Aug. 16, 1955 J. G. RUSPINO 2,715,410

DRAINAGE CONTROL SYSTEM FOR DISHWASHERS

Filed Dec. 30, 1953 3 Sheets-Sheet 1

Fig. 1

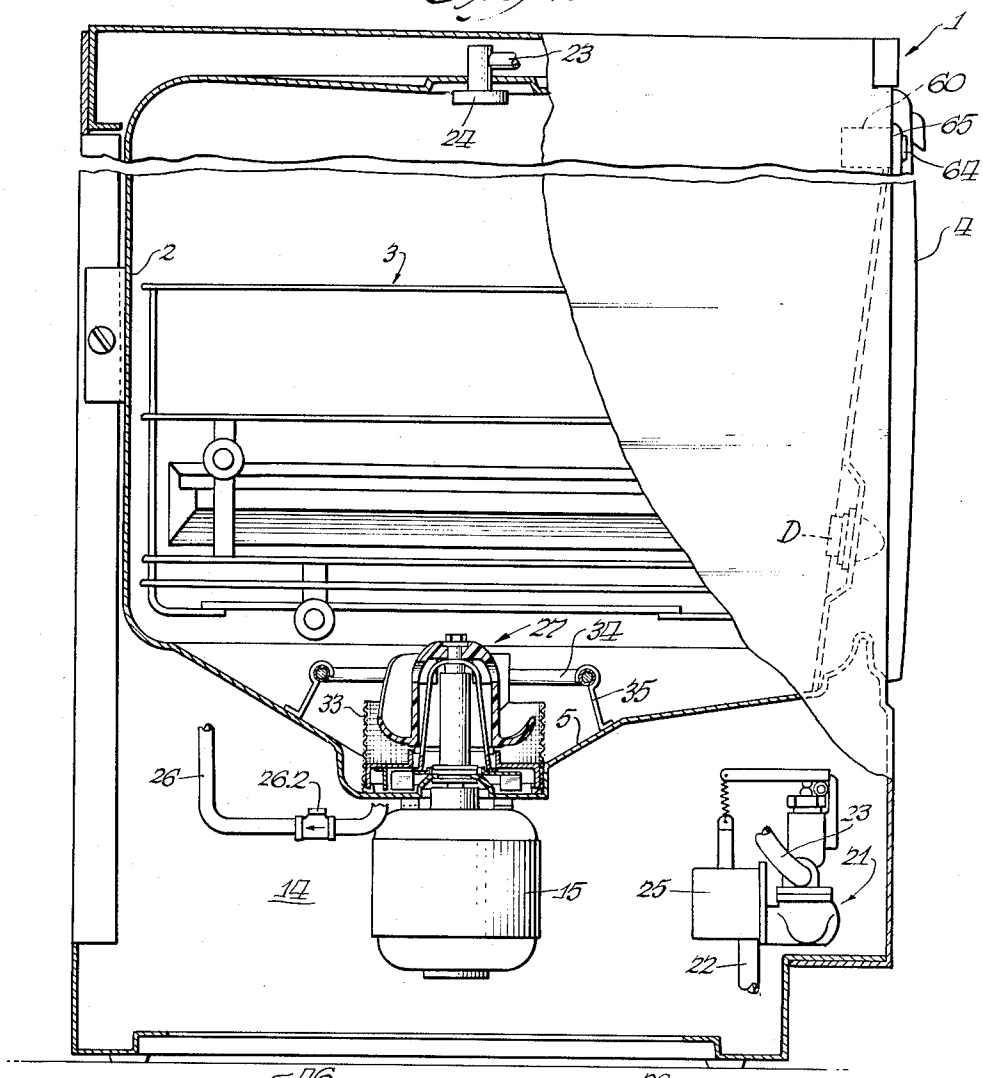


Fig. 4

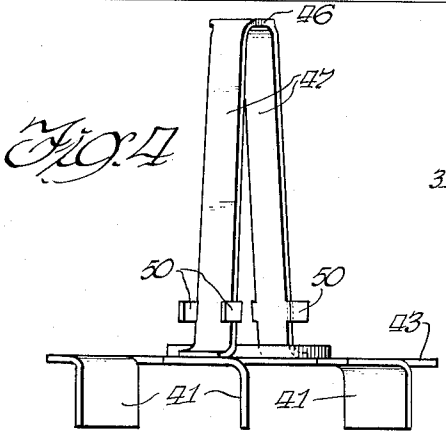
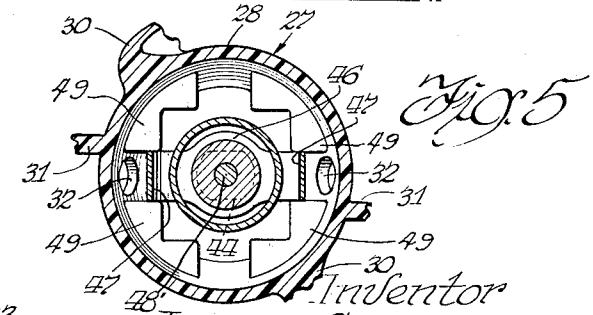


Fig. 5



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Fig. 2

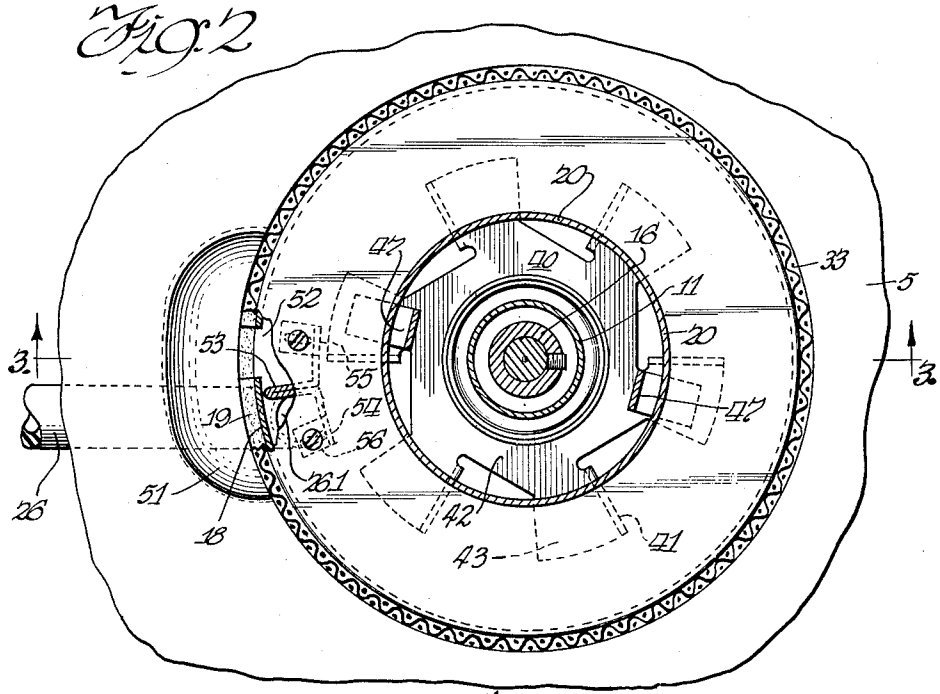
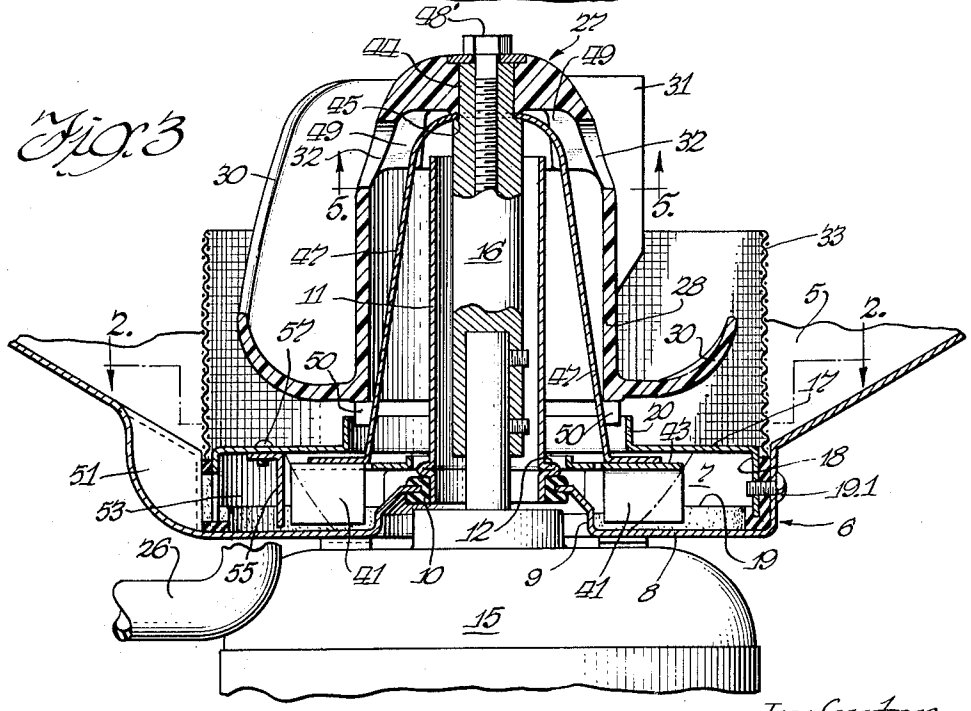


Fig. 3



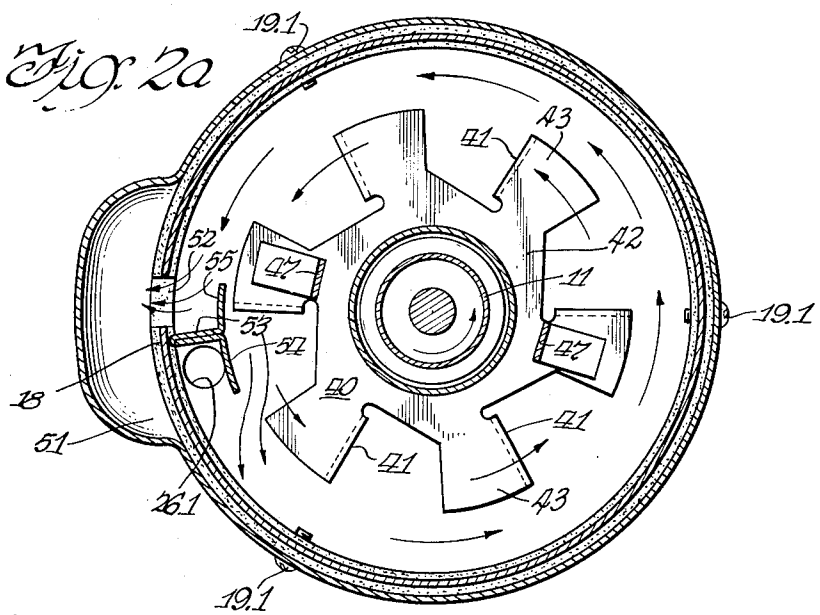
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DRAINAGE CONTROL SYSTEM FOR DISHWASHERS

Filed Dec. 30, 1953 3 Sheets-Sheet 3

Fig. 2a



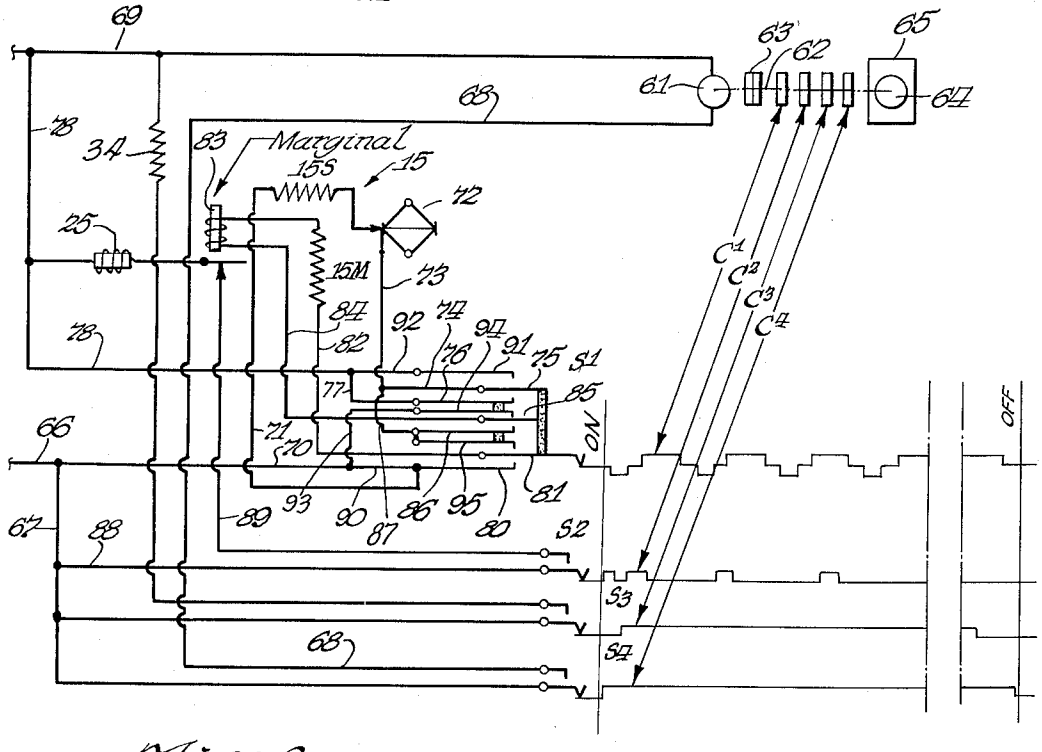


Fig. 6

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DRAINAGE CONTROL SYSTEM FOR DISHWASHERS

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Application December 30, 1953, Serial No. 401,157

14 Claims. (Cl. 134—182)

This invention relates to dishwashers and, in particular, to means for controlling drainage from the tub in which the dishes and the like are washed.

In presently known and used dishwashers of the domestic type, it is the practice to use a relatively small amount of water for the washing operations and for certain of the rinsing operations. It is customary, for example, to use only about twelve pints of water in each of said operations. Certain types of dishwashers have an impeller disposed in a sump or other low portion of the dishwasher tub to pick up liquid which collects in said sump and throw it forcefully about, whereby the dishes and other articles are subjected to the cleansing and rinsing action of multitudinous particles of the washing or rinsing liquid. A single washing operation may be of five minute duration, and it is obviously important to prevent escape of liquid from the tub so as to conserve the charge of washing or rinsing liquid; for otherwise the impeller would quickly lose its efficiency.

Mechanically operated drainage valves and valve systems are well known and commonly used in dishwashers. They are however, subject to mechanical failure, and to failure by reason of sticking or jamming because of food particles accumulating therein. It has also been proposed to eliminate mechanical drainage valves by locating the drainage opening in the tub about the impeller axis and providing a centrifugal pump fixed to the dishwasher impeller to sweep the water away from said opening during periods of rotation of the impeller. Thus, so long as the impeller is operating, water is kept from entering the drainage opening, whereas drainage can be quickly accomplished merely by stopping the rotation of the impeller and its associated centrifugal pump. However, this arrangement is subject to the criticism that the action of the centrifugal pump repels the liquid from the dishwasher impeller itself and thereby reduces the efficiency of the impeller.

It is therefore an object of my invention to provide a dishwasher having a drainage control system which does not embody mechanically operated valves or the like and which does not in operation interfere with the normal dishwashing action of the impeller.

It is yet another object of my invention to provide a dishwasher having a continuously open main drainage outlet remote from the impeller shaft and drainage control means which prevents undesirable loss of liquid through said outlet.

It is still another object of my invention to provide a dishwasher having a reversible impeller and, in association therewith, a drainage system which will prevent drainage from the tub when the impeller is rotating in one direction and effect complete drainage when the impeller is rotating in the opposite direction.

It is a further object of my invention to provide a drainage control system which may be applied equally well to gravity drainage into the plumbing waste line of the building or to a drainage system in which it is necessary

to raise the effluent from the dishwasher to an elevated level before discharge into the plumbing waste system.

In a presently preferred embodiment, I utilize a centrifugal pump placed externally of the dishwasher tub and provide a continuously open drainage connection between the tub and the pump chmaber, said connection opening into the tub at a point radially outward of the dishwasher impeller itself. The plumbing waste connection communicates with the pump chamber preferably adjacent the point of entry of the drainage connection thereinto. By a novel arrangement of baffles within the pump chamber, liquid which enters the chamber during the operation of the pump in one direction will bypass the waste outlet and return to the dishwasher tub, whereas with the pump still, or rotating in an opposite direction (according to whether gravity or pressure discharge is required) the effluent from the dishwasher tub is permitted to flow substantially unobstructedly into the waste outlet opening.

Other features and advantages of the invention will be understood from the following detailed description of a presently preferred embodiment in which:

Fig. 1 is a side sectional elevation of a dishwasher embodying the present invention;

Fig. 2 is a plan view of a portion of the dishwasher sump with certain portions being broken away to reveal underlying structure, and being otherwise in section on lines 2—2 of Fig. 3;

Fig. 2*a* is a somewhat schematic plan view, similar to Fig. 2 with the pump chamber cover removed, to show the water action within the chamber under certain conditions of operation;

Fig. 3 is a vertical elevation looking in the direction of the lines 3—3 of Fig. 2;

Fig. 4 is a perspective of a presently preferred form of pump blade and mounting assembly;

Fig. 5 is a section taken through the impeller hub and associated structure and looking in the direction of the arrows 5—5 of Fig. 3; and

Fig. 6 is a schematic wiring diagram showing an arrangement whereby the dishwasher may be operated pursuant to an automatic time cycle.

Fig. 1 shows a dishwasher which is generally of the type disclosed in U. S. Patent No. 2,620,811, granted to F. A. Walker on December 9, 1952, for "Dishwashing Apparatus with Automatic Detergent Introduction Arrangement." For example, the dishwasher includes an outer cabinet 1 within which is supported a tub 2. Suitable roller-mounted racks 3 are arranged to be brought forwardly through a door opening of the tub when the door 4 is brought from its substantially vertical closed position to a substantially horizontal open position. With the racks then supported by the door, the dishes and other articles may be loaded therein and the rack returned to the tub. The user then places a charge of granular detergent into the detergent dispenser D and closes the door, whereupon the dishwasher is ready for operation. Attention is directed to said Walker Patent 2,620,811, for a complete description of the operation of a suitable detergent dispenser.

The floor of the dishwasher is shaped to provide a sump 5 of inverted frusto-conical configuration. At the central portion of the sump, the tub bottom wall extends downwardly to form the cylindrical side wall 6 of a pump chamber 7, and then inwardly and upwardly to form the bottom 8 of said chamber and a central neck portion 9. The upper extremity of the neck extends inwardly to terminate in an annular gasket 10, as best appears in Fig. 3. A guard tube 11 fits snugly within said gasket and is provided with a shoulder or equivalent 12 to fix the relationship of the tube to the gasket. As is now well understood, the guard tube extends above the maximum

free liquid level within the sump and thus prevents spill-over of liquid into the machinery compartment 14. The drive motor 15 is suitably supported relative to the bottom of the tub and a motor shaft and extension 16 extends vertically upwardly through the tube 11. Motor 15 is reversible, and is arranged to operate counterclockwise of Fig. 2 during washing and similar operations in which it is necessary to prevent loss of water, and in the reverse direction during other portions of the operating cycle.

The sump and pump chamber are completed by the plate 17 having a depending flange 18 which seats within the resilient gasket 19. Said gasket is crowded against the wall 6 of the pump chamber thereby frictionally retaining the plate 17 in position. It will be understood however that any suitable fastening means such as the machine screw 19.1 may be placed at convenient locations about the wall 6 so as positively to secure the plate 17 against rotational or other displacement with respect to the bottom of the tub. A neck 20 extending from plate 17 concentric with shaft 16 provides a central opening of sufficient diameter to accommodate portions of the drain control structure as presently described.

The supply of washing liquid to the apparatus is preferably under the control of a solenoid actuated valve 21 of any suitable design. Illustratively, valve 21 is suitably mounted within a machinery compartment below the tub 2 and its valve body is arranged to receive heated water from the building supply (not shown) through the inlet pipe 22 and to discharge it through the tube 23 to a spray-type fitting 24 disposed in an upper portion of the tub 2. A solenoid 25 is operatively associated with the valve by suitable linkage and dashpot mechanism which provides quick opening, slow closing operations and thus minimizes water hammer in the piping system. It will be understood that the valve mechanism itself comprises no part of the present invention. By suitable means—for example, a suitable time-fill control or a load-responsive relay, as later described—the inflow of water to the tub is limited to the quantity necessary for washing or for "power rinsing." In one presently known domestic machine, approximately twelve pints of water are used in each of said operations. A permanently open drain connection 26 opens into the pump chamber at 26.1 and communicates with the plumbing waste system (not shown) of the building. As is now well understood, said drain connection 26 may be of the gravity type in which it would communicate directly with a conventional plumbing trap (not shown), or, alternatively, the drain connection may rise to an elevated level to discharge across an air gap into a waste disposal piping arrangement (not shown) placed suitably above the floor line. This latter arrangement, which is contemplated in Fig. 1 makes it advantageous to use a check valve 26.2 as close as possible to the actual waste line opening 26.1 so as to prevent backflow of effluent into the pump chamber.

Washing is accomplished by means of the forceful circulation of a detergent solution throughout the tub 2, by means of an impeller 27, which may advantageously be as disclosed in the Koertge U. S. Patent 2,422,022, granted June 10, 1947, for "Dishwashing and Drying Apparatus." Accordingly, the impeller has a cylindrical hub 28 from which extends the water circulation impeller blades 30 and the diametrically opposed air circulation blades 31. The hub has openings 32 adjacent the air circulation blades, as indicated in Fig. 5. During washing and power rinsing operations, the impeller rotates at motor speed—usually about 1750 R. P. M.—and the blades 30 pick up water in the sump and circulate it in a multitude of drops and sprays over the articles arranged in the racks 3. During such an operation, the water level in the sump is sufficient to submerge only the lower portion of the impeller blades, and the quantity in the sump is constantly being replenished by return flow along the sides and bottom of the tub and by direct drippage from the articles within the tub. The screen 33 disposed about the lower portion of the impeller prevents solid particles of food soil from reaching the impeller and thus minimizes redeposition on the articles being washed. A heating element 34, preferably of the tubular metallic sheathed conductor type, is mounted adjacent the air circulation blades 31, as by the brackets 35.

Drainage control is accomplished by the selective rotation of the pump 40 disposed within the pump chamber 7. Pump 40 is of the centrifugal type, having a plurality of radially extending blades 41, which may conveniently be formed by striking down portions of an appropriately shaped disc 42. As illustrated each blade comprises a vertical wall extending downwardly from the radial extensions 43 of disc 42. Although other blade formations may be used satisfactorily, the extensions 43 advantageously restrict circulation of liquid up over the blades themselves. The pump is mounted in suitable fashion on the shaft 16 to be driven thereby, and means are provided to key the impeller 27 to the pump mounting, whereby the transmission of torque to said impeller is largely by means of the pump mounting itself. For example, as shown in Figs. 3 and 5, the end 44 of shaft 16 comprises a non-circular formation rising from the square shoulders 45 of the shaft itself. A yoke 46, Fig. 3, has a central opening shaped identically with that of the shaft end 44 and fits snugly thereover to rest squarely on the shoulders 45. Straps 47 extend symmetrically from yoke 46 and are suitably secured to the pump disc 42.

An opening in the upper end of the impeller hub is sized to receive the shaft extension 44, whereby the end wall of the hub will seat on the yoke 46. A machine screw or equivalent 48' enters an internally threaded axial passage in the end of shaft 16 and serves to bring the impeller into tight contact with the surface of the yoke. It will be noted from Figs. 3 and 5, that, at its closed end, the inner wall of the impeller 27 is formed with bosses 49 which snugly engage the sides of the adjacent straps 47. This engagement of the straps and bosses serves as a driving connection between the shaft 16 and the impeller 27. The impeller may additionally be supported with respect to the pump yoke by relatively simple means such as the ears 50 struck outwardly from the straps 47 at locations which will cause the lowermost edge of the impeller hub to seat firmly upon the upper edges of said ears when the impeller is in its home position on the shaft.

The drainage connection between the sump 5 and the pump chamber is advantageously provided by forming a cup-like depression 51 in the sump externally of the screen 33, as best appears in Figs. 2 and 3. Obviously, a simple elbow pipe connection may be employed. The gasket 19 and the flange 18 are each interrupted to provide the actual inflow opening 52 into the pump chamber. Any liquid in the sump can flow freely into the pump chamber and thence to the drainage connection 26. The flow of liquid to the drainage opening will remove much of the food soil which had gathered on the screen.

Pursuant to the present invention, means are provided whereby operation of the pump during the rotation of the impeller in the "washing" direction is effective to prevent any appreciable loss of liquid to the drain, whereas rotation in the opposite direction produces positive discharge of liquid to the plumbing waste line. These results are obtained by utilizing the centrifugal forces acting on a rapidly rotating body of water, together with baffle means which cause the water within the pump chamber to bypass one or the other of the openings into said chamber. The baffle may advantageously be fabricated from a strip of sheet metal having a width equal to the internal depth of the pump chamber. For example, the metal strip may be bent to provide the wall 53 extending radially within the pump casing between the inflow opening 52 and the outflow opening 26.1, and the arcuately extending walls 54 and 55 which extend relatively close to the outermost edges of the respective pump blades, as shown in Fig. 2. A convenient means of se-

curing the baffle member is by means of the ears 56 and machine screws 57, as illustrated in Fig. 3.

It will therefore be apparent that the baffle member coperates with the walls of the pump casing to provide a right-angled termination of the respective openings 52 and 26.1 and that said openings face in mutually opposite directions. According to the direction of rotation of the pump impeller, one of the pump casing openings will effectively be bypassed, whereas the other opening will be in the direct path of liquid flow.

This effect is illustrated somewhat schematically in Figs. 2*a* and 3. When the impeller 27 and pump 40 are rotating counterclockwise of Fig. 2*a*, liquid will be flowing along the sump wall. Most of the liquid will traverse the screen 35 and will be caught up by the impeller blades 30 for immediate recirculation into the tub. A small portion will climb the wall 20. Some of this portion will be repelled by the centrifugal effect of the pairs of ears 50 and the strap members 47; the rest may pass over the wall and drop into the pump chamber 6. The rest of the liquid flowing along the sump will enter the pump chamber directly through the opening 52.

As a result of this inflow of liquid into the pump chamber and the centrifugal action of the blades 41 of pump 40, there will be quickly generated within the chamber a rotating body of water which will have a somewhat parabolic inner wall as represented by the broken line in Fig. 3. It will be understood, however, that said inner wall has a rather high percentage of entrained air. As shown in Fig. 2*a*, however, the walls 55 and 53 direct a very large portion of this rotating liquid mass back through the opening 52 into the tub 2, and it has been observed in practice that the liquid returns to the tub with appreciable force. The rapidly rotating liquid mass within the pump chamber is diverted from the drain opening 26.1 by the wall 54 and there is no loss of liquid to the drain.

The liquid in the pump chamber quickly reaches the stage of forceful expulsion through the opening 52 and it is obvious that no additional liquid can enter the pump chamber through said opening under such a condition of operation. The accumulation within the pump chamber therefore stabilizes rapidly; there is soon reached an equilibrium condition in which water entering the pump chamber through any opening is immediately returned to the tub. In this situation, residual liquid in the pump chamber comprises a rapidly rotating, somewhat irregular annulus extending radially inward from the pump chamber wall to the outermost portion of the pump blades 41. The radially outermost portion is essentially solid liquid; the inner portion is frothy and irregular. As will presently appear, the motor 9 maintains the impeller 30 and pump 40 at full rotational speed during the washing cycle and therefore loss of water from the tub during a washing operation is limited to the insignificant amount remaining in the pump chamber at the end of the washing operation. This residuum is small, being only about one-half cupful in most instances.

In gravity drainage installations, in which liquid will flow to a plumbing trap below the pump chamber, it is only necessary to stop the motor to effect drainage from the sump. In pressure drainage installations, in which it is necessary to raise the effluent to a point of discharge into the plumbing waste connection, the motor is reversed, whereupon the baffles 54 and 53 direct the liquid to the pump chamber outlet 26.1 and the baffles 55 and 53 maintain the inlet 52 clear for free flow of liquid from the sump into the pump chamber.

The wiring diagram shown in Fig. 6 is specifically for time-cycle control of dishwashing apparatus in which the effluent is to be lifted prior to its discharge into the plumbing waste system.

For example, there is mounted on the front of the dishwasher cabinet adjacent the door 4, or in any other convenient location, a conventional time-cycle controller 60 such as that shown in the D. F. Illian U. S. Patent 2,619,557, granted November 25, 1952, for "Program Selector Switch." A time-cycle controller has a conventional timer motor 61 which by means of the usual reduction gearing (not shown) drives the cam shaft 62 through a slip-clutch 63. Mounted on said shaft for rotation therewith are a series of insulated cams C1, C2, C3, C4. A manual setting knob 64 is fixed to the end of the shaft 62, and said knob will have a pointer or other indexing mark which will have reference to indicia such as "off" and "on" marked on an escutcheon plate 65 behind the knob.

Cam followers respectively control switches of the spring-leaf contact type as follows: Cam C1 is operatively associated with a triple pole, double throw switch S1, which energizes the motor 15 for operation in forward or reverse direction according to the closure of the contacts of switch S1. Cam C2 is associated with a single pole, single throw switch S2, which controls the energy to the inlet valve solenoid 25. Cam C3 operates the switch S3 in circuit with heating element 34. Cam C4 controls the energy to the timer motor 61.

The first hot water introduction into the dishwasher is for a "flushaway" rinse to remove loose food soil from the articles within the tub. The water is therefore not permitted to remain in the tub and for the positive expulsion of the soil bearing liquid, the impeller 27 and the associated centrifugal pump 40 are caused to rotate in a clockwise direction, as viewed in Fig. 2.

Assuming the dishwasher to have been loaded and ready for operation, the user turns the knob 64 clockwise of Fig. 6 to "on" position. This has the effect of rotating all of the cams, and specifically rotes C4 to a position closing its switch S4 to energize the timer motor 61 through the circuit comprising line conductor 66, conductor 67, switch S4 and conductor 68 to line conductor 69. The cam shaft then continues rotation under power, and very shortly thereafter cam C1 closes switch S1 in one of its throw positions to energize the motor 15. The rinsing operation requires the motor to run in its "drain" position as contrasted to its opposite or "wash" direction. It will be observed that cam C1 is a three level cam, having a low or "drain" position, an intermediate or "off" position, and a high or "wash" position. As shown, the cam follower first drops to the drain position. This closes the windings of motor 15 as follows: Conductors 66, 70, 90, 71, start winding 15S, centrifugal switch 72 (which would at that time be closed), conductors 73, 74, contacts 75 and 76 of switch S1, and conductors 77 and 78 to line conductor 69. The main winding 15M is also energized at this time in the circuit comprising conductors 66, 70, 90, contacts 80 and 81 of switch S1, conductor 82, winding 15M, marginal relay 83, conductor 84, contacts 85, 86 of switch S1, conductors 87 and 74, contacts 75 and 76 of switch S1, and conductors 77 and 78 to line conductor 69. As the motor develops speed, the centrifugal switch 72 will break the circuit to winding 15S and the motor continues under its main winding.

The current drawn by the motor is light and is below the threshold point of the marginal relay 83 which therefore remains in closed circuit condition. After the motor begins operation, cam C2 closes switch S2 to energize the solenoid coil of the inlet valve 21 through the circuit which includes conductors 66, 67, 88, switch S2, conductor 89, the closed contacts of relay 83, solenoid 25 and conductor 78 to line conductor 69. The motor operating under a very light load, the current drawn by the relay 83 remains below its pull-level. At the end of a forty-five second spray rinse period, cam C2 causes switch S2 to open, interrupting the solenoid circuit and the inlet valve closes. Motor 15 may if desired continue in operation for a brief additional period to insure the complete removal of all rinse water. Cam C1 returns switch S1 to open circuit condition and maintains that

condition for a period—for example, forty-five seconds—within which the motor comes to a complete stop.

The washing period is introduced by the operation of the motor in the "washing" direction and the addition of heated water. The operation of switch S2 is as above recited. Motor operation begins when cam C1 brings the actuator switch S1 to the high level of the cam. This energizes the motor winding 15S in the same direction, through the circuit comprising conductors 66, 70, 90 71, winding 15S, centrifugal switch 72, conductor 74, contacts 75 and 91 of switch S1 and conductors 92 and 78 to line conductor 69. Main winding 15M however is energized in the opposite direction through the circuit comprising conductors 66, 70, 93, contacts 94 and 85 of switch S1, conductor 84, marginal relay 83, winding 15M, conductor 82, contacts 81 and 95 of switch S1, conductors 87 and 74, contacts 75 and 91 of switch S1, and conductors 92 and 78 to conductor 69. When the motor picks up speed, switch 72 will open, cutting out the start winding 15S.

With the impeller 27 and pump 40 now rotating in a direction in which practically no water will reach the drain opening 26.1, the load on the motor increases until the current drawn by the winding 15M reaches the threshold level of relay level 83 which thereupon attracts its armature to open inlet valve circuit. In presently known machines in which this type of control has been used for several years, it has been established that the relay 83 can be adjusted to interrupt water flow when substantially any desired quantity of water has been introduced. In the present instance, it will be assumed that the relay opens the inlet valve circuit when about twelve pints of water have entered the dishwasher tub. As a safety measure, cam C2 is arranged to open switch S2 after a brief further interval to provide a second interruption of the inlet valve circuit. During this washing period the detergent in the dispenser D will enter the washing liquid.

It will be observed that cam C3 has by this time closed its associated switch S3 and the heating element 34 becomes energized.

At the end of the predetermined washing time, cam C1 returns motor control switch S1 to the intermediate or "off" position and the motor comes to a stop. Then cam C1 drops to the drain position, pursuant to which the motor is reversed for a period of about forty-five seconds to operate in the discharge direction, as previously recited and all of the spent wash water is pumped to the plumbing drain. The cam returns the switch to open position and after an interval causes it to close to operate the motor in the "wash" direction, all as previously explained. Simultaneously, cam C2 causes switch S2 to close the circuit for the inlet valve solenoid 25, it being understood that at this time, the marginal relay will again have its contacts in closed position. A second quantity of water is introduced and the motor continues operating in the "wash" direction to accomplish a power rinse operation in which any residual detergent solution and food soil is removed from the dishes. At the end of this rinse operation, the motor stops and then reverses to discharge the rinse water to the plumbing drain and operates then for a third time in the "wash" direction. At this time as clearly indicated by the cam diagram of Fig. 6, the inlet valve is again operated to introduce a second quantity of rinsing liquid.

At the end of the second rinse, the motor stops and reverses to discharge the spent rinsing liquid. Fig. 6 indicates that the motor stops, and restarts in the "wash" direction. If desired, the motor control cam may be arranged to continue motor operation in the "drain" direction, for there is no further introduction of water and the operation of the motor is now to drive impeller 27 so that the blades 31 thereof will circulate warmed air through the dishwasher tub to dry the articles contained therein. About ten minutes before the end of the complete operation, cam C3 returns its switch S3 to open circuit condition, thus interrupting the circuit to the heating element. The motor continues operation to circulate air throughout the dishwasher tub until shortly before the end of the operation, at which time cam C1 returns switch S1 to "off" position. Coincidentally therewith, or shortly thereafter, cam C4 returns the timer motor switch S4 to open position and the entire operation is terminated. The knob 64 will then have rotated through a complete cycle in which its pointer indexes to the "off" designation on the escutcheon 65.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. In a dishwasher or the like, the combination of a tub adapted to receive a quantity of liquid, means within said tub to circulate said liquid throughout said tub, a pump of the centrifugal type having a pump casing disposed beneath said tub, said pump having a multibladed impeller, a drainage conduit communicating between said tub and said pump casing, a baffle disposed within said pump casing at the entry of said drainage conduit thereinto to direct the opening of said conduit tangentially of the rotation of said impeller, a discharge conduit opening into said pump casing, a baffle disposed within said pump casing about the discharge conduit to direct the opening thereof tangentially of the rotation of said pump impeller but facing oppositely to said drainage conduit opening, each said baffle being disposed relatively closely adjacent the radius of rotation of said impeller, and means for selectively rotating said impeller in a clockwise or a counterclockwise direction.

2. A dishwasher according to claim 1, in which the openings of said drainage and discharge conduits into said pump casing are closely adjacent and the respective baffles have a common wall between said openings.

3. A dishwasher according to claim 1, in which said baffles are disposed radially outward of said impeller blades.

4. A dishwasher according to claim 1, in which said impeller rotates in a horizontal plane and the openings communicating between the pump casing and the respective drainage and discharge conduits are within the vertical area traversed by said pump impeller.

5. A dishwasher according to claim 1, in which upper and lower wall portions of the pump casing respectively comprise upper and lower wall portions of said baffles.

6. In a dishwasher or the like, the combination of a tub adapted to receive a quantity of liquid, an impeller within said tub to circulate said liquid throughout said tub, a pump of the centrifugal type having a pump casing disposed beneath said tub, said pump having a multibladed impeller concentric with said first-named impeller, a motor disposed beneath said pump casing and having a shaft extending therethrough into said tub, means for drivingly connecting said pump impeller to said motor shaft, means for keying said first-named impeller to said pump impeller driving connection to be driven thereby, a drainage conduit communicating between said tub and said pump casing and entering said casing through a side wall thereof, a discharge conduit communicating between said pump casing and a point remote therefrom, baffle means within said pump casing to direct flow of liquid within said casing into either said drainage conduit opening or said discharge conduit opening according to the direction of rotation of said pump impeller, and means for rotating said motor shaft in a direction to produce the desired direction of rotation of said pump impeller.

7. A dishwasher according to claim 6, in which said drainage conduit opens into said tub radially outward of said first-named impeller.

8. A dishwasher according to claim 6, in which a substantially cylindrical screen is disposed concentrically about said first-named impeller and said drainage conduit opens into said tub radially outward of said screen.

9. In a dishwasher or the like, the combination of a tub adapted to receive a quantity of liquid in a sump portion thereof, a motor disposed beneath said tub and having a shaft extending into said tub through a relatively large-diameter opening in the bottom wall of said sump, a pump of the centrifugal type having a casing disposed beneath said sump, said casing having an opening permitting the passage of said motor shaft therethrough, a pump impeller disposed within said casing about said shaft, means including a yoke member fixed to said shaft at the upper end thereof and extending through said sump wall opening into securement with said pump impeller to drivingly connect said motor shaft and said pump impeller, a dishwasher impeller disposed within said sump and fixed to said motor shaft for rotation therewith, said dishwasher impeller having a hub portion disposed about said yoke member, a drainage conduit communicating between said sump and said pump casing, a discharge conduit communicating with said pump casing, baffle means within said pump casing to direct flow of liquid within said casing into either said drainage conduit or said discharge conduit according to the direction of rotation of said pump impeller, and means for rotating said motor shaft in a direction to produce the desired rotation of said pump impeller.

10. A dishwashing machine according to claim 9, in which said yoke member comprises rigid strap portions disposed symmetrically about said motor shaft and extending through the opening in said sump bottom wall.

11. A dishwashing machine according to claim 9, in which said pump impeller is secured to said yoke member by a plurality of rigid strap portions disposed symmetrically about said motor shaft, said strap portions having radially extending ears extending through said sump wall

opening in relatively close proximity to the wall of said opening.

12. A dishwashing machine according to claim 9, in which said yoke member and said motor shaft have mutually interfitting, non-circular portions by which said yoke member is associated with said shaft to be driven thereby.

13. A dishwashing machine according to claim 9, in which said pump impeller is secured to said yoke member by a plurality of rigid strap portions disposed symmetrically about said motor shaft within said dishwasher impeller hub, said strap portions having outwardly extending projections providing a support for a lower wall portion of said hub.

14. In a dishwasher or the like, the combination of a tub adapted to receive a quantity of liquid, said tub having a sump formed in its bottom wall, a pump casing secured to said tub below said sump, a reversible motor fixed below said pump casing and having a drive shaft extending through said casing and said sump and projecting into said tub, a dishwashing impeller fixed to said motor shaft for rotation within said sump, a multibladed pump impeller fixed to said shaft for rotation within said pump casing, a conduit opening into said tub at a low point thereof remote from said dishwashing impeller and opening into said pump casing, a discharge conduit opening into said pump casing, means within said pump casing to direct liquid into one of said pump casing openings and diverting liquid from the other of said pump casing openings according to the direction of rotation of said motor shaft, and means for effecting a desired direction of rotation of said shaft.

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