United States Patent [19]

Ochi et al.

[11] **3,877,398**

[45] **Apr. 15, 1975**

[54] **INCINERATOR FEEDING SYSTEM**

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[22] Filed: **Mar. 1, 1974**

[21] Appl. No.: **447,344**

[52] **U.S. Cl.** ..... **110/8 R**; 110/101 R; 214/18.38

[51] **Int. Cl.** **F23g 5/00**; F23k 3/00

[58] **Field of Search** ..... 214/18.38; 110/8 R, 15, 110/101 R, 115

[56] **References Cited**

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Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] **ABSTRACT**

The material, e.g., sludge to be incinerated is fed under gravity to a generally horizontal surface which is swept by a multiple-, curved-blade rotary agitator which cuts and stirs the material to expose a greater part of the bulk thereof to the exterior for drying by contact with heated gases from the combustion chamber. The agitator impels the material toward an inclined surface which leads down to the combustion chamber. In passing down the incline to the combustion chamber, the material may pass across one or two additional generally horizontal surfaces provided with similar rotating agitators for the same purpose.

3 Claims, 3 Drawing Figures

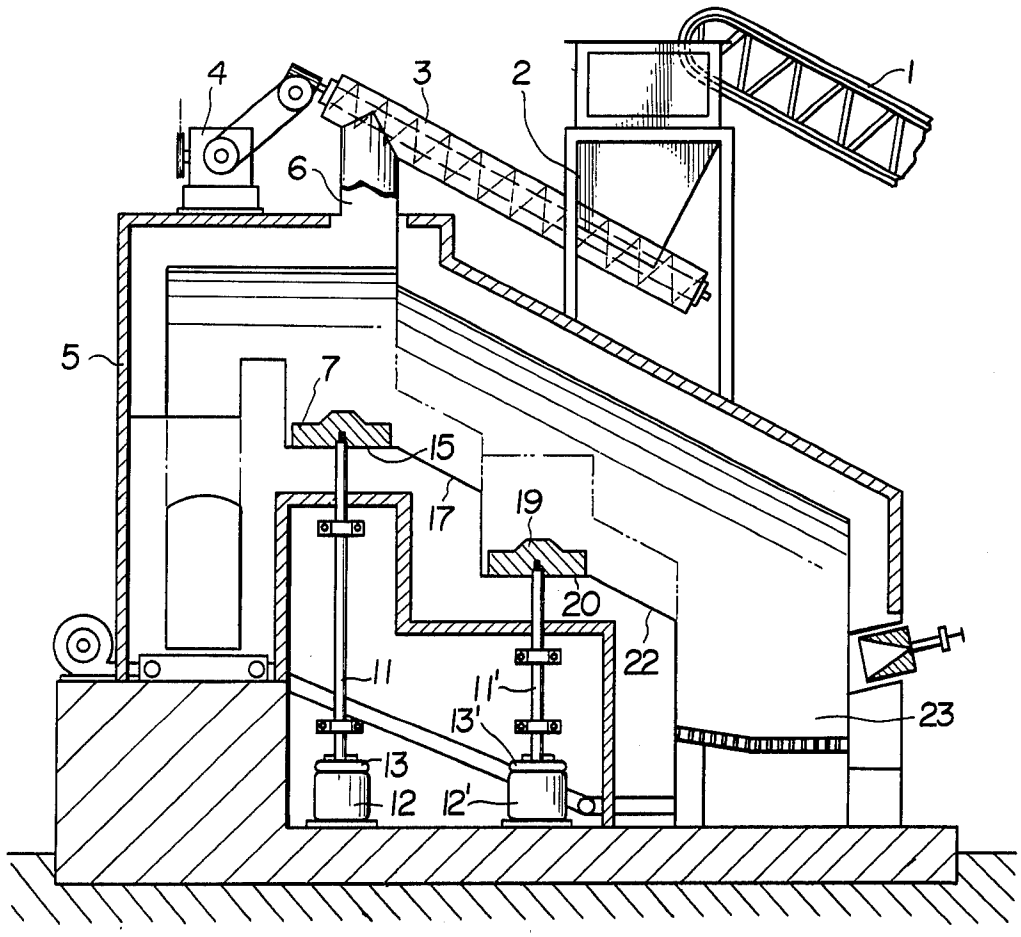

FIG. 1

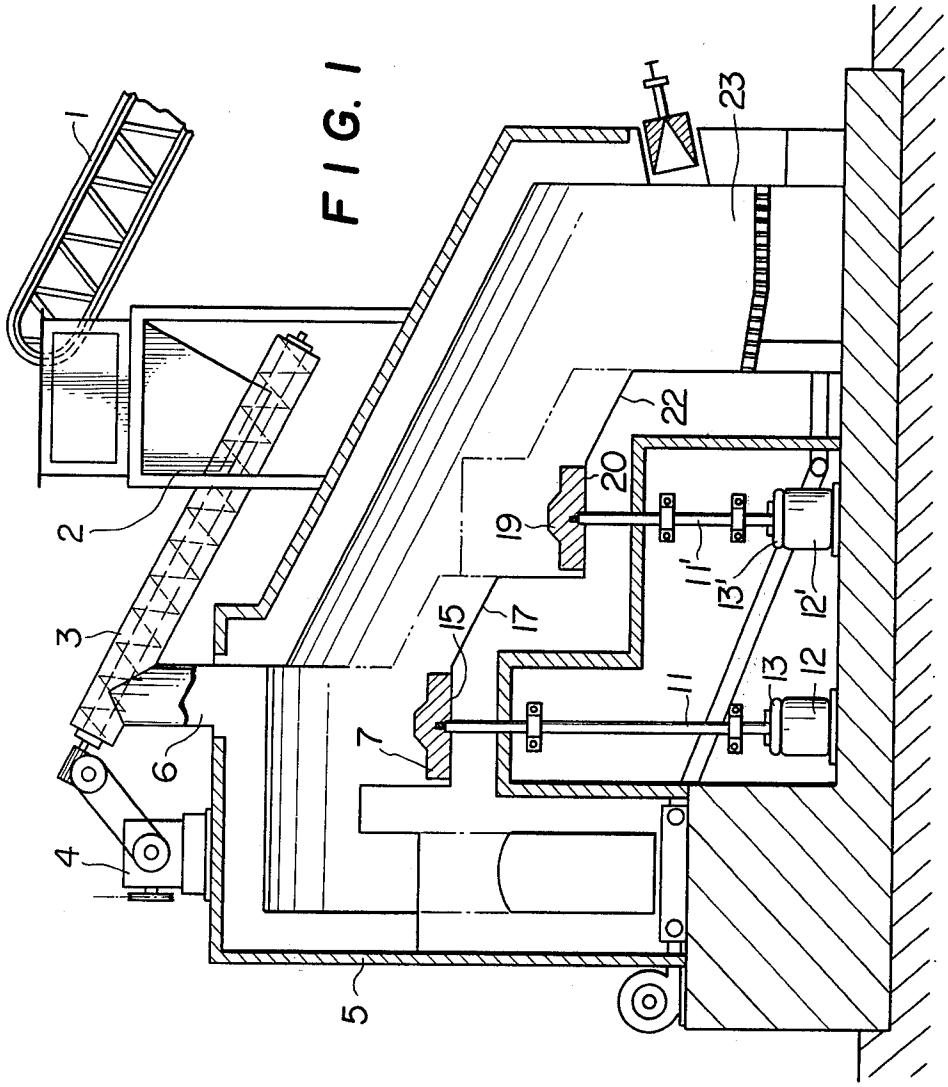

FIG. 3

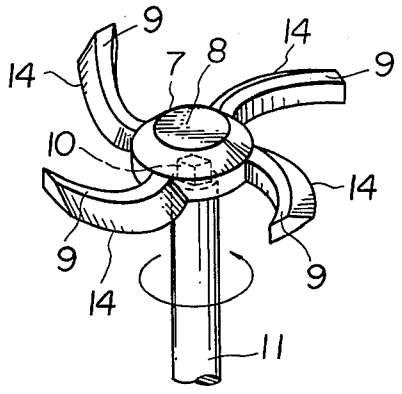
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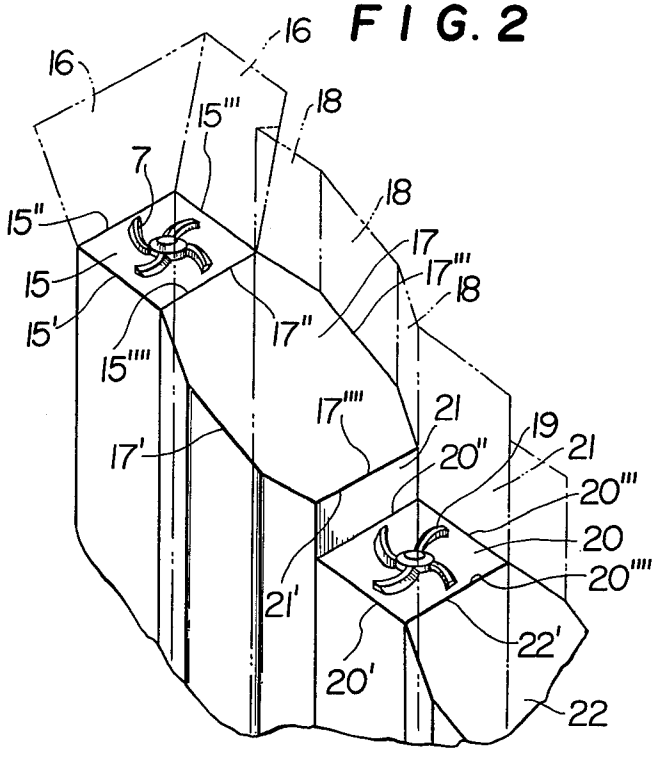
FIG. 2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INCINERATOR FEEDING SYSTEM

SUMMARY OF THE INVENTION

An incinerator for sludge or the like is provided with a gravity feed down an inclined surface. At least one site along the incline, where the material being fed is in contact with heated drying gases from the combustion chamber, the incline has a generally horizontal surface portion, swept by a multiple-, curved-blade rotary agitator which cuts and stirs the material to expose a greater part of the bulk thereof to the exterior for drying by contact with heated gases from the combustion chamber.

FIELD OF THE INVENTION

The invention relates to promotion of drying efficiency by means of charging material such as sludge into a drying chamber while stirring and breaking the material as it is forwarded to an incinerator combustion chamber.

The principles of the invention will be further hereinafter discussed with reference to the drawings wherein a preferred embodiment is shown. The specifics illustrated in the drawings are intended to exemplify, rather than limit, aspects of the invention as defined in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings

FIG. 1 is a longitudinal, vertical sectional view through a gravity fed incinerator for material such as sludge;

FIG. 2 is a fragmentary perspective view of the inclined surface and agitators of the system; and

FIG. 3 is a perspective view of one of the agitators.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENT OF THE INVENTION

Referring to FIG. 1, a belt conveyor 1 charges material, such as sludge, into a receiving hopper 2 which supplied that material to a tunnel screw conveyor 3 driven by a motor 1 reduction gear set 4. The screw 3 is inclined to feed by gravity down an outlet conduit 6 which introduces the material into an enclosure 5 that is in communication with the incinerator combustion chamber 23. The fed material, upon falling down the conduit 6, lands on a generally horizontal surface 15, surrounded on three sides 15', 15'', 15''' by upstanding sidewalls 16. The fourth side 15'''' of the surface 15 constitutes the upper edge 17'' of an inclined drying plate 17'. The latter is surrounded about its edges 17', 17''', i.e. but for at its upper edge 17'' and its lower edge 17'''', by upstanding sidewalls 18. In other words, the elements 17, 18 constitute an inclined shute leading toward the combustion chamber 23.

A multiple-, curved-bladed agitator 7 is disposed upon the generally horizontal surface 15 and keyed, via a square portion 10 (FIG. 3), on the upper end of a shaft 11 which extends down under the surface 15 to a reduction gear 13 driven by a motor 12.

One (or two) additional agitator stations may be disposed further along the inclined surface. One is shown at 19 et seq.

The lower edge 17'''' of the inclined surface 17 is shown constituting the upper edge of an upstanding sidewall 21 which leads down to a generally horizontal

surface 20 at 20''. The latter surface is also surrounded on two laterally opposite sides 20', 20''' by upstanding walls 21. The fourth side 20'''' constitutes the upper edge 22' of an inclined drying plate 22. The latter may be conceived of as being a continuation of the surface 17 that was interrupted at 17'''' to 22'. In other words, the chute 17, 18 continues at 21, 22.

A multiple-, curved-bladed agitator 19 (like the one 7) is disposed upon the generally horizontal surface 20. It is keyed for rotation at the upper end of a shaft 11' which extends down to a reduction gear 13', driven by a motor 12'.

The number of agitator stations to be provided depends upon the amount of drying needed to be accomplished and the necessary through-put of material to be dried.

In operation, the material, such as sludge loaded onto the conveyor 1 is charged thereby into the hopper 2 from which it is withdrawn by the screw 3 and sent down the inlet pipe 6 into the incinerator plant housing 5. Therein, the material such as sludge, drops onto the surface 15, where the wedge-shaped, cutting, leading edges 14 of the curved, radiating blades 9 of the agitator 7 break clods of the material into pieces to increase the exposed surface thereof. (The blades or wings 9 curve as they radiate from the hub 8, so that, in the direction of rotation indicated by the curved arrow about the shaft in FIG. 3, the outer tips of the respective leading edges angularly trail where those leading edges start from the hub 8.) As the clods of sludge or the like are engaged by the agitator 7 and broken into smaller pieces, the pieces are slowly forwarded toward the outer ends of the blades 9, and spill over the edge 17'' onto the incline 17. As the pieces slide down the inclined surface 17, under the influence of gravity and due to being pushed from behind by more of the material spilling over the edge 17'', the material dries, due to contact with heated gases rising from the combustion chamber 23. The partially dried and broken material slides over the edge 17'''' and falls onto the surface 20, where the agitator 19 stirs it, further breaks it up and forwards the broken, partially dried material over the edge 22' so that it slides down the surface 22 and into the combustion chamber 23.

(Drying is caused by direct heat from the flame and combustion gases from the combustion chamber 23 of the incinerator, and by indirectly heat transferred from the walls and surfaces of the inclined trough and agitator stations, in turn heated by the combustion at 23.)

The incineration of sludge and the like by means of the invention, enables the fully automatic charging, stirring, drying and incinerating of that material as one continuous operation. The breaking of the clods at the agitating station(s) promotes efficiency of the device by using heat thrown off the combustion process to prepare the sludge or the like to be more easily incinerated as dried, pulverized material.

It should now be apparent that the incinerator feeding system as described hereinabove possesses each of the attributes set forth in the specification under the heading "Summary of the Invention" hereinbefore. Because the incinerator feeding system can be modified to some extent without departing from the principles of the invention as they have been outlined and explained in this specification, the present invention should be understood as encompassing all such modifications as are within the spirit and scope of the following claims.

We claim:

1. A feeding system for an incinerator having a housing enclosing a combustion chamber comprising:

means defining a generally horizontal platform within the housing, in communication with heat generated in the combustion chamber;

inclined trough means leading from the platform to the combustion chamber, the inclined trough means also being in communication with heat generated in the combustion chamber;

upstanding wall means about the platform to confine material transport to proceeding from the platform onto the inclined trough means;

conduit means extending through the housing over the platform, whereby material such as sludge forwarded into the housing through the conduit will fall onto the platform;

a multiple, radiating bladed agitator disposed upon the generally horizontal platform, these blades including ones having leading cutting edges for stirring and communicating said material falling onto said platform;

driving means under the pressure, operatively connected to the agitator, for rotating the agitator with the leading cutting edges presented angularly forwardly,

whereby material such as sludge, landing on the platform, is comminuted to expose more surface area thereof to heating and drying, and that as more material continues to land on the platform, the agitator propels the material it has comminuted into the inclined trough wherein the combined effect of gravity and of more comminuted material being propelled into the trough by the agitator, causes the comminuted material to slide down the inclined trough and into the combustion chamber.

2. The feeding system of claim 1, wherein the individual agitator blades are curved, in plan view, so that the outer tips thereof angularly trail the bases thereof.

3. The feeding system of claim 1 further including at least one additional agitator station intermediate the first-described platform and the combustion chamber, each such additional agitator station including:

the inclined trough being notched to provide another generally horizontal platform having wall means defining a vertical drop between the upstream edge thereof and the upstream remainder of the inclined trough and having the downstream edge thereof intersecting the downstream remainder of the inclined trough;

upstanding wall means about the additional platform to confine material transport to proceeding from the upstream remainder of the inclined trough over the vertical drop, onto the additional platform and over the downstream edge of the additional platform onto the downstream remainder of the inclined trough;

another multiple, radiating bladed agitator disposed upon the additional platform, these blades including ones having leading cutting edges for stirring and comminuting said material falling onto said additional platform; and

driving means under the additional platform, operatively connected to said other agitator, for rotating said other agitator with the leading cutting edges thereof presented angularly forwardly,

whereby said other agitator assists the first-described agitator in stirring, comminuting and forwarding material toward the combustion chamber.

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