Sept. 30, 1969 H. KREMER 3,469,544

INCINERATOR

Filed March 14, 1968

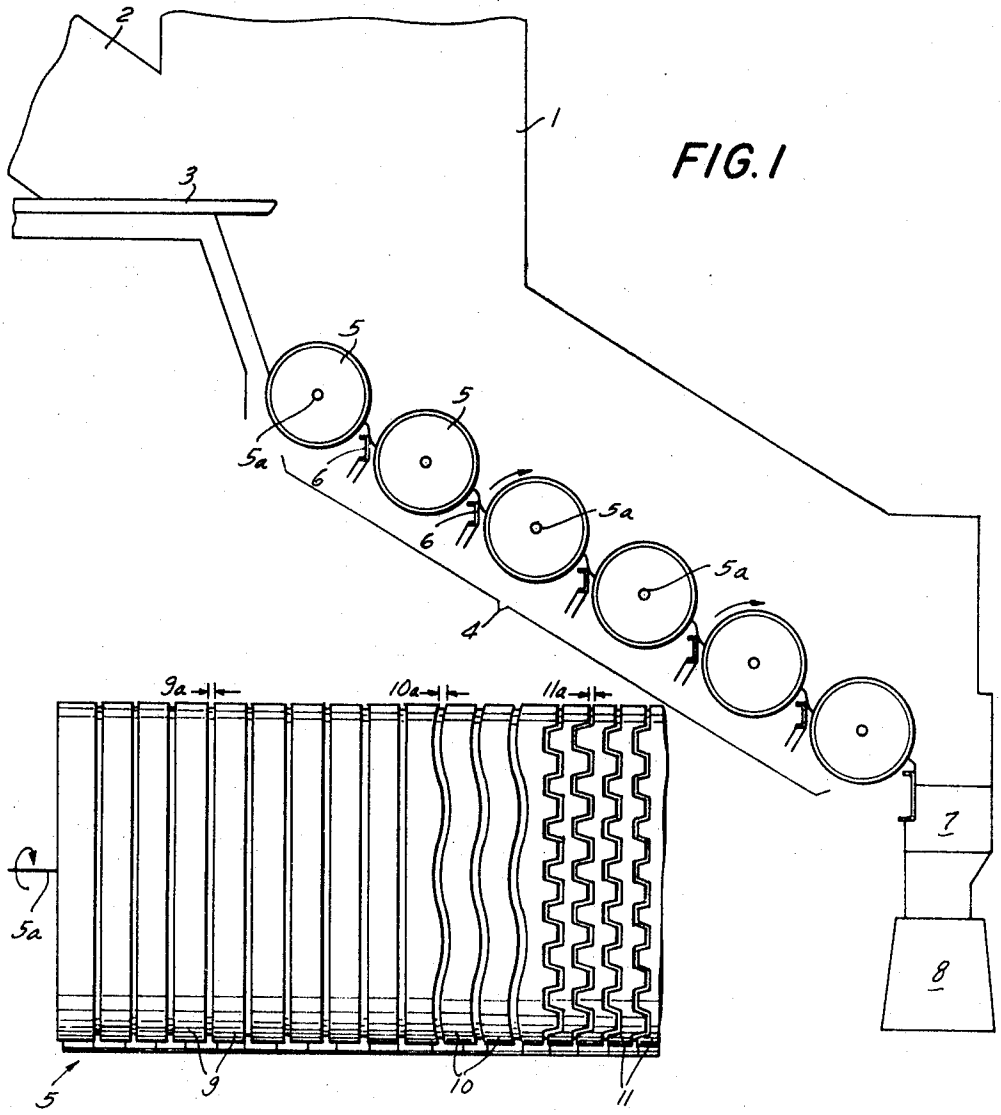


FIG. 1

FIG. 2

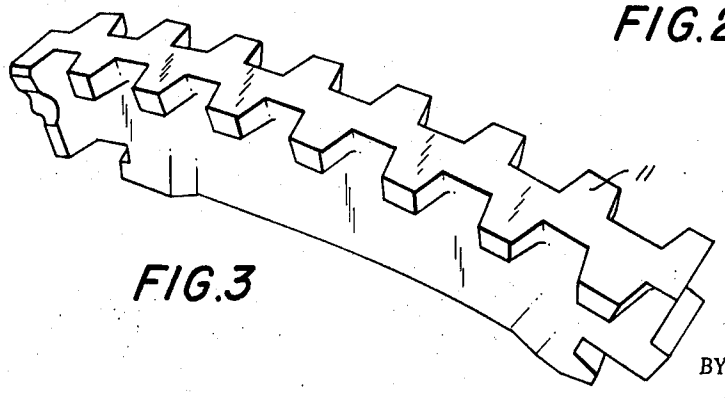


FIG. 3

INVENTOR.
Heinrich Kremer
BY
Michael S. Striker
Attorney

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INCINERATOR

Heinrich Kremer, Krefeld, Germany, assignor to Vereinigte Kesselwerke A.G., Dusseldorf, Germany

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ABSTRACT OF THE DISCLOSURE

In a rotary drum-shaped grate of an incinerator onto whose peripheral surface combustible refuse is so deposited that the refuse has greater density towards the center of the grate than towards the axial ends thereof, interstices for admitting combustion air are so arranged in the circumferential surface that their combined surface area is greater per unit area of the peripherial surface in the median region of the grate than in the marginal regions thereof.

BACKGROUND OF THE INVENTION

The present invention relates to incenerators in general, and more particularly to incinerators of the type which comprises travelling grates. Still more specifically, the present invention relates to refuse-supporting grate bars for travelling grates in such an incinerator.

Incinerators of the type here in question are utilized specifically for commercial and municipal purposes wherein large quantities of commercial and domestic refuse must be disposed of. Basically, such incinerators are already known. Incoming refuse is supplied to a feed hopper from where it is fed onto an incineration grate, usually by means of a water-cooled push-plate coveyor or in any other suitable manner.

The grate on which the actual incineration takes place consists of a plurality of axially parallel rollers all of which rotate in a common direction. The refuse is fed onto the first of these rollers and passes from this onto the succeeding rollers until it finally drops off the terminal roller into the ash-extractor at the end of the grate. Throughout the passageway of the refuse over the grate, hot gases continually flow over the incoming refuse helping to dry and ignite it. The revolving rollers agitate the fuel bed so that new burning surfaces are constantly exposed, thereby assisting in complete combustion of the refuse. Secondary air is admitted to insure a thorough mixture and final combustion of the flue gases. The rollers or drums are provided in their peripheral surfaces with interstices through which combustion air can pass.

This type of incinerator is highly efficient. It does, however, suffer from one problem which has not been solved until now. Specifically, it is very difficult to so supply the incoming refuse that it will be evenly distributed over the entire width—or, differently expressed, over the entire axial length—of the drums. If, however, the refuse is unevenly distributed on the drums, so that on one portion of the drums it has a greater thickness and therefore density than on other portions, then the combustion which takes place will be uneven also.

Attempts have been made to overcome this by providing feeding devices which are capable of feeding the refuse in such a manner that it will be evenly distributed over the entire axial length of the drums. However, while this is technically possible, it is very expensive to construct such devices, quite aside from the fact that the relative complexity of such constructions renders them susceptible to breakdown and also requires frequent and

expensive maintenance. Also, the available space frequently makes it impossible to employ such devices.

The simplest and least expensive feeding arrangement is to supply the refuse either va a hopper or via the gripper of a crane or similar device. This is, however, usually connected with at least some compression of the incoming refuse with the result that the compressed refuse will fall into the center or median region of the starring drum of the grate while certain portions of the refuse loosely fall onto the lateral or marginal zones. Evidently, the not so dense portions of the refuse on the marginal zones will burn more quickly than the denser quantities in the median zone.

This, on the other hand, is highly undesirable.

It is therefore, a general object of the present invention to overcome this disadvantage.

A more particular object of the invention is to provide a travelling grate for an incinerator of the type here under discussion on which combustion of refuse will take place substantially equally regardless of the density variations of the refuse.

A further object of the invention is to provide such a grate which is capable of obtaining the aforementioned objectives in simple and inexpensive manner.

SUMMARY OF THE INVENTION

In accordance with one feature of my invention I provide, in an incinerator of the type which comprises a feed combustible refuse and a travelling grate provided with a refuse-supporting surface onto different regions of which refuse is deposited by the feed at different density and which surface is provided with a plurality of interstices of predetermined surface area with the passage of combustion air therethrough, the improvement which consists in providing a first region of the surface onto which the refuse is deposited at greater density with interstices whose combined surface areas exceed the combined surface areas of the interstices which are provided in second regions of the surface onto which the refuse is deposited at lesser density. This results in a compensation for the different flow resistance offered to the combustion air by the different density of the refuse and provides for substantially equal combustion of the refuse in all regions of the grid.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof will be best understood from the following detailed description of specific embodiments when read in connection with the accompanying drawings.

Brief description of the drawing

FIG. 1 is a schematic side-elevation illustrating an incinerator utilizing travelling grates according to the present invention;

FIG. 2 is a fragmentary top-plan view of one drum of the grate shown in FIG. 1; and

FIG. 3 is a detailed view of a component of the drum shown in FIG. 2.

Description of the preferred embodiments

Discussing now the drawing in detail, and firstly FIG. 1 thereof, it will be seen that reference numeral **1** designates a housing which is schematically illustrated. The housing is provided with an inlet **2** communicating with a feeding device **3** which may be of various different types and in the illustrated embodiment is assumed to be a water-cooled push-plate feed conveyor of well known type. Arranged at the delivery end of the conveyor **3** down-

wardly spaced therefrom, is an assembly **4** consisting of a plurality of elongated rollers or drums **5** which are arranged in axial parallelism with one another and which are each rotatable in the direction indicated by the associated arrows about their respective axes **5***a*. FIG. 1 clearly shows that the assembly is downwardly inclined so that refuse falling from the conveyor **3** onto the uppermost drum **5** will move downwardly until it leaves the lowermost of the drums **5** in combusted form. The combusted refuse drops into the ash-extraction hopper **7** which communicates in turn with the water-cooled ash-extractor **8**. The ash-extraction hopper **7** and the ash-extractor **8** are of well known construction and require no further discussion. The baffle elements **6**, which are of known construction, are provided intermediate adjacent ones of the drums **5** so as to guide refuse from each preceding drum to the respective successive drum.

The present invention is shown more clearly in FIG. 2 which is a fractional top plan view of one of the drums **5** of the assembly **4**. The axis of rotation **5***a* is indicated in FIG. 2, as is the direction of rotation. It will be understood that only the left-half of the drum **5** is illustrated in FIG. 2, it being understood that the right-hand half is mirror symmetrical.

As shown in FIG. 2, the drum **5** comprises a plurality of grate members which define the outer circumferential surface of the drum. In accordance with my invention a first series of grate members **9** is provided in the marginal zones of the drum **5**. These grate members **9** define between each other in the region of the aforementioned marginal zones a plurality of interstices **9***a*. Each of these interstices **9***a* has a certain relationship with the solid area of the circumferential surface, per unit area of the latter. Thus, each of the interstices **9***a*, which of course extends circumferentially of the drum **5**, may have a surface area amounting for example to 2%—per unit area—of the circumferential surface of the drum. Towards the median or center portion of the drum, however, this relationship changes. For this purpose, I further provide the members **10**, which, because of the undulatory configuration provide interstices or circumferentially extending gaps **10***a* whose width is no greater than that of the gaps **9***a* but whose length is in excess of that of the gaps **9***a* because of the undulatory configuration. Accordingly, the surface area of each of the gaps **10***a* is greater than that of each of the gaps **9***a* and the combined surface area of the gaps **10***a* per unit area of surface of the drum **5** is greater than the similarly combined surface area of the gaps **9***a*.

In accordance with the invention this relationship is most pronounced at the center of the drum **5** where it may reach 7% or more. Thus, I provide the members **11** which constitute the median or center portion of the drum **5** and which, because of their zig-zag configuration, define between each other the circumferentially extending zig-zag-shaped gaps **11***a* which are evidently longer than the gaps **10***a* and considerably longer than the gaps **9***a*, thus having a greater individual and combined surface area than the corresponding areas of the gaps **10***a* and **9***a*.

It will be seen from this that more combustion air is able to pass through the gaps **10***a* and than through the gaps **9***a* and similarly more combustion air can pass through the gaps **11***a* than through the gaps **10***a*.

Accordingly, if the refuse has its greatest density in the region of the median zone of the drum **5**, and lesser density in outward direction towards the axial ends of the drum **5**, then compensation is provided for this by the fact that more combustion air can pass through the interstices **11***a*—where the density of the refuse is expected to be greatest—than through the gaps **10***a* where the density is less and through the gaps **9***a*, where the density is still smaller. This results in substantially equal combustion of refuse on the drum **5**, regardles of the density of the refuse, that is regardless of the fact that the refuse is denser on the median portion of the drum **5** than on the marginal portions. It is clear, of course, that this pattern can be varied depending upon the behavior of the refuse or upon the manner in which the refuse is supplied. In other words, if the refuse tends to be deposited—inherently or because of the manner in which it is supplied—with greater density on one or both of the marginal zones of the drum and with lesser density in the intermediate zone, than the gaps **11***a* and **10***a* will of course be provided in the marginal zones and the gaps **9***a* will be provided in the intermediate zone.

FIG. 3 which is otherwise self-explanatory illustrates a section of one of the members **11**. It will be understood that a plurality of these sections will be joined to provide an annular member **11**, but a showing of a single section in FIG. 3 is believed to be sufficient. The sections can of course be connected to one another in a suitable manner just as it will be understood that a suitable support is provided on the drum **5** on which these sections are supported. It is also clear that the members **9** and **10** can be provided in similar manner.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions, differing from the types described above.

While the invention has been illustrated and described as embodied in an incinerator, it is not intended to be limited to the details shown since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge readily adapt it for various applications without omitting features that from the standpoint of prior art fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In an incinerator of the type comprising a feed for combustible refuse, and a travelling grate provided with a refuse-supporting surface onto different regions of which the refuse is deposited by the feed at different density, said refuse-supporting surface being provided with a plurality of interstices of predetermined surface area for the passage of combustion air therethrough, the improvement consisting in providing a first region of said surface onto which the refuse is deposited at greater density with interstices whose combined surface areas exceed the combined surface areas of interstices provided in second regions of said surface onto which the refuse is deposited at lesser density, whereby to compensate for the different flow resistance offered to the combustion air by the different density of the refuse and obtain substantially equal combustion of refuse in all said regions of said grate.

2. In an incinerator as defined in claim **1**, wherein said grate is an endless grate.

3. In an incinerator as defined in claim **2**, wherein said grate is configurated as a drum and said refuse-supporting surface is the circumferential surface of the drum.

4. In an incinerator as defined in claim **1**, wherein said surface comprises two marginal zones, and a median zone between said marginal zones, said median zone constituting said first region and said marginal zones each constituting one of said second regions.

5. In an incinerator as defined in claim **4**, wherein the ratio of the combined surface areas of the interstices to the combined solid area of said refuse-supporting surface per unit area of said surface increases in direction from said marginal zones toward the center of said median zone.

6. In an incinerator as defined in claim 5, wherein the ratio of the combined surface areas of the interstices to the combined solid area of said refuse-supporting surface per unit area of said surface is greatest at the center portion of said median zone.

References Cited

UNITED STATES PATENTS

1,127,824	2/1915	Summers	110—35 XR
2,825,293	3/1958	Benoit-Cattin	110—35

KENNETH W. SPRAGUE, Primary Examiner