Dec. 30, 1969 T. R. SMITH 3,486,701

IMPELLER ASSEMBLY FOR WASTE DISPOSER APPARATUS

Filed Aug 8, 1967

Fig. 1

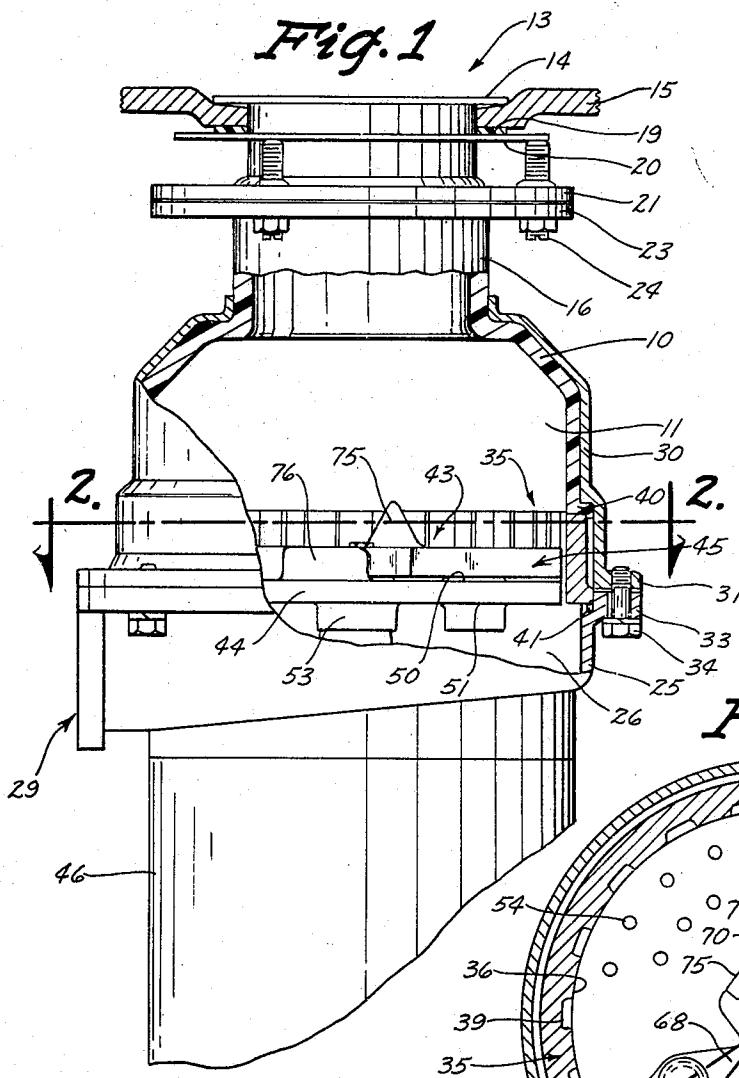


Fig. 2

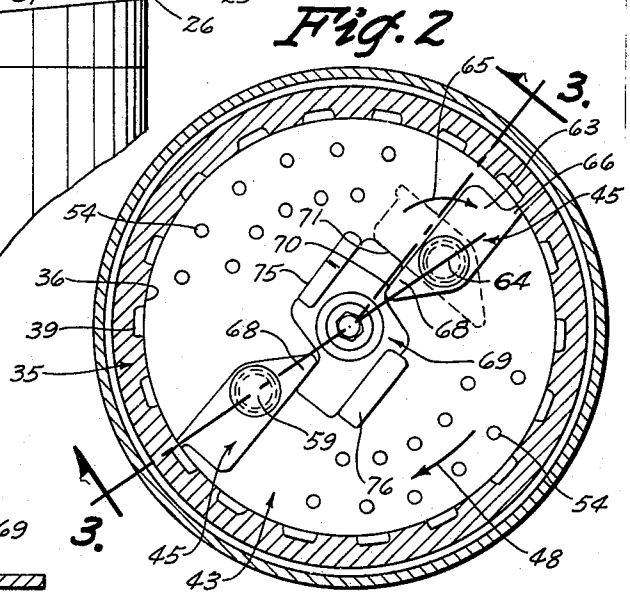
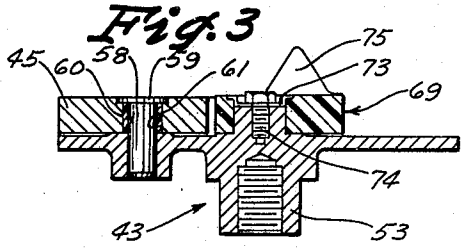


Fig. 3



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IMPELLER ASSEMBLY FOR 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 impellers freely pivotable on a rotor between a retracted position and an outwardly extending operative position. Resilient dampening means, including a resilient sleeve disposed between the impeller shaft and the rotor and further including resilient stop means in the form of a resilient cushion member having portions engageable by the impeller at the operative and retracted positions, effectively absorbs impact loading and thereby limits the transmission of noise and vibration between the impeller and the rotor.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a waste disposer apparatus and more particularly to an improved rotary impeller assembly.

Description of the prior art

In a food waste disposer apparatus, the rotary impeller assembly is subject to impact or shock loading of the rotor and impeller as the impeller moves between retracted and extended positions and as the impeller engages bones or other objects of waste material resisting comminution. By absorbing the impact, it is possible to iliminate the objectionable vibration resulting from the impact and the noise resulting from vibration of the operating unit. Prior art shows food waste disposer apparatus having a rotary assembly including movably mounted impellers engageable with a resilient stop or cushion in the retracted or inoperative position. The object of these devices is to absorb the impact and thereby limit or substantially prevent transmission of the impact and the vibration and noise associated with the impact. Prior art, however, is silent in the area of absorbing impact loading and limiting transmission of noise and vibration between the impeller and the rotor when the impeller moves to or is in the operative position. It is as important from the standpoint of noise and vibration to absorb the impact loading in the operative position of the impeller as in the inoperative or retracted position.

SUMMARY OF THE INVENTION

It is therefore, an object of the present invention to provide a waste disposer apparatus having movably mounted impellers freely operable between an outwardly extending operative position and a retracted position and further having means for substantially absorbing impact loading on the rotary impeller assembly in both the operative and retracted positions of the impeller.

It is a further object of the present invention to provide a waste disposer apparatus having an improved rotary impeller assembly including a pair of pivotally operable impellers and a resilient sleeve disposed between the impeller pivot pin and the supporting rotor.

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 impellers and resilient stop means engageable by said impellers in either the operative or extended position of the impeller to absorb impact loading.

The waste disposer of the instant invention provides an improved rotary impeller assembly having movably mounted impellers that are freely movable between extended and retracted positions and wherein resilient dampening means is disposed between the impeller and the rotor to absorb impact loading upon movement of the impeller to either the extended or retracted positions to substantially prevent or limit transmission of noise and vibration between the impeller and the rotor.

Operation of the device and further objects and advantages thereof will become evident as the description proceeds and from an examination of the accompanying pages of drawings which illustrates 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 vertical view of a waste disposer apparatus shown partially in section to illustrate a portion of the instant invention;

FIGURE 2 is a horizontal sectional view of the waste disposer as taken substantially along line 2—2 of FIGURE 1 and shows the rotary impeller assembly with pivotally operable impellers; and

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

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGURE 1, there is shown a generally cylindrical 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 is formed at least in part by an 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**, an annular ring (not shown) for supporting the lower mounting plate **21** on the inlet sleeve member **14**, 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 **31** and **33**.

A substantially cylindrical annular 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 thereof. Positioned between adjacent pairs of the inwardly extending elements **36** are longitudinally extending channels **39** for accommodating flow of fluid and comminuted waste material from the comminution 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 comminution chamber **11** and discharge chamber **26** from leakage through the connection at the mating flanges **31** and **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 rotation of the rotor **44**.

Attached to the lower portion of the lower housing **25** is a motor **46** for rotating the rotary impeller assembly **43** in a direction shown by the arrow **48** in FIGURE 2 to effect comminution of waste material between the impellers **45** and the shredder ring **35**. Means, not shown, provide for selective energization of the motor **46**.

The disc-like rotor **44** has 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** whereby the rotor **44** effectively serves 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 threaded engagement, for effecting rotation of the rotor **44** by the motor **46**. The outer diameter of the rotor **44** is established so that the periphery is closely spaced from the inner surface of the inwardly extending elements **36**. Th rotor **44** also includes a plurality of holes **54** for accommodating flow of fluid from the comminuting chamber **11** into the discharge chamber **26**.

The pair of impellers **45** are pivotally supported, as best shown in FIGURE 2, at substantially diametrically opposed positions on the rotor **44** and, since the impellers **45** are substantially identical, a description of one impeller and its mounting applies to each of the pair. Pivotal mounting of the impellers provides for effective comminution while reducing the incidence of jamming.

The impeller **45** is located near the outer portion of the rotor **44** and pivotally supported thereon by a pivot pin **58** supported in turn by the rotor **44**. Referring to FIGURE 3, the pivot pin **58** is fixed to the rotor **44** as by a press fit and includes a head portion **59** recessed flush to the top surface of the impeller **45** and operable for pivotally retaining the impeller **45** on the rotor **44**. A resilient sleeve member **60**, as one form of resilient dampening means, is disposed between the pivot pin **58** and the pivot hole **61** of the impeller **45** and serves as a pivot bearing for the impeller **45**. The resilient sleeve member **60** is preferably formed of a polyurethane material which possesses unique characteristics making it useful in the environment of a food waste disposer. The resilient sleeve **60** is capable of absorbing impact loading of the impeller **45** and thereby preventing transmission of the impact through the pivot mounting.

In addition to providing desirable impact absorption, the material for the resilient sleeve **60** provides a bearing that is capable of eliminating problems of corrosion and sticking of the impeller on the pivot pin.

The impeller **45** is freely pivotable about the pivot pin **58** between its retracted or inoperative position, as shown by broken lines in FIGURE 2, and its extended or operative position, as shown by full lines in FIGURE 2. The impeller **45** is operable or movable from its retracted position to its operative position responsive to centrifugal force acting on the impeller **45** upon rotation of the rotor **44** by the motor **46** as will be more fully defined and explained hereinafter.

The impeller **45** includes a first portion **63** having relatively large mass and disposed outwardly from the pivot pin **58** when the impeller **45** is in the operative position and establishing a mass center for the impeller **45** spaced from the pivot axis and spaced from a line **64** drawn between the axis of rotation from the rotary impeller assembly **43** and the pivot axis of the pivotal impeller **45**. Upon rotation of the rotary impeller assembly **43**, the centrifugal force acting on the mass center imparts a moment about the pivot pin **58** effecting movement of the impeller **45** in a clockwise direction as shown by the arrow **65** in FIGURE 2. As the impeller moves outwardly the moment arm of the mass center decreases but does not reach zero. Therefore, the impeller **45** is maintained in the outwardly extending operative position by centrifugal force acting on the mass center during rotation of the rotary impeller assembly **43** or until forced out of the operative position by items of waste material not easily comminuted.

The impeller **45** further includes a comminuting portion or cutting edge **66** cooperable with the inwardly extending elements **36** of the shredding ring **35** for effecting comminution of waste materials therebetween. The impeller **45** still further includes a tapered rear portion **68** extending inwardly from the pivot pin **58**, with the impeller **45** in the operative position, and engageable with resilient stop means **69** upon movement of the impeller **45** to the operative position as will be more fully defined hereinafter.

The stop means, as another form of resilient dampening means, is provided as a centrally located resilient cushion member **69** having portions engageable by the pivotally operable impeller **45** wherein a first face or portion **70** is engageable by the rear portion **68** of the impeller **45** in the operative position while a separate face or portion **71** is engageable by the outer portion **63** of the impeller while in the retracted position. The resilient cushion member **69** may be formed of a polyurethane material or other suitable elastomeric material possessing resistance to the moisture and abrasion present in the environment of a food waste disposer. The resilient cushion member **69** is axially retained on the rotor **44** by a collar **73** and screw member **74** as best shown in FIGURE 3 and non-rotatively retained on the rotor **44** by a pair of upwardly extending projections **75** and **76** as best shown in FIGURE 2. In addition to retaining the cushion member, the projections **75** and **76** serve as guards for the cushion member **69** as it moves into the waste material. A first of the upwardly extending projections **75** is in the form of a kicker attached to the rotor **44** for rotation therewith and extending above the cushion member **69**. The kicker **75** is effective for dislodging or moving waste material items which may tend to become located at the central portion of the comminution chamber **11**.

It has been shown in the drawings and the foregoing discussion that upon energization of the motor **46** the impellers **45** will move about the pivot pin **58** in a clockwise direction toward the operative position as shown by full lines in FIGURE 2. Movement of these impellers **45** to the outwardly extending position under centrifugal force will cause the rear portion **68** of the impeller **45** to engage the first stop portion **70** with an impact that in the absence of resilient cushion member **69** would cause objectionable vibration and noise. In the present invention, however, the provision of the resilient dampening means absorbs the impact and prevents transmission of objectionable vibration and noise. Engagement between the rear portion **68** of the impeller **45** and the cushion member **69** is effective for providing proper positioning of the comminuting portion **66** to effect optimum comminution of waste material between the comminuting portion **66** and the inwardly extending shredding elements **36**. Centrifugal force acting on the mass center of the impeller **45** tending to move the impeller in a clockwise direction about the pivot pin **58** provides a moment about the pivot pin for normally maintaining contact of the rear portion **68** with the cushion member **69**. The centrifugal force is sufficient to transfer a compressive force to the cushion member **69** with the impeller **45** in the operative position.

In the event the impeller **45** encounters waste material not easily comminuted or which otherwise might cause a jamming of the rotary impeller assembly **43**, the impeller **45** is pivoted about the pivot pin **58** in a counterclockwise direction to allow the waste material to move

past the impeller. This pivotal action of the impeller **45** may occur rapidly and result in an impact of the outer portion **63** of the impeller on the portion **71** of the central cushion member **69** as the impeller **45** assumes its retracted position as shown by broken lines in FIGURE 2. However, resilient stop means in the form of cushion member **69** is engageable by the impeller and thus absorbs the impact and prevents or limits transmission of vibration and objectionable noise. Following this pivotal movement out of the operative position, the impeller **45** is returned to its operative position under centrifugal force to continue the comminution operation on other materials in the comminution chamber. It may be seen that this kicking out of the impeller **45** may occur repeatedly under conditions in which the comminution chamber **11** includes a number of bones for example. In such a circumsatnce, the repeated kicking out and reengaging movements of the impeller **45** would create a vibration and noise problem if the instant invention is not used.

It is therefore seen that the instant invention provides a waste disposer apparatus having an improved rotary impeller assembly operable in a manner to achieve optimum comminution of waste material while effectively controlling or eliminating objectionable noise and vibration resulting from impact loading of the rotary impeller 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 including a housing providing a comminution chamber and having an inlet for receiving waste material and fluid, the combination comprising: shredding means within said comminution chamber; a rotary impeller assembly including a rotor and at least one impeller movably mounted on said rotor within said comminution chamber, said impeller being juxtaposed to said shredding means and cooperable therewith while in a first operative position upon rotation of said rotor for effecting comminution of said waste material; drive means for rotating said rotary impeller assembly; and resilient dampening means disposed between said impeller and said rotor in said first operative position and in a second retracted position of said impeller and operative for absorbing impact loading whereby transmission of vibration is limited.

2. A waste disposer apparatus as defined in claim **1** wherein said impeller is pivotally mounted on said rotor and wherein said resilient dampening means includes a resilient sleeve member disposed in the pivotal mounting between said impeller and said rotor.

3. A waste disposer apparatus as defined in claim **1** wherein said resilient dampening means includes resilient stop means having a first portion engageable by said impeller in said first operative position.

4. A waste disposer apparatus as defined in claim **1** wherein said impeller is pivotally mounted on said rotor and wherein said resilient dampening means includes a resilient sleeve member disposed in the pivotal mounting between said impeller and said rotor and further includes a resilient stop means engageable by said impeller in said first operative position.

5. A waste disposer apparatus as defined in claim **1** wherein said resilient dampening means includes a resilient stop means having a first portion engageable by said impeller in said first operative position and a second portion engageable by said impeller in a second retracted position.

6. A waste disposer apparatus including a housing providing a comminution chamber and having an inlet for receiving waste material and fluid, the combination comprising: shredding means within said comminution chamber; a rotary impeller assembly including a rotor, a pivot pin, and at least one impeller within said comminution chamber pivotally mounted on said rotor by said pivot pin, said impeller being juxtaposed to said shredding means and cooperable therewith while in a first operative position upon rotation of said rotor for effecting comminution of said waste material; drive means for rotating said rotary impeller assembly; and resilient sleeve means on said pivot pin and disposed between said impeller and said rotor.

7. A waste disposer apparatus as defined in claim **6** wherein said pivot pin is secured to said rotor and wherein said resilient sleeve means is in the form of pivot bearing means disposed between said impeller and said pivot pin.

8. A waste disposer apparatus including a housing providing a comminution chamber and having an inlet for receiving waste material and fluid, the combination comprising: shredding means within said comminution chamber; a rotary impeller assembly including a rotor and at least one impeller movably mounted on said rotor within said comminution chamber, said impeller being juxtaposed to said shredding means and cooperable therewith while in a first operative position upon rotation of said rotor for effecting comminution of said waste material; drive means for rotating said rotary impeller assembly; and resilient stop means on said rotor and engageable by said impeller in said first operative position for operatively positioning said impeller and for absorbing and dampening impact loading to substantially prevent transmission of vibration between said impeller and said rotor.

9. A waste disposer apparatus as defined in claim **8** wherein said resilient stop means includes a first portion engageable by said impeller in said first operative position and a second portion engageable by said impeller in a second retracted position.

10. A waste disposer apparatus as defined in claim **8** wherein said resilient stop means is engageable by said impeller with a compressive force to effect positioning of said impeller in said first operative position.

11. A waste disposer apparatus as defined in claim **8** wherein said impeller is pivotally mounted on said rotor and wherein said impeller includes a mass centroid spaced from a radial line drawn between the axis of rotation of said rotor and the pivot axis of said impeller to develop a centrifugal force for normally maintaining said impeller against said stop member.

12. A waste disposer apparatus as defined in claim **8** wherein the rotary impeller assembly includes a pair of oppositely disposed impellers and wherein said resilient stop means is centraly located on said rotary impeller assembly for engagement by each of said pair of impellers.

13. A waste disposer apparatus as defined in claim **12** wherein said centrally located resilient stop means is nonrotatively retained with respect to said rotor by a substantially upwardly extending kicker element.

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