Aug. 21, 1951 J. H. POWERS 2,565,322

GRINDER MECHANISM FOR WASTE DISPOSAL APPARATUS

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Fig. 1.

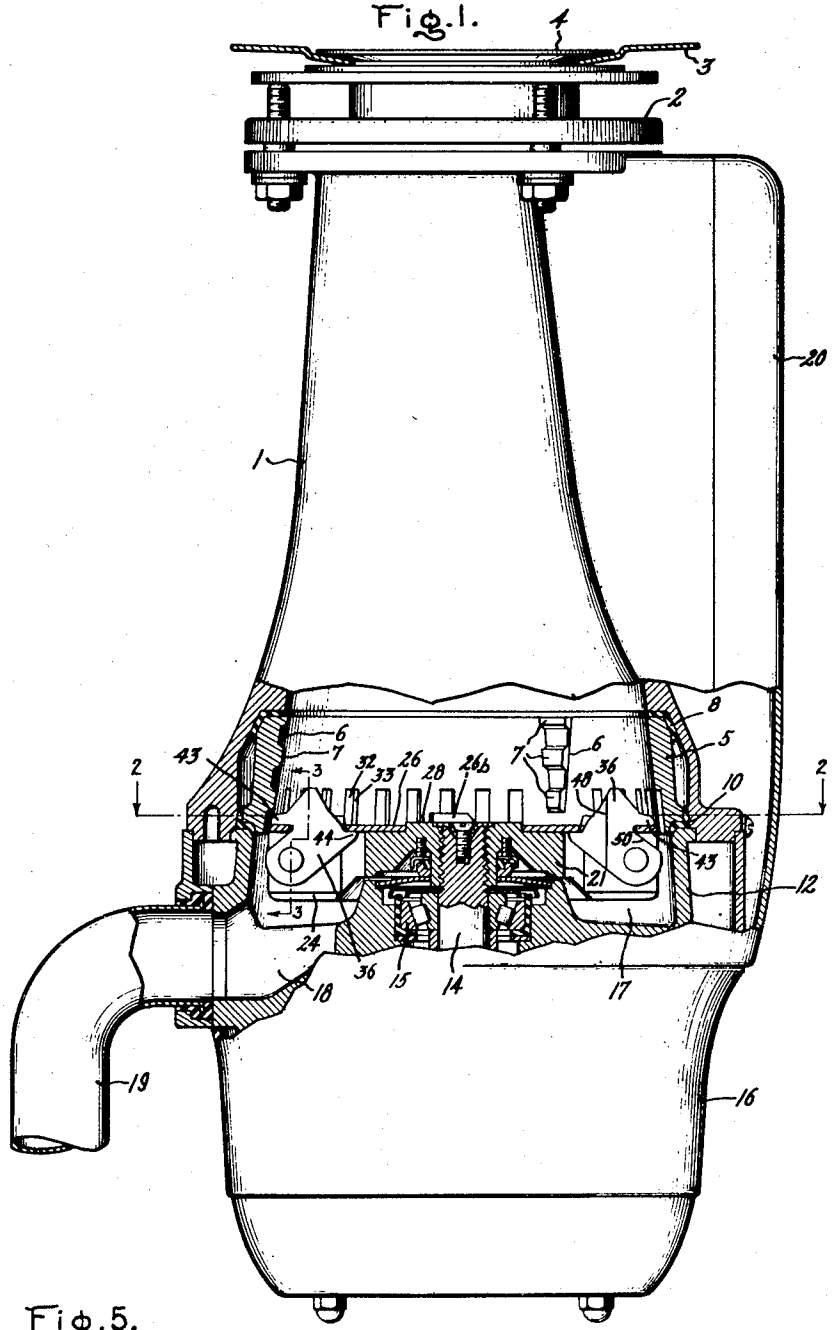
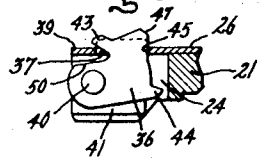


Fig. 5.



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Fig. 2.

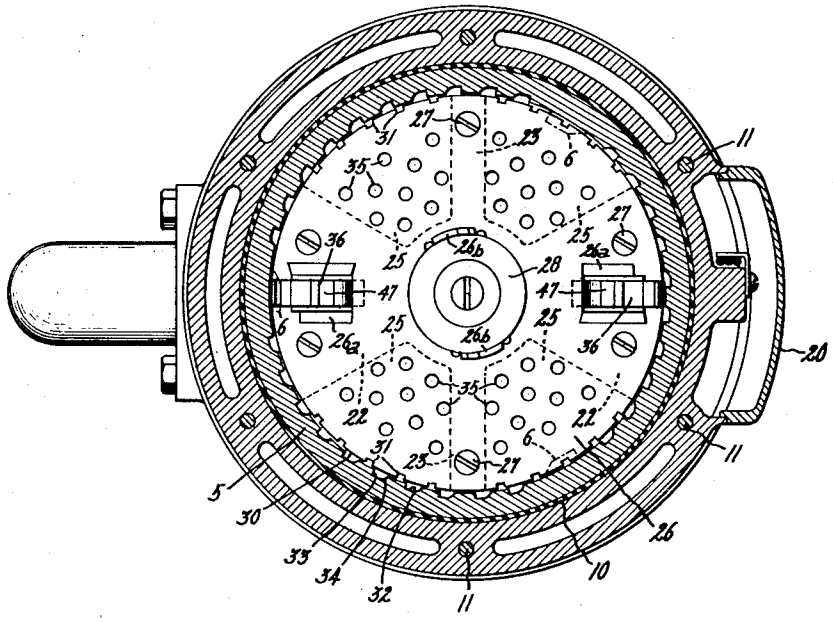


Fig. 3.

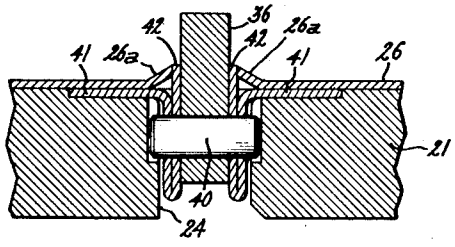


Fig. 4.

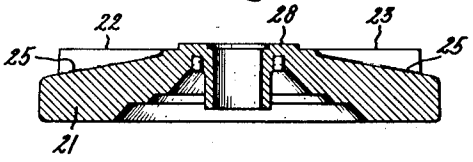
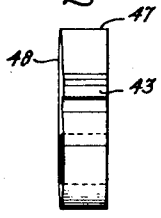


Fig. 6.



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UNITED STATES PATENT OFFICE

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GRINDER MECHANISM FOR WASTE DISPOSAL APPARATUS

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Application June 22, 1949, Serial No. 100,716

6 Claims. (Cl. 241—257)

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This invention relates to an improved garbage grinding apparatus in which garbage and other kitchen wastes are comminuted in the presence of water and the resultant mixture flushed to the waste disposal system of the building. This invention particularly concerns an improved grinding mechanism for such apparatus.

Garbage grinding and disposal apparatus of this general type is now widely known and accepted. The presently most effective constructions provide a relatively deep waste receiving chamber, at the base of which is a horizontally rotatable flywheel provided with a plurality of impeller elements useful principally as drivers to cause the waste materials to travel at high speed around the lower wall of the chamber to be comminuted by striking and scraping against blades or shredders projecting therefrom. The slurry of comminuted garbage and water passes through side wall grooves into a drainage chamber. To minimize the jamming of waste materials between an impeller and a shredder, it has been the practice suitably to pivot the impeller elements relative to the flywheel so that they will move into driving position by centrifugal force but are free to retract should a hard waste particle drive between an impeller and the wall of the shredder chamber. For various reasons, but notably the prior art methods of mounting the impellers relative to the flywheel, it has been difficult in mass production to hold close tolerances between the flywheel and impellers and the inner wall of the shredder chamber, with resultant eccentricity of the strainer space or passage between the flywheel rim and the adjacent wall and the corollary objection that a particle large enough to drop into a large opening between the flywheel and the chamber wall might immediately thereafter be jammed into an area of considerably smaller clearance, imposing a drag on the flywheel which in extreme cases, may actually stall the drive motor.

It is therefore an object of the invention to provide an improved grinding mechanism for waste disposal apparatus, in which the clearance between the rim of the flywheel and the adjacent chamber wall may be consistently held to close tolerances of spacing and concentricity, so as to eliminate undesirable, accidental variations in the size of the passage between the flywheel and the chamber wall.

It is another object of the invention to provide an improved flywheel facing having an uninterrupted periphery forwardly of the impellers and at the sides thereof, while permitting said impellers to be accurately positioned in close proximity to the shredder chamber wall.

It is a further object of the invention to provide an impeller blade for garbage grinding apparatus which is effective both to drive the garbage against the shredder elements, and to chop, gouge, and tumble large pieces of garbage as it engages the same.

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It is another object of the invention to provide a mounting for an impeller element which is substantially non-jamming and self-clearing in use.

It is yet another object of the invention to provide improved strainer grooves communicating between the shredder chamber and a drainage space, and having a wall contour which provides shredding surfaces for cooperation with the impeller blades and improves passage of shredded waste to the drain space, being particularly effective to prevent the trapping of short lengths of bone or other hard waste materials within the grooves.

In accomplishing these and other objectives, I provide a flywheel and impeller assembly in which the body of the flywheel is configurated to receive mounting brackets for radially extending impeller blades, and the flywheel is faced with a disk-like cover or shoe having a continuous outer rim and apertures, disposed inwardly of the periphery thereof, through which the blades project into the shredder chamber. The aforesaid continuous rim makes it unnecessary, as in previous constructions in which the blade occupies a deep slot cut from the rim of the flywheel shoe, to seek to design and position the blade so that it will under all operating conditions completely fill the outer extremity of the slot so as to avoid creation of irregular pockets. The impeller blades are shaped to extend forwardly from the apertures to terminate in a sloping nose which is in substantial registry with the shoe periphery and sweeps beneath the shredder devices projecting from the wall of the shredder chamber. The blades also have a rearwardly reaching peak or tooth effective to tear, tumble, and gouge the waste particles as well as maintain them in motion against the shredders. Large, hard, waste particles entering between the shredders and the peak of the blades will cam the blades rearwardly, thus effectively preventing clogging. The forward or leading side of the blades has a slight bevel which provides a gradually opening slot between a blade and its mounting bracket so as to permit small particles which may have dropped therein to be worked out by the oscillations of the blade in operation. The comminuted materials pass into an outflow chamber through improved strainer grooves in the chamber wall, said grooves having sharp, straight, cutting surfaces at the leading side wall, and a back wall which merges into the trailing side wall by a curve having a radius at least equal to the depth of the groove. Such construction improves both the shredding effect of the grooves and the passage of material therethrough, as hereinafter more fully explained.

These and other features and advantages deriving from my invention will be apparent from the following detailed description of the presently preferred embodiment shown in the accompanying drawings in which:

Fig. 1 is a side elevation, partly in section through the center of the shredder chamber and flywheel, and showing the impellers in projected position; Fig. 2 is a plan section taken through the shredder chamber on lines 2—2 of Fig. 1, showing the flywheel shoe; Fig. 3 is a vertical end section of the blade mounting taken in section on lines 3—3 of Fig. 1; Fig. 4 is a sectional elevation of the flywheel per se, taken through the channel portions thereof; Fig. 5 is a side elevation of an impeller blade in reclined position; and Fig. 6 is a front elevation of a preferred form of impeller blade.

Referring to the drawings, a garbage grinder embodying the present invention includes a substantially conical housing 1 defining a garbage and water receiving chamber at the upper end of which is an inlet assembly 2 having suitable clamping means for securement to the basin 3 of a kitchen sink or the like, the mouth 4 of the assembly occupying the sink drainage opening. Most desirably the said inlet assembly 2 is similar structurally and functionally to that of my Patent No. 2,202,729 dated November 5, 1940 for Apparatus for Comminution and Disposal of Waste Material, and assigned to the present assignee. As is shown therein, a stopper may be rotated to a position providing for ordinary sink drainage into and through the waste disposal apparatus, and is removable for insertion of waste materials into the chamber. Return and rotation of the stopper to a designated position locks the stopper in the mouth 4, and automatically closes a switch in the drive motor circuit. It may also be mentioned that the grinding motor circuit is preferably also controlled by a water flow responsive switch system (not shown) under my Patent No. 2,244,402 of June 3, 1941, and also assigned to the assignee herein, and pursuant to which the motor will not operate unless water in suitable volume for proper comminution of waste is flowing into the sink and thence into the chamber. The housing is preferably of light metal, and is configurated to receive at the base of the chamber formed thereby, a shredder ring 5 of hardened steel or equivalent, said ring being provided with a plurality of—for example, three—shredder elements 6 disposed equiangularly about the inner wall of the ring and projecting therefrom as shown in Fig. 1. Said elements have relatively widely spaced rows of projecting teeth or cutters 7 Upper and lower gaskets 8, 10 of rubber or other resilient material cushion the ring 5 and minimize the transfer of vibrations from said ring to the rest of the apparatus. The ring defines what will hereinafter be referred to as the shredder or comminution chamber, within which the actual grinding of the waste products occurs. Suitably affixed to housing 1 by a plurality of machine screws or studs 11 is a frame 12 carrying the grinding motor (not shown) and serving to journal the motor shaft 14, as in bearings 15. The motor is housed within a cover 16. The upper portion of frame 12 provides an annular space 17 into which flows the mixture of ground waste and water as later described. Said space has an outflow passage 18 to which is connected a drain fitting 19 which may be a leg of a conventional waste trap communicating with the waste line of the building. A removable casing or shroud

20 encloses a compartment which accommodates certain control elements and electrical components (not shown) for the motor circuit. Broadly speaking, the foregoing structure is relatively conventional and well known in the art.

The present invention concerns improvements in the flywheel and impeller assembly, the impeller mounting means, and the strainer grooves formed in the shredder ring.

The flywheel comprises a relatively heavy body 21 provided with integral rib structures 22, 23 of which the diametrically opposed ribs 22 are relatively wide and provided with slots 24 to receive the impeller mounting brackets presently described. Ribs 23 may be narrow, and define with the adjacent ribs 22 drainage channels 25 relatively steeply pitched from the center of the flywheel toward the drainage space 17 within which the flywheel rotates. The upper rib surfaces are coplanar so as to support a flywheel cover plate or shoe 26 which may be of stainless steel, aluminum bronze, or other corrosion resistant, hard material. The flywheel and its shoe are positioned in accurate concentricity with respect to the shredder ring 5. The shoe may be secured to the flywheel by any convenient means such as the plurality of screws 27, staked after setting, and may also be held against shifting on the flywheel by interfitting with a central flywheel boss 28. It will be noted particularly that the shoe 26 is above the lowermost edge of the shredder ring and extends into close proximity to the wall thereof. The practicability of this close relationship derives largely from the continuous rim flywheel shoe construction later described. The close and consistent tolerance between the shoe and shredder ring provides a uniform strainer space 30 between the rim of shoe 26 and the wall of ring 5 for control of waste-particle passage into the drain line. In contemporary structures it is the practice to place the top of the flywheel assembly in close relationship with the bottom edge of the shredder ring. Such construction involves both vertical and horizontal concentricity clearances and a slight discrepancy in either will create spacial irregularities which may cause jamming.

I provide the flywheel shoe with spaced groups of shallow, preferably rectangular, rim notches 31, as best shown in Fig. 2. Said notches are of the order of $\frac{1}{8}$'' x $\frac{1}{32}$'' in size, and accordingly prevent sizable waste particles from passing into the drain space; but at the high speed of flywheel rotation they effectively agitate the slurry of garbage particles and water and facilitate its flow through the clearance space 30 and the strainer grooves 32 provided in the lower part of the shredder ring. The grooves 32 function as auxiliary shredder means and accordingly, I provide each with a sharp forward wall 33 (considered as respects the clockwise rotation of the flywheel as seen in Fig. 2) which extends substantially radially inwardly, but round off the opposite wall 34 on a curve having a radius at least equal to the depth of the groove. This opposed straight and curved wall arrangement effectively prevents particles of hard waste such as bone splinters or fruit pits from wedging or locking in the strainer grooves to project outwardly and create a drag on the rotating flywheel because, as will be obvious, the curved trailing wall cannot hold such waste particles against the effort of the flywheel to draw them outwardly.

To accommodate the normal sink drainage, I provide the shoe with groups of holes 35 disposed

above the respective flywheel channels 25 and sufficiently inward of the shredder ring to be clear for drainage even if a residue of waste material has been permitted to remain about the shredder grooves 32.

A feature of the invention which contributes importantly to the improved action of the waste disposal apparatus resides in making the rim of the flywheel shoe 26 continuous except for the previously noted small notches 31, while securely anchoring the impellers 36 for free swinging movement in a vertical plane. To mount the impellers to provide maximum rigidity and freedom of retraction, while keeping the same sufficiently low within the comminution chamber to tumble and tear the waste materials, I project them from beneath the shoe through rectangular openings 37 formed therein, see Fig. 5, said openings being centered on the flywheel slots 24, and spaced inwardly of the edge of the shoe to maintain an uninterrupted margin 39 of substantial width.

The impellers 36 mount within the flywheel body adjacent the outer edge thereof on pivots 40 carried by brackets 41, countersunk into the flywheel body, as shown in Fig. 3. The brackets are secured to the flywheel shoe by projection welding or equivalent processes. I prefer to stamp the brackets from sheet metal, preferably stainless steel, and to make the vertical leg portion of each bracket of double thickness to provide side wall rigidity and improved pivot bearing surface. It will be noted also that each side wall portion 42 adjacent the impeller extends above the flywheel body and abuts against the edge of the ramps 26*a* struck upwardly from the shoe, said ramps effectively buttressing the walls 42 to impart substantial rigidity to the impeller mounting means.

The impellers are so shaped that their center of gravity is rearwardly of the pivot, and the impellers will fall to a reclined position, see Fig. 5, when the flywheel is at rest. Under centrifugal force the impellers will rotate outwardly to a position in which the bottom edge of the nose 43 of the impellers will engage the rim 39 of the flywheel shoe. I prefer also to provide a lug 44 to contact with the underside of the shoe, thus distributing the support for the impeller when in extended position. Recline is limited by a wall 45 which strikes against the rear edge of the opening 37.

The impellers 36 are designed for cutting, penetration and reduction of large and small particles of waste in addition to driving the waste material at high speed along the shredder chamber wall for action of the shredders 6 and strainer grooves 32 thereon. Accordingly, the nose portion 43 projects forwardly to sweep beneath the lower edge of the shredder element 6, and comes into substantial registry with the outer edge of the flywheel shoe. The leading face of the impellers, considered as respects the rotation of the flywheel, provides a cutting edge; and the slight clearance with the chamber wall is effective in cooperation with the cutting edges 33 of the strainer grooves 32 and with the sharp bottom edge of the shredder elements to cut and shred lighter and fibrous waste materials. The body of the impeller breaks sharply away from the sloping nose 43 to form a relatively large angle with the wall of the shredder ring and the therewith parallel face of the shredder elements. The impeller thus reaches a peak 47 which is free and away from the shredder ring wall, and any large piece of waste tending to lodge between the impeller and the shredder will upon striking the shredder element 6 swing the impeller rearwardly to a position in which its driving action is reduced without unduly affecting the cutting quality thereof. This will be apparent in considering the reclined position of the impeller in Fig. 5 in which it is shown that the nose 43 and peak 47 provide gouging and scoring elements connected by an angular continuous cutting edge, but there is only a relatively small side wall surface capable of engaging the garbage mass. This reduction of the effective driving surface of the impeller blades tends to slow the motion of the waste material about the shredder ring and said waste is subjected to repetitious attack by the rapidly rotating impellers. This is particularly effective to break up large, hard, waste masses.

For additional tumbling and agitation of the garbage within the chamber, I provide the lugs 26*b*, which may be struck upwardly from the shoe 26 at the inner rim thereof. The relatively small diameter of the central aperture of the shoe, and the resultant rather small circle of rotation of the lugs 26*b*, makes said lugs effective to grasp and toss otherwise difficultly manageable articles such as grapefruit skins which in constructions having more widely spaced flywheel lugs, sometimes lay on the center of the flywheel without being struck by the lugs.

The free pivotal action of the impeller is aided by bevelling the forward portion of the leading face thereof at a small angle, for example 2°, from line 48, Fig. 1 to present a small but continuously increasing clearance with respect to the side wall of the supporting bracket. Fragments of paper or the like which might otherwise lodge between the impeller and its mounting wall and restrain the free pivoting of the impeller will rather quickly be ejected therefrom by the normal rapid oscillation of the blade in use. The ramps 26*a* at the sides of the impellers deflect the waste masses upwardly into the effective path of the impeller cutting edges, whereas their radially outward end portions throw waste particles upwardly away from the radially outermost portions of the mounting brackets.

An additional guard against impeller jamming may if desired be created by flattening the upper edge 50 of the lower body portion of the blade so that said edge will slope downwardly away from the under surface of the flywheel shoe even when the blade is reclining. Thus any small bone particles which might drop over the forward edge of the shoe aperture when the blade is in reclining position will work clear of the blade body and pass into the drainage space.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made; and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

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

1. A garbage grinder, including a chamber for the reception of garbage and water; a plurality of shredder elements disposed within said chamber at a lower wall portion thereof; a horizontally rotatable flywheel concentric with said lower wall portion; means for rotating said flywheel; a shoe of wear resistant material secured to said flywheel to provide a floor for said chamber, said shoe extending close to the wall of said chamber wholly above the bottom edge thereof; a plu-

rality of impellers pivotally supported beneath said shoe for rotation in a vertical plane and extending into said chamber through centrally disposed apertures in said shoe, said impellers having a nose portion projecting radially outwardly toward the rim of said shoe and engaging with the top surface thereof as the centrifugal forces engendered by flywheel rotation cause rotation of said impellers about their pivots, and a body portion with an outer face extending angularly upwardly from said nose portion away from said chamber wall at a relatively large angle therewith to provide a flat surface of substantial area for impelling garbage against said shredder means for reduction thereby, said surface terminating in a tooth remote from said chamber wall for additionally attacking said garbage; strainer grooves in said chamber wall communicating between said chamber and a drainage space beneath said flywheel; a plurality of shallow indentations in the rim of said shoe to agitate the comminuted garbage and water for passage into said strainer grooves; and further drainage passages between said chamber and said drainage space, said passages commencing at the central portion of said flywheel shoe and extending radially downwardly through the body of the flywheel for peripheral discharge into said space.

2. A garbage grinder, including a chamber for the reception of garbage and water and having a lower wall provided with shredder elements projecting therefrom; a horizontally rotatable flywheel concentric with said lower wall and extending into close proximity therewith immediately above the bottom edge thereof; impellers pivotally mounted within said flywheel for rotation in a vertical plane and projecting into said chamber through apertures disposed radially inwardly of the periphery of the flywheel, said impellers having a low, sharp-edged nose portion projecting radially of the flywheel to substantially the periphery of the flywheel to sweep beneath the shredder elements and having a body portion with an outer face sloping upwardly from said nose portion and away from said chamber wall at a relatively large angle therewith to provide a sharp-edged peak; a drainage space beneath and about said flywheel; a plurality of grooves through said chamber wall to pass a mixture of garbage and water from said chamber to said drainage space, said grooves having one side wall extending substantially radially inward to provide a cutting edge for cooperation with said impeller; and a motor for rotating said flywheel to cause said impellers to strike garbage within the chamber and cause it to move as a substantially annular mass in scraping contact with the grooves and shredder elements at the wall of said chamber.

3. A garbage grinder, including a chamber for the reception of garbage and water; a plurality of shredder elements disposed within said chamber at a lower wall portion thereof; a horizontally rotatable flywheel concentric with said lower wall portion and extending into close proximity therewith; a shoe of wear resistant material disposed on said flywheel to provide a floor for said chamber; a plurality of impellers pivotally mounted within said flywheel for rotation in a vertical plane and projecting into said chamber through apertures formed in said shoe inwardly of the periphery thereof to provide an uninterrupted outer surface for said shoe, said impellers extending radially of said shoe to extend across the said outer shoe surface for substantially the full width thereof, and having an outer face sloping upwardly from said shoe at a relatively large angle with respect to the chamber wall to terminate in a sharp-edged peak remote from said wall; and a motor for rotating said flywheel at high speed.

4. In garbage grinding apparatus having a chamber for the reception of garbage and water, the lower wall of said chamber having shredder elements projecting into said chamber, an improved grinding means comprising a flywheel mounted for rotation at the bottom of said chamber, said flywheel being concentric with said lower wall and extending into close proximity thereto, impeller members pivotally mounted within said flywheel for rotation in a vertical plane and projecting above said flywheel into said chamber to drive the garbage therein against said shredders, cover means for said flywheel having a continuous rim and having apertures entirely inwardly of the rim thereof to individually accommodate said impeller members while limiting the extent of rotation thereof, means for rotating said flywheel, and means to conduct a mixture of comminuted garbage and water from said chamber to a drainage connection.

5. In a garbage grinder having a shredder chamber for the reception of garbage and water, said chamber having shredder elements projecting from its wall, an improved grinding mechanism comprising a flywheel concentric with the lower wall of said chamber and extending in close proximity thereto, a cover plate for said flywheel, said plate having radially extending elongate apertures disposed inwardly of the periphery thereof, and impeller blades pivotally mounted within said flywheel for rotation in a vertical plane, said blades projecting through said apertures into said chamber and having a sloping nose portion extending forwardly over said cover plate to sweep beneath said shredder elements during rotation of said flywheel and an upwardly and rearwardly peak portion, the respective angles of slope of the nose and peak portions being such that upon rotation of the blade toward the center of the flywheel there is presented an obtuse-angled V opening upward into the chamber to provide widely-spaced teeth to tumble and gouge garbage masses struck thereby.

6. An improved garbage grinding mechanism according to claim 5, in which the impeller blades when at the extreme of their rearwardly rotated positions present only a small amount of vertical surface engageable with said garbage masses so as to be relatively ineffective to drive said masses within said chamber.

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