Dec. 20, 1960 R. M. GETCHELL ET AL 2,965,112

DISHWASHER PUMP AND OUTLET VALVE

Filed Dec. 28, 1956

2 Sheets-Sheet 1

FIG. 1.

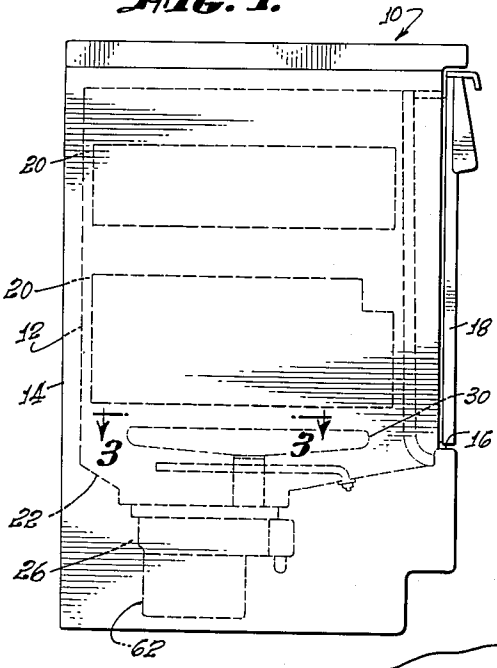


FIG. 2.

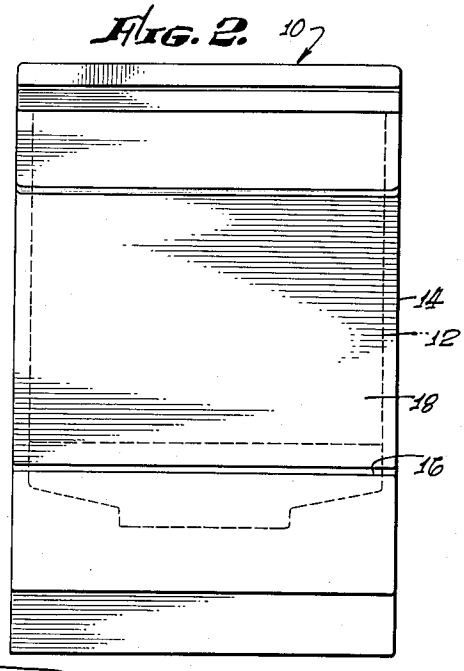
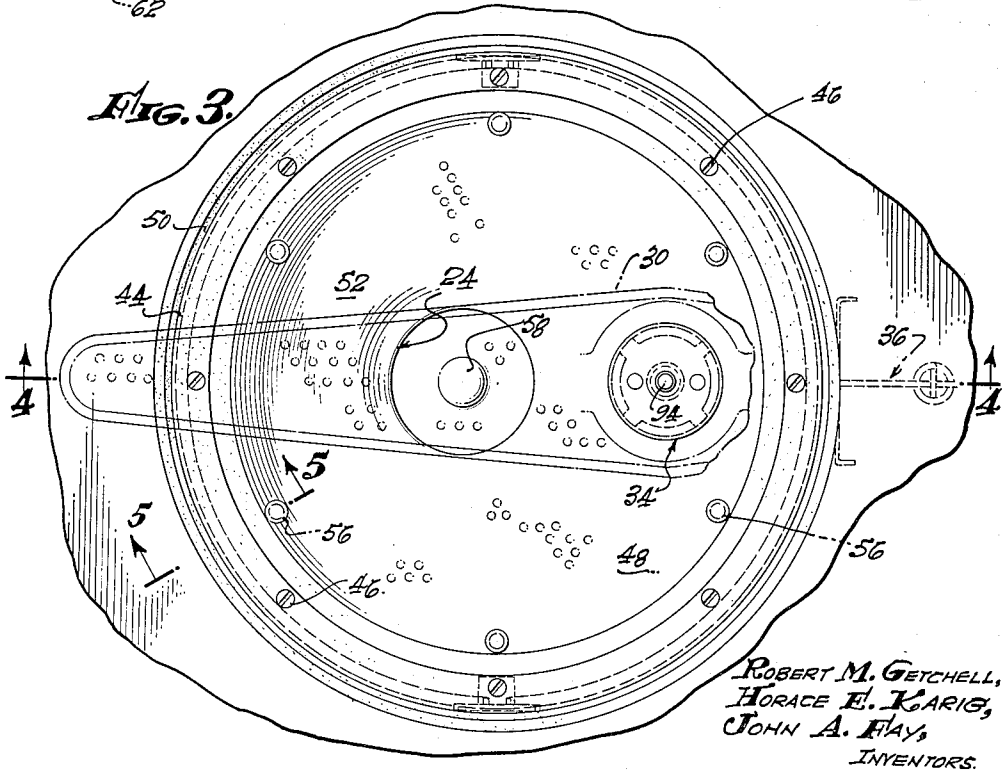


FIG. 3.



ROBERT M. GETCHELL,
HORACE E. KARIG,
JOHN A. FLAY,
INVENTORS.

BY THEIR ATTORNEYS
HARRIS, KIECH, FOSTER & HARRIS.

Dec. 20, 1960 R. M. GETCHELL ET AL 2,965,112

DISHWASHER PUMP AND OUTLET VALVE

Filed Dec. 28, 1956

2 Sheets-Sheet 2

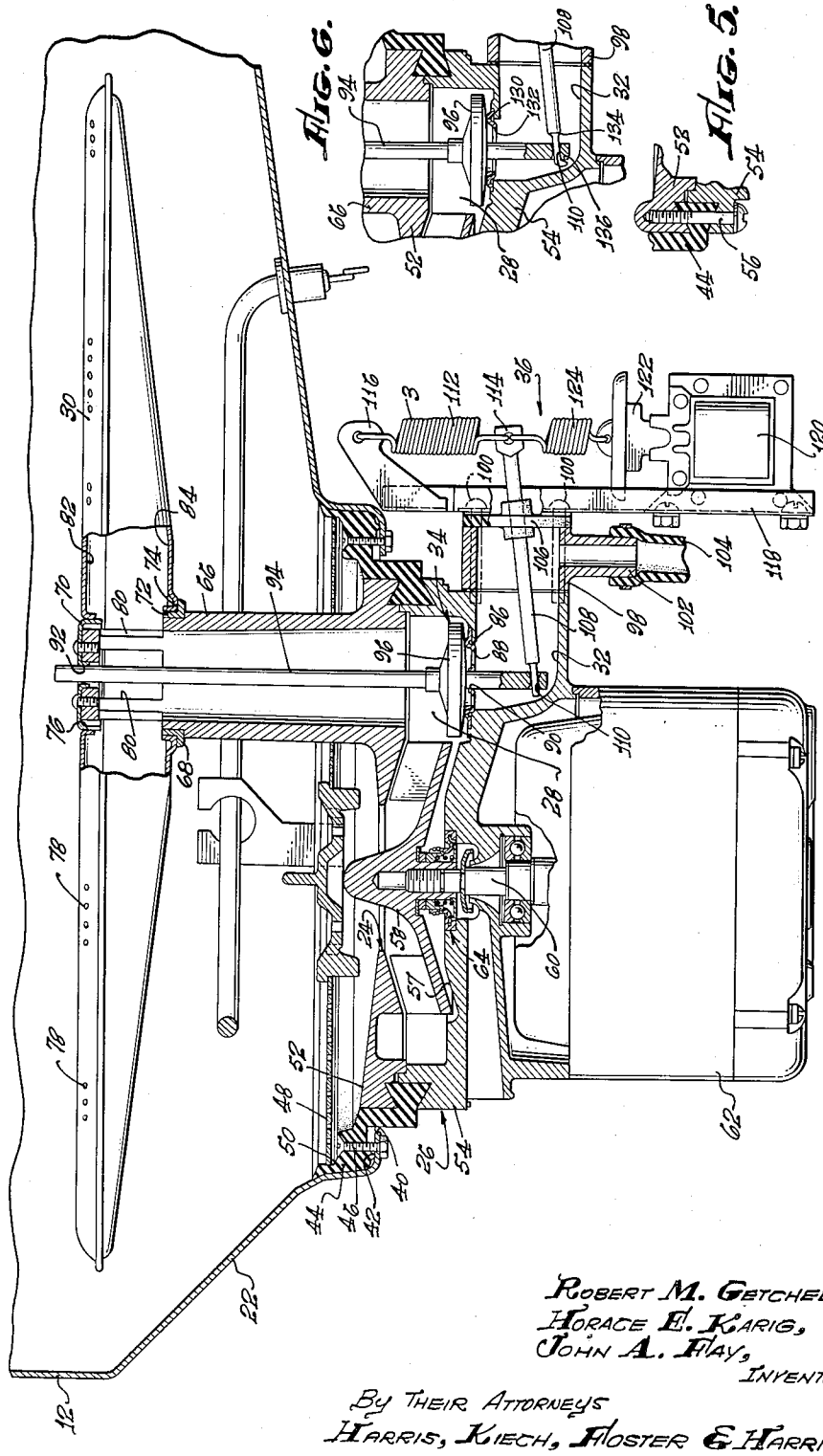


Fig. 4.

Fig. 6.

Fig. 5.

Robert M. Getchell,
Horace E. Karig,
John A. Flay,
Inventors.

By Their Attorneys
Harris, Kiech, Foster & Harris.

United States Patent Office 2,965,112 Patented Dec. 20, 1960

2,965,112

DISHWASHER PUMP AND OUTLET VALVE

Robert M. Getchell, Monrovia, Horace E. Karig, Pasadena, and John A. Fay, North Hollywood, Calif., assignors to Waste King Corporation, Los Angeles, Calif., a corporation of California

Filed Dec. 28, 1956, Ser. No. 631,150

5 Claims. (Cl. 134—176)

The present invention relates in general to dishwashers and, more particularly, to a dishwasher having means for selectively circulating water over dishes to be washed or rinsed and draining the water away upon completion of the washing or rinsing operation.

In general, the present invention contemplates a dishwasher having a dish chamber therein for dishes to be washed and rinsed, and preferably dried, the dishwasher including an impeller of the reaction type at the bottom of the dish chamber for spraying water upwardly over the dishes during the washing and rinsing operations, and including a pump communicating with the bottom of the dish chamber for supplying water to the impeller. The invention further contemplates a dishwasher having means for connecting the bottom of the dish chamber to a drain at the end of each washing or rinsing operation so as to drain away the water sprayed over the dishes by the impeller during such operation.

A primary object of the invention is to provide a dishwasher having valve means for selectively connecting the outlet of the pump to the impeller and to the drain so as to provide forced drainage of water from the dish chamber as well as forced circulation of water over the dishes therein, thereby materially reducing the time required to drain the water from the dish chamber at the end of each washing and rinsing operation.

More particularly, an object of the invention is to provide a valve movable between an impeller position wherein it connects the pump outlet to the impeller and a drain position wherein it connects the pump outlet to the drain, and to provide selective means for moving the valve between such positions.

Another object is to provide spring means constantly biasing the valve toward the impeller position, and to provide electromagnetic means for moving the valve from the impeller position to the drain position when it is desired to utilize the pump to discharge the water from the dish chamber at the end of a washing or rinsing operation.

Another object is to provide a dishwasher wherein the impeller is mounted on a tubular impeller support which extends upwardly into the dish chamber and which communicates with the pump outlet and the drain, the selector valve being located at the junction of the pump outlet with the tubular impeller support and the drain so as to connect the pump outlet to either the impeller or the drain.

Still another object is to provide a selector valve mounted on a valve stem which is reciprocable axially of the tubular impeller support to move the valve between its impeller and drain positions, the valve stem being guided for such reciprocatory movement by central bearing apertures in the impeller support and in a valve seat which is engaged by the valve when it is in its impeller position to connect the pump outlet to the impeller support.

A further object is to provide a flexible wall adjacent the valve stem which acts as a pivot for an actuating rod extending therethrough into engagement with the valve stem.

Another object is to provide a structure wherein the spring means and the electromagnetic means for controlling the position of the selector valve are connected to the outer end of the actuating rod mentioned.

An important object of the invention is to provide a reaction-type impeller having upwardly directed discharge orifices for spraying water delivered thereto by the pump upwardly over the dishes in the dish chamber, and to provide the impeller with a net internal, downwardly-facing area to which the pressure of the water supplied by the pump is applied so as to provide an upward force acting on the impeller in opposition to the downward reactive force acting thereon as a result of the upward discharge of water through the orifices in the impeller. With this construction, thrust forces acting on the impeller are substantially balanced, which is an important feature.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the dishwasher art in the light of this disclosure, may be attained with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevational view of a dishwasher which embodies the invention;

Fig. 2 is a front elevational view of this dishwasher;

Fig. 3 is an enlarged, fragmentary plan view of a portion of the bottom of a dish chamber of the dishwasher and of a portion of a reaction-type impeller therein, and is taken along the arrowed line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken along the arrowed line 4—4 of Fig. 3;

Fig. 5 is a fragmentary sectional view taken along the arrowed line 5—5 of Fig. 3 of the drawings; and

Fig. 6 is a fragmentary sectional view similar to a portion of Fig. 4, but illustrating another embodiment of the invention.

In the drawings, the numeral 10 designates a dishwasher of the invention which includes a dish chamber 12 enclosed by an outer housing or cabinet 14, a doorway 16 adapted to be closed by a door 18 extending through the cabinet and dish chamber to provide access to the interior of the latter. Dishes to be washed in the dish chamber may be supported therein on racks 20.

The bottom of the dish chamber 12 provides a sump 22, the inlet 24 of a pump 26 communicating with this sump to draw water therefrom and the outlet 28 of the pump communicating either with a reaction-type impeller 30 or a drain 32. A selector valve means 34, controlled by an actuating means 36, connects the pump outlet 28 either to the impeller 30 to cause the impeller to spray water upwardly throughout the dish chamber 12 and over dishes in the racks 20, or to the drain 32 to provide forced discharge of water from the sump 22 at the end of each washing and rinsing operation.

Considering the dishwasher 10 now in more detail, the bottom of the dishwasher 10 is provided with an opening 40 rimmed by a flange 42 which serves as a seat for an elastomeric annulus 44, the latter being secured to the flange 42 by bolts 46. A strainer 48 for trapping food waste removed from the dishes during the washing operation is inserted into the upper end of the annulus 44 and is seated on an annular shoulder 50 therein.

The lower end of the annulus 44 is clamped between upper and lower housing members 52 and 54 by screws 56, Fig. 5, the pump 26, the impeller 30, the drain 32, the selector valve means 34 and the actuating means 36 all being carried by the housing members 52 and 54 and thus all being supported by the elastomeric annulus 44 to prevent vibration transmission to the dish chamber 12.

This mounting of the components mentioned is disclosed and claimed in the co-pending application of Walter Peglow, Serial No. 631,369, filed December 28, 1956, now Patent No. 2,880,740, and assigned to the same assignee as the present application.

The housing members 52 and 54 provide therebetween an impeller chamber 57 for a pump impeller 58 of the axial intake and radial discharge type, the pump inlet 24 being formed in the housing member 52 and the pump outlet 28 being located between the two housing members. The pump impeller 58 is carried by the shaft 60 of an electric motor 62 which is mounted on the lower housing member 54, a suitable seal 64 being provided to prevent leakage along the shaft 60.

The upper housing member 52 includes a tubular impeller support having the form of a tubular post 66 which extends upwardly into the dish chamber 12 and which communicates with the pump outlet 28 at its lower end. The impeller 30 is rotatably mounted on the upper end of the tubular post 66, the latter including bearings 68 and 70 for the impeller. The bearing 68 is a combined journal and thrust bearing, being disposed in a bearing opening 72 in the impeller 30 and being provided with an annular thrust flange 74 on which the impeller is seated. The bearing 70 is disposed in a bearing opening 76 in the impeller 30, this bearing taking the form of a cap secured to the upper end of the post 66.

The impeller 30 is hollow and is provided in its upper wall with discharge orifices 78. The latter are directed upwardly to spray water delivered to the impeller 30 upwardly throughout the dish chamber 12 and over dishes carried by the racks 20, and are also directed tangentially to some extent so as to produce rotation of the impeller 30 in a manner well known in the art. Communication between the interior of the impeller 30 and the tubular post 66 is provided by ports 80 in the post between the bearings 68 and 70.

It will be noted that the bearing opening 76 is smaller than the bearing opening 72. This provides the impeller 30 with an internal, downwardly-facing area 82 and a smaller, upwardly-facing area 84. Consequently, the pressure of water delivered to the impeller 30 by the pump 26 acts on a net, downwardly-facing area, equal to the difference between the areas 82 and 84, or to the difference between the areas of the bearing openings 72 and 76, to apply an upward force to the impeller 30. This upward force, which is equal to the product of the net, downwardly-facing area and the pressure of the water within the impeller 30, is selected to substantially cancel the downward reactive force resulting from the upward spraying of water through the discharge orifices 78. Consequently, the impeller 30 substantially "floats" when water is being delivered thereto by the pump 26 to minimize resistance to rotation thereof, which is an important feature.

The drain 32 is formed in the lower housing member 54 and at the junction of the drain with the pump outlet 28 is a valve seat 86 carried by the housing member 54. This valve seat is provided with ports 88 therethrough which establish communication between the pump outlet 28 and the drain 32, and is provided with a central aperture 90 therein lying on the axis of the tubular post 66 and aligned with a central aperture 92 in the upper end of the post, i.e., in the cap, on the upper end of the post, formed by the bearing 70.

Reciprocable axially of the tubular post 66 is a valve stem 94 which extends through the apertures 90 and 92, the bearing 70 and the valve seat 86 thus serving as guides for the valve stem. Carried by the valve stem 94 above the valve seat 86 is a selector valve 96 which is provided with a spherical surface engageable with the valve seat and which is movable upwardly out of engagement with the valve seat into, or substantially into, engagement with the lower end of the tubular post 66. When the valve 96 is in engagement with the valve seat 86, it is in what is referred to hereinafter as an "impeller position" since it cuts off communication between the pump outlet 28 and the drain 32 and establishes communication between the pump outlet and the impeller 30 by way of the tubular post 66. When the valve 96 is moved upwardly out of engagement with the valve seat 86, it is in what may be termed a "drain position" since it establishes communication between the pump outlet 28 and the drain 32 by way of the ports 88 through the valve seat.

Thus, when the selector valve 96 is in its impeller position, the pump 26 supplies water from the bottom of the dish chamber 12 to the impeller 30 for upward spraying over the dishes in the racks 20. Conversely, when the selector valve 96 is in its drain position, the pump discharges water from the sump 22 into the drain 32 under pressure for rapid draining of the sump, which is an important feature.

The drain 32 terminates in a tubular fitting 98 secured to the housing member 54 by screws 100, the fitting 98 being provided with a nipple 102 to which a drain hose 104, or the like, may be connected to conduct water discharged from the sump 22 by the pump 26 to a suitable point of disposal, such as a sewer.

The tubular fitting 98 is closed by a flexible wall or diaphragm 106 through which an actuating rod 108 extends in a fluid-tight manner, the diaphragm 106 being adapted to flex to provide a pivot for the actuating rod. The inner end of the actuating rod is pivotally connected to the valve stem 94, as by inserting it into a transverse aperture 110 therein. As will be apparent, if the actuating rod 108 is pivoted relative to the flexible wall 106 in the clockwise direction, the selector valve 96 will be moved from its impeller position to its drain position, counterclockwise pivoting of the actuating rod resulting in reverse movement of the selector valve.

Considering the actuating means 36 for the selector valve means 30, it includes the actuating rod 108 and also includes spring means for biasing the selector valve 96 toward its impeller position, such spring means including a tension spring 112 connected at one end to the outer end 114 of the actuating rod and connected at its other end to an arm 116 of a bracket 118 secured to the fitting 98 by the screws 100. The actuating means 36 also includes electromagnetic means for moving the selector valve 96 from the impeller position to the drain position, such electromagnetic means including a solenoid 120 mounted on the bracket 118 and having an armature 122 connected to the outer end 114 of the actuating rod 108 by a tension spring 124.

Considering the operation of the invention, when the solenoid 120 is de-energized, the spring 112 maintains the selector valve 96 in its impeller position, wherein it is seated on the valve seat 86. Under such conditions, communication between the pump outlet 28 and the impeller 30 is established, and communication between the pump outlet and the drain 32 is cut off. Consequently, energization of the motor 62 to drive the pump 26 will result in delivery of water from the sump 22 to the impeller 30 to rotate this impeller and to spray water upwardly over dishes in the racks 20. It will be understood that if such water is intended to wash the dishes, suitable additives, such as water softeners, detergents, soaps and the like, may be present therein. If the purpose of spraying the water over the dishes is to rinse them, the water may be fresh water, or it may also contain suitable additives, such as water softeners, and the like.

When it is desired to drain the water from the dish chamber 12 at the end of a washing or rinsing operation, it is merely necessary to energize the solenoid 120, which moves the selector valve 96 upwardly off the valve seat 86 and into its drain position, wherein the pump outlet 28 is in communication with the drain 32. Under these conditions, the pump 26 operates to pump water from the sump 22 out the drain 32 under pressure for rapid re-

moval of water from the dish chamber **12**, which is an important feature.

Referring to Fig. 6, the embodiment illustrated therein is provided with a valve seat **130** differing from the valve seat **86** in that it has an enlarged central opening **132** so that it does not guide the lower end of the valve stem **94**. This guiding function is performed by the actuating rod or lever **108**, which has shoulders **134** and **136** permitting, in effect, longitudinal movement of the inner end of the rod **108** relative to the stem **94** as the rod pivots but still restraining the stem sufficiently against lateral movement to provide a guide for the lower end thereof while permitting relative pivoting of the rod and stem. The shoulder **136** is formed by hooking or peening the inner extremity of the rod **108**.

Although an exemplary embodiment of the present invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the following claims.

We claim:

1. In a dishwasher, the combination of: a dish chamber; a pump having an inlet communicating with the bottom of said dish chamber and having an outlet; a motor connected to said pump; a tubular impeller support extending upwardly into said dish chamber and communicating at its lower end with said pump outlet; a reaction-type impeller rotatably mounted on the upper end of and communicating with the interior of said impeller support; a drain communicating with said pump outlet below said impeller support; a valve stem reciprocable axially of said impeller support; guide means for said valve stem; a valve carried by said valve stem and movable axially of said impeller support between an impeller position wherein it connects said pump outlet to the interior of said impeller support and a drain position wherein it connects said pump outlet to said drain; and means connected to said valve stem for moving said valve between said impeller and drain positions.

2. In a dishwasher, the combination of: a dish chamber; a pump having an inlet communicating with the bottom of said dish chamber and having an outlet; a motor connected to said pump; a tubular impeller support extending upwardly into said dish chamber and communicating at its lower end with said pump outlet, said impeller support having a central aperture; a reaction-type impeller rotatably mounted on the upper end of and communicating with the interior of said impeller support; a drain communicating with said pump outlet below said impeller support; a valve seat interposed between said pump outlet and said drain; a valve stem reciprocable axially of said impeller support and extending through said central aperture in said impeller support; a valve carried by said valve stem and movable axially of said impeller support between an impeller position wherein it is seated on said valve seat and connects said pump outlet to the interior of said impeller support and a drain position wherein it is out of engagement with said valve seat and connects said pump outlet to said drain; and means connected to said valve stem for moving said valve between said impeller and drain positions.

3. In a dishwasher, the combination of: a dish chamber; a pump having an inlet communicating with the bottom of said dish chamber and having an outlet; a motor connected to said pump; a tubular impeller support extending upwardly into said dish chamber and communicating at its lower end with said pump outlet, said impeller support having a central aperture; a reaction-type impeller rotatably mounted on the upper end of and communicating with the interior of said impeller support; a drain communicating with said pump outlet below said impeller support; a valve seat interposed between said pump outlet and said drain; a valve stem reciprocable axially of said impeller support and

extending through said central aperture in said impeller support; a valve carried by said valve stem and movable axially of said impeller support between an impeller position wherein it is seated on said valve seat and connects said pump outlet to the interior of said impeller support and a drain position wherein it is out of engagement with said valve seat and connects said pump outlet to said drain; spring means connected to said valve stem for constantly biasing said valve into engagement with said valve seat; and electromagnetic means connected to said valve stem for moving said valve out of engagement with said valve seat.

4. In a dishwasher, the combination of: a dish chamber; a pump having an inlet communicating with the bottom of said dish chamber and having an outlet; a motor connected to said pump; a tubular impeller support extending upwardly into said dish chamber and communicating at its lower end with said pump outlet, said impeller support having a central aperture; a reaction-type impeller rotatably mounted on the upper end of and communicating with the interior of said impeller support; a drain communicating with said pump outlet below said impeller support; a valve seat interposed between said pump outlet and said drain; a valve stem reciprocable axially of said impeller support and extending through said central aperture in said impeller support; a valve carried by said valve stem and movable axially of said impeller support between an impeller position wherein it is seated on said valve seat and connects said pump outlet to the interior of said impeller support and a drain position wherein it is out of engagement with said valve seat and connects said pump outlet to said drain; means providing a flexible wall adjacent said valve stem; a rod extending through said flexible wall and connected at one end to said valve stem, said flexible wall providing a pivot for said rod; spring means connected to the other end of said rod for pivoting said rod in a direction to bias said valve into engagement with said valve seat; and electromagnetic means connected to said other end of said rod for pivoting said rod in the opposite direction to move said valve out of engagement with said valve seat.

5. In a dishwasher, the combination of: a dish chamber; a pump having an inlet communicating with the bottom of said dish chamber and having an outlet; a motor connected to said pump; a tubular impeller support extending upwardly into said dish chamber and communicating at its lower end with said pump outlet; a reaction-type impeller rotatably mounted on the upper end of and communicating with the interior of said impeller support; a drain communicating with said pump outlet below said impeller support; a valve seat interposed between said pump outlet and said drain; a valve stem reciprocable axially of said impeller support; guide means for said valve stem; a valve carried by said valve stem and movable axially of said impeller support between an impeller position wherein it is seated on said valve seat and connects said pump outlet to the interior of said impeller support and a drain position wherein it is out of engagement with said valve seat and connects said pump outlet to said drain; and means connected to said valve stem for moving said valve between said impeller and drain positions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,675,192	Murdoch	June 26, 1928
1,757,278	Weidman	May 6, 1930
1,878,568	Zademach	Sept. 20, 1932
1,980,065	Johnston	Nov. 6, 1934
2,297,694	Dunham	Oct. 6, 1942
2,468,584	Wotring	Apr. 26, 1949
2,620,811	Walker	Dec. 9, 1952
2,629,390	Walker	Feb. 24, 1953
2,706,486	Loeb	Apr. 19, 1955