

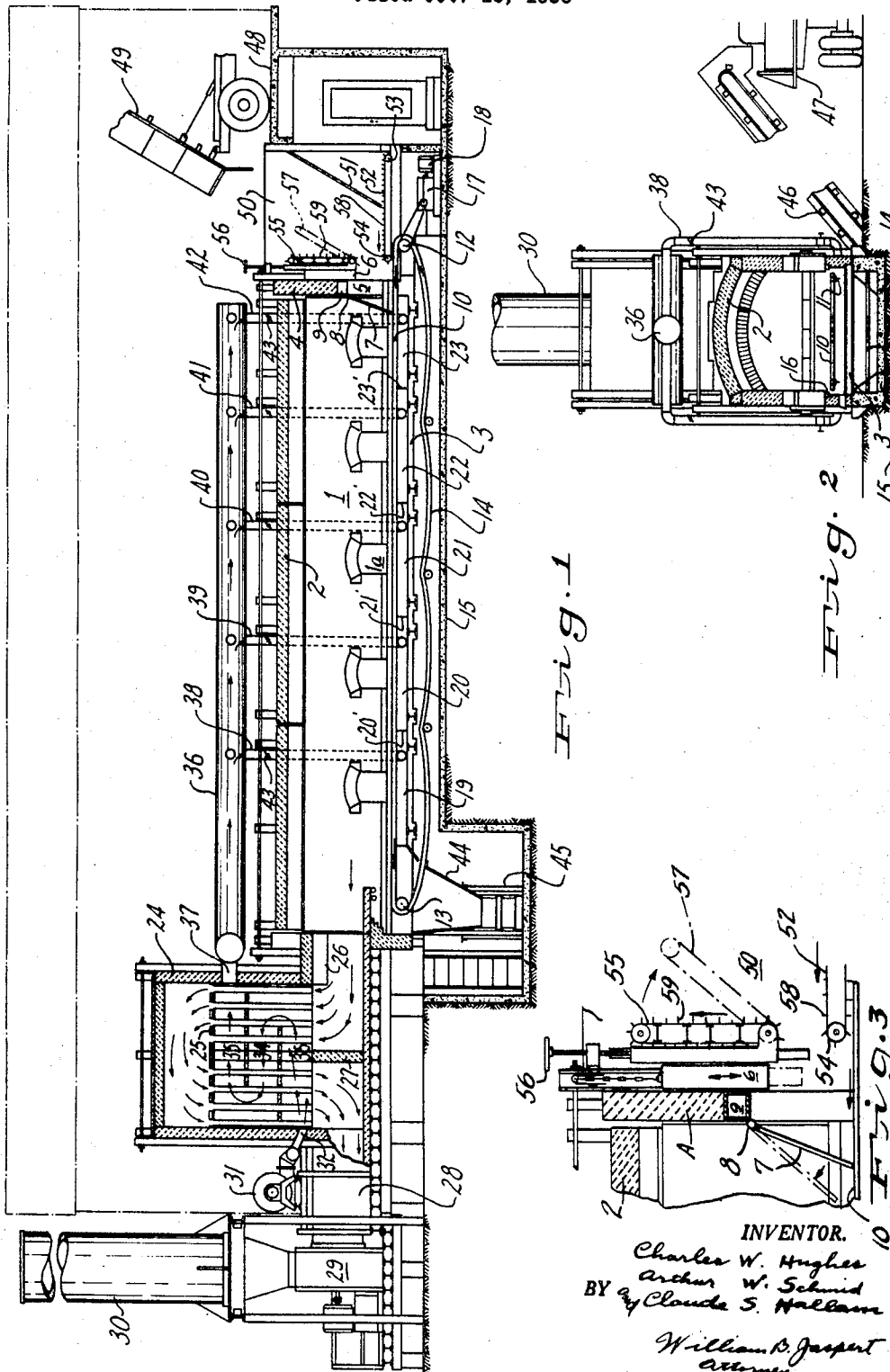
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CONTINUOUS INCINERATOR STRUCTURES

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CONTINUOUS INCINERATOR STRUCTURES

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1 Claim. (Cl. 110—8)

This invention relates to new and useful improvements in continuous incinerator structures more particularly to the continuous incinerators useful in serving densely populated communities and it is among the objects thereof to provide an incinerator of the continuous type having a movable grate of the endless conveyor type passing through an elongated incinerator chamber with improved means for loading the moving grate with refuse or garbage that has been pre-conditioned to be uniformly spread over the moving grate at a uniform depth.

It is a further object of the invention to utilize the combustible materials of the refuse as the sole means of burning same by supplying preheated air in desired volumes and rates to selected areas below the traveling grate to thereby establish separately controllable heating zones throughout the incinerator chamber for the purpose of pre-drying and firing the refuse in a highly efficient manner to obtain the maximum capacity for consuming the garbage in a minimum of time.

A further object of the invention is the provision of a recuperator and pre-heat air manifold with damper control take-off conduits for supplying preheated air to wind boxes extending longitudinally below the grate bars.

These and other objects of the invention will become more apparent from a consideration of the accompanying drawing constituting a part hereof in which like reference characters designate like parts and in which:

Fig. 1 is a vertical cross-sectional view partially in elevation of a continuous incinerator embodying the principles of this invention;

Fig. 2 is a vertical cross-section partially in elevation taken along the line 2—2 of Fig. 1; and

Fig. 3, a vertical section, partially in elevation, of the charging end of the incinerator structure illustrating the conveyor 55 and the water cooled sills and doors on an enlarged scale.

With reference to the several figures of the drawing, numeral 1 generally designates one of the side walls of the incinerator chamber having a roof structure 2 and a base 3. Doors 1a are provided for cleaning out and inspection use. An end wall 4 is provided with a charging opening 5 controlled by an adjustable door 6. A swinging gate 7 is hinged at 8 to a hollow water cooled frame 9, the gate 7 being longer than the charging opening 5 and of substantial weight to rest upon the garbage to spread it uniformly on the traveling grate generally designated by the numeral 10.

As shown in Fig. 2, the grate consists of cast iron bars which are connected to links 11 of a pair of endless chains that pass over a drive drum 12 at one end and an idle sprocket 13 at the other end, Fig. 1. The return strands of the grate chains which are designated by the numeral 14 pass beneath the bottom wall 3 through a duct above the wall 15, Figs. 1 and 2. As shown in Fig. 2, a water cooled sill 16 extends the full length of the incinerator adjacent the load bearing grate bars to prevent excessive heating of the conveyor chain. Drum 12 is driven through a variable speed drive 17 by a motor 18. As shown in

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Fig. 1, the space below the load bearing strand of the grate conveyor is divided into chambers 19, 20, 21, 22 and 23 by partitions 20', 21', 22' and 23'. These chambers may be termed wind boxes.

Pre-heated air is supplied by a recuperator generally designated by the numeral 24 having heat exchange tubes 25 through which the products of combustion from the incinerator chamber pass from an outlet opening 26 to the bottom of the tubes, then vertically on one side of a partition wall 27 and down the other side, as shown by the arrows.

The products of combustion are exhausted from the recuperator 24 through a duct 28 by an exhaust fan 29 leading to a stack 30.

Air is supplied to the recuperator by a blower fan 31 and delivered through an inlet 32 to the passages 33, 34 and 35 of the recuperator structure from which it passes to a preheat air manifold 36 from an outlet 37 through the recuperator wall. The air supplied by the blower 31 passes in heat exchange relation with the recuperator tubes 25 as shown by the arrows and is at a high state of preheat when it passes into the manifold 36. Conduits 38, 39, 40, 41 and 42 extend from the manifold 36 to the wind boxes 19, 20, 21, 22 and 23 respectively, the conduits being provided with dampers or valves 43 to control the volume of pre-heat air supplied to the individual wind boxes below the grate conveyor. After the refuse has been burned away, the residue, ash and non-combustible substances are dumped into a hopper 44 above a water tank 45 from which they are removed by an endless conveyor 46, Fig. 2 and dumped in a truck 47 for disposal.

The refuse or garbage is charged into the incinerator from a loading platform 48, Fig. 1, by dump cart 49 which delivers it to a hopper generally designated by the numeral 50, the hopper having a baffle 51 for guiding the same onto a feeding conveyor 52 having a drive drum 53 and an idle sprocket wheel 54. One or more additional conveyors 55 mounted to be vertically adjustable by a hand wheel screw 56 are provided along the wall of the hopper and the conveyor may be tiltable as shown by dotted lines at 57. The conveyors 52 and 55 are provided with tines 58 and 59 digging into the refuse to cause forward movement thereof by the feeding conveyor to the chain grates which the feeding conveyor overlaps, as shown in Fig. 1. The conveyor 55, however, may be operated to work in an upward direction to control the density of the material as it is being fed on the chain grate, thus assuring a density condition such that the pre-heat air below the load bearing strand of the grate conveyor passes uniformly in an upward direction through the material loaded on the conveyor. The swinging gate or door 7 further aids in spreading the material uniformly on the grate bars, as heretofore stated.

The operation of the above-described incinerator is briefly as follows:

Assuming the combustion within the incinerator chamber to have been initiated by means of combustible materials such as kindling fuel and coal, the garbage or refuse is dumped into the hopper 50 in the manner shown and the feed conveyor 52 delivers the same onto the conveyor grate bars which are traveling from the feeding hopper 50 to the discharge hopper 44 from right to left, as viewed in Fig. 1 of the drawing. Conveyor 55 is also actuated to prevent packing of the material at the entrance end of the incinerator and to loosen it up to make it more accessible to the air after it passes into the incinerator chamber.

Air is delivered to the wind boxes 19 to 23 below the grate bars as the conveyor passes thereover and the preheated air passes through the bed of refuse and initially dries the bed of material to remove the mechanical moisture after which the volatile gases will freely

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burn and become ignited. In its travel through the incinerator chamber, the organic and carbonaceous or other burnable substances will be readily consumed leaving a residue of ash that is dumped into the hopper 44 of the water tank 45. The products of combustion pass from right to left through the incinerator chamber to the recuperator 24 on the righthand side of the partition wall 27, then upward through the recuperator tubes 25 and down on the other side of the partition wall 27 from which they are removed by the exhaust fan 29 and delivered to the stack 30. The air to support combustion is delivered by the blower or combustion fan 31 to the recuperator, thence to the manifold 36 and delivered at regulated volumes controlled by dampers 43 to the wind boxes. This preheated air can be heated to the combustion temperature of the materials being burned so that they are rapidly consumed in passing through the incinerator chamber.

By means of the dampers 43, the volume of preheat air delivered to each wind box may be controlled as desired, thus for example, more hot air may be required to drive off the mechanical moisture above the wind box 23 when the garbage is first delivered to the incinerator's chamber than is required to support combustion at the final stage above the wind box 19.

By means of the above-described incinerator, garbage may be continuously processed by means of equipment of minimum size requiring a minimum amount of space because of the rapid combustion of the materials passing through the incinerator as controlled by the application of the preheated air to different parts of the chamber.

Also, by means of the feed and density conditioning conveyors the garbage is spread on the grate conveyor at a uniform depth and at a workable density to provide for the free flow of the preheated air from the bottom through the bed to dry the material and support combustion.

Although one embodiment of the invention has been herein illustrated and described, it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

We claim:

In an incinerator, an elongated combustion chamber having a movable grate formed of grate bars for sup-

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porting and feeding refuse from one end to the other of said chamber, a charging pit at one end of said chamber and an ash pit at the other end thereof, a recuperator structure adjacent said ash pit having a waste gas inlet communicating with the combustion chamber and an exhaust outlet communicating with a stack, said recuperator having a plurality of flow passages for the products of combustion in heat exchange relation with air flow passages leading to a source of air and to a manifold extending longitudinally of and above the combustion chamber having vertical ducts extending below the movable grate, said combustion chamber being provided with partitions to form wind boxes beneath the movable grate having connections with the vertical ducts of the preheated air manifold, damper regulating means for controlling the volume of preheated air supplied to said wind boxes, said wind boxes being in open communication at the top with the lower surface of the grate bars and a pair of endless chains supporting said grate bars having a drive drum outside of the combustion chamber and terminating above the ash pit at the other end of the combustion chamber, said combustion chamber having a charging opening adjacent the charging pit and a swinging gate mounted for movement inward of the combustion chamber to permit continuous charging of the grate bars, said charging pit having conveying means at the bottom thereof for feeding the charge onto the movable grate bars of the conveyor, and said charging pit having conveying means disposed on a wall thereof with upwardly moving tines for engaging the refuse to control the density of the material fed by the bottom conveyor for regulating the flow of air from the wind boxes to the combustion chamber.

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