

Aug. 13, 1957

E. C. LEVIT

2,802,477

COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

Original Filed Sept. 9, 1954

9 Sheets-Sheet 1

Fig. 1

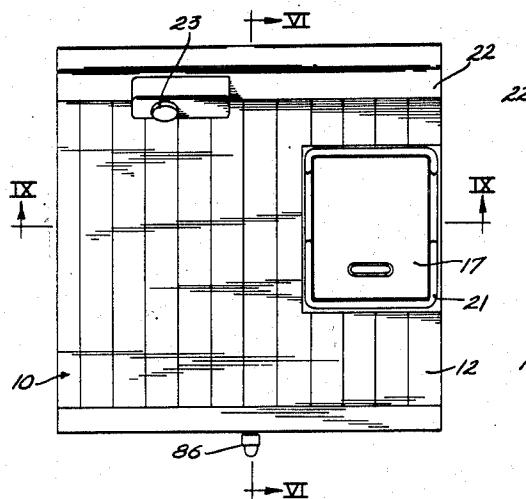


Fig. 2

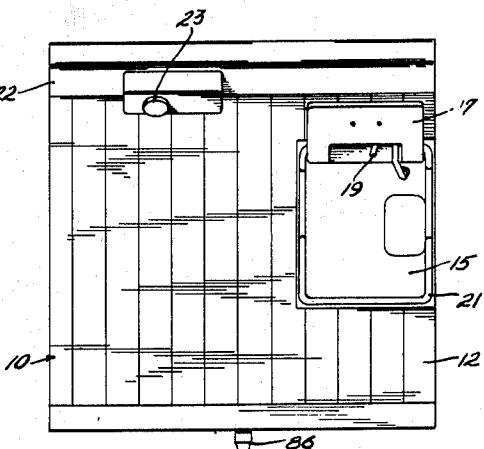


Fig. 3

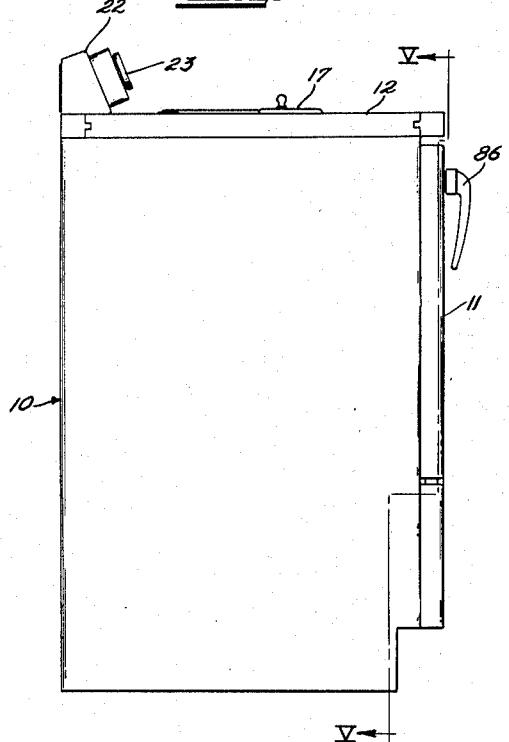
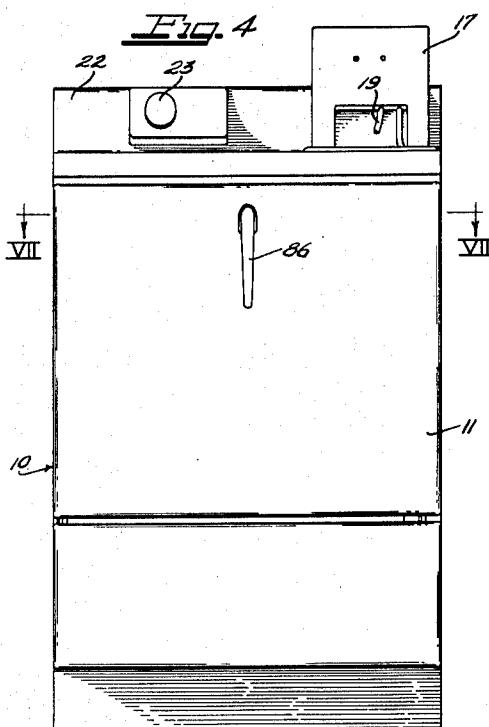


Fig. 4



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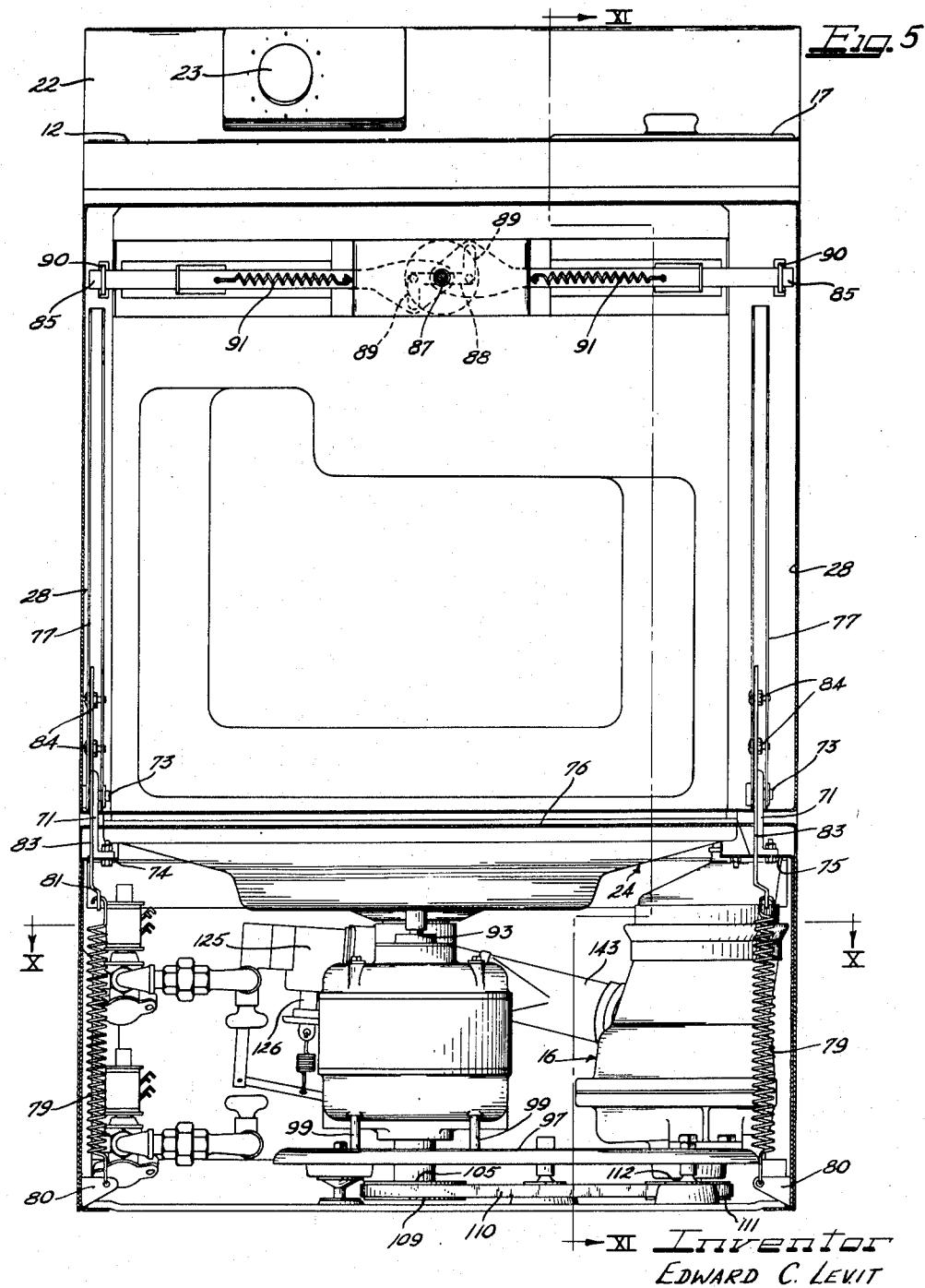
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 2



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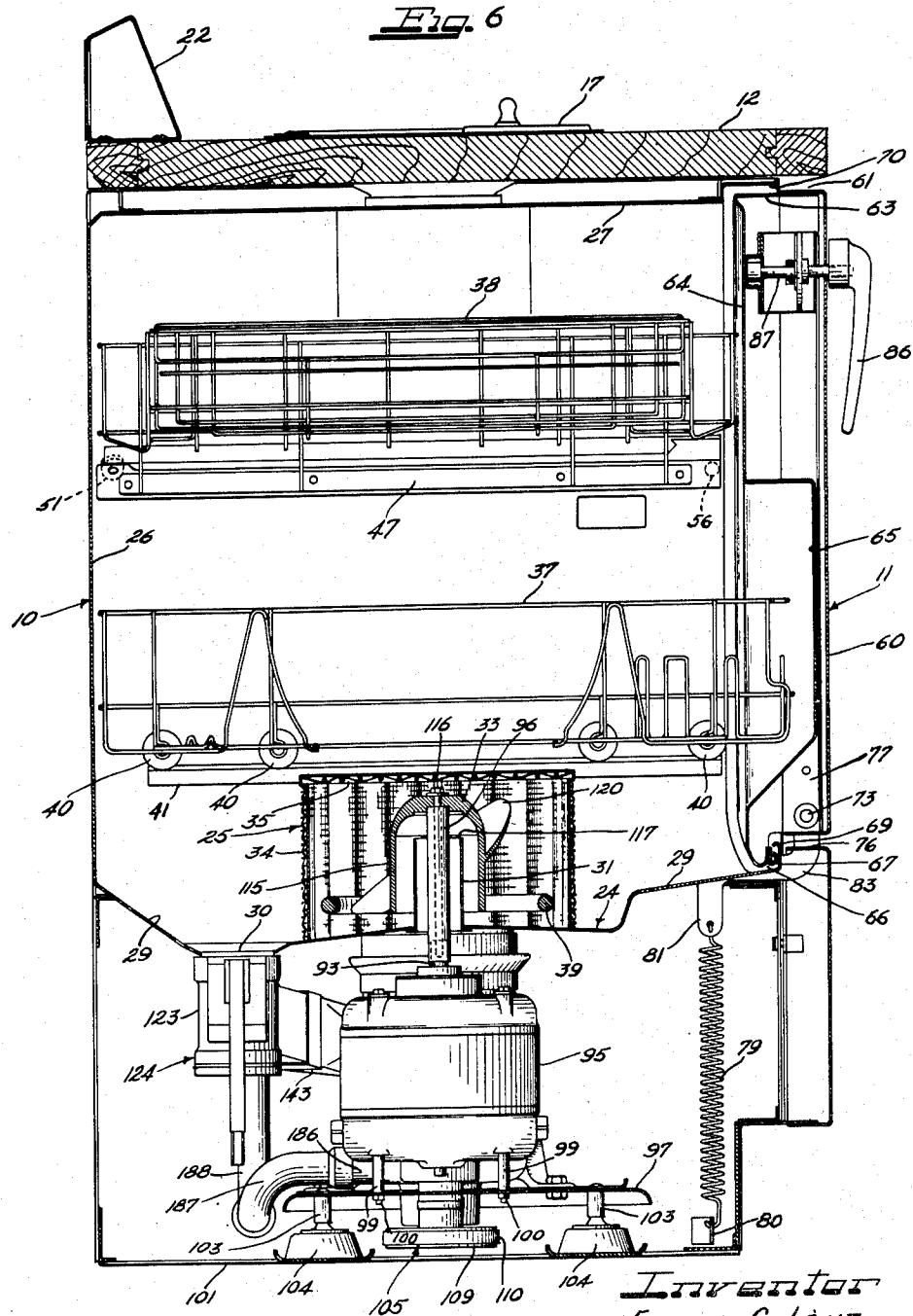
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 3



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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 4

Fig. 7

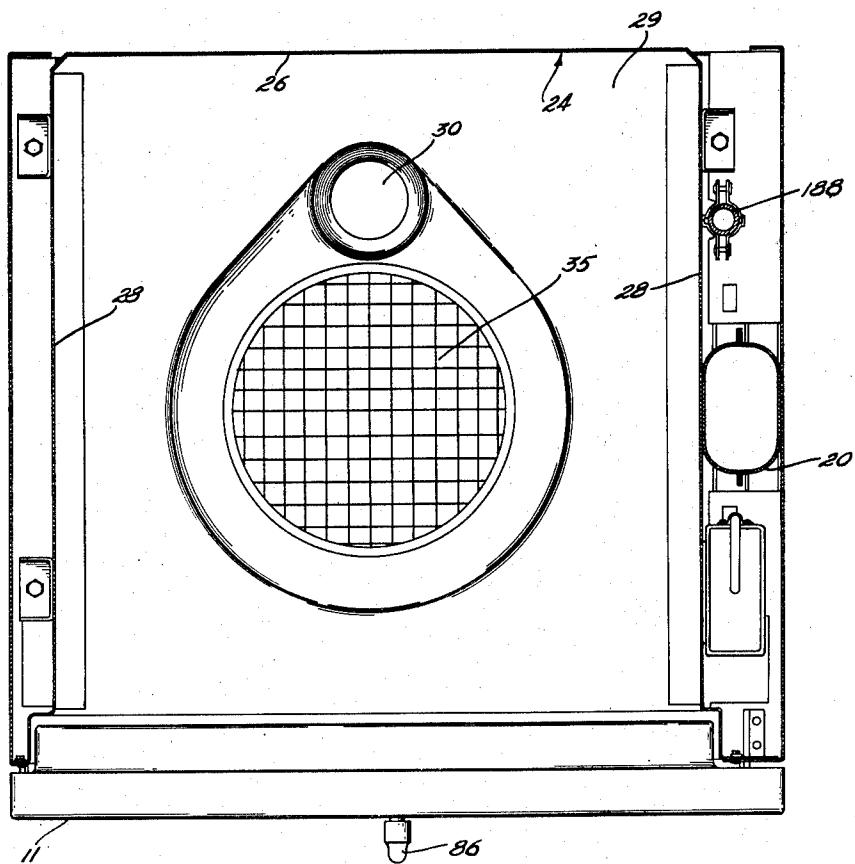
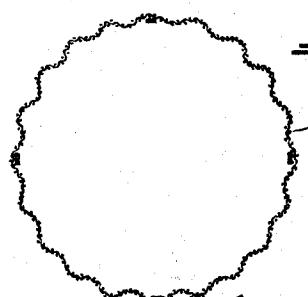


Fig. 8



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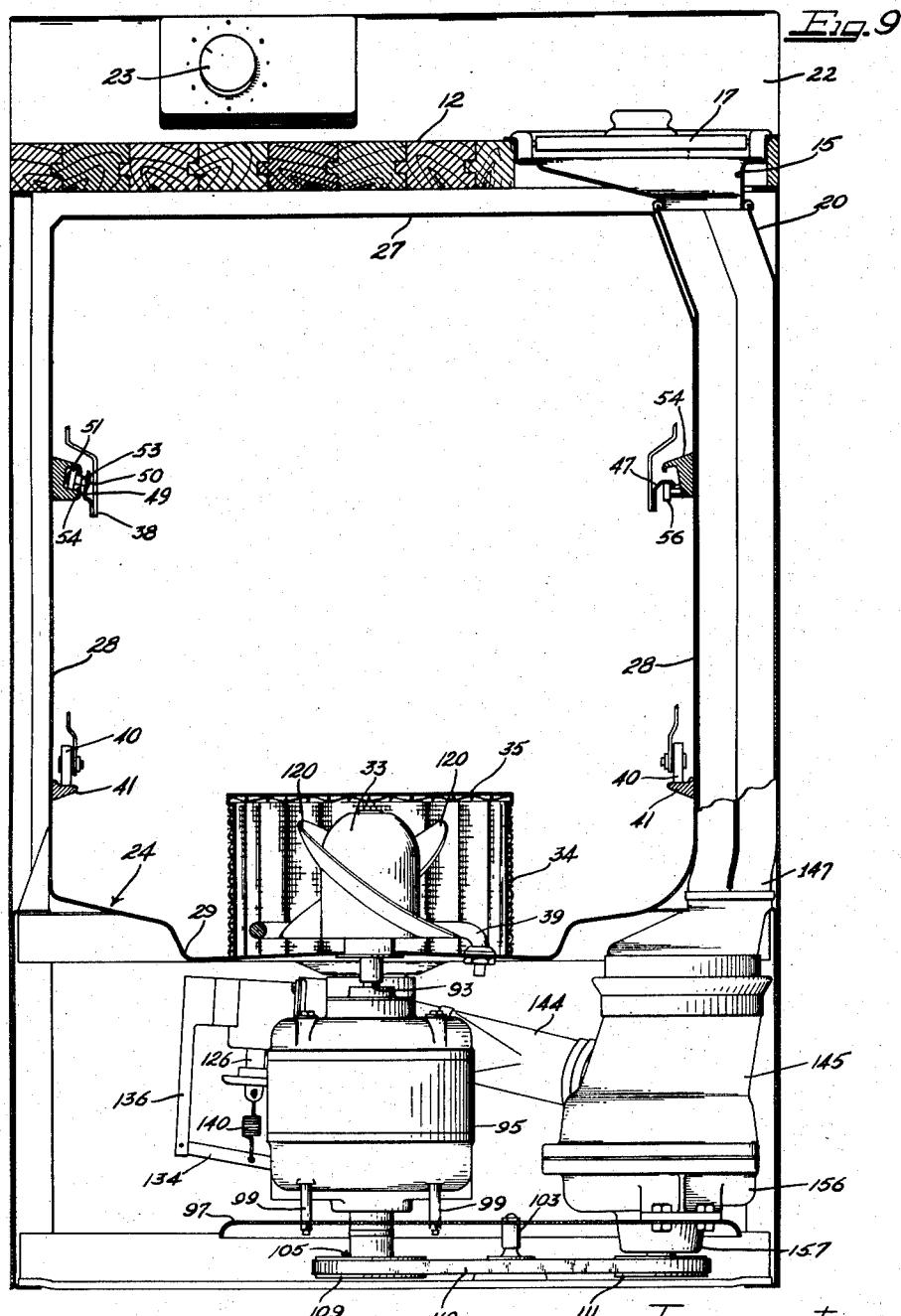
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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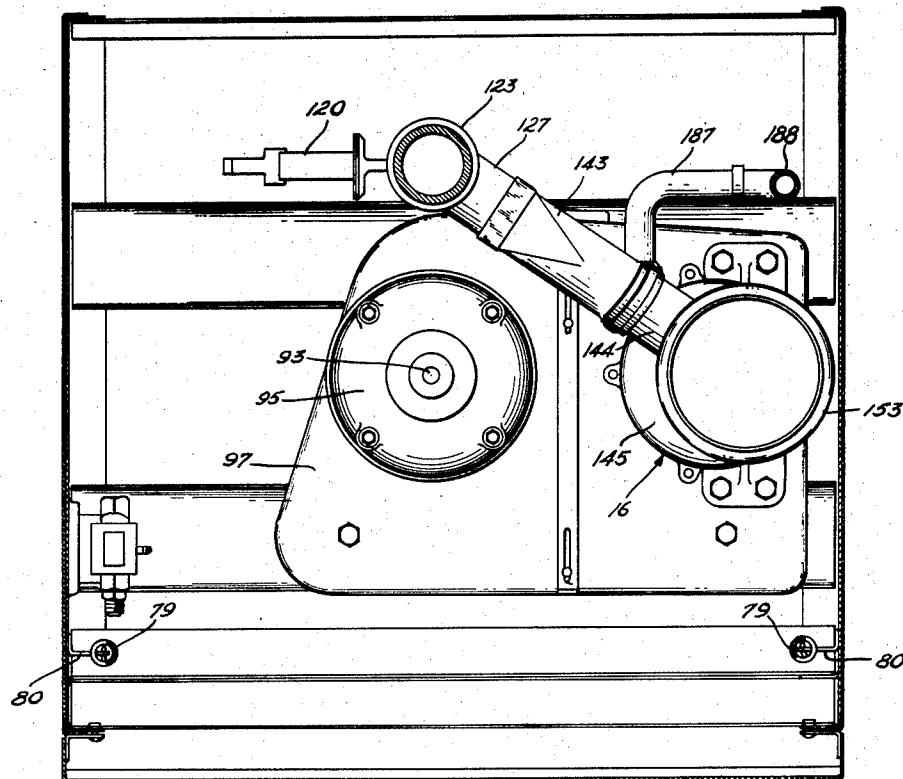
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 6

E-10



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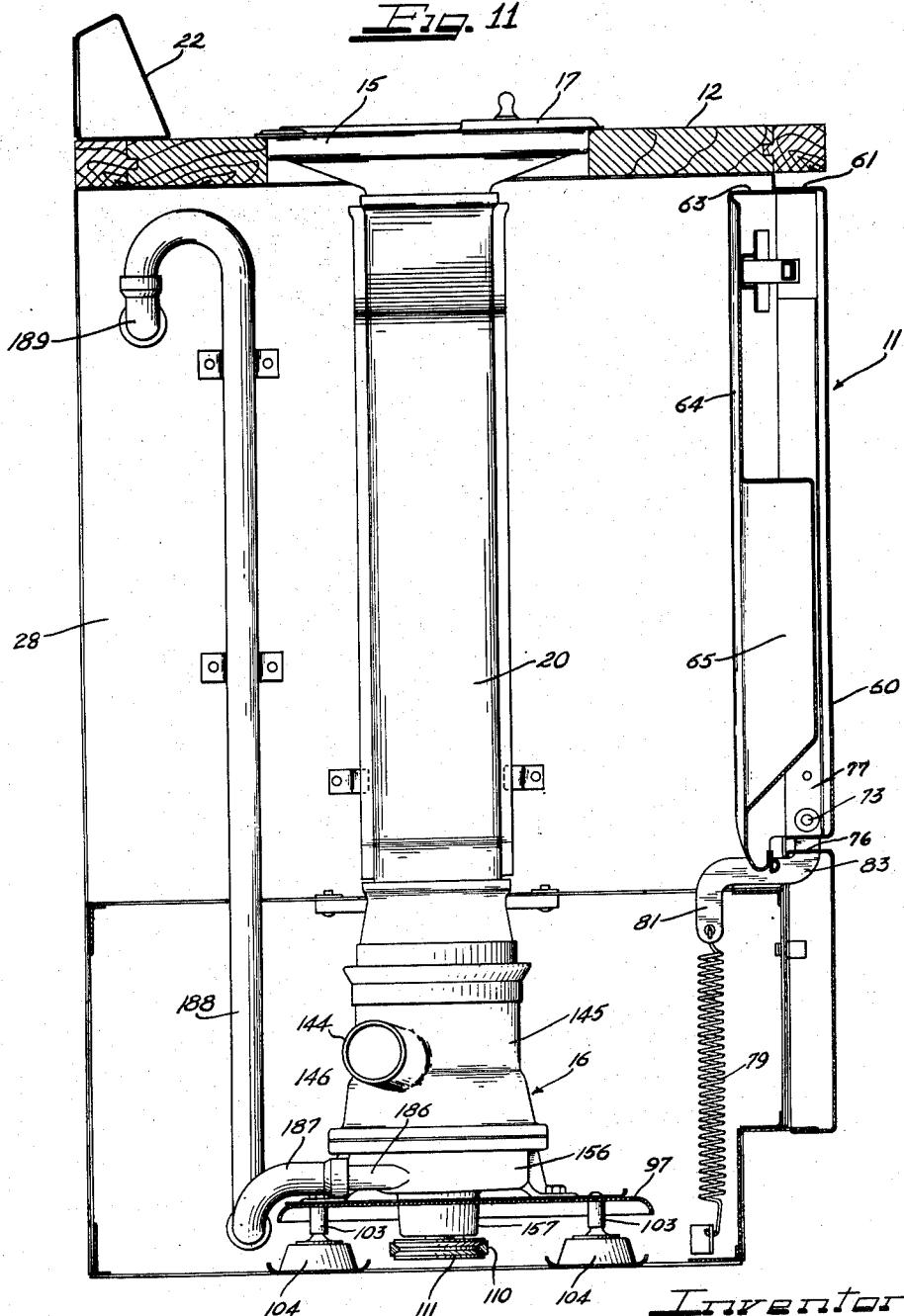
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 7



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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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Fig. 13

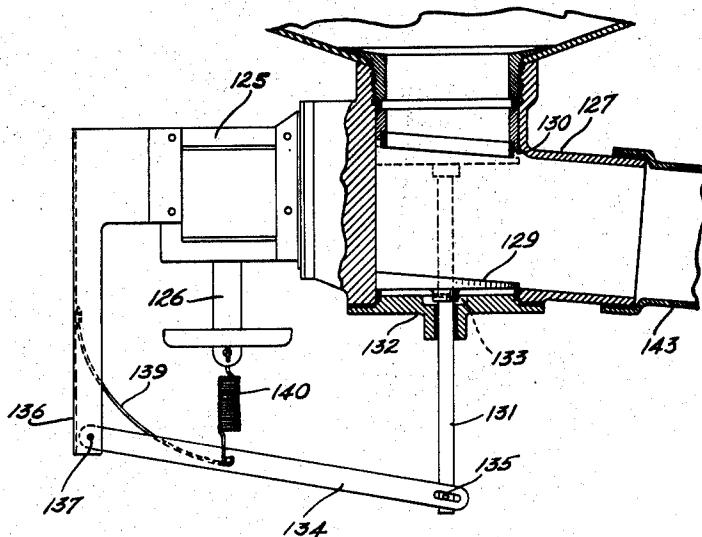
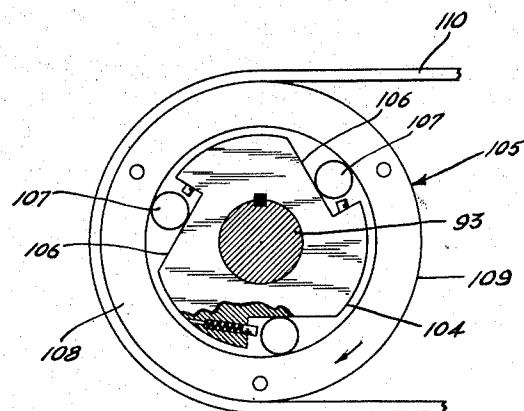


Fig. 12



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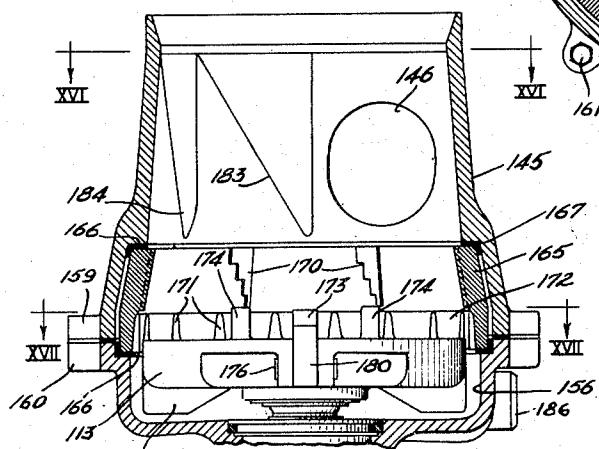
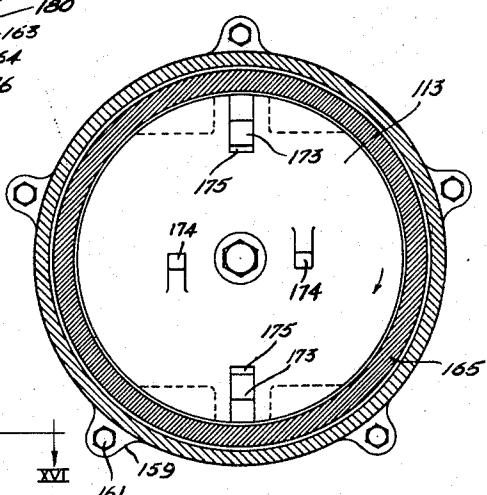
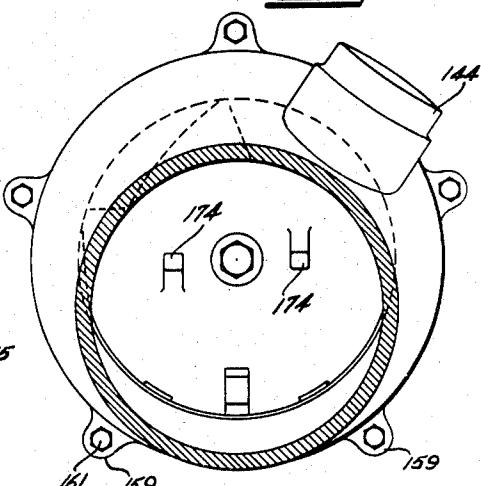
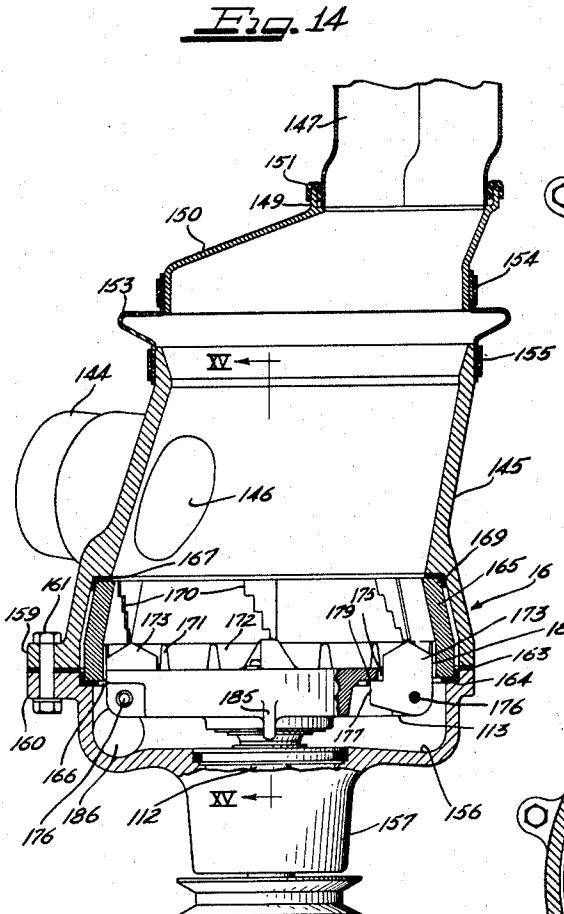
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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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9 Sheets-Sheet 9



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United States Patent Office

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COMBINED DISHWASHING MACHINE AND DISPOSAL UNIT

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Application May 31, 1956, Serial No. 588,566, which is a continuation of application Serial No. 454,941, September 9, 1954. Divided and this application August 29, 1956, Serial No. 610,041

18 Claims. (Cl. 134—104)

The present application is divided out of my copending application, Serial No. 588,566, filed May 31, 1956, which was a continuation of my copending application, Serial No. 454,941, filed September 9, 1954, now abandoned.

This invention relates to a combined dishwashing machine and waste disposal unit.

A principal object of my invention is to provide an improved construction and arrangement of dishwashing machine and waste disposal unit arranged with a view toward utmost efficiency in construction and operation.

A further object of my invention is to provide a novel and improved construction and arrangement of dishwashing machine and waste disposal unit in a unitary cabinet together with a sink for the disposal unit, separate from the dishwashing machine and arranged to obviate the necessity of scraping the dishes prior to washing.

Another object of my invention is to provide a simplified form of combined dishwashing machine and waste disposal unit in which access to the dishwasher is through a front opening door and access to the disposal unit is through a sink at the top of the dishwashing cabinet, and in which the drain from the dishwashing tub is through the disposal unit.

Another and important object of my invention is to provide a dishwashing unit in which water and air are circulated through the dishes by an impeller in the bottom of the tub, and in which the efficiency of air circulation through the dishes for drying is increased by providing an air-circulating vane within the hollow interior of the impeller.

A still further object of my invention is to provide an improved form of dishwashing machine having an air and water circulating impeller in the bottom of the tub for the dishwashing machine, enclosed by a screen forming a shroud for the impeller, in which the impeller circulates air and water through the dishes when rotating in one direction and backwashes the screen when rotating in a reverse direction.

Still another object of my invention is to provide an improved form of dishwashing machine in which an air and water circulating impeller enclosed by a screen is provided in the bottom of a tub and in which a reversible motor is provided to drive the impeller to effect the circulation of air and water through the dishes when driven in one direction, and in which the motor when rotating in a reverse direction drives a pump to drain water from the tub and drives the impeller in a direction to backwash the screen and clean articles of food therefrom.

Still another object of my invention is to provide a novel and improved form of combined dishwashing and waste disposal unit in which an impeller in the bottom of the dishwashing tub is provided for circulating air and water for washing the dishes, and a waste disposal unit spaced horizontally from the impeller outside of the tub is provided for the disposal of waste, and in which the drain from the dishwashing tub is through a wall of the waste disposal unit.

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Still another object of my invention is to provide a combined dishwasher and waste disposal unit in which a disposal unit having a shredding chamber is mounted within a cabinet, and a sink opening to the top of the cabinet has direct communication with the shredding chamber, and in which the dishwashing unit is carried within the cabinet for the waste disposal unit and a single motor is provided for driving the impeller of the dish washing unit when rotating in either direction and the impeller of the disposal unit when rotating in a reverse direction, and water is drained from the dishwasher unit through the disposal unit when the motor is rotating in a direction to drive the disposal unit, and the drain valve for the dishwasher unit is open.

A further object of my invention is to provide a more efficient form of dishwasher having a disposal unit combined therewith in which the dishwasher and disposal units are contained in the same cabinet and the disposal unit has direct communication with a sink opening to the top of the cabinet, while the dishwasher unit drains through the shredding chamber of the disposal unit and the passageway from the disposal unit to the sink forms a condenser for vapor from the dishwashing unit.

Still another object of my invention is to provide a novel and improved disposal unit particularly adapted for a combined dishwasher and garbage disposal, in which the disposal unit has a shredding chamber having an opening at its top for waste food with a shredding impeller at the bottom of the shredding chamber, and in which the shredding chamber has an opening through the wall thereof for communication with the tub of a dishwashing unit, for draining waste water through the disposal unit.

Still another object of my invention is to provide a waste disposal unit particularly adapted for use with a dishwasher and having a shredding chamber having an opening in its top for waste food, with a shredding impeller at the bottom of the chamber, and a pumping chamber forming a downward continuation of the shredding chamber, in which the shredding chamber has an opening in the wall thereof for connection with the tub of a dishwasher and the shredding impeller has pumping vanes thereon for pumping waste from the shredding chamber, and water from the tub of the dishwashing machine when the drain valve therefor is open.

A further object of my invention is to provide a waste disposal unit particularly adapted for use with a dishwashing machine, in which the waste disposal unit has a shredding chamber with an opening through the wall thereof and a shredding impeller at the bottom of the shredding chamber and in which the wall of the shredding chamber is so arranged on the inby side of the opening therethrough to prevent comminuted food from entering said opening during operation of said shredding impeller.

These and other objects of my invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a combined dishwasher and waste disposal unit constructed in accordance with my invention, showing the cover for the sink for the waste disposal unit closed;

Figure 2 is a view somewhat similar to Figure 1 but showing the cover for the sink for the waste disposal unit open and showing the water spray for supplying water to the disposal sink;

Figure 3 is a view in side elevation of the dishwashing and waste disposal unit shown in Figures 1 and 2;

Figure 4 is a front end view of the dishwashing machine and waste disposal unit showing the cover for the disposal sink open;

Figure 5 is a sectional view taken substantially along line V—V of Figure 3, showing the door and its latching mechanism in vertical section, and also showing the waste disposal unit in the bottom of the cabinet, together with its drive motor therefor;

Figure 6 is a vertical sectional view taken substantially along line VI—VI of Figure 1;

Figure 7 is a horizontal sectional view taken substantially along line VII—VII of Figure 4 and showing the bottom of the dishwashing tub and the drain therefrom, as well as the duct to the disposal unit;

Figure 8 is a horizontal sectional view taken through the screen enclosing the dishwashing impeller;

Figure 9 is a vertical sectional view taken substantially along line IX—IX of Figure 1, and showing the sink for the disposal unit and its duct leading to the shredding chamber for the disposal unit in section;

Figure 10 is a horizontal sectional view taken substantially along line X—X of Figure 5;

Figure 11 is a vertical sectional view taken substantially along line XI—XI of Figure 5;

Figure 12 is a detail horizontal sectional view showing the overrunning drive connection to the disposal impeller;

Figure 13 is a fragmentary horizontal sectional view taken through the drain valve from the dishwashing tub;

Figure 14 is a vertical sectional view taken through the disposal unit and showing the drain from the dishwashing sink entering the wall of the shredding chamber;

Figure 15 is a sectional view taken substantially along line XV—XV of Figure 14;

Figure 16 is a horizontal sectional view taken substantially along line XVI—XVI of Figure 15; and

Figure 17 is a horizontal sectional view taken substantially along line XVII—XVII of Figure 15.

In the embodiment of my invention illustrated in the drawings, I have shown generally in Figures 1 through 4 a combined dishwashing machine and waste disposal unit comprising a cabinet 10 having a front opening door 11 for the dishwashing unit, a top 12, shown as being made of wood to provide a work surface, but which may be made of steel coated with enamel or porcelain or any other desired material.

A sink 15 for a disposal unit 16 (see Figures 1, 2, and 9) is recessed beneath the top 12 and has an upwardly opening cover substantially flush with the top 12, and closing the sink when not in use.

The cover 17 is shown as having a spray nozzle 19 extending thereacross and connected with a water inlet, for washing food down a duct 20 having communication at its lower end with the disposal unit 16. The spray may be controlled by a valve (not shown) operated by opening movement of the cover 17, to turn the spray on as the cover is opened, and to shut off the flow of water to the spray when the cover is closed. The sink 15 is also shown as having a bumper 21 extending therearound. The bumper 21 may be made from resilient material such as rubber or the like and may serve as a bumper for the dishes, so the dishes may be bumped thereagainst to cause food to drop therefrom into the sink 15, to be washed down to the disposal unit 16.

The top of the cabinet 10 is also shown as having an upwardly and rearwardly inclined panel 22 extending upwardly therefrom along the back thereof and forming a mounting for controls 23, controlling operation of the dishwashing machine and disposal unit. The controls 23 may be cyclically operated controls for operating the disposal unit and dishwashing machine in a predetermined cycle and are not herein shown or described, since they form no part of my present invention.

Within the cabinet 10 is a tub 24 for a dishwashing machine. The tub 24 is shown as having a rear wall 26 formed by the rear wall of the cabinet 10, a top wall 27, side walls 28, 28 spaced inwardly of the outer side walls of the cabinet, and a bottom 29 sloping downwardly to a

drain opening 30 at one side of the center of the tub. The bottom 29 is also shown as having a standpipe or sleeve 31 extending upwardly therefrom in the center thereof and forming a conduit for drawing air into the tub 24 from beneath the bottom of the cabinet, by the operation of an impeller 33, for drying the dishes.

The impeller 33 is shown as being encircled or enclosed by a generally cylindrical screen 34 of a corrugated form in cross section and shown as having a generally flat top 35. The screen 34 and its top 35 form, in effect, a shroud enclosing the impeller 33, for directing the flow of air and water upwardly through vertically spaced dish racks 37 and 38 and the dishes therein, and also serve to prevent silverware or small dishes from dropping onto the impeller.

Within the screen 34 and encircling the impeller 33, adjacent the bottom thereof is an immersion heater 39, suitably mounted in vertically spaced relation with respect to the bottom of the tub. The immersion heater 39 may be of any well known form and is provided to heat the air for drying, and also to keep the water up to temperature during washing and rinsing, and is no part of my present invention so need not herein be shown or described further.

The dish racks 37 and 38 are shown as being in the form of wire baskets for containing the dishes and glasses during washing and are of a well known form, so need not herein be described in detail.

The dish rack 37 is provided with spaced rollers 40, 40 adjacent the bottom thereof which are adapted to ride along a track 41, extending inwardly from side walls 28, 28 of the dishwashing tub 24.

The dish rack 38 is shown in Figure 6 as having a rail 47 depending therefrom and extending along each side thereof. Each rail 47 is shown as having a rear support portion 49, for a roller 51, extending a slight distance upwardly from the upper margin thereof and inclined inwardly and forming a mounting for a pin 50 having the roller 51 mounted thereon. The pin 50 may be riveted to the projecting end portion 49 and may have a head at its outer end to retain the roller 51 thereto. A spacing collar 53 is shown as spacing the roller outwardly from the support portion 49. The roller 51 is shown in Figure 9 as riding within a channel like track 54. The tracks 54, 54 are mounted on and extend along and inwardly from opposite walls 28, 28 of the dishwashing tub 24. The track 47 is also shown as having an outwardly turned downwardly facing channel-like extension extending from the upper end thereof for fitting within the channel of the track 54 and riding upon a roller 56 at the outer end thereof, supporting the forward end portion of the rail 47 when the door 11 is closed.

The door 11 is shown in Figures 5, 6, 7 and 11 as being formed from a generally rectangular outer panel 60 having an inturned flange 61 extending around the periphery thereof and fitting over a corresponding flange 63 of an inner panel 64.

The inner panel 64 is shown as having a recess 65 formed therein and conforming generally to the form of the lower dish rack 37 to accommodate the rack to extend within the door panel, when the door is closed.

The inner panel 64 also has an inwardly extending lower shouldered portion 66 facing the front of the machine, and on which is mounted a flexible seal 67, having engagement with an upwardly extending flanged portion 69 of the bottom 29 of the tub. The sides and top of the door 11 may also be suitably sealed to the opening at the front of the tub. The seal may be of any well known form and construction, and is no part of my present invention so need not herein be shown or described further.

The door 11 is shown as being pivotally mounted on two spaced hinge supports 71, 71 on pivot pins 73, 73. The hinge supports 71, 71 are shown as being mounted on and extending upwardly from inwardly extending flanges 74 and 75 respectively extending inwardly from opposite

side walls of the cabinet, beneath the bottom of the tub 29. The hinge supports 71, 71, as herein shown, extend upwardly through a flange 76 extending along the front of the cabinet beneath the door 11 and within a downwardly opening slotted portion in each side of the door 11 into a channel 77, secured to the rear panel 64 of the door and extending upwardly therealong. The hinge pins 73, 73 are shown as being mounted in opposite legs of the channel and as extending through the hinge supports 71, 71.

Counterbalancing springs 79, 79 are provided to bias the door in a closed position and to hold the door open when off-center with respect to the hinge pins 73, 73. As herein shown, each spring 79 is connected at its lower end to an ear 80 extending inwardly from a side wall of the cabinet.

The opposite end of the spring 79 is connected to a depending arm 81 of a crank 83. The crank 83 extends outwardly from the depending arm 81 toward the hinge pin 73 and thence extends upwardly within the channel 77 and is secured thereto as by nuts and bolts 84, 84. The springs 79, 79 thus bias the door to a closed position, and when the door is fully open are positioned off-center with respect to the hinge pins 73, 73 by the arms 81, 81 to hold the door open for loading the dish racks with dishes to be washed.

The door 11 is latched closed by suitable latching bars 85, 85 guided between the panels 60 and 64 and operated by a door handle 86 on the outer end of a shaft 87 journaled in the space between the panels 60 and 64 (see Figures 5 and 6). The shaft 87 is shown as having a lever arm 88 secured thereto intermediate its ends, to which are pivoted links 89, 89 pivotally connected to the latching bars 85, 85 to move the latching bars in a released direction, to be released from keepers 90, 90 upon operation of the handle 86, in an obvious manner. The latching bars 85, 85 are biased in a release direction by tension springs 91, 91.

The dishwashing impeller 33 is shown in Figure 6 as being coaxial with a shaft 93 of a motor 95 and as being driven therefrom through a coupling sleeve 96 which also forms a support for said impeller. The motor 95 may be a well known form of electric motor and is shown as being mounted on a base plate 97 on spacer sleeves 99, through which extend bolts 100, 100 which may be threaded within the motor casing. The base 97 is also shown in Figure 10 as forming a support for the disposal unit 16. The base 97 is supported in vertically spaced relation with respect to a bottom 101 of the cabinet 10 on pedestals 103, 103. The pedestals 103, 103 may have resilient bases indicated generally by reference character 104 and made from rubber an elastomer or the like, to damp vibration of the motor 95.

The opposite end of the motor shaft 93 from the impeller 33 projects downwardly beneath the base 97 and has an overrunning clutch 105 thereon. The overrunning clutch 105 as shown in Figure 12 is of a well known form, including a drive member 104 on the shaft 93 and having cooperating cam faces 106 and drive rollers 107 engaged by said cam faces with the inner periphery of a casing 108 for the clutch, to drive the casing when the motor is rotating in one direction, and to free the casing when the motor is rotating in an opposite direction. The casing 108 of the overrunning clutch 105 is grooved at its periphery to form a pulley 109 having a belt 110 trained thereabout. The belt 110 has driving connection with a pulley 111 on the lower end of a shaft 112 of the disposal unit 16. The shaft 112 has an impeller 113 of the disposal unit 16 on its upper end for driving said impeller upon rotation of the motor in one direction, which in the present invention is a direction opposite to the direction required to drive the impeller 33 in a dishwashing direction.

The impeller 33 is shown in Figure 6 as having a hollow hub 115 of a dome-like form, mounted on the coupling 96 forming an upward continuation of the motor shaft 93. The impeller 33 is secured to the motor shaft as by a

through bolt 116 extending through the top of the dome of the hub through the coupling sleeve 96 and threaded within the end of the motor shaft 93.

Within the hollow interior of the hub 115 at the discharge end of the standpipe 31 is an air impelling vane 117. The air impelling vane 117 thus serves to draw air up through the standpipe 31 and discharge it through the bottom of the impeller during the drying operation. During the washing operation the level of the water in the tub 24 is above the level of the bottom of the impeller 115 and thus seals the impeller and prevents the drawing of air onto the dishes during washing.

The impeller 33 is shown as having a plurality of liquid circulating blades 120 spaced around the hub 115. The blades 120 are shown in Figure 6 as being inclined upwardly from said hub and as extending downwardly along said hub from the top of the dome thereof to the bottom thereof in a spiral path in the direction of rotation of said hub, to draw water upwardly through the shroud and screen 34 and 35 onto the dishes in the dish racks 37 and 38 during washing and to force air drawn upwardly through the shroud by the impelling vane 117 upwardly over the dishes during drying.

The impeller 33, except for the internal air circulating vane 117, is therefore of a conventional construction, and when a body of cleansing liquid is placed in the tub 29, the impeller blades 120, 120 will engage and hurl this liquid upwardly through the screen 35 over the surfaces of the dishes, glasses, silverware and other utensils placed in the racks 37 and 38. This action continues as long as the impeller is operated and as long as the body of liquid is retained in the tub.

The drain 30 leads to a vertically extending valve body 123 of a drain valve 124. The drain valve 124 is shown in Figure 13 as being operated by a solenoid 125 having an armature 126 extensible therefrom. As shown in Figure 13, the drain opens directly into the vertically extending body 123 of the valve. The valve body 123 has an angularly extending outlet extending outwardly from the wall thereof. A valve member 129 is slidably moved along the valve body into position to engage an annular set 130 at the upper end portion of said valve body, to close the valve. The valve member 129 is shown as being pivoted to the upper end of a valve stem 131 on a pivot pin 133. The valve stem 131 is slidably mounted in a bottom end cap 132 for the valve body, and has a slotted operating lever 134 connected thereto, as by a pivot pin 135. The opposite end of the lever 134 from the pivot pin 135 is pivotally connected to a rigid depending arm 136 as by a pivot pin 137. A leaf spring 139 connected between the arm 136 and the lever arm 134 is provided to bias the valve member 129 into an open position when the solenoid 125 is deenergized. A tension spring 140 is provided to connect the solenoid 125 with the lever arm 134, to pivot the same in a valve closing direction upon energization of the solenoid. It will be noted that when the valve is in its open position shown in Figure 13, that a free passageway for water is provided through the outlet 127, which is uninterrupted by the parts of the valve.

The outlet 127 from the valve is shown as having a flexible conduit 143 connected thereto. The flexible conduit 143 is shown as being secured to an integrally formed conduit 144 extending outwardly from a shredding chamber 145 of the disposal unit 16, intermediate the ends of said chamber. It will be seen from Figure 14 that the conduit 144 opens directly through the wall of the shredding chamber 145, as indicated by reference character 146 in Figures 14 and 15. The discharge from the dishwashing tub is thus directly through the shredding chamber 145 when the valve 124 is in an open position.

The disposal unit 16 is shown in Figures 14 and 15 as including the shredding chamber 145 of a generally frusto-conical form and angularly offset to register its inlet with the discharge duct 20 leading from the sink 15

downwardly along the outer side of the wall 28 of the tub 24. The duct 20 is shown as extending downwardly within an annular flange 149 of an offset conduit 150, having communication at its lower end with the upper open end of the shredding chamber 145. A gasket 151 fits around the upper and outer sides of the annular flange 149, and has engagement with and may be sealed to the lower end portion 147 of the duct 20 to seal said duct to the flange 149. The discharge opening of the offset conduit 150 extends within a flexible boot 153 which is connected thereto as by a clamping ring 154 having clamping engagement with said boot. The boot 153 extends around and is sealed to the outer periphery of the shredding chamber 145, as by a clamping ring 155.

Sealed to the lower end of the shredding chamber 145 and extending downwardly therefrom is a water and ground waste circulating or pumping chamber 156 (Figures 14 and 15). The pumping chamber 156 has a depending bearing support portion 157 within which is journaled the shaft 112 for the impeller 113. The shredding chamber 145 and pumping chamber 156 have a plurality of circumferentially spaced outwardly extending connecting ears 159 and 160, respectively, through which extend bolts 161 for securing the liquid-circulating chamber to the shredding chamber 145. Suitable packing 163 is provided between the two chambers to provide a liquid-tight joint therebetween. The liquid circulating chamber 156 has an upwardly facing shoulder 164 extending therearound adjacent the upper end thereof, within which is carried a shredding ring 165 on an annular shouldered packing member 166. The shredding ring 165 is herein shown as being of generally frusto-conical form and as extending upwardly from the shoulder 164 along the shredding chamber 145 for a short portion of the length thereof. The shredding ring 165 is seated at its upper end in a shouldered packing ring 167, seated within a downwardly facing shoulder 169 formed in the shredding chamber 145.

The shredding ring 165 is provided with a plurality of circumferentially spaced stepped deflectors 170, 170 extending therearound and partially along the wall thereof. The stepped deflectors 170, 170 are shown as being of an inverted form and converging toward the lower end of the ring, and serve as deflectors to deflect the material being shredded down on to the shredding impeller 113.

Beneath the deflectors 170, 170 and extending vertically along the shredder ring 165 are a plurality of circumferentially spaced cutting grooves 171, 171 formed in the shredding ring 165 and opening to the bottom thereof. The cutting grooves 171, 171 extend along a generally vertical wall portion 172 of the shredder ring 165, and gradually increase in cross-sectional area from the top of the bottom thereof, both in width and depth and cooperate with cutting impellers 173 projecting upwardly along the cutting grooves 171, 171 and pivotally carried on the shredding impeller 113, for shredding the garbage upon rotation of said impeller.

The shredding impeller 113 is shown as being generally disk-like in form having a substantially flat top with a plurality of spaced impelling lugs 174 extending upwardly therefrom inwardly of the outer margins thereof. The shredding impeller 113 is also shown in Figures 14 and 15 as having two diametrically opposed slots 175, 175 formed therein and opening to the outer periphery thereof, and forming recesses within which the impelling cutters 173 are pivotally mounted.

Each cutting impeller 173 is shown as being pivoted within its slot 175 on a transverse pivot pin 176. As herein shown, the pivot pin 176 is spaced toward the outer side of the cutting impeller 173 to provide a pivot point for the cutting impeller so located that the weight of the impeller will bias the same inwardly toward the inner end of its slot 175. Each cutting impeller 173 likewise has an inwardly extending stop 177 abutting a shouldered

under portion 179 of the slot 175, to limit outward movement of the impeller.

The cutting impellers 173 have outer faces 180 extending upwardly along the cutting grooves 171 for a greater portion of the length thereof and have inwardly extending peaked portions shown as terminating at substantially the tops of the cutting grooves to impel the garbage outwardly to said cutting grooves. Thus upon rotation of the shredding impeller 113, the cutting impellers 173 will fly outwardly under centrifugal force to the position shown in Figure 14 and move along the cutting grooves 171, 171, impelling the waste material thereagainst and cutting the waste material against the grooves, from which it is strained with the water entering the shredding chamber, into the circulating or pumping chamber 156.

Spaced upwardly from the shredding ring 165 and on the side of the inlet 146 which is the inby side of said inlet in accordance with the direction of rotation of the impeller 115 are two deflectors 183 and 184. The deflectors 183 and 184 are of a generally triangular shape in plan view, in the form of an inverted right angle triangle with the vertical side thereof facing the inlet passageway 146. The deflectors 183 and 184 also project inwardly within the shredding chamber 145 as shown in Figure 15 to form angular deflecting faces to deflect particles of food away from the inlet passageway 146, and to prevent the lodging of food particles therein.

It should here be understood that in Figures 14 through 20, the shredding impeller 113 is rotating in a clockwise direction and that the overrunning clutch 105 drives this impeller to rotate in this direction only. For this reason the deflectors 170 in the shredding ring 165 and the deflecting vanes 183 and 184 face the shredding impeller in the direction of rotation thereof to assure that flying particles of food are deflected downwardly onto said impeller while the face of the shredding chamber 145 on the opposite side of the inlet 146 is smooth.

A suitable pumping means is provided for discharging water entering the shredding chamber 145 from the dish-washing tub through the passageway 146, and for discharging water and ground particles of food entering the shredding chamber 145 from the sink 15, which is shown in Figures 14 and 15 as comprising a plurality of pumping vanes 185, 185 projecting downwardly from the shredding impeller 113 into the water circulating or pumping chamber 156, for impelling liquid and ground particles of food out of said pumping chamber through a discharge passageway 186.

While I have herein shown the pumping vanes as being formed integrally with and depending from the impeller 113 into the pumping chamber 156, it may readily be understood that a separate pumping means may be provided in said chamber if desired, or that the pump may even be outside of the pumping chamber for withdrawing liquid and particles of food therefrom.

The outlet 186 is shown in Figures 6, 10 and 11 as being connected with a pipe 187 leading downwardly in the form of a gooseneck, to provide a water trap, and then connected with a pipe 188 leading upwardly along the outer wall 28 of the tub 24. The pipe 188 turns downwardly at its upper end and is connected with an outlet pipe 189, which may be connected to the drain through the wall of the cabinet 10.

In operation of the disposal unit, the cover 17 for the sink 15 may be opened to accommodate the scraping of garbage into the sink 15. Assuming that the controls 23 are in a disposal position, when the cover 17 for the sink is open, a spray of water will flow downwardly along the sink through and along the duct 20 into the shredding chamber 145. When the cover 17 is open the dishes may be bumped on the rubber bumper 21 to dislodge the food therefrom and may even be rinsed by the spray if desired. During the period of dislodging food from the dishes, the shredding impeller 113 is operated by the mo-

tor 95 to rotate in a clockwise direction and shred the food along the cutting and strainer grooves 171, 171 for discharge through the pumping chamber and discharge pipes 187 and 188. At the end of the disposal cycle the motor 95 will stop. At this time the dishes free from garbage may be placed in the racks 37 and 38, which may be moved into the sink along the tracks 41 and 54 when loaded. The door 11 may then be closed and the dishwashing operation may be initiated, the tub 24 being first partially filled with water to a level above the bottom of the impeller 33 and the motor 95 then being started to rotate in a direction opposite to its direction of rotation when driving the shredding impeller 113. This will drive the dishwashing impeller 33 in a direction, which in Figure 6 is a counterclockwise direction, when looking downwardly onto said impeller to impel the hot water upwardly through the dishes in the racks 37 and 38. At the end of the dishwashing operation, the motor 95 stops. Its direction of rotation is then reversed, to drive the impeller 113 and effect pumping of the water drained from the tub 24 upwardly along the pipe 187 to drain. At the same time, the drain valve 124 is opened under control of the cyclic control means 23.

The dishwater thus drains directly through the shredding chamber 145 and pumping chamber 156. During the draining operation, the direction of rotation of the motor 95 being reversed to drain the spent dishwater from the pumping chamber 156 of the disposal 16, the dishwashing impeller 33 will reverse its direction of rotation and wash particles of food which may lodge on the screen 35, back from said screen to pass to drain through the disposal unit 16. As the spent dishwater has been drained from the tub 24, a rinsing operation may then be effected, the drain valve 124 may again be closed and the tub 29 be partially filled with water, and the direction of the motor 95 be reversed to drive the dishwashing impeller 33 in a direction to spray clear hot water over the dishes in the racks 37 and 38. After this operation the drain valve 124 may again be opened and the direction of the motor 95 be reversed, to again effect operation of the shredding impeller 113 to pump the spent rinsing water from the pumping chamber 156.

The valve 124 remaining open, the direction of the motor 195 may again be reversed to drive the impeller 33 in an impelling direction, for drying the dishes by air drawn up the standpipe 31 and circulated by the pumping vane 117 and circulating blades 120, it being understood that during the entire washing, rinsing and drying operation the immersion heater 39 is on both to maintain the dishwashing water hot and to heat the air for drying the dishes.

It should here be noted that during the drying and draining operations when the drain valve 124 is open that the vapor or moisture entering the drain 30 and the shredding chamber 145 of the disposal unit will tend to pass upwardly along the duct 20 and that the duct being relatively cool and outside of the tub, will serve as a condenser for the vapor, allowing the condensed water to flow downwardly for discharge through the pumping chamber 156.

It will be understood that modifications and variations in the present invention may be effected without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a dishwasher, a cabinet having a front opening door and a dishwashing tub therein beneath the top of said cabinet, a disposal sink opening to the top of said cabinet separate from said dishwashing tub, a shredding chamber adjacent the bottom of said cabinet in communication with said disposal sink and having an outlet for connection with a drain, a rotary shredding impeller in said shredding chamber, a rotary dishwashing impeller in the bottom of said tub for washing the dishes therein, a drain passage from said tub into said shred-

ding chamber, separate drive shafts for said shredding and dishwashing impellers and a single reversible motor for driving said shafts, the drive to said shredding impeller having an overrunning clutch therein to drive said shredding impeller in one direction of rotation of said motor only, and driving said shredding impeller in a direction to pump water from said tub through said drain passage.

2. In a dishwasher, a cabinet having a dishwashing tub therein, a front opening door affording access to said tub, a waste disposal sink opening to the top of said cabinet, a waste disposal unit adjacent the bottom of said cabinet and having a shredding chamber having communication with said waste disposal sink, a shredding impeller rotatably journaled in said shredding chamber, a dishwashing impeller rotatably mounted in the bottom of said tub, a motor in axial alignment with said dishwashing impeller for rotatably driving the same, a flexible drive connection from said motor to said shredding impeller for rotatably driving the same, said shredding impeller having pumping vanes thereon, a drain from said tub through a wall of said shredding chamber, and a second drain from the bottom of said shredding chamber for spent dishwater and comminuted particles of food.

3. In a dishwasher, a cabinet, a dishwashing tub within said cabinet, said cabinet having a front opening door affording access to said tub, a disposal sink separate from said dishwashing tub, a waste disposal unit within said cabinet adjacent the bottom thereof and having a shredding chamber, a duct leading along a wall of said tub from said waste disposal sink to the top of said shredding chamber, a shredding impeller in said shredding chamber, a dishwashing impeller in the bottom of said tub, means driving said dishwashing impeller in one direction for washing dishes and in an opposite direction during drain of the dishwater from said tub comprising a reversible motor, and an overrunning clutch and flexible drive connection therefrom for driving said shredding impeller when said dishwashing impeller is driven in direction reverse from its dishwashing direction.

4. In a dishwasher, a cabinet, a dishwashing tub within said cabinet, said cabinet having a front opening door affording access to said tub, a garbage disposal sink opening to the top of said cabinet, a waste disposal unit within said cabinet adjacent the bottom thereof having a shredding chamber, a shredding impeller rotatable in said shredding chamber, adjacent the bottom thereof, a pumping chamber forming a downward continuation of said shredding chamber and extending beneath said impeller, pumping vanes on said impeller for forcing water and ground particles of food from said pumping chamber for discharge, a drain duct leading from the bottom of said dishwashing tub to said shredding chamber for the discharge of spent dishwater by said pumping vanes through said pumping chamber, and a condenser means for the vapor in the dishwater draining from said tub comprising a duct leading from said sink to said shredding chamber along the outside of said tub.

5. In a combined dishwasher and waste disposal unit, a cabinet, a dishwashing tub within said cabinet, a disposal sink separate from said dishwashing tub, a waste disposal unit within said cabinet adjacent the bottom thereof and having a vertically extending shredding chamber, a drain duct leading downwardly from said sink to said shredding chamber, a pumping chamber forming a downwardly continuation of said shredding chamber and extending beneath said impeller, pumping vanes on said impeller for forcing water and ground particles of food from said shredding and pumping chambers, a water spray in said sink, for flushing food to said shredding chamber, a valve in said drain duct controlling the drain of dishwater from said tub to said shredding chamber, and said first mentioned vertically extending duct forming a condenser for vapor from the water draining from said dishwashing tub.

6. In a combined dishwasher and waste disposal unit, a cabinet, a dishwashing tub within said cabinet, a disposal sink separate from said dishwashing tub, a waste disposal unit adjacent the bottom of said cabinet having a shredding chamber, a shredding impeller in the bottom of said shredding chamber, a pumping chamber forming a downward continuation of said shredding chamber and extending beneath said impeller, pumping vanes on said impeller for forcing water and ground particles of food from said pumping chamber, a dishwashing impeller within said tub, a reversible motor having a vertical shaft in axial alignment with the axis of rotation of said impeller for rotatably driving the same in each direction of rotation of said motor, an overrunning clutch on the lower end of said shaft, a flexible drive connection from said clutch to said shredding impeller and pump for rotatably driving said shredding impeller in one direction of rotation of said motor only, a drain duct leading from the bottom of said dishwashing tub to said shredding chamber for the discharge of spent dishwater through said pumping chamber, and means for condensing vapor from the water draining from said dishwashing tub through said shredding chamber comprising a duct leading upwardly from said shredding chamber to said sink along the outside of said tub.

7. A dishwasher comprising a cabinet having a tub therein and having a front opening door affording access to said tub, a disposal sink opening to the top of said cabinet and separate from said tub, a waste disposal unit adjacent the bottom of said cabinet and having a shredding chamber, a duct leading directly from said disposal sink to the top of said shredding chamber, a shredding impeller in the bottom of said shredding chamber, a pumping chamber forming a downward continuation of said shredding chamber and extending beneath said impeller, pumping vanes on said impeller for forcing water and ground material from said pumping chamber for discharge to a sewer and the like, a dishwashing impeller in the bottom of said tub, a screen encircling said dishwashing impeller and extending over the top thereof, a reversible motor having a vertical shaft in axial alignment with the axis of said dishwashing impeller for rotatably driving the same in each direction of rotation of said motor, an overrunning clutch on the lower end of said motor shaft, a flexible drive connection from said clutch to said shredding impeller and pump for rotatably driving said shredding impeller and pump only when said motor is rotating in one direction, a drain duct leading from said tub to said shredding chamber for draining spent dishwater through said shredding chamber, and said dishwashing impeller rotating in a direction opposite to a dishwashing direction upon rotation of said motor to drive said shredding impeller, and washing particles of food from said screen upon rotation of said shredding impeller to drain spent dishwater from said tub.

8. A dishwashing machine comprising a cabinet having a dishwashing tub therein and having a front opening door affording access to said tub, a waste disposal sink in said cabinet opening to the top thereof, a shredding chamber at the lower end of said cabinet beneath the bottom of said tub and having a shredding impeller therein having pumping vanes thereon for pumping particles of comminuted food from said shredding chamber, a duct leading directly from said sink to the top of said shredding chamber, a drain duct leading from the bottom of said tub and opening into said chamber through the wall thereof in vertically spaced relation with respect to said shredding impeller for the discharge of spent dishwater through said shredding chamber by the action of said pump, and a deflecting segment extending inwardly from the wall of said shredding chamber on the inby side of said opening into said shredding chamber in the direction of rotation of said shredding impeller, to deflect particles of food from said drain duct from said dishwashing tub.

9. A dishwashing machine comprising a cabinet hav-

ing a dishwashing tub therein and having a front opening door affording access to said tub, a disposal sink in said cabinet and opening to the top thereof, a shredding chamber within said cabinet adjacent the bottom thereof, a duct leading vertically from said waste disposal sink to the top of said shredding chamber, a rotatable impeller in said shredding chamber having cutting impellers projecting upwardly therefrom and having pumping vanes projecting downwardly therefrom for pumping water and particles of ground food from said pumping chamber, means for driving said rotatable impeller, a drain duct leading from said tub and opening into said shredding chamber through the wall thereof, above said shredding impeller, and two spaced deflecting segments extending inwardly from the wall of said shredding chamber on the inby side of said opening for draining dishwater from said tub for deflecting particles of food from said opening downwardly onto said shredding impeller.

10. In a dishwasher, a tub having a dishwashing impeller in the bottom thereof, a reversible motor having a vertical motor shaft having direct drive connection with said impeller in both directions of rotation thereof, a waste disposal unit having a shredding chamber located beneath the bottom of said tub and to one side thereof and having a shredding impeller rotatably journaled for rotation in said shredding chamber adjacent the bottom thereof, said shredding impeller having impelling cutters projecting upwardly therefrom along the rim thereof and having pumping vanes projecting downwardly therefrom for discharging water and ground particles of food from said shredding chamber, a drain duct leading from the bottom of said tub through the wall of said shredding chamber for the discharge of spent dishwater from said tub into said shredding chamber, and a flexible drive connection from said motor to said shredding impeller for driving said shredding impeller only when said motor is rotating in a direction opposite to its direction of rotation for driving said dishwashing impeller in a direction to wash dishes for draining water from said tub and for comminuting waste material discharged in said sink.

11. In a dishwasher, a tub having a dishwashing impeller in the bottom thereof, a reversible motor beneath said tub having a vertical motor shaft extending upwardly into said tub and forming a support for said impeller and rotatably driving the same, a screen surrounding said dishwashing impeller and extending over the top thereof, a waste disposal unit having a shredding chamber disposed beneath the bottom of said tub having a shredding impeller rotatably journaled therein having impelling cutters projecting upwardly therefrom and pumping vanes depending therefrom, a drain duct leading from the bottom of said tub through the wall of said shredding chamber for discharging drain water from said tub therein, an overrunning clutch on the lower end of said motor shaft and a flexible drive connection from said clutch to said shredding impeller for rotatably driving the same when said motor is rotating in a direction opposite to its direction for driving said dishwashing impeller in a dishwashing direction, whereby said shredding impeller may pump spent dishwater from said tub, and said dishwashing impeller when driven in a direction opposite to its dishwashing direction, backwashing particles of food from said screen for discharge through said drain.

12. A waste disposal unit particularly adapted for a combined dishwasher and disposal comprising a shredding chamber having an opening in its top for waste food and having a shredding ring adjacent its bottom having a plurality of spaced deflectors therein, a rotatable shredding impeller in association with said shredding ring having impelling cutters thereon, and also having pumping vanes depending therefrom, a drain opening in the wall of said shredding chamber above said shredding ring adapted for connection with a dishwasher and the like for accommodating dishwater to be pumped therefrom through said shredding chamber by said shredding impeller upon ro-

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tation of said shredding impeller in a pumping direction, and means projecting inwardly from the wall of said shredding chamber for deflecting waste food particles away from said drain opening.

13. A waste disposal unit particularly adapted for a combined dishwasher and disposal comprising a shredding chamber having an opening in its top for waste food and having a shredding impeller journaled in the bottom thereof for rotation about a vertical axis, said shredding impeller having impelling cutters projecting upwardly therefrom adjacent the rim thereof and having pumping vanes depending therefrom for pumping water and ground particles of food from said shredding chamber, an inlet for spent dishwater opening through the wall of said shredding chamber spaced above said shredding impeller for connection with a dishwasher tub, for accommodating dishwater to be pumped therefrom through said shredding chamber upon rotation of said shredding impeller in a pumping direction, and deflector vanes projecting inwardly from the wall of said shredding chamber on the inby side of said drain opening leading thereto in accordance with the direction of rotation of said shredding impeller for deflecting waste particles of food from said drain opening downwardly onto said impeller.

14. A waste disposal unit particularly adapted for a combined dishwasher and disposal comprising a vertically extending shredding chamber having an opening in its top for waste food and having a rotatable shredding impeller in the bottom thereof having impelling cutters projecting upwardly therefrom adjacent the rim thereof and also having pumping vanes depending therefrom, a shredding ring within said shredding chamber in association with said shredding impeller and having spaced deflectors therein facing in a direction opposite to the direction of rotation of said impeller for deflecting particles of food onto said impeller, an opening in the wall of said chamber above said shredding ring adapted for connection with a dishwasher and the like for accommodating spent dishwater to be pumped therefrom by said shredding impeller, and deflecting vanes projecting inwardly from the wall of said chamber above said shredding impeller for deflecting waste particles of food from said drain opening, said deflecting vanes being arranged on the inby side of said drain opening in accordance with the direction of rotation of said impeller and being generally triangular in form and the apices thereof facing said shredding impeller.

15. In a waste disposal unit particularly adapted for a combined dishwasher and waste disposal comprising a vertically extending shredding chamber having a waste-receiving opening in the top thereof and having a shredding impeller journaled for rotation in the bottom thereof, said shredding impeller being in the general form of a disk having a generally flat top with spaced impellers projecting upwardly therefrom inwardly from the rim thereof and having spaced centrifugally actuated impellers extending upwardly therefrom along the rim thereof and biased inwardly by gravity and moving outwardly by centrifugal force, a shredding ring within said chamber

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in association with said impeller having a plurality of vertically extending spaced cutting grooves formed therein in association with said cutting impellers, a drain opening leading through the wall of said shredding chamber above said shredding ring and adapted for connection with a dishwasher and accommodating said shredding impeller to pump spent dishwater through said drain and shredding chamber, and means projecting inwardly from the wall of said shredding chamber for deflecting waste food particles away from said drain opening.

16. In a dishwasher, a tub having an impeller rotatably journaled in the bottom thereof, a reversible motor beneath said tub and having a motor shaft having direct drive connection with said impeller for rotatably driving the same, a screen encircling said impeller and extending over the top thereof, a drain opening from the bottom of said tub spaced from said impeller and screen, a pump for draining water from said tub, said impeller impelling washing liquid within said tub for washing dishes when rotating in one direction and backwashing said screen when rotating in an opposite direction, and a one way drive connection to said pump for driving said pump to drain said tub when said motor is rotating in a direction to drive said impeller to backwash said screen.

17. In a dishwasher, a tub, a rotatable impeller journaled in the bottom of said tub for circulating liquid and air therethrough, a motor beneath said tub having a motor shaft having direct supporting and drive connection with said impeller, said impeller having a hollow hub having a dome-like imperforate outer periphery, a standpipe encircling said motor shaft and opening through the bottom of said tub and extending upwardly within the hollow interior of said hub, a plurality of spaced liquid circulating blades spaced around said hub and curving downwardly from the top to the bottom thereof in a spiral path and facing in the direction of rotation of said impeller, and an air circulating vane within said hub at the discharge end of said standpipe for drawing air upwardly through said standpipe and expelling the same from the bottom of said hub.

18. In a dishwasher, a tub, a rotatable impeller for circulating liquid and air throughout the tub journaled in the bottom of said tub, a motor beneath said tub having a drive shaft connected to said impeller for rotating the impeller, said impeller having circumferentially extending imperforate walls forming an open bottomed hollow interior, a tubular standpipe sleeve around said shaft extending upwardly through the bottom of said tub and into the hollow interior of said impeller, liquid circulating vane means on the outside of said impeller for circulating liquid throughout the tub during a washing cycle, and air circulating vane means on said impeller in the hollow interior thereof for drawing air upwardly through said sleeve and for expelling the air outwardly of the hollow interior of the impeller through the open bottom thereof into the tub during a drying cycle.

No references cited.