Jan. 27, 1970 R. F. DOTY 3,491,955

WASTE DISPOSER APPARATUS

Filed July 21, 1967

Fig. 1

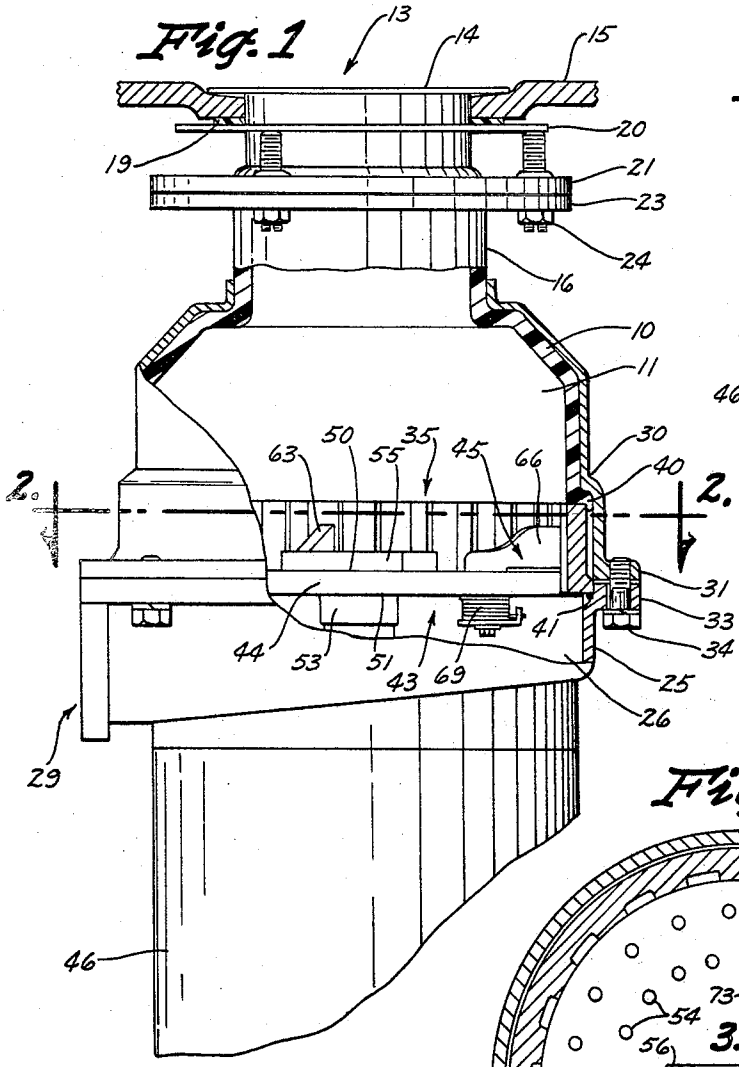


Fig. 4

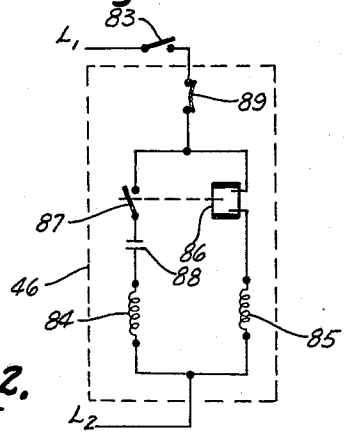


Fig. 2

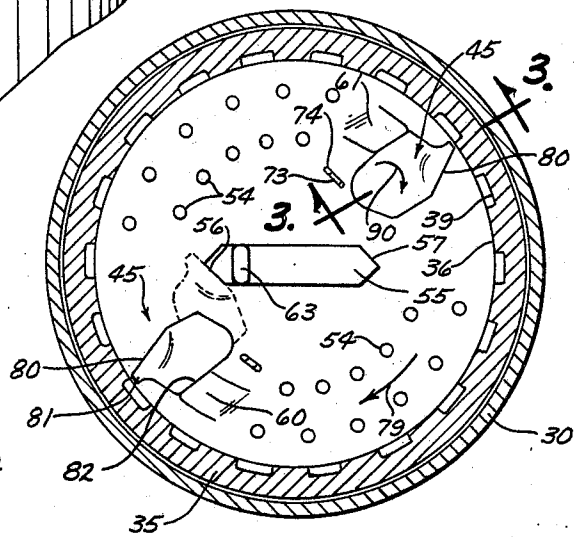
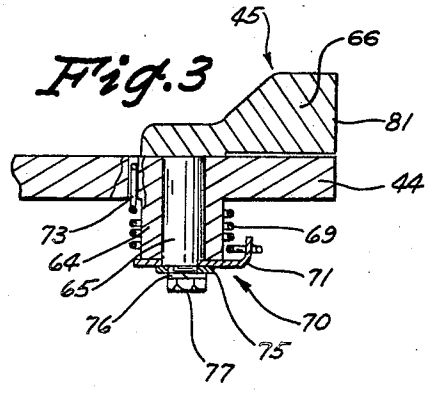


Fig. 3



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WASTE DISPOSER APPARATUS

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ABSTRACT OF THE DISCLOSURE

A food waste disposer apparatus including an improved rotary impeller assembly having a pair of inwardly biased pivotally operable impellers movable to an outwardly disposed effectively fixed position relative to the rotor during operation of the disposer. Overload means associated with the motor de-energizes the motor upon the disposer encountering an overloaded condition resulting from the wedging of material between the operationally fixed impellers and the stationary shredding ring so that the inwardly biased impellers may operate to eliminate the jammed condition.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a food waste disposer apparatus and more particularly to an improved rotary impeller assembly and in one embodiment to a cooperating motor control for achieving optimum comminution effectiveness.

Description of the prior art

Prior art shows waste disposer apparatus having a rotary assembly including impellers fixed on a rotor that are efficient waste material comminuters but which have a tendency to become jammed with certain articles of waste material. The jamming is caused by particles of food waste material becomming jammed between the impellers and the cooperating shredding ring or by bones which become wedged between the impellers and the shredding ring. Upon encountering a jamming of the rotary assembly in these fixed cutter devices, it is necessary for the operator to manually free the rotor from the jammed condition and/or remove the material causing the jam and then to re-energize the device.

Numerous prior art patents are directed to providing rotary impeller assemblies having movable impellers that are biased to an inwardly disposed inoperative position. The impellers are moved to an operative position by centrifugal force for cooperation with a stationary shredding ring to effect comminution of waste material. To prevent jamming of the rotary impeller assembly, the impellers shown in this group of prior art have been made freely pivotable out of the operative position responsive to the impending jamming. These freely pivotable impellers, therefore, are operable in a manner that allows the waste material to move them out of the operative position.

SUMMARY OF THE INVENTION

The waste disposer of the instant invention provides an improved rotary impeller assembly having movably mounted, inwardly biased, impellers that are operable during comminution as effectively fixed impellers.

It is, therefore, an object of the present invention to provide a food waste disposer apparatus having movably mounted impellers operable under centrifugal force to an outwardly disposed effectively fixed operative position.

It is a further object of the present invention to provide

a food waste disposer apparatus having movably mounted impellers operable under centrifugal force to an outwardly disposed effectively fixed operative position and responsive to a stalled condition for returning to the inwardly biased position to remove the cause of the overload.

It is another object of the present invention to provide a waste disposer apparatus having an improved rotary impeller assembly including a pair of pivotally operable inwardly biased impellers operable as fixed impellers during the comminuting operation of the disposer and operable under the biasing to effectively remove a jammed condition.

Operation of the device and further objects and advantages thereof will become evident as the description proceeds and from an examination of the accompanying page of drawings which illustrate a preferred embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an over-all view of a waste disposer apparatus shown partially in section to illustrate a portion of the instant invention;

FIGURE 2 is a section view of the waste disposer as taken along line **2**—**2** of FIGURE 1 and shows the rotary impeller assembly with pivotally operable impellers.

FIGURE 3 is a fragmentary sectional view of the impeller assembly showing the mounting and biasing of one of the pivotal impellers as taken generally along line **3**—**3** of FIGURE 2; and

FIGURE 4 shows an electrical schematic circuit for the waste disposer apparatus embodying the instant invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGURE 1, there is shown a generally cylindrical food waste disposer having an upper housing **10** defining a comminution chamber **11** for accommodating waste material to be comminuted. The disposer includes an inlet **13** at its upper end for receiving the waste material. The inlet **13** is formed at least in part by inlet sleeve member **14** supportable in a drain opening of a sink **15** or the like. The inlet sleeve member **14** is connected to the inlet end **16** of the upper housing **10** through a supporting arrangement including a resilient sink gasket **19**, upper and lower mounting plates **20** and **21**, a housing clamping plate **23**, and a plurality of mounting studs **24**.

A lower housing **25** defines a discharge chamber **26** communicating with a fluid outlet **29**. The lower housing **25** is attached to the upper housing **10** through a housing clamp **30** encompassing the lower portion of the upper housing **10** and having a flange **31** mating with a flange **33** of the lower housing **25**. A plurality of bolts **34** join the mating flanges.

A substantially cylindrical shredder ring **35** is maintained in a relatively stationary position through the clamping action of the housing clamp **30** and the lower housing **25**. The shredder ring **35** includes a plurality of inwardly extending shredding elements **36** disposed around the inner periphery of the shredding ring **35**. Between the inwardly extending elements **35** are longitudinally extending channels **39** for accommodating flow of fluid and comminuted waste material from the comminuting chamber **11** toward the discharge chamber **26** and the outlet **29**. The shredder ring **35** engages and compresses a sealing flange **40** at the lower end of the upper housing **10** and a sealing gasket **41** recessed into the upper flange of the lower housing **25** to seal the comminuting chamber **11** and discharge chamber **26** from leakage through the connection at the mating flanges **31**, **33** of the housing clamp **30** and the lower housing **25**.

A rotary impeller assembly **43** includes a rotor **44** attached to the motor shaft (not shown) for rotation therewith. The rotor **44** supports a pair of substantially identical impellers **45** that are cooperable with the inwardly extending elements **36** of the shredder ring **35** for effecting comminution of the waste material upon operation of the motor in a manner as will be more fully explained hereinafter.

Attached to the lower portion of the lower housing **25** is a motor **46** for rotating the rotary impeller assembly **43** to effect comminution of the waste material between the impellers **45** and the shredder ring **35**.

The rotary impeller assembly **43** includes the disc-like rotor **44** having an upper face **50** substantially forming a bottom for the comminution chamber **11** and a lower face **51** substantially forming the upper side of the discharge chamber **26** and thereby effectively serving as a divider between the comminution chamber **11** and the discharge chamber **26**. The rotor **44** includes a depending central mounting hub **53** attached to the motor shaft, as by a threading engagement, for effecting rotation of the rotor **44** by the motor **46**. The diameter of the rotor **44** is established so that the outer periphery is closely spaced from the inner peripheral surface of the inwardly extending elements **36**. The rotor **44** also includes a plurality of holes **54** for accommodating flow of fluid from the comminuting chamber **11** into the discharge chamber **26**.

Extending upwardly from the upper face **50** of the rotor **44** is a central stop member **55** having a pair of oppositely disposed faces **56** and **57** engageable by the pivotally operable impellers **45** during periods of nonrotation of the rotary impeller assembly **43** as shown by broken lines in FIGURE 2. Also extending in an upwardly direction from the upper face **50** of the rotor **44** is a pair of stop members **60** and **61** disposed for engagement by one of the pivotally operable impellers **45** during periods of rotation of the rotary impeller assembly **43** as shown by full lines in FIGURE 2.

A kicker element **63** is attached to the rotor **44** for rotation therewith, and in this embodiment extends upwardly from the central stop member **55**. The kicker **63** is offset from the central axis of the rotor **44** and is effective for dislodging or moving waste material items which may tend to become located at the central portion of the comminuting chamber **11**.

The pair of impellers **45** are pivotally supported on the rotor **44** as best shown in FIGURE 2 at substantially diametrically opposed positions on the rotor **44** and since the impellers are substantially identical, a description of one impeller applies to each of the pair. The impeller **45** is located near the outer portion of the rotor **44** and pivotally supported by a depending hub portion **64** of the rotor **44**. A shaft member **65** connected to the impeller **45** extends through the hub portion **64** and is axially retained therein as will be more fully defined hereinafter. The impeller **45** includes an upper portion **66** having a mass responsive to centrifugal force imparted to the impeller **45** upon rotation of the rotor **44** for effecting movement of the impeller **45** to an outwardly disposed operative position.

The impeller **45** is biased to the inwardly disposed position, for engagement with the central stop member **55** when the rotor **44** is at rest. The biasing of the impeller **45** is provided by a coil spring **69** connected between the depending impeller shaft member **65** and the rotor **44**. One end of the spring is attached to the impeller **45** through a flanged plate **70** having a flange portion **71** connected with the one end of the spring. A D-shaped hole in the flanged plate **70** mates with a D-shaped portion of the shaft **65**. The other end of the spring **69** includes a finger portion **73** engageable with a hole **74** formed in the rotor **44**. The flanged plate **70** is retained on the impeller shaft **65** and the impeller shaft **65** is axially retained in the rotor hub **64** through use of a clamping washer **75**, lock washer **76** and screw member **77**.

Upon rotation of the rotor **44** centrifugal force acting on the impeller **45** will overcome the biasing force of the coil spring **69** and will move the impeller **45** in a counterclockwise direction from the inoperative position shown by broken lines in FIGURE 2 to the operative position shown by the full lines in FIGURE 2. The movement of the impeller **45** to the operative position increases the loading of the spring member **69** on the impeller **45**, but the centrifugal force is sufficient to maintain the impeller **45** in the operative position.

It is also noted from FIGURE 2 that operation of the rotor **44** in a clockwise direction as indicated by the arrow **79** and the resulting movement of the pivotal impeller **45** to the operative position with the trailing portion **82** against the stop **60**, for example, causes the impeller **45** to effectively become fixed with respect to the rotor as the face **80** of the impeller **45** moves into the waste material. The waste material moving into the face **80** of the impeller **45** will help maintain it in contact with the stop member **60**. A high profile is provided at face **80** and at the cutting edge **81**.

It has been recognized that fixed impellers effect efficient comminution but are more susceptible to jamming by waste materials becoming lodged between the cutting edge of the impeller and the inwardly extending shredding element of the shredding ring. The instant invention is operative for effectively removing this disadvantage by providing an improved rotary impeller assembly **43** operable with effectively fixed impellers during comminution but having biased pivotal operation for effectively eliminating jamming as will be more fully explained hereinafter.

The improved rotary impeller assembly **43** is cooperable with a motor **46** having an overload device, as will be shown in FIGURE 4, for achieving the improved operation. The schematic electric circuit of FIGURE 4 shows the motor **46** connected between power lines L_1 and L_2 under control of the operator controlled "on-off" switch **83**. The motor **46** includes the start winding **84**, the run winding **85**, capacitor **88**, and a starting relay arrangement including a current sensitive relay coil **86** and a switch **87** operated thereby. Connected in series with the on-off switch **83** is a normally closed thermal device **89** for interrupting energization of the motor **46**. The thermal device **89** is operable to an open position responsive to increased motor temperature over a period of time or to a high current through the thermal device and run winding **85** for a relatively short period of time. Thus it is seen that the increased current resulting from a jammed condition of the rotary assembly **43** will open the thermal device **89** and de-energize the motor **46**.

In the present embodiment this overload condition effects de-energization of the motor **46** to remove the driving torque from the rotary impeller assembly **43**. Upon removal of the driving torque the biasing of the spring **69** imparts a torque to the impeller causing the impeller **45** to pivot clockwise away from the operative position, as shown by arrow **90** in FIGURE 2, toward the inoperative position and thereby allow a jam to become broken. In the alternative the torque of the spring **69** applied to the impeller **45** causes the rotary impeller assembly **43** to back up in a counterclockwise direction and thereby allow movement of the impeller **45** from the operative position as shown in FIGURE 2 toward the inoperative position shown by the broken lines in FIGURE 2. The net result, of course, is to remove the jammed condition and after a time delay, for allowing the motor overload device to become resettable, the disposer apparatus may be re-energized to continue the comminution process.

The re-energization may be effected by the operator by merely actuating a switch associated with the thermal device to re-energize the motor. This actuation could be

made automatic following the time delay; however, such an automatic arrangement is not as desirable from the standpoint of safety.

Although not shown in the preferred embodiment depicted in the drawings, an enclosure may be provided on the underside of the rotor **44** enclosing the biasing spring **69** and hub **64** to prevent comminuted material and other debris from accumulating in and around the spring.

The construction shown in the preferred embodiment is especially effective for accomplishing rapid comminution of the food waste material as well as complete comminution of the last remaining particles of waste material. This effectiveness is due at least in part to a combination of the factors including the effectively fixed nature of the impellers and the high profile of the impeller cutting edge and waste material engaging face. In previously known waste disposers having fixed impellers, the cutting face or surface is maintained with a low profile to prevent excessive jamming. With a device such as shown in the drawings wherein a jam or stall is automatically removed the need for providing a low profile is not as critical as in previous devices.

It is therefore seen that the instant invention provides a waste disposer apparatus having an improved impeller assembly and motor control cooperable in a waste disposer apparatus for achieving optimum comminution of waste material while effectively eliminating the inconveniences of a jammed rotary assembly.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, these are used in a generic and a descriptive sense only and not for purposes of limitation. Changes in form and the proportion of parts as well as the substitution of equivalents are contemplated as circumstances may suggest or render expedient, without departing from the spirit or scope of this invention as further defined in the following claims.

I claim:

1. A waste disposer apparatus comprising: a housing providing a comminution chamber and having an inlet for receiving waste materials and fluids; shredder means including shredding elements for effecting comminution of materials in said chamber; a rotary impeller assembly coaxial to said shredder means and including a rotor and at least one impeller; means for pivotally mounting said impeller on said rotor for movement between a first operative position and a second retracted position and including a pivot pin spaced radially outwardly from the axis of said rotary impeller assembly on a radial line extending outwardly from said axis, said impeller including a cutting portion spaced radially outwardly from said pivot pin and positioned generally on said radial line juxtaposed to said shredding elements when said impeller is in said operative position; means for biasing said impeller toward said second position; drive means for rotating said rotary impeller assembly, said impeller being responsive to centrifugal force for movement from said second position to said first position upon rotation of said rotary impeller assembly by said drive means; and means for holding said impeller in said first position for operation as an effectively fixed impeller during energization of said drive means whereby said cutting portion is cooperable with said shredding elements to effect comminution of said waste materials during said energization and whereby said biasing means is responsive to de-energization of said drive means for moving said impeller from said operative position with initial movement of said cutting portion being directed approximately perpendicularly away from said radial line.

2. A waste disposer apparatus as defined in claim **1** wherein said biasing means is operable for producing a reaction force on said rotary impeller assembly upon de-energization of said drive means with a jammed condition of said rotary impeller assembly and said shredder means for effectively backing off the rotary impeller assembly from the jammed condition when the reaction force exceeds the jamming force.

3. A waste disposer apparatus as defined in claim **2** wherein said biasing means is in the form of a coil spring substantially coaxial with said pivot pin and operably connected between said rotor and said impeller.

4. A waste disposer apparatus comprising: a housing providing a comminution chamber and having an inlet for receiving waste materials and fluids; shredder means including shredding elements for effecting comminution of materials in said chamber; a rotary impeller assembly coaxial to said shredder means and including a rotor and at least one impeller mounted on said rotor for movement between a first operative position juxtaposed to said shredding means and a second retracted position; means for biasing said impeller toward said second position; drive means for rotating said rotary impeller assembly, said impeller being responsive to centrifugal force for movement from said second position to said first position upon rotation of said rotary impeller assembly by said drive means; means for holding said impeller in said first position for operation as an effectively fixed impeller cooperable with shredding elements to effect comminution of said waste materials; and means responsive to a jammed condition of said rotary impeller assembly for de-energizing said motor, said biasing means being operable after said de-energization for initiating movement of said impeller toward said second position thereby tending to eliminate said jammed condition.

5. A waste disposer apparatus as defined in claim **4** wherein said biasing means is operable responsive to the absence of centrifugal force and motor driving torque after said deenergization for moving said impeller from said first position toward said second position thereby tending to free said rotary impeller assembly.

6. A waste disposer apparatus as defined in claim **4** wherein said biasing means is operable for moving said rotor in a direction opposite to the driven rotation responsive to said motor de-energization to initiate movement of said impeller from said first operative position and thereby tending to eliminate said jammed condition.

7. A waste disposer apparatus comprising: a housing providing a comminution chamber and having an inlet for receiving waste materials and fluid; shredder means including shredding elements for effecting comminution of materials in said chamber; a rotary impeller assembly coaxial to said shredder ring and including a rotor and at least one impeller movably mounted on said rotor; stop means on said rotor engageable by said impeller at a first operative position of said impeller juxtaposed to said shredding means; means for biasing said impeller to a second position spaced from said stop means, said impeller being responsive to centrifugal force for movement from said second position to said first position upon rotation of said rotary impeller assembly for operation as an effectively fixed impeller cooperable with said shredding elements to effect comminution of said waste materials; drive means for rotating said impeller assembly in a first direction to overcome said biasing means by centrifugal force and to effect movement of said impeller to said first operative position; and means responsive to a jammed condition of said rotary impeller assembly for de-energizing said motor, said biasing means being operable responsive to said de-energization for initiating movement of said impeller toward said position thereby tending to eliminate said jammed condition.

8. A waste disposer apparatus as defined in claim **7** wherein said impeller is pivotally operable between said first and second positions:

9. A waste disposer apparatus as defined in claim **7** wherein said impeller includes a leading portion and a trailing portion when in said first operative position and wherein said trailing portion is engageable with said stop means to effectively position said impeller for operation

as a fixed impeller during operation of said rotor in said first direction.

10. A waste disposer apparatus comprising: a housing providing a comminution chamber and having an inlet for receiving waste materials and fluids; shredder means including shredding elements for effecting comminution of waste materials in said chamber; a rotary impeller assembly coaxial to said shredder ring and including a rotor and at least one impeller pivotally mounted on said rotor for movement to a first operative position juxtaposed to said shredding means upon rotation of said rotary impeller assembly; stop means associated with said rotor and engageable by a trailing portion of said impeller at said first operative position; means for biasing said impeller to a second position spaced from said stop means, drive means for rotating said impeller assembly in a first direction to overcome said biasing means by centrifugal force and to effect pivotal movement of said impeller to said first operative position for operation as an effectively fixed impeller cooperable with said shredding elements for effecting comminution of said waste materials; and means responsive to a jammed condition

of said rotary impeller assembly for de-energizing said motor, said biasing means being operable responsive to said jammed condition and said motor de-energization for initiating pivotal movement of said impeller toward said second position thereby tending to eliminate said jammed condition.

11. A waste disposer apparatus as defined in claim **10** wherein said biasing means is responsive to said de-energization of the motor for effecting movement of said rotor in a second direction to free said impeller and then effecting pivotal movement of said impeller to said second position.

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