Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The present invention relates to a dish washing machine, or dishwasher, having a sump assembly arranged at a lower portion of a washing tub to store wash water.

A dish washing machine, which is a home appliance to wash dishes, includes a body provided therein with a washing tub, a basket to accommodate dishes, a spray unit to spray wash water, a water storage chamber to store wash water, and a sump assembly having a plurality of filters to filter out dirt, and a washing pump to pump out the wash water in the water storage chamber toward the spray unit.

In general, the filters to filter out dirt include a fine filter arranged on the bottom of the washing tub and having through holes of an intermediate size, a coarse filter arranged in the opening of the fine filter and having relatively large through holes, and a microfilter arranged in the water storage chamber and having microscopic through holes.

Herein, the microfilter is formed in the shape of a cylinder having an open top and an open bottom and disposed in a water storage space. After passing through the coarse filter, the wash water is introduced into the microfilter through the open top of the microfilter. Dirt whose size is greater than that of the micro through holes formed in the circumferential surface of the microfilter is caught in the microfilter.

Accordingly, a dirt catching chamber is formed in the microfilter, and a circulation chamber connected to a circulation flow passage is formed between the microfilter and a sump housing.

DE 93 12 801 discloses a filter combination for a dishwasher.

According to the invention, there is provided a dish-washing machine according to claim 1.

Therefore, it is an aspect to provide a dish washing machine including a sump assembly having a microfilter formed in a flat shape rather than a cylindrical shape.

It is an aspect to provide a dish washing machine including a sump assembly having a dirt catching chamber defined by a microfilter and a sidewall portion and a bottom portion of a sump housing.

It is an aspect to provide a dish washing machine which may ensure smooth circulation of wash water from a sump assembly to a spray unit.

It is an aspect to provide a dish washing machine which may enhance sealing of a microfilter and a sump.

In accordance with one aspect, a dish washing machine includes a body, a washing tub provided in the body, a basket provided in the washing tub to store dishes, a spray unit to spray wash water to wash the dishes in the basket, and a sump assembly arranged at a lower portion of the washing tub to store wash water, wherein the sump assembly includes a sump housing including a water storage chamber to store wash water and a side wall portion and a bottom portion, the sidewall portion and the bottom portion defining the water storage chamber, a fine filter arranged at an upper portion of the sump housing and provided with an opening allowing the washing tub and the water storage chamber to communicate with each other therethrough, a coarse cylindrical filter mounted on the opening, and a microfilter mounted in the water storage chamber to define a dirt catching chamber for catching of dirt in conjunction with one part of the sidewall portion and one part of the bottom portion of the sump housing, the microfilter being formed in a flat shape.

The dish washing machine may further include a circulation chamber defined by the other part of the sidewall portion, the other part of the bottom portion of the sump housing, and the microfilter and adapted to circulate the wash water to the spray unit. The sidewalk portion of the sump housing may be provided with a pair of side fitting grooves allowing the microfilter to be fitted thereinto.

Herein, a width of each of the side fitting grooves may gradually decrease as the side fitting grooves extend downward.

The bottom portion of the sump housing may be provided with a bottom fitting groove allowing the microfilter to be fitted thereinto.

The microfilter may include a filter mesh to filter out dirt and a filter frame to support the filter mesh, wherein the filter mesh may be formed in a flat shape.

The microfilter may include a pair of fitting protrusions protruding from both sides of the filter frame to be coupled to the sump housing, wherein a width of each of the fitting grooves may gradually decrease as the fitting grooves extend downward.

The dish washing machine may further include a dirt cover coupled to the sump housing to cover an open top of the dirt catching chamber.

Herein, the dirt cover may be screw-coupled to the sump housing.

The dirt cover may include a through hole allowing the coarse filter to pass therethrough.

The dirt cover may include a filter support protruding toward the microfilter to support the microfilter.

The sump housing may further include a cover support protruding inward to support the dirt cover.

In accordance with an aspect, a dish washing machine includes a body, a washing tub provided in the body, a sump housing arranged at a lower portion of the washing tub and provided with a water storage chamber to store wash water, a fine filter adapted to cover the water storage chamber and provided with an opening allowing the washing tub and the water storage chamber to communicate with each other therethrough, a coarse cylindrical filter mounted on the opening, and a microfilter mounted in the water storage chamber such that the microfilter crosses the water storage chamber, the microfilter being formed in a flat shape.

Herein, the microfilter may include a filter mesh formed in a flat shape and a filter frame to support the...
filter mesh.

[0025] The microfilter may include a fitting protrusion protruding from the filter frame to be coupled to the sump housing.

[0026] The sump housing may include a sidewall portion and a bottom portion, the sidewall portion and the bottom portion defining the water storage chamber, wherein one part of the sidewall portion, one part of the bottom portion of the sump housing, and the microfilter may define a dirt catching chamber, and the other part of the sidewall portion, the other part of the bottom portion of the sump housing, and the microfilter may define a circulation chamber to circulate the wash water to the washing tub.

[0027] The dish washing machine may further include a dirt cover coupled to the sump housing to cover an open top of the dirt catching chamber.

[0028] In accordance with an aspect, a dish washing machine including a body, a washing tub provided in the body, a sump housing arranged at a lower portion of the washing tub and provided with a water storage chamber to store wash water, a sidewall portion, and a bottom portion, the sidewall portion and the bottom portion defining the water storage chamber, a fine filter adapted to cover the water storage chamber and provided with an opening allowing the washing tub and the water storage chamber to communicate with each other therethrough, a coarse filter formed in a cylindrical shape and mounted on the opening, a microfilter mounted in the water storage chamber, a dirt catching chamber defined by the microfilter, one part of the sidewall portion, and one part of the bottom portion of the sump housing, and adapted to communicate with the opening, and a circulation chamber defined by the microfilter, the other part of the sidewall portion, the other part of the bottom portion of the sump housing, and adapted to circulate the wash water to the washing tub.

[0029] Herein, the circulation chamber may take a concentrated form rather having a doughnut shape.

[0030] The microfilter may be formed in a flat shape.

[0031] The dish washing machine may further include a dirt cover to cover an open top of the dirt catching chamber.

[0032] In accordance with an aspect, a dish washing machine includes a body, a washing tub provided in the body, a water storage chamber arranged at a lower portion of the washing tub to store wash water, and a microfilter arranged in the water storage chamber to divide the water storage chamber into a dirt catching chamber to catch dirt and a circulation chamber to circulate wash water to the washing tub, the microfilter being formed in a non-cylindrical shape.

[0033] Herein, the microfilter may be formed in a flat shape.

[0034] The dish washing machine may further include a sump housing provided with the water storage chamber, a sidewall portion, and a bottom portion, the sidewall portion and the bottom portion defining the water storage chamber, wherein the dirt catching chamber may be defined by the microfilter, one part of the sidewall portion, and one part of the bottom portion of the sump housing, and the circulation chamber may be defined by the microfilter, the other part of the sidewall portion, and the other part of the bottom portion of the sump housing.

[0035] In accordance with an aspect, a sump assembly for a dish washing machine includes a sump housing including a water storage chamber to store wash water and a sidewall portion and a bottom portion, the sidewall portion and the bottom portion defining the water storage chamber, a fine filter arranged at an upper portion of the sump housing and provided with an opening allowing the washing tub and the water storage chamber to communicate with each other therethrough, a coarse filter formed in a cylindrical shape and mounted on the opening, and a microfilter mounted in the water storage chamber to define a dirt catching chamber for catching of dirt in conjunction with one part of the sidewall portion and one part of the bottom portion of the sump housing, the microfilter being formed in a flat shape.

[0036] A dish washing machine includes a body, a washing tub provided in the body, a spray nozzle to spray wash water, a sump provided with a water storage chamber to store wash water, a microfilter mounted to the water storage chamber to partition the water storage chamber into a dirt catching chamber to catch dirt and a circulation chamber to circulate the wash water to the spray nozzle, the microfilter being provided with a flat filter portion, and a coarse filter mounted to the sump to pre-filter out dirt contained in the wash water flowing to the dirt catching chamber and to press the microfilter downward and laterally such that sealing of a gap between the sump and the microfilter is maintained.

[0037] Herein, the coarse filter may be mounted to the sump by being inserted into the sump vertically downward and then turned from a release position to a lock position. Herein, in turning the coarse filter from the release position to the lock position, the coarse filter may move downwards and press the microfilter downwards. Herein, the coarse filter may include a downwardly pressing surface to press the microfilter downwards. Herein, the microfilter may include a downwardly pressed surface pressed by the downwardly pressing surface.

[0038] In addition, the coarse filter may include a mounting protrusion provided with an upward inclination surface inclined upward as the upward inclination surface extends in a direction of turning of the coarse filter from the release position to the lock position. Herein, the sump may include a mounting groove allowing the mounting protrusion to be inserted thereinto, the mounting groove being provided with a downward inclination surface configured to contact the upward inclination surface and inclined downward as the downward inclination surface extends in the direction of turning of the coarse filter from the release position to the lock position.

[0039] In addition, the coarse filter may include a laterally pressing surface formed by expanding a portion of
an outer circumferential surface of coarse filter radially outward such that the laterally pressing surface presses the microfilter laterally when the coarse filter is turned from the release position to the lock position.

[0040] Herein, the microfilter may include a laterally pressed surface pressed by the laterally pressing surface.

[0041] In addition, the microfilter may include a frame portion adapted to surround the filter portion to support the filter portion, the frame portion including an upper frame, lower frame, and two side frames.

[0042] Herein, the lower frame may include a lower sealing groove adapted to seal the sump.

[0043] Herein, the sump may include a lower sealing protrusion inserted into the sealing groove of the lower frame.

[0044] In addition, each of the side frames may include a side sealing protrusion adapted to seal the sump.

[0045] Herein, the sump may include side sealing grooves allowing the side protrusions of the side frames to be inserted thereinto.

[0046] In addition, the dish washing machine may further include a vane to move within the washing tub and reflect the wash water sprayed from the spray nozzle toward dishes, and a rail extending from a front of the washing tub to a back of the washing tub to guide movement of the vane, wherein the coarse filter may be disposed such that one of two sidewalls of the washing tub is closer than the other sidewall to the coarse filter.

[0047] Herein, a bottom surface of the washing tub may be provided with a drainage hole, the dish washing machine further including a fine filter mounted to the drainage hole.

[0048] In accordance with an aspect, a dish washing machine includes a body, a washing tub provided in the body, the washing tub having a bottom surface provided with a drainage hole, a fixed nozzle fixed to one side of the washing tub to spray wash water, a vane to move within the washing tub and reflect the wash water sprayed from the fixed nozzle toward dishes, a rail extending from a front of the washing tub to a back of the washing tub to guide movement of the vane, a sump provided with a water storage chamber to store wash water, a fine filter mounted to the drainage hole, and a coarse filter mounted to the washing tub to partition the water storage chamber into a dirt catching chamber to catch dirt and a sump to filter out dirt in the wash water flowing to the dirt catching chamber, the coarse filter being positioned such that one of two sidewalls of the washing tub is closer than the other to the coarse filter.

[0049] Herein, the coarse filter may be mounted to the sump by being inserted into the sump vertically downward and then turned from a release position to a lock position. In addition, the coarse filter may press the microfilter downward and laterally to maintain sealing of the sump and the microfilter.

[0050] These and/or other aspects will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a view schematically illustrating a structure of a dish washing machine according to an exemplary embodiment;
FIG. 2 is a view illustrating the structure of the lower portion of a washing tub of the dish washing machine of FIG. 1;
FIG. 3 is a view illustrating the sump assembly of the dish washing machine of FIG. 1;
FIG. 4 is an exploded perspective view illustrating constituents of the sump assembly of the dish washing machine of FIG. 1, as viewed from a different angle;
FIG. 5 is an exploded perspective view illustrating constituents of the sump assembly of the dish washing machine of FIG. 1;
FIG. 6 is a view illustrating the sump assembly of the dish washing machine of FIG. 1 with the coarse filter and fine filter removed;
FIG. 7 is a cross-sectional view taken along line I-I of FIG. 3;
FIG. 8 is a cross-sectional view taken along line II-II of FIG. 3;
FIG. 9 is a view illustrating a process of catching dirt in the sump assembly of the dish washing machine of FIG. 1;
FIG. 10 is a view illustrating a sump, a coarse filter and a fine filter of a dish washing machine according to an embodiment;
FIG. 11 is an exploded view illustrating the sump, coarse filter, fine filter and microfilter of the dish washing machine of FIG. 10;
FIG. 12 is a cross-sectional view taken along line III-III of FIG. 10;
FIG. 13 is an enlarged view illustrating section B of FIG. 12;
FIG. 14 is a cross-sectional view taken along line IV-IV of FIG. 10;
FIG. 15 is an enlarged view illustrating section C of FIG. 14;
FIG. 16 is a plan view illustrating the sump and coarse filter of the dish washing machine of FIG. 10, in which the coarse filter performs a locking operation;
FIG. 17 is a side view illustrating the coarse filter of the dish washing machine of FIG. 10;
FIG. 18 is a view illustrating the sump and coarse filter of the dish washing machine of FIG. 10, in which the coarse filter performs a locking operation;
FIG. 19 is a cross-sectional view illustrating the sump, coarse filter and microfilter of the dish washing machine of FIG. 10;
FIG. 20 is a enlarged plan view illustrating parts of the coarse filter and microfilter of the dish washing machine.
to generate driving power, a pulley 36 to transmit the assembly 30. The drive unit may include a drive pump 35 to provide with a drive unit to drive the reflecting plate assembly 30. When the drive pump 35 is driven, the wire 37 may be pulled toward the drive pump 35 and the reflecting plate assembly 30 connected to the wire 37 in the third spray unit 23. When wash water is sprayed from the spray nozzles 24 with the drive pump 35 remaining stationary, the reflecting plate assembly 30 may be moved in the spray direction of the spray nozzles 24 by water pressure.

This way, the reflecting plate assembly 30 may reciprocate. Accordingly, the third spray unit 23 may spray wash water into the washing tub 12 such that the wash water reaches all positions in the washing tub 12.

The configuration of the drive unit of this embodiment is simply illustrative. Any commonly known element adapted to implement rectilinear reciprocation may be employed.

In addition, while the dish washing machine is illustrated as being provided with two rotor type spray units 21 and 22, and one spray unit 23 to reciprocate, embodiments of the present invention are not limited thereto.

The water flow passage 40 connects an external water supply source with the interior of the washing tub 12. The water flow passage 40 may be provided with a water supply valve 41 to regulate supply of water.

The sump assembly 100 is arranged at a lower portion of the washing tub 12 to store wash water. The bottom surface 13 of the washing tub 12 is inclined toward the sump assembly 100. Thereby, wash water is allowed to flow down the bottom surface 13 and be collected in the sump assembly 100.

The sump assembly 100 includes a sump housing 150, a water storage chamber 151 (FIG. 4) provided in the sump housing 150, and a plurality of filters to filter out dirt contained in the wash water. The sump housing 150 may be provided with a circulation port 161 connected to the circulation flow passage 42 and a drainage port 162 connected to the drainage flow passage 44.

The filters includes a coarse filter 110 having relatively large through holes, a fine filter 120 having through holes of an intermediate size, and a microfilter 130 (FIG. 4) having relatively small through holes. Particularly, the microfilter 130 defines a dirt catching chamber 152 (FIG. 7) which catches dirt and drains the dirt along with the wash water during draining.

Hereinafter, constituents of the sump assembly 100 will be described in detail.

Referring to FIGS. 3 to 8, the sump assembly 100 of the dish washing machine according to this embodiment includes a sump housing 150 having a water storage chamber 151 to store wash water, a fine filter 120 arranged at the upper portion of the sump housing 150, a coarse cylindrical filter 110 mounted on an opening 123 of the fine filter 120, and a microfilter 130 provided...
in the water storage chamber 151.

[0069] The sump housing 150 may have an approximately semispherical shape having an open top. The sump housing 150 includes a sidewall portion 154 and a bottom portion 155, which define the water storage chamber 151. The water storage chamber 151 is formed in a space surrounded by the sidewall portion 154 and bottom portion 155 of the sump housing 150 and is provided with an open top. 162

[0070] The sump housing 150 includes a circulation port 151, a drainage port 162, a first auxiliary port 163, and a second auxiliary port 164, which communicate with the water storage chamber 151. The circulation port 151 is connected to a circulation flow passage, and the drainage port 162 is connected to a drainage flow passage. When necessary, a turbidity sensor and an air discharge hose may be connected to the first auxiliary port 163 and the second auxiliary port 164.

[0071] The sidewall portion 154 of the sump housing 150 is provided with a pair of side fitting grooves 156 into which the microfilter 130 is fitted, and the bottom portion 155 of the sump housing 150 is provided with a bottom fitting groove 157 (FIG. 8) into which the microfilter 130 is fitted.

[0072] The microfilter 130 may be detachably fitted into the side fitting grooves 156 and bottom fitting groove 157 of the sump housing 150. By fitting the microfilter 130 into the sump housing 150, sealing of the gap between the microfilter 130 and the sump housing 150 may be secured and dirt may be prevented from passing through a portion at which the microfilter 130 and the sump housing 150 are coupled to each other.

[0073] The side fitting grooves 156 may have a width gradually decreasing as the grooves extend downward. Thereby, the microfilter 130 may be easily inserted into the side fitting grooves 156.

[0074] Once the microfilter 130 is mounted to the sump housing 150 by fitting the microfilter 130 into the side fitting grooves 156 and the bottom fitting groove 157, the water storage chamber 151 may be partitioned into a dirt catching chamber 152 (FIGS. 7 and 8) and a circulation chamber 153 (FIGS. 7 and 8) by the microfilter 130.

[0075] The fine filter 120 includes a fine filter body 121, fine through holes 122 formed in the fine filter body 121 and having a relatively intermediate size, and an opening 123 formed in the fine filter body 121 to allow the washing tub to communicate with the water storage chamber 151. The fine filter body 121 is inclined downward to the opening 123.

[0076] The coarse filter 110 is approximately formed in a cylindrical shape. The coarse filter 110 is mounted on the opening 123 of the fine filter 120 to filter out dirt contained in the wash water passing through the opening 123 of the fine filter 120. The coarse filter 110 includes a coarse cylindrical filter body 111, coarse through holes 112 formed in the coarse filter body 111 and having a relatively large size, and a grip 113 facilitating holding of the coarse filter 110.

[0077] When necessary, a turbidity sensor and an air discharge hose may be connected to the first auxiliary port 163 and the second auxiliary port 164. The circula­tion port 161, a drainage port 162, a first auxiliary port 163, and a second auxiliary port 164, which communicate with the water storage chamber 151. The circulation port 151 is connected to a circulation flow passage, and the drainage port 162 is connected to a drainage flow passage. When necessary, a turbidity sensor and an air discharge hose may be connected to the first auxiliary port 163 and the second auxiliary port 164.

[0078] The microfilter 130 includes a filter mesh 131 having a flat shape and micro through holes and a filter frame 132 to support the filter mesh 131.

[0079] That is, a microfilter having a bent shape or zigzag shape may be within the scope of the present invention if the microfilter is allowed to be disposed across the water storage chamber such that a dirt catching chamber is defined by being surrounded by the microfilter and the sump housing.

[0080] The microfilter 130 includes a filter mesh 131 having a flat shape and micro through holes and a filter frame 132 to support the filter mesh 131.

[0081] The filter frame 132 may include an outer frame 133 joined to the edge of filter mesh 131 and a middle frame 134 arranged at the center of the filter mesh 131. The lower end 135 of the filter frame 132 may be fitted into the bottom fitting groove 157 of the sump assembly 150.

[0082] In addition, the microfilter 130 may include a pair of fitting protrusions 136 protruding from the filter frame 132 to be fitted into the side fitting grooves 156 of the sump housing 150. The width of the fitting protrusions 136 may decrease as the fitting protrusions 136 extends downward such the fitting protrusions 136 correspond to the side fitting grooves 156 of the sump housing 150.

[0083] By fitting the fitting protrusions 136 on both sides of the microfilter 130 into the side fitting grooves 156 of the sump housing 150, the microfilter 130 is mounted to the sump housing 150 across the water storage chamber 151.

[0084] Accordingly, the water storage chamber 151 is divided into two chambers 152 and 153 by the microfilter 130. Chamber 152 is disposed under the opening 123 of the fine filter 120. Accordingly, dirt having passed through the coarse filter 110 mounted on the opening 123 is introduced into this chamber 152.

[0085] The dirt having failed to pass through the filter mesh 131 of the microfilter 130 is caught in the chamber 152. In this context, the chamber 152 is defined as a dirt catching chamber 152, and the other chamber 153 is defined as a circulation chamber 153. The dirt catching chamber 152 communicates with the drainage port 162, and the circulation chamber 153 communicates with the circulation port 161.

[0086] The dirt catching chamber 152 is formed in a space surrounded by the microfilter 130, one part 154a of the sidewall portion of the sump housing (FIGS. 7 and 8), and one part 155a of the bottom portion of the sump housing (FIGS. 7 and 8).

[0087] In addition, the circulation chamber 153 is formed in a space surrounded by the microfilter 130, the
other part 154b of the sump housing (FIGS. 7 and 8), and the other part 155b of the bottom portion of the sump housing (FIGS. 7 and 8).

[0088] The above configuration results from the microfilter 130 being formed in a flat shape rather than a cylindrical shape and disposed across the water storage chamber 150.

[0089] The dirt catching chamber 152 and the circulation chamber 153 take a concentrated form rather than a distributive form like a doughnut shape. The concentrated form may allow smoother flow of wash water than the distributive form.

[0090] The dish washing machine may further include a dirt cover 140 coupled to the open top of the dirt catching chamber 152 in order to prevent backflow or overflow of the dirt caught in the dirt catching chamber 152.

[0091] The dirt cover 140 may be joined to the sump housing 150 by a screw S. To this end, screw fastening holes 143 and 158 (FIG. 5) may be formed respectively in the dirt cover 140 and the sump housing 150. In addition, the sump housing 150 may include a cover support 159 protruding toward the water storage space 151 to support the edge of the dirt cover 140.

[0092] The dirt cover 140 may include a cover portion 141 arranged approximately horizontally to cover the open top of the dirt catching chamber 152, and a filter support 142 protruding from the cover portion 141 to support the microfilter 130.

[0093] The cover portion 141 may be provided with a through hole 144 through which the coarse filter 110 passes. The filter support 142 may include a horizontal support 142a to support the filter frame 132 of the microfilter 130 and a vertical support 142b to support the filter mesh 131 of the microfilter 130. The vertical support 142b may be provided with an insertion groove 142c into which the middle frame 134 of the filter frame 132 is inserted.

[0094] Through the configuration as above, the dirt cover 140 may prevent backflow or overflow of the dirt caught in the dirt catching chamber 152 and support the microfilter 130.

[0095] Hereinafter, a process of catching dirt in the sump assembly of the dish washing machine will be described with reference to FIGS. 1 to 9.

[0096] Wash water sprayed from the spray units 21, 22 and 23 washes the dishes and falls to the bottom 13 of the washing tub 12, causing the dirt to fall. Then, the wash water is moved to the fine filter 120 by inclination of the bottom 13 of the washing tub 12.

[0097] Then, the wash water reaches the top of the fine filter 120. After passing the through holes 122 of the fine filter 120, the wash water is stored in the water storage chamber 151.

[0098] Some of the dirt reaching the fine filter 120 passes through the through holes 122 of the fine filter 120 and falls into the circulation chamber 153, and the remaining portion of the dirt is moved to the coarse filter 110 by inclination of the fine filter 120.

[0099] Some masses of the dirt moved to the coarse filter 110 have a large size and is thus caught at the exterior of the coarse filter 110, not passing through the through holes 112 of the coarse filter 110. The remaining masses of the dirt pass through the through holes 112 of the coarse filter 110 and fall into the dirt catching chamber 152.

[0100] When the circulation pump 43 is driven, the wash water in the water storage chamber 151 is pumped out to the spray units 21, 22 and 23. At this time, some of the dirt having passed through the fine filter 120 and fallen into the circulation chamber 153 is also pumped out. Most of the dirt in the dirt catching chamber 152 fails to pass through the densely formed microfilter 130 and continues to remain in the dirt catching chamber 152.

[0101] After the dishes are sufficiently washed by operating the circulation pump 43 several times, the drainage pump 45 is driven to drain the wash water. When the drainage pump 45 is driven, the dirt in the dirt catching chamber 152 and the wash water are drained from the body 10.

[0102] Hereinafter, a sump and filters of a dish washing machine according to an embodiment will be described with reference to FIGS. 10 to 21.

[0103] According to this embodiment, the dish washing machine includes a sump 300 to store wash water, a circulation pump 251 to circulate the wash water from the sump 300 to spray nozzles, a drainage pump 252 to discharge the wash water in the sump 300 and dirt from the body, and filters 320, 330 and 340 to filter out the dirt contained in the wash water.

[0104] A bottom plate 235 of the washing tub is provided with a drainage hole 250 (FIG. 21) to discharge wash water to the sump 300. The bottom plate 235 of the washing tub may be inclined toward the drainage hole 250 such that the wash water is guided toward the drainage hole 250 by gravity.

[0105] The sump 300 may be formed approximately in the shape of a semi-sphere having an open top. The sump 300 includes a bottom portion 301, a sidewall portion 303, a water storage chamber 310 formed between the bottom portion 301 and the sidewall portion 303 to store wash water, a circulation port 307 connected with the circulation pump 251, and a drainage port 308 connected with the drainage pump 252.

[0106] The filters 320, 330 and 340 includes a fine filter 320 mounted in the drainage hole 250 of the bottom plate 235, a coarse filter 340 mounted to the sump 300, and a microfilter 330.

[0107] The coarse filter 340 may be approximately formed in a cylindrical shape. The coarse filter 340 may be mounted on the inner surface of the sidewall portion 303 of the sump 300.

[0108] The coarse filter 340 may have a filter portion 342 to filter out dirt having a relatively large size and a handle 341 for installation of the coarse filter 340. The filter portion 342 of the coarse filter 340 may be formed on the circumferential surface of the coarse filter 340.
The wash water introduced into the dirt catching chamber 311 from flowing into the circulation chamber 312.

Meanwhile, the coarse filter 340 may be mounted to the sump 300 when it is inserted vertically downward into the sump 300 and turned from a release position to a lock position.

With this configuration, when the coarse filter 340 is turned from the release position to the lock position, the upward inclination surface 344 of the mounting protrusion 343 may slide along the downward inclination surface 306 of the mounting groove 305, thereby causing the coarse filter 340 to move downward.

When the coarse filter 340 is turned from the release position to the lock position, it may press the microfilter 330 downward while moving downward. To this end, the coarse filter 340 may have a downwardly pressing surface 345 which is horizontally formed to press the microfilter 330 downward. The microfilter 330 may have a downwardly pressed surface 337 which is horizontally formed to be pressed by the downwardly pressing surface 345.

As the coarse filter 340 presses the microfilter 330 downward by being turned from the release position to the lock position, sealing of the gap between the lower frame 333 of the microfilter 330 and the sump 300 may be further enhanced, and displacement of the microfilter 330 may be prevented.

In addition, the coarse filter 340 may have a laterally pressing surface 346 formed by radially outward expansion of a portion of the outer circumferential surface of the coarse filter 340 so as to laterally pressing the
microfilter 330 when it is turned from the release position to the lock position. That is, the coarse filter 340 may have a bulging shape or an oval shape.

[0127] The microfilter 330 may have a laterally pressed surface 338 which is laterally pressed by the laterally pressing surface 346. With this configuration, the microfilter 330 is laterally pressed when the coarse filter 340 is turned from the release position to the lock position. Thereby, sealing of the gap between the side frames 335 of the microfilter 330 and the sidewall portion 303 of the sump 300 may be enhanced.

[0128] Meanwhile, as shown in FIG. 21, the coarse filter 340 may be disposed such that one of two sidewalls 233 and 234 of the washing tub is closer than the other one of the sidewalls 233 and 234 to the coarse filter 340. That is, the coarse filter 340 may be disposed such that the left sidewall 233 is closer than the right sidewall 234 to the coarse filter 340. That is the coarse filter 340 is disposed off center of the center line of the bottom of the washing tub. As the coarse filter 340 is disposed as above, the coarse filter 340 may be readily removed without being interfered with by a rail 440, which guides movement of the reflecting plate 400.

[0129] As is apparent from the above description, according to embodiments, a microfilter disposed in a water storage chamber to define a dirt catching chamber for catching of dirt has a flat shape which is simpler than the conventional cylindrical shape. Thereby, the cost of fabrication of the microfilter may be reduced.

[0130] In addition, cleaning the microfilter may be facilitated. For example, installing a spray nozzle for spray of wash water for cleaning of a filter in a water storage chamber may facilitate cleaning of the microfilter.

[0131] Moreover, since a dirt catching chamber to catch dirt and a circulation chamber to circulate wash water through a spray unit are respectively defined by a microfilter and a sidewall portion and bottom portion of a sump housing, the dirt catching chamber and the circulation chamber may take a concentrated form.

[0132] Accordingly, wash water may smoothly flow from the circulation chamber into a circulation flow passage, and designing the sizes and specific shapes of the dirt catching chamber and the circulation chamber may be facilitated.

[0133] For example, in the case of a sump assembly having a conventional cylindrical microfilter, the circulation chamber is formed in a doughnut shape between the exterior of the microfilter and the sump housing, and accordingly increasing the diameter of the microfilter to increase the size of the dirt catching chamber may adversely affect flow of wash water in the circulation chamber.

[0134] On the contrary, a circulation chamber according to an embodiment takes a concentrated form rather than having a doughnut shape, and accordingly it may enhance flow of wash water compared to conventional cases. In addition, shifting the microfilter toward the circulation chamber to increase the size of the dirt catching chamber may rarely change flow of wash water in the circulation chamber.

[0135] According to embodiments, sealing of a microfilter and a sump may be enhanced. Thereby, the dirt catching capability of the dish washing machine may be improved.

[0136] In addition, as a course filter is arranged such that one of the two sidewalls is closer than the other sidewall to the coarse filter. Accordingly, the coarse filter may be readily installed and separated without being interfered with by rails guiding the vane.

[0137] Although a few embodiments have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the claims.

Claims

1. A dish washing machine (1) comprising:
   a body (10);
   a washing tub (12) provided in the body;
   a basket (17, 18) provided in the washing tub to store dishes;
   a spray unit (21, 22, 23) to spray wash water to wash the dishes in the basket; and
   a sump assembly (100) arranged at a lower portion of the washing tub to store wash water,

   wherein the sump assembly comprises:
   a sump housing (150) comprising a sidewall portion (154) and a bottom portion (155) a water storage chamber (151) to store wash water defining;
   a fine filter (120) arranged at an upper portion of the sump housing and provided with an opening (123) allowing the washing tub and the water storage chamber to communicate with each other therethrough;
   a coarse filter (110) formed in a cylindrical shape and mounted on the opening; and
   a microfilter (130) formed in a non-cylindrical shape and mounted in the water storage chamber so as to define a dirt catching chamber (152) for catching dirt in conjunction with one part (154a) of the sidewall portion and one part (155a) of the bottom portion of the sump housing.

2. The dish washing machine according to claim 1, further comprising a circulation chamber (153) defined by the other part (154b) of the sidewall portion, the other part (155b) of the bottom portion of the sump housing, and the microfilter and adapted to circulate
the wash water to the spray unit.

3. The dish washing machine according to claim 1 or 2, wherein the sidewall portion of the sump housing is provided with a pair of side fitting grooves (156) allowing the microfilter to be fitted thereinto.

4. The dish washing machine according to claim 3, wherein a width of each of the side fitting grooves gradually decreases as the side fitting grooves extend downward.

5. The dish washing machine according to any one of the preceding claims, wherein the bottom portion of the sump housing is provided a bottom fitting groove (157) allowing the microfilter to be fitted thereinto.

6. The dish washing machine according to any one of the preceding claims, wherein the microfilter comprises a filter mesh (131) to filter out dirt and a filter frame (132) to support the filter mesh, wherein the filter mesh is formed in a flat shape.

7. The dish washing machine according to claim 6, wherein the microfilter comprises a pair of fitting protrusions (136) protruding from both sides of the filter frame to be coupled to the sump housing, wherein a width of each of the fitting protrusions gradually decreases as the fitting protrusions extend downward.

8. The dish washing machine according to any one of the preceding claims, further comprising a dirt cover (140) coupled to the sump housing to cover an open top of the dirt catching chamber.

9. The dish washing machine according to claim 8, wherein the dirt cover is screw-coupled to the sump housing.

10. The dish washing machine according to claim 8 or 9, wherein the dirt cover comprises a through hole (144) allowing the coarse filter to pass therethrough.

11. The dish washing machine according to claim 8, 9 or 10, wherein the dirt cover comprises a filter support (142) protruding toward the microfilter to support the microfilter.

12. The dish washing machine according to any one of claims 8 to 11, wherein the sump housing further comprises a cover support (159) protruding inward to support the dirt cover.

13. The dish washing machine according to claim 1, wherein the microfilter is provided with a flat filter portion; and the coarse filter is mounted to the sump to pre-filter out dirt contained in the wash water flowing to the dirt catching chamber and to press the microfilter downwards and laterally such that sealing of a gap between the sump and the microfilter is maintained.

14. The dish washing machine according to claim 13, wherein the coarse filter is mounted to the sump by being inserted into the sump vertically downwards and then turned from a release position to a lock position.

15. The dish washing machine according to claim 14, wherein, in turning the coarse filter from the release position to the lock position, the coarse filter moves downwards and presses the microfilter downwards.

**Patentansprüche**

1. Geschirrspülmaschine (1), die Folgendes aufweist:
   einen Körper (10);
   einen im Körper bereitgestellten Spülbottich (12);
   einen im Spülbottich bereitgestellten Korb (17, 18) zum Lagern von Geschirr;
   eine Sprüheinheit (21, 22, 23) zum Sprühen von Spülwasser zum Spülen des Geschirrs im Korb;
   und
   eine Wannenanordnung (100), die zum Speichern von Spülwasser an einem unteren Teil des Spülbottichs angeordnet ist,

   wobei die Wannenanordnung Folgendes aufweist:

   ein Wannengehäuse (150), das einen Seitenwandteil (154) und einen Bodenteil (155) aufweist, die eine Wasserspeicherhöhle (151) zum Speichern von Spülwasser definieren;
   einen Feinfilter (120), der an einem oberen Teil des Wannengehäuses angeordnet ist und mit einer Öffnung (123) versehen ist, durch die hindurch die Verbindung des Spülbottichs und der Wasserspeicherhöhle miteinander ermöglicht wird;
   einen Grobfilter (110), der eine zylindrische Gestalt hat und an der Öffnung montiert ist; und
   einen Mikrofilter (130), der eine nichtzyllindrische Gestalt hat und in der Wasserspeicherhöhle montiert ist, um in Verbindung mit einem Stück (154a) des Seitenwandteils und einem Stück (155a) des Bodenteils des Wannengehäuses eine Schmutzfangkammer (152) zum Abfangen von Schmutz zu definieren.

2. Geschirrspülmaschine nach Anspruch 1, die ferner eine Umwälzkammer (153) aufweist, die von dem anderen Stück (154b) des Seitenwandteils, dem an-
deren Stück (155b) des Bodenteils des Wannengehäuses und dem Mikrofilter definiert wird und zum Umwälzen des Spülwassers zur Sprühseinheit ausgeführt ist.

3. Geschirrspülmaschine nach Anspruch 1 oder 2, wobei der Seitenwandteil des Wannengehäuses mit einem Paar seitlicher Passnuten (156) versehen ist, in die der Mikrofilter eingepasst werden kann.


5. Geschirrspülmaschine nach einem der vorhergehenden Ansprüche, wobei der Bodenteil des Wannengehäuses mit einer Bodenpassnut (157) versehen ist, in die der Mikrofilter eingepasst werden kann.

6. Geschirrspülmaschine nach einem der vorhergehenden Ansprüche, wobei der Mikrofilter ein Filtersieb (131) zum Herausfiltern von Schmutz und einen Filterrahmen (132) zum Tragen des Filtersiebs aufweist, wobei das Filtersieb eine flache Gestalt hat.


8. Geschirrspülmaschine nach einem der vorhergehenden Ansprüche, die ferner eine Schmutzabdeckung (140) aufweist, die mit dem Wannengehause gekoppelt ist, um eine offene Oberseite der Schmutzfangkammer abzudecken.

9. Geschirrspülmaschine nach Anspruch 8, wobei die Schmutzabdeckung durch eine Schraubverbindung mit dem Wannengehause gekoppelt ist.

10. Geschirrspülmaschine nach Anspruch 8 oder 9, wobei die Schmutzabdeckung ein Durchgangsloch (144) aufweist, durch das der Grobfilter hindurchgeführt werden kann.

11. Geschirrspülmaschine nach Anspruch 8, 9 oder 10, wobei die Schmutzabdeckung einen Filterträger (142) aufweist, der zum Tragen des Mikrofilters zum Mikrofilter hin vorsteht.

12. Geschirrspülmaschine nach einem der Ansprüche 8 bis 11, wobei das Wannengehause ferner einen Abdeckungsträger (159) aufweist, der zum Tragen der Schmutzabdeckung nach innen vorsteht.

13. Geschirrspülmaschine nach Anspruch 1, wobei der Mikrofilter mit einem flachen Filterteil versehen ist; und der Grobfilter an der Wanne montiert ist, um Schmutz, der im zur Schmutzfangkammer fließenden Spülwasser enthalten ist, als Vorfilter herauszufiltern und um den Mikrofilter nach unten und zur Seite zu pressen, so dass die Abdichtung eines Spalts zwischen der Wanne und dem Mikrofilter aufrecht erhalten wird.

14. Geschirrspülmaschine nach Anspruch 13, wobei der Grobfilter an der Wanne montiert wird, indem er senkrecht nach unten in die Wanne eingesetzt wird und dann aus einer Freigabestellung auf eine Sperrstellung gedreht wird.


Revendications

1. Machine à laver la vaisselle (1) comportant :
  un corps (10) ;
  une cuve de lavage (12) mise en oeuvre dans le corps ;
  un panier (17, 18) mis en oeuvre dans la cuve de lavage à des fins de stockage de la vaisselle ;
  une unité de pulvérisation (21, 22, 23) servant à pulvériser de l’eau de lavage à des fins de lavage de la vaisselle dans le panier ; et
  un ensemble puisard (100) agencé au niveau d’une partie inférieure de la cuve de lavage à des fins de stockage de l’eau de lavage,

  dans laquelle l’ensemble puisard comporte :
  un logement de puisard (150) comportant une partie de paroi latérale (154) et une partie inférieure (155) définissant une chambre de stockage d’eau (151) pour stocker de l’eau de lavage ;
  un filtre fin (120) agencé au niveau d’une partie supérieure du logement de puisard et comportant une ouverture (123) permettant à la cuve de lavage et à la chambre de stockage d’eau de communiquer l’une par rapport à l’autre par le biais de celle-ci ;
  un filtre grossier (110) formé en une forme cylindrique et monté sur l’ouverture ; et
  un microfiltre (130) formé en une forme non cylindrique et monté dans la chambre de stockage.
d’eau de manière à définir une chambre de collecte de saleté (152) à des fins de collecte de saleté conjointement avec une partie (154a) de la partie de paroi latérale et une partie (155a) de la partie inférieure du logement de puisard.

2. Machine à laver la vaisselle selon la revendication 1, comportant par ailleurs une chambre de circulation (153) définie par l’autre partie (154b) de la partie de paroi latérale, l’autre partie (155b) de la partie inférieure du logement de puisard, et le microfiltre et adaptée pour faire circuler l’eau de lavage jusque dans l’unité de pulvérisation.

3. Machine à laver la vaisselle selon la revendication 1 ou la revendication 2, dans laquelle la partie de paroi latérale du logement de puisard comporte une paire de rainures de fixation latérales (156) permettant au microfiltre d’être fixé dedans.

4. Machine à laver la vaisselle selon la revendication 3, dans laquelle une largeur de chacune des rainures de fixation latérales va progressivement en diminuant alors que les rainures de fixation latérales s’étendent vers le bas.


6. Machine à laver la vaisselle selon l’une quelconque des revendications précédentes, dans laquelle le microfiltre comporte une toile de filtre (131) à des fins de filtrage de la saleté et un cadre pour filtre (132) à des fins de support de la toile de filtre, dans laquelle la toile de filtre est formée en une forme plate.

7. Machine à laver la vaisselle selon la revendication 6, dans laquelle le microfiltre comporte une paire de parties saillantes de fixation (136) faisant saillie depuis les deux côtés du cadre pour filtre à des fins d’accouplement au logement de puisard, dans laquelle une largeur de chacune des parties saillantes de fixation va progressivement en diminuant alors que les parties saillantes de fixation s’étendent vers le bas.

8. Machine à laver la vaisselle selon l’une quelconque des revendications précédentes, comportant par ailleurs un couvercle pour saleté (140) accouplé au logement de puisard pour couvrir une partie supérieure ouverte de la chambre de collecte de saleté.

9. Machine à laver la vaisselle selon la revendication 8, dans laquelle le couvercle pour saleté est accou-
FIG. 19
REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader’s convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

• DE 9312801 [0006]