COMMERCIAL DISH WASHER EQUIPPED WITH AN AUXILIARY RINSING WATER PIPE AND RINSING STEP

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ABSTRACT
A dish washer for commercial use is provided. The dishwasher according to current application is used for restaurants, hotel, school and military camp, etc. The dish washer of the current application has an auxiliary rinsing water pipe that is embedded inside of a washing water pipe. The rinsing water supplied to the washing water pipe drives the remaining soapy washing water out of an upper washing water impellor just after the washing step is finished. In rinsing step, rinsing water is supplied to an upper rinsing impeller via main rinsing water pipe. Rinsing water is sprayed to the bottom of the washing water impellor to remove the residual soapy washing water droplets. The dish washer of the current application removes a chance of contamination of dishes and cups by soapy washing water drops after washing is finished.
COMMERCIAL DISH WASHER EQUIPPED WITH AN AUXILIARY RINISING WATER PIPE AND RINISING STEP

1. FIELD OF THE INVENTION

[0001] Current application relates to a commercial dish washer, especially to a dish washer that has an auxiliary rinsing water pipe separated from main rinsing water pipe to eliminate soapy washing water remains inside of a washing water impeller.

2. BACKGROUND OF THE INVENTION

[0002] Most of dish washers, both of commercial and home appliances, do not clean dishes or cups inside thereof cleanly. As a result, many kinds of detergents are developed to remove stains that remain even after washing. However, it causes another problem of using strong detergent and contaminating wasting water. The inventor focused on commercial dish washers, which have rinsing water impellers and washing water impellers inside of the dish water. He finds that the soapy washing water remained inside of the washing water impeller come out of the impeller later and drop on the dishes and cups during a drying step. Then the soapy washing water droplets are dried on the surface of the dishes and/or cups and remain stains of powdery soap. Since those stains are formed after washing step, those new detergent can not remove the stains. The inventor changed the inside structure of rinsing line and achieved a new commercial washing machine that does not leave any stains after washing.

DESCRIPTION OF THE PRIOR ART

[0003] U.S. Patent Application 20060130878 by Lee; Tae Hee; et al. illustrates a dish washer includes a sump communicated with a tub to accommodate water, a water supply pump for pumping the water in the sump, a filtering device for receiving a part of the water pumped through an auxiliary passageway to filter the pumped water and to supply the filtered water to the sump again, and a bypass for bypassing the water to be supplied to the filtering device to the tub or the sump when the filtering device is blocked by sewage. The bypass includes a first sensor detecting water passing through the filtering device being blocked and transmitting the detected result to a controller, and a second sensor detecting and informing the water pollution level to the controller when the filtering device is blocked. A controlling method thereof determines an algorithm of a cycle for washing or rinsing dishes over two times using information acquired from the first and the second sensors.

[0004] U.S. Patent Application 20040089029 and U.S. Pat. No. 7,216,514 by Sakita, Yoshiaki; et al. illustrates a dish washer-dryer and a control system, which facilitate establishing of a special operating program.

[0005] U.S. Patent Application 20030115682 by Gardner, Douglas W. illustrates a dryer that is programmed by receiving a washing mode selection associated with a washer, automatically creating a dryer mode selection from the washing mode selection, and applying the dryer mode selection to the dryer.

[0006] U.S. Patent Application 20020128729 by Blair, Jeffrey L.; et al. illustrates a laundry machine control system including various slates of cycles pre-programmed into a CPU which controls the machine.

SUMMARY OF THE INVENTION

[0012] Most of dish washers, both of commercial and home appliances, do not clean dishes or cups inside thereof cleanly. As a result, many kinds of detergents are developed to remove stains that remain even after washing. However, it causes another problem of using strong detergent and contaminating wasting water. The inventor focused on commercial dish washers, which have rinsing water impellers and washing water impellers inside of the dish water. He finds that the soapy washing water remained inside of the washing water impeller come out of the impeller later and drop on the dishes and cups during a drying step. Then the soapy washing water droplets are dried on the surface of the dishes and/or cups and remain stains of powdery soap. Since those stains are formed after washing step, those new detergent can not remove the stains. The inventor changed the inside structure of rinsing line and achieved a new commercial washing machine that does not leave any stains after washing. A dish washer for commercial use is provided. The dishwasher according to current application is used for restaurants, hospital, school and military camp, etc. The dish washer of the current application has an auxiliary rinsing water pipe that is embedded inside of a washing water pipe. The rinsing water supplied to the washing water pipe drives the remaining soapy washing water out of an upper washing water impeller just after the washing step is finished. In rinsing step, rinsing water is supplied to an upper rinsing impeller via main rinsing water pipe. Rinsing water is sprayed to the bottom of the washing
water impellor to remove the residual soapy washing water droplets. The dish washer of the current application removes a chance of contamination of dishes and cups by soapy washing water droplets after washing is finished.

BRIEF DESCRIPTION OF DRAWINGS

[0013] FIG. 1 is a perspective view of a commercial use dish washer of prior art.

[0014] FIG. 2 is a side cross-sectional view of the conventional dish washer of prior art seen along the line A-A' in FIG. 1.

[0015] FIG. 3 is a cross-sectional view of the section ‘B’ in the FIG. 2 to show the washing water and rinsing water distribution through the upper washing water impellor and the upper rinsing impellor of the prior art.

[0016] FIG. 4 is a perspective view of a commercial purpose dish washer according to current application.

[0017] FIG. 5 is a side cross-sectional view of a dish washer according to the current application seen along the line C-C' in FIG. 4.

[0018] FIG. 6 is a cross-sectional view of the section ‘D’ in the FIG. 5 to show the washing water distribution line through the upper washing water impellor of the current application and shows washing water flow in washing step.

[0019] FIG. 7 is a cross-sectional view of the section ‘D’ in the FIG. 5 to show the rinsing water distribution line through the upper washing water impellor of the current application and shows rinsing water flow in auxiliary rinsing step.

[0020] FIG. 8 is a cross-sectional view of the section ‘D’ in the FIG. 5 to show the rinsing water distribution line through the upper rinsing impellor of the current application and shows rinsing water flow in rinsing step.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] FIG. 1 is a perspective view of a commercial use dish washer (1) of prior art that was made and sold by the inventor in Korean Market. And FIG. 2 is a side cross-sectional view of the conventional dish washer (1) of prior art seen along the line A-A' in FIG. 1. Conventional dish washers (1) currently used in a restaurant, hospital and military camp, etc., have typical structure as shown in the FIG. 1. The conventional dish washer (1) is comprised of a water tank (10) that is divided into a washing water tank (12) and a rinsing water tank (14), an upper washing impellor (20), a lower washing impellor (22), an upper rinsing impellor (30), a lower rinsing impellor (32), a rack (42) for holding dishes and bowls, a washing water pump (28), a rinsing water pump (38), a washing water pipe (24), a rinsing water pipe (34). Washing water (25) is stored in the washing water tank (12) mixed with detergents. The washing water pump (28) delivers the washing water (25) from the washing water tank (12) to the upper washing water impellor (20) and the lower washing water impellor (22) through the washing water pipe (24). The rinsing water pump (38) delivers the rinsing water (35) from the rinsing water tank (14) to the upper rinsing water impellor (30) and to the lower rinsing water impellor (32) through the rinsing water pipe (34).

[0022] FIG. 3 is a cross-sectional view of the section ‘B’ in the FIG. 2 to show the washing water (25) and rinsing water (35) distribution through the upper washing water impellor (20) and the upper rinsing impellor (30) of the prior art. Usually, the upper washing impellor (20) locates above the upper rinsing water impellor (30). A connection housing (36) connects the rinsing water pipe (34) and washing water pipe (24) to the rinsing water impellor (30) and washing water impellor (20) respectively. The rinsing water pipe (34) penetrates the housing (36) from above and reaches the rinsing water impellor (30). The washing water pipe (24) is connected to the housing (36) from the side thereof. So, the washing water (25) that contains soap pass outside of the rinsing water pipe (34) and flow to the upper washing water impellor (20). As the washing water (25) flows into the upper washing impellor (20) and sprayed on the rack (42) through the washing water nozzles (201), the upper washing water impellor (20) rotates by the reaction force. In the dish washer (1) of the prior art, the sequence of dish washing is comprised of water filling up step, washing step, waiting step, and rinsing step. In the water fill up step, tap water is heated by an external heater, such as flash heater, and stored in the washing water tank (12) and rinsing water tank (14). In this step, detergent is introduced to the washing water (25) to make soap water. The washing water (25) is recycled to the washing water tank (12) after pass through the screen net (121), which is located at the bottom of the washing bath, to remove left over particles comes from dishes. The rinsing water tank (14) is closed with a cover.

[0023] A waiting step is followed just after washing step. This waiting step is to allow the washing water (25) which contains soap to drain out of the upper washing water impellor (20). However, there still remains soapy washing water in the upper washing water impellor (20) and some soapy water drops hang at the tip of the washing water nozzles (201).

[0024] In the rinsing step, the rinsing water (35) is sprayed to the rack (42) through rinsing water nozzles (301) that developed at the lower surface of the upper rinsing impellor (30) to rotate the impellor (30).

[0025] If such soapy water drops that were hang at the upper washing water impellor (20) or at the nozzles (201) remain throughout the rinsing step, they drop to the dishes or cups placed on the rack (42) and contaminate them. Even repeated rinsing can not eliminated the possibility of contamination by the soapy water as far as such structure is maintained.

[0026] It is the purpose of the current application to provide a dish washer that eliminates such defects of the prior arts forever by changing the structure of a dish washer.

[0027] FIG. 4 is a perspective view of a commercial purpose dish washer (1') according to current application. Apparent shape of a dish washer (1') of the current application is the same as the prior art. The only modification is done inside of the pipes.

[0028] FIG. 5 is a side cross-sectional view of a dish washer according to the current application seen along the line C-C' in FIG. 4. The commercial dish washer (1') of the current application is also comprised of a water tank (10') that is divided into a washing water tank (12') and a rinsing water tank (14'), an upper washing impellor (20'), a lower washing impellor (22'), an upper rinsing impellor (30'), a lower rinsing impellor (32'), a rack (42') for holding dishes and bowls, a washing water pump (28'), a rinsing water pump (38'), a washing water pipe (24'), a rinsing water pipe (34'). One auxiliary rinsing water pipe (50) is developed from the rinsing water tank (14') and penetrates one side of wall of the washing water pipe (24') and embedded inside of the washing water pipe (24') along the length thereof and reaches a connection housing (36').
Since the washing water (25') is supplied with a pressure, one check valve (54) is installed on the auxiliary rinsing water pipe (50), just before it meets the washing water pipe (24'), to prevent reflux of the washing water (25'), which contains soap, through the auxiliary rinsing water pipe (50) and contaminates the rinsing water (35') in the rinsing water tank (14'). Another check valve (39) is installed on the main rinsing water line (34') to prevent reflux of the washing water.

FIG. 8 is a cross-sectional view of the section 'D' in the FIG. 5 to show the washing water (25) distribution line through the upper washing impellor (20') of the current application and shows washing water (25') flow in washing step.

The upper washing impellor (20') locates above the upper rinsing water impellor (30'). A housing (36') connects the rinsing water pipe (34') and washing water pipe (24') to the rinsing water impellor (30') and washing water impellor (20') respectively. The rinsing water pipe (34') penetrates the housing (36) from above and reaches the rinsing water impellor (30'). In addition to the rinsing water pipe (34'), another auxiliary rinsing water pipe (50) is installed inside of the washing water pipe (24') along the length of the washing water pipe (24'). The washing water pipe (24') is connected to the housing (36) from the side thereof. So, the washing water (25) that contains soap pass outside of the rinsing water pipe (34') and flows to the upper washing water impellor (20'). As the washing water (25') flows into the upper washing impellor (20') and sprayed on the lag (42') through the nozzle (201'), the upper washing water impellor (20') rotates by the reaction force. The rinsing water impellor (30') has two rows of rinsing water nozzles (301') and (302'). One row of rinsing water nozzles (301') is developed facing downward as in the prior art. Another row of rinsing water nozzles (301') is developed facing upward.

In the dish washer (1') of the current application, the sequence of dish washing is comprised of water filling up step, washing step, preliminary rinsing step, and rinsing step. So as to washing step, the sequence is the same as the prior art.

FIG. 7 is a cross-sectional view of the section 'D' in the FIG. 5 to show the rinsing water (35') distribution line through the upper washing impellor (20') of the current application and shows rinsing water (35') flow in auxiliary rinsing step. Just after washing step is finished, i.e., washing water (25') is cut, an auxiliary rinsing water pump (52) supply rinsing water (35') to the auxiliary rinsing water pipe (54).

Then the rinsing water (35') comes out of the end of the auxiliary rinsing water pipe (50) and drives out the washing water (25') that was left inside of the housing (36) and the washing impellor (20'). In the auxiliary rinsing step, the rinsing water (35') comes out through the washing water nozzle (201'). The rinsing water (35') additionally washes upper surface of the rinsing water impellor (35') to remove soapy washing water (25') that might sprayed thereon during the washing step and remain on the upper surface of the rinsing water impellor (35'). Even though the residual soapy washing water (25') is driven out of the washing water impellor (20'), some washing water (25') droplets (25') may hang on underneath of the upper washing water impellor (20'). Such droplets (25') are washed out during the following rinsing step due to the special structure of the rinsing water impellor (30) and nozzles (301') (302').

FIG. 8 is a cross-sectional view of the section 'D' in the FIG. 5 to show the rinsing water (35') distribution line through the upper rinsing impellor of the current application and shows rinsing water (35') flow in rinsing step. In rinsing step, the rinsing water (35') is supplied through the rinsing water pipe (34') and introduced to inside of the rinsing water impellor (30'). As the rinsing water (35') comes out through the rinsing water impellor (30') through the rinsing water nozzles (301') (302'), part of the rinsing water (35') that comes out through the rinsing water nozzle of (302'), face the bottom surface of the washing water impellor (20'), clean the washing water droplets (25').

By the mechanism described above, all the soapy washing water (25') is removed and the chances of contaminating the dishes or cups are eliminated.

What is claimed is:

1. A commercial purpose dish washer that is comprised of;
   a. a water tank that is divided into
   b. a washing water tank, and
   c. an upper washing impellor that locates above an upper rinsing water impellor, and
   d. a lower washing impellor, and
   e. an auxiliary rinsing water pump, and
   f. a washing water pump, and
   g. a connection housing that connects;
   h. a rinsing water pipe that penetrates the connection housing from above and reaches the rinsing water impellor and
   i. the washing water from the side thereof, and
   j. an auxiliary rinsing water pipe that is developed from the rinsing water tank and penetrates one side of wall of the washing water pipe and embedded inside of the washing water pipe along the length thereof and reaches the connection housing, and
   k. a check valve that is installed on the auxiliary rinsing water pipe, just before it meets the washing water pipe, to prevent reflux of the soapy washing water through the auxiliary rinsing water pipe to contaminate the rinsing water in the rinsing water tank, and another check valve is installed on the main rinsing water line to prevent reflux of the washing water.

2. A commercial purpose dish washer of claim 1, wherein
   a. the auxiliary rinsing water pump supplies rinsing water to the auxiliary rinsing water pipe to allow the rinsing water comes out of the end of the auxiliary rinsing water pipe and drives out the washing water that was left inside of the housing and the washing impellor and comes out through the washing water nozzle.

3. A commercial purpose dish washer of claim 1, wherein
   a. the rinsing water comes out though the rinsing water nozzles, which face the bottom surface of the washing water impellor, cleans the soapy washing water droplets that are hung on underneath of the upper washing water impellor.