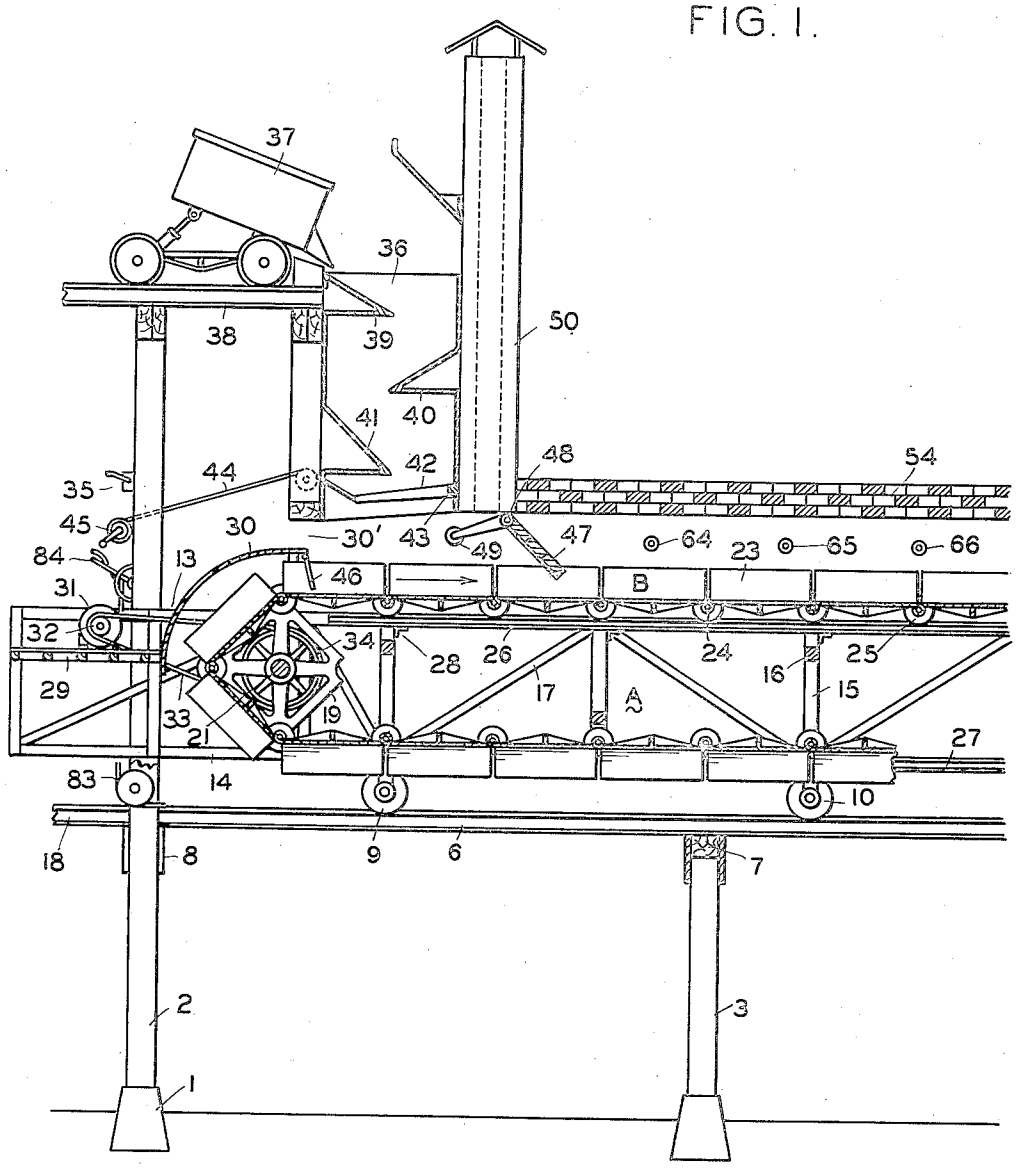
Dec. 17, 1935. A. F. MARTEL 2,024,652

INCINERATOR

Filed Dec. 13, 1933 3 Sheets-Sheet 1

FIG. 1.



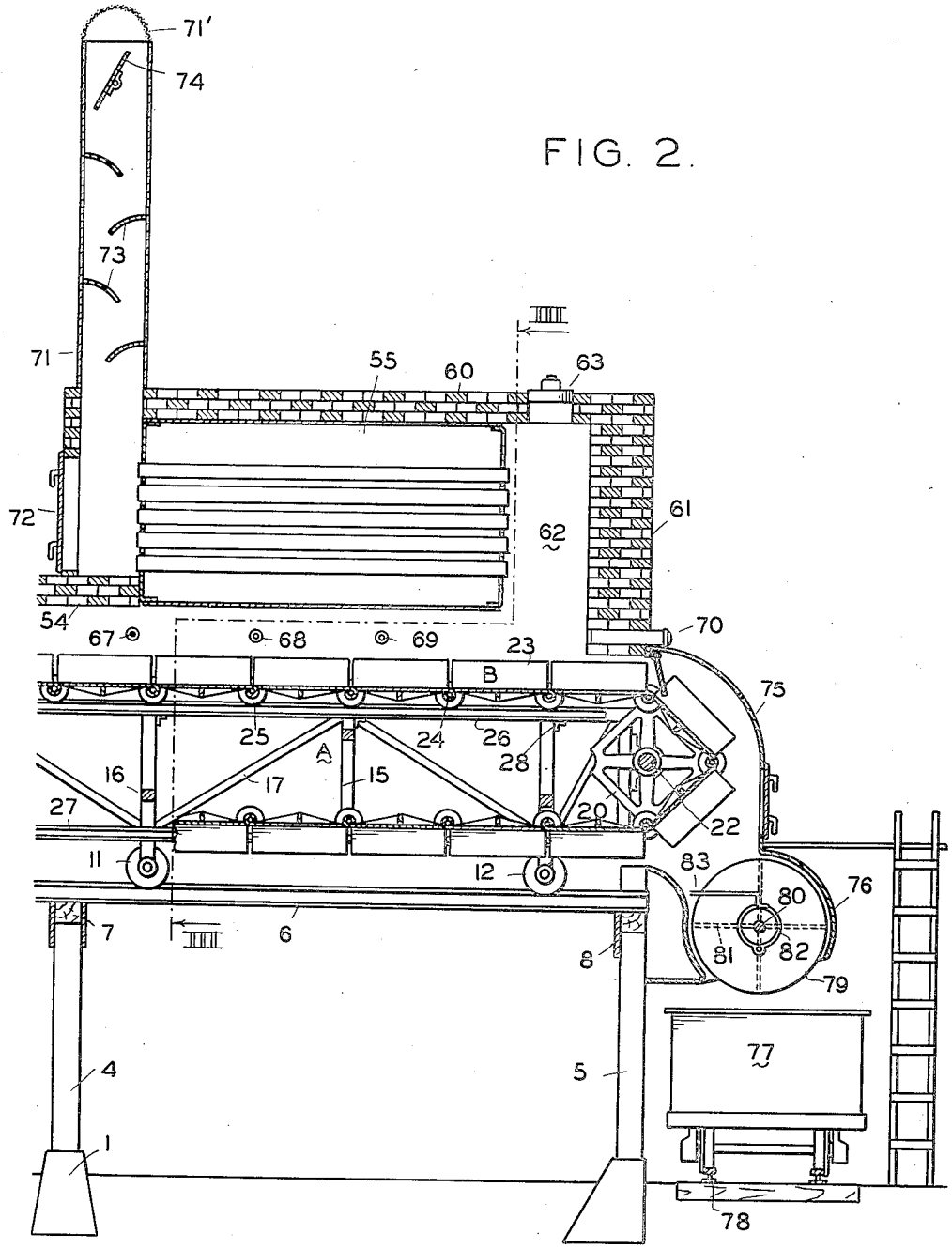
INVENTOR:
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INCINERATOR

Filed Dec. 13, 1933 3 Sheets-Sheet 2

FIG. 2.



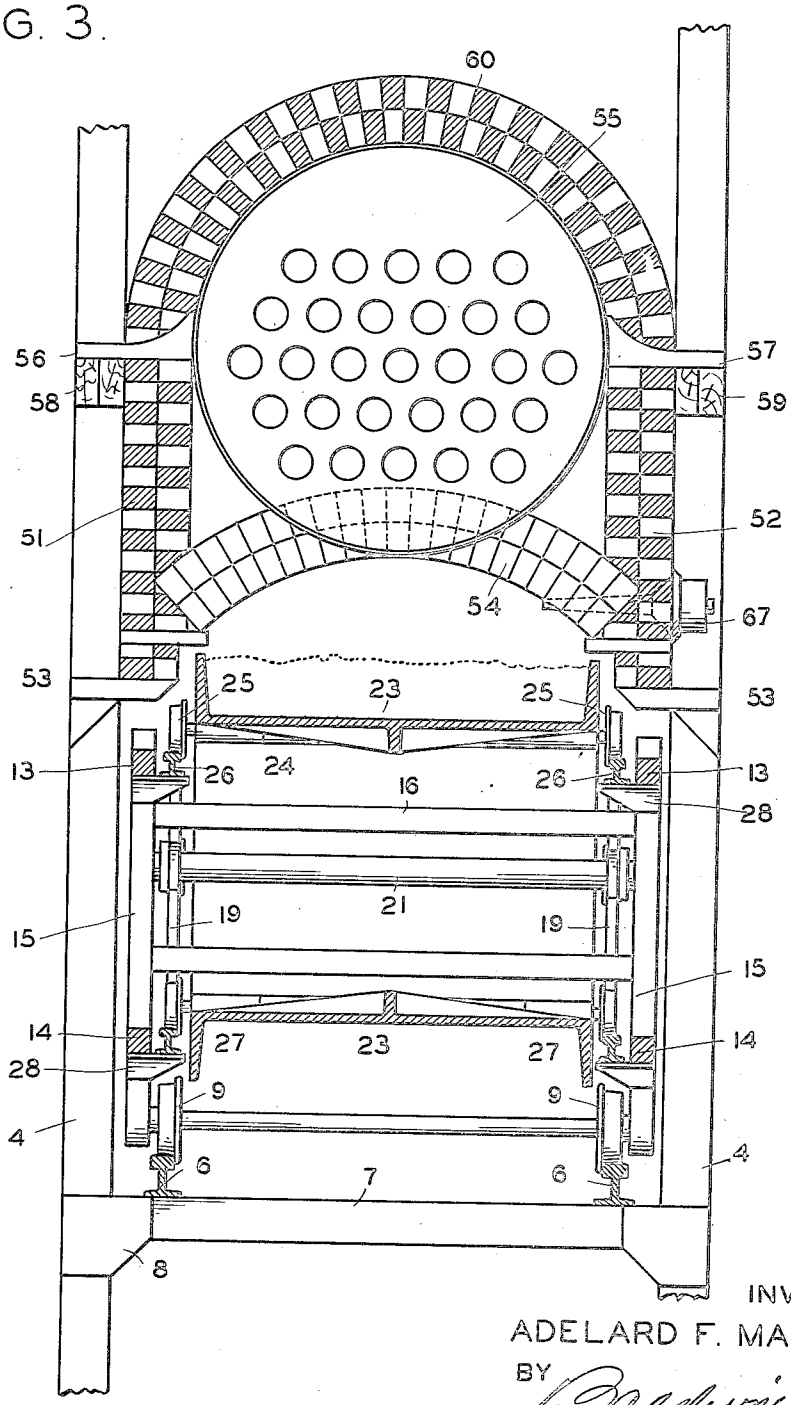
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INCINERATOR

Filed Dec. 13, 1933 3 Sheets-Sheet 3

FIG. 3.



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UNITED STATES PATENT OFFICE

2,024,652

INCINERATOR

Adelard F. Martel, San Mateo, Calif., assignor of one-half to George W. Gates, Burlingame, Calif.

Application December 13, 1933, Serial No. 702,139

1 Claim. (Cl. 110—10)

This invention relates to improvements in incinerators and more particularly to the method and apparatus for garbage disposal by burning.

Among the objects of the invention is the complete reduction to ashes of garbage having a high moisture content.

Another object is to consume the smoke and noxious gases produced by incineration.

Another object is to utilize the waste heat incidental to the process for generating steam.

Another object is to apply the necessary heat for desiccating and igniting the garbage with the minimum wear and tear on the apparatus.

Another object is to progressively incinerate a relatively thin layer of garbage.

A further object is to minimize the labor required to operate the incinerator.

Other objects and advantages appear as the description progresses.

In this specification and the accompanying drawings, the invention is disclosed in its preferred form. It is, however, to be understood that the invention is not limited to this form because it may be embodied in other forms without departing from the spirit of the invention as defined in the claim following the description.

In the accompanying three sheets of drawings:

Figs. 1 and 2, to be read in conjunction with each other, illustrate a vertical section of a garbage incinerator constructed in accordance with the present invention.

Fig. 3 is a transverse vertical section of the same taken on the line III—III in Fig. 2.

In detail, the construction illustrated in the drawings comprises the foundation 1 having pillars such as 2, 3, 4, and 5 mounted thereon and suitably cross braced. The rails 6—6 (see also Fig. 3) are fixed on ties such as 7 which extend transversely between the several pillars and are secured thereto by the brackets 8.

The carriage A has the flanged wheels 9—9, 10, 11, and 12 which engage the rails 6—6. The carriage consists of the longitudinal sills 13—13 and 14—14 joined together by the uprights 15—15 and otherwise rendered rigid by bracing as at 16 and 17. The rails 6—6 extend longitudinally at 18 to permit the carriage A to be withdrawn from its operative position in the incinerator.

A pair of interspaced sprockets 19—19 and 20—20 are fixed on each of the shafts 21 and 22 suitably mounted at the ends of the movable carriage A. The endless travelling grate B consists of a series of channel members 23 hinged together at 24. The flanged rollers 25—25 are mounted on opposite sides of the grate on the pintles of the hinges 24.

The grate B encircles the sprockets 19—19 and 20—20, the rollers 25—25 engaging in openings provided therefor in the sprockets. The rails 26—26 and 27—27 are fixed on the brackets 28 extending from the sills 13 and 14. The rollers 25—25 rest on these rails 26 and 27 to support the travelling grate intermediate the sprockets 19 and 20.

The operator's platform 29 is mounted on an extension of the frame of the movable carriage A. The plate 30 shields the sprockets 19—19 and the grate B thereon at this platform. The motor 31 is mounted on the platform 29 and actuates the travelling grate B through the pulley and belt drive 32, 33, and 34. The speed of the travelling grate can be regulated to meet the varying conditions of the incoming material to be incinerated by the conventional controller rheostat 35 which controls the current supplied to the motor 31.

The garbage is dumped into the incinerator through the vertical chute 36 which discharges on the end of the travelling grate B. The dump truck 37 on the rails 38 conveys the material to the upper end of the chute 36. The inclined baffles 39, 40, and 41 are provided in the chute 36 to break up, and spread the descending material.

The gate 42 is pivoted at 43 at the lower end of the chute. The cable 44, wound on the manually operated spool 45, is arranged to open or close the gate 42 to regulate the rate of feed onto the grate B. The pivoted gate 46 prevents backward flow of the incoming material over the end of the grate B.

The specific form of feeding means shown and described is merely incidental to the successful operation of the present invention.

The entrance to the furnace chamber is closed by the fire brick lined door 47 which is pivoted at 48 and counterweighted at 29. The door 47 impinges on the top of the incoming garbage and further serves to level the material to a substantially uniform thickness on the grate B. The flue 50 is arranged to carry off the products of combustion should any inflammable material in the garbage become ignited before it arrives in the furnace chamber.

The furnace chamber consists of the vertical fire brick walls 51 and 52 which extend along side the upper portion of the travelling grate B

and are supported on the pillars 3, 4, and 5 by the brackets 53. The fire brick arch 54 extends between the walls 51 and 52 over the grate B to form the top of the front portion of the furnace chamber.

The tubular boiler 55 is mounted above the rear portion of the furnace chamber and has the arms 56 and 57 which are supported on the beams 58 and 59 connecting the pillars 4 and 5. The boiler is enclosed by the brick dome 60 which extends upward from the walls 51 and 52. The rear wall 61 of the furnace chamber is spaced from the end of the boiler 55 to form the combustion chamber 62. The fan blower 63 is arranged to direct a draft of atmospheric air into the chamber 62 as required.

The conventional oil or gas burners 64, 65, 66, 67, 68, and 69 are mounted at intervals in the wall 52 and have nozzles discharging transversely into the interior of the furnace chamber. The observation window 70 provided in the rear wall 61 of the furnace chamber permits inspection of the burners during their operation.

The smoke stack 71 rises from the end of the boiler 55 and is provided with the smoke filter screen 71' at its top. The door 72 at the base of the smoke stack 71 permits access to the horizontal fire tubes of the boiler. The baffle plates 73 are provided in the stack 71 to impede the progress of the draft therethrough for purposes later described. The draft can be varied to meet conditions by the damper 74 pivoted in the upper portion of the stack 71.

The sprockets 20—20 are enclosed by the plate 75 extending down into the chute 76 discharging into the ash car 77 on the rails 78. The hopper 79 is rotatably mounted in the chute 76 on the shaft 80. The radial partitions 81 divide the hopper 79 into a series of compartments and serve to close the chute 76. The weight of the ashes discharged from the traveling grate B onto one of the partitions 81 rotates the hopper and dumps the accumulated ashes into the car 77. The operation of the hopper 79 serves to properly distribute the ashes in the car.

The frictional brake 82 is provided on one side of the hopper 79 and is operated by the cable 83, the other end of which is connected to the control lever 84 (see Fig. 1) within reach of the operator on the platform 29. The application of the brake 82 prevents the ashes from passing through the hopper 79, thus permitting the car 77 to be substituted without suspending the operation of the incinerator.

The invention operates substantially as follows: The garbage to be disposed of conveyed by the truck 37 is dumped into the chute 36. The baffle plates 39, 40 and 41 in the chute break the fall of the descending garbage and distribute it laterally in the chute. The garbage drops from the lower end of the chute onto the traveling grate B which is continuously driven by the motor 31.

The lateral distribution of the garbage by the baffles 39, 40, and 41 insures the garbage being uniformly deposited the full width of the grate B (see dotted line, Fig. 3). This prevents exposure of the metal grate to the flames within the furnace chamber and materially lengthens its life.

The thickness of the layer of garbage deposited on the grate B is regulated by the gate 42 which is manually controlled by the cable 44. The operator constantly observes at the opening 30' the nature of the garbage passing through the chute 36 and regulates its flow onto the grate B in accordance with the moisture content thereof. Relatively wet garbage will be deposited on the grate B in a thinner layer than drier material. The rheostat 35 can be also operated to decelerate the motor 31 to retard the speed of the grate B for prolonged runs of wet material. The truck 37 is frequently loaded and dumped to maintain a continuous flow of material through the chute 36.

The garbage on the grate B travels in the direction indicated by the arrow in Fig. 1. Fumes and smoke resulting from pre-ignition are carried off by the flue 50. The garbage passes under the door 47 into the furnace chamber. The door spreads the garbage in a substantially uniform layer on the grate B.

The present process consists in moving the layer of garbage into areas of progressively increasing temperatures until incineration takes place and the material is finally reduced to ashes.

The first three burners 64, 65, and 66 create a temperature of about 1500° F. beneath the arch 54. The garbage as it slowly passes therebeneath is gradually heated and its moisture driven off until it becomes thoroughly desiccated. Even highly aqueous material, such as watermelon, etc., are completely desiccated when spread in a thin layer on the grate B and subjected to the heat of the burners 64, 65, and 66.

The desiccated garbage then passes under the final burners 67, 68, and 69 and is heated until the ignition temperatures of the various substances therein are reached. The burners maintain the material at burning temperatures until it is completely reduced to fine ash.

When the grate B passes around the sprockets 20—20 the ash thereon drops into the rotatable hopper 79 in the chute 76. Accumulations of ash in the hopper are dumped into the car 77. The ash resulting from the present process is completely innocuous, odorless and amounts to but a small fraction of the volume of the garbage disposed of. It may be utilized for land reclamation, fertilizer, and other uses.

The air to support combustion enters the furnace chamber through the space between the flanges of the channels 23 and the adjacent walls 51 and 52. The updraft of cold air protects the traveling grate B from excessive temperature. The products of combustion and the water vapor given off by the garbage during desiccation flow through the furnace chamber into the combustion chamber 62.

The carbon constituents of the products of combustion are fully consumed within the combustion chamber 62 thus preventing the formation of smoke. The burning of some materials, however, unavoidably produces dense smoke. In this instance, the blower fan 63 can be operated to force air downward into the combustion chamber 62. This addition of air causes the flame in the combustion chamber to oxidize and dissipate the carbon particles in the smoke.

The boiler 55 is heated by the products of combustion passing through its fire tubes from the combustion chamber to the stack 71. The boiler also receives the excess heat from the burners 67, 68, and 69 therebeneath as well as the heat generated by the burning of the desiccated garbage. The power generated at 55 will practically offset the cost of the fuel consumed by the burners 64 to 69.

The baffles 73 in the stack 71 retard the escaping products of combustion. This produces

a very slow draft in the furnace and combustion chambers thus promoting the efficiency of incineration. It also minimizes the production of smoke. The draft can be increased or retarded in accordance with conditions by the damper 14. The filter screen 11' prevents the escape of flakes of ash which may be carried up the stack by the draft.

The present process is characterized by the gradual and continuous heating of a graduated mass of garbage to controlled incineration avoiding sudden temperature changes. The grate B in passing inoperatively along the rails 27—27 is exposed to the up draft atmosphere and becomes relatively cooled before garbage from the chute 36 is deposited thereon. This is a considerable factor in the prevention of malodorous gases.

The carriage A may be withdrawn from the furnace chamber along the extension 18 of the rails 6. This permits easy access to the grate B and its supporting structure for cleaning and repairs. It also enables the entry of workmen into the interior of the furnace chamber for repairs to the brick work.

Having thus described this invention, what is claimed and desired to be secured by Letters Patent is:

An incinerator comprising a furnace chamber having side walls and a top and open at the bottom thereof; a pair of sprockets at opposite ends of said chamber; a travelling grate encircling said sprockets; motive means for driving said travelling grate; a feed chute above one end of said grate; baffles in said chute adapted to break up the descending material; a manually operable gate at the bottom of said chute for regulating the feed of said material; a door closing the entrance into said chamber but arranged to permit the ingress of said material; a flue interposed between said feed chute and said door and adapted to carry off the gases generated by said material outside said door; a boiler in said chamber above said grate; a series of burners in said chamber in juxtaposition to said boiler; some of said burners being arranged so that their flames impinge upon said boiler; a stack communicating with said furnace chamber through said boiler; an ash chute leading from the discharge end of said travelling grate; a rotary hopper closing said chute; and means for stopping the rotation of said hopper.

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