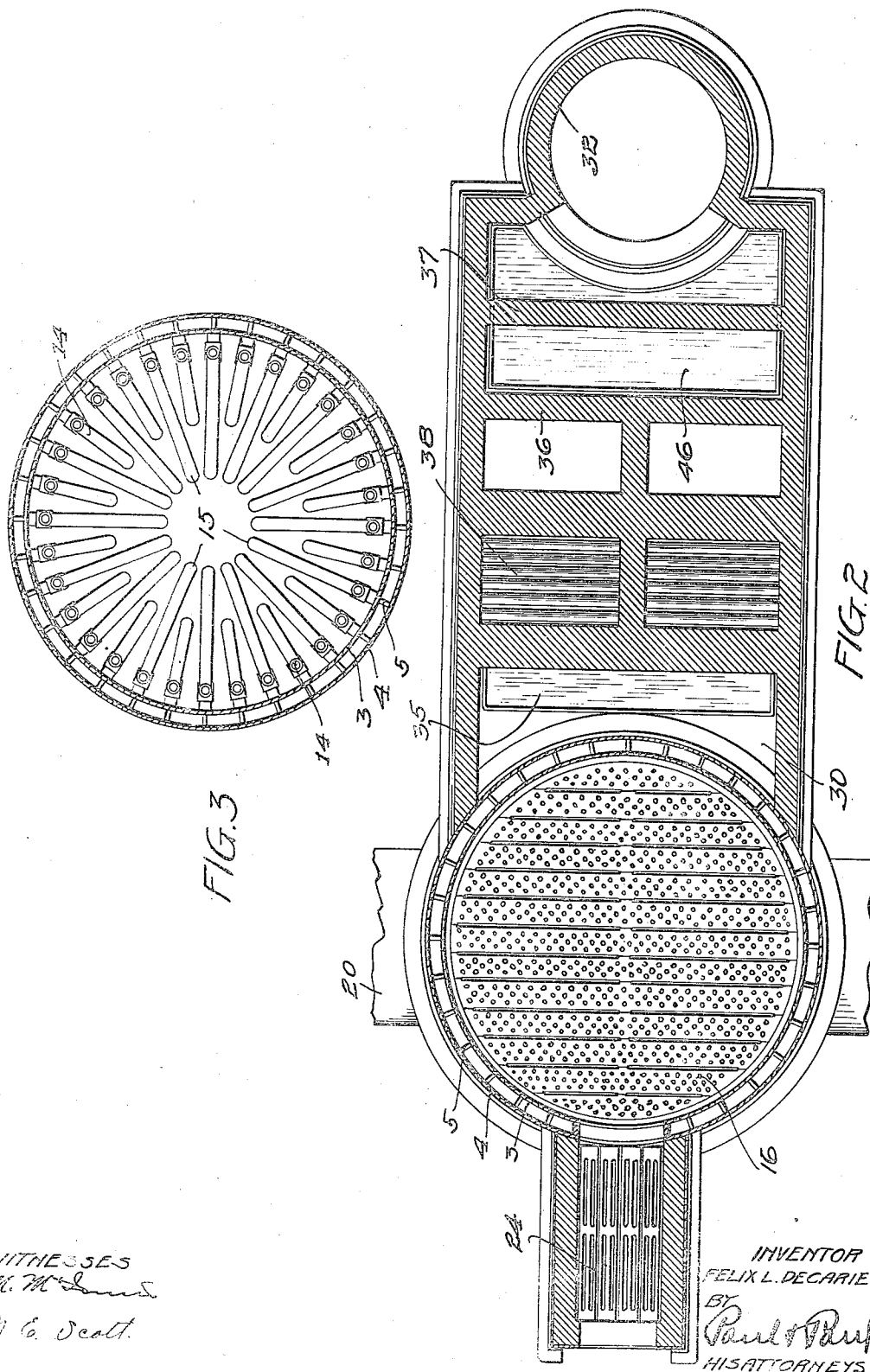


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APPLICATION FILED JAN. 2, 1906.

954,855.

Patented Apr. 12, 1910.

4 SHEETS—SHEET 2.



WITNESSES
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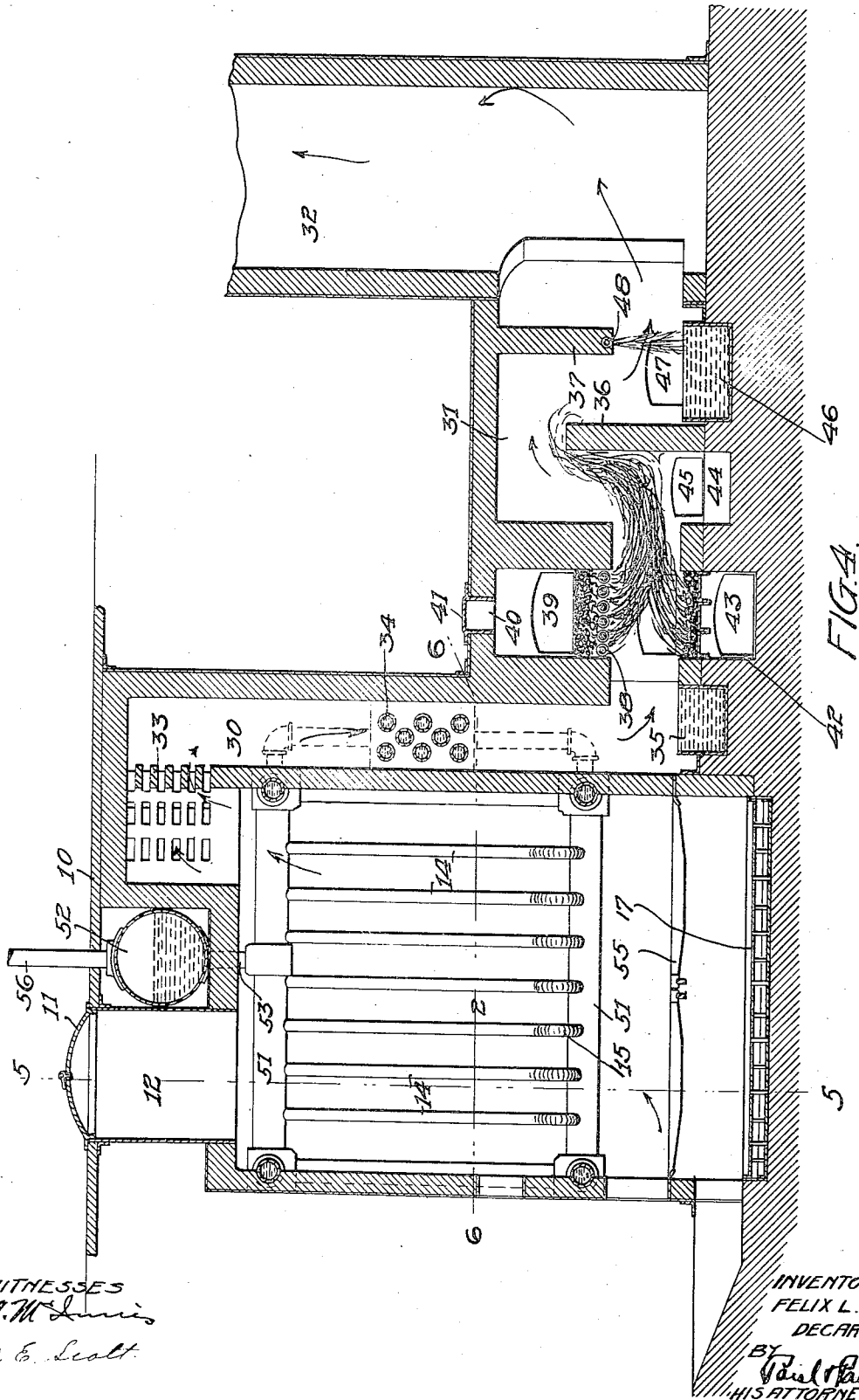
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F. L. DECARIE.
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4 SHEETS—SHEET 3.



WITNESSES
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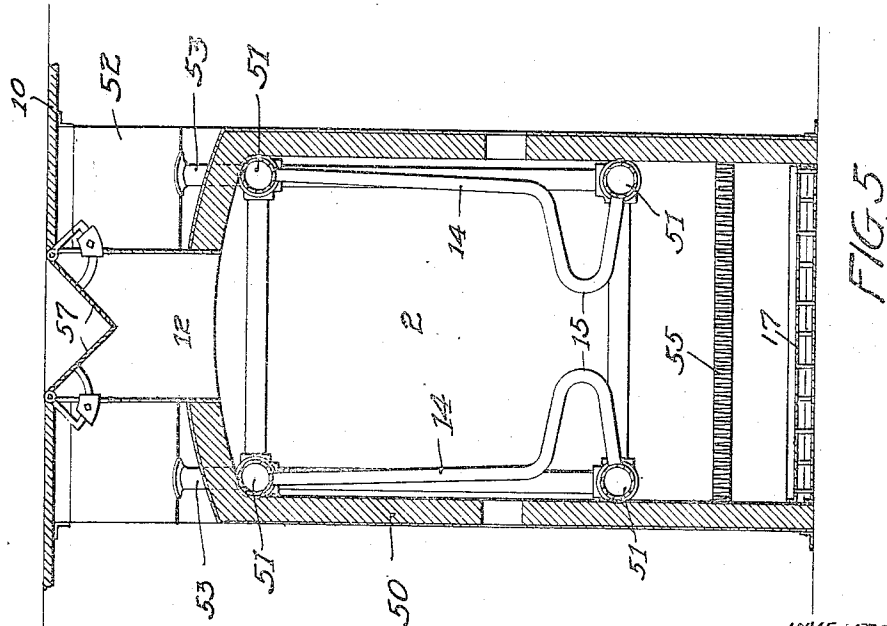
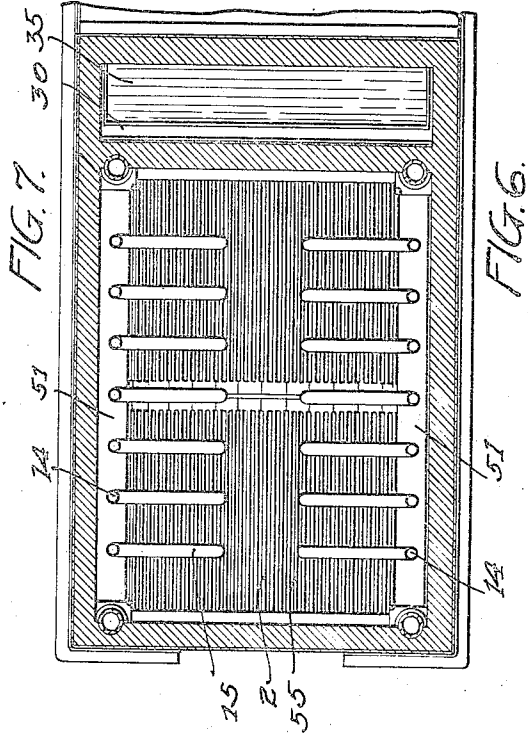
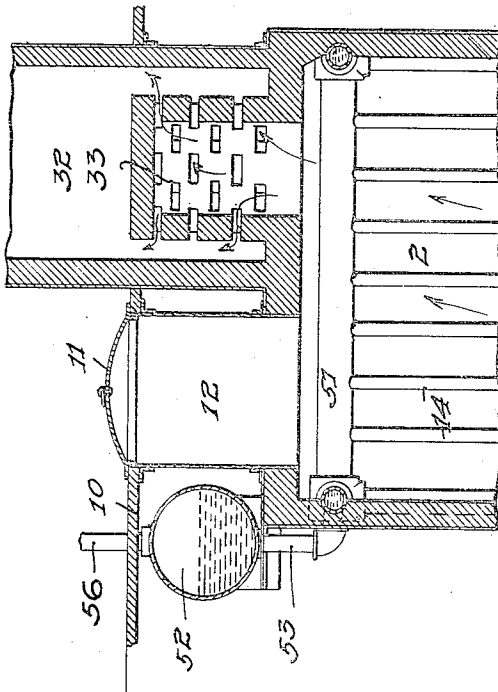
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4 SHEETS—SHEET 4.



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GARBAGE EVAPORATOR AND CREMATORY.

954,855.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed January 2, 1906. Serial No. 294,179.

To all whom it may concern:

Be it known that I, FELIX L. DECARIE, a subject of the King of Great Britain, residing at Minneapolis, county of Hennepin, State of Minnesota, have invented a new and useful Garbage Evaporator and Crematory, of which the following is a specification.

This invention relates to improvements in crematories designed especially for evaporating the moisture from garbage and other refuse and cremating the solid material, and the objects I have in view are to provide a crematory of this character that is simple in construction, easily operated and in which refuse material, even though it may be very wet, can be quickly and readily evaporated and burned, together with all of the smoke and gases arising therefrom, thereby securing a complete combustion of the material and preventing the escape of smoke, gases or offensive odors.

The invention consists generally in the constructions and combinations hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a longitudinal vertical section of a crematory embodying my invention. Fig. 2 is a horizontal section of the same taken on line 2—2 of Fig. 1. Fig. 3 is a similar section on line 3—3 of Fig. 1. Fig. 4 is a longitudinal vertical section showing a modified construction. Fig. 5 is a transverse vertical section on line 5—5 of Fig. 4, a modified form of feed-hopper being shown. Fig. 6 is a transverse vertical section on line 6—6 of Fig. 4. Fig. 7 is a detail section of the structure shown in Fig. 4 with a modified arrangement of the stack.

In all of the drawings, 2 represents the main combustion chamber, which may be of circular form as shown in Figs. 1, 2 and 3, or of rectangular form as shown in the other figures of the drawing. The walls of the combustion chamber may be formed of an inner metallic shell 3, and an outer metallic shell 4, said shells being arranged with a suitable water space between them, and being secured together by suitable stay-bolts 5. The upper portion of this double walled shell is preferably extended inward horizontally, forming a steam and water chamber 6 of annular form. The central opening 7 through said chamber forms both the inlet

for material, and the outlet for the smoke and gases passing from the combustion chamber to the flue leading to the stack.

The combustion chamber 2 has arranged above it a vertical wall 8, preferably formed of fire brick or other suitable material, and this is covered by a horizontal wall 9, and a platform or floor 10, in which is arranged an opening, having a suitable cover 11. Below this opening is a vertical chute or hopper 12 leading to the combustion chamber. By removing the cover 11 the refuse material may be thrown or dumped into the center of the combustion chamber. The combustion chamber is provided with a suitable garbage holding and drying basket 13. This basket is preferably made up of a series of pipes 14, having their upper ends connected to the annular water space or chamber 6 and their lower ends connected to the space between the shells 3 and 4. Each of said pipes is provided also with the inturned portion 15, alternate pipes having longer inturned portions as shown in Fig. 3. These pipes or tubes 14 form a storage basket into which the material is dumped often in a very damp or wet condition. This basket has a large capacity, preferably 40 or 50 tons, varying, however, with the capacity of the plant, and is designed to hold the garbage in whatever condition it may be, in suspension within the combustion chamber. The basket may be, and usually is, filled with garbage before the fires are lighted and while supporting the material within reach of the flames, prevents it from coming in direct contact with the fuel and smothering or checking the fire. This feature of the apparatus is particularly valuable in case the garbage is in a damp or very wet condition. The basket is so constructed and supported as will hereinafter appear, that the flames can pass up through and around it and dry its contents and partially consume the same without the weight of the garbage being thrown upon the grate or the fire beneath. In other words, the material to be consumed is suspended within the combustion chamber within reach of and subjected to the action of the flames without in any way checking or smothering the fire, which would result if the garbage should be dumped directly upon the grate.

Below the basket 13 is a flat grate 16 consisting of a series of flat bars each having a series of perforations and the bars being also

arranged with narrow spaces between them. Below the grate 16 is a double bottomed evaporating pan 17 in which the liquid that drains out of the garbage and passes down through the grate 16, will be collected. By supplying steam to the space below the upper bottom of the pan 17 the pan may be heated so as to cause the liquid to be evaporated and the vapor passing upward through the grate 16 will be consumed with the gases arising from the garbage or refuse material in the basket 13. Suitable door openings 18 and 20 are provided permitting access to the interior of the crematory above the grate 16 and above the evaporating pan 17. Through these doors ashes and incombustible material may be removed. I also prefer to provide the walls of the combustion chamber with suitable stoking holes 21 and 22.

In a separate chamber 23 arranged at one side of the shell of the crematory, I provide one or more auxiliary grates. This chamber, therefore, forms an auxiliary furnace in which a fire may be maintained by the consumption of coal or other fuel. In this auxiliary furnace I have shown an ordinary lower grate 24 and an upper grate 25 preferably formed of water pipes or tubes connected with the water space between the shells 3 and 4 of the combustion chamber, so that a circulation of water is maintained through said grate. The opening from the lower auxiliary furnace into the combustion chamber of the crematory is above the grate 16 and below the basket 13. The grate 24 is arranged below this opening while the grate 25 is arranged above it. The auxiliary furnace is provided with suitable fuel doors 27, an ash door 28, and a stoking door 29. It will be seen that with this arrangement, by maintaining a separate fire on each of the grates 24 and 25, an up-draft is obtained on the lower grate and a down-draft on the upper grate. The flames from these two grates, therefore, come together and pass through the opening leading from the auxiliary furnace to the combustion chamber of the crematory and by the use of the two grates, a perfect combustion of the fuel upon the grate is secured. The flame from the auxiliary furnace passing into the lower part of the crematory combustion chamber, passes upward through and around the basket 13 and passing through the annular space 7 enters the flue leading to the stack. As the flames pass around the basket they cause the moisture to be evaporated from the garbage, and other refuse material, and heat and dry the remaining portion thereof, and gradually consume the same as it moves downward in the basket.

A portion of the garbage or refuse material will fall through the central space, between the inturned portions of the tubes, forming the basket, and will then rest upon

the grate 16 where it will be consumed. Some of the partially consumed material may also drop down between the tubes forming the basket and this material will be consumed while resting upon the grate 16. The principal part of the dried garbage will pass down through the central space or discharge opening in the bottom of the garbage holding basket, as this space is much greater than the space between the tubes of which the basket is formed. As the material in the basket becomes dried, it tends to automatically feed through the discharge opening onto the lower grate, and, as this material is consumed, more material will fall through the opening and this process will be continued so long as fresh material is supplied to the basket.

It will be noted that there is a clear space between the basket and the inner wall of the combustion chamber, and as it is customary to fill the basket only partially full of garbage or refuse material, there is always a clear space for the passage of the flames around and over the top of the mass of garbage and refuse material in the basket. By this means an evaporation of the moisture and a complete combustion of the material that is put into the basket are secured, regardless of the condition of the material when placed in said basket.

The gases and the products of combustion which pass from the combustion chamber 2 first enter a diving flue 30 and then after passing downward in this flue, they pass into a gas consuming chamber 31. This chamber communicates with a stack 32, which is made of sufficient height to secure a suitable draft through the auxiliary furnace, the garbage consuming chamber, the diving flue and the gas consuming chamber. The opening between the combustion chamber and the diving flue 30 is preferably provided with a series of tile or fire brick 33 arranged with spaces between them. The tile 33 being near to the combustion chamber of the crematory are raised to a high heat, and the vapors and gases from the material being consumed in the combustion chamber pass between these tile and the gaseous current is broken up and raised to a great heat. The currents of gases passing between these tile impinge upon the wall of the diving flue opposite said chamber. They are deflected by said wall and passed downward through the diving flue. A series of water pipes or tubes 34 are preferably arranged transversely in the diving flue 30, (see Fig. 1). These tubes are connected to the upper and lower portions of the water space surrounding the combustion chamber so that there is at all times a circulation of highly heated water, through said tube. The gaseous current passing downward in the diving flue, strikes these tubes and pass-

ing between them raises the water in the tubes to a higher temperature and assists in the generation of steam within the space inclosed by the outer and inner shells forming the combustion chamber. The steam thus generated may be used for any desired purpose.

At the bottom of the diving flue 30 an open water tank 35 is preferably located. A large portion of the solid or unconsumed material from the combustion chamber is collected in this tank. A large percentage of the material collected in this tank is combustible and after being dried it may be burned.

The gas consuming chamber 31 is provided with the upwardly extending wall 36 and with the downwardly extending wall 37. A tortuous passage is thus formed between the diving flue and the stack. A grate 38 is preferably arranged above the passage through the gas consuming chamber and a coal or other suitable fire is made on this grate and burned with a down draft, the flames passing downward from this grate and along the gas consuming chamber toward the stack 32. The wall of the chamber above the grate 38 is preferably provided with a door 39 and there is also preferably an opening 40 through the top of the chamber having a suitable door or cap 41. Below the grate 38 is a suitable ash pit 42 with a door 43 in the wall of the chamber, opposite said ash pit, and the foot of the wall 36 is a dust and cinders collecting chamber or pit 44, opposite which is a door 45. Upon the other side of the wall 36 is a water tank 46, opposite which is a door 47; at the lower end of the wall 37 is a steam or water pipe 48 having a perforated wall through which a sheet of water or steam passes downward to the surface of the water in the tank 46.

The gases and vapors pass from the bottom of the diving flue through the fire from the fuel on the grate 38. Solid particles such as cinders and dust carried by the current of gases impinge upon the wall 36 and fall backward and downward into the chamber 44. The unconsumed gases pass upward over the wall 36, being subjected to the flames from the fire on the grate 38. After passing over the wall 36 the gases take a downward course and impinge upon the surface of the water in the tank 46, and any of them that remain unconsumed pass into the sheet of water or steam above said tank 46 and are thrown downward into said tank. By this means any remaining solid material, such as dust or cinders is collected in the tank 46.

With this apparatus garbage or other refuse material in a wet or damp condition placed in the basket will be evaporated and consumed by the flames entering the lower

part of the combustion chamber from the auxiliary furnace. Any unconsumed material that falls upon the grate 16 will be subjected to the flames from the auxiliary furnace and will be consumed. Any liquid that drains out of the garbage will collect in the pan 17 and will be evaporated. The gases and unconsumed products of combustion during their travel from the combustion chamber to the stack will be thoroughly consumed and the cinders and non-combustible particles will be collected in one of the tanks or in the pits provided in the gas consuming chamber. All of the gases will be consumed and all of the noxious odors will be destroyed, either in the diving flue or in the consuming chamber, so that neither smoke nor noxious gases will escape from the stack, and a crematory of this kind may be located in any position without interfering with the health or comfort of persons living near.

When the basket contains a quantity of garbage and there is no fire on the grate beneath or in the auxiliary furnace, the gases arising from the material in the basket will pass into the gas consuming chamber and there be consumed so that even if there should be no fire in the main portion of the crematory the noxious vapors arising from the garbage that may be stored in the basket will nevertheless be destroyed before reaching the stack.

When there is a fire on the grate beneath the basket or in the auxiliary furnace the flames passing up between the basket and the walls of the combustion chamber will heat the brick in the construction shown in Figs. 4 and 5, or the metal walls illustrated in Fig. 1, and the heat radiating from these walls across the said space and entering the basket will aid in drying the material therein. In the construction illustrated in Fig. 1, the water contained in the chamber around the combustion chamber will be heated by the flames passing up through the space between said chamber and the basket, and steam for commercial purposes may be generated. It will also be seen that the flames from the auxiliary furnace entering the lower part of the combustion chamber below the garbage holding basket will pass upward in the space or flue between said basket and the inner wall of the combustion chamber thereby drying the material in the basket. If the auxiliary furnace were not provided and reliance were placed upon the fire on the grate below the basket it would occur at times, with very wet garbage, that the water would drain out of the material in the basket, and falling on the fire on the grate, would extinguish, or practically extinguish it, and there would be no means of drying the garbage in the basket. The result of this would be that the garbage in

the basket would remain damp and would not be in condition for burning. With the auxiliary furnace located near the combustion chamber there is a constant and uninterrupted flame passing into the combustion chamber and up and around the garbage held in the basket. With this combination, even if the water from the garbage does fall down onto the fire on the grate and completely extinguish the same, the flames from the auxiliary furnace will soon dry the fuel on the fire grate and will start up this fire again, and cause it to consume the dry garbage that will fall through the discharge opening in the basket onto the fire grate.

If preferred a rectangular combustion chamber having its walls formed of fire brick 50 as shown in Figs. 4, 5, 6 and 7, may be employed. In this instance suitable headers 51 will be arranged at the top and bottom of the basket and to these headers the tubes 14 will be connected. A suitable steam and water chamber 52 may be located above the combustion chamber and this chamber may be connected to the headers 51 by pipes 53. As here shown the auxiliary furnace 23 is omitted and a grate 55 adapted to have a coal or other suitable fire built thereon may be arranged below the basket (see Figs. 4, 5 and 6). If preferred, however, the auxiliary furnace may be used located in front of the combustion chamber and connected to it in the same manner as shown in Figs. 1 and 2 of the drawing. The diving flue, the gas consuming chamber and the stack will all be arranged substantially in the same manner as shown in Figs. 1, 2 and 3 of the drawings and already described. The diving flue and gas consuming chamber may both be omitted if preferred, in which case the stack 32 may be arranged directly above the combustion chamber as shown in Fig. 7.

To the steam chamber 52 a steam pipe 56 may be connected to conduct steam generated therein to any part it may be desired to use the same. The chute or hopper 12 may be provided with the weighted doors or valves 57 (see Fig. 5).

It will be seen that with the centrally arranged basket the wet garbage or refuse material will be suspended in the center of the combustion chamber and the flames from the auxiliary furnace and from the lower grate will pass up and around this mass of garbage, causing the moisture to evaporate therefrom and the solid material will be dried and burned. The dry and partially consumed material will fall down through the central opening in the basket, and the flames will also eat their way up through this opening. With the auxiliary furnace located outside of the combustion chamber the fire in this furnace can not be put out by water from the garbage, as might happen

if the fire on the lower grate 16 were alone employed.

I claim as my invention:

1. In a garbage crematory having a combustion chamber, the combination, with a fire grate, of a garbage basket arranged in the combustion chamber over said grate and composed of upright members having their lower portions extended inwardly to form the bottom of the basket, said members and their inwardly extending portions being spaced apart for the passage of flames from the fire grate, and the inwardly extending portions at their inner ends being so disposed in relation to each other as to form a discharge opening in the bottom of the basket.

2. In a garbage crematory, the combination, with a combustion chamber, of a garbage holding basket arranged in said chamber and formed of water tubes spaced apart and having substantially vertical portions constituting side walls of the basket and spaced from the walls of said chamber and inwardly extending portions forming the bottom of the basket, said inwardly extending portions at their inner ends being so disposed in relation to each other as to form a discharge opening in the bottom of the basket, the space between the side walls of the basket and the wall of the chamber forming a flue through which a portion of the products of combustion circulate when said basket is filled, and a fire grate located below said discharge opening and upon which the material is discharged from said basket.

3. In a garbage crematory, the combination, with a combustion chamber, of a garbage-holding basket arranged in said chamber and composed of oppositely arranged circulating tubes spaced apart and having inwardly extending portions, the inwardly extending portions of the tubes on one side of said chamber being spaced from the corresponding portions on the opposite side of said chamber to form a discharge opening in the bottom of said basket, and said inwardly extending portions being downwardly inclined to direct the material in said basket toward said discharge opening, and a fire grate located below said discharge opening and upon which the material is discharged from said basket.

4. In a garbage crematory having a combustion chamber the combination, with a fire grate, of a garbage basket arranged in said chamber over said grate and composed of circulating tubes having inwardly extending portions to form the bottom of the basket, said tubes being spaced from one another and the inwardly extending portions of the opposite tubes at their inner ends being so disposed in relation to each other to form a discharge opening in the bottom

of the basket, said discharge opening being of sufficient size to permit the passage of the dried garbage from the basket onto said fire grate.

5 5. In a garbage crematory, the combination, with a combustion chamber, of a garbage holding basket arranged in said chamber and composed of circulating tubes spaced apart and having substantially up-
10 right portions spaced from the walls of said chamber to form a circulating flue, and said basket having inwardly and downwardly inclined lower portions, the lower portions of said basket on one side of said chamber,
15 being spaced from the corresponding portions on the opposite side of said chamber to form a discharge passage, said basket being adapted to contain a quantity of garbage, and the downwardly inclined lower
20 portion of said basket directing the material therein to said discharge opening, the material in said basket compelling a portion of the products of combustion to circulate through said flue and aid in drying
25 the garbage, and a fire grate located below said basket and upon which the material is discharged through said passage.

6. The combination, in a garbage crematory, with a combustion chamber, of a garbage holder in said combustion chamber having substantially vertical sides spaced
30 from the walls of said chamber and composed of members spaced from one another, whereby a flue is formed around said garbage holder, and an inwardly extending bottom provided with a discharge opening, said holder being adapted to contain a quantity of garbage, and a fire grate located below
35 said holder and upon which the material is discharged through said discharge opening.

7. In a garbage crematory, the combination, with a combustion chamber, of a garbage holding basket formed of water tubes
45 spaced apart and having vertical portions constituting side walls and inwardly inclined portions forming an inwardly inclined bottom, said inclined portions being so disposed as to form a discharge opening
50 in the bottom of the basket.

8. In a garbage crematory, the combination, with a combustion chamber, of a garbage holding basket formed of water tubes spaced apart and having vertical portions
55 constituting side walls and inwardly inclined portions forming an inwardly inclined bottom, said inclined portions being so disposed as to form a discharge opening in the bottom of the basket, and a fire grate
60 located below said basket and upon which the material is discharged through said discharge opening.

9. The combination, in a garbage crematory, with a combustion chamber, of a garbage holding basket arranged in said cham-

ber and formed of a series of water circulating tubes spaced apart and having inwardly extending lower portions forming the bottom of the basket, said inwardly extending portions at their inner ends being so disposed in relation to each other as to form a
70 discharge opening in the bottom of the basket, a fire grate arranged below said basket and adapted to receive the dried garbage discharged from said basket through said discharge opening, and an auxiliary furnace
75 having a flue opening communicating with said combustion chamber below said basket, substantially as described.

10. In a garbage crematory, the combination, with a combustion chamber, of a garbage holding basket arranged in said chamber and formed of water tubes spaced apart and having substantially vertical portions
80 constituting the side walls of the basket and spaced from the walls of said chamber, and inwardly extending portions forming the bottom of the basket, said inwardly extending portions at their inner ends being so disposed in relation to each other as to form
85 a discharge opening in the bottom of the basket, the space between the side walls of the basket and the walls of the chamber forming a flue through which a portion of the products of combustion circulate when
90 said basket is filled, a fire grate located below said discharge opening and upon which the material is discharged from said basket, and an auxiliary furnace contiguous to said combustion chamber and having a flue opening
95 communicating with said chamber below said basket, to cause the flames from said auxiliary furnace to pass up around and through said basket, substantially as described.

11. The combination, in a garbage crematory, with a combustion chamber, of an open walled storage basket arranged within said chamber and adapted to contain a quantity of garbage, a fire grate located below said
105 basket, adapted to receive for consumption dried garbage discharged from the basket, and an auxiliary furnace located near said combustion chamber and communicating with said chamber below said basket and above said fire grate, said basket being so arranged whereby the flames from said furnace will pass up through and around the material in said basket to dry and consume the same.

12. The combination, in a garbage crematory with a combustion chamber, of an open walled basket arranged therein and in which basket a large supply of garbage may be stored, an outlet flue communicating with
120 said combustion chamber above said basket, an auxiliary furnace contiguous to said combustion chamber and having a flue opening leading to said combustion chamber below said basket, and said basket being of greater diameter than the upper portion of said
130

chamber leading to said first named flue, said basket being so arranged whereby the flames from said auxiliary furnace will be compelled to pass through said basket and dry the material therein before reaching said first named flue.

13. The combination, in a garbage crematory, with a combustion chamber, of an open walled storage basket supported within said chamber and adapted to contain a quantity of garbage, a flue leading from said combustion chamber above said basket, a fire grate located below said basket, and adapted to receive for consumption dried garbage discharged from the basket, an auxiliary furnace arranged contiguous to said combustion chamber and provided with a plurality of grates located one above the other and having a flue opening leading to said combustion chamber below said basket and above said fire grate, whereby the flames from said grates will be directed beneath and around said basket to dry the material therein.

14. The combination, in a garbage crematory, with a combustion chamber, of a centrally disposed open walled basket arranged therein, an outlet flue connected to said combustion chamber above said basket, an auxiliary furnace arranged adjacent to said combustion chamber, with a flue opening connecting said auxiliary furnace with said combustion chamber below said basket, and two grates arranged in said auxiliary furnace one above and the other below said flue opening, substantially as described.

15. The combination, in a garbage crematory, with a combustion chamber, of an open walled basket located therein and spaced from the walls thereof, an outlet flue connected to said combustion chamber above said basket, a grate located below said basket, an auxiliary furnace arranged adjacent to said combustion chamber, with a flue opening connecting said auxiliary furnace with said combustion chamber and discharging thereinto below said basket and above said grate, substantially as described.

16. The combination in a garbage crematory with a combustion chamber, of an open walled garbage holder supported therein and spaced from the walls of the chamber, an auxiliary furnace located near said combustion chamber and having a flue opening leading into said chamber below said holder, and a flue connected with said combustion chamber above said holder, the flames from said auxiliary furnace being compelled to pass up and around and through said holder and the material therein before reaching said last named flue.

17. The combination in a garbage crematory with a combustion chamber, of a garbage holder supported therein, and having vertical sides spaced from the walls of said chamber and an inwardly extending bottom

having a feed opening, the sides and bottom of the holder being formed with flame passages, an exit flue communicating with said combustion chamber above said holder, an auxiliary furnace contiguous to said combustion chamber and having a flue opening communicating with said chamber below said holder, to cause the flames from said auxiliary furnace to pass up around and through said holder and the material therein before reaching said exit flue.

18. The combination, in a garbage crematory, with a combustion chamber, and an open walled garbage holder suspended therein and adapted to contain a quantity of garbage, said garbage holder being spaced from the walls of the combustion chamber to form passages for the flame from the auxiliary furnace, of an auxiliary furnace having a flue opening communicating with said chamber below said holder, a gas consuming chamber, a flue leading from said combustion chamber above said holder and connected with said gas consuming chamber whereby the gases from the garbage in said holder will be consumed independently of said auxiliary furnace, substantially as described.

19. The combination, in a garbage crematory, with a combustion chamber, of a storage basket suspended therein and adapted to contain a quantity of garbage and substantially circular in form and composed of water circulating pipes spaced apart, the bottom of said basket being formed of inwardly turned portions of said pipes, the inwardly turned portions of adjoining pipes being of different length and there being a central feed opening formed between the inwardly turned portions of said pipes for the discharge of dried garbage, and a fire grate located beneath said basket and whereon the material is discharged through said central feed opening.

20. In a garbage crematory, the combination, with a combustion chamber, of an open walled garbage holding basket arranged within said chamber and provided with a discharge opening in its bottom, said basket being spaced from the walls of said chamber, whereby a flue opening is provided around said basket, a fire grate located below said basket and adapted to receive dried garbage discharged from said basket through said discharge opening, an auxiliary furnace contiguous to said combustion chamber and having a flue opening and connecting with said chamber below said basket, substantially as described.

In witness whereof, I have hereunto set my hand this 27th day of December, 1905.

FELIX L. DECARIE.

Witnesses:

A. C. PAUL,
M. E. SCOTT.