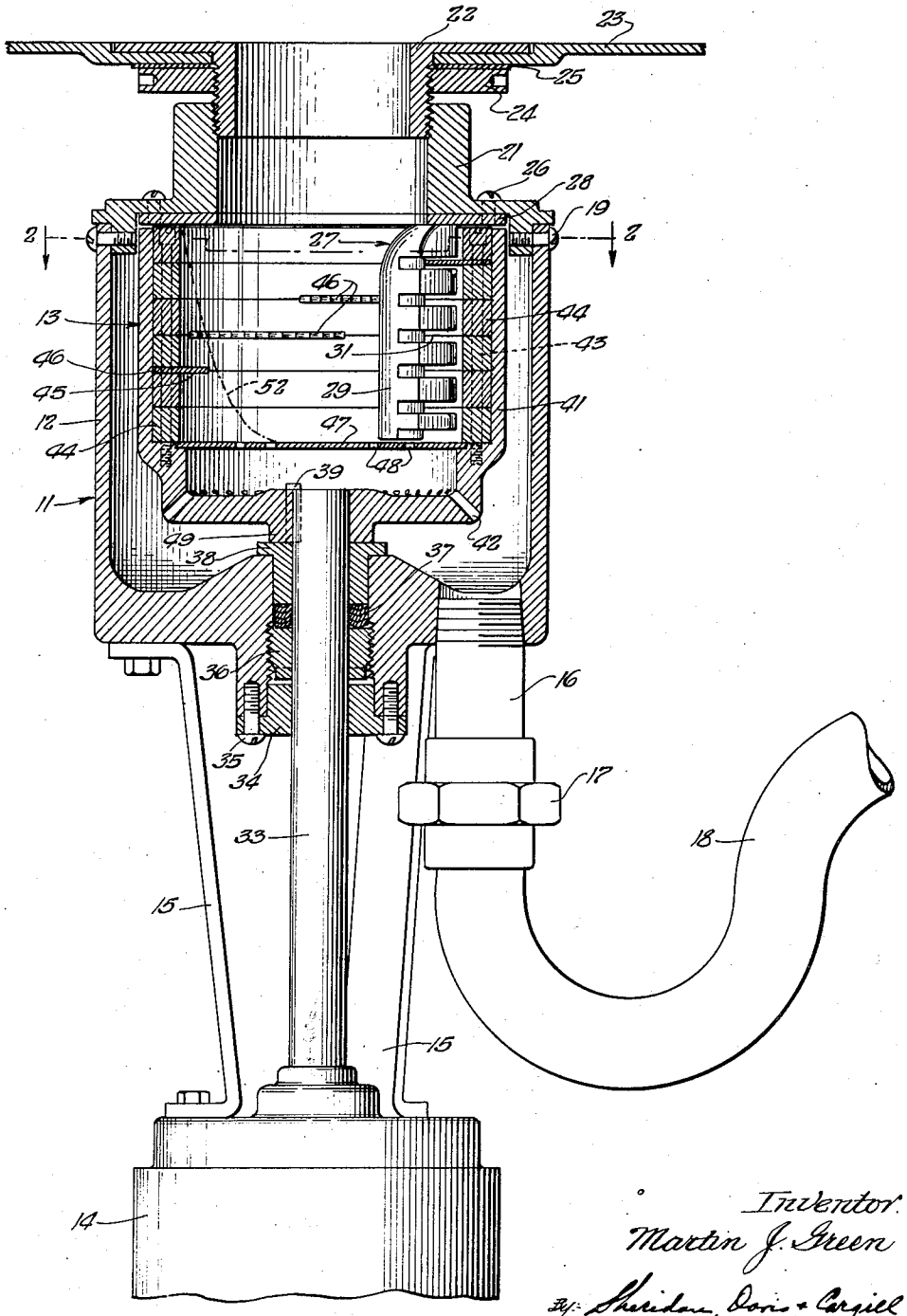
July 21, 1953 M. J. GREEN 2,646,222

GARBAGE DISPOSAL UNIT

Filed March 22, 1946 2 Sheets-Sheet 1

Fig. 1



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GARBAGE DISPOSAL UNIT

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Fig. 2

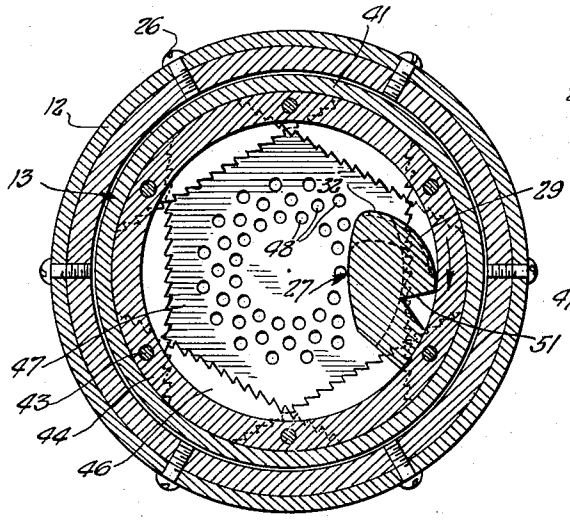


Fig. 3

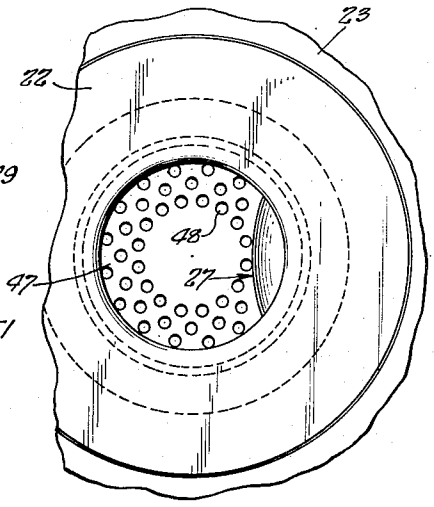


Fig. 4

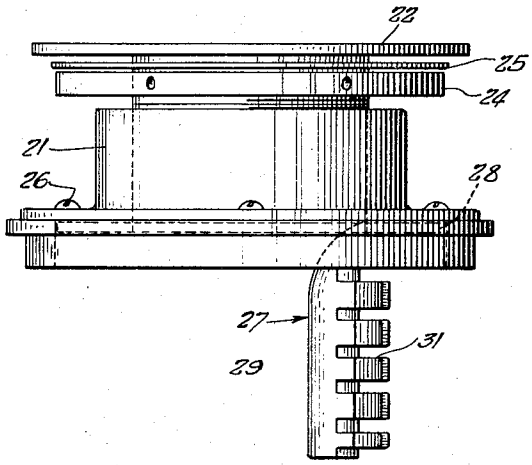


Fig. 5

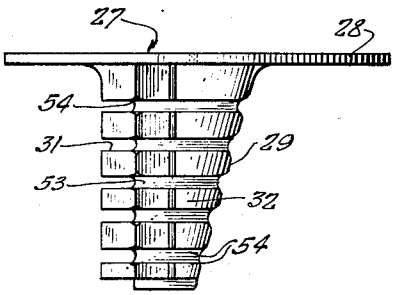
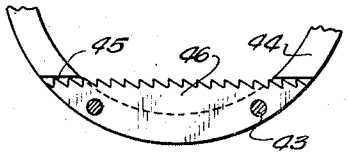


Fig. 6



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UNITED STATES PATENT OFFICE

2,646,222

GARBAGE DISPOSAL UNIT

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Application March 22, 1946, Serial No. 656,459

10 Claims. (Cl. 241—46)

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This invention relates in general to garbage disposal units, and more particularly to an improved unit for rapidly disposing of all normal table waste.

A principal object of the invention is the provision of a garbage disposal unit which is of such size and weight as to be readily supported from the ordinary kitchen sink and connectible to the standard drain pipe normally extending from the latter.

The unit of the present invention is therefore easy and simple to install on any standard sink, and completely eliminates one objectionable feature of some prior devices of generally similar function by obviating the rather extensive plumbing alterations necessitated in the installation of such prior devices.

Another important object of the instant invention is the provision of a disposal unit employing a plurality of sawing elements so arranged as to be capable of reducing any solid waste introduced thereto into minute particles adapted to be flushed through the sink drain pipe.

A further important object of the invention is to provide a rapidly rotating saw carrying member in such a unit which, through the centrifugal force resulting from its rotation, causes any waste material introduced thereto to be carried into contact with a stationary baffle member where it is presented to the saw elements of the rotating member for cutting thereby.

Another object of the invention is the formation of such a rotating member with a plurality of saw elements set therein on different chords of a circle described by rotation of said member and spaced from each other in a direction normal to the plane of such circle, and the provision of a stationary baffle member disposed interiorly of said saw elements and having slots through which the saw elements pass and shaped with a downwardly decreasing horizontal cross sectional area, whereby at a given speed of rotation the maximum cutting action is obtained on the different types of solid waste material introduced thereto.

Another important object of the invention is the provision of a garbage disposal unit employing rotary means for feeding solid waste material to a rotating conveyor which in turn delivers the solid waste material to a comminutor having a plurality of cutting elements spaced in a direction parallel to the axis of rotation of the conveyor, whereby the desired comminuting action is extremely rapidly accomplished.

A further important object is to mount such a

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unit below the usual drain opening in a sink so it may receive water therethrough from the taps or other water supply with which the sink is normally furnished, such water functioning in its resulting swirling action to assist in carrying the waste solids into position to be acted upon by the comminutor and also to flush away the resulting comminuted particles.

Another important object of the invention is the provision in the bottom of the rotating member of such a unit of a series of small discharge apertures so spaced from the center of rotation thereof as to insure a predetermined portion of any liquid introduced into the rotating member being maintained at a desired height on its peripheral walls while the member is rotating at normal speed, and functioning to discharge liquid in excess thereof from said member.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, when taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In the drawings:

Fig. 1 is a vertical sectional view of a garbage disposal unit embodying the features of the invention;

Fig. 2 is a horizontal section taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view, with parts broken away, of the device of Fig. 1;

Fig. 4 is an elevational view of the cover and unit supporting portion of the device;

Fig. 5 is an elevation of the baffle member as seen from the side thereof which the saw elements approach in their cutting action; and

Fig. 6 is a detailed horizontal view illustrating the mounting of one of the saw elements.

Referring more particularly to the drawings, reference numeral 11 indicates a garbage disposal unit comprising a main casing 12 which houses a rotatable saw carrying member 13 and has an electric motor 14 depending therefrom and secured thereto in any desired manner, as by means of straps or brackets 15. At one side, the main casing 12 is provided with an outlet at its lower end in the form of a nipple 16 connected in turn by a union 17 to the standard drain or soil pipe 18 normally provided with any sink.

Secured to the open upper end of the main casing 12 by means of screws 19, or the like, is a flanged cover member 21 having threaded engagement at its upper end with a flanged supporting member 22. The latter is adapted to

be mounted within, and extend downwardly through, the standard drain or outlet opening in a sink of any usual construction, indicated in Fig. 1 by reference numeral 23. A retaining nut 24 is mounted upon the threaded portion of the supporting member 22 below the sink 23, and a suitable gasket 25 is disposed between this retaining nut and the lower peripheral portion of the sink adjacent the drain opening therethrough. With this arrangement, the disposal unit 11 is connected to, and supported in depending position from, the sink 23. The supporting member 22 thus takes the place of the usual apertured drain plate of the sink, and, together with the cover 21 provides an inlet opening to the interior of the disposal unit.

Secured to the horizontal flanged portion of the cover 21, as by means of screws 26, is a stationary baffle member, indicated generally by reference numeral 27, which comprises an upper flange or plate portion 28 with which the screws 26 engage. This baffle member 27 is shown in greater detail in Fig. 5, and includes a main body portion 29 preferably formed integrally with and depending from the flange 28. Along its outer edge, the main body 29 of the baffle member 27 is provided with a plurality of horizontally disposed, saw-receiving grooves 31 spaced vertically from each other for a purpose later to be described. As is best illustrated in Fig. 5, this main body portion 29 decreases in horizontal cross sectional area in a downward direction to provide a downwardly decreasing object-detaining face portion 32.

The shaft 33 of the motor 14 extends upwardly into the interior of the main casing 12 through a lower bushing 34 which is secured to the casing 12 by bolts 35, a packing gland 36, packing 37, and an upper flanged bushing 38 having a finished upper bearing surface. The upper end of the shaft 33 is secured, as by means of a key 39, to the bottom of a cup shaped outer casing 41 of the rotatable saw carrying member 13. The annular side wall of the cylindrical member 41 is imperforate, but the lower portion of this casing 41 is provided with a plurality of peripherally spaced outlet apertures 42. Secured to the casing 41, as by means of a plurality of elongated bolts 43, and disposed in vertically stacked relationship therein are a plurality of annular rings 44 which are formed with cut-out portions 45 in their horizontal surfaces so arranged as to receive comminutor or saw elements 46 which are retained therein by certain of the bolts 43 extending therethrough. These saw elements 46 are thus spaced vertically from each other or in a direction parallel to the axis of rotation of the comminutor by the collars or rings 44, and the cutout portions 45 in adjacent rings are so arranged as to stagger the saw elements 46 spirally around the inner periphery of the rotatable member 13. As best seen in Fig. 2, each of the saw elements or comminuting members 46 extends inwardly the same radial distance from the annular side wall of the cylidrical member 41.

As shown in Fig. 1, a bottom plate 47 is held in the casing 41 between the lowermost ring 44 and an inner flanged portion of the casing by the bolts 43. The plate 47 is provided with a plurality of small discharge apertures 48 spaced around concentric circles in predetermined distances from the center of the plate for a purpose to be later described. The lower end of the casing 41 is provided with a boss 49 having

a lower finished bearing surface which rests upon the upper finished bearing surface of the bushing 38. The hollow cylindrical or saw carrying member 13 is thus mounted for rapid rotation by the motor 14, preferably at a speed of approximately 1750 revolutions per minute. For this purpose, the motor 14 need only be of ¼ horsepower rating. Since the unit as a whole is of relatively small size, the inlet aperture through the supporting member 22 preferably being approximately two inches in diameter and the vertical interior dimension of the saw carrying member 13 preferably being approximately three inches, the entire device is readily supportable by any standard sink. The outlet nipple 16 is disposed at a relatively short distance from the bottom of the sink 23 when the unit is mounted thereon, so that there is no necessity for any extensive plumbing alterations in the installation of the device, as is the case in installing prior devices of generally similar function.

In its operation, any normal table waste is merely introduced into the unit through the aperture in the supporting member 22 and the motor 14 energized. Any liquid introduced to the interior of the hollow cylindrical or saw carrying member 13 will flow through the outlet apertures 48 and 42 into the discharge nipple 16 and to the standard drain or soil pipe 18. Solid waste matter must first be comminuted to enable it to be flushed through the discharge apertures 48. This function is performed by the comminutor comprising the cylindrical wall formed by the casing 41 and rings 44, the cutting or saw elements 46 and the baffle member 27 which comprises a stationary comminuting means having comminuting members or different portions spaced by the slots or grooves 31 to cooperate each with only one of the cutting elements 46. Any solid waste material introduced to the interior of the member 13 will, through the centrifugal force resulting from the rotation of the bottom plate 47 of this member, be carried by the bottom plate 47 into contact with the rotating side walls presented by the rings 44 and conveyed thereby to the object-detaining face 32 of the stationary baffle member 27, where it will be temporarily retained for successive comminuting or sawing actions by the several saw elements 46. The bottom plate 47 thus comprises means for receiving garbage to be disposed of and for delivering the same to the comminutor. The object-detaining face 32 of the stationary member 27 is not intended to retain solid objects for continuous sawing by the saw elements, since such action would not best accomplish a complete reduction of the solid material. Consequently, the baffle member 27 is shaped as best illustrated in Fig. 5 and as previously described, so that any solid waste material directed thereagainst by rotation of the member 13 will tend to move downwardly along the object-detaining face 32 as successive saw elements 46 cut away portions thereof. During normal operation, where a number of pieces of solid waste material are introduced simultaneously into the unit, successive pieces will tend to move those first engaged by the stationary member 27 away from the object detaining face 32 thereof, but such action is in no way objectionable since it will merely result in the different pieces of solid waste material having successive increments of comminuting actions applied thereto. The grooves 31 are so spaced as to permit respective passage therethrough of the

several saw elements 46 and, together with pitch of the teeth of the saw elements, determining the size of the comminuted particles. In this connection, it should be noted that the outer vertical surface of the main body portion 29 of the baffle member 27 is disposed as close as possible to the inner surfaces of the rings 44 so as to permit free rotation of the latter but at the same time prevent passage of solid waste material therebetween. For the same reason, the baffle member 27 extends downwardly into almost contacting relationship with the bottom plate 47, as shown in Fig. 1. In order to further assure complete reduction of the solid waste material into particles of the desired size, the main body portion 29 of the baffle member 27 is preferably provided with a vertical V-shaped relief slot 51, as shown in Fig. 2. The slot 51 results in additional comminuting action which insures this result.

The smaller the angle between the object-detaining surface 32 of the stationary member 27 and the inner surface of the rings 44, the faster will be the cutting or sawing action on solid material. Conversely, increasing this angle would decrease the cutting action until a point would be reached where no cutting action could take place, the surface 32 then merely rejecting or imparting an inward or glancing blow to any object presented to it. As shown in Fig. 2, this surface 32, in the horizontal plane of each of the saw elements 46, is described by an arc of a circle of one half the diameter of that of the inner surface of the rings 44 and having its center in each such horizontal plane on the line normal to the cutting edge of the associated saw element from that point of the saw element first entering the vertical plane of the surface 32, which results in a fast sawing action. At the same time, this surface 32 is so shaped that any extremely hard object such as one of metal, which might accidentally be deposited in the unit and which has a sufficiently large diameter or a horizontal dimension as normally to offer too great a resistance to the cutting action of the saw elements will, by virtue of its size and the inwardly directed force imparted thereto by a saw element because of its extreme resistance to being cut thereby, be forced inwardly and out of engagement with the saw elements.

While each saw element 46 is of a relatively short length, it will be appreciated that the total comminuting or sawing action imparted to any solid waste material by these several saw elements will be extremely great in view of the rapid rotation of the member 13. As will be best seen in Fig. 6, each saw element 46 is so mounted within the unit as to prevent any waste material being forced behind the same, and also so as to enable ready replacement.

As has been previously noted herein, the disposal unit 11 being mounted as described in the sink 23, it is adapted to receive water from the taps or other water supply with which the sink is normally furnished through the inlet aperture defined by the supporting member 22. During rotation of the hollow cylindrical or saw carrying member 13, such water, or any other liquid introduced thereto, functions in its resulting swirling action to assist in carrying the waste solids into position to be cut by the saw elements. Also, on a principle similar to that of the well-known centrifugal separator, the finely comminuted particles resulting from the sawing action being lighter in weight than the solid material from which they have been cut, will be floated to the inner surface of the water or other liquid and be flushed thereby through the outlet apertures 48 which comprise disposal means formed in the bottom plate 47.

With a device of a size of that above described and illustrated herein and a speed of rotation of the member 13 of approximately 1750 revolutions per minute, the apertures 48 are made approximately ⅛ of an inch in diameter, which means that no solid material is discharged from the disposal unit which is too large to pass through these apertures. The positioning of the apertures 48 in the plate 47 has particular significance in relation to the size of the member 13 and the speed of rotation imparted thereto, since this relationship will determine the height to which liquid may rise along the inner peripheral wall defined by the rings 44 by centrifugal force resulting from rotation of the member 13. It is desired that this wall of liquid normally assume approximately the position indicated by the broken line 52 in Fig. 1. Consequently, the apertures 48 are positioned as best shown in Fig. 2, whereby any liquid introduced into the unit will build up to the point just described during rotation of the member 13 and any liquid in excess thereof will be discharged through the apertures 48. It will, of course, be understood that as soon as the motor 14 is turned off and the member 13 comes to rest, any liquid remaining therein will flow through the discharge apertures 48.

As has previously been described, the main body portion 29 of the stationary member 27 is provided with a downwardly decreasing cross sectional area, i. e., the object-detaining surface 32 retaining the same configuration in all horizontal planes but sloping downwardly and outwardly from its upper portion. If this surface 32 were vertically disposed, solid material presented thereto would tend to receive only single cutting actions by the several saw elements 46 successively directed thereagainst, and the tendency would be for this solid material to be retained in such position against the surface 32, and it would only be moved therefrom by the action of other solid material introduced into the unit. The above described downward sloping of the surface 32, however, results in any solid material directed thereagainst having a downward motion along such surface imparted to it, so that while such object is detained against this surface it will move downwardly along it and receive a plurality of cutting actions by each of the several saw elements.

Any solid material introduced into the unit is thus gradually reduced in size, and the resulting comminuted particles will be floated inwardly by any liquid in the unit and carried by the excess liquid, as previously described, downwardly to the discharge apertures 48. If these particles have not been reduced sufficiently in size to permit their passage through the apertures 48, they will again be carried outwardly and upwardly by centrifugal force and the action of any liquid in the unit to be returned into contacting relationship with the surface 32 of the stationary member 27. In order to insure such particles being again presented to the saw elements 46, horizontally disposed grooves 53 are provided in the object-detaining surface 32 in alignment with the several slots 31, as shown in Fig. 5. These grooves 53 channel the flow of liquid past the stationary member 27, directing

it through the slots 31, so as to accomplish the desired result of causing the liquid to carry the insufficiently reduced particles into position in alignment with the slots 31 to be further cut by the saw elements. To assist such action, the end portions of the several grooves 53 are rounded off or chamfered, both vertically and horizontally, as illustrated at 54 in Fig. 5. The relief groove or vertically disposed slot 51 additionally functions to trap any solid particles which are larger than the apertures 48 but small enough to pass through a slot 31 when its saw element 46 is not in the slot, so as to insure further sawing action thereon in the next passage through the slot 31 of the associated saw element. This will be better appreciated when it is understood that in the practical embodiment of the invention illustrated in the drawings, the apertures 48 are approximately ⅛'' in diameter, the saw elements 46 are approximately $\frac{1}{16}$'' thick, and the slots 31 have a vertical dimension or width of approximately $\frac{3}{16}$''.

The arrangement of the parts and shaping thereof as above described have been designed so as to increase to the maximum the number of incremental comminuting actions which will be given any particular piece of solid waste material, regardless of the specific physical characteristics of that piece of material. It will be appreciated, of course, that different types of solid waste material will react differently to the operation of the instant device, but the mechanism herein described has been found to satisfactorily reduce any type of solid material normally found in table waste. Operation of the instant unit has resulted in extremely rapid disposal of any normal table waste introduced thereto, including bones, fruit rind, potato peelings and stringy material which other prior devices of a somewhat similar nature are unable to handle. At the same time, the instant unit is inherently of a self-cleaning nature, and the only thing that is necessary to accomplish a complete cleaning thereof is the introduction of a small amount of soap flakes or soap powder into the rotatable member 13. It will also be understood that, if desired, a removable grating may be placed in the inlet aperture defined by the supporting member 22.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and the scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A garbage disposal unit, comprising a hollow cylindrical member for receiving solid waste material and liquid and mounted for rotation on a vertical axis, comminuting members disposed in vertically spaced relation interiorly of said cylindrical member, and rotatable means mounted below said comminuting members for imparting outward movement to the solid waste material received by said cylindrical member to deliver the same to the interior walls of the latter to be fed thereby to said comminuting members, said rotatable means having apertures therethrough spaced inwardly from the outer periphery thereof so as to maintain a predetermined quantity of liquid in said cylindrical member during rotation thereof and comprising outlet means for any liquid in excess of said predetermined quantity and for the comminuted solid waste material.

2. A garbage disposal unit, comprising a hollow cylindrical member for receiving waste material to be disposed of and mounted for rotation on a vertical axis, comminuting members mounted interiorly of said cylindrical member in vertically spaced relationship, and a stationary member disposed interiorly of said cylindrical member with an outer vertical surface in substantial contact with the inner surface of the latter having horizontally disposed slots permitting passage of said comminuting members therethrough, said stationary member having a downwardly decreasing cross sectional area to provide a downwardly sloping surface adjacent the comminuting member entrance ends of said slots.

3. A garbage disposal unit, comprising a hollow cylindrical member for receiving waste material to be disposed of and liquid and mounted for rotation on a vertical axis, comminuting members mounted interiorly of said cylindrical member in vertically spaced relationship, and a stationary member disposed interiorly of said cylindrical member with an outer vertical surface in substantial contact with the inner surface of the latter having horizontally disposed slots permitting passage of said comminuting members therethrough, said stationary member having a downwardly decreasing cross sectional area to provide a downwardly sloping surface adjacent the comminuting member entrance ends of said slots to detain solid matter in said waste material for comminuting action thereon, and said detaining surface being provided with horizontally disposed grooves for channeling liquid into said slots.

4. A garbage disposal unit, comprising a hollow cylindrical member for receiving waste material to be disposed of and liquid and mounted for rotation on a vertical axis, comminuting members mounted interiorly of said cylindrical member in vertically spaced relationship, and a stationary member disposed interiorly of said cylindrical member with an outer vertical surface in substantial contact with the inner surface of the latter having horizontally disposed slots permitting passage of said comminuting members therethrough, said stationary member having a downwardly decreasing cross sectional area to provide a downwardly sloping surface adjacent the comminuting member entrance ends of said slots to detain solid matter in said waste material for comminuting action thereon, said detaining surface being provided with horizontally disposed grooves for channeling liquid into said slots, and said hollow cylindrical member having a horizontally disposed bottom portion provided with apertures therethrough so disposed as to maintain a predetermined quantity of liquid in the cylindrical member during rotation thereof and comprising outlet means for any liquid in excess of said predetermined quantity and for the comminuted solid matter.

5. A garbage disposal unit, comprising a cylindrical member mounted for rotation and adapted to receive garbage to be disposed of and having imperforate side walls, comminuting members carried for rotation by said side walls and extending inwardly therefrom the same radial distance and spaced vertically from each other, and stationary comminuting members mounted interiorly of said cylindrical member in vertically spaced arrangement in conformity with the spacing of, and for cooperating respec-

tively with, said rotatable comminuting members, said cylindrical member by its rotation conveying garbage received thereby into position to be acted upon by said comminuting members and having a bottom wall with outlet apertures for the discharge of the comminuted garbage.

6. A garbage disposal unit for use in a sink having a water supply, comprising rotatable means for receiving solid waste material and liquid from said water supply, a communitor, conveyor means for delivering such solid waste material to said comminutor, and outlet apertures through said receiving means spaced inwardly from the outer periphery thereof so as to maintain liquid at a predetermined level therein during rotation of said receiving means and for discharging any liquid in excess thereof and the comminuted solid material and operable to drain said receiving means when the latter is stationary.

7. For use with a standard sink having the usual drain opening; a table waste disposal unit attachable to and supportable in depending relationship from the sink in vertical alignment with the drain opening, comprising a stationary main casing, a hollow cylinder rotatably mounted in said casing and having an annular side wall, a bottom wall and an open upper end for receiving through the drain opening of the sink water and table waste to be comminuted, said cylinder having outlet means adjacent its lower end, an electric motor for rotating said cylinder, cutting elements carried by said cylinder in vertically and circumferentially spaced relationship relative to each other and extending inwardly from said side wall, and a stationary baffle supported by said casing and extending downwardly into said cylinder in close proximity to the inner surface of said side wall and outwardly of the inner portions of said cutting elements and having horizontally disposed slots opening toward said side wall to accommodate said cutting elements during rotation of the hollow cylinder.

8. For use with a standard sink having the usual drain opening; a table waste disposal unit attachable to the sink in vertical alignment with the drain opening, comprising a stationary main casing, a hollow cylinder rotatably mounted in said casing and having an annular side wall, a bottom wall and an open upper end for receiving through the drain opening of the sink water and table waste to be comminuted, said cylinder having outlet means only adjacent its lower marginal edge, an electric motor for rotating said cylinder, a bottom plate mounted in the lower end of said cylinder for rotation therewith in spaced relationship to said bottom wall and having a plurality of outlet apertures of predetermined size adjacent the center thereof to govern the flow of fluid from the interior of said cylinder to said outlet means, cutting elements carried by said cylinder in vertically spaced relationship relative to each other and extending inwardly from said side wall, and a stationary baffle supported by said casing and extending downwardly into said cylinder with its outer wall and lower end in close proximity, respectively, to the inner surface of said side wall and the upper surface of said bottom plate and having horizontally disposed slots opening toward said side wall to provide clearance passages for said cutting elements during rotation of the hollow cylinder.

9. A table waste disposal unit, comprising a hollow cylinder mounted for axial rotation on a vertical axis and having its upper end open to receive table waste and water, the lower end of said cylinder being provided with a plurality of relatively small outlet apertures spaced inwardly from the periphery thereof so as to maintain a certain amount of water in the outer portion of the cylinder by centrifugal force during rotation thereof while enabling drainage therefrom of water in excess of such certain amount and of all water when the cylinder is stationary, stationary comminutor means mounted interiorly of said cylinder in close proximity to the vertical wall thereof, and comminuting members carried by said vertical wall in vertically spaced relationship relative to each other for cooperation with said stationary comminutor means during rotation of said cylinder to reduce table waste introduced into the open upper end of the cylinder to particles of small enough size to pass through said outlet apertures with the water introduced into said cylinder in excess of said certain amount.

10. A garbage disposal unit for use in a sink having a water supply, comprising a hollow cylinder mounted for roattion with its annular side wall disposed vertically and having an open upper end for receiving solid waste material to be comminuted and liquid from said water supply, rotatable comminuting members carried by the annular side wall of said cylinder in vertically and circumferentially spaced relationship relative to each other and extending inwardly from said side wall, stationary comminuting means disposed in close proximity to the inner surface of said annular side wall and having horizontally disposed slots opening toward said side wall to accommodate said rotatable comminuting members during rotation of the hollow cylinder, and a base member for said hollow cylinder having apertures spaced inwardly from said annular side wall to maintain liquid at a predetermined level in said hollow cylinder during rotation thereof and for discharging any liquid in excess thereof and comminuted solid material, said apertures being operable to drain all liquid from said hollow cylinder when the latter is stationary.

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