April 8, 1958 H. J. MACEMON 2,829,838

WASTE DISPOSAL APPARATUS

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FIG. 1

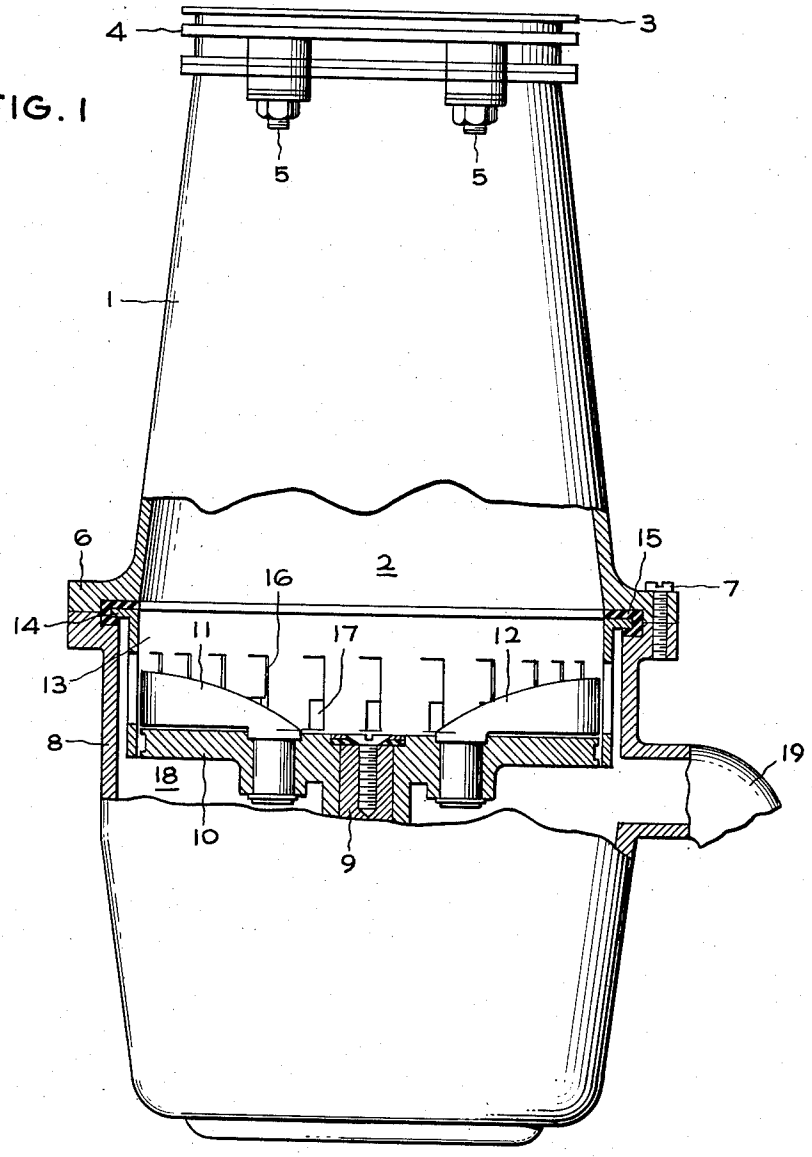


FIG. 2

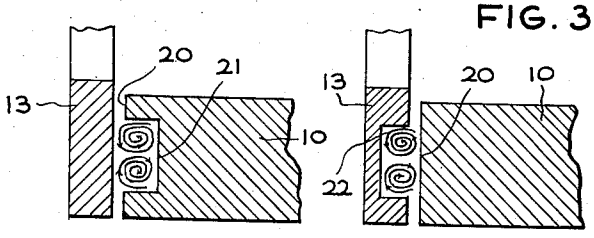


FIG. 3

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WASTE DISPOSAL APPARATUS

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6 Claims. (Cl. 241—46)

This invention relates to waste disposal apparatus and has as its principal object the provision of comminuting or grinding mechanism for apparatus of this type which is particularly effective in comminuting fibers and other long stringy material.

Another object of this invention is to provide waste disposal apparatus of the type having a rotary grinding member and a stationary grinding member in which the annular clearance between these two members is sealed so as to prevent the passage of fibers and similar material.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Briefly stated, in accordance with one aspect of my invention I provide a generally cylindrical stationary shredding member having apertures therein through which comminuted material is expelled, a rotary comminuting member having a cylindrical peripheral surface in close proximity to the inner surface of the shredding member, and an annular groove in one of the adjacent opposing surfaces so arranged as to define an annular chamber in which a hydrodynamic seal is formed during rotation of the rotary member in the presence of water.

For a better understanding of my invention, reference may be made to the accompanying drawing in which:

Fig. 1 is an elevation view, partly in section, of a waste disposal device embodying my invention.

Fig. 2 is a fragmentary enlarged sectional view showing a detail of the device of Fig. 1.

Fig. 3 is similar to Fig. 2 but shows a modified form of my invention.

Referring first to Fig. 1 of the drawings, I have shown a waste disposal device having a generally tubular casing or hopper 1 enclosing a grinding or shredding chamber 2 at the bottom of which the comminuting or shredding of waste material takes place as will be described below. The upper end of hopper 1 is provided with means suitable for supporting the device in the drain opening of a sink or the like, the supporting means including a supporting flange 3, a clamping flange 4 and clamping bolts 5, all arranged so that the open top of hopper 1 may be supported in alignment with a sink drain opening.

The lower end of hopper 1 is provided with a flange 6 which carries mounting bolts 7 for securing a motor housing 8 to the hopper so as to form an integral structure. Mounted within motor housing 8 is an electric motor (not shown) provided with a vertically extending shaft 9 to which is fixedly secured suitable rotary comminuting means located at the bottom of chamber 2. In the illustrated embodiment of my invention the rotary comminuting means comprises a flat generally circular

flywheel 10 which carries a pair of movable impellers 11 and 12.

Secured to the bottom of tubular hopper 1 so as to cooperate with flywheel 10 and its impellers 11 and 12 is a generally cylindrical shredding ring 13. A flange 14 at the top of shredding ring 13 is secured between flange 6 of the hopper and the upper end of motor housing 8 so that the shredding ring is stationary with respect to the hopper although it is preferably resiliently mounted to reduce noise and vibration, as by providing a resilient gasket 15 between flange 14 and the hopper and motor housing structures. Shredding ring 13 is provided with a plurality of shredding projections 16 on its inner surface, and also a plurality of apertures 17 through which comminuted material is expelled during grinding operations. Projections 16 and apertures 17 may be conveniently formed in one lancing and stamping operation or by any other suitable means. From the foregoing it will be evident that during operation of the device shown in Fig. 1, waste material deposited in comminuting chamber 2 will be rotated by flywheel 10 and impelled against shredding projections 16 by impellers 11 and 12, and that the particles of comminuted material will be expelled through apertures 17 into drainage chamber 18 below flywheel 10 and will finally be carried by the flow of water through the device out through drain outlet 19.

One of the problems which has been encountered in the design and operation of waste disposal apparatus of the foregoing type is that fibrous material such as celery, bean pods and carrot stalks may pass from the comminuting chamber into the drainage chamber practically intact, and may later mat together to obstruct the drain line with which the device is connected. I have found that such material generally passes through the clearance between the flywheel 10 and the shredding ring 13, and furthermore that the fibers are in a generally horizontal extended position when they escape from the comminuting chamber. To overcome this difficulty, I provide an annular chamber between the periphery of flywheel 10 and the inner surface of shredding ring 13, whereby a hydrodynamic seal is formed within this chamber during rotation of the flywheel 10 in the presence of water, and hence passage of waste material between the flywheel and the shredding ring is prevented. As best illustrated in Fig. 2 the peripheral cylindrical surface 20 of flywheel 10 is concentric with the inner surface of cylindrical member 13 and is in close proximity thereto, the clearance being preferably of the order of .015 inch. Formed in peripheral surface 20 is a peripheral groove 21 which, with the opposite inner cylindrical surface of shredding ring 13 forms an annular chamber in which vortices are formed as shown in Fig. 2, so as to provide an effective hydrodynamic seal between flywheel 10 and the shredding ring.

Alternatively an annular groove 22 may be formed in the portion of the inner surface of shredding ring 13 adjacent peripheral surface 20 of flywheel 10, as illustrated in Fig. 3. In this modified arrangement a hydrodynamic seal is formed within the annular chamber defined by the walls of groove 22 and the peripheral surface 20 of flywheel 10 during its rotation in the presence of water.

In both of the illustrated forms of my invention, the water movement pattern in the annular sealing chamber between the flywheel and the shredding ring effectively prevents passage of waste material therethrough, and in particular the passage of fibrous materials which are generally thrown by centrifugal force into an arcuate position lying along the inner wall of the shredding ring. Hence fibrous materials are retained in the comminuting

chamber until they are chopped into relatively short lengths either before or during their passage through apertures 17.

While I have shown and described two specific embodiments of my invention, I do not desire my invention to be limited to the particular construction shown and described, and I intend by the appended claims to cover all modifications within the true spirit and scope of the invention.

What I claim is:

1. Waste disposal apparatus comprising a generally cylindrical member located at the bottom of a vertically extending comminuting chamber having a top access opening for receiving waste material and water, said member having a plurality of apertures therein through which comminuted waste material is expelled, stationary shredding means in said chamber, rotary means at the bottom of said chamber for impelling waste material against said shredding means and for expelling comminuted material through said apertures, said rotary means including a peripheral cylindrical surface concentric with the inner surface of said cylindrical member and in close proximity thereto, and one of said surfaces having an annular groove therein of lesser axial extent than the cylindrical surface opposite thereto, said groove being so located that the walls thereof and the cylindrical surface opposite thereto define an annular chamber, whereby a hydrodynamic seal is formed within said annular chamber during rotation of said rotary means in the presence of water.

2. Waste disposal apparatus comprising a generally cylindrical shredding ring fixedly mounted at the bottom of a vertically extending tubular hopper having a top access opening for receiving waste material and water, said shredding ring having a plurality of apertures therein through which comminuted waste material is expelled, a plurality of shredding projections formed on the inner surface of said shredding ring, a flywheel mounted for rotation at the bottom of said shredding ring below said apertures and said shredding projections about an axis concentric with said shredding ring, means carried by said flywheel for impelling waste material against said shredding projections during rotation of said flywheel, said flywheel having a peripheral cylindrical surface in close proximity to an annular portion of the inner cylindrical surface of said shredding ring, and one of said cylindrical surfaces having an annular groove therein of lesser axial extent than the cylindrical surface opposite thereto, said groove being so located that the walls thereof and the cylindrical surface opposite thereto define an annular chamber, whereby a hydrodynamic seal is formed within said annular chamber during rotation of said flywheel in the presence of water.

3. Waste disposal apparatus comprising a generally cylindrical member located at the bottom of a vertically extending comminuting chamber having a top access opening for receiving waste material and water, said member having a plurality of apertures therein through which comminuted waste material is expelled, stationary shredding means in said chamber, rotary means at the bottom of said chamber for impelling waste material against said shredding means and for expelling comminuted material through said apertures, said rotary means including a peripheral surface concentric with the inner surface of said cylindrical member and in close proximity thereto, and said peripheral surface having a peripheral groove therein, whereby a hydrodynamic seal is formed between said member and said rotary means during rotation thereof in the presence of water.

4. Waste disposal apparatus comprising a generally cylindrical shredding ring fixedly mounted at the bottom of a vertically extending tubular hopper having a top access opening for receiving waste material and water, said shredding ring having a plurality of apertures therein through which comminuted waste material is expelled, a plurality of shredding projections formed on the inner surface of said shredding ring, a flywheel mounted for rotation of the bottom of said shredding ring below said apertures and said shredding projections about an axis concentric with said shredding ring, means carried by said flywheel for impelling waste material against said shredding projections during rotation of said flywheel, said flywheel having a peripheral surface in close proximity to an annular portion of an inner cylindrical surface of said shredding ring, and said peripheral surface having a peripheral groove therein, whereby a hydrodynamic seal is formed between said shredding ring and said flywheel during rotation thereof in presence of water.

5. Waste disposal apparatus comprising a generally cylindrical member located at the bottom of a vertically extending comminuting chamber having a top access opening for receiving waste material and water, said member having a plurality of apertures therein through which comminuted waste material is expelled, stationary shredding means in said chamber, rotary means at the bottom of said chamber for impelling waste material against said shredding means and for expelling comminuted material through said apertures, said rotary means including a peripheral surface concentric with the inner surface of said cylindrical member and in close proximity thereto, and said cylindrical member having an annular groove of lesser axial extent than the width of said peripheral surface, in the portion of its inner surface adjacent said peripheral surface, whereby a hydrodynamic seal is formed in the annular chamber defined by the walls of said groove and said peripheral surface during rotation of said rotary means in the presence of water.

6. Waste disposal apparatus comprising a generally cylindrical shredding ring fixedly mounted at the bottom of a vertically extending tubular hopper having a top access opening for receiving waste material and water, said shredding ring having a plurality of apertures therein through which comminuted waste material is expelled, a plurality of shredding projections formed on the inner surface of said shredding ring, a flywheel mounted for rotation at the bottom of said shredding ring below said apertures and said shredding projections about an axis concentric with said shredding ring, means carried by said flywheel for impelling waste material against said shredding projections during rotation of said flywheel, said flywheel having a peripheral surface in close proximity to an annular portion of the inner cylindrical surface of said shredding ring, said annular portion of said shredding ring having an annular groove therein of lesser axial extent than the width of said peripheral surface so located that the walls thereof and the peripheral surface opposite thereto define an annular chamber, whereby a hydrodynamic seal is formed within said annular chamber during rotation of said flywheel in the presence of water.

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