United States Patent

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[72] Inventor George O. Sherman, Jr.
Prairie Village, Kans.

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[73] Assignee The Salvajor Company
Kansas City, Mo.
a corporation of Missouri

[54] **WASTE DISPOSER ROTOR WITH YIELDABLY BIASED TEETH**
9 Claims, 3 Drawing Figs.

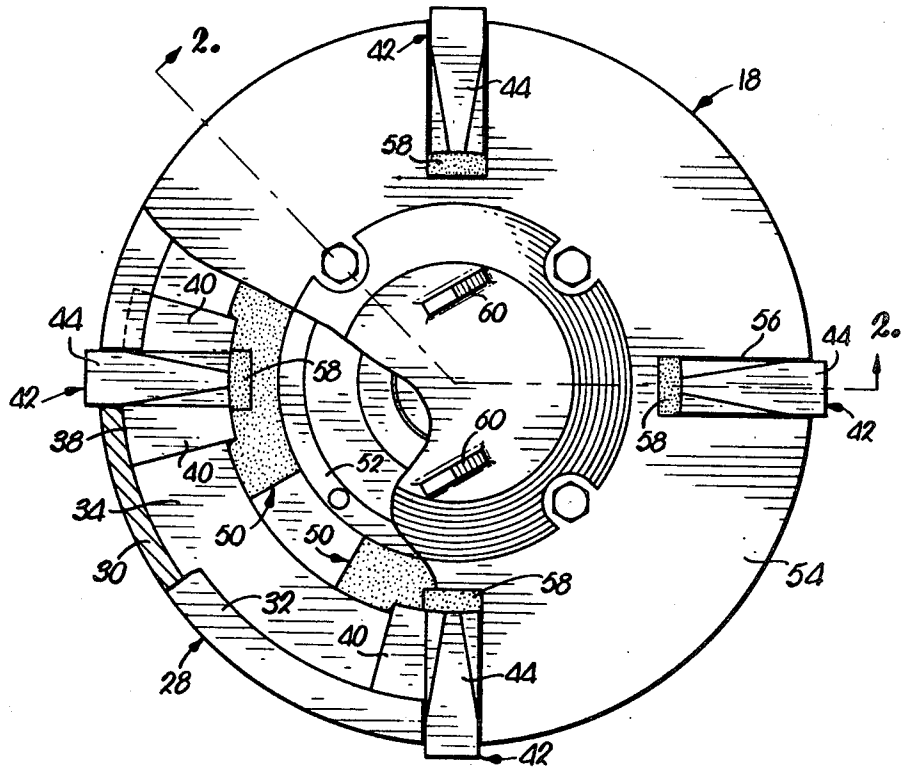
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[51] Int. Cl. B02c 13/28, B02c 18/40
[50] Field of Search ..... - 241/(Rubber Elements in Mills Digest), 46.1, 46.06, 46.08, 102, 191–2, 257, 259, 291, 194, 46, 193, 277

[56] References Cited
UNITED STATES PATENTS

2,220,729	11/1940	Powers	241/46.08
2,828,086	3/1958	Macemon	241/193X
2,950,868	8/1960	Lannert	241/46.08

Primary Examiner—Robert C. Riordon
Assistant Examiner—Donald G. Kelly
Attorney—Schmidt, Johnson, Hovey, Williams & Chase

ABSTRACT: A rotor for a waste disposer comprising a relatively heavy base presenting a peripheral, upwardly extending wall and inturned lip defining an inwardly facing groove. Grinding teeth having integral flanges projecting outwardly from the sides of the teeth are carried by the base so that the major forces directed against the teeth are transmitted to the base through the flanges. Resilient members engage each tooth respectively to yieldably oppose movement of the teeth away from their normal-grinding positions and a retainer plate secures the teeth and resilient members in position on the base.



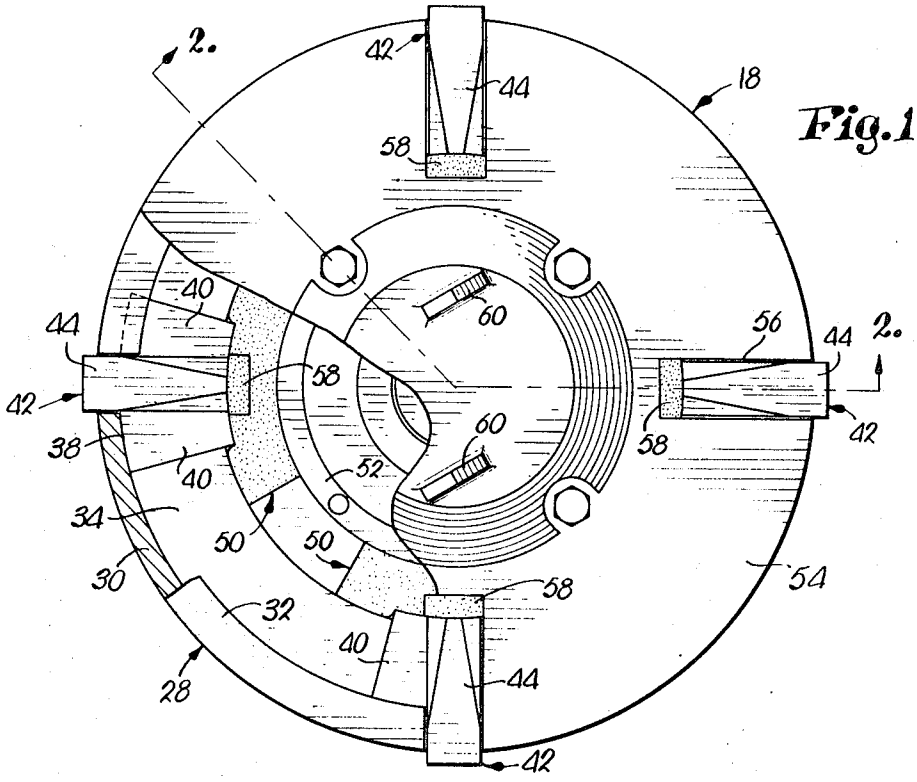


Fig.1.

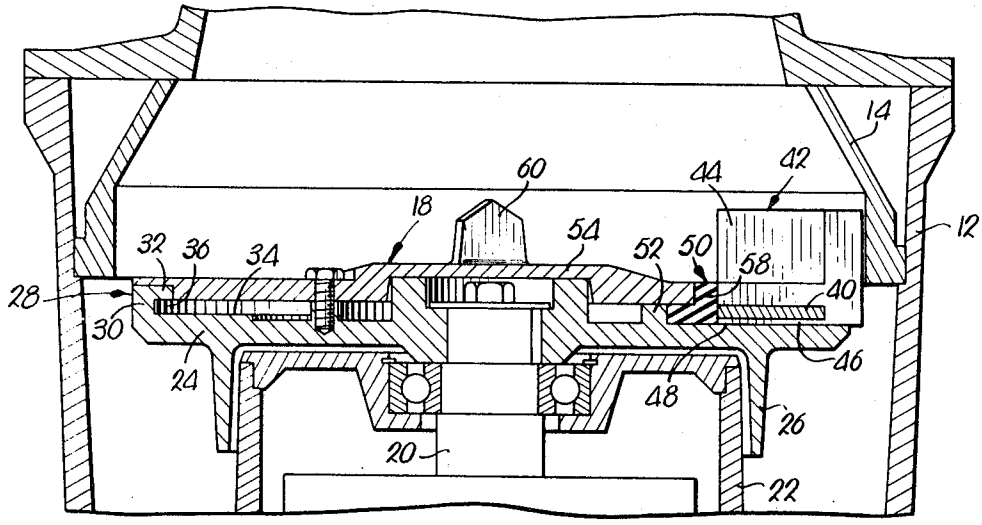


Fig.2.

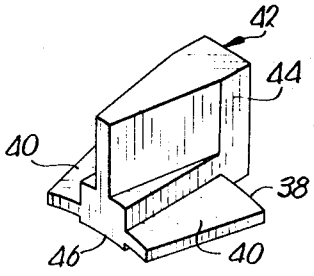


Fig.3.

INVENTOR
George O. Sherman Jr.

BY Schmidt, Johnson, Hovey, Williams & Bradley.
ATTORNEYS.

WASTE DISPOSER ROTOR WITH YIELDABLY BIASED TEETH

CROSS REFERENCES

This is a continuation-in-part of my copending application Ser. No. 471,769, filed July 13, 1965, now U.S. Pat. No. 3,436,027, issued Apr. 1, 1969, and entitled "Waste Disposer."

This invention relates to waste disposer construction and, more particularly, to a novel rotor for a waste disposer. Conventionally, the rotor carries a plurality of cutting or grinding teeth which cooperate with an annular shredding ring for comminuting the waste material so that the latter may be disposed through the sewer. The teeth normally are situated relatively close to the shredder ring. Consequently, a problem often encountered in the operation of disposers of this type is the jamming of the rotor as a result of relatively hard material becoming wedged between a tooth and the ring. Various means have been suggested for alleviating the tendency of the rotors to become jammed. For example, the grinding teeth are often swingably mounted on the rotor so that they may pivot away from the grinding position when they encounter objects capable of jamming the rotor.

The swingable mounting of disposer grinding teeth detracts from the effectiveness of the disposer. Also, the pivot means used in swingably mounting the teeth to the rotor requires complete disassembly of the unit to repair or replace worn or broken teeth. The pivotal coupling of the swingable teeth to the rotor is inherently weak and the teeth are prone to break away from the rotor under the influence of stresses imparted to the teeth during operation of the disposer.

Accordingly, it is an object of this invention to provide a rotor wherein the teeth are firmly supported against tilting or twisting stresses during operation, yet the teeth are permitted to move away from the shredder ring under the influence of stresses which would otherwise jam the disposer.

It is another object of the invention to provide a waste disposer rotor constructed in a manner wherein the grinding teeth are supported by a relatively heavy base member during operation so that the forces from the teeth do not distort or damage the other components of the rotor.

It is also an object of the invention to provide a rotor having grinding teeth which are relatively firmly held in normal-operating position but which will readily yield to avoid or release jamming forces.

Still a further object of the invention is to provide novel grinding teeth configured to distribute the waste material evenly and uniformly to the grinding surfaces of all of the teeth and at a rate which eliminates the tendency to overload or jam any one tooth.

These and other objects of the invention will be further explained or will become apparent from the specification, claims and drawing.

In the drawing:

FIG. 1 is a top plan view of a rotor embodying the principles of this invention, parts being broken away to reveal details of construction;

FIG. 2 is a fragmentary, vertical cross-sectional view through a waste disposer equipped with the rotor of FIG. 1; and

FIG. 3 is a perspective view of one of the teeth used in the rotor.

The waste disposer **10** is illustrated fragmentarily in FIG. 2 of the drawing and includes a generally cylindrical housing **12** provided with an annular shredder ring **14** mounted in the upper portion of housing **12** immediately beneath a neck section **16**. The latter is adapted to be coupled with a sink or other waste receiver so that garbage and other kitchen wastes may be flushed into the disposer **10**.

The rotor **18** embodying the principles of this invention is mounted within housing **12** and is secured to the shaft **20** of an electric motor **22**. Rotor **18** comprises a circular, irregularly

shaped, relatively heavy base **24**. Base **24** is preferably cast as a homogeneous unit and includes a depending skirt **26** disposed in partial surrounding relationship to the upper end of motor **22** to provide an air seal to protect motor **22** from water and other liquids handled by disposer **10**.

Rotor **18** includes an integral, annular, peripheral rim **28** including an upright wall **30** and an integral, inturned lip **32** overlying the uppermost surface **34** of base **24** at the outer peripheral margin of the latter. Lip **32** and wall **30** define an annular, inwardly facing groove **36**. The latter is adapted to receive the complemental outer edge **38** of outwardly projecting flanges **40** on each side of and integral with a tooth **42** carried by rotor **18**. It may be seen in FIG. 1 that rotor **18** carries four identical teeth **42**, each constructed as illustrated best in FIG. 3.

Each tooth **42** comprises an upwardly extending body portion **44**, the opposed lateral faces of portion **44** sloping or tapering toward each other as the innermost end of the tooth **42** is approached as illustrated clearly in FIG. 3. The outermost surface of body **44** is the grinding surface and is disposed immediately opposite the cooperating grinding surface of shredder ring **14** so that the waste material is comminuted between the grinding surfaces as the best teeth are rotated during rotation of rotor **18** by motor **22**.

Each tooth **42** is provided with an elongated rib **46** integral with and projecting downwardly from the bottom of body **44** beyond the lowermost surfaces of flanges **40**. It may be seen in FIG. 2 of the drawing that the upper surface **34** of base **24** is provided with a channel **48** for each rib **46**, the latter being complementally received within its corresponding channel for lending stability to the tooth.

Rim **28** is notched to permit each tooth **42** to project radially outwardly from rotor **18** and into relatively closely spaced relationship from shredder ring **14** during normal operation of the disposer. An elongated member **50** of resilient material is received between an outwardly facing shoulder of an upward annular projection **52** and the inner surface of each tooth **42**. Projection **52** is integral with base **24**. It may be seen in FIG. 1 that there is a separate member **50** provided for each tooth **42**. The members **50** may be formed of resilient material such as gum rubber or the like, and the members **50** normally hold the teeth **42** in their operating positions. However, when the teeth **42** encounter forces which might otherwise jam the rotor, the yieldable nature of the resilient material **50** permit the tooth to shift radially inwardly to release the jamming force and permit continued rotation of rotor **18**.

A retainer or cover plate **54** is bolted to base **24** in overlying relationship to members **50** and the major part of the outwardly extending flanges **40** of the teeth **42**. The plate **54** is provided with radially extending, elongated slots **56** as illustrated best in FIG. 1. Slots **56** cooperate with the ribs **46** and channels **48** to define the path of shifting movement of each tooth **42** toward and away from its operating position. It will be noted that the slots **56** are longer than necessary to accommodate the teeth **42**. However, an upwardly extending boss **58** integral with each member **50** projects upwardly into each slot **56** immediately behind the corresponding tooth **42** to plug the gap between plate **54** and the innermost ends of the teeth **42**. Manifestly, boss **58** is yieldable to permit inward shifting of the teeth **42** as mentioned above. Projections **60** integral with plate **54** provide impeller means for partially comminuting and for directing waste material outwardly of the rotor to the grinding surfaces.

In operation, the material of members **50** yieldably hold the teeth in their grinding positions. The outermost arcuate edges of the flanges **40** are received within the corresponding portions of groove **36** so that the overhanging lip **32** prevents any twisting of the tooth. The forces generated in the comminuting of waste material are transmitted from the tooth directly into the relatively heavy casting or base **24** which is capable of withstanding the forces without a tendency to distort or to become damaged. Relatively little force is directed against the lighter cover plate **54**.

The spacing between the adjacent members **50** permits the latter to be installed between projection **52** and the proximal tooth by the application of tensile forces to each end of a member **50**. This narrows the member so that it may be positioned easily, whereupon subsequent release of the member places the latter in compression between projection **52** and against tooth **42**. Since boss **58** is provided primarily as a filler, it need not be compressed against tooth **42**. The compressive forces of member **50** hold the grinding tooth relatively rigidly until, of course, the tooth encounters forces sufficient to jam or break the rotor whereupon the tooth is permitted to shift by virtue of the deformation of the material of member **50**. Such shifting of the tooth immediately releases the forces to obviate jamming or to prevent breakage or damaging of the rotor.

The sloping surfaces of body **44** provide that the leading surface of each tooth is tapered rearwardly as the innermost end of the tooth is approached. This permits a portion of the waste material which engages the leading surface of the tooth to flow inwardly and rearwardly around the tooth. Such flow prevents the teeth from becoming overloaded as a result of the grinding of the material to the outer periphery of the rotor under the influence of centrifugal force. Consequently, the excess material is permitted to flow past the inner end of each tooth thus equalizing the load on each tooth during the grinding operation.

The importance of the integral flanges **40** of the teeth **42** should not be overlooked. These flanges provide lever arms extending outwardly in each direction from the centerline of the tooth to resist any twisting or bending forces acting upon the tooth. Accordingly, the teeth are normally in their proper working positions and only move therefrom when jamming or damaging forces are encountered. Should the rotor become jammed, it is merely necessary to reverse the direction of motor **22** and the resilient forces exerted by members **50** permit sufficient withdrawal of the teeth to release the jam. Rotor **18** is constructed so that the disposer may operate in the reverse direction with no loss of efficiency whatsoever. In this connection, it is to be noted that each side of each tooth **42** is symmetrical with the other side so that the leading surface of each tooth is tapered rearwardly regardless of the direction of rotation of the rotor.

I claim:

1. A waste disposer rotor comprising:

a rotatable base having an upper surface;

a peripheral rim extending upwardly from the surface, said rim having an inwardly facing groove;

a grinding tooth shiftably carried on said upper surface;

flange means integral with the tooth and extending into said groove, the rim having a notch to permit projecting of the tooth from the base during grinding, the proximal edge of the flange means being received within the groove when the tooth is in its grinding position for stabilizing the latter;

a resilient member carried by the base and engaging the tooth for yieldably biasing the latter into said grinding position; and

means carried by the base for securing the tooth and said member to the base.

2. The invention of claim **1**; said base including an upwardly extending projection presenting an outwardly facing shoulder, the member being interposed between the shoulder and the tooth.

3. The invention of claim **1**, wherein said securing means includes a plate: said plate having an elongated slot extending radially of the rotor and aligned with the notch of said rim; said tooth being received through the slot, the latter being longer than the corresponding portion of the tooth to permit limited shifting of the latter longitudinally of the slot toward and away from said grinding position.

4. The invention of claim **3**: there being a plurality of teeth carried by the base; said base having a notch and said plate having a slot for each tooth respectively.

5. The invention of claim **4**, wherein said flange means includes a flange for each side of the tooth respectively and integral therewith: each flange extending outwardly from the corresponding side of the tooth; said groove in the rim being arcuate, the proximal edge of each flange being complemental with the corresponding portion of said groove.

6. The invention of claim **5**:

there being an elongated channel in said upper surface of the base for each tooth respectively;

each channel being longitudinally aligned with the corresponding slot in said plate; and

a rib on each tooth, integral therewith, said rib being received in the corresponding channel to limit relative movement between the base and said tooth to the longitudinal direction of said channel.

7. The invention of claim **4**, wherein said member includes an upwardly projecting, resilient boss extending into the slot behind said tooth to yieldably resist movement of the tooth along the slot in the direction away from said grinding position.

8. The invention of claim **1**, wherein said tooth includes an upwardly projecting, radially elongated body, said body having an upright, leading face disposed to engage waste material during rotation of the rotor; said leading face tapering rearwardly as the radially innermost end of said body is approached, whereby to permit inward movement of waste material along said tapered face during operation of the disposer.

9. The invention of claim **8**, wherein said tooth is provided with a second face on the opposite side of said body from said leading face: said second face being tapered toward said leading face as the radially innermost end of the body is approached; whereby to permit said inward movement of the waste material upon rotation of the base in either direction.