Feb. 3, 1953 J. H. BENSON 2,627,075

GARBAGE DISPOSAL

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FIG. 1

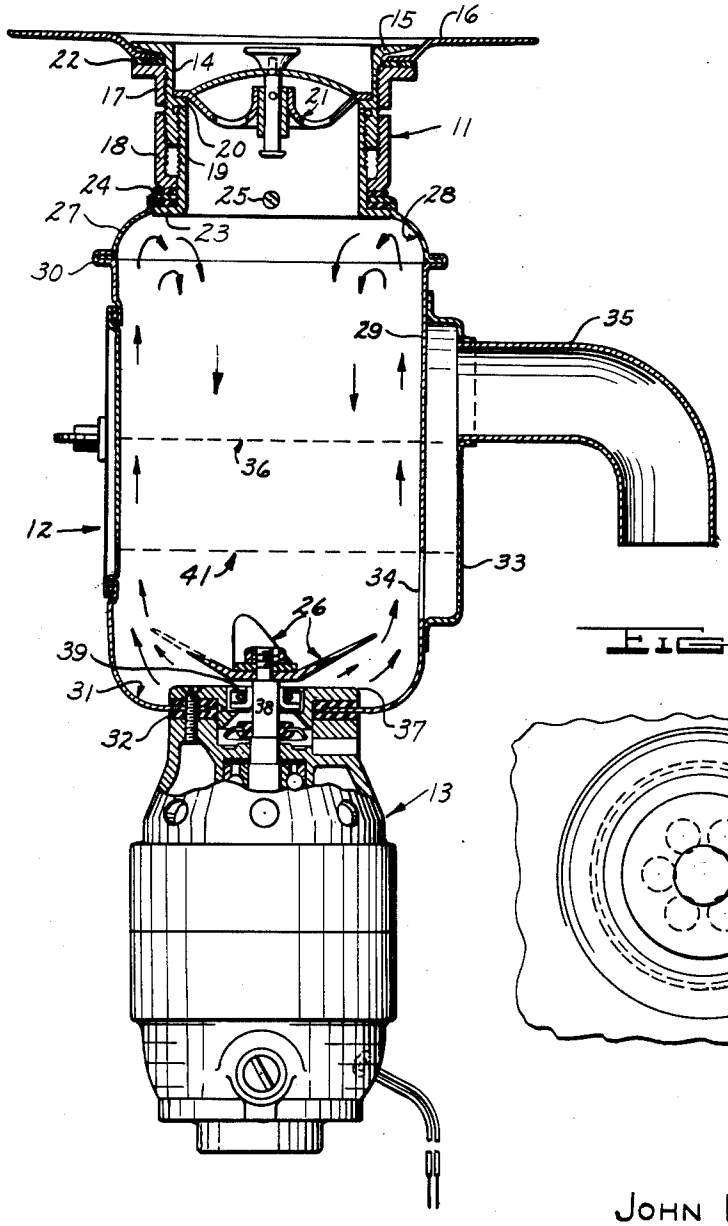


FIG. 2

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GARBAGE DISPOSAL

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FIG. 3

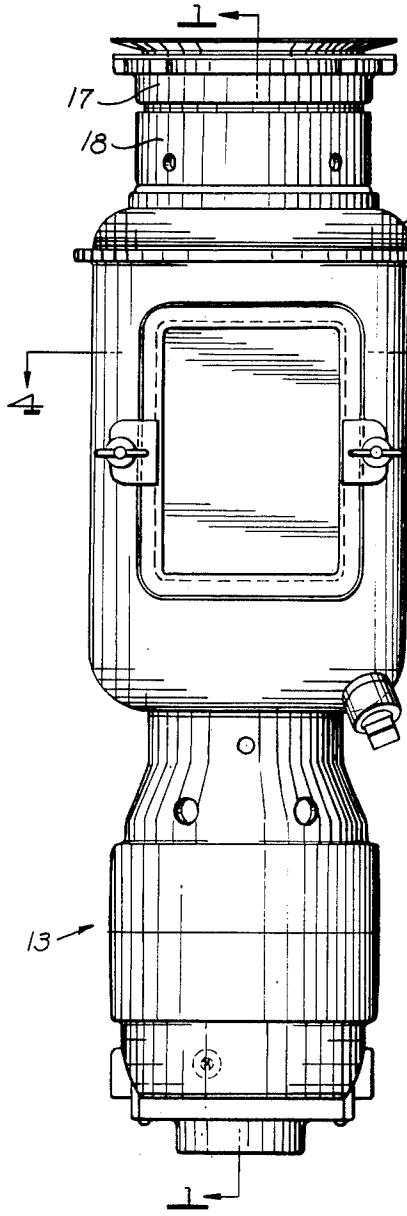
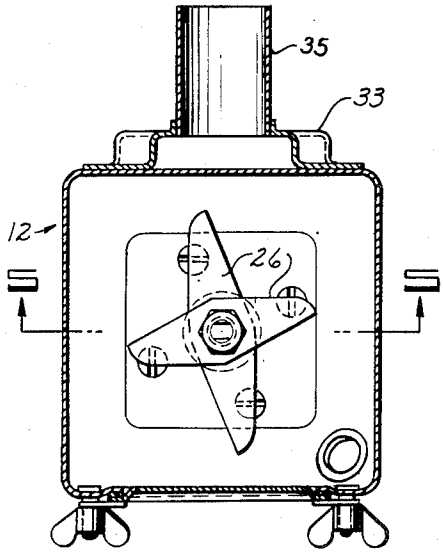


FIG. 4



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GARBAGE DISPOSAL

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FIG. 6

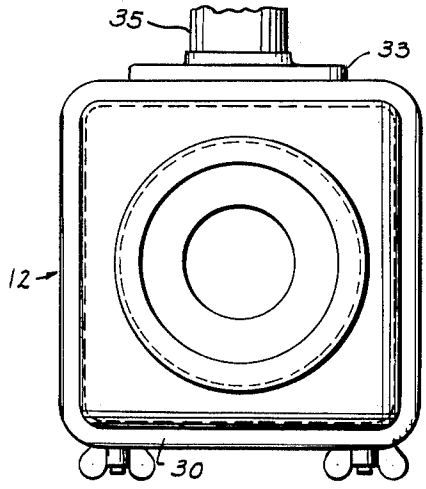


FIG. 5

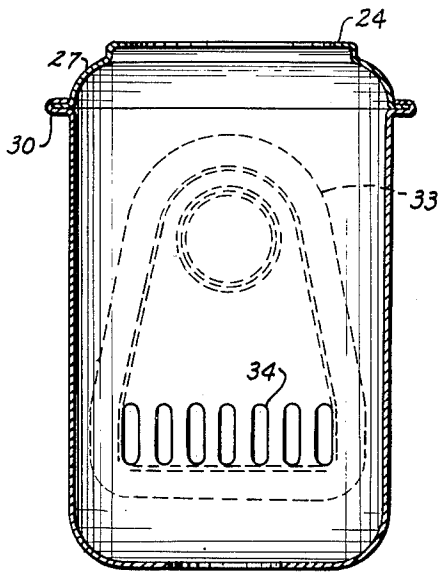


FIG. 7

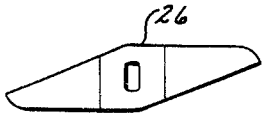


FIG. 8

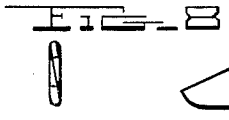


FIG. 10

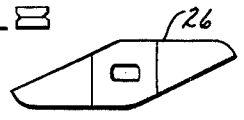


FIG. 11

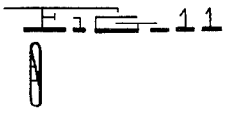
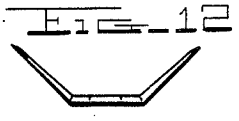


FIG. 9



FIG. 12



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UNITED STATES PATENT OFFICE

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GARBAGE DISPOSAL

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Application February 1, 1946, Serial No. 644,701

15 Claims. (Cl. 4—187)

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This invention relates to garbage disposal and has to do particularly with a method and apparatus for disposing of garbage by floatation and cutting action wherein the disposal unit is so designed as to form or take the place of the standard sink trap.

Heretofore most garbage disposal units which have been built in as a part of the sink have utilized some form of grinding or crushing step with stationary teeth or perforated blades in conjunction with moving elements in the comminution of the waste material. Mechanism to accomplish such grinding and crushing has necessitated heavy and expensive design. Such structures of the prior art are represented by the patents to Powers No. 2,220,729 of November 5, 1940; Shaver No. 1,732,775 of October 22, 1929; and Green No. 2,200,061 of May 7, 1940.

An important object of the present invention is the elimination of the usual grinding or crushing step in garbage disposal and to substitute therefor a floatation and cutting action; to accomplish this floatation and cutting action liquid is used as a vehicle for suspending the garbage particles so as to subject the same to the cutting action of high speed cutting blades.

More specifically it is an object of the present invention to adopt the principle of mixers such as that shown in the patent to Osius No. 2,109,501, of March 1, 1938, in the disposal of garbage. It is well known that mixers like that shown in the Osius patent will cut up vegetables and ice into a liquid suspension, and I have developed a unit which utilizes the general principle of the Osius mixer as a garbage disposal unit.

Another object of the present invention is the provision of a garbage disintegrating unit, the container or housing of which is supported by the sink and is so designed as to itself form the trap for the sink outlet; by such a design water is always present to a predetermined level in the disintegrator container or trap.

Another object of the invention is to provide an extremely simple, inexpensive disposing unit which will efficaciously dispose of any kitchen refuse, excepting heavy bones and tin cans, and which unit based on the high-speed cutter-rotor principle operating in a body of water will quickly reduce garbage to a state fluent enough to run through the drain and sewer pipes without clogging.

Other features of the invention have to do with details of design and methods of operation, as will be more clearly set forth in the specification and claims.

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In the drawings:

Fig. 1 is an elevation, mostly in section, showing a disposal unit embodying the present invention and directly supported from the sink bowl opening.

Fig. 2 is a plan view, partially cut away, of the structure shown in Fig. 1.

Fig. 3 is an elevation of the assembly shown in Fig. 1 but showing particularly the door for access to the interior of the unit and the location of the drain plug.

Fig. 4 is a sectional plan view taken on line 4—4 of Fig. 3 and showing the cross sectional shape of the sheet metal combined container and trap unit.

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 4 and showing the positioning of the discharge apertures and discharge pipe determining the level of water in the combined container and trap.

Fig. 6 is a plan view of the structure shown in Fig. 5.

Figs. 7, 8 and 9 are respectively a plan view, an end elevation and a side elevation of one of the cutter blades.

Figs. 10, 11 and 12 are respectively a plan view, an end elevation and a side elevation of the second cuttter blade.

As best shown in Fig. 1, my disposal unit comprises three main parts, a coupling unit 11 for attaching the disposal unit to the standard opening in the sink, a light sheet metal housing or container 12 which forms a combined body and trap and a high speed motor unit 13.

The mounting unit 11, in the preferred form shown in Fig. 1, comprises an adapter member 14 and a flange 15, which flange is tapered on the underside to insure a neat fit with the drain hole of any standard sink 16; suitable gasket material under the flange 15 will assist in the forming of a watertight joint.

The adapter member 14 is threaded externally to receive collars or nuts 17 and 18, and internally to receive collar or nut 19; an annular flange 20 is provided on the inside of the adapter, which flange acts as a seat for the drain member 21 and as a stop for the collar 19. In the assembled form shown in Fig. 1, the collar or nut 17 is adapted to compress a gasket 22 against the bottom of the sink opening to form a tight seal and a rigid joint between the sink bowl 16 and adapter member 14.

The inner collar 19 is provided with a flange 23 which cooperates with an inturned flange 24 of the housing 12. The outer collar or nut 18

is adapted to be tightened down against a neoprene gasket to secure the flanges 23 and 24 in cooperating relationship. Another similar gasket separates the flanges 23 and 24. Thus container 12 has no direct metal to metal contact with mounting unit 11 to transmit vibration to the sink. A rod 25 extends diametrically across inner collar 19 so as to make it impossible for one to reach their hand down into the container 12 far enough to be injured by the rotating cutter blades 26.

As no grinding or crushing takes place in my disposal unit the housing or container unit 12 may be formed of relatively thin sheet metal. In several models that I have fabricated, I have used brass and steel in thicknesses from .040'' to .064''. My preference of materials is brass or stainless steel although aluminum and steel when properly protected against corrosion can be used.

In the form shown in the drawings the housing 12 is formed into two parts. The upper part 27 carries the flange 24 and is provided with a relatively large radius 28. This upper portion 27 preferably is connected to the main portion 29 of the housing by a suitable flange connection 30, which connection may be soldered or brazed in the usual manner. The bottom portion of the housing is also provided with a relatively large radius 31 and terminates in a relatively deep flange 32 for cooperating with and supporting the motor unit 13. The cross sectional shape of the housing 12 is preferably square and this square shape in cooperation with the large radii 28 and 31 has a special function, as will be subsequently described.

As best shown in Figs. 1, 4 and 5, the stamping 33 is brazed to one side of the housing 12 and the space enclosed by this stamping 33 is connected to the interior of the main housing 12 by means of apertures 34 which are equivalent in area to the area of the waste pipe 35, which pipe 35 is connected to the standard drain pipe which normally leads from the sink. It will thus be seen that the interior of housing 12 connected with the interior of stamping 33 through apertures 34 forms and takes the place of the standard trap; in other words, in the arrangement shown in Fig. 1, the member 12 is not only the disintegrator housing or cutting chamber, but it also is one leg of a trap, with the normal level of water indicated by line 36 determined by the bottom of drain pipe 35, and when the trap syphons, the water level drops to line 41 which is determined by the top of aperture holes 34. There is, therefore, a water seal always between the sink drain opening and the waste or soil pipe. The outlet or drain pipe 35, is connected directly to the waste pipe coming through the floor or wall in the undersink compartment since no additional trap is required.

Also of light and compact design is a motor unit 13 which is held in position on the flange 32 of the housing 12 by a stainless steel cap 37, said cap serving to compress neoprene seals on opposite sides of the flange 32. The motor 13 with the size unit shown in Fig. 1 is preferably a 115 v. Universal series type one-third horsepower motor having an R. P. M. of 7500. The motor shaft 38 which carries the cutter blades 26 is preferably sealed from the contents of the container 12 by neoprene seal 39 of a standard type.

The cutter blades are preferably of the general contour shown in Figs. 7 through 12, although they are not necessarily restricted to this exact shape, are preferably formed of chrome cutlery steel, hardened, tempered, polished and preferably having a Brinell of from 550–600. Garbage disposal units of the grinding and crushing type have been necessarily of heavy and rigid construction and of relatively large size. In the preferred size of unit of the type shown in the drawings, the total height of the unit from the bottom of the sink to the bottom of the motor is approximately 17 inches; the total weight of the complete unit, that is, the total weight suspended from the sink, is approximately 18 pounds. The over-all height of the container 12 is around 8 inches and the same container is approximately 5 inches square and holds approximately 2 quarts of water at level indicated by 36. The light compact design of the unit is very important from the standpoint of the weight suspended from the sink, from the standpoint of vibration and from the standpoint of overall cost.

When the motor is started, the combination of the shape and high speed of the cutter blades and the shape of the container 12 causes a violent agitation of the water and in combination with the large bottom radius 31 of the container will cause a water upsurge so that the contents are forced upwardly around the container and the contents hitting the large radius 28 at the top of the container will be deflected inwardly and downwardly so it may be said that the cutter blades or propeller in combination with the design of the container forms a vortex. Any refuse dropped into the container will be carried by the induced current down the center of the vortex into direct contact with the high-speed cutting action of the blades. The circulating action will be continuous and the particles will gradually be cut up and made fluent enough to run through the drain and sewer pipes without clogging. There is no crushing or grinding action in this operation. The high speed blades catch the particles in suspension and chop them into pieces by reason of the inertia of the particles. The action might be referred to as "inertia cutting."

In normal operation of the unit, the drain stopper assembly 21 is removed and the garbage inserted through the opening. The unit will handle all normal soft or wet garbage but metallic objects, large bones, cloth or rubber articles should not be inserted. It is well known that in the average home the large bulk of garbage is composed of waste incurred during the preparation of foods and vegetables, fruits, etc., and table scraps left on the plates after the meal. Bones are a small percentage of the total material to be disposed of and should be classified as refuse along with tin cans, ashes, etc. The motor may or may not be turned on when feeding in the garbage although faster action has been observed if the motor is running at the time of feeding in the garbage. Since the container 12 acts as a trap, there is always sufficient water in it to act as a vehicle for the garbage, and the garbage is quickly reduced to finely divided particles by the high speed cutting action of the cutter blades in combination with the water action which rapidly carries the particles in and out of contact with the whirling cutting edges of the blades. In normal operation I have found that the motor should run from 2–3 minutes in order to completely reduce the garbage. Usually the reduction and disposal of the garbage precedes the dishwashing operation. In this case, flushing of the trap containing the suspended garbage particles takes place when rinse water is used on the dishes and when the dishpan water is emptied into the drain. If the operation of

garbage reduction is done at other than at the time of dishwashing, the tap may be turned on during the last minute of motor operation. This additional water will quickly flush the trap of all suspended materials. Repeated use of water in the sink during the normal daily use of the sink, is sufficient to keep the trap flushed and free of odors at all times. Due to the complete scrubbing action of the water on the interior walls of container 12, no garbage particles can cling to any surface, thus keeping the container walls always clean. This complete scrubbing action is facilitated by the large radii at the top and bottom of container 12, the corners and flat walls of the container because of the high speed cutting action of the blades and the water action which becomes a rapidly moving vehicle which is drawn down into the vortex created by the blades and forced outwardly and upwardly before being again directed into the vortex. This action plus constant flushing prevents any odors being present in my unit. During operation there is a floatation or suspension zone maintained throughout most of the height of the container 12 and because of the centrifugal action of the water and the continuous current of water in the vortex the liquid suspension will be forced out of the openings 34 and out through the drain, leaving no chance for any odors to be present as in a grinding or crushing action.

Operation of units built in accordance with the drawings and containing sightglasses shows that after approximately two minutes of operation with the water turned off and then another minute of operation with running water that the water remaining in the container or trap is clean and without any small floating particles. Any particles that should remain after any run will be disposed of during the next run. These sightglasses also show that when the motor is started the water is thrown upwardly along the flat walls of the container 12, the top water falling into the center so that suspended particles will be repeatedly reintroduced to the whirling cutter blades. The unit will take and dispose of grapefruit rinds, orange and tangerine peelings without precutting into small pieces as is necessary with some standard types of disposing units. The unit will efficaciously take care of paper towels, wax paper, whole bread wrappings, potato peelings, egg shells, milk bottle caps, carrot tops, banana stems and soft bones, such as chicken bones and spareribs, but in general bones, tin cans, glass and wire should be avoided.

In addition to the ability of a light weight, compact unit which will efficaciously dispose of practically all garbage in a very short time, such complete light weight unit may be installed by anyone by merely removing the standard trap from beneath the sink and replacing the same with my disposing unit which acts as and takes the place of the standard trap; it connects directly to one end of the sink outlet and its outlet pipe connects directly to the standard outlet pipe which leads from the standard trap. It will thus be seen I have provided an extremely light weight, inexpensive unit which takes the place of and utilizes the water of a trap in its operation and which requires a minimum of installation cost. It will be obvious that the cycles of two minutes and one minute may be automatically controlled, but it is believed that the average housewife will like manual control much better because operation beyond the two and one minute cycles will in no way be harmful and the housewife will operate these cycles to accommodate her activities.

I claim:

1. A garbage disposal unit adapted to be attached to the drain opening of a sink, comprising a combination container and trap, the container forming the down passage of said trap, means to maintain a predetermined liquid level in said container and means in said container to disintegrate garbage placed in said container before said garbage is washed away through the trap and into the sewer line, said last means comprising a plurality of radially extending blades positioned to rotate adjacent the bottom of said unit.

2. A garbage disposal unit adapted to be attached to the drain opening of a sink, comprising a combination container and trap, the container forming the down passage of said trap, means to maintain a predetermined liquid level in said container and high-speed cutting means located in said unit below said liquid level, said cutting means causing the water in the container to circulate primarily in an up and down direction and suspend the particles to continuously subject the particles to the high-speed cutting action of the cutting means, said first means comprising a vertical passage and an outlet connected thereto above said cutting means and separated from the container by a liquid seal.

3. A garbage disposal unit forming a part of a sink trap attached to the drain opening of a sink, comprising a light weight, thin-gauge container, cutter blades mounted in said container and spaced from the walls thereof whereby inertia cutting action is obtained rather than grinding or crushing, means for rotating said cutter blades at relatively high speeds and means for maintaining a predetermined amount of water in said container at all times whereby it acts as a trap, the path of the cutter blades being entirely below the surfaces of said water.

4. A garbage disposal unit forming a part of a sink trap attached to the drain opening of a sink, comprising a light weight, thin-gauge container, cutter blades mounted in said container and spaced from the walls thereof whereby inertia cutting action is obtained rather than grinding or crushing, means for rotating said cutter blades at relatively high speeds, the location and speed of the cutter blades and the shape of the container setting up a floatation zone during operation of the unit whereby particles suspended in the liquid will be continuously subjected to the high speed cutting action of the blades, an outlet for said container above the path of said blades, and a vertical passage connected to said outlet to form a liquid trap.

5. A garbage disposal unit adapted to form a part of a trap, comprising a container vertically disposed to act as a trap inlet means to maintain a predetermined volume of liquid in the container, said container having an outlet below its normal liquid level, cutter blades mounted in the container and means for operating the same at relatively high speeds, in a path below the normal liquid level said cutter blades creating a continuous moving floatation zone to reduce materials placed in the container for passage through the trap, passage through the trap being induced by the addition of more material or liquid.

6. In an apparatus for comminuting food refuse suspended in a liquid, a container in combination with a trap, the trap overflow maintaining and determining the liquid level in the con-

tainer, cutter blades disposed entirely below the liquid level mounted on a shaft projecting through a wall of the container, means to rotate said cutter blades at relatively high speeds, the outlet from the container being below the liquid level to permit the comminuted solution to overflow the trap when liquid and/or solids are added to the container, the trap having a free flow passage therethrough outside the path of the cutter blades.

7. In an apparatus for disintegrating and disposing of vegetable and animal matter by suspending said matter in an agitated liquid and subjecting it to the repeating cutting action of high-speed cutter blades, comprising in combination a container and a trap, the container forming a vertical leg of the trap, cutter blades mounted for rotation at the bottom of the container, means for admitting liquid and matter to be disintegrated to the container, the trap overflow being the outlet for the disintegrated mixture from the container, the trap having a flow passage therethrough independent of the cutter blade path.

8. A garbage disposal unit adapted to be attached to and supported by a standard sink, comprising a thin-walled housing defining a combined trap and container, the said container being substantially square in cross section and having relatively large radii at the top and bottom and high-speed cutter blades positioned adjacent the bottom central portion of the container, the high speed of the cutter blades causing the water to be thrown upwardly along the flat walls of the container, the water hitting the top radii and falling into the center of the container so that suspended particles will be repeatedly reintroduced to the cutter blades, the bottom radii assisting in the upsurge of water and also assisting in maintaining the bottom of the container clean.

9. A garbage disposal unit adapted to be attached to and supported by a standard sink, said unit being so designed and including connections to replace the conventional trap in the waste line, said unit comprising a vertical entrance and cutting chamber, a blade mounted for rotation in the bottom of said chamber, and a vertical trap riser passage attached to said chamber and serving as an outlet therefore, the entrance to said riser being horizontally offset from the path of said blade.

10. A combination sink-trap and garbage disposal device which comprises a container having a square, horizontal cross-section and an opening at the top, means to suspend the container below a waste opening in a sink, rotating means on a vertical axis at the bottom of said container empowered by a motor outside said container, said rotating means comprising a set of blades having cutting edges thereon to disintegrate garbage and move the liquid in said container, an outlet opening formed in the side of the container just above the blade level, and conduit means leading upward, outward and downward from said opening to form of said container a sink trap with a flow-passage from end to end.

11. A combination sink-trap and garbage disposal device which comprises means forming a down passage, and up-passage, and a connecting passage therebetween, means forming a disintegration chamber directly open to and below said passages and below the level of said connecting passage, and one or more blades in said chamber disposed to rotate on a vertical axis, and upon rotation to direct liquid upward at the sides of said down passage, said blade or blades having a cutting edge at the leading edge thereof, and power means comprising a motor to rotate said blades at high speed.

12. A combination sink-trap and garbage disposal device which comprises a vertically disposed container to serve as a down-passage, means forming an up passage, a connecting passage between the container and the up passage, a rotor at the bottom of said container disposed for rotation on a vertical axis, one or more blades on said rotor having a cutting edge at the leading edge thereof, the blades being disposed to travel in a path completely free of the up passage, and means outside the container to rotate the rotor at high speed whereby garbage in said container is cut to pieces by said blades in an inertia cutting action while immersed in liquid in said trap and may be subsequently flushed through said trap for disposal.

13. A combination sink-trap and garbage disposal device which comprises a vertically disposed container to serve as a down-passage, means forming an up passage, a connecting passage between the container and the up passage entering the container at a point spaced from the bottom of the container, a rotor in said container below the level of said connecting passage disposed for rotation on a vertical axis, one or more blades on said rotor having a cutting edge at the leading edge thereof, and means outside the container to rotate the rotor at high speed whereby garbage in said container is cut to pieces by said blades while immersed in liquid in said trap and may be subsequently flushed through said trap for disposal.

14. A combination sink-trap and garbage disposal device as described in claim 13 in which the connecting passage comprises a plurality of closely spaced holes in a wall of said container.

15. A combination sink-trap and garbage disposal device which comprises a vertically disposed container to serve as a down passage, means forming an up passage, a connecting passage between the container and the up passage, means in said connecting passage to block the passing of non-fluent particles, a rotor in said container disposed for rotation on a vertical axis, one or more blades on said rotor having a cutting edge at the leading edge thereof, and means outside the container to rotate the rotor at high speed whereby soft garbage in said container is cut to pieces by said blades while immersed in liquid in said trap and may be subsequently flushed through said connecting passage and trap for disposal.

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