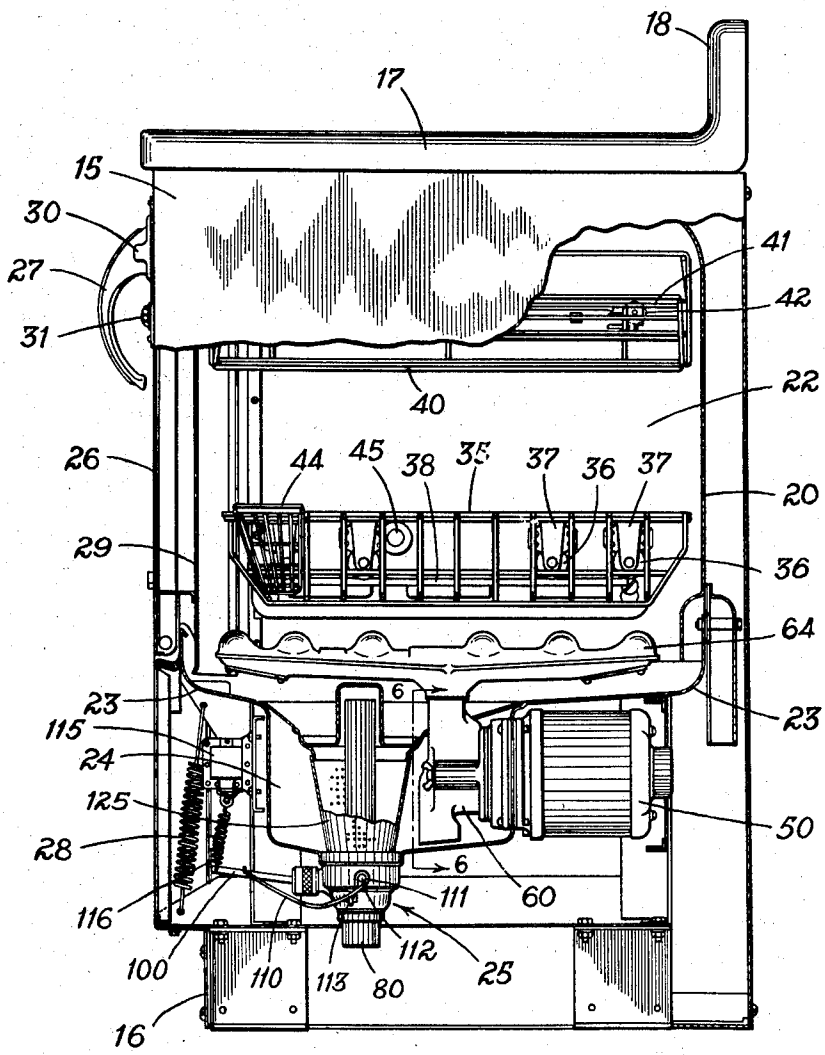
March 24, 1959 D. A. MEEKER ET AL 2,879,026

DETACHABLE ACTUATOR

Original Filed Oct. 11, 1949 3 Sheets-Sheet 1

Fig-1



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Fig-2

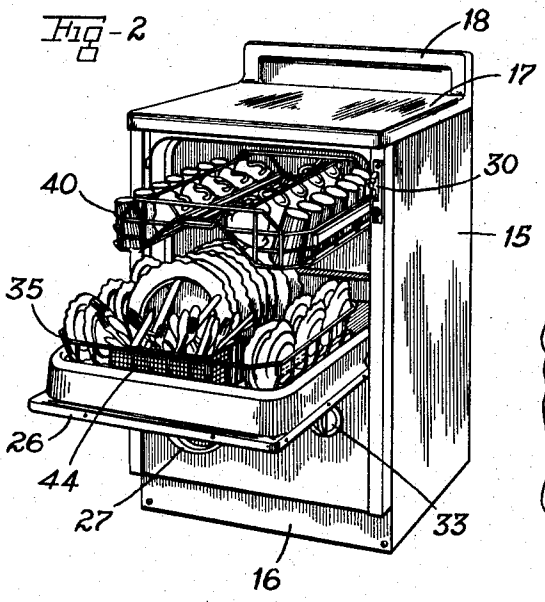


Fig-3

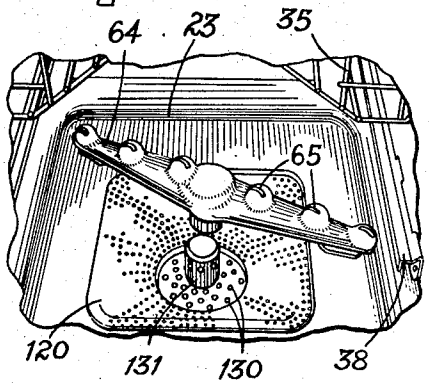
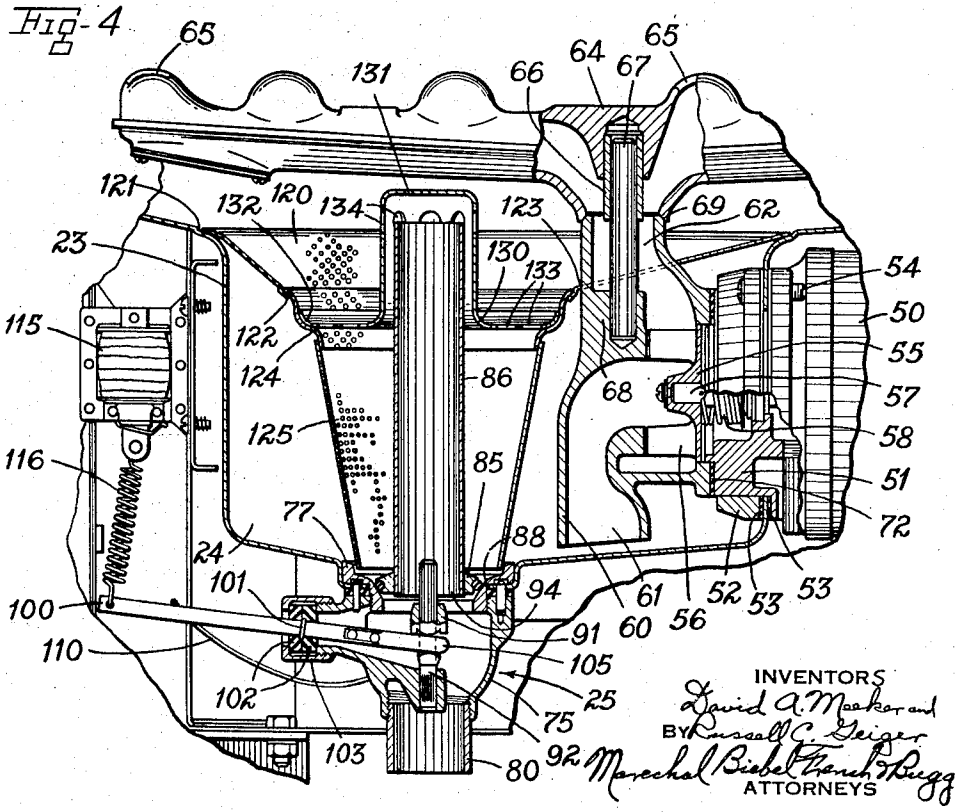


Fig-4



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Fig-5

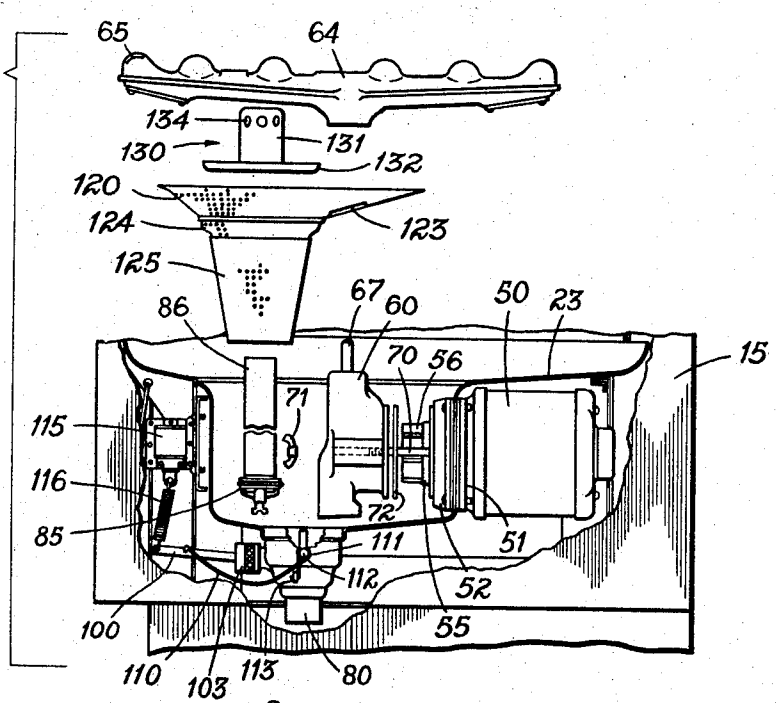


Fig-7

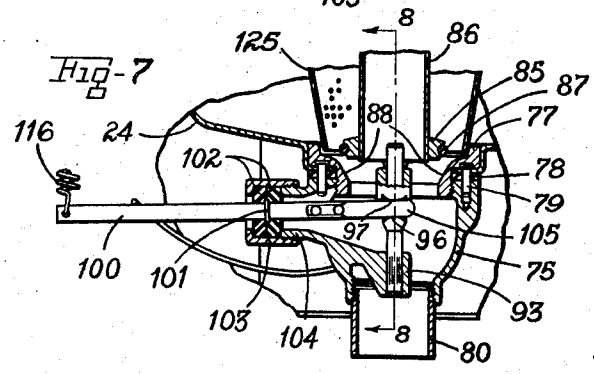


Fig-6

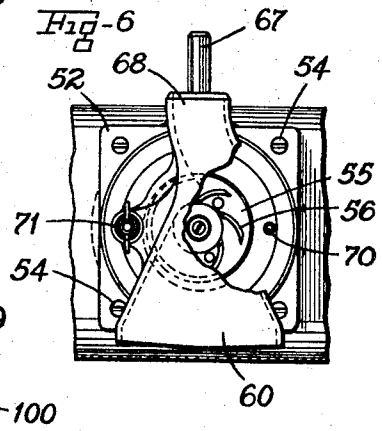


Fig-8

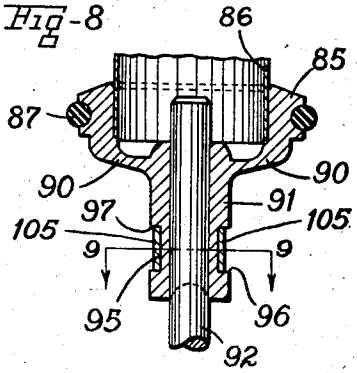
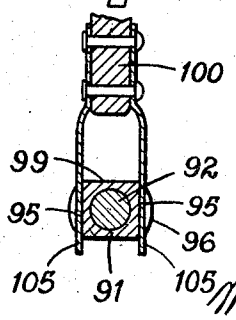


Fig-9



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2,879,026

DETACHABLE ACTUATOR

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Original application October 11, 1949, Serial No. 120,655, now Patent No. 2,681,658, dated June 22, 1954. Divided and this application May 27, 1954, Serial No. 432,683

4 Claims. (Cl. 251—291)

This invention relates to dishwashers and more particularly to such machines which are adapted for household use and for use in smaller commercial installations. This application is a division of our application Serial No. 120,655, filed October 11, 1949, now Patent No. 2,681,658, issued June 22, 1954.

In machines of this character, the soiled dishes or other articles are placed in a washing chamber and subjected to the action of washing sprays. The wash water is recirculated for a period of time sufficient to loosen and remove the food particles on the articles, such food particles being carried along with the wash fluid. While it is important to provide for such fluid recirculation, it is undesirable to allow the food particles themselves to be recirculated, particularly the larger sized particles thereof.

In accordance with the present invention, therefore, a simple and effective strainer construction is provided which is arranged to overlie a sump in the lower part of the chamber into which the liquid drains, the strainer being such as to collect the food particles on its surface while allowing the fluid with at most only the smaller particles entrained therewith to pass freely therethrough. The strainer is formed with a recessed annular portion which extends downwardly forming an enclosing screen entirely surrounding and enclosing the drain outlet so that the food particles which collect upon the screen surface are retained within the screen and are forced to collect at the bottom of this recessed area immediately adjacent the drain outlet. The wash liquid meanwhile has been allowed to flow freely into the remainder of the sump lying outwardly of this screen chamber, and the pump which recirculates the wash fluid has its inlet in this outer area so that it picks up the fluid itself with only the smaller entrained materials, but with the larger sized particles being effectively removed therefrom. The central recessed area of the strainer may have a coarse screen mounted above it to collect still larger food particles and prevent the flushing of such materials down the drain, but these perforations are preferably of such size as to allow the passage of practically all particles of normal size.

In the course of the washing operation, therefore, the food particles are continuously withdrawn from the circulating fluid and collected in this inner screen chamber, immediately above the drain opening. Thereafter, at the end of the washing cycle, the operation of the pump is stopped and the drain outlet is opened, providing for immediate flushing of the collected food particles down the drain. This provides a self-cleaning strainer assembly which contributes to the production of the dishes in a clean condition, as well as greatly facilitating the maintenance of the dishwasher itself in a clean and sanitary condition.

Maintenance of sanitary conditions is further facilitated by reason of the fact that the strainer assembly and the drain valve structure are readily removable from the sump and may be lifted directly out of the sump through the door opening. The wash arm lifts off of its support

on the pump housing, and following removal of these parts the pump housing itself may be directly removed exposing the pump impeller. In this way full and complete cleaning of all of the parts is greatly facilitated, those which are removed being readily cleaned outside the chamber and the pump impeller which remains being directly and readily accessible through the large door opening so that it may likewise be readily and easily kept in a thoroughly clean and sanitary condition.

It is accordingly the principal object of the invention to provide a dishwasher of this character which is simple to operate, easy to maintain in a clean and sanitary condition, and which is highly advantageous and satisfactory in use.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a side elevation of a dishwasher in accordance with the invention for domestic use, with portions of the cabinet and other parts broken away to illustrate details of internal construction;

Fig. 2 is a perspective view of the dishwasher with the door opened and the racks filled with dishes;

Fig. 3 is a fragmentary perspective view looking at the bottom of the washing chamber through the opened door;

Fig. 4 is a fragmentary view on a larger scale taken in vertical central section through the strainer and pump assembly and the drain outlet and showing the drain outlet closed;

Fig. 5 is a fragmentary exploded view of the parts shown in Fig. 4;

Fig. 6 is a fragmentary view taken as indicated by the line 6—6 in Fig. 1 and showing the front of the pump housing with a portion thereof broken away to expose the impeller;

Fig. 7 is a fragmentary sectional view showing the drain outlet opened;

Fig. 8 is an enlarged fragmentary section on the line 8—8 of Fig. 7; and

Fig. 9 is a fragmentary section on the line 9—9 of Fig. 8.

Referring to the drawings, which illustrate a preferred embodiment of the invention, the dishwasher includes an outer cabinet shell **15** provided with a supporting base **16** and a top **17** having a splasher back **18** preferably formed integral therewith. An inner shell or casing **20** encloses the washing chamber **22** for receiving the dishes to be washed, and a lower shell or casing **23** forms a sump portion **24** of the chamber **22** which is provided with a drain outlet assembly indicated generally at **25**. Access to the dish chamber **22** for loading and unloading dishes is provided through a door **26** at the front of the cabinet hinged on a horizontal axis as shown in Fig. 2 and provided with a handle **27** and spring counterbalance **28**, and it will be noted that shell **23** extends upwardly above and outwardly of the lower end of the inner liner **29** of door **26**. The starting switch handle and an indicator light are shown at **30** and **31**, respectively, at the front of the cabinet, and a sequence timer control has a knob shown at **33** in Fig. 2, cross reference being made in this connection to our co-pending application, Serial No. 120,656, filed October 11, 1949.

Two separate and independent racks are shown for supporting the dishes and other articles to be washed in chamber **22**. The lower rack **35** is mounted just above the level of the door hinge line by means of rollers **36** carried by brackets **37** on the sides of the rack and riding on tracks **38** at the sides of inner shell **20**. The upper rack **40** is mounted independently of rack **35** by means of inverted channel-shaped tracks **41** secured on either side thereof and riding on rollers **42** carried by the sides

of the shell 20. As shown in Fig. 2, the lower rack 35 is adapted to carry plates and cooking utensils, and it is also provided with a basket portion 44 at the front for silverware. The upper rack 40 is intended to receive glasses, cups and the like.

The washing and rinsing fluid enters the washing chamber 22 at 45 (Fig. 1) by way of a suitable valve controlled conduit (not shown) operated by the timer to admit the desired amount of fluid. This fluid is then recirculated over the articles by means of a pump assembly in the sump as shown in Figs. 4 and 5. The pump motor 50 is provided with a front bracket 51 which extends into the sump from the rear through a suitable opening in the lower shell 23 and is clamped in position by means of a ring 52, gaskets 53 and bolts 54. An impeller 55 having multiple curved blades 56 is secured to the end of the motor shaft 57, and a packing 58 is provided along the motor shaft to prevent leakage.

A single casting 60 forms the housing for impeller 55 and includes a funnel-shaped lower portion providing an intake 61 from the sump to the impeller. The upper end of the pump housing 60 forms a discharge outlet 62 to a wash arm 64 of the reaction type having multiple discharge slots 65. The wash arm is rotatably mounted by means of a bushing 66 on a stud 67 set in an internal boss portion 68 of housing 60, and the lower end of the wash arm is flared at 69 to ride on the tapered upper end portion of housing 60 and provide a liquid tight seal. The housing 60 is removably secured in position over the impeller by means of a pair of bolts 70 extending forwardly from the bracket 51 and provided with wing nuts 71, a suitable gasket 72 being positioned between the rear edge of the housing and the front face of bracket 51.

The drain outlet unit 25 is shown in detail in Figs. 4 and 7 to 9. It includes a generally bowl shaped valve body 75 which is clamped to the bottom of shell 23 by means of a flanged collar 77 and gasket 78, locating pins 79 being provided to assure that the body will remain in proper angular position, and the lower end of the body is tapped for connection to a drain tube 80. The drain valve 85 is a collar force fitted on the lower end of the overflow tube 86 and provided with a rubber O-ring 87 adapted to seat on the tapered inner surface 88 of collar 77 to close the drain.

The valve 85 is mounted for vertical movement to open and close the drain. Referring to Figs. 7 to 9, the valve 85 includes a pair of oppositely disposed arms 90 extending inwardly and downwardly to an integral sleeve 91 forming a valve stem slidably mounted on a vertical pin 92 set in an internal boss portion 93 of the body 75, leaving open passages 94 on either side of arms 90 for free drainage from the overflow tube 86 to drain tube 80 when valve 85 is in closed position. The sleeve 91 is provided on opposite sides with flats 95 having shoulders 96 at their lower ends and a circumferential shoulder 97 above them, and the lower end of sleeve 91 is tapered at 99 on its other pair of opposite sides.

A lever rod 100 is mounted for pivotal movement in a flexible mounting comprising a ring 101 set in a peripheral groove on the rod to form an enlargement thereon which is held between a pair of rubber washers 102 in an open-ended cap 103 threaded on an extension portion 104 of body 75, these washers thus sealing this part of the body against escape of liquid while supporting the lever 100 for tilting movement. Two resilient yoke arms 105 are riveted to the inner end of lever 100 and are adapted to be received in the flats 95 between the shoulders 96 and 97 as shown in Fig. 8. Thus when the lever 100 is in the position shown in Fig. 4, the yoke arms bear against the shoulders 96 and draw the sleeve 91 and valve 85 downwardly into drain closing position, and when the lever arm tilts to the position shown in Fig. 7, the yoke arms bear against the shoulder 97 and lift the sleeve 91 and valve 85 to open the drain, the overflow tube 86 being raised and lowered with valve 85. It will also be noted that the shoulders 96 and 97 are rounded to permit yoke arms 105 to rock smoothly over them during movement of the valve 85.

A spring 110 normally biases the lever 100 to valve opening position. As shown in Figs. 4 and 5, this spring is generally U-shaped as viewed from above, and it includes coiled portions 111 mounted on cylindrical bosses 112 and with their ends received in apertured lugs 113 at either side of valve body 75. This arrangement thus provides a downward pull on the middle part of the spring which seats on the lever 100 near its outer end. The lever 100 is moved in the opposite direction to valve closing position by means of a solenoid 115 mounted in the front portion of the cabinet and having its plunger yieldably connected with the outer end of lever 100 through a spring 116. The solenoid is energized and deenergized through the timer in proper relation with the washing and rinsing cycles to permit spring 110 to open the drain valve for discharge of the washing and rinsing liquids as desired.

The strainer assembly is arranged to trap food particles from the dishes and prevent such particles from reaching the pump assembly. The main or upper unit of the strainer assembly comprises a centrally dished and generally square perforate upper section 120 having rounded corners and adapted to seat in the complementary recessed portion 121 of the inner shell 23 to separate the dish chamber 22 from the sump 24. This upper strainer section 120 is so formed as to slope toward an opening 122 so located as to be approximately concentric with the drain outlet of the sump. It is also formed adjacent one side with an opening 123 to receive the upward portion 62 of the pump housing 60. A middle perforate strainer section 124 is welded at its upper end in the opening 123 and is in turn welded in its lower end to a lower frustoconical perforate section 125 which forms a funnel extending at its lower end into the valve collar 77. All of these strainer sections have relatively fine perforations for preventing the passage of food particles of such size as to be capable of clogging or otherwise interfering with the action of the impeller or the proper washing and rinsing operations, perforations of the order of 1/16 inch in diameter having been found satisfactory.

A separate inner strainer 130 includes an upwardly extending central portion 131 which forms a handle adapted to telescope over the upper end of overflow tube 86, and the lower portion of this which is provided with a curved outer rim 132 adapted to seat removably on the complementary curved portion of the intermediate strainer section 124 and to form an annular trough. The strainer 130 is provided with a series of relatively large holes 133 in its lower portion and a similar ring of holes 134 in its handle portion 131 at approximately the level of the upper end of the overflow tube 86 when valve 85 is in closed position, satisfactory results having been obtained with the holes 133 and 134 approximately 5/16 inch in diameter.

In operation, after the racks have been loaded with dishes in the desired quantity and a suitable detergent placed in the washing compartment, the machine is started by means of switch 30 to actuate the timer, which first effects closing of the drain valve and opening of the fill valve to supply wash liquid through the inlet 45 to the level in sump 24 of the top of the overflow tube 86. The timer then starts the pump motor 50 to drive the pump, and the liquid is drawn up into the intake passage 61 by impeller 55 and forced upwardly through outlet passage 62 and wash arm 64 for discharge through the slots 65. As this action continues, the liquid flows down into the sump through the strainer unit for recirculation, carrying with it the food particles removed from the dishes, and with the upper strainer portion 120 concave as shown, food particles washed from the dishes are carried down toward the strainer funnel portion 125. The food particles which are too large to pass through

the perforations of the strainer assembly are retained upon the upper surface of strainer section **120** and follow the path of the fluid in moving downwardly, passing through the larger perforations **133** of the strainer **130** and into the lower section **125**, where they collect immediately above the drain outlet. Meanwhile the washing fluid with only the finely entrained food particles is allowed to flow into the sump portion outwardly of the strainer, and it is in this area that the pump inlet **60** is located, thus effectively segregating the food particles from the recirculating fluid. The strainer itself thus tends to be self-cleaning with the collected material being located immediately adjacent the drain outlet and in position where it will be flushed out upon the opening thereof. If there are any unusually large sized particles which should not be allowed to flush out through the drain, or if an article of silverware should fall into the sump, it will be caught upon the strainer **130** and can be removed by the operator at the end of the cycle, this being accomplished simply by the lifting out of the strainer portion **130**.

It will thus be seen that during the washing operation, any food particles present on the dishes are effectively removed and trapped for ready disposal without being recirculated, the wash liquid being strained each time before it again reaches the intake **61** of the pump. Then after the washing cycle is completed and the wash liquid discharged, similar rinsing operations follow as controlled by the timer, the rinse water being repeatedly sprayed over the dishes and then strained before further recirculation. Thus not only is proper cleansing of the dishes assured, but also with solid particles disposed of as described, the interior of the cabinet is maintained clean and sanitary.

The construction and arrangement of the strainer and pump units greatly facilitates maintenance of the dishwasher by making possible quick and easy disassembly of these parts. Referring particularly to Fig. 5, the wash arm can be removed by simply lifting it off stud **67**, and the strainers **130** and **120** can be similarly lifted out. Next the overflow tube and drain valve can be removed by first twisting them through 90° to release the yoke arms **105** from between shoulders **96** and **97**, after which this unit can be lifted out as indicated in Fig. 5. The pump housing **60** will then be fully accessible as shown in Fig. 6, and it can be quickly removed by releasing wing nuts **71** to expose the impeller **55**. Direct and easy access is thus provided through the large door opening so that the cleaning and repair of the pump impeller are greatly facilitated while the other parts of the pump and the entire strainer assembly are directly removable.

Reassembly of these parts is equally simple by following the reverse sequence of steps, and it will be noted that the tapered sides **99** on the drain valve sleeve **91** guide the lower end of this sleeve between yoke arms **105** until the shoulder **97** engages the upper edges of the yoke arms, after which the overflow tube **86** may again be twisted through 90° to lock flats **95** between the yoke arms. It will thus be seen that if any of these parts require inspection, cleaning or replacement, they can be quickly and easily removed from the interior of the cabinet through the opened door **26**, without disconnecting any part of the mechanism or otherwise dismantling the dishwasher, thus assuring desired ease of maintenance.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. For use in a dishwasher of the character described including a casing forming a washing chamber and having a sump provided with a drain outlet in the lower portion thereof and a drain valve controlling the drain outlet, an overflow tube secured to the drain valve and extending upwardly therefrom in the sump to form a handle for rotating the valve, the combination of a stem depending from the drain valve, detachable operating means comprising a pair of resilient yoke arms adapted for raising and lowering said stem, said stem including portions on opposite sides thereof proportioned for a snap fit between said yoke arms to lock said stem releasably to said yoke arms against both axial and rotational movement relative thereto, and additional portions of said stem located between said first named portions being of lesser radial dimensions to provide for axial release of said stem from said yoke arms following partial rotation of said stem against the resiliency of said yoke arms.

2. For use in a dishwasher of the character described including a casing forming a washing chamber and having a sump provided with a drain outlet housing having an annular valve seat in the upper part thereof defining the drain outlet from the sump and provided also with a drain valve adapted to engage the annular seat to close the drain outlet, an overflow tube secured to the drain valve and extending downwardly therethrough for overflow drainage and upwardly therefrom to form a handle accessible in the sump for rotating the valve, the combination of a hollow stem depending from the drain valve, an operating lever for moving said stem to produce opening and closing movements of the valve, said lever having an enlargement thereof, a pair of rubber washers received on said lever on opposite sides of said enlargement supporting said lever for tilting movement only, means for supporting said washers in clamped relation about said enlargement providing a fixed pivot point for said lever, means connecting said stem to said operating lever, said connecting means including a pair of resilient yoke arms fitted around said stem and being releasable upon rotational movement of said stem with respect to said lever.

3. For use in a dishwasher of the character described including a casing forming a washing chamber adapted to receive articles to be washed and having a sump provided with a drain outlet housing having an annular valve seat in the upper part thereof defining the drain outlet from the sump and provided with a drain valve adapted to engage the annular seat to close the drain outlet and with means supporting the valve for opening and closing movement with respect to the seat, the combination of a stem on the valve depending within the outlet housing, detachable operating means for said stem comprising a pair of resilient yoke arms supported within the housing for upward and downward movement, said stem having portions thereon proportioned for a snap fit between said arms to lock said stem releasably against rotational movement with respect to said arms, said stem having shoulders thereon respectively above and below said first named portions for axially interlocking engagement with said arms to form an operating connection causing said opening and closing movement of the valve in response to said movement of said arms, and said stem having relieved portions thereon in substantially 90° spaced relation with said shoulders to provide for disconnection of said stem from said operating means in response to rotation and upward movement of said stem with respect to said arms.

4. For use in a dishwasher of the character described including a casing forming a washing chamber having a sump provided with a drain outlet housing having an annular valve seat in the upper part thereof defining the drain outlet from the sump and provided with a drain valve adapted to engage the annular seat to close the drain outlet, an overflow tube secured to the valve and extending downwardly therethrough for overflow drainage and upwardly therefrom to form a handle accessible

in the sump for rotating the valve, the combination of a hollow stem depending in fixed relation from the drain valve, a pin receivable in said stem, means for mounting said pin extending upwardly within said hollow stem for cooperation therewith to support said stem for guided up and down movement, a pair of resilient yoke arms supported within the housing for upward and downward movement, said stem having shoulders thereon respectively above and below said first named portions for axially interlocking engagement with said arms to form an operating connection causing said up and down movement of said stem in response to said movement of said arms, and said stem having relieved portions thereon in substantially 90° spaced relation with said shoulders to provide for disconnection of said stem from said arms in response to rotation and upward movement of said stem with respect to said arms.

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