

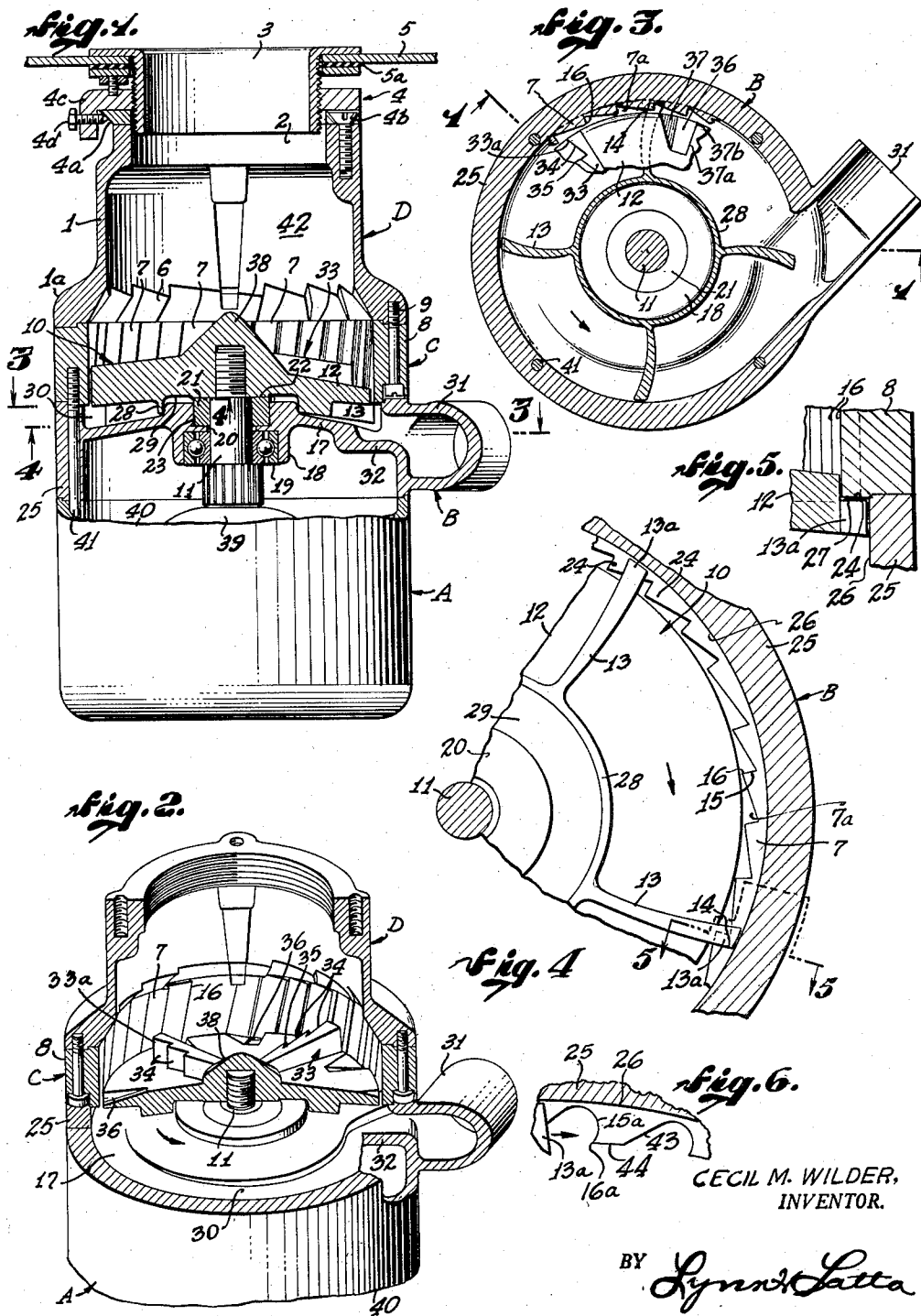
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C. M. WILDER

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GARBAGE GRINDER AND DISPOSER

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CECIL M. WILDER,
INVENTOR.

BY *Lynn & Latta*

ATTORNEY.

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GARBAGE GRINDER AND DISPOSER

Cecil M. Wilder, Whittier, Calif., assignor, by mesne assignments, to Pump Suppliers Inc., Pico, Calif., a corporation of California

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This invention relates to garbage disposers of the well-known type having means for grinding garbage in the presence of a stream of water and flushing the ground garbage through an outlet which is connected to a sewer line. The general object of the invention is to provide an improved garbage grinder of this general class.

A specific object of the invention is to provide a garbage disposer having improved grinding means adapted to chop fibrous material as well as to pulverize pulpy material of a non-fibrous character. In this respect, the conventional garbage grinders now available are universally subject to failure in the presence of any substantial quantity of fibrous material such as corn husks, artichoke hulls, and the like. The housewife, discovering that such material becomes clogged in the grinding mechanism and ultimately stops the operation of the grinder, learns to dispose of these materials through other channels, and avoids any attempt to dispose of them through her garbage grinder. The present invention solves this problem by providing grinder mechanism which, in addition to more or less conventional grinding jaws, has shearing edges which chop such fibrous material into fibers of short lengths which are readily passed into the disposal outlet, and winding of the fibers about the rotor of the disposer, is avoided. The grinder of my invention will comminute even rags, paper and the like. At the same time, the invention provides a sturdy grinding apparatus that will pulverize hard materials such as glass without having its fiber-shearing edges dulled thereby.

A further object is to provide a garbage disposer which has dual centrifugal pumping means on the upper and lower sides of the rotor respectively, whereby on the upper side of the rotor, the unpulverized material is impelled outwardly against fixed grinding jaws and on the underside, the slurry, comprising a mixture of pulverized material and water, is impelled by centrifugal force into the disposal outlet.

A further object is to provide a disposer which in addition to the above mentioned features, is of relatively simple and inexpensive construction, and very durable. To this end, the invention provides an arrangement wherein the fiber shearing mechanism is developed from a combination of the pulp grinding jaws above the rotor and the slurry impelling blades on the lower side of the rotor. More specifically, the invention provides an arrangement wherein fixed pulp grinding jaws extending generally vertically in substantial parallelism to the rotor axis, have their lower ends arranged in a common plane in a manner to define a series of machine tool tooth shaped shearing edges, and wherein the slurry impeller blades project beyond the rim of the rotor body, with the upper extremities of the projecting portions of the blade disposed in a radial plane immediately below that of said saw-tooth edges, and providing cutting edges which cooperate with the stationary edges to execute a shearing action against fibers moving downwardly past the rim of the rotor.

Another object is to provide an improved method of fabricating the grinder components of a garbage grinder inexpensively, to obtain accurate but extremely hard,

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and long wearing grinder parts having the combination of pulp grinding and fiber shearing structure and arrangement outlined above.

Other objects will become apparent in the ensuing specification and appended drawing in which:

Fig. 1 is a side elevation of a garbage disposer embodying my invention, with the operative mechanism shown in axial section;

Fig. 2 is a perspective view of the same with the rotor and parts above the plane thereof, being shown in section;

Fig. 3 is a horizontal radial sectional view of the grinder taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary horizontal sectional view on a larger scale, taken on the line 4—4 of Fig. 3 and looking upwardly to illustrate the fiber shearing and slurring impelling mechanism;

Fig. 5 is a fragmentary vertical sectional view of the same, taken on the line 5—5 of Fig. 4; and

Fig. 6 is a fragmentary view of a preferred form of grinder tooth profile.

Referring now to the drawings in detail, I have shown, as an example of one form in which my invention may be embodied, a garbage grinder having, as its main components, a motor and housing unit A; a combined motor dome and outlet scroll unit B; a grinder unit C; and a throat D. These parts, arranged in the order named above, are superimposed on one another and attached together to constitute the complete grinder unit, with the rotor unit A at the bottom and the throat D at the top, providing a means for suspending the grinder from a kitchen sink.

Referring first to the throat unit D, said unit comprises a cylindrical body portion 1 which defines a throat leading downwardly from a reduced mouth 2 into the grinder unit C. Mouth 2 receives the lower end of a fitting 3, the latter projecting downwardly through the drain opening in the bottom 5 of a kitchen sink or other receptacle in which the grinder may be installed; fitting 3 have a radial flange resting on sink bottom 5. The grinder is attached to an external thread on fitting 3 by means of a coupling unit 4 which includes a ring 4a attached to the top of throat D by flush head screws 4b extending downwardly through the ring and into the throat D; and which further includes a collar 4c having ears projecting thereto by set screws 4d threaded through such ears and engaging in undercut recesses in the periphery of ring 4a as shown. The faces of these recesses are inclined at an angle such that the pointed ends of set screws 4d may engage them with a camming action through which, by adjusting several set screws 4d (there being three or more of the set screws around the circumference of the coupling) the entire grinder may be adjusted for axial alignment and fitting outlet unit B with exactness to the sewer line.

Below its cylindrical body 1, throat D has an end portion 1a of enlarged diameter within which is formed a series of saw-tooth grinder teeth 6 leading downwardly to and communicating with fixed grinder teeth 7 of grinder unit C.

Grinder unit C is in the form of a cylindrical ring 8 having the fixed grinder teeth 7, which is of a machine tool "tooth form" section, formed integrally therein and defining the serrated inner wall thereof; and having an upper end fitted to the above mentioned lower end of throat D and secured thereto by screws 9 extending from end to end through the jaw ring C. Grinder unit C also includes a grinding rotor 10 the rim of which is fitted to the serrated inner wall (defined by teeth 7) of ring 8. Adequate clearance is provided by the triangular openings

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7a (Fig. 4) which are defined between said rim and the lower extremities of fixed grinder teeth 7, to provide adequately for the flow of slurry from grinder unit C into outlet scroll unit B. Rotor 10 is secured to the upper end of a motor shaft 11, which is rotated by motor unit A in a counter-clockwise direction as viewed from above (Fig. 3) and a clockwise direction as viewed from below (Fig. 4) the arrows in these two figures indicating such rotation.

Rotor 10 includes a disc body 12 the periphery of which constitutes the rim referred to above, and has on its underside a series of radiating slurry impellers 13 formed integrally therewith and projecting beyond the rotor rim to provide fiber shearing blades 13a. Defined between the forward or advancing faces of shearing blades 13a and their upper faces, are shearing edges 14 (Fig. 5) which cooperate with shearing edges 15 (Figs. 4 and 5) that are formed at the lower ends of fixed grinder teeth 7. As will be apparent in Fig. 4, the fixed shearing edges 15 are disposed substantially radially, and edges 14 have a slightly swept-back inclination from true radial position, whereby the shearing action proceeds toward the base (radially outwardly extremity) of each shearing edge 15, from the tip (radially inward extremity) thereof. The substantially vertical fixed jaws 7 have substantially radial faces and diagonal faces, the latter extending circumferentially and diagonally outwardly in the direction of rotation of rotor 10 and intersecting said radial faces to define apex edges 16. Apex edges 16, which constitute the fixed grinding edges of grinder ring 8, are preferably disposed with a slight helical tilt as indicated in Fig. 1, with an angle of inclination extending downwardly in the direction of rotation. Consequently, there is a tendency for the material thrown outwardly by rotor 10 against fixed grinding teeth 7 to be fed by the helical tilt of the teeth 7, around the rim of the rotor into openings 7a.

It will now be apparent that a shearing action between the shearing edges 14 of the rotor and the fixed shearing edges 15 will be exerted against fibers fed downwardly through openings 7a, in a manner to effect a chopping action on the fibers. The low inclination of the diagonal faces of teeth 7 is such as to facilitate the outward movement of fibers into position in front of shearing edges 15, awaiting shearing action.

Effectiveness of shearing action is obtained by the combination of accuracy in the dimensioning and fitting of the blades 13a to the under faces of fixed grinder teeth 7, with only sufficient clearance to avoid the retarding effect of frictional rubbing of the blades 13a against said lower faces of the fixed grinder teeth. In this respect it will be understood that the clearance indicated in Fig. 5 is exaggerated for the purpose of illustration.

The outlet scroll unit B includes a disc body 17 which provides a dome for the housing of motor unit A and has a hub 18 in which is mounted an anti-friction bearing 19 carrying the shaft 11 for free rotation of rotor 10. Hub 18 is divided by an internal shoulder flange 20 into a lower compartment which mounts the bearing 19 and an upward compartment in which is mounted a fluid seal 21. Seal 21 is a spring loaded carbon seal of a well known manufacturer, adapted to maintain snug engagement with the flat underface 22 of rotor 10 and snug engagement, at its periphery, with the cylindrical inner wall 23 defining said upper compartment of hub 18. At the same time, the material is such as to avoid any substantial wear between its upper face and the rotor 10. Thus an effective fluid seal is maintained for a long period of operation, preventing any passage of moisture into motor unit A. This fluid sealing action is assisted by the centrifugal pumping action of slurry impeller blades 13 which actually create a suction at the upper side of hub 18, resisting any tendency toward downward flow of any fluid in the hub region.

The lower end face of ring 8, which is disposed in a

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radial plane and intersects the radial faces of teeth 7 to define shearing edges 15, is indicated at 24 in Figs. 4 and 5. Outlet scroll unit B includes a cylindrical lateral wall section 25, joined integrally to the periphery of disc body 17, projecting upwardly therefrom to meet lower end face 24 of grinder ring 8, and having a cylindrical inner wall 26 which is overhung by said lower end face 24 to provide an annular space in which shearing blades 13a rotate. Upper faces 27 of blades 13a, which are intersected by the forward faces thereof to define shearing edges 14, are disposed in a radial plane and fitted closely to end face 24, for maximum shearing efficiency.

Grinder unit C further includes an annular integral splash guard apron or slinger ring 28 projecting downwardly from the lower face of rotor 10 and defining an annular recess 29 in which is received the upwardly projecting upper end of rotor hub 18. This provides a further protection to the seal from becoming clogged or contaminated with ground waste particles. This arrangement provides a splash-arresting seal around the seal ring 21, and the suction developed by slurry impeller blades 13 constantly tends to oppose any movement of moisture inwardly past this splash guard seal, from the scroll chamber 30 in which the slurry mixture of pulverized material and water, flowing downwardly around the rim of rotor 10, is collected and guided toward an outlet 31.

As illustrated in Fig. 2, scroll chamber 30 for approximately 180° of its length, is of gradually increasing depth, as defined by a downwardly slanted portion 32 of the peripheral portion of disc body 17 which defines the bottom of the chamber 30. This deepening portion of the scroll chamber leads to outlet 31 as shown.

In grinder unit C, the rotor 10 has on its upper side, pulp grinding blades 33 extending radially, having flat radial rear faces and serrated forward faces 34 of saw-tooth form. The serrated faces 34 are inclined outwardly in the direction of rotation and thus exert a restraining effect, opposing the effect of centrifugal force in moving material outwardly against fixed grinder teeth 7. Forward edges 35 of serrated faces 34 provide sharp teeth which function to engage and hold the material being fed outwardly to fixed grinder teeth 7, for improved pulverizing action.

In the upper face of rotor disc 10, in the outer portion thereof and sloping downwardly to its rim, are a series of recesses 36 the forward faces of which are inclined upwardly in the direction of rotation as at 37 to facilitate downward movement of material to these recesses, and the rear sides of which are defined by shoulders 37a (Fig. 2) disposed in vertical, radial planes and having, at their outer extremities, secondary grinding edges 37b that cooperate with fixed grinding edges 16 to effect a grinding action. Similarly, the outer ends of rotor blades 33 have grinding edges 33a which cooperate with grinding edges 16 to effect a preliminary pulverizing action. In Fig. 3 at the top thereof, a small fragment of the rotor is shown in plan, to illustrate the relationship between the grinding edges 33a and grinder edges 16. The clearance between edges 33a and edges 16 is somewhat greater than between the edges 37b defined at the ends of shoulders 37a, whereby the coarser particle grinding is effected by blades 33 and the finer particle grinding by the edges 37b.

Rotor 10 has a conical hub 38 which separates and distributes outwardly, the material fed downwardly from throat D; also forms a cone into which a "blind hole" is drilled and tapped which eliminates corrosion which will "freeze" the rotor-shaft 11 into the rotor 10.

Motor unit A includes the motor, the armature of which is visible at 39, and a casing 40 the upper end of which is fitted to the lower end of scroll body 25. Long screws 41 are extended full length through lateral wall of motor casing 40 and the lateral wall section 25 of unit B, and threaded into the grinder ring 8 as indicated in Fig. 1, thus securing these several sections of the grinder

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in assembly. The mating ends of these sections are properly flanged, as indicated, for piloting inter-engagement such as to establish the coaxiality of these parts, and to effect a seal between them. If necessary, although not shown, gaskets may be interposed between the adjoining ends of throat 1, ring 8 and scroll body 25, in order to attain a liquid tight connection. Thus there is defined, between throat D, grinder ring 8 and rotor 10, a grinding chamber 42 which is liquid tight except for the escape openings 7a, and there is defined between the lower side of rotor 10 and scroll unit B, outlet scroll chamber 30 leading to outlet 31.

Accuracy and durability in the grinder components including the ring 8 and the rotor 10 is obtained by a process of fabrication wherein these parts are first formed as sand castings, using highly compacted molds of fine sand, shaped in accurate patterns and baked to an adequate degree of hardness and form stability; machining the end faces and upper faces 27 of shearing blades 13a to an accurate fit within cylindrical inner wall 26 of lateral body 25 of outlet scroll unit B and to provide the close accurate clearance between the upper faces 27 and the lower end face 24 of ring 8, which is likewise machined. The rim of the disc body of rotor 10, and the underface 22 thereof, may likewise be machined. The upper end face of ring 8 may likewise be machined for proper close fit between throat unit D and motor casing A. After machining, these parts are flame hardened so as to harden their cutting edges without creating any distortion in the castings. This flame hardening is applied to shearing blades 13a, to the grinding teeth 7, and to the grinding blades 33. Thus there is imparted to the cutting edges, long life wear such that the cutting edges do not require re-sharpening.

Referring now to Fig. 6, the preferred form of grinder tooth section shown in that figure, which, like Fig. 4, looks upwardly past the leading edge of a shearing blade 13a at the lower end face 24 of grinder ring 8, tooth section being shown in end profile. The forward faces of the teeth, instead of being disposed in radial planes as previously described, are of semi-cylindrical curvature, so that the cutting edges 15a are semi-circular. The slanting rear faces 43 of the teeth are tangent to the curved forward faces, at the base of the latter, and instead of intersecting the outer extremities of the curved faces to define the vertical cutting edges 16a, slanting faces 43 intersect segmental cylindrical faces 44 to define lands which are fitted closely to the rim of the rotor disc 12.

The advantage of this improved tooth profile arises from the fact that the fibers, sheared near the outer extremities of cutting edges 15a at 16a will have little tendency to pack in the base area of the groove defined between succeeding teeth, as they do have in a saw-tooth profile such as is shown in the other figures. Instead, they will curl around the curved contour of cutting edges 15a and even past the points of tangency with slanting faces 43, if necessary, in order to work their way out of the pocket between the teeth and gradually feed downwardly through opening 7a.

It will now be apparent that blades 33 on the upper side of rotor 10 do double duty as centrifugal pumping blades which urge the raw material outwardly against grinding teeth 7 and which have at their outer ends the cutting edges 33a, cooperating with fixed grinding edges 16 for the primary pulverizing action. Again, there is provided, in rotor 10, the secondary grinding edges 37a, coating with fixed grinding edges 16 for the finer pulverizing at a lower level, prior to passage of the pulverized material downwardly through opening 7a into the outlet scroll chamber 30.

Below the rotors, there are the slurry impeller blades 13 having the projecting tips 13a which constitute the shearing blades coating with shearing edges 15 for chopping into short lengths, fibrous material which is urged downwardly into openings 7a by the downward flow of

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pulverized material. The blades 13 also function to create, in outlet scroll chamber 30, by centrifugal force, a pumping action, which in connection with the gradually increasing area of chamber 30 approaching outlet 31, develops the pumping action which has two useful effects, namely: (a) to facilitate the downward flow of material past the rim of rotor 10 and (b) to create, between scroll body 17 and the lower side of rotor 10, adjacent hub 18, a region of lowered pressure which opposes any tendency for liquid to pass inwardly toward fluid seal 21, thus reinforcing the action of seal 21 in preventing any escape of moisture from the outlet chamber 30 into the motor unit A.

I claim:

1. In a waste disposer: a housing; a rotor mounted therein for rotation on the major axis thereof, said rotor having a circular rim, having a plurality of impeller blades integral with and projecting downwardly from the lower face thereof, said blades extending generally radially from a diameter inwardly of said rim to said rim and having integral tip portions constituting shearing blades projecting beyond said rim and provided with upper faces disposed substantially in a radial plane, said rotor further having grinder blades integral with and projecting upwardly from the upper face of said rotor, said grinder blades extending generally radially to said rim and having grinding ends substantially flush with said rim; said housing having internal serrations in a continuous array about the circumference thereof and extending generally parallel to said major axis from the plane of the upper faces of said shearing blades to a substantial height above the upper face of said rotor and above said grinder blades, said serrations defining fixed grinder teeth extending from the upper extremities of said grinder blades substantially to the plane of the upper faces of said shearing blades and defining waste-conducting passages extending from above said grinder blades downwardly past said rim to said plane, for feeding ground waste downwardly past said rim to said shearing blades, said fixed grinder teeth being of saw-tooth cross-section in a plane normal to said major axis, and having substantially radially disposed forward faces toward which said rotor revolves, said fixed grinder teeth having lower ends overhanging said shearing blades and disposed substantially in a radial plane closely adjacent the upper faces of said shearing blades, said lower ends having, as the lower edges of said radially disposed forward faces, shearing edges cooperating with the upper edges of said shearing blades for shearing fibrous waste passing downwardly past said rim, and said fixed grinder teeth having rear faces that are slanted outwardly in the direction of rotation of said rotor to the outer extremities of said forward faces, so as to facilitate outward movement of waste from said rotor into said waste conducting passages; said housing defining an annular waste disposal space therein directly below said rotor, in which said shearing blades are adapted to revolve, and a disposal outlet communicating with said disposal space, said impeller blades and shearing blades having a centrifugal pumping action impelling waste into said outlet.

2. A disposer as defined in claim 1, wherein said rotor has in its upper faces, recesses opening through said rim and of gradually increasing depth from their inner extremities to said rim, with downwardly and outwardly sloping bottoms.

References Cited in the file of this patent

UNITED STATES PATENTS

2,322,058	Powers	June 15, 1943
2,442,812	Jordan	June 8, 1948
2,476,630	Schindler	July 19, 1949
2,577,152	Powers	Dec. 4, 1951
2,594,250	Tranbarger	Apr. 22, 1952
2,682,376	Frank	June 29, 1954