

F. L., A. S. & L. A. R. DECARIE.
INCINERATOR.

APPLICATION FILED FEB. 9, 1909.

Patented Mar. 15, 1910.

3 SHEETS—SHEET 1.

951,905.

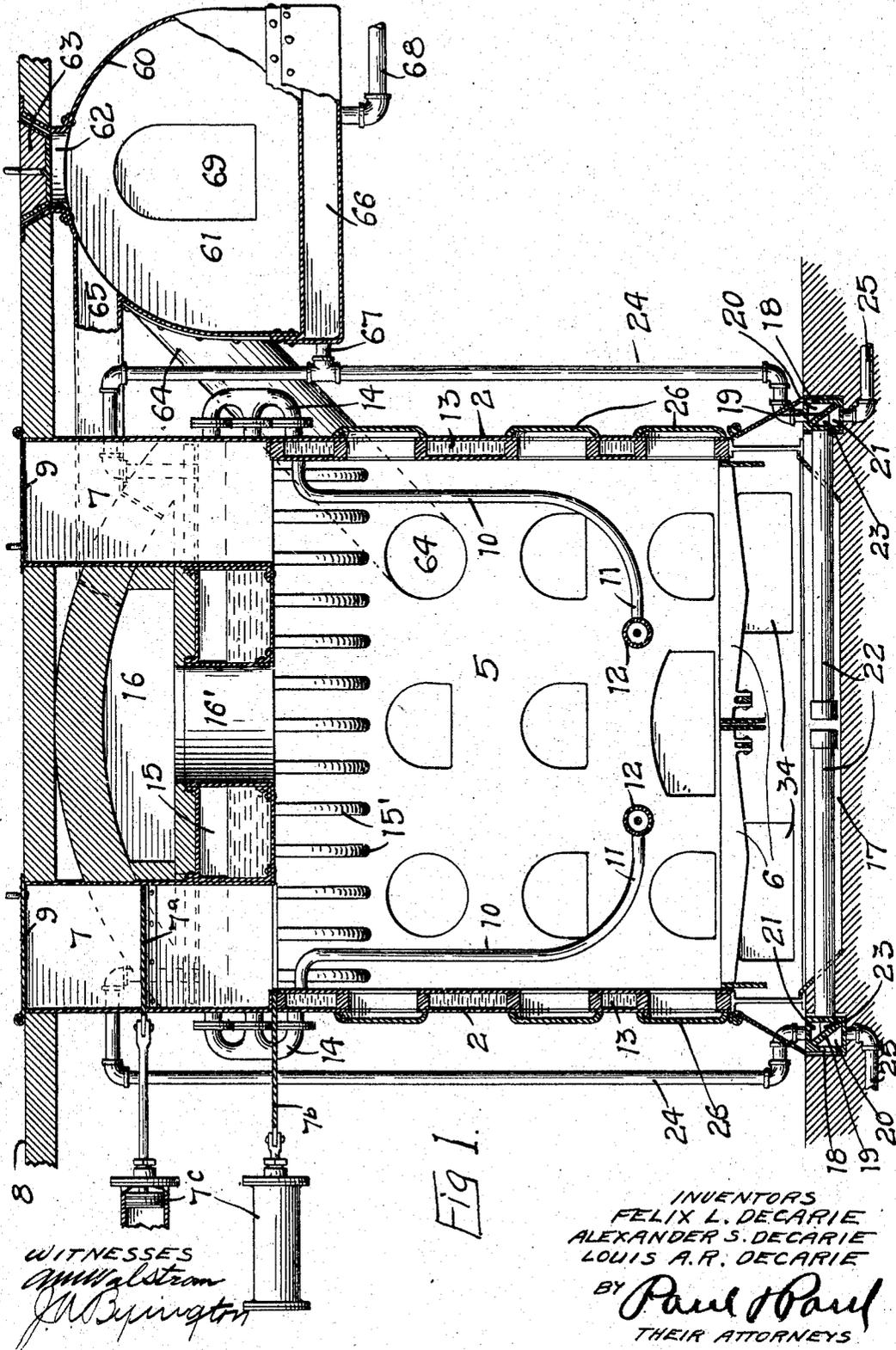


Fig. 1.

WITNESSES
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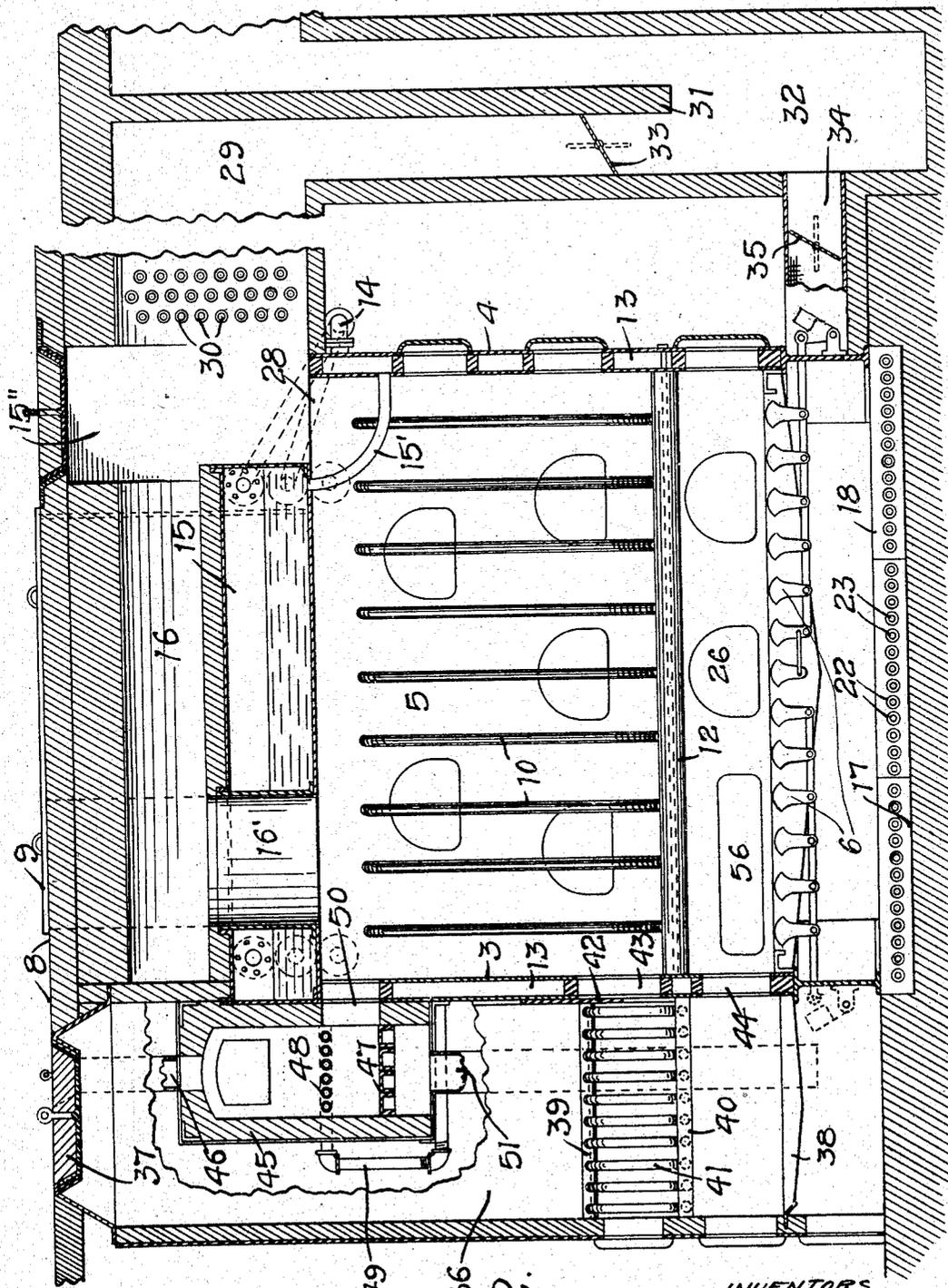
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3 SHEETS—SHEET 2.



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Fig. 2.

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8 SHEETS—SHEET 3.

951,905.

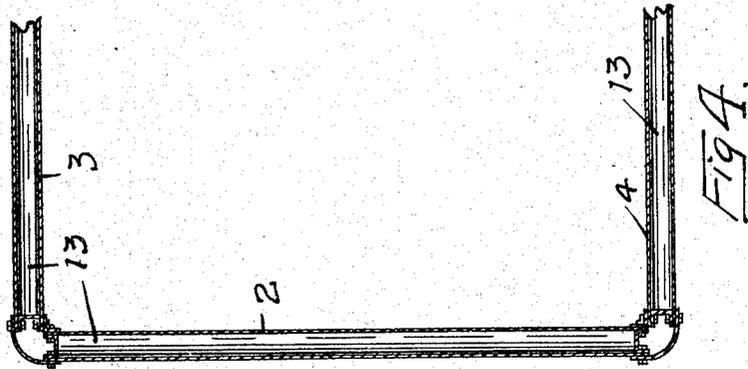


Fig 4.

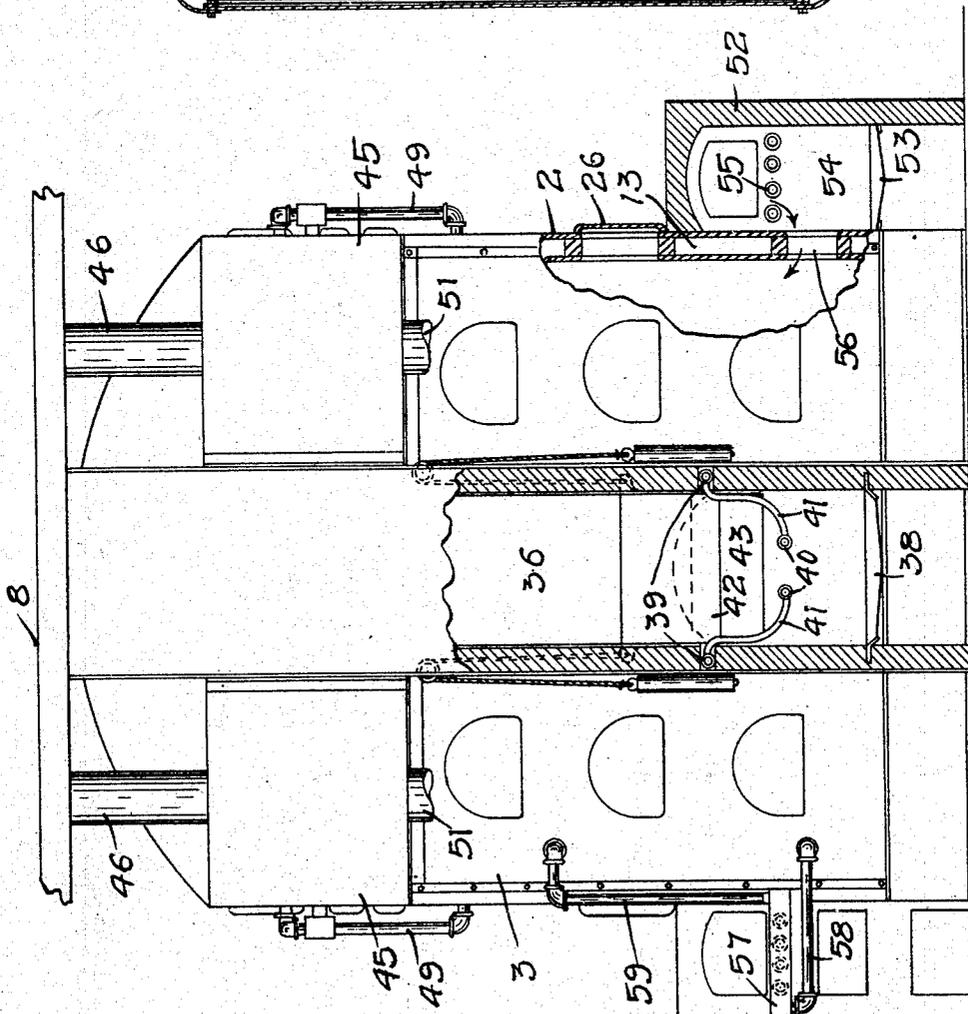


Fig 3.

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UNITED STATES PATENT OFFICE.

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INCINERATOR.

951,905.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed February 9, 1909. Serial No. 476,971.

To all whom it may concern:

Be it known that we, FELIX L. DECARIE, ALEXANDER S. DECARIE, and LOUIS A. R. DECARIE, all of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Incinerators, of which the following is a specification.

The object of our invention is to provide an incinerator having a large capacity and capable of extremely economical operation, to provide means for dividing the mass of material to be consumed, so that the flames can penetrate and work through the material in the combustion chamber more rapidly and perfectly consume the same, to provide improved means for utilizing the heat of the burning material for the generation of steam for heating or power purposes, to provide an improved gas consuming chamber, and to provide improved means for handling the liquid or semi-liquid substance.

Further objects of the invention will appear from the following detailed description.

The invention consists generally in a suspended or hanging grate arranged to support a portion of the material above the grate.

Further, the invention consists in a steam generating chamber above the combustion chamber.

Further, the invention consists in headers located in the lower part of the combustion chamber and having connection with the steam generating chamber.

Further, the invention consists in locating a gas consuming chamber above the steam generating chamber and below the roadway.

Further, the invention consists in an improved auxiliary furnace.

Further, the invention consists in constructing the walls of the incinerator of separable sections and rendering it capable of shipment in knock down form from the factory to the place where it is to be used.

Further, the invention consists in a filling hopper having means of regulating the discharge of material therefrom into the combustion chamber.

Further, the invention consists in grates located in the upper part of the combustion chamber and whereon dead animals may be placed to be consumed.

Further, the invention consists in various constructions and combinations all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1, is a transverse vertical sectional view of an incinerator of steel construction embodying our invention, Fig. 2, is a longitudinal, vertical sectional view of the same, Fig. 3, is an end elevation partially in section, showing the construction and arrangement of the paper chute and the grates upon which the combustible material, such as paper, is deposited. Fig. 4, is a diagrammatic view illustrating the sectional character of the walls of the incinerator, these sections being capable of separation to allow shipment of the apparatus in knock down form.

In the drawing, 2 represents the side walls of the steel construction of the incinerator and 3 and 4 the front and rear walls. Inclosed by these walls is a combustion chamber 5 having a rocking grate 6 of ordinary construction arranged in the lower part of the chamber and operated by the usual grate shaking apparatus, and adapted to support the fuel, such as coal or wood that may be used for starting the combustion in the incinerator.

7 represents hoppers leading to the combustion chamber from a roadway 8, in which covers 9 are set closing the open upper ends of the hoppers. The material is discharged into the combustion chamber through these hoppers in the usual way. We prefer to provide one or more of these hoppers, as indicated in Fig. 1, with slides 7^a and 7^b, located one above another with a space between them and operated by means of cylinders and pistons 7^c. By means of these slides, we are able to control the delivery of material into the combustion chamber, allowing it to remain in the hopper for a length of time, and, finally discharge it therefrom by opening the lower slide upon the hanging grate. We have shown only one of the hoppers equipped in this way, but the other hopper may be constructed in a similar manner, if preferred. Where the material is dumped upon the lower grate of the combustion chamber, it frequently will pack down in such a mass that it is difficult for the fire to penetrate and reach the combustible material and a longer time is also

required for combustion. To obviate this objection, we provide what we term as a suspended or hanging grate, consisting of pipes 10 supported in the upper walls of the combustion chamber and extending downwardly therein and having inwardly curved ends 11 which are inserted into horizontal pipes 12. These pipes are spaced apart and cooperate with the inwardly curved portions 11 of the pipes 10 to support the material in the combustion chamber and suspend it in such a way over the fire beneath that combustion will be hastened and any wet material will be thoroughly dried by being exposed to the hot gases and flames from the material on the lower grate. The walls of the incinerator, as shown, are double, having inner and outer casings with chambers 13 formed between them. Through these chambers water circulates around the combustion chamber. The pipes 10 lead into the chambers 13 and the pipes 14 communicate with the chambers 13 and also with a steam generating chamber 15, which contains a supply of water and is connected with the pipes 14 above and below the water line. See Fig. 1. The chamber 15 incloses the hoppers 7 and extends horizontally over the combustion chamber. A gas consuming chamber 16 is formed over the steam generating chamber and has a lining of fire brick which will absorb and retain the heat from the burning gases. The gas consuming chamber has a flue 16' leading thereto from the top of the combustion chamber, and this flue is inclosed by the steam generating chamber 15. At the rear of the main combustion chamber, we provide a series of pipes 15' connecting the water leg formed in the wall of the boiler with the steam generating chamber, and these pipes are curved and are adapted to support dead animals which may be inserted through the filling opening 15'' and suspended over the flames in the combustion chamber until they are consumed. We have found that where dead animals are dropped down into the combustion chamber upon the grate and rest upon the material therein, there is a tendency to pack the material to be consumed, particularly if it is wet, and seriously delay combustion. All this difficulty is obviated by providing these pipes in the upper part of the combustion chamber. Below the grate 6 is a pan 17 on each side of which headers 18 are horizontally arranged, each having a longitudinal partition 19 and chambers 20 and 21 therein, connected respectively with pipes 22 and 23, which are concentrically arranged and project horizontally from opposite sides of the incinerator toward the middle portion thereof. The chambers 18 are connected by pipes 24 with the top of the steam generating chamber 15, so that a circulation of steam will

be established through the headers and through the pipes 22 and 23 and into pipes 25, which may be utilized to conduct the steam away for heating or power purposes. The liquid, dripping from the mass of material on the grates above, will be evaporated in the pan 17 by the heat from the headers, and at the same time, the lower portion of the mass above will be dried and rendered more combustible by the radiation from the headers.

The water circulates freely through the water legs 13 around the boiler. Doors 26 being provided at intervals through which access may be had to the combustion chamber for the purpose of stirring or examining the burning material. Above the combustion chamber, we provide openings 28 leading to the gas consuming chamber 16 and the flue 29. In this flue a drum 30 is arranged for the purpose of generating steam. This, however, is a common construction and I make no claim to the same herein. A baffle plate 31 is provided in the flue 29 compelling the products of combustion to pass down to the bottom of the descending flue 32 before entering the stack and the valve 33 is provided in the flue 29, by means of which the flow of smoke and gases through the flue is regulated. A flue 34 leads from the pit beneath the lower stationary grate to the flue 32 and is provided with a valve 35.

On the opposite side of the boiler is a combustion chamber 36 for such light combustible material, such as paper and other inflammable refuse. This combustion chamber is provided with a cover 37 which, when removed, allows the material to be discharged into the chamber from the roadway above. The stationary grate 38 is provided in the lower part of the chamber and above this grate is a suspended one, consisting of upper horizontal pipes 39, lower pipes 40 and curved tubes 41 between them, the grate being in two sections, one on each side of the middle line of the chamber. The material, falling on this grate will be supported and prevented from packing down on the lower grate and where there is an abundance of inflammable material it will be unnecessary to provide a fire on the lower grate for heating the walls of the gas consuming chamber. The pipes 39 and 40 are connected with the circulating system of the boiler, and, whenever desired, the slide 42 controlling the passage 43 may be closed and the products of combustion directed down through the tubes of the hanging grate through the passage 44 into the main combustion chamber of the boiler. This will have the effect of heating the water in both the suspended grates and generating steam immediately. When sufficient steam is generated, the slide 42 may be raised and the

products of combustion directed through the opening 43 into the main combustion chamber. While this hanging grate and the combustion chamber 36 are designed for consuming inflammable material and will, to a certain extent, aid in heating the walls of the gas consuming chamber, we prefer, in addition thereto, to provide auxiliary furnaces 45 located one on each side of the chamber 36, see Fig. 3, having each a filling hopper 46 and a lower stationary grate 47 and an upper down-draft grate 48 composed of tubing and connected with the circulating system through a pipe 49. A flue 50 leads from the space between the upper and lower grates of this furnace to the gas consuming chamber. A fire started in this furnace will have the effect of heating the fire brick composing the walls of the gas consuming chamber and raising the temperature thereof sufficiently to cause the consumption of all noxious gases before they enter the stack. The ash pit of this auxiliary furnace has a discharge spout 51 leading to the pit below the grate 38. Auxiliary furnaces 52 are also provided on each side of the incinerator having lower stationary grates 53, combustion chambers 54 and down-draft grates 55 between which and the grates 53, passages 56 are provided leading into the main combustion chamber of the incinerator, the grates 55 having headers 57 connected by pipes 58 and 59, with the water leg of the boiler.

In an apparatus of this kind, it is desirable to provide some independent means for effecting an evaporation of the liquid that is brought to the incinerator. We therefore provide evaporating drums 60 on each side of the boiler having evaporating chambers 61 therein, provided with hoppers 62 and covers 63 therefor. A pipe 64 leads from the evaporating chamber 61 to the combustion chamber 5 of the boiler, through which the dried material may be discharged upon the grates. Flues 65 lead from the top of the evaporating chamber 61 into the gas consuming chamber 16 and through these flues the gases and steam from the evaporating material is conducted and consumed in the chamber 16. A steam chamber 66 is provided in the bottom of the evaporator drum 60 and provided with connections 67, communicating with the pipes 24 and also having draw-off pipes 68 through which the steam and hot water can be discharged for heat or power purposes. Through the door 69, access may be had to the ventilating chamber for the purpose of discharging the contents of these chambers into the main combustion chambers of the incinerator.

We claim as our invention:

1. An incinerator having walls composed of metal plates, with water legs formed between them, a combustion chamber provided

within said walls, a grate in the lower part of said combustion chamber, and a suspended grate composed of pipes depending within said combustion chamber and connected with said water legs through the opposite walls of the combustion chamber. 70

2. An incinerator having side and end walls, a combustion chamber inclosed thereby, said walls having water legs formed therein, and a filling hopper provided in the top of said combustion chamber, a steam generating chamber arranged above said combustion chamber and having pipe connections with said water legs, substantially as described. 75 80

3. In an incinerator, comprising walls having water legs formed therein, and a combustion chamber inclosed by said walls, a grate in the lower part of said combustion chamber, a hanging grate in said chamber composed of tubing connected with said water legs, a steam generating chamber formed above said combustion chamber and having pipe connections with said water legs, and said hanging grate, substantially as described. 85 90

4. In an incinerator, comprising outer walls and a combustion chamber formed therein, a grate in the lower part of said chamber, a hopper and filling opening in the upper part of said chamber, a steam generating chamber arranged above said combustion chamber, a suspended grate, and pipes communicating with said generating chamber and said hanging grate, whereby the circulation is formed through said grate, substantially as described. 95 100

5. The combination, with an incinerator combustion chamber, of evaporating drums supported outside of said chamber and having discharge pipes, a steam generating chamber located above said combustion chamber, a steam chamber provided in the bottom of said evaporating drums, and pipes leading from said steam generating chamber to the chamber in said evaporating drums. 105 110

6. The combination, with an incinerator having a combustion chamber, and a hopper provided with a filling opening, of a steam generating chamber located above said combustion chamber, and an evaporating drum having a pipe connection with said combustion chamber and also having a filling opening and a steam chamber in its lower walls, and a discharge pipe leading therefrom, the pipe connecting said steam generating chamber with the chamber in said evaporating drum, and a discharge flue leading from said evaporating drum, substantially as described. 115 120 125

7. The combination, with an incinerator provided with a combustion chamber, of a steam generating chamber located above said combustion chamber, a gas consuming chamber arranged above said generating chamber 130

- and having a flue connection with the stack, of an evaporating drum having a pipe connection with said combustion chamber, and a filling opening, and a flue connection with
 5 said gas consuming chamber, said evaporating drum having a steam chamber, and a pipe communicating therewith and with said steam generating chamber whereby a circulation is maintained through said chambers, substantially as described.
 10 8. The combination, with an incinerator having a combustion chamber, and a grate in the lower part thereof, of heaters located below said grate and having circulating
 15 means extending horizontally beneath the grate in said combustion chamber, a steam generating chamber located above said combustion chamber, and pipes communicating with said steam generating chamber and
 20 with said heaters.
 9. The combination, with an incinerator having a combustion chamber therein, and a grate in the lower parts of said chamber, of
 25 headers located below said grate and having longitudinal chambers therein with partitions between them, and pipes concentrically arranged and communicating respectively
 30 with said chambers, and a steam generating chamber having pipe connections with one of the longitudinal chambers in said headers, and draw-off pipes for the other chambers in
 said headers.
 10. In an incinerator, the combination, with a combustion chamber, having walls
 35 provided with water legs therein, of a grate and flues provided in the top of said chamber, a steam generating chamber and a grate composed of pipes located in the upper part
 40 of said combustion chamber and communicating with said generating chamber and said water leg, for the purpose specified.
 11. In an incinerator, the combination, with a combustion chamber, of a steam generating
 45 chamber located above the same, filling hoppers provided in the top of said combustion chamber, a gas consuming chamber located above said steam generating chamber and having a passage communicating with said combustion chamber,
 50 said passage being inclosed by the water in said generating chamber, substantially as described.
 12. The combination, with an incinerator having a combustion chamber and a grate,
 55 of headers having longitudinal chambers therein with partitions between them, pipes communicating respectively with said chambers, a steam generating chamber having pipe connections with one of the longitudinal
 60 chambers in said headers and draw-off pipes for the other chambers in said headers.
 13. The combination, with an incinerator, having a combustion chamber therein and a grate, of a steam generating chamber, an
 65 auxiliary furnace, a header therefor, and pipes connecting said header with said steam generating chamber.
 14. The combination, with an incinerator having a combustion chamber and a grate,
 70 of circulating pipes, an auxiliary furnace, and a header provided in said auxiliary furnace and connected with said circulating pipes.
 15. An incinerator having walls and
 75 water legs therein, a combustion chamber, a grate therefor, a header, and circulating pipes connecting said header with said water leg.
 16. An incinerator comprising a combustion
 80 chamber, and water legs inclosing the same, a grate for said chamber, an auxiliary furnace, a header therein, and circulating pipes connecting said header with said water legs.
 85 17. An incinerator comprising walls having water legs and a combustion chamber and grate therefor, a steam generating chamber and pipes connecting said steam
 90 generating chamber and said water legs, and an auxiliary furnace, and circulating pipes therefor connected with said legs.
 18. An incinerator comprising a combustion chamber and a grate therefor, said
 95 chamber having a filling opening and a flue and a passage leading to said flue, a water leg and a steam generating chamber, pipes connecting said water leg with said steam generating chamber and extending
 100 across said passage.
 19. An incinerator comprising a combustion chamber having a passage leading
 105 therefrom, a flue communicating with said passage, a drum arranged in said flue for the purpose specified.
 20. An incinerator comprising a combustion chamber having a grate, a flue and a
 passage leading from said combustion chamber to said flue, circulating pipes extending
 110 across said passage and said incinerator having a filling opening above said circulating pipes, for the purpose specified.
 In witness whereof, we have hereunto set our hands this 2d day of February 1909.
 FELIX L. DECARIE.
 ALEXANDER S. DECARIE.
 LOUIS A. R. DECARIE.
 Witnesses:
 J. A. BYINGTON,
 C. G. HANSON.