July 23, 1935. G. L. TUPPEN 2,008,884

REFUSE DESTRUCTOR

Filed July 28, 1931 3 Sheets-Sheet 1

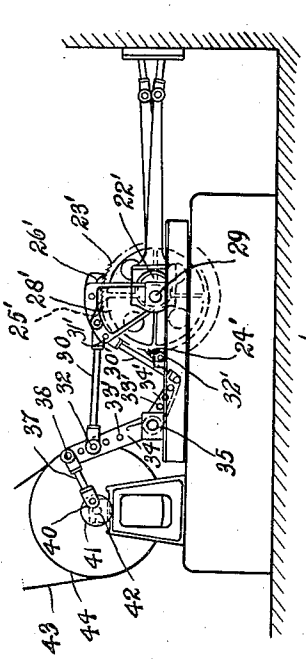


Fig. 1A.

Fig. 1.

INVENTOR.
GERARD LEE TUPPEN.
BY Edward Williams
ATTORNEY.

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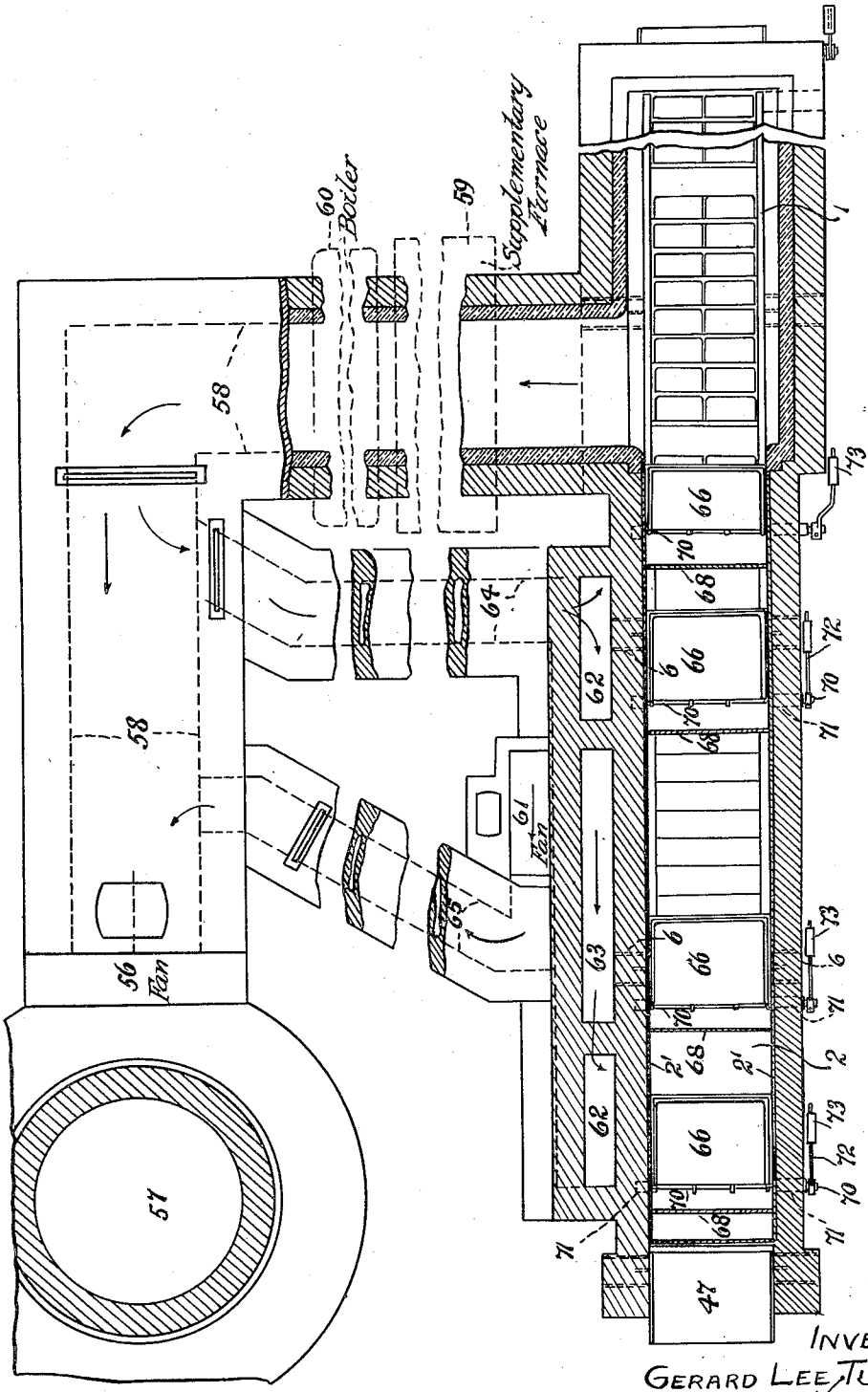


Fig. 2.

INVENTOR,
GERARD LEE TUPPEN
BY Edward Williams
ATTORNEY.

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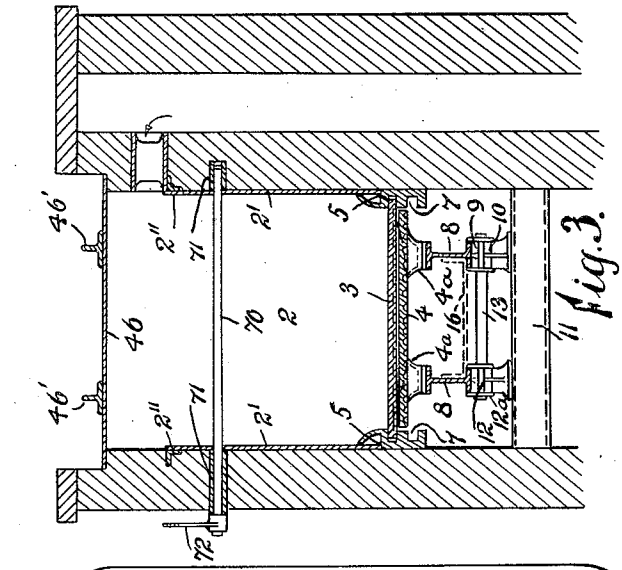


Fig. 3.

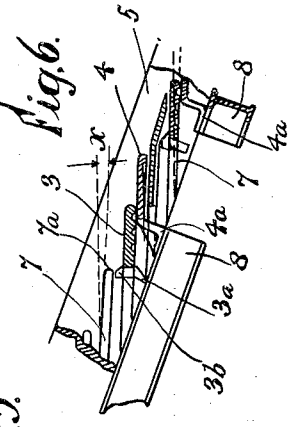


Fig. 6.

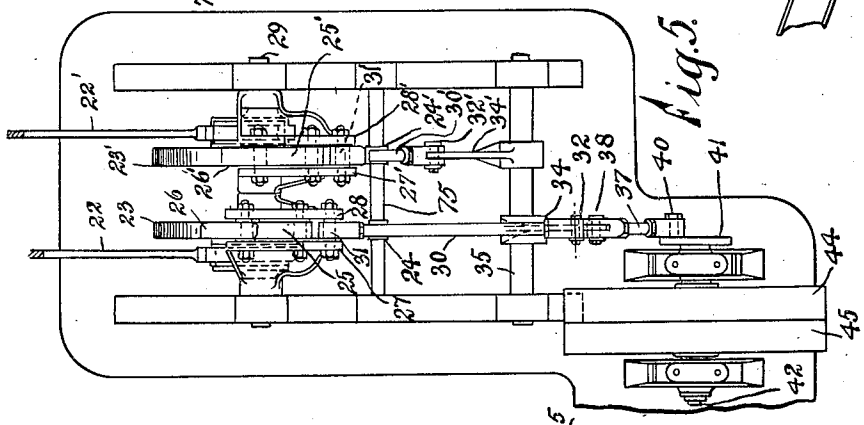


Fig. 5.

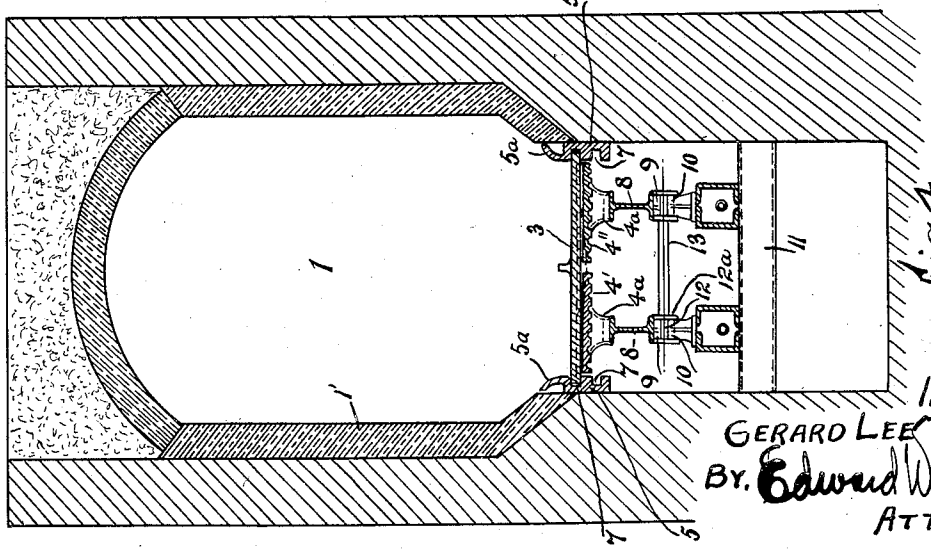


Fig. 4.

INVENTOR
GERARD LEE TUPPEN.
BY. Edward Williams
ATTORNEY.

Patented July 23, 1935 2,008,884

UNITED STATES PATENT OFFICE

2,008,884

REFUSE DESTRUCTOR

Gerard Lee Tuppen, Burma, India

Application July 28, 1931, Serial No. 553,694
In Great Britain December 6, 1930

17 Claims. (Cl. 110—15)

This invention relates to improvements in or relating to destructors for the drying and combustion of miscellaneous unscreened material such as city refuse or garbage.

The principal object of this invention is to provide a destructor of the above-mentioned type, in which compensation is provided for

1. The reduction in bulk of the material during the process of drying,

2. The reduction in bulk of the material during the process of combustion,

3. The varying rate of combustion of the various substances comprised in the material under treatment.

A further object of my invention is to provide such a destructor operating at a pressure below that of the atmosphere so that there is no emission of foul gases.

A still further object of my invention is to provide a destructor of this type in which the drying is effected by heat derived from the combustion of the materials under treatment.

To these ends, the destructor comprises a drying chamber and a combustion chamber, with an inclined grate, the said grate being divided into a plurality of sections, and means for varying as required the rate of progress of the material under treatment down the grate, section by section, at different stages of the drying and combustion processes.

For drying purposes, an adjustable proportion of the combustion gases is withdrawn at a suitable point from the main flue by a fan and caused to pass with aid of baffles through the mattress of material on the grate in the drying chamber at a plurality of points lengthwise of the grate and then returned to the main flue where these gases mingle with the remainder of the gases from the combustion chamber, and the whole passed by a second fan to the smoke stack.

This invention is illustrated in the accompanying drawings, in which

Fig. 1 is a sectional longitudinal elevation of a destructor embodying the present invention, a portion of the fixed fire-bars and moving fire-bars being omitted.

Fig. 1A is an elevation in continuation of Fig. 1, showing means for operating the several sections of moving fire-bars and varying the speed of reciprocation of each section independently.

Fig. 2 is a sectional plan view of the destructor taken on the line II—II—II—II of Fig. 1.

Fig. 3 is a cross section to an enlarged scale on the line III—III of Fig. 1.

Fig. 4 is a cross section to the same enlarged scale on the line IV—IV of Fig. 1.

Fig. 5 is a plan to an enlarged scale of the operating mechanism shown in Fig. 1A and

Fig. 6 is a broken sectional elevation showing a portion of the moving and fixed fire-bars at the junction of two sections of moving fire-bars.

Referring to the drawings, the destructor shown comprises a combustion chamber **1** and a single drying chamber **2**. The inclined grate comprises fixed fire-bars **3** and movable fire-bars **4**. As shown, between every two fixed fire-bars **3** there is located a movable fire-bar **4**. The fixed fire-bars **3** are carried by side racks **5** supported on each side wall of the drying and combustion chambers. Each side rack **5** is divided into suitable lengths and each length is independently secured to dogs **6** built into said side walls so that each length of the side racks may expand and contract independently. The racks **5** are mounted at a suitable angle with the horizontal according to the nature of the material to be treated, for example at an angle of the order of 21°, and are provided with parallel slots **7** for the reception of the fixed bars **3**. In order to prevent the working back of fine materials and dust, the slots **7** are not arranged horizontally but at a slight angle *x*, say for example 3° with the horizontal (see Fig. 6), so that the fixed fire-bars are tilted somewhat, the forward edges being lower than the rearward edges. The slots **7** are closed at their forward ends **7***a*, so that the fixed fire-bars may be readily mounted with a line joining their forward edges at the same angle with the horizontal as the racks **5**. The fixed fire-bars **3** consist of plates each stiffened by a longitudinal web **3***a* on the underside (see Fig. 6). Those fixed fire-bars **3** located within the combustion chamber **1** are advantageously also provided with a short central transverse stiffening web **3***b*. The fixed and movable fire-bars are spaced apart sufficiently to allow the free passage of air. The movable fire-bars **4** consist of plates with webbed feet **4***a* bolted on a suitable framework, or as shown to two inclined reciprocating beams **8**, **8**, so that said plates are parallel to the fixed bars **3**. The fire-bars **4** extend the full width between the side racks **5** in the drying chamber, but in the combustion chamber, the fire-bars **4** are transversely divided into two sections **4'**, **4''** so as to clear the stiffening central web **3***b* on the fixed fire-bars. Reciprocating framework for supporting the movable bars **4** is divided into as many sections, and each section is of such a length as may be required for varying the rate of progress of the ma-

terial under treatment down the grate section by section at different stages of the drying and of the combustion processes. As shown, the framework consists of beams 8, 8 divided into two sections only, one of which extends throughout the drying chamber 2 and into a certain portion of the upper part of the combustion chamber 1, while the other sections extends through the remainder of the combustion chamber. Each section of the beams 8, 8 is carried by two or more pairs of roller paths, lines passing through the centers of the rollers of two or more pairs being located at the same angle with the horizontal as beam 8. Each roller path consists of an upper bracket 9 bolted to the under side of a beam 8 and a bottom bracket 10 bolted to and carried by a transverse beam or beams 11 carried by the side walls of the drying and combustion chambers. Rollers 12 located between the brackets 9 and 10 are preferably provided with flanges 12a adapted to engage the sides of the brackets and the rollers of each pair of roller paths are spaced apart by a rigidly connected shaft 13. In order to reduce clearance spaces at the point where the upper end of a baffle wall located beneath the grate such as the end wall 14 of the combustion chamber 1, meets the grate, the beams 8, 8 are cut so as to permit of free reciprocation of the beams without coming into contact with the baffle wall and the two adjacent ends of the beams are connected together by longitudinal members 15 of relatively narrow cross section. Obviously, should two adjoining sections of the beams be located one on either side of the baffle wall, the connecting members 15 are not required and the question of reducing clearance spaces does not arise. The beams 8, 8 are cross connected by suitable bracing members 16. At points in the grate between adjacent ends of separate lengths of beams 8, 8 and at the lower end of the grate adjacent the ash and clinker outlet 17, a special fixed fire-bar 18 is mounted in rack slots between two fixed fire-bars 3. Each fire-bar 18 is provided with an apron 19 at an angle with the horizontal corresponding with that of the racks 5.

The material under treatment is moved down the grate in conjunction with the natural gravitational movement by imparting a reciprocating movement to the sections of beams 8, 8, for instance by means of reciprocating rods, tubes or bars 20, 20 at one end thereof secured to, if arranged horizontally, otherwise pivoted to, brackets 21, 21 suitably mounted on the beams. Where the reciprocating rods 20, 20 pass through baffle walls such as end wall 14 of combustion chamber 1, they are supported in roller glands 69 boxed in at each end and built into the wall. The power for driving the reciprocating rods 20, 20 may be derived from any suitable source, but advantageously from steam raised by the hot gases of combustion from chamber 1. The length of the stroke of the beams 8, 8 is preferably such that at one end thereof the outer ends of the moving fire-bars 4 are brought below the outer ends of the fixed bars 3 immediately above them and at the other end of the stroke the outer ends of the moving fire-bars 4 cover the outer ends of the fixed bars 3 immediately below them. By imparting a reciprocating movement to each section of the movable fire-bars 4 independently, that is to say each section having its own operating gear, the frequency of the reciprocating movement may be regulated as desired and thereby the rate of progress of the material under treatment down the grate may be regulated section by section at different stages of the drying and combustion processes. One form of operating gear meeting such conditions is shown in Figs. 1A and 5, where each reciprocating rod 20 is driven by a corresponding eccentric rod 22, 22'. Each eccentric is carried or otherwise driven by a corresponding ratchet wheel 23, 23'. Each ratchet wheel is provided with a locking pawl 24, 24' carried by a shaft 75 and with a plurality of oscillating operating pawls 25, 26 and 25', 26' pivoted on and between pairs of carrier cheeks 27, 28 and 27', 28' rigidly bolted together and capable of angular movement about the axis of said wheels and of a shaft 29 upon which the wheels are freely mounted. Each pair of cheeks 27, 28 and 27', 28' with the corresponding operating pawls 25, 26 and 25', 26' is caused to oscillate by a corresponding connecting rod 30, 30' pivotally connected at one end to the pair of cheeks by a pin 31, 31' and at the other end pivotally connected by a removable pin 32, 32' located in any one of a number of corresponding holes 33, 33' provided lengthwise of a corresponding lever 34, 34' each rigidly mounted on an oscillating countershaft 35. The countershaft 35 is caused to oscillate by means of a connecting rod 37 pivotally connected at one end by a removable pin 38 located in one of the holes 33 provided lengthwise of one of the levers 34, and at the other end to a crank pin 40 shown mounted on a disc 41 secured to a rotating shaft 42 which, as shown, is driven by a belt 43 and fast and loose pulleys 44, 45.

With such an arrangement, the angle of oscillation of both pairs of pawl carrier cheeks 27, 28 and 27', 28' and thereby the speed of rotation of both ratchet wheels and corresponding eccentrics, and consequently the frequency of the reciprocating movements of both sections of moving fire-bars 4 can be varied simultaneously by simply varying the location of the pin 38 in the lever 34 and the said angle of oscillation can be again varied by varying the location of the pins 32, 32' in the levers 34, 34', or, having adjusted said angle by correspondingly adjusting the location of the pin 38, the relative frequency of the reciprocating movements of the two sections of moving fire-bars 4 can be adjusted by varying the location of one of the pins 32, 32' in the corresponding levers 34, 34'.

The destructor may be constructed mainly of brickwork, the combustion chamber 1 being provided with a lining 1' of firebrick or other suitable refractory material and the side walls of the drying chambers 2 being protected by plates 2' of a suitable metal, for example iron or mild steel inserted at their lower edges between a suitable moulding 5a integral with or secured to the upper edges of the racks 5 and at their upper edges stiffened by angle irons 2' and bolted to said side walls. The top of the drying chamber 2 may conveniently be closed by plates 46 stiffened with T-irons 46' and of a suitable length to be conveniently handled and these plates may be provided with a light covering of earth or the like. At the upper end of the drying chamber 2, a hopper 47 is provided forming a connection with the storage floor 48 for the dumping of the material to be treated. At the lower end of the combustion chamber, the ash and clinker outlet 17 comprises a door frame 49 and a door 50 mounted on a horizontal shaft 51 and biased to the closed position by its own weight and that of a counterbalancing weight 52 adjustably mounted on a lever 53 rigidly secured on shaft 51 at such an angle with the door

50 that when this has been opened to the desired degree, the weight 52 will have passed the vertical plane through the axis of shaft 51 to a sufficient extent to wholly or partially counterbalance the weight of the door. The sides of the door frame 49 are shrouded at 54 to a sufficient extent to avoid an undesirable inrush of cold air into the combustion chamber, except that which might pass through the hot clinker and thereby become heated.

In one side wall at the upper level of the combustion chamber 1 is an archway 55, through which the combustion gases are drawn by an exhaust fan 56 located near a smoke stack 57 into a main flue 58. The gases in the main flue 58 may be utilized in a supplementary furnace indicated by dotted lines 59 and/or in a boiler indicated by dotted lines 60. The supplementary furnace 59 may be used for the combustion of selected or any particular material, such as animal bodies for example. The boiler 60 may be utilized in the known manner for the raising of steam which may be used, for example, as the driving power for the gear operating the sections of moving fire bars 4 and other mechanism that may be employed in connection with the destructor.

The mattress of material on the grate within the drying chamber 2 is dried by combustion gases withdrawn by a second exhaust fan 61 from the main flue 58 at a suitable point, and where a supplementary furnace structure 59 and/or a boiler structure 60 is employed, said point will be located between said structure or structures and the exhaust fan 56. The gases so withdrawn are caused to pass by the action of the fan 61 and under the influence of a suitable number of baffle walls or plates, arranged transversely of the grate, through the mattress of material on the grate in the drying chamber 2 a given number of times and thereupon returned to the main flue 58 and, under the influence of the fan 56, delivered to the stack 57 together with the remainder of the combustion gases. To these ends, as shown in Figs. 1 and 2, one or both of the side walls of the drying chamber 2 is or are provided with one or more inlet passages 62 arranged longitudinally of said chamber on either side of one or more outlet passages 63 of correspondingly increased cross-sectional area, the inlet passages 62 being connected by a branched by-pass flue 64 with the main flue 58 and the fan 61 being located between the outlet passage 63 and a by-pass flue 65 returning the gases to the main flue 58. Pivoted baffles 66 are shown between the hopper 47 and the adjacent passage 62, between the passage 63 and adjacent passages 62, and between the upper end of the combustion chamber 1 and the adjacent passage 62. These baffles bear by their own weight, assisted if necessary by weight 73, upon the mattress of material upon the grate independently of any variation in thickness of the mattress. In order to diminish the size of the pivoted baffles 66, these may be pivoted on a horizontal axis immediately below fixed baffle plates 68 supported by the side walls of the chamber 2. As shown, the baffles 66 are secured to shafts 70 carried by bearings 71 built into the side walls of the drying chamber. At a convenient point inside or outside the drying chamber, levers 72 are secured to the shafts 70 and adjustably carry weights 73.

The material, dumped on the floor 48 for treatment, is fed through the hopper 47 on to the top bar of the grate, whence it cascades downwards by gravitly, assisted by the action of the moving fire-bars, which action not only prevents adherence of clinker to the bars but also assures that any voids formed in the mattress of material,—as for example by the more rapid burning of lighter constituents—will be quickly and automatically closed. By the use of pivoted baffles bearing on the mattress of material, the combustion gases are forced by the induced draught to pass through the material more than once before reaching the stack and irrespective of the reduction in bulk of the material in the process of drying, while the curved contour of the baffles tends to prevent any banking up of the material against the baffles. By dividing the frames supporting the moving bars of the grate into sections, providing each section with separate operating gear and providing each gear with corresponding means for regulating the frequency of the reciprocating movement, the rate of progress of the material down the grate in the drying and in the combustion chamber can be regulated to compensate for the reduction in bulk of the material.

Although the frames supporting the moving bars have been shown in two sections only, it is to be understood that said frames may be divided into any desired number of sections according to the nature of the material to be treated, provided that each section has its own operating gear with corresponding means for regulating the frequency of the reciprocating movement as aforesaid.

It is also to be understood that in some cases a single baffle may suffice in the drying chamber when the combustion gases withdrawn from the main flue will pass into said chamber on one side of the baffle around this through the material on the grate to the other side of the baffle on its return to the main flue.

The term "grate" is to be understood as including the bars supporting the material under treatment in the drying chamber, as well as the bars supporting the material in the combustion chamber.

It will also be understood that the references throughout this specification to "treatment" of the materials are generic in that they include both the drying and combustion phases.

It is further to be understood that in place of a rotating or oscillating eccentric or equivalent crank for providing a reciprocating movement of the sections of frames supporting the moving bars 4, said movement may be obtained by means of a ram or piston, provided always that the frequency of said movement can be regulated as desired.

The reciprocating movement of the sections of frames supporting the moving bars 4 may include also a small rise and fall, the fixed bars 3 being spaced accordingly. The rise and fall during the reciprocating movement aforesaid may be obtained, for example, by suitably arranging or forming the bottom roller bracket 10 carrying the sections of frames supporting the moving bar 4, or may be obtained by any other suitable well-known means.

Although the grate has been shown as a continuous incline, the portion of the grate located in the combustion chamber may be stepped down with respect to the portion of the grate in the drying chamber, and in any case, the angles of inclination of the two said grate portions may differ. In the case of a larger installation, the arrangement of the grate as described may be duplicated side by side within the enclosing walls

and complete units, whether with duplicated groups, or not, may be arranged side by side operating with one or more units in reserve or in parallel.

In a larger installation, the ash and clinker would fall in due course into a stream of running water and under a water seal to be thereby carried away to a settling sump. The steam rising from the quenched ash and clinker would be drawn into the furnace by the induced draught.

Instead of using flue gases as the elastic fluid drying medium I may use as I have previously proposed free air heated by a heater such as is well known and commonly used between the boiler and smoke stack.

This heated air will then be passed through the refuse or material to be dried while in the drying section by the same means as employed in the case of flue gases and upon leaving the drying section will be delivered in the well known manner to the space under the combustion grate, with or without the admission of additional air as may be required.

It will be observed that while the employment of induced draught for the purpose of circulating combustion gases through the drying chamber prevents the emission of foul gases from the drying section, as previously stated, the use of a second induced draught fan at the base of the smoke stack enables the whole plant to be operated at a pressure below that of the atmosphere.

I claim:—

1. In a destructor for the drying and combustion of city refuse and other miscellaneous unscreened material comprising drying and combustion chambers, an inclined grate with fixed and movable bars arranged at a small angle with the horizontal in said chambers so that the forward edge of each bar is lower than its rearward edge, sectional side girders for carrying said fixed bars, each of said sections being free to expand and contract independently, sectional framework for carrying successive groups of said movable bars, supports for said framework, means for reciprocating each section of said framework independently to advance and retire said movable bars between said fixed bars, and means for varying the frequency of reciprocation of each section of said framework independently.

2. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened material comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed bars and interposed movable bars extending through both of said chambers, means for passing an elastic fluid drying medium through the materials on said grate in said drying chamber, means for reciprocating said movable bars by sections in a direction lengthwise of said chambers, each succeeding section being reciprocated at a frequency less than that of the preceding section.

3. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed bars and interposed movable bars extending through both of said chambers, means for inducing a draft through the materials on the inclined grate in said combustion chamber to consume said materials, means for passing an elastic fluid drying medium through the materials on the inclined grate in said drying chamber by induced draft, means for reciprocating said movable bars by sections in a direction lengthwise of said chambers, each succeeding section being reciprocated at a frequency less than that of the preceding section.

4. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed bars and interposed movable bars extending through both of said chambers, means for passing an elastic fluid drying medium through the materials on the inclined grate in said drying chamber by induced draft, means for reciprocating said movable bars by sections in a direction lengthwise of said chambers including means for varying the frequency of reciprocation of each of said sections independently.

5. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed bars and interposed movable bars extending through both of said chambers, means for passings an elastic fluid drying medium through the material on the inclined grate in said drying chamber by induced draft, means for reciprocating said movable bars by sections in a direction lengthwise of said chambers including means for varying the frequency of reciprocation of each of said sections independently and means for varying the frequency of reciprocation of all of said sections simultaneously.

6. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed bars and interposed movable bars extending through both of said chambers, means for passing an elastic fluid drying medium through the materials on the inclined grate in said drying chamber by induced draft, means for reciprocating said movable bars by sections in a direction lengthwise of said grate and at a small angle to the horizontal whereby said movable bars are caused to rise and fall during each reciprocation thereof, including means for varying the frequency of reciprocation of each section independently.

7. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed and interposed movable bars extending through both of said chambers, means for passing an elastic fluid drying medium through the materials on the grate in said drying chamber a plurality of times by induced draft including a plurality of movable baffles arranged transversely of said drying chamber and adapted to rest by gravity upon the materials on said inclined grate whereby said drying chamber is divided into a plurality of compartments, inlet passages for said drying medium to some of said compartments and outlet passages for said drying medium from other of said compartments, means for reciprocating said movable bars by sections including means for varying the frequency of reciprocation of each section independently.

8. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened

materials comprising a drying chamber, a combustion chamber below the level of and communicating with said drying chamber, an inclined grate with fixed and interposed movable bars extending through said chambers, means for passing an elastic fluid drying medium through the material on said grate in said drying chamber by induced draft including a plurality of baffles arranged transversely of said drying chamber, each pivoted along its upper edge and arranged to rest on the material on said grate along its lower side at an angle on the forward side of the vertical through the axis of the pivot irrespective of the depth of said materials whereby said drying chamber is divided into a plurality of compartments, inlet passages for said drying medium to some of said compartments and outlet passages for said drying medium from other of said compartments, and means for reciprocating said movable bars by sections including means for varying the frequency of reciprocation of each section independently.

9. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials comprising drying and combustion chambers, an inclined grate extending through both of said chambers with fixed and interposed movable bars, means for reciprocating said movable bars by sections including means for varying the rate of reciprocation of each section independently, a plurality of movable baffles arranged transversely of said drying chamber and adapted to rest on the materials on said grate, said movable baffles dividing said chamber into a plurality of compartments, a main flue for carrying off the combustion gases from said combustion chamber, inlet passages leading to some of said compartments, a bypass flue for conducting a portion of the combustion gases from said main flue to said inlet passages, an outlet for said gases from the remaining compartments, and means including a flue connecting said outlets to said main flue for exhausting said gases from said remaining compartments.

10. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened material, comprising a drying chamber and a combustion chamber below the level of said drying chamber, an inclined grate arranged in said chambers with fixed and movable bars, a vertical baffle wall below said grate between said drying and combustion chambers, a vertical baffle wall below said grate adjacent the upper end thereof, sectional framework for carrying successive groups of said movable bars, means for reciprocating each section of said framework independently to advance and retire said movable bars between said fixed bars including reciprocating members each connected at one end to a corresponding section of said framework and each of sufficient length to pass through said second mentioned wall, gland boxes carried by said wall for supporting said members and adapted to act substantially as air-locks, means for varying the frequency of reciprocation of each of said sections of the framework independently, and means for passing an elastic fluid drying medium through the materials on the grate in said drying chamber.

11. A destructor, for the drying and combustion of city refuse and other miscellaneous unscreened materials, comprising a drying chamber and a combustion chamber below the level of said drying chamber, an inclined grate with fixed and movable bars arranged in said chambers, sectional framework for carrying successive groups of said movable bars, means for reciprocating each section of said framework independently to advance and retire said movable bars between said fixed bars including a reciprocating member connected to each section of said framework, means for imparting a reciprocating movement to each of said members independently comprising a ratchet wheel, a locking pawl for said wheel, a plurality of operating pawls mounted on pivots carried by an element capable of oscillation about the axis of said wheel, a power-driven shaft, means operated by said shaft for imparting an angular movement to each of said elements independently, means for varying the angle of movement of each element independently and means for passing an elastic fluid drying medium through the materials on the grate in said drying chamber.

12. A destructor, for the drying and combustion of city refuse and other miscellaneous unscreened materials, comprising a drying chamber and a combustion chamber below the level of said drying chamber, an inclined grate with fixed and movable bars arranged in said chambers, sectional framework for carrying successive groups of said movable bars, means for reciprocating each section of said framework independently to advance and retire said movable bars between said fixed bars including a reciprocating member connected to each section of said framework, means for imparting a reciprocating movement to each of said members independently comprising a ratchet wheel, a locking pawl for said wheel, a plurality of operating pawls mounted on pivots carried by an element capable of oscillation about the axis of said wheel, a power-driven shaft, a counter-shaft, means operated by said power driven shaft for imparting an angular movement to said counter shaft, means for varying the angle of movement thus imparted to said countershaft, means operated by said countershaft for imparting an angular movement to each of said elements independently, means for varying the angle of movement of each element independently, means for passing an elastic fluid drying medium through the materials on the grate in said drying chamber, a stack, and means for passing said medium and the combustion gases from said combustion chamber under induced draft to said stack.

13. Apparatus for treating city refuse and other miscellaneous unscreened materials comprising a chamber, an inclined grate having fixed and interposed movable bars arranged in said chamber, means for passing an elastic fluid medium through the materials on said grate, means for reciprocating said movable bars by sections in a direction lengthwise of said chamber including means for independently increasing the frequency of reciprocation of any superior section with respect to a succeeding section to compensate for changes in volume of said materials.

14. Apparatus for treating city refuse and other miscellaneous unscreened materials comprising a drying chamber, a combustion chamber, a grate having fixed and interposed movable bars extending through both of said chambers, means including baffle members arranged transversely of said drying chamber for passing an electric fluid medium through the materials on said grate a plurality of times and means for reciprocating said movable bars by sections in a direction lengthwise of said chambers including

means for independently increasing the frequency of reciprocation of any superior section with respect to a succeeding section to compensate for changes in volume of said materials.

15. Apparatus for treating city refuse and miscellaneous unscreened materials comprising a drying chamber, a grate arranged in said chamber, a plurality of baffle members arranged transversely of said chamber above said grate pivotally supported along the upper edge thereof and of such depth as to normally bear on the materials on said grate whereby said chamber is divided into three or more compartments, an open compartment beneath said grate and substantially coextensive with said last mentioned compartments, means for supplying an elastic fluid drying medium to end compartments, an outlet for the intermediate compartment and means for withdrawing said drying medium from said intermediate compartment by induced draft.

16. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials, comprising a drying chamber, a combustion chamber communicating with said drying chamber, a sectionalized grate extending through both of said chambers, a transversely arranged baffle member for substantially preventing communication between the spaces above said grate in said chambers, said baffle member being pivoted along its upper edge and arranged to rest on the materials on said grate along its lower side at an angle on the forward side of the vertical through the axis of the pivot, means for passing an elastic fluid drying medium through the materials on said grate in said drying chamber by induced draft, and means for feeding said materials over each succeeding section of said grate at a progressively decreasing rate.

17. A destructor for the drying and combustion of city refuse and other miscellaneous unscreened materials, comprising a drying chamber, a combustion chamber communicating with said drying chamber, a sectionalized grate extending through both of said chambers, a transversely arranged baffle member for substantially preventing communication between the spaces above the grate in said chambers, said baffle member being pivoted along its upper edge and arranged to rest on the materials on said grate along its lower side at an angle on the forward side of the vertical through the axis of the pivot, means for inducing a draft through the materials on said grate in said combustion chamber to consume said materials, means for passing an elastic fluid drying medium through the materials on said grate in said drying chamber by induced draft, and means for feeding said materials over each succeeding section of said grate at a progressively decreasing rate.

GERARD LEE TUPPEN.