United States Patent

Reilly

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[54] **APPARATUS FOR MOVING REFUSE FROM A BIN**

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[51] **Int. Cl.**.....**B65g 65/44**

[58] **Field of Search**.....214/17 D, 23; 198/161, 226; 241/186 R, 101 R; 110/109

[56] **References Cited**

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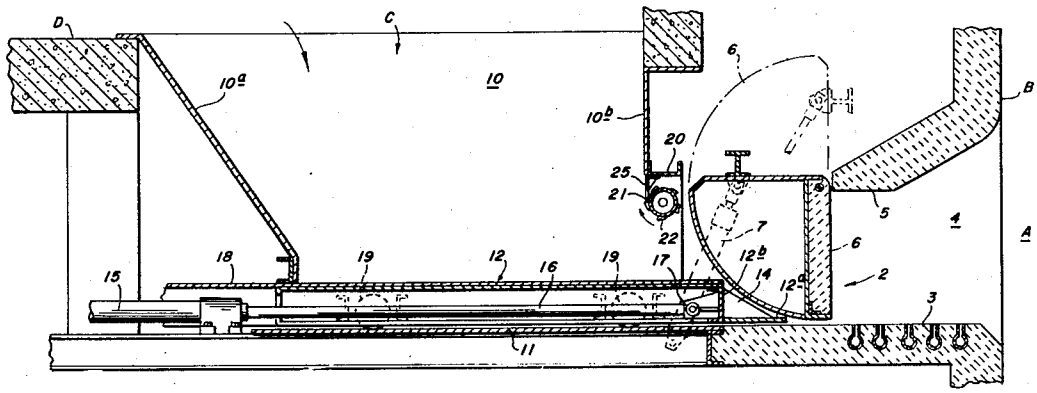
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[57] **ABSTRACT**

In an installation where compactable material is intermittently pushed laterally from a hopper through a passageway by a reciprocating pusher, as for example the feeding of municipal rubbish from a receiving hopper into an incinerator, a toothed power-driven roll extending across the top of the passageway rakes and forces some of the material in the upper part of the mass which is being pushed into the passageway in the opposite direction, that is away from the entrance to the passageway, and thereby reduces the tendency of the material to become compacted at the entrance to said passage.

6 Claims, 5 Drawing Figures



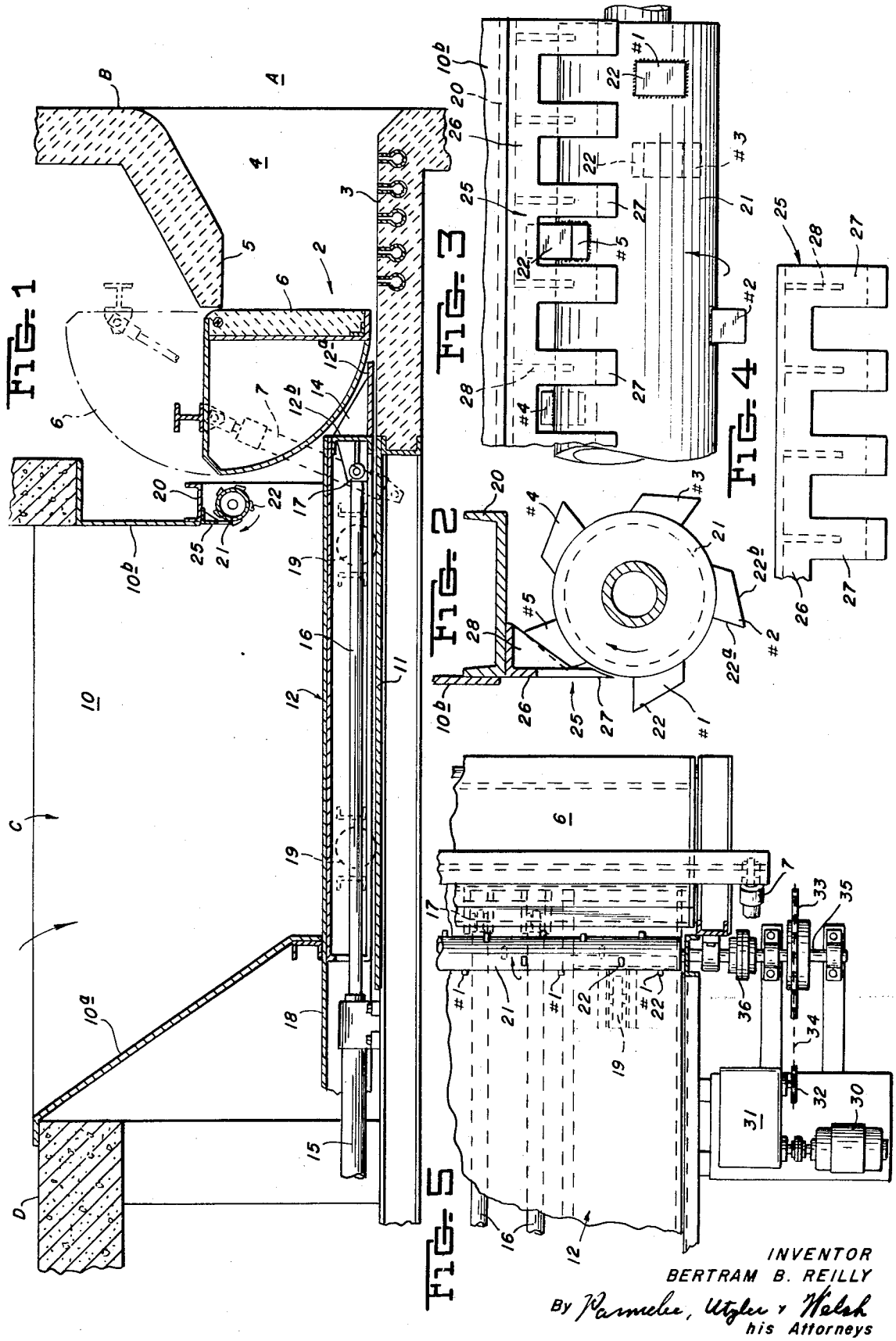


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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APPARATUS FOR MOVING REFUSE FROM A BIN

This invention relates to an improvement in the feeding of compactible material from a bin or hopper into and through a laterally extending passageway by a pusher, and more particularly to means at the entrance of the passageway for reducing the tendency of the material to become compacted at the passageway entrance or in the passageway itself. The invention is especially for an improvement in the apparatus disclosed in my U.S. Pat. No. 3,303,947 granted Feb. 14, 1967.

In my U.S. Pat. No. 3,303,947 there is disclosed an apparatus comprising a receiving bin with a bottom, side, front and rear walls positioned at the front of an incinerator. A ram type pusher, movable over the bottom of the bin, pushes material from the bottom of the bin toward the front wall of the bin and into a passage that opens through the front wall into the charging end of an incinerator. The construction of the pusher is such that it pushes against only the lowermost stratum of material in the bin, but the discharge passage leading in a generally horizontal direction from the bin to the incinerator is of a height much higher than the ram. Thus, while only the lower stratum of material is engaged by the pusher, the heterogeneous composition of municipal rubbish, with the matting and tangling that occurs, causes material above the pusher to be carried along and forced into the passageway where it becomes compacted, offering great resistance to the operation of the pusher, especially in succeeding cycles of its operation.

In my said patent a free-turning roller was placed under the front wall of the bin at the top of the entrance into the discharge passage to help relieve this condition.

While the arrangement shown in my patent has performed in a generally satisfactory manner, conditions arise where the material in the passage, and particularly at the entrance, require excessive power to operate the ram, and even require that workmen sometime relieve the impaction.

According to the present invention, means is provided at the top of the entrance to the discharge passage for raking the topmost material that is being pushed into the passage in a reverse direction back into the bin, and also lifting material upwardly and loosening it while also cutting some of it into relatively small fragments. The simplest and what I deem to be the preferred means comprises a horizontal roller extending along the top of the discharge passage under the lower edge of the front wall or front face of the bin, this roll having spaced projecting teeth, staggered with relation to adjacent teeth, on its periphery. The teeth are ratchet-shaped with the leading face being abrupt, that is, in a plane substantially radial to the axis of rotation of the roll. A power drive rotates the roll in a direction such that the teeth at the bottom of the roll move opposite to the direction in which the material being pushed into the opening travels. There is a fixed comb positioned in about the plane of the front face of the bin with spaced teeth or fingers between which the teeth of the roller pass, so that the teeth on the roller in cooperation with the comb, will cut or break some of the refuse that is moved by the teeth of the drum against the face of the comb into coarse fragments.

My invention may be more fully understood by reference to the accompanying drawings illustrating the preferred embodiment of the invention, and in which:

FIG. 1 is a longitudinal vertical section through the apparatus;

FIG. 2 is a fragmentary schematic end elevation showing on a larger scale the drum and comb arrangement;

FIG. 3 is a fragmentary front elevation of a portion of the roller;

FIG. 4 is a similar fragmentary front elevation of a portion of the comb; and

FIG. 5 is a fragmentary top plan view of the roller drive arrangement which is at one side of the apparatus.

In the drawings I have shown an apparatus similar to that of my said U.S. Pat. No. 3,303,947 with certain details omitted, and with the present invention being applied thereto and to the applicable extent the description is duplicated.

In the drawings, wherein like reference numerals designate corresponding parts, there is shown somewhat schematically the forward or charging end of an incinerator A, with a horizontal charging passage **2** in the front wall B thereof. This charging passage is generally rectangular in section, being wider than it is high. It has a refractory bottom wall or floor **3**, side walls **4**, and a top wall **5**. At **6** there is an upwardly and outwardly movable door, movable from the closed position shown in the drawings to the open position indicated by dotted lines. A fluid pressure cylinder and piston mechanism **7** is here indicated for operating the door.

Forwardly of the charging door there is a receiving bin C at the top of which there may be a platform D from which trucks dump refuse into the bin. The bin has side walls **10** and a metal bottom **11** flush with the floor **3** of the passage. The wall opposite the incinerator opening is designated **10***a*. The front wall or face of the bin is designated **10***b*. At the bottom of rear wall **10***a* there is a pusher **12** having a pan portion **12***a* that rides on the bottom of the bin and a vertical pusher plate **12***b*. There are bracing gussets **14** attached to both plates for strengthening the pusher. At the rear of the pusher there is a ram having a fixed cylinder **15** and a plunger **16** which is attached to the pusher at **17**. There is an apron **18** at the back of the pusher over the plunger which moves with the plunger. Beneath the apron are supporting rollers **19**.

In operation, the plunger moves the pusher toward the charging passage, forcing refuse in the lower portion of the bin toward and into the passage, while the apron **18** prevents the overlying refuse from getting in behind the pusher. At this time the door **6** is open and the refuse is pushed forward onto the floor **3** of the passage and then withdraws to repeat the operation, pushing the material previously advanced off the floor **3** into the incinerator.

As here shown, there is a structural cross member in the form of a channel section **20** extending along the lower edge of the front wall **10***b*. Below this channel section there is a hollow cylindrical drum or roller **21** that extends across the full width of the bin, or at least substantially the full width of the opening into the

passage 2. The roller is supported in bearings at each side of the bin. There are teeth 22 on the periphery of the drum spaced from one another around the periphery of the drum and spaced lengthwise of the drum. As here shown, the teeth are arranged in helical rows around the drum. Looking at one end of the drum, the tooth No. 1 is nearest the end; 120° from No. 1 is tooth No. 3, and 120° from it is tooth No. 5. Then comes tooth No. 2 which is 60° from tooth No. 1, but considerably further from the end of the drum, followed by tooth No. 4 which is 120° from No. 2 but 60° from No. 3, and of course the one most remote from the end of the drum as seen in FIG. 2. From No. 4 the helical series of teeth begins again with No. 1. If the teeth are 2 inches wide and the space between them is 3 inches, there is a span of 25 inches between the first No. 1 and the next No. 1, and as a matter of fact the second No. 1 might start behind the first No. 1 some distance, say 15°, and the third series 30°. With such an arrangement only one tooth or two or three, depending on the length of the roll, would be at a given angular position with respect to the comb, now about to be described, at a time.

The comb, designated 25, comprises a main cross bar portion 26 supported at the bottom of the channel 20 in about the plane of the front wall 10*b* of the hopper, and it has depending spaced teeth or fingers 27 that extend down from the bar somewhat tangentially to the periphery of the drum with their free ends terminating against the drum. The spacing between the teeth of the comb is such that the teeth on the front upper quadrant of the drum or roll pass between them with considerable clearance. Angular bracing plates are indicated at 28.

The drum is driven at a relatively slow speed in a clockwise direction as viewed in FIG. 2, that is the teeth on the lowermost portion of the roll periphery are moving in a direction toward the bin instead of toward the passage to move the uppermost portion of the material in a direction opposite the direction in which the ram pushes it, and the teeth in the portion below the front wall move upwardly to lift material upwardly in respect to the hopper. Material that is carried by the teeth against the comb is cut or broken in two, and fragments that pass through the comb may be carried over the top of the drum and dropped into the passage 2. In this respect the drum and comb arrangement serves also as a cutter means or cutter bar. The teeth on the drum are desirably of a ratchet shape. Each tooth 22 has a leading face 22*a* that is in a plane of a radius of the drum and its periphery decreases in height from the forward tip toward the opposite end of the tooth, providing the required strength and "rake" 22*b*.

For rotating the drum there is shown an electric motor 30 connected with a reducing gear 31 which drives a sprocket or chain belt pulley 32. This drives pulley or sprocket 33 through chain belt 34. Pulley 33 is on a shaft 35 that is coupled at 36 to one end of the drum.

The teeth on the drum are staggered in the manner indicated so that if the drum is of the order of ten feet in length, only two or three teeth along its length will be in any given angular position at one time, thus reducing the torque required to rotate the drum when the machine is operating.

I claim:

1. In an apparatus for feeding compactible material from a bin which has a front wall and a horizontally extending passageway extending upwardly from the bottom of the bin to the lower edge of the front wall which terminates at and extends across the top of the passageway, the apparatus having means for pushing material in the bin across the bottom of the bin into the passageway, the invention comprising:

a. toothed means extending across the entrance to the passageway under the front wall at the top of the passageway and spaced above the pushing means entirely clear of the path of movement of said pushing means, said toothed means having a plurality of teeth projecting therefrom, and

b. power means arranged to drive said toothed means in a direction where the teeth move continuously in a closed path with the teeth on the lowermost portion thereof traveling in said passageway in a direction opposite the direction in which said pushing means moves the material.

2. The invention defined in claim 1 wherein the toothed means is a roller and the teeth are carried on and project from the periphery of the roller, the power means for driving the roller rotating it in a direction where the teeth along the bottom quadrant of the roller travel counter to the direction in which the material is pushed by said pushing means and the teeth at the front of the roller move upwardly in a vertical arc.

3. The invention defined in claim 2 where the teeth are spaced from one another lengthwise of the roller and in staggered relation to one another about the periphery of the roller, and a comb element located below the front wall forwardly of the roller with spaced teeth thereon between which the teeth at the front of the roller pass, the teeth of the comb extending in a tangential direction with respect to the roller.

4. The invention defined in claim 3 wherein the free ends of the comb teeth ride against the surface of the roller.

5. The invention defined in claim 2 wherein the teeth are of ratchet shape with the leading face of the teeth being in a plane radial to the roller and the peripheries of the teeth sloping rearwardly inward from the leading face.

6. In an apparatus for feeding compactible material from a bin which has a front wall with a horizontally extending passageway therethrough extending upwardly from the bottom of the bin only partway up the full height of the front wall whereby the bin may hold compactible material to a level extending above the top of the passageway, the front wall of the bin having its lower edge terminating along the top of the passageway, the apparatus having a ram reciprocable over the bottom of the bin toward and away from the passageway for pushing material from the bin into and through the passageway, the invention comprising:

a. a roller extending horizontally across the front of said passageway just below the front wall of the bin and spaced entirely above the plane of travel of the ram,

b. means arranged to rotate said roller in a direction in which the lower portion of its periphery moves opposite to the direction of travel of material being pushed from the bin into and through said passageway,

c. the periphery of the roll having spaced teeth projecting therefrom arranged to rake some of the material in the top of the mass of material that is being pushed by the ram into the passageway, and

d. a comb fixed to the bin at the lower edge of the front wall in front of the roller having fingers between which the teeth on the front quadrant of the roller pass for cutting material that may be carried by the teeth against the comb.

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