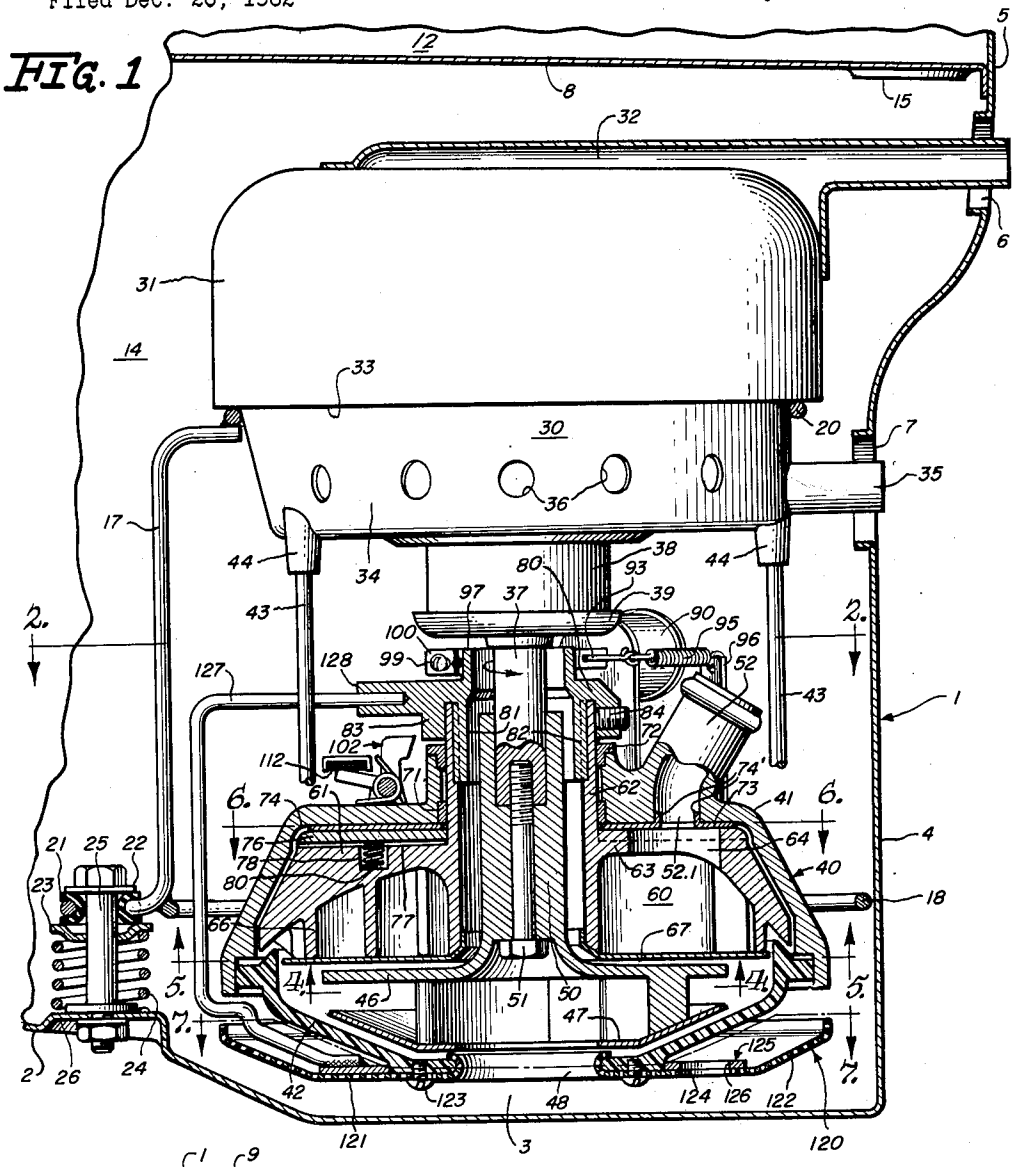
March 24, 1964 E. S. STODDARD ETAL 3,125,959

PUMPING APPARATUS

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FIG. 1



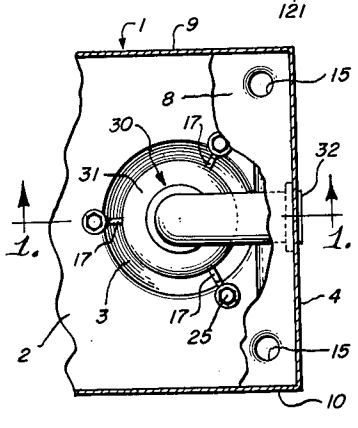


FIG. 1a

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PUMPING APPARATUS

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FIG. 2

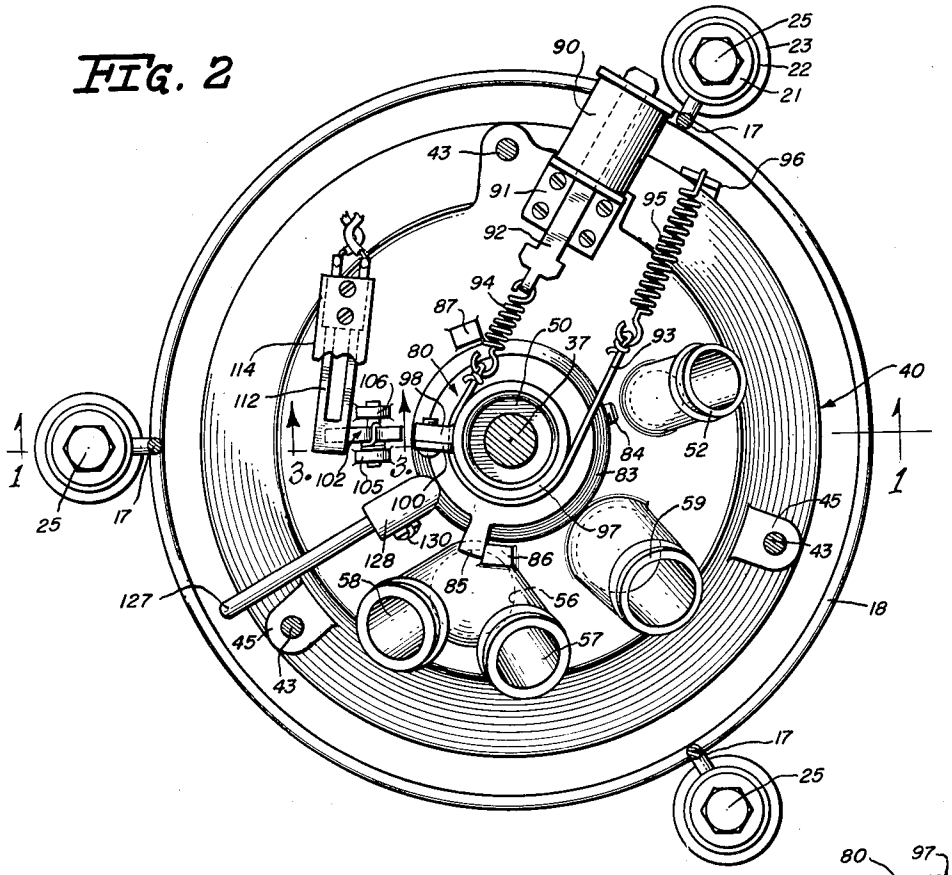


FIG. 4

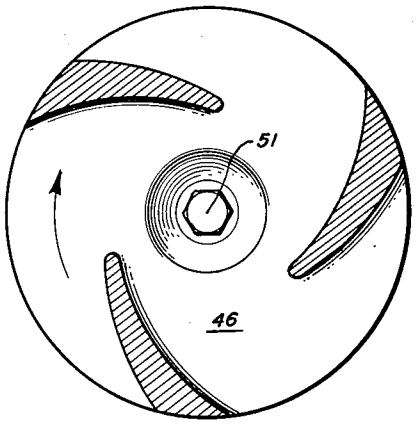
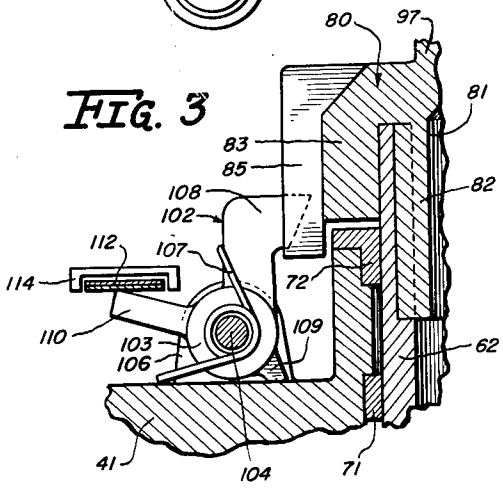


FIG. 3



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FIG. 5

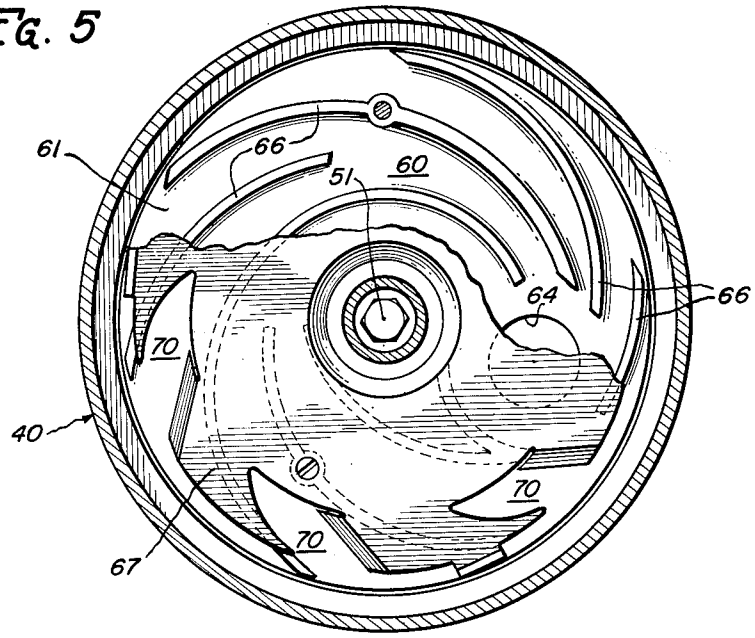
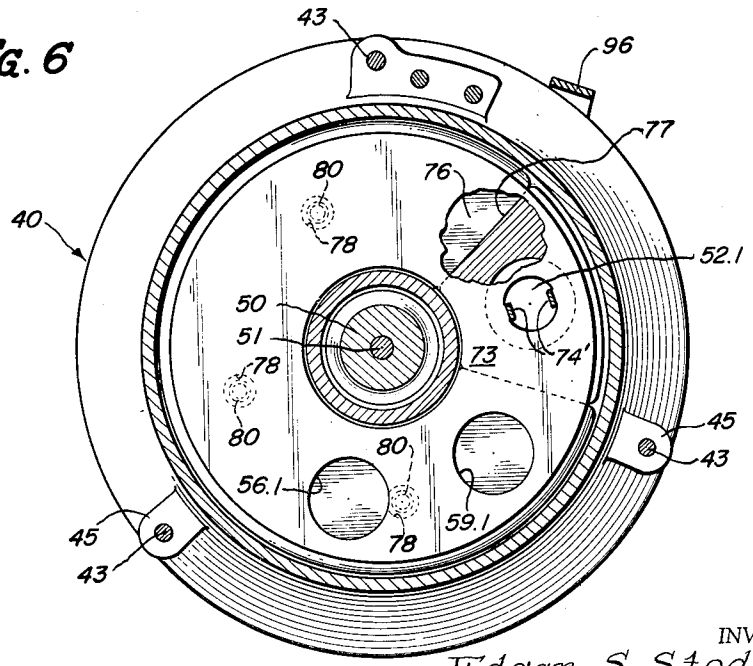


FIG. 6



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PUMPING APPARATUS

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FIG. 7

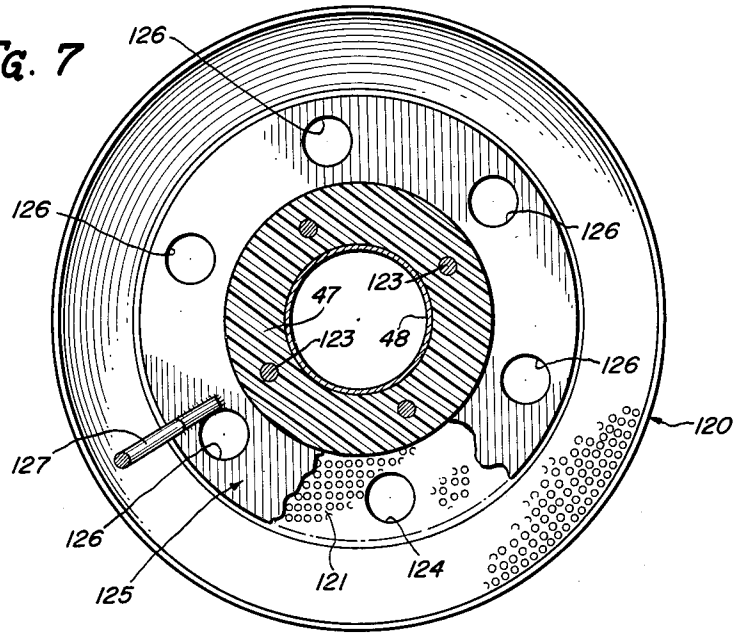
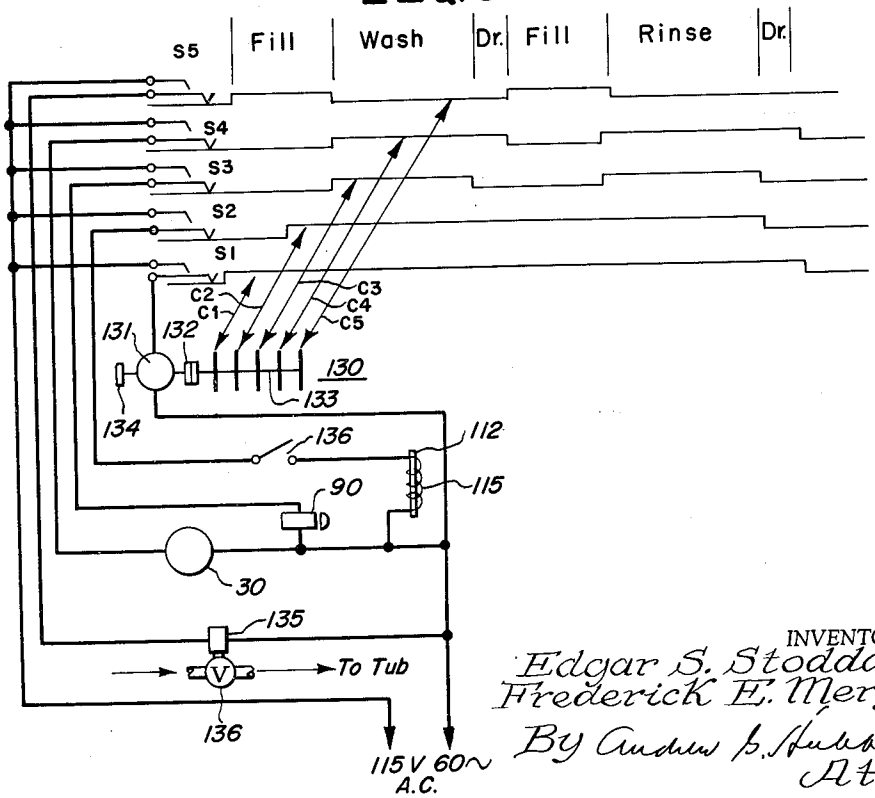


FIG. 8



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3,125,959

PUMPING APPARATUS

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Filed Dec. 26, 1962, Ser. No. 246,939
14 Claims. (Cl. 103—2)

This invention relates to pumping apparatus, and in particular, to apparatus having a fluid impeller disposed within a casing provided with multiple discharge ports, and valve means disposed between the impeller and said ports to select the port through which discharge is to be made.

Although not limited thereto, our invention is particularly adaptable to dishwashing apparatus having a first compartment within which dishes, glassware, table silver and the like are to be washed, and a second compartment for the washing of pots, pans and other cooking utensils. In view of the fact that dishes and pots and pans present substantially different washing problems, it has never been quite satisfactory to use the same sequence of washing and rinsing operations for each, and the usual domestic dishwasher is generally inadequate for pan washing. A dishwasher equipped with pumping apparatus embodying our invention, can be arranged to direct washing liquid at maximum flow to either the dishwashing or the pan washing compartment, whereby water distribution means and other mechanisms advantageous to the respective washing and rinsing requirements may be operated at maximum efficiency. After each of the washing and rinsing cycles, the pump automatically adjusts itself to pass the spent washing or rinsing liquid to the drain.

It is therefore an object of our invention to provide a pumping apparatus having improved means for selecting among a plurality of pump discharge outlets.

Another object of our invention is to provide a pumping apparatus having a combination strainer and particulate matter trap at the intake of the apparatus, said trap including automatically operating means for purging the same when the pumping apparatus is established in a specific discharge outlet position.

In a presently preferred embodiment of our invention, a pump of the axial flow type has an impeller mounted within a casing provided with a plurality of outlets displaced one from the other on an arc concentric with the impeller axis. In a dishwasher application, one of said outlets may communicate with the dishwashing compartment, a second may supply the pan washing compartment, and a third may be connected to the drain line. For selection of the desired outlet we provide a rotatable valve member intermediate the impeller and the casing, with solenoid actuated means for effecting rotation of said valve member. First and second fixed stops on said casing cooperate with a stop on said valve member to bring said member into registry with first and second casing outlet ports respectively; and a movable stop mounted on said casing is adapted for selective registration with said valve member stop to establish the valve member in registry with a third of the discharge outlets. The valve member actuating means is biased so as to restore the valve member in registry with the discharge outlet connected to the drain line.

Surrounding the casing and the inlet port thereof, we provide a concave screen through which a large part of the liquid flows before it enters the impeller. At the radially innermost portion of the strainer we provide a plurality of relatively large openings arranged about a circle concentric with the casing. In covering relation to said openings, we provide a control ring having a mechanical connection with said rotatable valve member. When said member is established in either the dishwashing

or the pan washing position, the control ring closes the strainer openings, whereupon liquid is caused to pass through the screen; but when the valve member is rotated to position it in registry with the drainage outlet, the control plate exposes the large screen openings so that any accumulation of solid matter on the screen will pass through the openings to the impeller inlet and be discharged by the pump to the drain line.

It will be seen, therefore, that a feature of our invention resides in means for operating the valve means to select the desired discharge passage.

Another feature of our invention resides in an improved strainer system for filtering out of the liquid, food particles and other particulate matter which might otherwise be redeposited on the dishes or pans, and subsequently purging the strainer of the accumulated matter as a part of the adjustment of the valve means to its drainage position.

Other features and advantages of the invention will best be understood by the following detailed description of a presently preferred embodiment thereof, read in connection with the accompanying drawings in which:

FIG. 1 is an elevation of our pumping mechanism in operating relationship to a dishwasher structure with the pump itself taken in section on lines 1—1 of FIG. 2;

FIG. 1*a* is a fragmentary plan section to illustrate a preferred location of the pumping mechanism in a dishwasher;

FIG. 2 is a plan view of the pump casing and associated equipment with certain ancillary structure shown in section on lines 2—2 of FIG. 1;

FIG. 3 is an enlarged view of the supplemental stop mechanism, with certain elements shown in section on lines 3—3 of FIG. 2;

FIG. 4 is a bottom plan view of the pump impeller, in section on lines 4—4 of FIG. 1;

FIG. 5 is a bottom plan view of the discharge selection valve, with the casing in section on lines 5—5 of FIG. 1 and the inlet guide plate fragmentarily shown;

FIG. 6 is a plan section taken on lines 6—6 of FIG. 1;

FIG. 7 is a plan section of the strainer and purge ring, looking in the direction of the arrows 7—7 of FIG. 1, the purge ring being fragmentary; and

FIG. 8 is a schematic wiring diagram.

Referring to FIGS. 1 and 1*a*, the lower portion of a dishwasher tub 1 is fragmentarily shown. It will be understood that the tub has a base wall 2 sloping toward a sump 3 which is arranged centrally of the rear wall 4. Said wall curves upwardly and outwardly to an upper rear wall portion 5; in the rear wall are the elongated openings 6 and 7 through which extend certain motor ventilation ducts, as later described. A wall 8 cooperates with side walls 9 and 10 to form an upper washing compartment 12 within which dishes, glassware, and table silver are washed. Said side walls cooperate with the base wall 2 and wall 8 to provide a lower washing compartment 14 for pot and pan washing. It will be understood that the tub structure is completed by a top wall and a front wall (not shown) and that said front wall has one or more doors (not shown) which afford access to the respective washing compartments. Also, said tub has facilities (not shown) for the admission of heated water into the tub; means (shown schematically in FIG. 7) for establishing an operational cycle for washing dishes and pots and pans; racks or other means (not shown) for disposing the soiled ware in said compartments 12 and 14, and supporting feet or other mounting devices. It will be noted that the wall 8 slopes toward the rear wall portion of the tub and that in corner areas of the wall 8 openings 15 are provided whereby washing or rinsing liquid drains from the upper compartment 12 into the sump portion 3. Said

openings will, of course, be provided with screens or the like (not shown).

As best shown in FIGS. 1 and 2, a supporting cage or frame is used to resiliently support the motor and pump assembly. Said cage has three uprights 17 enclosed by a lower ring 18 and an upper ring 20, the latter functioning as the actual support structure for the motor and pump assembly. The foot of each of the uprights 17 is formed into a circle enclosing a rubber grommet 21 confined between an upper washer 22 and a lower washer 23, the latter serving as an upper member of a cage confining the coil spring 24. As best shown in FIG. 1, this mounting assembly is carried by the shoulder bolt 25, in turn carried on the step portion 26 of the base. Obviously, the shoulder bolt provides a means for adjusting the compression of the coil spring 25.

The motor 30 is of the usual induction type; in the illustrated service of a dishwasher it would probably have a one-third horsepower rating. The motor casing includes an upper sheet metal casing 31 to which is affixed the ventilation duct 32, said duct projecting through the elongated opening 6, see FIG. 1*a*. It will be understood that the motor armature has the usual integral fan blades (not shown) whereupon motor operation will draw air through the upper portion of the motor and discharge it through an annular space 33 at the bottom of the housing portion 31. The lower housing portion 34 is preferably of cast aluminum or other metal to which the upper support ring 20 may be secured. A second ventilation passage 35 extends through opening 7 and is arranged to discharge air upwardly into the motor, being drawn thereinto by fan blades (not shown) forming a part of the motor armature. The housing has any suitable number of openings 36 through which air leaves the motor casing and discharges into the dishwasher. The motor shaft 37 extends downwardly through the appropriate bearing structure 38 and has affixed thereto a cup-like water slinger 39 which prevents any creepage or passage of water into the motor housing.

The pump 40 comprises an upper casing portion 41 and a lower casing portion 42. Desirably, the upper casing portion is of metal, such as cast aluminum, but the lower casing portion may be of a phenolic condensation material such as "Bakelite" or the like. The respective portions are arranged for securement one to the other by means of a conventional bayonet joint or interrupted thread arrangement (not shown). The upper casing part is suspended from the motor by three suspension rods 43 which secure to the lower motor casing in socketed elements such as at 44, FIG. 1, and enter tapped openings formed in the flats 45 of the upper pump casing, as indicated in FIG. 2.

The pump impeller 46 is conventional and has a conventional inlet shroud 47 fixed over the blades to bring liquid more efficiently through the axial inlet opening 48 of the lower pump casing. The impeller shaft 50 receives the motor shaft 37 and is fastened thereto by means such as the bolt 51. It will be understood that the motor shaft may have a flat side cooperating with a D shaped socket at the end of the impeller shaft to perfect the driving arrangement.

FIG. 2 shows that the upper pump casing has three outlets. Outlet 52 is the drainage outlet through which spent washing and rinsing liquid is ejected to the plumbing waste line (not shown). Outlet 56 has structure providing a dual outlet arrangement including the branches 57 and 58 to serve water distribution means (not shown) located adjacent each side of the pan washing compartment 14. Outlet 59, intermediate the other two, serves the water distribution system (not shown) in the dish washing compartment 12. Of course, the respective outlets are connected to the facilities served thereby by flexible conduits (not shown). It will be understood that the exact type and arrangement of the water distribution systems for the respective compartments may be in all respects conventional and form no part of our present invention.

In order selectively to establish the outlet through which the pump discharge flows, we provide a rotatable valve member and means for selectively establishing the valve member in the proper relationship to the casing outlet. Referring first to FIGS. 1 and 5, the valve member 60 includes a body part 61 having a tubular hub 62. Intermediate the ends of the hub, the body portion 61 has a flat platform 63 through which passes the single discharge opening 64. The diameter of opening 64 is that of the largest of the pump casing outlet openings; in the present instance, each of the openings 56 and 59 is one inch in diameter and opening 64 would be the same. It will be noted in FIG. 1 that the lower wall of the valve member presents a concavity having a maximum depth at the passage 64. Viewed from below, as seen in FIG. 5, the valve member has a plurality of spiral ribs 66 which direct the impeller discharge to the valve outlet 64; and it will also be noted that the bottom of the valve member is closed by a directional plate 67 (fragmentarily shown in FIG. 5) which causes the liquid leaving the impeller (the liquid flows spirally outward) to enter the valve cavity through the slots 70 of the plate 67.

It will be understood, of course, that the valve member is stationary during the operation of the pump but is arranged for rotation to bring its opening 64 into registry with the pump casing outlet to be used at a prescribed stage of the operation of the dishwasher. To reduce friction, the upper portion of the hub 62 is journaled in oil impregnated, porous bronze bearings 71, 72 carried within a hub portion of the upper pump housing 41; and we also provide a circular friction plate 73 in surface contact with the smooth underside 74 of the pump housing 41. Said plate 73 fits tightly over the upper portion of the valve member hub 62 and is rendered immobile relative to the pump housing. A convenient way of securing plate 73 is by the upwardly facing tabs 74' in the passage 52.1. These tabs enter the pump casing aperture 52. It will be noted that plate 73 also has apertures 56.1 and 59.1, and that the diameter and disposition of the three apertures in plate 73 are identical with those of the pump casing portion 41; that is, they are on the same radius and in the same angular relationship one with the other. As a low friction member between the surface 63 of the valve member and the plate 73, we provide a plate 76 of an inherently lubricous material such as a high density polyethylene. Said plate is an interrupted annulus, there being a gap of sixty degrees in its circumference. This plate seats within a similarly shaped recess 77 formed in the upper wall 63 of the valve member; the gap portion of the plate straddles the opening 64 in such member. FIG. 1 shows one of three cavities 78, within each of which is a coil spring 80. These springs collectively urge the plate 76 against the plate 73. The upper surface of the plate 76 is therefore slightly above the surface of the valve member 60 whereupon it becomes immaterial whether or not said valve member surface is smooth.

To accomplish the orientation of the valve member relative to the desired outlet aperture in the upper pump casing 41, we utilize electro-motive means, advantageously a solenoid, acting upon a collar which is keyed to the upper portion of the valve member hub 62. As best seen in FIGS. 1 and 3, the collar 80 has an inner skirt portion 81 which enters said upper hub portion and is provided with ribs 82 which key into grooves in the hub. There is also a skirt portion 83 externally of the valve member hub; said external skirt accommodates one or more set screws 84 to perfect the securement of the collar to the hub. The external skirt has a downwardly extending radial lug 85 arranged for engagement with one or the other of the fixed lugs 86, 87 (FIG. 2) formed as part of the pump casing portion 41. The disposition of the respective lugs is such that the lug 85 is against the stop 86 when the aperture 64 of valve member 60 is in registry with the drain discharge outlet 52 of the pump casing. When said lug 85 is adjacent stop 87, the aperture 64 is

in registry with the casing aperture **56** which, as above noted, supplies the pan washing compartment **14**. When the lug **85** is stopped by an intermediate stop, presently described, the aperture **64** will register with the casing aperture **59** serving the dishwashing compartment **12**.

To accomplish the rotation of the hub **80** and its associated valve member, we mount a solenoid **90** on a suitable rigid bracket **91** fastened securely to the pump casing portion **41**. The armature **92** of the solenoid is attached to a flexible steel cable **93** by the interposed coil spring **94**. The other end of cable **93** secures to a coil spring **95**, in turn attached to a bracket **96** fixed to the pump casing. Cable **93** traverses the upper portion **97** of the collar **80**, passing through an opening formed in a radially extending arm **98** which mounts a screw **99** and a plate **100** secured thereby; said plate **100** jams the cable **93** tightly against the collar portion **97** and prevents the cable from moving relative to the collar. The stroke of the armature **92** is such as to effect the rotation of the valve member required to bring the aperture **64** from the drainage aperture **52** to the pan wash aperture **56**. When the solenoid is deenergized, the spring **95** rotates the valve member to bring the aperture **64** into a "home" registry with the drain opening **52**, this home registry being established by the engagement of lug **85** with stop **86**, as previously noted.

The intermediate stop **102** (FIG. 3) has a cylindrical body **103** rotatably mounted on a pin **104** secured within the spaced lugs **105**, **196** (FIG. 2). A light mouse-trap spring **107** biases the stop in clockwise rotation, as viewed in FIG. 3, thus bringing it normally into an operating relationship with the lug **85** on the collar. An arm **108** integral with the body **103** extends angularly into the path of movement of the lug **85**. A foot **109** normally rests against casing **41** to establish the "home" position of the stop **102**. A lever **110** extends from the body **103** as shown. It is therefore obvious that the stop **102** is normally in position to interrupt the rotation of the valve member **60**; said interruption is such as to establish the valve port **64** in registry with the dishwashing outlet **59**. Although the valve member is held by the stop **102** in this intermediate position, the spring **94** permits the solenoid armature to complete its full stroke.

To rotate the stop **102** counterclockwise of FIG. 3 to permit a full rotation of the valve member **60** and thus establish the pumping mechanism for the pan washing function, we provide a bimetal member **112** having a cantilever mounting within a casing **114**. The free end of the bimetal overlies the end of lever **110**, as indicated in FIG. 3. The bimetal is arranged so that on heating it deflects downwardly, thus effecting a counterclockwise rotation of stop **102**. Deflection of the bimetal may be accomplished by making it an element of an electrical circuit, or as suggested in FIG. 7, by enclosing it in a resistance wire wrapping **115**.

In a dishwasher application, and in others in which the pump may be handling liquids containing particulate matter, it is desirable to separate the foreign matter from the body of liquid, and to provide means for automatically purging the filter or separator at the appropriate time. In the present invention we provide a fixed screen arranged about the inlet to the pump housing. The screen is below the water level in the sump during operation, and is arranged so that a portion of the liquid will flow through the screen as the liquid is recirculated during the pumping operation. In brief, it is contemplated that in the recirculation process, food soil and other foreign particles are continually being removed from the body of liquid, and yet the filtering device is arranged so that clogging the filter cannot prevent liquid from reaching the pump. At the end of a washing cycle when the pump goes into its drainage operation, the screen is purged of the accumulated soil.

As shown in FIG. 1, the screen **120** is bowl-shaped, having a horizontal wall portion **121**, and an upwardly and outwardly extending wall **122**, terminating in a substantially vertical rim. The screen may be secured to the pump housing portion **42**, as by screws **123**. The screen may be formed from perforated brass sheet stock in which are a relatively large number of perforations of the order of .020 inch in diameter. In the flat portion **121** the screen is provided with a plurality of ½-inch diameter holes **124**, arranged in a circle which as indicated in FIG. 1, brings them into the area **121**, above which the slopping wall of the pump casing portion **42** forms a sloping roof, insuring flow of liquid through the large openings at the proper time. Control of flow through the large openings is by means of an annular valve plate **125** mounted on the screen portion **121** for rotation relative thereto. As shown in FIG. 7, plate **125** has a similar row of holes **126**, arranged about a circle having a radius bringing the holes **126** into registry with the holes **124**.

The valve plate **125** is mechanically connected to the collar **80** by means of the rod **127**. One end of this rod is welded to plate **125**, and the other end enters a socket **128** extending radially from the collar. A set-screw **130** secures the rod within the socket. The angular spacing of the holes **124** and **126** is such that whenever the collar **80** is in a washing position bringing the valve port **64** into registry with either of the valve discharge openings **56** or **59**, the holes **126** in the valve plate are not in registry with the holes **124** of the screen. Thus, during any washing operation water passes through the strainer portion of the screen, which intercepts any food particles large than the screen perforations. Because of the shape of the screen and the overlying pump casing, these food soil particles will drift into the area overlying the valve plate **125**. When the deenergization of solenoid **90** signifies the end of a washing cycle, the rotation of the collar **80** to return valve member **60** to register with drainage outlet **52** will rotate the valve plate **125** to bring the holes **124** and **126** into registry. The resulting flow of water through these large openings and into the pump inlet will scour the valve screen of its accumulations.

FIG. 8 is a schematic operational cycle and circuit diagram. It will be understood that the actual operation of a dishwashing machine usually embodies at least two washing periods and two or more rinsing periods, and that the respective wash and rinsing periods may be of various time durations. Also, contemporary dishwashing machines embody automatic detergent introduction, and the addition of rinse-water conditioning liquids. These factors are not germane to the present invention, and have not been shown in FIG. 8.

In the figure, **130** represents any conventional time-cycle device having a synchronous motor **131** of the well-known "Telechron" type, which by way of a slip clutch and gear reduction mechanism **132** rotates a cam shaft **133** on which are mounted the five cams C1 through C5. A manually operable knob **134** permits the operator to rotate the timer to its starting position, as presently explained. Each of the cams has associated therewith a set of switches, respectively S1 through S5, said switches controlling specific elements of the washing and rinsing system. For example, assuming that a dishwashing function is to be performed, and that the operator has introduced the necessary detergent into the dishwashing tub, the timer cam shaft is then manually rotated to an "on" designation on the usual timer dial (not shown). The set of contacts in switch S1 close, completing the obvious circuit through the timer motor **131**, which then effects continued rotation of the cam shaft. Immediately following the energizing of the timer motor, cam C5 closes switch S5, whereupon the solenoid **135** is energized to open the associated valve **136** to admit hot water to the tub. At the end of the time allotted for filling the tub to the proper operational level, switch S5 returns to open position, and switches S4 and S3 are closed by their respective cams C4 and C3. Switch S4 closes the

circuit to the pump motor 30 beginning the pumping operation, and switch S3 completes the energy circuit to the valve actuating solenoid 90. At this stage it will be noted that the stop 102 is in position to intercept the rotation of the valve member, whereupon the valve member assumes the intermediate position in which the valve port 64 has been moved from the drainage port 52 to the dishwashing port 59. The pump therefore circulates the washing water throughout the dishwashing portion of the cabinet. The rotation of valve plate 125 relative to strainer 120 closes the openings 124. At the end of the wash period cam C3 restores switch S3 to open position, whereby spring 95 enforces the rotation of the collar 80 and returns the valve plate to the drainage position. Switch S4 continues operation of the pump for an interval calculated to effect complete drainage of the spent wash liquid. There follows another fill period to introduce heated water, another period of joint energization of motor 30 and solenoid 90, and another termination of the solenoid circuit while the motor 30 continues to discharge the spent rinse water to the drain.

It will be noted that cam C2 is arranged to close switch S2 for a period beginning just prior to a washing operation and continuing throughout the washing and rinsing cycles. The closure of the switch S2 prepares for a pan washing operation, which is not established until the operator closes the manual switch 136. Assuming this switch to have been closed, the heating element 115 has the opportunity to move the bimetal stop actuator 112 downwardly on the leg 110 of the stop to withdraw the nose 108 of the stop from the path of the stop 85 of the valve member hub 80. When the nose 108 is in this retracted position the solenoid 90 is effective to rotate the valve 60 to its full distance to bring the valve outlet port into registry with the port 56 serving the pan washing compartment. With the switch 136 in a closed position the operation of the pan washing cycle proceeds as described with respect to the dishwashing function. The timer motor cam S1 remains energized until the final drainage operation is completed, whereupon the cam C1 restores the switch S1 to open circuit position and the dishwasher operation is completed.

While there has been described what is at present thought 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.

We claim:

1. Pumping apparatus, comprising a casing having an intake and a plurality of discharge passages, said discharge passages being angularly displaced one from the other on equal radii;
- a valve structure within said casing upstream of said discharge passages, said structure including a body portion and a cylindrical hub portion supporting said body portion within said casing for rotation relative thereto;
- said body portion having a passage selectively registrable with any one of said discharge passages;
- means engaging with said said hub portion to rotate said valve structure;
- fixed stop means for limiting rotation of said valve structure to bring the said body portion passage into registration with one of said casing discharge passages;
- movable stop means for limiting rotation of said valve structure to bring the said passage thereof optionally into registry with another of said discharge passages;
- means for selectively actuating said movable stop means between operating and non-operating positions;
- means for energizing said rotation means;
- and means for effecting translation of fluid from said intake through said body portion passage and the casing passage in registry therewith.

2. Pumping apparatus, comprising a casing having an axially disposed intake and a plurality of discharge passages radially outward thereof, said discharge passages being angularly displaced one from the other;
- an impeller within said casing to effect translation of fluid from said intake to said discharge passages;
- a valve structure having a body portion within said casing between said impeller and said discharge passages;
- means for supporting said body portion for rotation relative to said casing;
- said body portion having a passage selectively registrable with any one of said discharge passages upon rotation of said portion;
- means for rotating said valve body portion to effect said registry;
- fixed stop means for limiting rotation of said valve structure to bring the said passage thereof into registration with one of said casing discharge passages;
- movable stop means for limiting rotation of said valve structure to bring the passage thereof optionally into registry with another of said discharge passages;
- means for selectively actuating said movable stop means between operating and non-operating positions;
- means for energizing said rotation means;
- and means for rotating said impeller.

3. Pumping apparatus, comprising a casing having an axially disposed intake and a plurality of discharge passages radially outward thereof, said discharge passages being angularly displaced one from the other;
- an impeller within said casing to effect translation of fluid from said intake to said discharge passages;
- a valve structure including an external hub portion and a body portion within said casing between said impeller and said discharge passages, said hub portion supporting said body portion for rotation relative to said casing;
- said body portion having a passage equal in diameter to the largest diameter of any of said discharge passages, said passage being selectively registrable with any of said discharge passages upon rotation of said body portion;
- means mechanically associated with said hub portion to rotate said valve body portion to effect said registry;
- fixed stop means on said casing for engagement with said hub to position said body portion with the passage thereof into registration with a predetermined one of said discharge passages;
- movable stop means on said casing for optionally engaging said hub to position said valve body portion with the passage thereof into registry with another of said discharge passages;
- means for selectively actuating said movable stop means between operating and non-operating positions;
- means for energizing said valve structure rotation means;
- and means for rotating said impeller.

4. Pumping apparatus, comprising a casing having an intake and three discharge passages, said discharge passages being angularly displaced one from the other on equal radii;
- an impeller within said casing to effect translation of fluid from said intake through said casing;
- a valve structure within said casing between said impeller and said discharge passages, said valve structure having a cylindrical hub portion concentric with said impeller and said casing and supporting a valve body within said casing for rotation relative thereto;
- said valve body having a passage selectively registrable with any one of said discharge passages;
- means for rotating said hub and body through the arc separating the first and last of said casing passages;
- fixed stop means for defining the extent of said rota-

tion whereby said valve body passage will accurately register with said first or last passage according to the direction of rotation;

movable stop means interposed between said fixed stop means for limiting rotation of said valve structure to bring the body passage thereof optionally into registry with the intermediate casing passage;

means for selectively actuating said movable stop means between operating and non-operating positions;

means for energizing said rotation means;

and means for rotating said impeller.

5. Pumping apparatus according to claim 4, in which said movable stop means comprises a lever mechanism biased to normally exert said rotation limiting function.

6. Pumping apparatus according to claim 4, in which said movable stop means comprises a lever mechanism and the actuating means thereof includes a bimetal member adapted to effect rotation of said lever mechanism against the resistance of a biasing spring.

7. Pumping apparatus according to claim 1, in which said hub engaging means comprises a belt encircling the same and the energizing means therefor comprises a solenoid having a fixed stroke.

8. Pumping apparatus according to claim 4, in which said hub rotation means includes a belt and a solenoid affixed thereto, said belt being spring biased to bring said valve body passage into registry with a predetermined casing passage upon deenergization of said solenoid.

9. Pumping apparatus, comprising a casing having an intake and a plurality of discharge passages, said passages being angularly displaced one from the other on equal radii;

an impeller within said casing to effect translation of fluid therethrough;

a valve body within said casing intermediate the impeller and said discharge passages, said valve body comprising a hollow substantially spherical structure concentric with said casing discharge passages and having a passage adapted for registration with any one of said discharge passages, said valve body having directional vanes internally thereof to define passages receiving fluid from the impeller and conducting the same to said passage;

means for rotating said valve body to bring the passage thereof into registration with a selected one of said casing discharge passages;

and means for rotating said impeller.

10. Pumping apparatus according to claim 9, in which said valve body is substantially enclosed by a plate which restricts entry of fluid to areas about the periphery of said body.

11. Pumping apparatus, comprising a casing having an intake and a plurality of discharge passages, said discharge passages being angularly displaced one from the other on an arc concentric with said casing axis;

an impeller within said casing to effect translation of fluid from said intake to said discharge passages;

a valve rotatably disposed within said casing between said impeller and said discharge passages, said valve having a passage selectively registrable with any of said discharge passages,

means for rotating said valve for effecting said selective registration;

means disposed about said casing intake to provide a screen to intercept and retain particulate matter prior to entry into said intake;

and means effective upon rotation of said valve to establish registration of its passage with a particular casing discharge passage to release the intercepted matter for passage into said casing and ejection through said discharge passage.

12. Pumping apparatus, comprising a casing having an axially disposed intake and a plurality of discharge passages;

an impeller within said casing to effect translation of fluid from said intake to said discharge passages;

a valve disposed within said casing between said impeller and said discharge passages, said valve having a passage selectively registrable with any one of said discharge passages and effective to block flow through the remaining passages;

means for displacing said valve for effecting said selective registration;

means providing an annular screen about said casing intake to intercept and retain particulate matter prior to entry thereof into said intake;

and means effective upon displacement of said valve to establish registration of its passage with a particular casing discharge passage to release the intercepted matter for passage into said casing for ejection through said discharge passage.

13. Pumping apparatus, comprising a casing having an axially disposed intake and a plurality of discharge passages;

means effecting translation of fluid from said intake to said discharge passages;

a valve disposed within said casing between said impeller and said discharge passages, said valve having a passage selectively registrable with any one of said discharge passages and being effective to block flow through the remaining passages;

means for operating said valve for effecting said selective registration;

means providing an annular screen about said casing intake to intercept and retain particulate matter prior to entry thereof into said intake, a portion of said screen having at least one large size aperture for accommodating the escape of said retained material;

a valve plate mounted on said screen portion for movement relative thereto;

and means operable concurrently with operation of said valve to establish said selective registration of said valve passage with a casing passage to position said valve plate to block or permit escape of said retained matter according to the casing passage with which said valve passage is brought into registry.

14. Pumping apparatus, comprising a casing having an axially disposed intake and a plurality of discharge passages, said discharge passages being angularly displaced one from the other on an arc concentric with said casing axis;

an impeller within said casing to effect translation of fluid from said intake to said discharge passages;

a valve rotatably disposed within said casing between said impeller and said discharge passages, said valve having a passage selectively registrable with any of said discharge passages and effective to block flow through the remaining passages;

means for rotating said valve for effecting said selective registration;

means providing an annular screen about said casing intake to intercept and retain particulate matter prior to entry thereof into said intake, a portion of said screen adjacent the casing inlet having a circular row of large openings to pass the retained matter;

an annular valve plate disposed in overlying relation to said row of openings to block or permit passage of material therethrough;

and means mechanically connecting said valve plate and said rotatable valve for operating said valve plate to permit flow through said openings as said valve is rotated to bring its passage into registry with a particular casing passage.

No references cited.