Aug. 28, 1956 H. JORDAN 2,760,730

GARBAGE GRINDER WITH SELF-CLEANING CUTTER HEAD

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Fig. 3

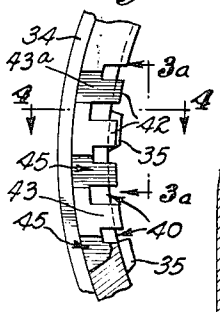


Fig. 3a

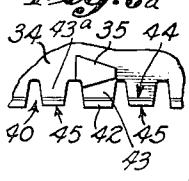


Fig. 4

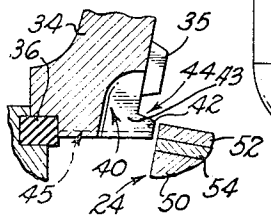


Fig. 1

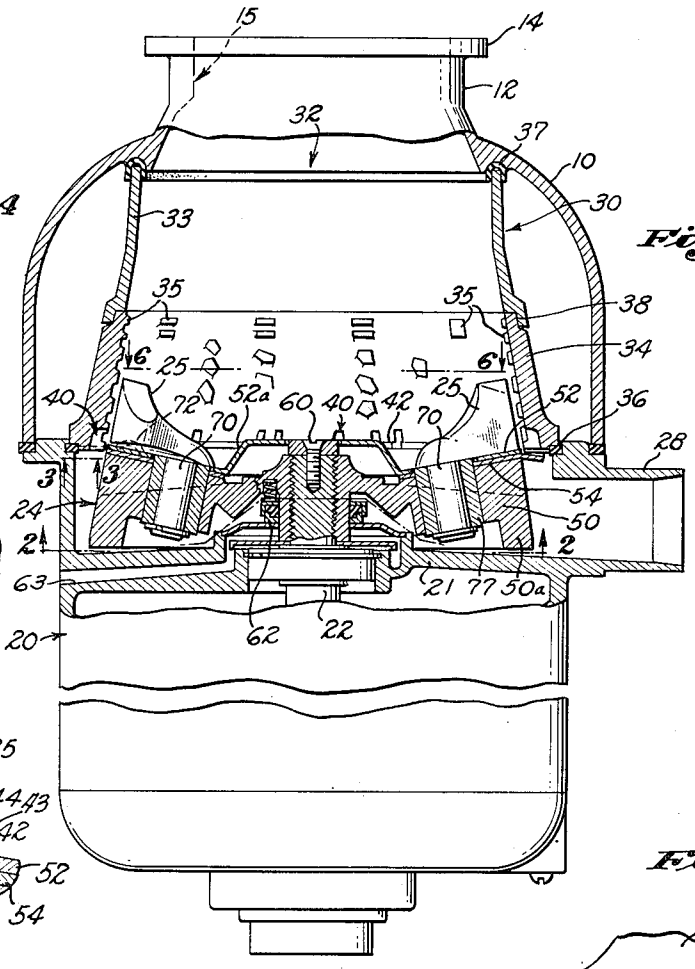


Fig. 5

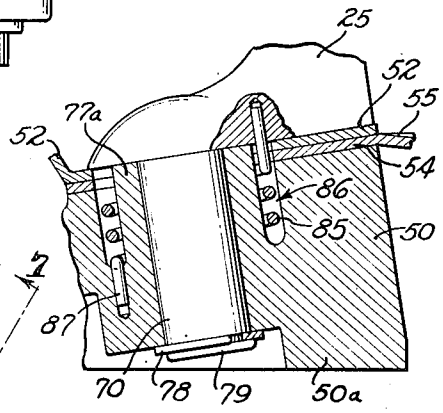
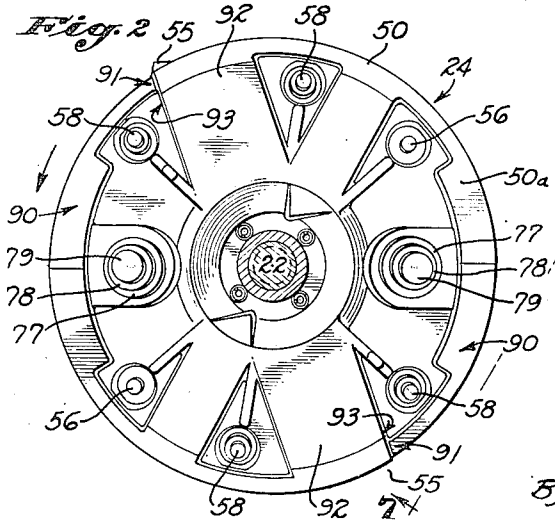


Fig. 2



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Fig. 6

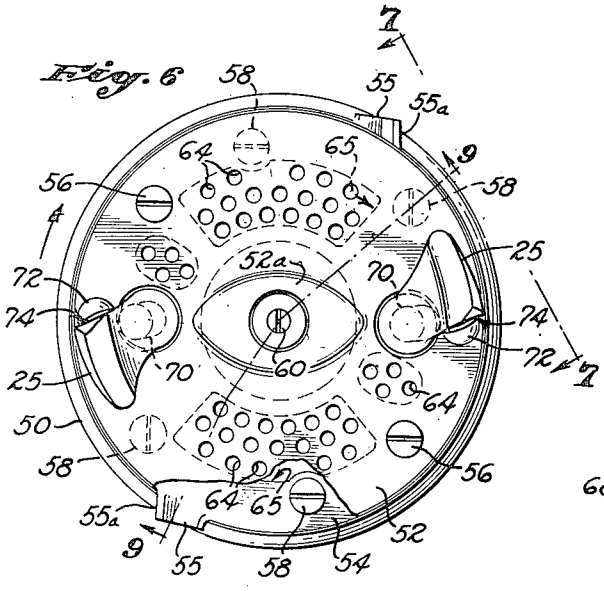


Fig. 8

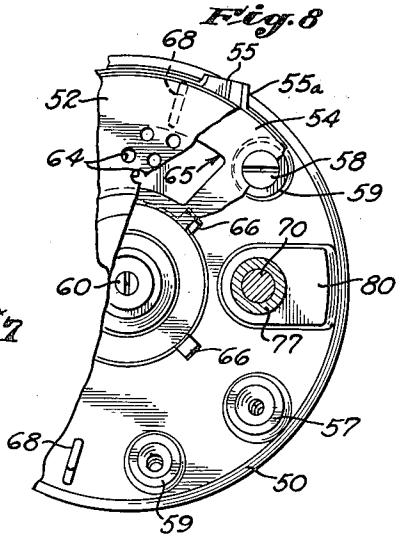


Fig. 7

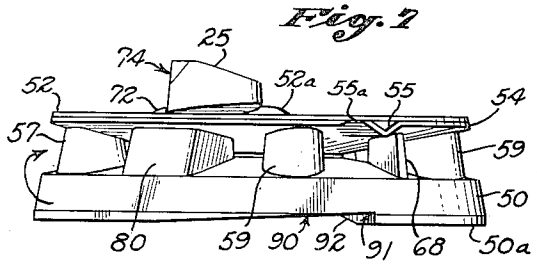


Fig. 10

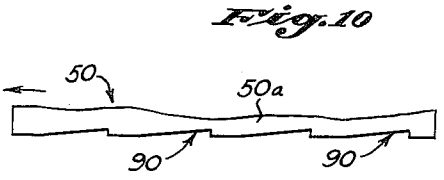


Fig. 9

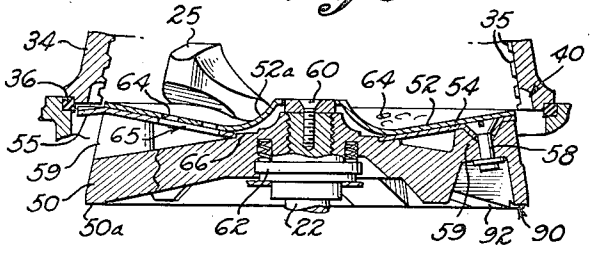
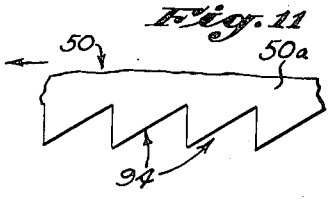


Fig. 11



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2,760,730

GARBAGE GRINDER WITH SELF-CLEANING CUTTER HEAD

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Application November 1, 1951, Serial No. 254,397

12 Claims. (Cl. 241—155)

This invention relates to the waste disposal art and, more particularly, to a device adapted for the comminution and disposal of garbage or other waste materials and which is suitable for home or restaurant use where only relatively small volumes of such materials are normally passed through the device.

The present invention is a continuation-in-part of my copending application Serial No. 190,927, filed October 19, 1950, now abandoned, and is directed to a garbage disposal device of the general character disclosed in my United States Patent No. 2,442,812, for Garbage Disposal Device, dated June 8, 1948. The disposal device shown in the patent includes an outer housing section adapted for attachment to the under side of a sink, and an inner housing section, these sections defining a passage or throat through which waste material and water can be introduced into a comminuting chamber defined by the inner section and a rotary table element which closes the lower end of the inner section. The table element is rotated by an electric motor disposed in a motor shell at the lower end of the disposal device and has one or more movable cutters which cooperate with fixed cutter means on the internal surface of the inner section to comminute the waste material within the chamber. In the patented device, openings or passages are provided in the wall of the inner section through which the comminuted material can pass downwardly into a port which is connected to the drain pipe of the sink.

It is common practice in waste disposal devices of this character to provide considerable clearance between the inner housing section and the cutter table (such as that above mentioned) in order to allow rotation of the latter and to provide an annular passage through which the comminuted waste material can flow downwardly into the drain passage. If this annular passage is made relatively wide, the waste material is quite apt to pass downwardly therethrough before being acted upon by the comminuting means. On the other hand, if the annular passage is made sufficiently narrow to prevent this condition, then some forms of waste materials, such as fibrous vegetables, strings and the like, are apt to become caught in this restricted passage so as to impair the rotation of the cutter table or head and to clog the waste disposal device.

In conventional waste disposal devices it is the usual practice to form the fixed cutters as lugs which project inwardly from the wall of the inner housing section, these cutter lugs being ground to provide sharp corners or edges with which rotary cutters cooperate to effect the shearing action necessary to comminute the waste material. In such devices, the cutter lugs are usually arranged in spaced groups around the interior of the inner housing section. In devices in which the lugs are disposed adjacent the bottom of the comminuting chamber, the problem of providing the clearance or discharge passage between the inner surface of the inner section and the periphery of the rotary cutter head or table which will allow discharge of the properly comminuted material and yet prevent the accumulation of unshredded fibrous material therein is indeed a perplexing one. As will be apparent, if the lower cutting lugs are disposed in the plane of the cutting head so as to effect maximum shredding of the material, and the periphery of the cutting head is located in proximity to these lower lugs, then there exist arcuate spaces between the periphery of the head and the wall of the inner housing section at areas between the groups of cutter lugs. These spaces are substantially equal to the thickness of the lugs and are in excess of the width necessary for the proper discharge of the comminuted material. Consequently, it is possible for larger, unshredded pieces of the material to pass into the drain pipe to clog the same.

It is therefore an important object of my invention to provide a waste disposal device which includes an inner housing section and a cutter head or table element rotatable within the section at the lower end thereof, said cutter head having movable cutters which cooperate with spaced cutter lugs on the interior of the inner housing section to effect the comminuting operation, and to provide passage means for allowing discharge of the comminuted particles while preventing clogging of the device with uncut, fibrous material.

Another object is to provide, in a waste disposal unit of the type having spaced groups of cutter lugs on the inner housing section, relatively narrow openings or passages through which the comminuted material can be flushed, so that, as the material is comminuted, it is immediately discharged into the drain.

Another object is to provide, in a waste disposal device of the character referred to, means disposed between the groups of cutter lugs for directing the material, shredded or unshredded, through the discharge passages referred to above. This object is best attained by providing arcuate projections or flanges on the interior of the inner housing section, the flanges being of a thickness equal to that of the cutter lugs so that the flanges and lugs together define an orifice in which the cutter head rotates. In accordance with this invention, the diameter of the orifice is only slightly larger than the diameter of the cutter head so that there exists an annular clearance space of extremely small width whereby the possibility of vegetable fibers and other attenuated material or relatively hard material such as tin, wire, etc., becoming wedged between the housing and the cutter head to clog the device and thus impair its operation, is entirely avoided. It is a furhter object in this respect to so form the arcuate flanges that they tend to direct material, which is thrown radially outwardly, toward the groups of cutter lugs.

Waste disposal devices heretofore employed are subject to another serious disadvantage in that they frequently become jammed. This condition is due to several factors, one of which is that when the revolvable cutter elements are mounted rigidly on the rotary table and hard material is inadvertently placed in the comminuting chamber, the material may wedge between the stationary and movable cutters to suddenly arrest the rotation of the table and thus stall the electric motor which drives the same. As will be apparent, such a condition may result in permanent damage to the cutter components and the driving motor. This objectionable condition is aggravated when the keen cutting edges of the cutter elements become worn to provide spaces therebetween in which material of solid, heavy, stringy or fibrous nature is placed in the comminuting chamber and becomes jammed in these spaces. In another form of waste disposal unit, the rotary cutter elements are movable relative to the rotary table in paths extending parallel to the axis of rotation of the table and are thrown radially outwardly under the influence of centrifugal force. In such a unit,

when the table slows down due to wedging of waste material between the movable and stationary cutters, the driving motor becomes at least partially stalled and the movable cutter elements move to a fully open position with the result that the comminuting operation is completely discontinued.

It is another object of the present invention to provide a waste disposal device which avoids the deficiencies of prior devices discussed above, this object being attained by providing a novel form of rotary table and movable cutter assembly in which the rotary cutter elements are pivoted on axes extending approximately parallel to the axis of rotation of the table and which are weighted to cause them to be pivoted radially outwardly under the influence of centrifugal force. According to one form of this improvement, spring means are provided for pivoting the movable cutter elements toward an operative position, the spring means preferably being of the torsion spring type and surrounding the pivots of the movable cutter elements with their ends engaging the elements and the table. The springs are coiled in such a direction and so connected between the rotary table and each movable cutter that they tend to move the cutters outwardly into cooperative relation to the stationary cutter lugs. It is impractical to construct the movable cutter elements of sufficient weight that they attain a centrifugal force which is substantially equal to the pull-out torque of the driving motor. Moreover, when the motor slows down, the centrifugal force decreases as the square of the R. P. M. that is, very rapidly. In conventional waste disposal devices, when the movable cutters move inwardly, due to decrease in the speed of the motor as caused by wedging of material or any other condition, the entire mass of each movable cutter moves closer to the axis of rotation of the cutter table. Consequently, the radius on which the centrifugal force acts is decreased so that an additional decrease in the centrifugal force occurs. With the present form, the springs are designed to overcome this condition by providing that when each movable cutter moves inwardly, the power of its spring increases to counterbalance the loss of centrifugal force due to the reduced speed and the shorter effective radius. By this provision, when the unit becomes overloaded, due to the entrance between the stationary and movable cutter elements of material which might tend to wedge therebetween and the motor thus slows down to pivot the movable cutter elements inwardly to release the material, resistance to such inward pivotal movement of the cutters is resisted so that the comminuting operation is maintained continuous. This not only prevents damage to the relatively movable cutters and associated parts and to the driving motor, but effects a more efficient grinding or comminuting action, it being apparent that, upon release of the material or waste object, the movable cutter elements immediately return to their outermost position under the power of their torsion springs and the action of centrifugal force so as to again cooperate with the stationary cutters.

In disposal devices of the indicated type, it sometimes happens that accumulations of comminuted waste material develop between the under side of the rotary table element or cutter head and the top of the underlying motor shell containing the motor by which the table is driven. Such a condition more frequently develops when no water is supplied during the grinding process through some neglect, in which case the ground material is pushed toward the outlet spout without the presence of water to flush it away, and as a consequence tends to accumulate under the rotary table edge and thereby interfering with its freedom of rotation.

It is another object of this invention to provide a rotary head or table structure which tends to dislodge accumulations which might otherwise occur. In the particular form here disclosed, this result is accomplished by notching the under side of the rotary table or head element with relatively long, slightly tapering notches, or shorter tooth-like notches, which will act to dislodge material otherwise tending to accumulate.

Other objects of the invention will become apparent to those skilled in the art upon reference to the following specification and accompanying drawings wherein certain embodiments of the invention are illustrated.

In the drawings:

Fig. 1 is principally a vertical section of my improved waste disposal device in an operative position, certain portions being shown in elevation;

Fig. 2 is a bottom plan view of the rotary cutter head or table element as indicated by the line **2—2** of Fig. 1;

Fig. 3 is a fragmentary view as indicated by the line 3—3 of Fig. 1, showing one arrangement of the discharge orifices and ledge arrangement at the lower edge of the frusto-conical grind ring with which the movable cutters cooperate;

Fig. 3A is an enlarged detail taken from the line 3A—3A of Fig. 3;

Fig. 4 is a vertical sectional detail taken on the line 4—4 of Fig. 3;

Fig. 5 discloses a preloaded or spring loaded modification of the movable cutters;

Fig. 6 is a top plan view of the rotary cutter head as taken from the line **6—6** of Fig. 1;

Fig. 7 is a side elevation thereof as taken from the line **7—7** of Figs. 2 and 6;

Fig. 8 is a fragmentary top plan view similar to that of Fig. 6, the corresponding rotary cutter and a portion of the uppermost disc and underlying cutter finger disc being removed;

Fig. 9 is a cross section through the cutter head and adjacent cooperative portions of the grind ring somewhat similar to the cross section of Fig. 1 but taken in a different position as indicated by the line **9—9** of Fig. 6; and

Figs. 10 and 11 are fragmentary details showing possible modifications of the self-cleaning, tapered notches on the under side of the rotary cutter head or table.

Having reference to Fig. 1 of the drawings, the disposal device illustrated includes an outer circular housing **10** of dome shape having an upper tubular end **12** provided with a flange **14** or the like for suspension from a kitchen sink by any suitable means. The tubular end **12** provides a throat or opening **15** through which waste is received from the mentioned sink.

Secured to the lower end of the housing section **10**, in any appropriate manner, is a lower housing member **20** whose lower portion provides an electric motor casing or shell having a top wall **21**, the electric motor having a vertical shaft **22** which carries on its upper end a rotary table element or cutter head, indicated generally at **24**, which in turn carries movable flipper-like cutters **25**. Thus, the head **24** is located in the upper portion of the housing member **20** above the top wall **21**. A discharge neck **28** leads from the side of the member **20** to dispose of disintegrated material passed by the cutting means.

The lower housing section **20** supports an inner housing section **30** which encloses a comminuting chamber **32** and comprises an upper circular housing member **33** and a lower housing member **34** which constitutes a grind ring and will be referred to as the grind ring **34**. The grind ring **34** is provided on its inner surface with a plurality of stationary, inwardly projecting cutter lugs **35** which preferably are irregularly disposed and constructed to cooperate with the movable flipper-like cutters **25** as more fully described below. The lower end of the grind ring **34** is seated and sealed in an annular groove in the upper end of the lower housing member **20** as by means of a sealing ring as generally indicated at **36**, and the upper end of the inner and upper housing member **33** is seated and sealed against an upper portion of the upper housing member **10** by an appropriate sealing ring as indicated at **37**. The lower edge of the upper

member 33 is seated on the grind ring 34 by any appropriate flanged and grooved means such as seen at 38. These parts are primarily metallic and the grind ring 34 in particular is of such construction and hardness as to provide cutter lugs 35 of adequate life, which are shown as integrally formed with the grind ring 34.

The projecting cutter lugs 35 may be arranged in appropriate patterns which preferably are largely irregular, being distributed continuously around the ring 34 as seen in Fig. 1. The lugs 35 may also be irregularly shaped as indicated, and they are machined to provide adequately sharp edges for cooperating with the movable flipper-like cutters 25 and for restraining waste material during grinding operations. In general, the cutter lugs 35 provide vertical channels between them, at least adjacent the lower end of the grind ring 34. The waste material, which is projected outwardly by the centrifugal action of the cutter head 24 and its movable cutters 25, works downward through the mentioned channels to the lower edge of the grind ring 34. In order to provide for proper discharge of the waste being treated and to prevent discharge of such material before being properly ground, I have found it desirable that the lower, inner edge of the grind ring 34 be provided with a plurality of small, narrow, outwardly and downwardly extending discharge orifices 40 (Figs. 3 and 4). Between the lower, inner edge portions of the orifices 40, inwardly directed flange-like members or ledges are disposed so as to provide an annular lower ring or flange structure 42 on the inner wall of the grind ring 34 which is interrupted only by the discharge orifices 40 which thus provide between them a series of depending cutting or shearing elements 43, 43*a* spaced by the orifices, the resultant interrupted flange structure 42 providing a corresponding upwardly directed annular shelf structure 44 (Fig. 4) that serves to direct ground material acted upon by the movable cutters 25 into the discharge orifices 40 and to prevent material which is not sufficiently ground from passing between the rotating cutter head 24 and the annular flange structure 42. The extent of inward projection into the chamber 32 of the lugs 35 and the members of the flange structure 42 is uniform and substantially equal for all of these parts. The orifices may be arranged in groups such as seen in Figs. 3 and 3A, which groups may be spaced around the ring 34, or they may be disposed substantially continuously around the ring 34. On the under edge of the ring 34, alternate depending elements 43*a* are relieved at the orifices 40, as indicated at 45 (and where shaded in Fig. 3) by terminating slightly above the intervening elements 43 which provide shearing edges for cooperation with underlying rotating cutter fingers on the head 24, as described below.

The rotary cutter head 24 comprises a relatively heavy cast metal rotary table 50, the under side of which is flanged at 50*a* to provide appropriate spacing above the top wall 21 of the motor shell. The table 50 is screwed onto the upper end of the motor shaft 22, and carries upon its upper face a pressed metal disc or plate 52 (Figs. 1, 5, 7, and 9) which, in operative position, fits within the annular flange structure 42 on the lower end of the grind ring 34 and cooperates with such flange structure 42 to retain waste material. Also carried on the upper face of the rotary table 50 is a second plate or disc 54 which underlies the disc 52 and is provided with opposed cutter fingers 55 (above mentioned) which fingers underlie the lower edge of the grind ring 34 and its discharge orifices 40 and cooperate with the longer shearing elements 43 and with the relieved portions 45 of the shorter elements 43*a* at such lower edge of the grind ring 34 to shear off fibrous materials including strings and the like. Where the waste being treated does not require such severe cutting action, the plate 54 and its cutting fingers 55 could be omitted. The shearing or cutting fingers 55 on the disc 54 are shown as being integral extensions of the disc 54, and as being somewhat offset from the plane of the disc 54 and machined at their leading edges to provide appropriate knife edges 55*a* (especially Fig. 6) to cooperate with the lower edge of the grind ring 34 as best indicated in Fig. 9. The two discs 52 and 54 are secured to the rotary table 50 as by means of screws 56 (Fig. 6) received in upstanding bosses 57 (Fig. 7), and the disc 54 carrying the cutting fingers 55 preferably is additionally secured to the rotary table 50 by means of other screws 58 received in additional upstanding bosses 59 (Figs. 6, 7, and 8) on the rotary table 50. In addition to screwing the rotary table 50 onto the top of the motor shaft 22, any appropriate anchor screw and binding washer such as indicated at 60 may be used. Also, appropriate packing means 62 may be employed adjacent the motor shaft 22 in connection with the mounting of the rotary table 50 to guard against entry of liquid or other foreign matter, and, as seen in Fig. 1, a liquid drainage duct 63 in the top wall 21 of the motor shell may desirably be provided. For the purpose of reducing weight and also to facilitate flushing of spaces at the top of the rotary table 50 between the various bosses, the two discs 52 and 54 may be apertured as best indicated in Figs. 6, 8, and 9 where the disc 52 is shown as being provided with a plurality of small drill holes 64 and the disc 54 is provided with large arcuate openings 65. These openings are in addition to the central opening in the disc 52 which receives the anchor screw means 60 and is preferably flush with the top thereof, and the larger central opening in the disc 54 which accommodates an upstanding, central hub of the rotary table 50 and seats on spaced lugs 66 therearound. If desired, additional upstanding lugs may be provided on the rotary table 50 adjacent the periphery thereof for the bearing of the corresponding annular portions of the disc 54 thereon as best indicated at 68 in Fig. 7. It is to be appreciated that where the term "disc" is applied to the circular discs or plates 52 and 54 that term is used in a sense to include the saucer-like shape which both of these discs possess.

From the standpoint of the mounting of the flipper-like, movable cutters 25 previously mentioned, each of these embodies an integral pivot pin or stud 70, best indicated in Figs. 1 and 5, which is journalled on a slightly inclined axis in the rotary table 50 at a point spaced outward from the axis of the motor shaft 22 and the table 50 to dispose the outer head portion or end portion of the respective cutter 25 in operative position adjacent the stationary cutter lugs 35 on the inner wall of the grind ring 34, and to permit its swinging inward toward the axis of the rotary table 50 until stopped by an upstanding central boss-like member of the upper disc 52 as indicated at 52*a* in Figs. 6 and 9. The saucer-like arrangement of the discs 52 and 54 permits such swinging movement of the movable cutters 25 on their inclined axes. In operation, movement of the cutters 25 outward to the operative position indicated in Fig. 6 is effected by centrifugal force during the rotation of the whole cutter head including the rotary table 50, the direction of rotation being indicated by the arrows in Figs. 2, 6 and 7. The movement of the cutters 25 about their axes to operative position is limited by stops 72 (Fig. 6) which are struck up from the upper disc 52. It will be noted that the axis of said stop 72 is substantially radially in line with the axis of the stud 70 of each movable cutter 25 so that the center of mass of the enlarged head of each cutter 25 trails behind such radius during high speed operation and insures adequate driving power in the cutters 25 to force waste material against the fixed cutting lugs on the grind ring 34. This arrangement will be apparent from the showing of Figs. 6, 7, and 9 which illustrate each cutter as including an upstanding head which tapers downward somewhat as it extends rearward, that is against the direction of rotation, and whose leading end 74 against the stop 72 angles off rearward so as to crowd waste material between such

leading end 74 and the inner wall of the grind ring 34 and thereby force the waste material against the cutting lugs 35 for disintegration thereof.

In mounting the pivoting stud 70 of each movable cutter 25 on its inclined axis, it is journalled in the rotary table 50 either by means of a bearing sleeve 77 which may be press-fitted into place, as shown in Fig. 1, or it may be journalled in an integral sleeve such as indicated at 77*a* in Fig. 5. In either event the upper end of such journalling sleeve extends through corresponding openings in the discs 52 and 54, and the lower end of the respective stud is headed over upon a washer 78 as indicated at 79 (Fig. 5). This mounting of each stud 70 is located in an enlarged upstanding boss 80 (Fig. 7) of rectangular shape which is integral with the rotary table 50.

If, while the table 50 is rotating and the whole cutter head 24 is in operation, waste material which is thrown centrifugally outward against the stationary cutting lugs 35 tends to wedge against the inner wall of the grind ring 34 and clog the device so that it slows down, the movable cutters 25 yield and are moved back toward the axis of the cutter head. When the wedging action has been overcome, the movable cutters 25 may be more quickly returned to their outward operative position if they are preloaded as by spring means. To accomplish this purpose, each movable cutter 25 may be preloaded, as with a torsion spring 85 shown in Fig. 5. This spring 85 is disposed in a well 86 about the bearing sleeve 77 or 77*a*, the lower end of the spring being seated in a bore 87 in the table 50 and the upper end of the spring being fixed in the respective movable cutter 25 at a position eccentric to its axis. In the form illustrated, the openings in the discs 52 and 54 around the upper end of the sleeve 77*a* are made large enough to accommodate movement of the upper end of the spring 85. The arrangement of the spring 85 is such that, as it is moved backward away from operative position toward the axis of the cutter head 24, the power of the spring is increased to counterbalance the loss of centrifugal force due to the reduced speed at the head of each movable cutter 25 by reason of its shorter effective radius when retracted. Such spring tension compensates for loss in the centrifugal forces. In the form shown in Fig. 5, the inner end of the movable cutter 25 is made large enough to overlie and close the well 86 housing the spring 85. Similarly, in the form of Fig. 1 the inner end of each movable cutter 25 is large enough to overlie the bearing sleeve 77.

Inasmuch as it has been found that there is a strong tendency for comminuted waste material which is passed through the discharge orifices 40 to accumulate and pack under the rotary table 50 between the peripheral flange portion 50*a* thereof and the top wall 21 of the motor shell, especially when the disposal device has been operated without water or with insufficient water, means have been provided to guard against accumulation and thereby keep the table free from interference with rotation which such accumulation produces. According to one form of construction for this purpose, two opposed, elongated, tapered slots or notches 90 have been formed in the under side of the peripheral annular flange 50*a* of the rotating table 50, and such elongated notches extended in each instance for about 60°, with a depth at the deep end 91 in the order of an eighth of an inch to two tenths of an inch where the diameter of the rotating plate 50 approximates six inches. Such a construction is shown in Figs. 7 and 9. Here the vertical shoulder of the deep end 91 constitutes a projection of the corresponding side of a wide land 92 on the under side of the rotary plate 50, the parallel sides of the wide land 92 being, as a consequence, angularly disposed with respect to corresponding radii. As a result, since the vertical shoulder of each notch 90 is at the trailing end of the notch, the respective side wall of the adjacent land 92, which has been indicated at 93 in Fig. 2, serves, by reason of its angular disposition, to aid ejection of material which would otherwise tend to accumulate.

However, other notch arrangements than that shown in Figs. 2, 7 and 9 may be employed with beneficial results. For example, as indicated diagrammatically in Fig. 10, the notches 90 may be shorter, as well as more numerous, and might extend continuously around the periphery of the flange 50*a*. Again, they might be so numerous as to constitute a sawtooth effect indicated on a large scale at 94 in Fig. 11.

With respect to sizes of some of the parts, it has been indicated above that, in a typical construction, the inclined, self-cleaning slots or notches 90 of the form of structure shown in Figs. 2, 7, and 9 may have a depth of around one eighth inch to two tenths of an inch at the deepest end, and the length may be in the order of 60° more or less for two opposed notches, such dimensions having been found very serviceable for adequate self-cleaning of the rotary table during operation. As to the orifices 40, these may vary in width for practical household operations between about one tenth of an inch and one sixth of an inch for the purpose of passing adequately comminuted waste particles, the depths of these orifices and the height thereof above the disc 52 of the rotary head 24 being adequate to receive appropriately ground waste, such as generally indicated in Fig. 4. The relief provided on the lower edge of the grind ring 34, as indicated in Figs. 3 and 3A may have a vertical depth of which two hundredths of an inch is typical, although such other depths may be employed as is most desirable for any given type of work. The height of the members of the annular flange structure 42 is commonly somewhat greater than the thickness of the disc 52 of the rotary cutting head 24, where such disc 52 just enters the mouth of the lower end of the grind ring 34, whereby the upper edges of such elements lie somewhat above the adjacent upper surface of the disc 52, approximately as indicated in Fig. 4.

Operations

In the use of the described construction, when the rotary cutter head 24 is in operation for the purpose of grinding waste material which has been introduced into the top of the chamber 32 through the throat 15, centrifugal force throws the movable cutters 25 outward into the position illustrated in Figs. 1 and 6, and such action also throws waste material on the rotary cutter head outward into contact with the inner wall of the grind ring 34 and the fixed cutter lugs 35. As a consequence, the waste material is disintegrated to sizes which will pass through the exposed upper portions of the orifices 40. Under normal operations water is run into the apparatus during the grinding operation so that the ground material is flushed outward over the top wall 21 of the motor shell and into the discharge neck 28 leading from the side of the housing 20. If, during this operation, no water at all, or insufficient water, has been delivered into the apparatus, and if under these circumstances relatively dry material otherwise tends to pack under the annular flange 50*a* of the rotary table 50, the inclined notches or grooves indicated at 90 and 94 serve adequately to keep free the space between the lower side of such annular flange 50*a* and the adjacent upper portion of the top wall 21 of the motor shell, whereby there will be no interference with freedom of rotation of rotary cutter head 24.

For the purpose of insuring adequate disintegration of fibrous materials such as stringy vegetables and cotton strings or the like, the cutter fingers 55 which project horizontally from the cutter-finger-carrying plate 54 cooperate with the lower edge of the grind ring 34 at the lower discharge ends of the orifices 20 to break up such waste materials into adequately small portions. By reason of the cutting edges 55*a* of the cutter fingers 55 and the relief portions 45 on the under side of the cutter ring

34 at the orifices 40, a satisfactory shearing effect may be accomplished.

Where bones, or other obdurate materials, are encountered which tend to clog against the projecting fixed cutter lugs 35 so as to retard the speed of rotation of the cutter head 24, the movable cutters 25 will recede against the resultant pressure and their head portions will move backward toward the axis of the rotating head. In order to overcome any objectionable delay in the return of the swinging heads of the movable cutters 25 to their outermost, operative position, such cutters 25 may be preloaded as by means of the spring 85 shown in Fig. 5 which is set so that, as the respective movable cutter 25 retracts, tension in the spring 85 is built up. Consequently, when the force which caused retraction of the respective movable cutter 25 has dissipated, the cutter will be promptly returned to operative position under the influence of both centrifugal force and the spring 85. With this form of the improvement, the masses of the components and the strength of the torsion spring 85 are so calculated that the movable cutter 25 in each instance opens when the resistance to rotation reaches approximately 90% of the pull-out torque of the motor. Thus, until the motor attains its normal operating speed, there is provided an influence aiding centrifugal force.

I claim as my invention:

1. A waste disposal device, including: a vertical housing member defining a comminuting chamber having a vertical axis for receiving waste material, said member having a plurality of stationary cutter lugs on its inner surface; a horizontal cutter head rotatable within said comminuting chamber on a vertical axis and having at least one centrifugally-actuable horizontally movable cutter pivotally movable about an axis on said cutter head toward and away from said stationary cutter lugs and adapted, when moved outwardly under the influence of centrifugal force, to cooperate with said cutter lugs in comminuting waste material disposed therebetween; and force applying means operatively connected to said movable cutter and effective upon inward displacement and in the event of a decrease in centrifugal force when the speed of said cutter head decreases to exert a force capable of moving said movable cutter outwardly.

2. A waste disposal device, including: a housing member defining a comminuting chamber having a vertical axis for receiving waste material, said member having a plurality of stationary cutter lugs on its inner surface; a horizontal cutter head rotatable within said comminuting chamber on a vertical axis and having at least one centrifugally-actuable movable cutter pivoted on said cutter head on an upright axis and adapted to be pivoted under the influence of centrifugal force in a generally radial horizontal direction toward said stationary cutter lugs so as to cooperate therewith in comminuting material disposed between said lugs and said movable cutter; and torque applying means operatively connected to said movable cutter and normally ineffective during normal, full-speed rotation of said cutter head, but effective in the event of outward movement of said cutter and reduction of the centrifugal force effected when the speed of said cutter head decreases, to exert a force to pivot said movable cutter radially outwardly.

3. A device as defined in claim 2 in which said torque-applying means is spring means and said spring means is disposed beneath said movable cutter and has an end engageable with said cutter and another end engageable with said cutter head, said cutter having an axis parallel to the axis of said head.

4. A device as defined in claim 2 in which said torque-applying means is spring means and said movable cutter is mounted on a pivot pin carried by said cutter, said spring means being a torsion spring disposed in an annular recess of said cutter head surrounding said pin, said spring having one end connected to said cutter head and another end connected to said movable cutter.

5. A waste disposal device, including: a housing member defining a comminuting chamber having a vertical axis for receiving waste material, said member having a plurality of stationary cutter lugs on its inner surface; a cutter head rotatable on said vertical axis within said comminuting chamber and having at least one centrifugally-actuable movable cutter pivoted on a generally vertical axis on said cutter head and adapted to be pivoted under the influence of centrifugal force in a generally radial direction toward said stationary cutter lugs so as to cooperate therewith in comminuting material disposed between said lugs and said movable cutter; an electric motor for rotating said cutter head; and spring means operatively connected to said movable cutter and adapted to pivot the same outwardly, said spring means being untensioned when the cutter is in normal position and during the normal full-speed operation of said motor, but being adapted to be tensioned in response to inward pivotal movement of said movable cutter, upon reduction of the centrifugal force effected when the torque of said motor decreases due to a load imposed thereupon, so as to pivot said movable cutter radially outwardly, the combined effective spring and centrifugal forces being such that said movable cutter will move inwardly when said load reaches approximately 90% of the pull-out torque of said motor.

6. A waste disposal device, including: a vertical housing member having a vertical axis defining a comminuting chamber for receiving waste material, said member having a plurality of stationary cutter lugs on its inner surface; a cutter head rotatable on said vertical axis within said comminuting chamber; an electric motor for rotating said cutter head; a pivot pin carried on a generally vertical axis by said cutter head and projecting upwardly therefrom; a movable cutter pivoted on said pin and adapted to be pivoted under the influence of centrifugal force in a generally outward radial direction toward said cutter lugs so as to cooperate therewith in comminuting material disposed between said lugs and said movable cutter; and spring means operatively connected between said cutter head and said movable cutter and adapted to apply torque to said cutter so as to pivot the same radially outwardly, said spring means being untensioned when the cutter is in outward position, but being adapted to be tensioned in response to inward pivotal movement of said movable cutter, to return said cutter radially outward in the event of reduction of the centrifugal force effected when the torque of said motor decreases due to a load imposed thereupon, the combined effective spring and centrifugal forces being such that said movable cutter will move inwardly when said load reaches approximately 90% of the pull-out torque of said motor.

7. In combination in a waste disposal device: a housing member defining a grinding chamber for receiving waste material, said housing member having a plurality of stationary cutter lugs on its inner surface and projecting into said chamber for engagement by waste material therein, said housing member having an open lower end; a cutter head rotatably mounted on a vertical axis in said open lower end and substantially closing said lower end; cutters mounted on said cutter head in cooperative relation with said cutter lugs for grinding waste material therebetween, the lower end of said housing member having a plurality of small, downwardly-directed outlet passages therein whose upper ends communicate with said chamber at and immediately above said cutter head to receive ground waste and discharge the same, said passages providing between them depending shearing elements; and laterally extending shearing fingers carried by said rotatable cutter head and underlying the lower end of said housing member in shearing relation with said depending shearing elements, the under ends of certain of said shearing elements terminating slightly above the under ends of intervening shearing elements in relieved relation for facilitating shearing of fibrous materials extending from said passages.

8. A device as in claim 7 wherein said cutters are movable and are pivoted on generally vertical axes to swing outward to cooperate with said cutter lugs.

9. A device as in claim 7 wherein the under ends of said shearing elements are substantially flat and lie substantially in planes perpendicular to the axis of said cutter head.

10. A waste disposal device, comprising: a housing member defining a comminuting chamber for receiving waste material, said member having a plurality of stationary cutter lugs on its inner surface; a cutter head rotatable on a vertical axis within said comminuting chamber; an electric motor for rotating said cutter head; a pivot pin carried on a vertical axis by said cutter head and projecting upwardly therefrom; a movable cutter pivoted on said pin and adapted to be pivoted under the influence of centrifugal force in a generally outward radial direction toward said cutter lugs so as to cooperate therewith in comminuting material disposed between said lugs and said movable cutter; and spring means operatively connected between said cutter head and said movable cutter and adapted to apply torque to said cutter so as to pivot the same radially outwardly, said spring means being untensioned during the normal full-speed operation of said motor, but being adapted to be tensioned in response to inward pivotal movement of said movable cutter, under load applied to the cutter causing reduction of the centrifugal force effected when the torque of said motor decreases due to such load, so as to return said movable cutter radially outwardly.

11. A device as defined in claim 10 in which said spring means is disposed beneath said movable cutter and has an end engageable with said cutter and another end engageable with said cutter head.

12. A device as defined in claim 10 in which said spring means is a torsion spring disposed in an annular recess of said cutter head surrounding said pin, said spring having one end connected to said cutter head and another end connected to said movable cutter.

References Cited in the file of this patent

UNITED STATES PATENTS

1,320,968	Baudendistel	Nov. 4, 1919
1,439,754	Plaisted	Dec. 26, 1922
1,723,615	Hamlin	Aug. 6, 1929
2,091,080	Mursch	Aug. 24, 1937
2,220,729	Powers	Nov. 5, 1940
2,322,058	Powers	June 15, 1943
2,442,812	Jordan	June 8, 1948
2,476,630	Schindler	July 19, 1949
2,482,125	Powers	Sept. 20, 1949
2,534,944	Bissey	Dec. 19, 1950
2,562,736	Powers	July 31, 1951
2,566,069	Powers	Aug. 28, 1951
2,629,558	Miller	Feb. 24, 1953