

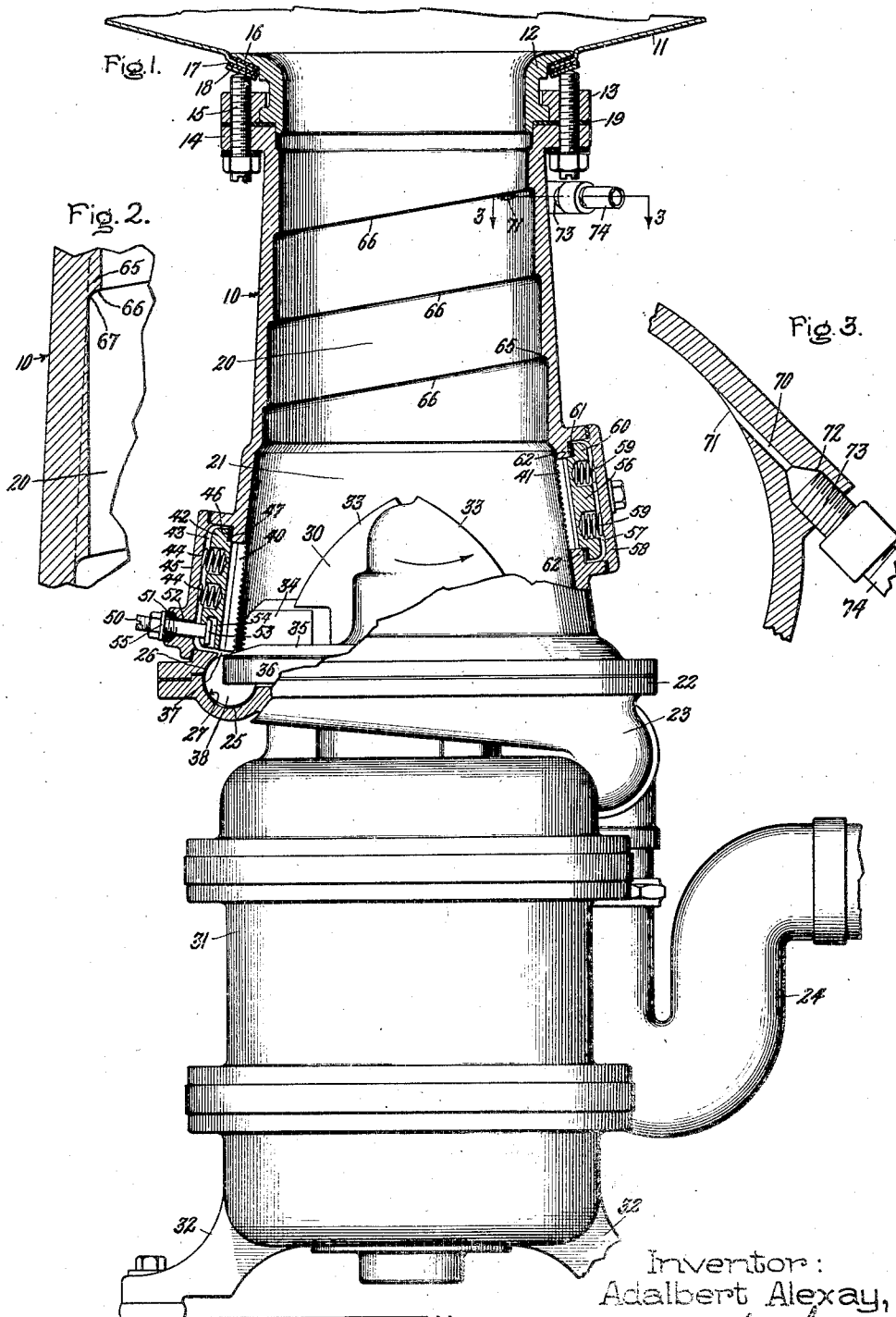
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WASTE DISPOSAL APPARATUS

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WASTE DISPOSAL APPARATUS

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4 Claims. (Cl. 146—192)

The present invention relates to apparatus for the disposal of waste material and particularly to a device suitable for the comminution, by grinding, cutting, or crushing, of waste material such as garbage in the form of vegetables, meat, bones, and the like, and for the flushing of the comminuted material into a sewer system or the like with the aid of water supplied to the device.

10. An important object of the invention is the provision of an improved simple and rugged waste disposal device particularly suited for, but not limited to, the employments in hotels, restaurants, drug stores, and other installations wherein large volumes of waste material to be disposed of render it essential that the device be capable of operating economically and efficiently, without jamming, over relatively long periods of time.

20. Other objects and the details of that which I believe to be novel and my invention will become apparent from the following description and the claims appended thereto taken in conjunction with the accompanying drawing in which is illustrated an exemplary form of waste disposal apparatus embodying my present invention.

In the drawing, Fig. 1 is a partially cut-away view showing the internal construction of the waste disposal device; Fig. 2 is an enlarged showing of a detail of the construction of the housing; and Fig. 3 is a sectional plan view of another detail of the housing construction.

35. As shown in the drawing, the casing 10 of the waste disposal device therein illustrated is adapted to be connected to a kitchen sink, hopper, or like structure indicated at 11, by means of an exteriorly flanged adapter ring 12 and an interiorly flanged clamping ring 13. The casing is provided with an upper flange 14 fastened to clamping ring 13 by means of bolts 15. In order to minimize the transmission of vibration from the waste disposal device to the structure 11, a resilient packing 16 is inserted between the structure 11 and adapter ring 12 and a second resilient packing 17 is inserted between structure 11 and a metal bearing ring 18 which is engaged by bolts 15. For a similar purpose, a resilient packing 19 is inserted between clamping ring 13 and the flange 14 of casing 10. As will be seen from the drawing, the adapter ring provides an inlet opening for the admission of material to be ground from the sink or hopper structure 11 to the interior of casing 10, and also for the passage of water into the casing from the sink or

hopper to which the water may be supplied in any suitable manner as by means of a faucet (not shown).

The upper portion of casing 10 is formed to provide a frusto-conical material admission passage 20, the larger end of which is disposed downwardly and communicates with a frusto-conical grinding chamber 21 formed in the lower portion of casing 10. If desired, for convenience in manufacture or installation, the portions of the casing forming passage 20 and chamber 21 may be made separately. Closing the lower end of casing 10 is a bottom flange 22 having an integrally formed discharge passage 23 which may be connected in a suitable manner to a sewer system connection, preferably with the interposition of a trap such as indicated at 24. The bottom flange 22 is formed with a circular trough 25 arranged to cooperate with a curved surface 26 in the bottom edge of casing 10 to provide an annular recess 27 communicating with passage 23 and adapted to receive comminuted material from the grinding chamber 21 in a manner to be pointed out more in detail hereinafter.

25. Within the grinding chamber 21 is disposed a rotatable material impelling device which is generally designated 30 and which is illustrated as being of the type described in detail in my copending application Serial No. 71,156, filed March 27, 1936 and assigned to the assignee of the present invention. This impelling device is connected to be rotated in a counterclockwise direction, designated by the arrow, as viewed by one looking into casing 10 from above, by means of a motor 31 which may be supported in a suitable manner as by means of floor mounting legs 32.

The illustrated material impelling device 30 comprises upwardly extending wing-like impeller elements 33 and one or more cutter elements 34 which are mounted on a supporting disk 35 which in turn is mounted on a flywheel 36. The cutter elements 34 may be biased inwardly and movable outwardly under the influence of centrifugal force, as set forth in detail in my previously referred to copending application, or may be permanently fixed in their operative positions. Disk 35 has a downwardly slanting outer edge arranged to cooperate with a lower edge of casing 10 to form a restricted opening 37 for the passage of comminuted material from the grinding chamber to the annular recess 27, while flywheel 36 has mounted thereon one or more impeller vanes 38 which serve, in the manner of a centrifugal pump, to create a pressure tending to

force comminuted material and water from recess 27 through passage 23 to the connected sewer system. The width of opening 37 determines the size of material which may pass from the grinding chamber to recess 27.

For cooperation with the rotatable material impelling device 30 in the comminution of material, there are illustrated two stationary cutting elements 40 and 41, although more than two of such stationary cutting elements may be employed if desired, depending upon the volume of waste material to be disposed of. Stationary cutter 40 is supported on a holder 42 which is disposed in a lateral recess 43 in the side wall of the portion of casing 10 forming the grinding chamber 21. This cutting element has an extended vertically arranged toothed face and may be secured to its supporting holder in any suitable manner. The cutting element is resiliently biased into its cutting position, wherein it projects into chamber 21, by means of springs 44 which act between holder 42 and a plate 45 which serves as the closure for the recess 43. The upper end of cutter 40 is restrained from further movement into chamber 21 by the pressure of the upper end of holder 42 against a resilient bumper 46 which in turn rests against a flange 47 of casing 10 adjacent the upper end of recess 43. The lower end of cutter 40 is arranged to be adjustable inwardly and outwardly by means of adjusting screw 50 which extends through packing 51 and an opening 52 in plate 45 and has a head 53 accommodated in a flanged recess 54 in holder 42. Thus springs 44 tend to pivot the lower end of cutter 40 toward the rotatable cutter 34, about the point of engagement of holder 42 with flange 47, and the position of the lower end of cutter 40 may be fixed in any desired position relative to cutter 34 by the adjusting screw 50 which may be secured by a lock washer and nut, as indicated at 55. As will be seen from the drawing, the lower end of cutter 40 and also the lower end of cutter 34 extend into close adjacency with material discharge opening 37 so that material when reduced to the desired fineness by the cooperative action of cutters 34 and 40 may pass directly into opening 37 and annular recess 27.

Stationary cutter 41 is vertically staggered relative to cutter 40 so that its lower end is substantially spaced above the bottom of grinding chamber 21 and material discharge opening 37 while the upper end of cutter 41 extends substantially above the level of the upper end of cutter 40. Cutter 41 is attached in any suitable manner to a holder 56 which is disposed in a lateral recess 57 in the wall of chamber 21, which recess is closed by plate 58, and the cutter 41 is urged inwardly toward the grinding chamber by springs 59 which act between holder 56 and plate 58. Engagement of flanges 60 of holder 56 against resilient bumpers 61 which in turn press against flanges 62 of casing 10 at the upper and lower edges of recess 57, serves to restrain cutter 41 in its illustrated operative position wherein it projects into grinding chamber 21. For reasons which will become apparent hereinafter, it is not necessary to provide means for adjusting the position of upper cutter 41, although such adjusting means may be provided if desired.

To aid in the positive feeding of large quantities of material through material admission passage 20 into grinding chamber 21, the portion of casing 10 forming passage 20 is so bored or cast that its internal diameter increases spirally in

the direction of the grinding chamber. This results in there being formed on the inner wall of passage 20 a helical flange or ridge 65 which is roughly of non-equilateral triangular cross-section, as indicated by the broken line in Fig. 2, having its steeper side in the form of a ledge 66 facing downwardly toward the grinding chamber. As will be seen from the drawing, the junction of this ledge with the adjacent surface of the wall of the passage is curved, as indicated at 67.

As a further aid in the feeding of material through passage 20 and in the grinding of material in chamber 21, there is provided in the wall of casing 10 a passage 70 having a discharge opening 71 into the upper portion of passage 20 and located just beneath a portion of helical ledge 66. Passage 70 and opening 71 are arranged, as best shown in Fig. 3, so as to discharge a stream of water tangentially into passage 20 and in a counterclockwise direction as viewed from above. The outer end of passage 70 communicates with a tapped bore 72 in which is disposed a threaded nipple 73 for connection with any suitable water supply pipe such as indicated at 74. The stream of water discharged tangentially from opening 71 tends to follow along under helical ledge 66 and not only aids in the rotation of the body of material in passage 20, but also serves to lubricate the ledge and the surface of the passage to reduce the frictional resistance. This water finally reaches chamber 21 and aids in the grinding operation in the same manner as water supplied from the sink or hopper through the opening in ring 12.

The waste disposal device hereinbefore described and embodying the present invention is particularly suited for use in those establishments, such as drug stores and the kitchens of hotels and restaurants, where during rush hours large volumes of waste food material and the like must be disposed of in a minimum of time. With the device illustrated, the waste material is deposited in the sink or hopper and tends to pack into and fill the material admission passage. The driving motor is energized by means of any suitable switching mechanism, preferably before the waste material becomes packed in the grinding chamber, and water is supplied to the device through the passage 70 or through the admission opening in ring 12 from a faucet, or from both such sources for best operation of the apparatus. With the motor in operation, the material impelling device 30 causes rotation of the mass of material in grinding chamber 21 and material admission passage 20. As the material is ground and passes out through the bottom of the grinding chamber, the downwardly expanding frusto-conical form of passage 20 and chamber 21 tends to produce in effect a downwardly directed relieving action which tends automatically to feed unground material to the grinding means in chamber 21. This downward feeding is materially aided by the screw-like action produced by helical ledge 66, the outer surface of the relatively packed mass of material in passage 20 being forced against the ledge and rotated by impelling device 30. Due to the substantial cornice-like overhanging of ledge 66, the outer surface of the mass of material is positively gripped and pressed downwardly, thereby causing a positive downward feed of the whole mass and making it unnecessary for an operator constantly to press the material into the grinding chamber in order to secure the desired speed of waste disposal required in rush hours. Curved surface 67

insures a smooth action and prevents the undesirable catching of material such as would occur with a groove which would soon become packed full of material and lose its ability to produce a screw-like feeding action. This curved surface also makes it easier to keep the material admission passage in a sanitary condition since it renders ledge 66 self-cleaning and prevents accumulation of material under the ledge after cessation of operation of the waste disposal device.

A further advantage of the frusto-conical shape of the grinding chamber and material admission passage and of the helical ledge makes itself apparent when there is in the disposal device an insufficient quantity of material to fill the grinding chamber and passage. Under these circumstances, the upward contraction of passage 20 and the overhanging ledge 66 tend to intercept material thrown upwardly by impeller 30 so that such material is not thrown outwardly through the admission opening in ring 12.

During operation of the waste disposal device, material feeds from passage 20 and into chamber 21 in the manner described hereinbefore and larger objects, such as bones, grapefruit rinds, and the like, are given a course of crushing or cutting by cooperation of upper stationary cutter 41 with the rotating wing-like impeller blades 33. This facilitates the passage of the material into the more restricted space between the rotating impeller and lower stationary cutter 40 and finally into the small space between the rotating cutters 34 and lower cutter 40 where the material is shredded and reduced to the desired degree of comminution for passage through opening 37 into annular passage 27. The employment of a plurality of stationary cutters and the placing of these cutters in angularly displaced and vertically staggered relationship to each other insures proper comminution of large quantities of waste material while materially reducing the frictional resistance of the grinding operation. Thus, it is made possible to operate the device over long periods of time for the disposal of large volumes of waste material while requiring a minimum of motor capacity and insuring reliable operation with a minimum of jamming and motor heating. This results in lower initial cost due to the fact that a smaller motor may be employed and results also in lower cost of operation and maintenance.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an apparatus for the disposal of waste material such as garbage and the like, a casing providing a substantially vertical axis round grinding chamber, a material admission passage opening into said chamber, means for comminuting material in said chamber including a substantially vertical axis material impelling device rotatable in said chamber and a plurality of stationary elements projecting from the walls of said chamber for cooperation with said rotatable device in the comminution of material, said elements being angularly displaced relative to each other about the periphery of said chamber, and means providing a substantially circular restricted opening for the passage of comminuted material from said chamber, one of said elements being

disposed with its lower end closely adjacent said opening and another of said elements being disposed with its lower end spaced substantially from said circular opening and its upper end extending above the level of the upper end of said one element.

2. In an apparatus for the disposal of waste material such as garbage and the like, a casing providing a substantially vertical axis round grinding chamber, a material admission passage communicating with said chamber, means for comminuting material in said chamber including a substantially vertical axis rotatable material impelling device and a plurality of stationary cutting elements cooperating with said rotatable device for the comminution of material, and means providing an opening adjacent the bottom of said chamber for the passage of comminuted material from the chamber, said stationary elements being angularly displaced relative to each other about the periphery of said chamber and certain of said elements being vertically staggered relative to other of said elements, said rotatable device and the lowermost of said elements being relatively adjustable and extending into close adjacency with said opening, the uppermost of said elements being substantially spaced from said opening and extending above the level of the said lowermost of said elements.

3. In an apparatus for the disposal of waste material such as garbage and the like, a grinding chamber, means including a rotatable material impelling device for grinding material in said chamber, a substantially round material admission passage communicating with said chamber and disposed substantially coaxial with said rotatable device, means providing on the walls of said passage a helical ledge facing in the direction of said chamber for cooperation with said rotatable device to produce a screw-like forced feeding of material into said chamber, and means for discharging into said passage, on the side of said ledge toward said chamber, a stream of water which is substantially tangentially directed in such manner that the stream tends to flow circumferentially around the passage in contact with the passage walls.

4. In a waste disposal apparatus, housing means providing a grinding chamber and a downwardly expanding generally frusto-conical material admission passage having its larger lower end opening into said chamber, means for comminuting material in said chamber including a material impelling device disposed in the chamber below said passage and rotatable about an axis substantially coinciding with the extended axis of the passage, and a motor operable for rotating said device at relatively high speed, the cross-section of said passage increasing spirally so as to provide on the wall of the passage an overhanging ledge which extends in a conical spiral and faces downwardly generally toward said chamber and impelling device, the portions of the wall of said passage which extend downwardly from the base of each turn of said ledge to the next subjacent turn of the ledge being non-reentrant.

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