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O. D. KUENEMAN
DISHWASHING MACHINE

2,573,794

Filed Sept. 19, 1947

2 SHEETS—SHEET 1

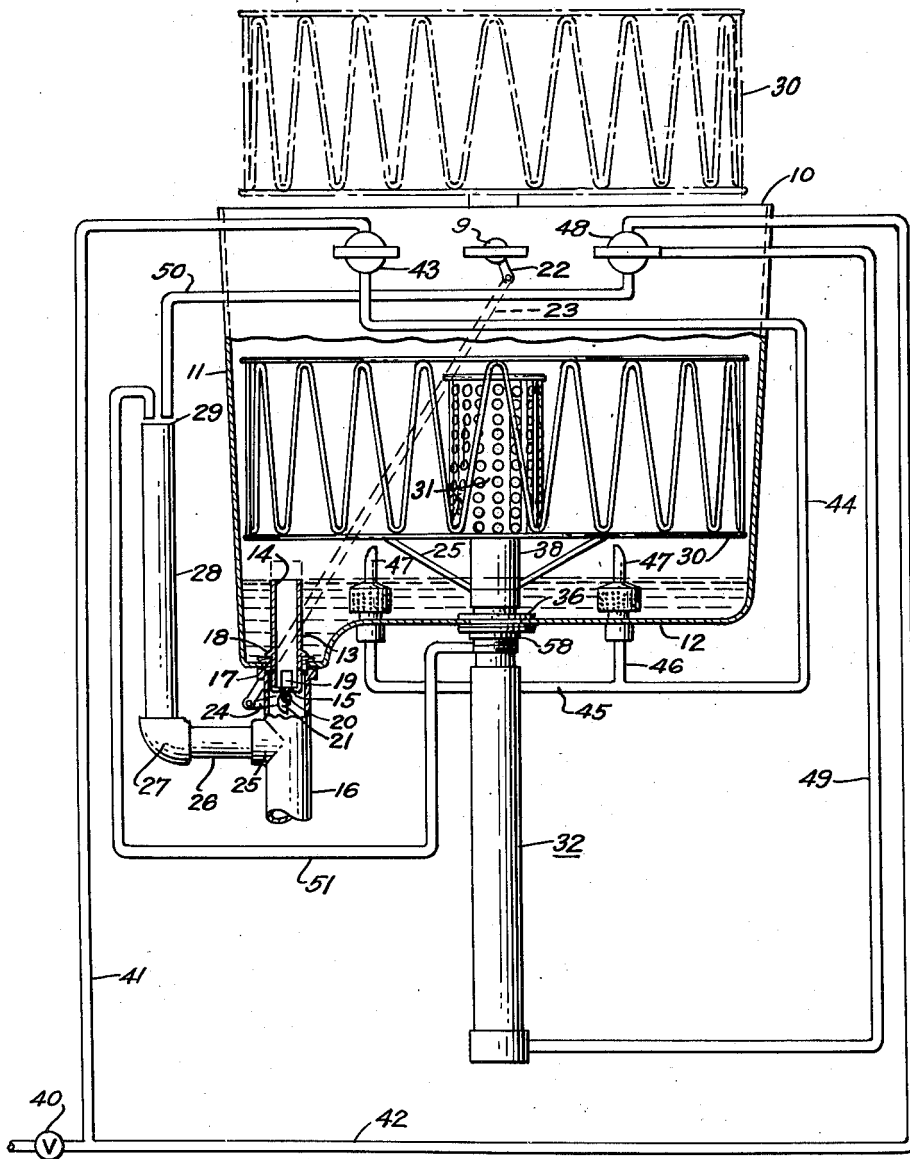


Fig. 1.

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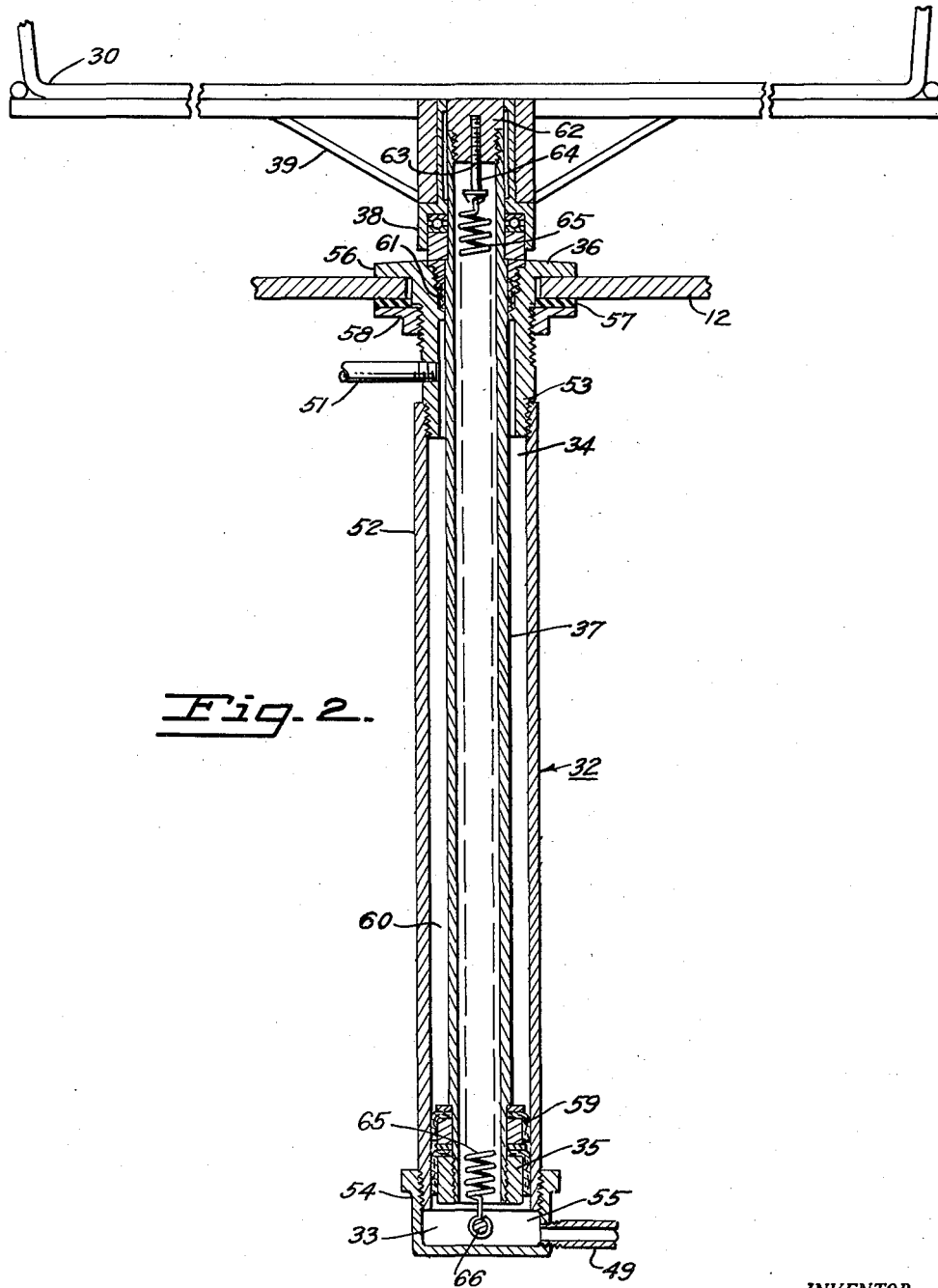


Fig. 2.

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DISHWASHING MACHINE

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4 Claims. (Cl. 134—138)

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This invention relates to improvements in dishwashing machines, and more particularly to dishwashing machines employing a hydraulic lift device for raising and lowering a rotatable dish container within the dishwasher tub.

In the constructions of the prior art, hydraulic cylinders have heretofore been employed for raising and lowering the rotatable basket or dish-supporting member to facilitate the loading and unloading operation and the drying of dishes in hydraulic dishwashing machines of the type wherein the cleansing action and rotational movement of the basket is effected solely or predominantly by liquid under pressure. Such prior constructions have applied fluid pressure to the both sides of the piston, with the result that dirt and other foreign matter may inadvertently be drawn into the cylinder so as to necessitate frequent servicing and repair of the hydraulic lift device.

It is the principal object of the present invention to provide an improved hydraulic system for a dishwashing machine wherein a single source of liquid under pressure is adapted to impart a cleansing action and rotational movement to a dish-containing basket and to the contents thereof solely by liquid under pressure, and to actuate a hydraulic cylinder and piston adapted to vertically raise and lower the dish container by applying fluid pressure to not more than one side of the piston during intermittent reciprocating movement of the actuating plunger.

It is a further object of the instant invention to provide a dishwashing machine wherein a single source of liquid under pressure is adapted to impart a cleansing action and rotational drying movement to a dish-containing basket and to the contents thereof, and by admitting uncontaminated liquid from said single source into a hydraulic cylinder in such a manner as exert fluid pressure on only one side of the piston contained therein to move the piston and the basket in opposition to a resilient means, and by periodically discharging to a drain the portion of the said liquid admitted to the cylinder which seeps past the piston during the reciprocation thereof.

Such objects are accomplished by providing in a dishwashing machine a rotatable dish-containing basket, a tub having a drain in the bottom portion thereof, a hydraulic cylinder having a piston therein, a shaft adapted to be reciprocated by the piston and adapted at one end to rotatably support the basket within the tub, a single source of liquid under pressure adapted to move said piston and to discharge spray within the tub,

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means for admitting a portion of said liquid to said cylinder for exerting fluid pressure on not more than one side of said piston, and means for discharging to a drain that portion of the fluid within the cylinder which seeps past the piston during the reciprocation thereof.

Figure 1 is a front elevation view of my improved dishwashing machine in which the dish-containing basket is shown in full lines in its depressed position, and in dotted lines in its elevated position.

Figure 2 is a vertical mid-section of the hydraulic lift device on an enlarged scale.

Referring now to the drawings, I have shown a dishwashing tub 10 having cylindrical sides 11 and a bottom portion 12. Extending through the bottom of the tub is a vertically disposed overflow pipe 13 having an upper portion 14 and a lower portion 15 adapted to be slidably supported within the upper extremity of an external drain pipe 16 which is secured by an annular flange 17 to the bottom of the tub and in liquid-tight engagement therewith. Intermediate the upper and lower portions of the overflow pipe 13 is an annular ring 18 adapted to effect a liquid-tight seal with the bottom of the tub 12. The annular ring 18 is positioned transversely of the overflow pipe 13 so that the upper portion 14 will establish a predetermined liquid level in the tub 10 whenever the overflow pipe 13 is in its normal or lowermost position established by contact between the annular ring 18 and the bottom of the tub 12. The lower portion 15 of the overflow pipe preferably has a plurality of longitudinally extending apertures 19 formed in the surface thereof adapted to facilitate the flow of liquid from the bottom of the tub and into the drain pipe 16 whenever the overflow pipe 13 is in the raised position and the annular ring 18 is not in liquid-tight engagement with the bottom of the tub 12.

Rotatably mounted within the upper extremity of the drain pipe 16 and transversely of the axis thereof is a pin 20 carrying a cam 21 adapted to contact the lower portion 15 of the overflow pipe 13 for the vertical reciprocation thereof. A drainage control 9 is operably connected through the arm 22, rod 23 and lever 24 in such a manner as to impart angular displacement to the pin 20 within predetermined limits and for bringing the cam 21 into contact with the lower portion 15 of the overflow pipe.

The external drain pipe 16 preferably but not necessarily has a T-portion 25 communicating the pipe 16 with a conduit 26 and an elbow 27, which is adapted to vertically support a standpipe 28

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externally of the tub 10 and with its lower extremity in communication with the pipe 16. The standpipe 28 has an upper portion 29 adapted to receive discharge fluid at a level substantially above the predetermined liquid level established within the tub 10 by the upper portion 14 of the overflow pipe. If desired, the standpipe may be connected to a drainage pipe which is independent of the pipe 16, but the same external drainage connection 16 is preferably employed for both the overflow pipe 13 and the standpipe 28.

A permeable basket or dish-container 30 is vertically disposed within the tub 10 and preferably has a perforated cylindrical compartment 31, adapted to hold tableware and other small articles, mounted inside the basket with its axis concentric with the axis thereof. The basket 30 is rotatably supported by the bottom portion 12 of the tub, preferably with its axis of rotation coinciding with the vertical axis of the tub. In vertical alignment with the axis of the basket 30, but disposed on the opposite side of the tub bottom from the basket, is a hydraulic cylinder 32 having a lower chamber 33, an upper chamber 34, and a piston 35 therebetween. The upper end of the cylinder is preferably secured to the bottom of the tub 12 by a suitable attaching means, such as the tubular connection 36, and the piston 35 is operably connected to the basket 30 by a shaft or plunger 37. A suitable anti-friction bearing member 38 rotatably supports basket 30 on the upper extremity of the shaft 37, and bracing members 39 are preferably employed to provide additional structural support for the basket 30.

A shut-off valve 40 communicates both the conduit 41 and the conduit 42 with a hot water system or other single source of fluid under pressure, not shown. Preferably this pressurized fluid is hot water, but under some circumstances cold water or other cleansing fluids can be employed without departing from the scope of my invention.

Conduit 41 communicates the source of fluid under pressure with a two-way lift control valve 43, which in turn is adapted to permit the pressurized fluid to flow through the delivery conduit 44 and into the manifold pipe 45. Preferably, but not necessarily, a siphon breaker of conventional design, not shown, is inserted in the delivery conduit 44 to prevent improper fluid flow in the event of unusual pressure conditions in the drainage system. To the manifold pipe 45 are fastened a plurality of vertically disposed unions 46 connected to the bottom of the tub 12 in a leakproof manner and each having threaded openings extending through the bottom of the tub. Threadedly engaged with the top portion of each of the unions 46 is a fluid discharge jet 47 adapted to discharge a spray mixture into the tub 10 in such a manner as to impart a rotational movement to the basket 30 and a cleansing action to the contents thereof. A suitable metallic or non-metallic cover, not shown, is preferably provided to prevent the escape of spray from the tub 10 whenever the discharge jets 47 are in operation.

The conduit 42 communicates the source of fluid under pressure with a three-way lift control valve 48 which in turn is adapted to permit a portion of the fluid from the pressurized source to flow through a conduit 49 and into the lower chamber 33 and to force the piston to its fully elevated position so as to raise the dish-containing basket 30 vertically out of the tub 10 in the

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manner indicated in Figure 1. Upon manually returning the valve 48 to its normal position, substantially all of the fluid entrained in the lower chamber 33 during the upward movement of the piston 35 is allowed to flow through conduit 49, valve 48, discharge conduit 50, and into the standpipe 28.

Upper chamber 34 of the cylinder 32 is normally not subjected to the action of fluid under pressure, but serves as an accumulation chamber for such leakage fluid from the lower chamber 33 as may result from wear of the contacting surfaces of the piston 35 and the cylinder 32. A drainage conduit 51 discharges such leakage fluid into the standpipe 28 upon upward movement of the piston 35.

Preferably, though not necessarily, a check valve may be installed in the conduit 42. A second siphon breaker of known design, not shown, is also preferably inserted in the conduit 42 to protect the hydraulic cylinder 32 from possible damage in the event of unusual pressure fluctuations in the hydraulic system.

Referring now to Figure 2, there is shown a tubular connection 36 adapted to secure the hydraulic cylinder 32 to the bottom portion 12 of the tub in a leakproof manner. The cylinder 32 includes an external tube 52 having a threaded upper portion and the tubular connection 36 having a threaded lower portion 53 extending through the tub bottom 12 for engagement with the upper portion of tube 52. The lower end of the cylinder 33 is closed by means of a cap 54, there being a space 55 provided between the closed end of the cap 54 and the end of the cylinder.

The connection 36 is provided with an annular flange 56 which overlies the adjacent surrounding portion of the bottom of the tub 10, the said flange assuming a substantial portion of the weight of the lift together with that of the basket 30 and the dishes supported thereby.

In order to make a leakproof joint between the flange 56 and bottom portion 12 of the tub, I provide a gasket 57 which is securely held in place by the annularly flanged lock nut 58.

Concentrically supported slidably within the tube 52 is the hollow shaft or plunger 37. On the lower end of the shaft 37 is fastened a dual packing gland 59 whereby the annular space 60 between the tube 52 and the shaft 37 at that point is closed.

At the upper end of the shaft 37 I provide a second packing gland 61. This gland is formed in the connection 36 and provides a seal for preventing the fluid in the tub from entering the space 60.

Into the upper end of the plunger is screwed a plug 62, said plug being provided with a hole 63 axially tapped into its lower end and having the mouth of the hole conically tapered. Into the hole 63 is screwed a screw 64 having fastened to its head one end of a spirally coiled spring 65. The other end of the spring is fastened to an anchor pin 66 which underlies the lower end of the cylinder.

When the three-way lift control valve 48 is manually operated so as to place the conduit 42 in communication with the conduit 49, fluid from the single source under pressure flows through the valve 48, the conduit 49, and into the lower chamber 33 so as to exert fluid pressure against the piston 35, thereby elevating the piston and the shaft 37 against the opposition of the coiled spring 65. During the elevation of the shaft

37, the antifriction bearing member 38 permits any angular momentum of the dish container 30 and its contents to continue the rotational movement of the container for a substantial period of time after the container has been elevated to its fully raised position so as to dry the contents thereof by inducing the movement of air around articles therein having surfaces exposed to contact with the atmosphere. This rotational movement continues during the elevation of the dish container and for a substantial period after the container has reached the fully elevated position.

When it is desired to lower the basket 30 into the tub 10, the three-way valve 48 is again manually actuated to place the fluid entrapped in the lower chamber 33 in communication with the standpipe 28 through the conduit 49, valve 48, and the fluid discharge conduit 50. The weight of the basket 30 and its contents assists the coiled spring 65 in inducing the flow of the entrapped fluid out of the lower chamber 33 and into the standpipe 28 whenever the valve 48 is actuated to place the conduit 49 into communication with the fluid discharge conduit 50.

By maintaining a predetermined liquid level in the bottom of the tub 10 during the discharge of liquid under pressure through the unions 46, I am able to continuously recirculate the detergent-containing liquid in the bottom of the tub through partially submerged aspirator passageways in the discharge jets 47 in such a manner as to form a spray mixture with the liquid flowing into the jets 47 through the unions 46. This predetermined liquid level is maintained by the upper portion 14 of the overflow pipe 13 whenever the cam 21 is out of engagement with the lower portion 15 of the overflow pipe so that annular ring 18 is in sealing engagement with the bottom portion 12 of the tub.

When the dishwasher is not in use and it is desired to completely drain the liquid from the bottom of the tub 10, the drain control 9 is manually turned to angularly displace the lever 22, reciprocate the rod 24, and to angularly rotate the arm 24 and pin 20 so that the cam 21 is brought into engagement with the lower portion 15 to elevate the overflow pipe to the raised position indicated in Figure 1. The upward movement of the overflow pipe 13 with respect to the drain pipe 16 breaks the seal between the annular ring 18 and the bottom portion 12 of the tub so as to allow the liquid in the bottom of the tub to flow through the apertures 19 and into the external drain pipe 16.

From the above description, it will be evident that I have produced an improved dishwashing machine wherein a single source of fluid under pressure is employed to actuate the hydraulic lift device and to rotate the dish container solely by liquid under pressure. It is further evident that I have provided a hydraulic lift device for a dishwasher wherein no scavaging action of the cylinder is required and into which no contaminating fluid can be drawn so as to cause excessive wear in the event the lift is inadvertently operated during abnormal pressure conditions in the actuating fluid and in the associated drainage system. I have also made provision for draining away from the lift device any leakage fluid which may result from normal wear of the contacting surfaces between the hydraulic cylinder and lift actuating piston.

Although only one form of the invention has been described in detail, it will be apparent to those skilled in the art that various modifications

may be made without departing from the scope of the appended claims.

What is claimed is:

1. In a dishwashing machine of the type wherein a single source of liquid under pressure is adapted to rotate and vertically reciprocate a dish-containing basket, the combination comprising a basket, a tub, a first drainage means in the bottom of the tub adapted to maintain a predetermined liquid level therein, a second drainage means adapted to receive discharge liquid at a level above said predetermined liquid level in said tub, a hydraulic cylinder mounted on the bottom of said tub with its upper extremity in fluid-tight engagement therewith, a shaft rotatably connected at one end to said basket and extending into said cylinder and having a piston at its other end, means for spraying liquid upon the basket and its contents, a single source for supplying liquid under pressure to said spraying means and to said cylinder, control means for alternately causing liquid to flow from said single source through a piping system to the one end of said cylinder to thereby actuate said piston and said shaft to raise said basket and then for causing discharge of said liquid from said cylinder only to said second drainage means through at least a portion of the said piping system through which the liquid enters said cylinder to thereby lower said piston and said basket and thus exert fluid pressure on not more than one side of the said piston, means including said portion of said piping system for directly connecting the one end of said cylinder to said second mentioned drainage means, and by-passing the other end of said cylinder and a conduit separate and apart from said last mentioned means for directly connecting said other end of said cylinder to said second mentioned drainage means and for discharging into said second drainage means that portion of the liquid within the said cylinder which seeps past said piston during the reciprocation thereof.

2. In a dishwashing machine of the type wherein a single source of liquid under pressure is adapted to rotate and vertically reciprocate a dish-containing basket, the combination comprising a basket, a tub, a drainage control means, a lower drainage connection operably connected to said control means for selectively maintaining a predetermined liquid level in said tub and for completely draining said tub, an upper drainage means adapted to receive discharge liquid at a level above said predetermined liquid level, a hydraulic cylinder vertically mounted on the bottom of said tub with its upper extremity in fluid-tight engagement therewith, a shaft connected at one end to said rotatable basket and extending into said cylinder and having a piston at its other end, means for spraying liquid upon the basket and its contents, a single source for supplying liquid under pressure to said spraying means and to said cylinder, control means for alternately causing liquid to flow from said single source through a piping system to the one end of said cylinder to thereby actuate said piston and said shaft to raise said basket and then for causing discharge of said liquid from said cylinder and into said upper drainage connection through at least a portion of the said piping system through which the liquid enters said cylinder to thereby lower said piston and said basket and thus exert fluid pressure on not more than one side of said piston, means including said portion of said piping system for directly connecting the

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one end of said cylinder to said upper drainage means and by-passing the other end of said cylinder and a conduit separate and apart from said last mentioned means for directly connecting said other end of said cylinder to said upper drainage means and for discharging into said upper drainage means that portion of the liquid within the said cylinder which seeps past said piston during the reciprocation thereof.

3. In a dishwashing machine including a tub having a drainage means in the bottom portion thereof adapted to maintain a predetermined liquid level in the tub, a dish-containing basket, a hydraulic cylinder mounted on the bottom of said tub, a vertical shaft rotatably connected at its upper end to said basket and extending into said cylinder and having a piston at its other end, and a means for spraying liquid upon the basket and its contents, the improvement which comprises a single source adapted to supply liquid under pressure to said spraying means and to said cylinder, control means for alternately causing liquid to flow from said single source through said piping system to the one end of said cylinder to thereby actuate said piston and said shaft to raise said basket and then for causing discharge of liquid from the one end of said cylinder to said drainage means through a portion of the said piping system through which the liquid enters said cylinder to thereby lower said piston and said basket and thus exert fluid pressure on only one side of said piston means including said portion of said piping system for directly connecting the one end of said cylinder to said drainage means while by-passing the other end of said cylinder and a conduit separate and apart from said last mentioned means for directly connecting said other end of said cylinder to said drainage means and for discharging into said drainage means that portion of the liquid within the said cylinder which seeps past said piston during the reciprocation thereof.

4. In a dishwashing machine including a tub having a drainage means in the bottom portion

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thereof adapted to maintain a predetermined liquid level in the tub, a dish-containing basket, a hydraulic cylinder mounted on the bottom of said tub, a vertical shaft rotatably connected at its upper end to said basket and extending into said cylinder and having a piston at its other end, and a means for spraying liquid upon the basket and its contents, the improvement which comprises a single source for supplying liquid under pressure to said spraying means and to said cylinder, control means for alternately causing liquid to flow from said single source through a piping system to the one end of said cylinder to thereby actuate said piston and said shaft to raise said basket and then causing discharge of liquid from said cylinder to said drainage means through at least a portion of said piping system to thereby lower said piston and said basket and thus exert fluid pressure on only one side of said piston, resilient means for returning the said piston moved by said liquid under pressure and tending to force fluid out of said cylinder and into said means including said portion of said piping system for directly connecting the one end of said cylinder to said drainage means while by-passing the other end of said cylinder and a conduit separate and apart from said last mentioned means for directly connecting said other end of said cylinder to said drainage means and for discharging to said drain that portion of the liquid within the said cylinder which seeps past said piston during the reciprocation thereof.

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