

[54] **WASHING APPARATUS**
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134/56 R, 56 D, 72, 98, 82

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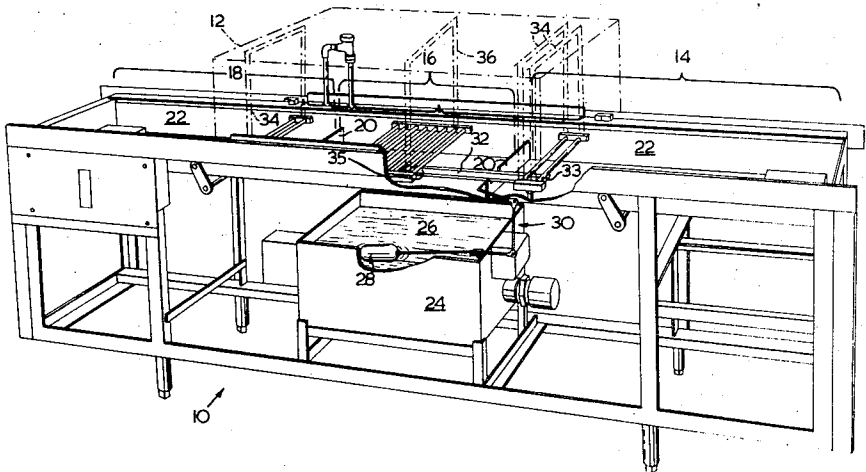
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[57] **ABSTRACT**

A liquid level controlling device is described which is particularly suited for use in conveyor- or straight-through types of glass washers and dish washers. A float indicates the liquid level of wash solution in a tank, and is operatively connected to a diverter trough which effects the transfer of liquid to the tank in response to an indicated low level, and from the tank in response to an indicated high level of wash solution. A simple mechanical linkage, or a fluid connection using an incompressible fluid or the like, is employed in order to cause a corresponding movement of the diverter trough to any movement of the float due to a change in the level of wash solution in the tank.

3 Claims, 2 Drawing Figures



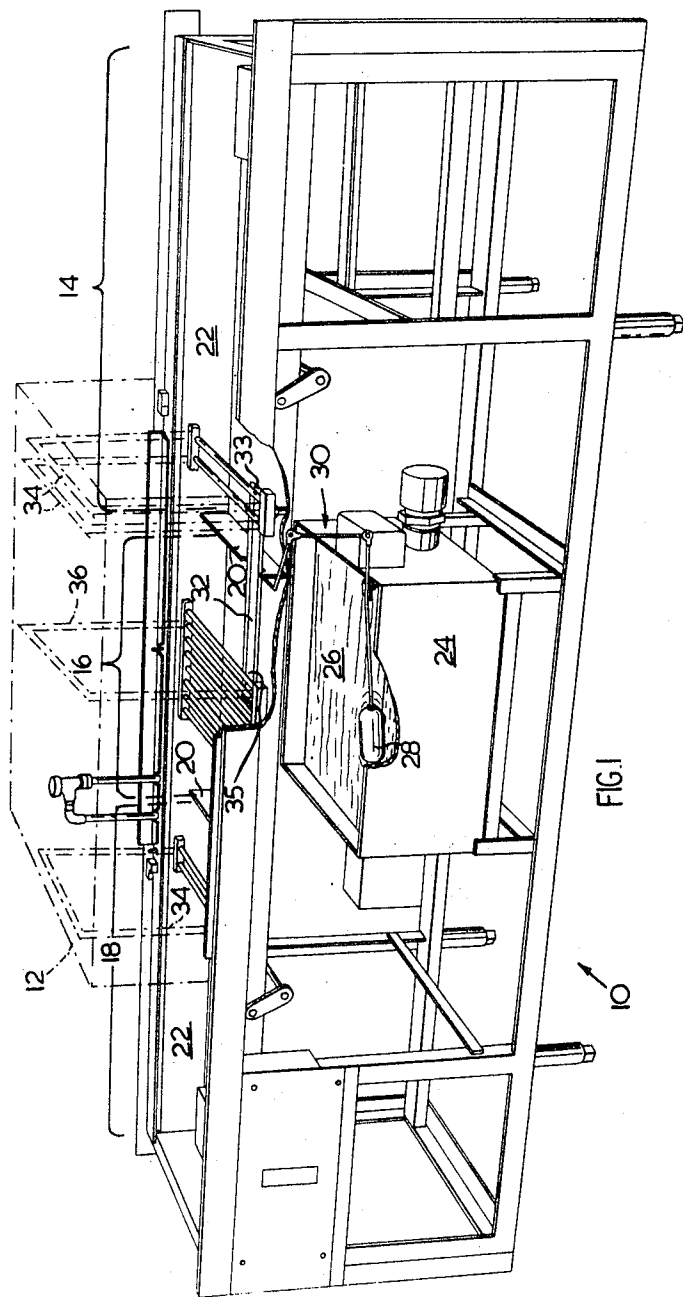
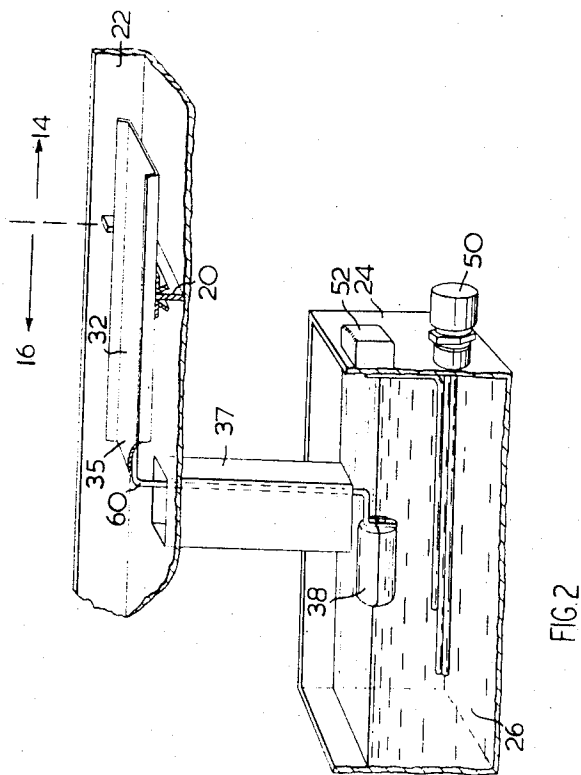


FIG. 1

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WASHING APPARATUS

This invention relates to a level control device, particularly to a level control device for use in a conveyor type of glass washer. This application is a division of U.S. Ser. No. 858,317 of Sept. 16, 1969 now U.S. Pat. No. 601,144 dated Aug. 24, 1971.

Glasswashers and dishwashers of the type contemplated above are broadly known to persons skilled in this art. Accordingly, a detailed description of their complete operation and construction is believed to be unnecessary at this time. The following description should suffice, however, in giving the reader a clear understanding of the invention together with its operation. Moreover, the description below is presented by way of example only with particular application in a glasswasher which is known in the trade as a Barrie Glasswasher.

Basically, the Barrie Glasswasher operates on much the same principle as most prior art conveyorized glasswashers and dishwashers. In brief, such prior art apparatus includes a tunnel arrangement in which there is provided a pre-rinse section, then a wash section, and lastly a final rinse section. Normally the two rinse sections provide a spray of fresh water which does not contain any detergent. Also, the pre-rinse section may sometimes be omitted. A wash tank is provided in the glasswasher for containing a wash solution consisting of fresh water charged with a predetermined quantity of detergent. The wash tank is in a fluid circuit which is in communication with the wash section to provide a spray of wash solution therein. The wash solution is recirculated, reheated and recharged with detergent as required. It should be noted, however, that during operation, circulation of the wash solution is continuous. A spray pan is provided beneath the tunnel arrangement and is divided into (three) sections by means of suitable baffles. In the case of the Barrie Glasswasher, all of the pre-rinse and final rinse water is discharged after use directly into a sewer, and so the two end sections of the spray pan receive water from the prerinse and final rinse spray tubes and by means of a common drain manifold direct this water to the sewer. The central section of the spray pan is located beneath the wash section and all of the water received in this centre section is delivered back to the wash tank.

Due to spray, carryover on inverted glasses, and so on, the level of wash solution in this wash tank would not remain constant without the inclusion of some apparatus for regulating and controlling the level of liquid therein. To applicant's knowledge, all such prior art conveyorized glasswashers and dishwashers equip the wash tank with suitable plumbing for adding water and in some cases, also provide an overflow port to protect against flooding. A float controlled valve is generally connected to a pressurized water supply to effect adding water to the wash tank whenever the float drops and indicates a low level condition of wash solution. If an overflow is included, this usually took the form of a port or passage located near the top of the wash tank. This port or passage was then connected to the sewer line by means of suitable piping. However, it should be noted that the piping which leads back to the sewer cannot be a closed path, since such an arrangement would invite the possibility of sewer backup into the wash tank with the subsequent contamination of the wash solution. Accordingly, the piping or passageway

leading to the sewer line must therefore be opened to atmosphere at some point so that if a sewer-backup did occur, the sewer water would flow out of this open section and would not be able to reach the wash tank.

The preceding description which relates to prior art structures should give the reader some idea of the need for a more satisfactory arrangement for controlling the level of solution in the wash tank. The above described method presents several problems. In the first instance, it is dependent upon a float operated valve for replenishing the wash tank should the wash solution drop in level. However, it is known that such a valve is prone to failure due to its rather delicate lever and seat arrangement. An accumulation of dirt, for instance, or scale build-up can render the valve inoperative, and in the majority of cases, an "open" condition would result such that the light float is unable to seal the valve completely. Consequently, even a small, but continual flow of water through the valve would ultimately produce a flooding condition. The majority of overflow arrangements in the prior art have also been unsatisfactory in that the open section previously mentioned was often located considerably lower than the spray pan in the dishwasher or glasswasher, and any restriction in the sewer line would cause water to overflow at this open section since the drain line from the spray pan offers a greater static head than does the lower level overflow line. Both of these lines were usually connected to the same sewer connection. Accordingly, it will be recognized that the prior art systems did not prove to be entirely satisfactory.

It is therefore an object of the present invention to overcome at least some of the difficulties present in prior art arrangements.

It is also an object herein to provide a level control device which is simple in construction and which significantly reduces the risk of possible failure of the same.

It is yet another object of this invention to provide a level control device which serves to both add water to the wash solution, or divert water therefrom at an indicated high level of wash solution, efficiently and automatically.

In one aspect of the present invention, therefore, there is provided in a conveyorized washer unit for washing dishes, glasses and the like, having a plurality of sources of liquid spray for cleansing the dishes and glasses, a conveyor for carrying said dishes and glasses through a washing zone and a rinsing zone in which the sources of spray are located, and including a tank for containing a liquid wash solution, the tank being adapted to supply said solution to at least one of said sources of spray, the combination of a float member so disposed as to be buoyantly supported, in use, by wash solution in said tank for continuously and automatically indicating the level thereof; a diverter trough pivotally supported on the washer unit and having liquid retaining side walls and two oppositely disposed open ends for diverting liquid received in said trough; and connecting structure for operatively coupling the float member and diverter trough together such that both the float member and trough are automatically movable in response to a change in the level of wash solution in said tank, the diverter trough being operative to receive liquid from said sources of spray for selectively diverting rinse liquid into the tank in response to an indicated low level of wash solution, and diverting wash solution out of said tank in response to an indicated

high level of the same, thereby automatically maintaining the level of wash solution in the tank relatively constant.

The present invention can be better understood from the following detailed description taken with reference to the accompanying illustrative drawings in which:

FIG. 1 schematically shows one form of the present level control device as built into a glasswasher such as the Barrie Glasswasher previously described; and

FIG. 2 schematically shows a preferred embodiment of the present level control device as it could be mounted in the glasswasher of FIG. 1.

Turning now to FIG. 1 of the drawings, a conveyor type of glasswasher is shown at 10, and includes a tunnel structure 12 which is indicated by ghost lines, and which houses two rinse sections and a wash section. In use, the glasses, mugs or dishes to be washed are placed onto conveyor means which are not shown in the present drawings since this is conventional in both structure and operation, and the glasses are conveyed from right to left or, alternatively, from left to right as seen in FIG. 1. The actual direction of travel of glasses and dishes passing through the tunnel section 12 can be from either end of the glasswasher 10. This will depend upon the particular location in which the glasswasher is to be installed, and of course, on the direction in which the conveyor means will be arranged to travel. In other words, the dirty dishes and mugs are first placed onto the conveyor means and are moved into a first rinse section 14, subsequently they pass through a wash section 16 and lastly, through another rinse section 18, following which they exit from the tunnel structure 12. The first rinse section 14 and the other rinse section 18 can be either a "pre-rinse" or a "final rinse" section, depending upon the direction of travel of the glasses through the glasswasher 10. In the following description, and accompanying drawings, section 14 will be considered as a "pre-rinse" section, while section 18 will be taken to be a "final rinse" section. Accordingly, the direction of travel of glasses through the glasswasher 10 of FIG. 1 is taken, for illustrative purposes only, as being from right to left. The rinse sections 14 and 18 together with the wash section 16 are separated one from another by means of baffles 20, which make each section liquid tight one from another, as regards liquid flow therebetween. These sections 14, 16 and 18 are normally provided in a common spray pan 22; however, individual spray pans could also be used. Although it is not shown in FIG. 1, the two rinse sections 14 and 18 are normally connected to a common discharge manifold which delivers water from the spray sections directly to a sewer connection. The wash section 16 has an outlet which leads to a return spout in fluid communication with a wash tank 24 that is adapted to contain the wash solution 26. For purposes of clarity, FIG. 1 does not show all of the hydraulic and electrical connections and fixtures which are normally provided in a glasswasher of this type. Similarly, the conveyor means as well as apparatus driving the same have also been deleted from FIG. 1 for purposes of clarity. These features which have been omitted in the present drawings are well known to those familiar with this type of dishwasher, and hence a detailed description of the same is believed to be unnecessary at this time. It is also believed to be sufficient, therefore, to state that the wash tank 24 is connected by the appropriate plumbing to a source of fresh water, and in the

event that such fresh water is not already preheated an immersion heater, for example, may also be provided. Suitable apparatus for dispensing selected quantities of detergent into the water in the wash tank 24 is also provided in connection with the wash tank.

As shown in FIG. 1, a simple float member 28 is pivotally mounted on one side of the wash tank 24 to be buoyantly supported by the wash solution 26 in the wash tank, thereby indicating the level thereof. A rigid connecting linkage 30 is fixedly secured to this float member 28 and serves to connect the latter to a diverter trough 32. This diverter trough 32 is pivotally supported in the glasswasher 10, usually on the spray pan and preferably upon one of the baffles or side walls 20 which separate the wash section 16 from the rinse sections 14 and 18 of the spray pan 22. At least one and preferably a plurality of spray tubes 34 are disposed near the bottom and top of each of the rinse sections 14 and 18, while several corresponding spray tubes 36 are provided near the bottom and top of the wash section 16. The exact positioning and shape of these spray tubes 34 and 36 including the spray nozzles or orifices therein will be known to those familiar with this art. It will therefore be recognized that such spray tubes 34 and 36 are so located as to ensure that any glasses or dishes passing through the tunnel structure 12 will be subjected to a cleansing spray of liquid from many directions.

As previously stated, the diverter trough 32 is pivotally mounted on one of the baffles 20, and is so positioned that one end portion 33 thereof is located at least adjacent to and preferably beneath some of the spray tubes 34 in the pre-rinse section 14. The other end portion 35 of the diverter trough 32 will similarly be positioned, beneath at least one, and preferably several, of the spray tubes 36 in the wash section 16. Accordingly, the diverter trough 32 is normally substantially horizontally disposed when the float member 28 detects and indicates a normal operating level of wash solution 26. Any deviations from the normal operating level of wash solution 26 will therefore be transmitted through the connecting linkage 30 to the diverter trough 32 which is thereby tilted from the horizontal either to transfer liquid into the wash tank 24, in response to an indicated low level of wash solution 26, or from the wash tank or into the pre-rinse section 14 of the spray pan 22 in response to an indicated high level of wash solution 26. Because the rinse sections of the spray pan 22 are connected to the sewer line, any liquid transferred thereto will effect a reduction in the level of wash solution 26 in the wash tank 24, i.e., any liquid transferred from the wash section 16.

The following explanation should enable the reader to understand the function and operation of the present level control device in a glasswasher of the type described above. When the glasswasher is to be put into operation, fresh water is initially added to the wash tank 24 by opening a suitable valve which connects to a source of pressurized water. Preferably, this water will be preheated and the necessary, pre-selected amount of detergent will also be dispensed into the wash tank 24 as the fresh water is being added thereto. When the wash tank 24 is filled to the desired operating level with water, the valve is closed. As previously noted, with the proper level of solution in the wash tank 24, the diverter trough 32 is positioned substantially horizontally. The glasswasher can now be switched

"on" by actuating an appropriate on-off switch to close the electrical circuits which are involved in operating the immersion heater which could heat the solution in the wash tank 24, which drive the motor for the conveyor means, which operate the circulating pump and, if applicable, operate the dispensing apparatus for adding detergent to the water previously put into the wash tank 24. With the glasswasher in operating condition, any glasses or dishes which are now placed onto the conveyor means on the right-hand side of the tunnel structure 12, as seen in FIG. 1, will be conveyed into the tunnel structure and will be cleaned therein. As previously indicated, the rinse sections of the dishwasher 10 provide a spray of fresh water, and therefore, the spray tubes 34 will have been connected to a suitable supply of fresh water and will dispense a spray of the same. The circulating pump associated with the wash tank 24 provides a spray of wash solution 26 through the orifices in the spray tubes 36 in wash section 16. As the glasses and dishes pass through the tunnel structure 12 and are subjected to a spray of fresh water and wash solution, some liquid will either be added to or removed from the quantity of liquid in the closed circuit of continuously circulating wash solution 26.

Let us assume that there is enough splashing and carryover of wash solution from the spray tubes 36 into either of the rinse sections 14 or 18 that the level of wash solution in the wash tank 24 drops. The float member 28 will therefore sense an indicated low level of wash solution 26 and because of the connecting linkage 30 will cause the end portion 35 of the diverter trough 32 to dip downwardly. This then enables any liquid caught by the end portion 33 under spray tubes 34 to be directed into the wash section 16 and via a return spout 37 (shown in FIG. 2), be added to the solution in wash tank 24. When sufficient fresh water from spray tubes 34 has been added to the wash solution 26, the level thereof will reach its normal operating condition, and the float member 28 will return the diverter trough 32 to a substantially horizontal position. In this normal and substantially horizontal position, any liquid which splashes onto and is caught by the diverter trough 32 will tend to run more or less evenly out of both ends 33 and 35 thereof until such time as one or other end dips lower than the other as will be brought about by a change in the level of wash solution 26 from its normal operating level. If a large amount of fresh water from the spray tubes 34 in either of the rinse sections 14 or 18 is splashed or carried over into the wash section 16 and ultimately picked up by the wash tank 24, a high level of wash solution will shortly result. The float member 28 will then sense the indicated high level of wash solution, and will effect a tilting of the end portion 33 downwardly. This will then enable any wash solution picked up by the diverter trough 32 beneath the spray tubes 36 in wash section 16 to be transferred from the quantity of wash solution in wash tank 24 and into the rinse section 14 from which it is directed to a sewer line. This effectively reduces the quantity of wash solution 26 and hence will soon cause the float member 28 to be returned to what is the normal operating level of wash solution, and hence will return the diverter trough 32 to a substantially horizontal position. It will therefore be recognized that in operation, the diverter trough 32 will automatically transfer liquid either into or out of the wash tank 24 as soon as the float member

28 indicates a deviation from the normal operating level of wash solution. Moreover, it will be recognized from the nature of the operation, that there will usually be a small but continuous fluctuation in the level of wash solution 26 about a theoretically fixed operating level of wash solution.

It will be recognized by those skilled in this art that certain modifications and refinements can be made to the structure previously described while still remaining within the spirit of this invention. FIG. 2 illustrates one such modification of the structure previously described in FIG. 1. FIG. 2 therefore illustrates schematically a portion of the spray pan 22 and the wash tank 24 which is located beneath the same. As in the case of the embodiment illustrated in FIG. 1, the wash tank 24 again contains a quantity of wash solution 26 which can be reheated by means of a convenient immersion heater shown at 50, and to which additional amounts of detergent can be added when necessary by the dispensing apparatus 52. The immersion heater will normally be automatically operated and can be set by means of a temperature controller. The dispensing means 52 will usually be manually actuated by the operator of the glasswasher to add more detergent as required. As previously mentioned, the diverter trough 32 is pivotally mounted on the baffle 20 which separates the pre-rinse section 14 from the wash section 16. The return trough 37 simply conveys any liquid picked up in the spray pan 22 within the wash section 16 back to the wash tank 24. In this embodiment, a float member 58 is connected by means of a single connecting link 60 to the end portion 35 of the diverter trough 32. For convenience, the diverter trough 32 is positioned on one side of the spray pan 22 and is pivotally mounted on hinges or the like on the baffle 20 separating the pre-rinse and wash sections 14 and 16. For simplicity, the float member 58 has been connected directly to the left-hand end portion 35 of the diverter trough 32. The connecting linkage 60 now drops straight down through the return spout 37 to the wash tank 24, at which point the float member 58 is attached. This embodiment places the float member 58 near the rear of the wash tank 24 where it will not, for instance, interfere with tank cleaning operations.

In yet another more sophisticated modification of the present invention, the diverter trough and float member might be interconnected by means of a fluid coupling in which there is contained an incompressible fluid and which is so positioned that any movement upwardly or downwardly of the float member will effect a corresponding movement of the diverter trough so as to either add or subtract liquid from the wash tank depending upon whether it is either a low or a high level that has been indicated. It will also be recognized that additional modifications can be made, for instance, in the positioning and method of mounting the diverter trough in the spray pan of the glasswasher in question. It is therefore contemplated that all such changes and modifications as will be obvious to those skilled in this art are intended to be contemplated within the spirit of this invention as defined by the appended claims.

It will be seen from the foregoing description that the combination of a float member with a diverter trough will serve to constantly maintain a desired level of wash solution in the wash tank of a glasswasher at all times. Indeed, such an arrangement compensates for all conditions of excessive carryover or deflected spray of liq-

uid, or the like, which can cause deviations in the level of wash solution from its normal operating level. The present invention is therefore a considerable simplification of prior art arrangements for attempting to control the addition and overflow of liquid from the wash tank in a glasswasher. In accordance with the foregoing description, it is possible to eliminate much of the potentially troublesome equipment used in prior art glasswashers either for adding water to the wash tank or for preventing a flooding condition. The present diverter trough arrangement efficiently replaces both and will perform the same functions in a dependable and substantially foolproof manner.

I claim:

1. A conveyorized washer unit for washing dishes, glasses and the like, comprising;
 - a housing having a washing zone and a rinsing zone spaced therefrom, and including a conveyor for carrying said dishes and glasses through said zones, and spray pan means disposed in operative relation to said zones and being adapted to convey wash solution and rinse water away from said zones as washing and rinsing occurs;
 - a plurality of spray nozzles disposed in said zones for cleansing the dishes and glasses carried there-through;
 - a tank for containing the wash solution, the tank being connectible to pump means adapted to supply said solution under pressure to the spray nozzles;
 - a float member buoyantly supportable by wash solution in said tank to indicate continuously and automatically the level thereof;

a diverter trough pivotally supported by the washer unit and being disposed to underlie at least part of each of the washing and rinsing zones, the diverter trough having liquid retaining side walls and two oppositely disposed open ends for discharging liquid received in said trough; and

connecting linkage means operatively coupling the float member and trough together such that the float member automatically and continuously indicates the level of wash solution in said tank, and causes the trough to be moved pivotally in response to a change in the level of wash solution in said tank, the diverter trough being operative to divert wash solution from said tank in response to an indicated high level thereof and divert rinse water to said tank in response to an indicated low level thereof, thereby automatically maintaining the level of wash solution in the tank relatively constant.

2. The washer unit of claim 1, wherein the connecting linkage means comprises a float-supporting element pivotally supported on an edge of the tank and a lever arm joining said element to the diverter trough causing the latter to be movable directly in response to movement of the float member in following the level of liquid in the tank.

3. The washer unit of claim 1, wherein the connecting linkage comprises a single link having two oppositely disposed ends, one end being secured to the float member with the other end being connected to an end of the diverter trough.

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