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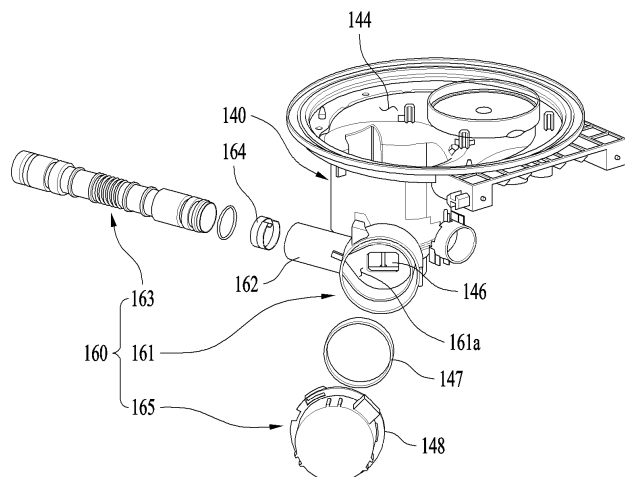
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(54) **METHOD FOR CONTROLLING WATER SUPPLY OF DISHWASHER**

(57) A method for controlling a dishwasher comprising a washing tub (120) defining a washing space in which one or more dishes are placed; an injection unit (122, 124) for injecting wash water to the dishes; a sump (140) provided underneath the washing tub; a driving unit supplying and circulating the wash water stored in the sump to the injection unit; and a drainage pump for draining the wash water from the sump, the method for controlling the dishwasher comprises a water supply step (S110)

for supplying wash water to the dishwasher; a washing step (S130) for washing dishes by using the wash water; a rinsing step (S140) for rinsing the washed dishes; and a drying step (S150) for drying the rinsed step, wherein the method further comprises an air exhausting step for operating the drainage pump for a preset time period to exhaust air from the drainage pump after the water supply step.

FIG. 2



Description

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

[0001] Embodiments of the present disclosure relate to a dishwasher, more particularly, to a method for controlling a dishwasher for controlling a drainage pump in water supply so as to prevent the cavitation of the drainage pump provided in the dishwasher.

Background of the Disclosure

[0002] Generally, a dishwasher is the electric appliance configured to wash dishes held therein by injecting wash water at a high pressure to the dishes and dry them. More specifically, wash water is injected into a washing tub, in which the dishes are held, at a high pressure in the dishwasher and the injected wash water is configured to contact with the dishes so as to remove food scraps from surfaces of the dishes.

[0003] Such the dishwasher is capable of filtering the food scraps or contaminants contained in the wash water by using a filter and re-using the filtered water. Also, detergent is dissolved in the wash water and supplied mixedly together with the detergent, to smoothly the food scraps.

[0004] In recent, dishwashers of which a motor raises the temperature of the wash water or generates steam to enhance efficiency of washing performance are broadly used.

[0005] Such the conventional dishwasher includes a case defining an external appearance; a washing tub provided in the cabinet and defining a washing space for the dishes; a door coupled to a front of the washing tub to open and close the washing tub; a sump provided under the washing tub and configured to supply, collect, circulate and drain wash water for washing the dishes; lower and upper arms for injecting the wash water supplied by the sump to the dishes; and lower and upper racks slidably provided in the tub and selectively disposed according to the kinds and sizes of the dishes.

[0006] Meanwhile, to wash dishes, using the dishwasher, a user has to open the door and draw the rack arranged in the washing tub. Then, the user put dishes to wash on the drawn rack and pushes the rack into the washing rack. Finally, the user closes the door.

[0007] Once the user puts the dishwasher into operation after that, the dishes disposed on the lower and upper rack starts to be washed while wash water is independently or simultaneously supplied to the upper/lower arm.

[0008] For the washing of the dishes, wash water has to be supplied and drained. The supplied wash water is guided into the sump and supplied to the lower and upper arms by an auxiliary pump. The wash water having been used in the washing is drained outside the dishwasher by a drainage pump.

[0009] In this instance, the drainage pump is typically located below the sump and the wash water is sucked into a drainage space defined in the drainage pump, as wash water is supplied.

5 [0010] The air remaining in the drainage space has to be exhausted via a drainage pipe as the wash water is drawn into the drainage space. Because of differences between the drainage pipe and the drainage space in the height and the pressure, the air might fail to be exhausted.

10 [0011] Meanwhile, an auxiliary air outlet hole may be provided in the drainage space to exhaust the air remaining in the drainage space. Such an air outlet hole might be blocked by the contaminants drained together with the wash water during the wash water drainage. In case the air outlet hole is blocked, the drainage of the drainage pump might not be performed smoothly and the drained wash water might counter-flow disadvantageously.

15 [0012] Accordingly, there is a disadvantage that the smooth and efficient operation of the drainage pump might be failed, because the exhaustion pressure is not formed by the drainage pump in case the air remaining the drainage space of the drainage pump is not exhausted.

25 SUMMARY OF THE DISCLOSURE

[0013] Accordingly, an object of the present disclosure is to address the above-noted and other problems and provide a dishwasher and a method for controlling a dishwasher which is capable of securing operational environments for a drainage pump by facilitating the exhaustion of air remaining in a drainage pump, while water is supplied to the dishwasher.

30 [0014] To achieve these objects and other advantages and in accordance with the purpose of the embodiments, as embodied and broadly described herein, embodiments of the present disclosure may provide a method for controlling a dishwasher comprising a water supply step for supplying wash water to the dishwasher; an air exhausting step for exhausting the air remaining in a path of the wash water in the water supply step; a washing step for washing dishes by injecting wash water to the dishes; a rinsing step for rinsing the dishes; and a drying step for drying the rinsed step.

35 [0015] The air exhausting step may be performed in a preset time period when the water supply step starts to be performed.

40 [0016] The exhausting step may be performed after a preset amount of wash water is supplied in the water supply step.

45 [0017] The air exhausting step may operate a drainage pump for draining the wash water.

50 [0018] The drainage pump may comprise a drainage pump in which wash water is stored; an impeller for draining the wash water from the drainage chamber; and a drainage path connected to the drainage chamber, and the air exhausting step rotates the impeller in a preset direction in which the air is rotated to move toward the

drainage path.

[0019] The air exhausting step may repeatedly and intermittently operate the drainage pump for a preset time period.

[0020] The air exhausting step may repeat the intermittent operation process in which the drainage pump operates for 1~2 seconds and pause the drainage pump for 1.5~2.5 seconds.

[0021] Embodiments of the present disclosure may also provide a method for controlling a dishwasher comprising a washing tub defining a washing space in which one or more dishes are placed; an injection unit for injecting wash water to the dishes; a sump provided underneath the washing tub; and a driving unit supplying and circulating the wash water stored in the sump to the injection unit; and a drainage pump for draining the wash water from the sump, the method for controlling the dishwasher comprising a water supply step for supplying wash water to the dishwasher; a washing step for washing dishes by using the wash water; a rinsing step for rinsing the washed dishes; and a drying step for drying the rinsed step, the method further comprising an air exhausting step for operating the drainage pump for a preset time period to exhaust air from the drainage pump after the water supply step.

[0022] The drainage pump may comprise a drainage pump in which wash water is stored; an impeller for draining the wash water from the drainage chamber; and a drainage path connected to the drainage chamber, and the air exhausting step may rotate the impeller in a preset direction in which the air is rotated to move toward the drainage path.

[0023] The air exhausting step may repeatedly and intermittently operate the drainage pump for a preset time period.

[0024] The air exhausting step may repeat the intermittent operation process in which the drainage pump operates for 1~2 seconds and pause the drainage pump for 1.5~2.5 seconds.

[0025] The method for controlling the dishwasher of claim 8, wherein the air exhausting step is performed in a preset time period when the water supply step starts to be performed.

[0026] The air exhausting step may be performed after a preset amount of wash water is supplied in the water supply step.

[0027] The embodiments have an advantageous effect. The method for controlling a dishwasher is capable of securing operational environments for a drainage pump by facilitating the exhaustion of air remaining in a drainage pump, while water is supplied to the dishwasher.

[0028] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and

modifications within the scope of the invention will become apparent to those skilled in the art from this detailed description.

5 BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings, which are given by illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a schematic diagram illustrating a dishwasher in accordance with one embodiment of the present disclosure;

FIG. 2 is an exploded perspective diagram illustrating a drainage device of the dishwasher in accordance with one embodiment;

FIG. 3 is a sectional diagram illustrating an internal structure of the drainage device in accordance with one embodiment;

FIG. 4 is a side sectional diagram illustrating the internal structure of the drainage device in accordance with one embodiment;

FIG. 5 is a flow chart illustrating an operation of the dishwasher in accordance with one embodiment;

FIG. 6 is a flow chart illustrating the operation of the drainage pump to remove an air pocket in accordance with one embodiment; and

FIG. 7 is a flow chart illustrating the operation of the drainage pump to remove an air pocket in accordance with another embodiment.

DESCRIPTION OF SPECIFIC EMBODIMENTS

[0030] Referring to the accompanying drawings, exemplary embodiments of the present disclosure according to one embodiment of the present disclosure will be described in detail. Use of such terminology for structures and control methods herein is merely intended to facilitate description of the specification, and the terminology itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. Regardless of numeral references, the same or equivalent components may be provided with the same reference numbers and description thereof will not be repeated.

[0031] Hereinafter, referring to the accompanying drawings, a dishwasher in accordance with one embodiment will be described in detail.

[0032] FIG. 1 is a schematic diagram illustrating the dishwasher in accordance with one embodiment of the present disclosure.

[0033] As shown in FIG. 1, the dishwasher 100 may include a cabinet 110 for defining an external appearance; a washing tub 120 provided in the cabinet 110 and defining a washing space in which one or more washing

objects or dishes are washed; a plurality of racks 130a and 130b detachably mounted in the washing tub 120 and having the washing objects or dishes disposed thereon; a plurality of injection arms 122 and 124 for injecting wash water to the washing objects disposed on the racks 130a and 130b; a sump 140 for circulating and supplying wash water to the injection arms 122 and 124 and collecting and receiving the wash water supplied in the washing space.

[0034] An opening 112 is formed in the washing tub 120, with a closable front side, and allows the washing tub to communicate with the outside of the cabinet 110. The opening 112 is open and closed by a door 113 rotatably coupled to the cabinet 110.

[0035] Accordingly, the user is able to draw the racks 130a and 130b from the washing tub 120 after opening the opening 112 by rotating the door 113.

[0036] The racks on which the washing objects are disposed may be provided in the washing tub 120. The racks may include an upper rack 130a provided in an upper portion of the washing tub; and a lower rack provided under the upper rack.

[0037] In case the racks are configured of the upper rack 130a and the lower rack 130b, the injection arms 122 and 124 may include an upper arm for injecting water to the upper rack 130a; and a lower arm 124 for injecting water to the lower rack 130b. The wash water (the water remaining in the washing tub 120) injected to the washing objects from the injection arms 112 and 124 may be collected in the sump 140.

[0038] The sump 140 may be provided underneath the washing tub 120 and function as means for storing water. The sump 140 may be partitioned off from the washing tub 120 by a sump cover 142. In this instance, a collection hole 144 may be provided in the sump cover 12 to suck the water into the sump 140 from the washing tub 120.

[0039] The sump 140 may be connected to a water supply source (not shown) via a water supply unit 150 and the water supply unit 150 may be open and closed by a water supply valve 152. In addition, the water supply unit may include a water flow sensor (not shown) for sensing the amount of the wash water supplied through the water supply valve 152.

[0040] A drainage unit 160 is provided in a lower portion of the sump 140 to exhaust the wash water and food scraps drawn into the sump. An outlet hole 146 for exhausting the wash water and food scraps sucked into the sump 140 may be provided in a lower portion of the sump 140 and communicate with the drainage pipe.

[0041] Such the drainage unit 160 includes a drainage chamber 161 in which the drainage pump 165 is installed; and a drainage pipe 163 for guiding the wash water and food scraps exhausted from the drainage chamber 161 by the drainage pump 165. Referring to the accompanying drawings, the drainage unit 160 will be described in detail later.

[0042] Meanwhile, the water stored in the sump 140 is supplied to the injection arms 122 and 124 via a water

supply path 170 by the pump 180. The water supply path 170 may include a connection path 172 connected to the pump 180; an upper path 174 connecting the connection path 172 and the upper arm 122 with each other; and a lower path 176 connecting the connection path 172 and the lower arm 174 with each other.

[0043] The upper arm 122 may be rotatably connected to the upper path 174 and the lower arm 124 may be rotatably connected to the lower path 176.

[0044] In this instance, the upper path 174 and the lower path 176 are formed by the branching of the connection path 172. A transfer valve 178 for controlling the opening/closing of the paths 174 and 176 may be provided in a branched point between the upper path 174 and the lower path 176.

[0045] The pump 180 may include a pump body 182 fixed in the cabinet 110; a partition wall 183 defining a pumping chamber 184 and a heating chamber 186 by partitioning off an internal space of the pump body 182; a partition through hole 183a provided in the partition wall 183 to allow the pumping chamber 184 and the heating chamber 186 to communicate with each other; and an impeller 181a provided in the pumping chamber 184.

[0046] The heating chamber 186 is connected with the sump 140 by a pump inlet 187 penetrating the pump body 182 and the pumping chamber 184 is connected with the connection path 172 by a pump outlet 185 penetrating the pump body 182.

[0047] The impeller 181a is rotated by a motor 181 fixed to an upper surface of the pump body 182. A shaft of the motor 181 is connected to the impeller 181a located in the pumping chamber 184 through the upper surface of the pump body 182.

[0048] Meanwhile, a heating unit 188 is provided in a bottom surface of the heating chamber 186. When the pump body 182 is cylindrical-shaped with an open bottom surface, the heating unit 188 may define the bottom surface of the heating chamber 186.

[0049] In this instance, the heating unit 188 may include a heating plate 188a defining the bottom surface of the heating chamber 186; and a heater 189 fixed to a bottom surface of the heating plate 188a and located outside the heating chamber 186. The heating plate 188a may be formed of metal which is easy to transmit heat.

[0050] In addition, the heating unit 188 is configured to define the bottom surface of the heating chamber 186, only to provide the pump 180 which is capable of performing the function of water supply to the injection arms 122 and 124 and the function of water heating simultaneously.

[0051] The dishwasher 100 including the pump 180 mentioned above may supply steam to the washing tub 120 by using the heating unit 188 provided in the pump 180. For that, a steam supply unit 190 may be further provided in the dishwasher 100.

[0052] The steam supply unit 190 may include a nozzle 192 for injecting steam into the washing tub 120; a steam supply pipe 194 connecting the nozzle 192 to the heating

chamber 186; and a steam valve 196 for opening and closing the steam supply pipe. FIG. 1 illustrates the nozzle 192 provided in the door 113 as one example. In this instance, the nozzle 192 may be installed in a lower portion of an inner surface of the door 113.

[0053] Hereinafter, the drainage unit will be described in detail, referring to the accompanying drawings.

[0054] FIG. 2 is an exploded perspective diagram illustrating a drainage device of the dishwasher in accordance with one embodiment. FIG. 3 is a sectional diagram illustrating an internal structure of the drainage device in accordance with one embodiment. FIG. 4 is a side sectional diagram illustrating the internal structure of the drainage device in accordance with one embodiment.

[0055] As shown in FIGS. 2 through 4, the drainage unit 160 in accordance with one embodiment may include a drainage chamber 161 provided in a lower portion of the sump and defining a predetermined pumping space for pumping the drained wash water, in communication with the outlet hole 146 of the sump 140; a drainage pump 165 connected to the drainage chamber 171 and including a drainage impeller 166 for draining the wash water; an outlet pipe 162 for exhausting wash water and food scraps along the rotation of the impeller 166, in communication with one side of the drainage chamber 161; and a drainage pipe 163 connected to the outlet pipe 162 and guiding the exhausted wash water.

[0056] The drainage pump 165 includes a motor 168 defining one surface of the drainage chamber 161 and coupled to the drainage chamber 161; a sealing member 167 provided between the motor 68 and the drainage chamber 161 and preventing leakage of wash water; and an impeller 166 coupled to the shaft of the motor 168 and configured to forcibly exhausting the wash water from the drainage chamber 161 to the outlet pipe 162 by a centrifugal force.

[0057] Meanwhile, the outlet hole 146 of the sump 140 in communication with the drainage chamber 161 is related with the location of the impeller provided in the drainage pump 165 provided in the drainage pump 165. The outlet is rotated in the center of the rotation performed by the impeller 166 to exhaust the wash water along the rotation of the impeller 166.

[0058] The outlet pipe 162 provided in the drainage chamber 161 is connected to a predetermined portion of the drainage chamber 161 to exhaust the wash water along the rotation of the impeller 166 and the wash water and food scraps drawn into the drainage chamber 161 simultaneously.

[0059] At this time, the drainage pipe 162 is connected to the outlet pipe 162 to guide the wash water containing food scraps drained by the drainage pump 165 outside the dishwasher 100. A check valve 164 may be further provided in a predetermined region of the drainage pipe 163 to prevent the exhausted wash water and food scraps from counterflowing.

[0060] Next, the operation of the dishwasher 100 will be described briefly, referring to the accompanying draw-

ings. Each of the components which will be mentioned herewith shall be understood, referring to the description and drawings mentioned above.

[0061] FIG. 5 is a flow chart illustrating an operation of the dishwasher in accordance with one embodiment.

[0062] As shown in FIG. 5, the user places dishes on the upper rack or the lower rack 130a or 130b of the dishwasher and then select a wash start button (not shown) to start the washing for the dishes.

[0063] Meanwhile, once the operation of the dishwasher 100 starts, a water supply step (S110) for supplying water to the washing tub 120 is performed. After the water supply step (S110) is complete, a preliminary washing step (S1210) for soaking contaminants or food scraps which are stuck on the dishes is performs.

[0064] After the preliminary washing step (S120), a main-washing step (S130) for spraying the wash water mixed with detergent is performed to remove the contaminants and food scraps.

[0065] Once the main washing step (S130) is complete, a rinsing step (S140) is performed and then a drying step (S150) for drying the dishes is performed after the rinsing step (S140).

[0066] Before the main washing step (S130) starts after the preliminary washing step (S120), water drainage for collecting the wash water injected in the preliminary washing step (S120) is performed.

[0067] Wash water is pumped by the pump 180 and injected into the washing tub 120 via the upper arm 122 and the lower arm 124. The wash water injecting process is repeated for a preset time period.

[0068] The wash water injection is performed a preset number of times and the main washing step (S130) is performed until the preset number of times. The main washing step (S130) is complete and the rinsing step (S140) is then performed. The wash water supplied in the main washing step (S130) will be drained before the rinsing step (S130) starts.

[0069] Meanwhile, after the rinsing step (S140), a drying step (S150) is performed to remove the moisture contained on the dishes. In the drying step (S150), hot air is supplied to the washing tub 120 and the moisture is evaporated from the dishes.

[0070] In this instance, the air changed into high-temperature humid air may be exhausted outside the dishwasher 100 by an auxiliary dry module (not shown).

[0071] The water supply step (S110), the preliminary washing step (S120), the main washing step (S130), the rinsing step (S140) and the drying step (S150) mentioned above are similar to the corresponding steps provided in the conventional dishwasher. Detailed description about the steps is omitted accordingly.

[0072] Meanwhile, the wash water supplied as water is supplied in those steps may be drawn into the drainage 161 via the outlet hole 146 from the sump 140. As being drawn into the drainage chamber 161, the wash water is filled in the drainage space 161a defined in the drainage chamber 161 so that the air not exhausted via the drain-

age pipe 163 might form an air pocket 161b in an upper portion of the drainage chamber 161a.

[0073] In other words, the wash water drawn into the drainage chamber 161 is filled to the height (H1) which reaches an upper end of the outlet hole 146 located in the center of the drainage chamber 161. Alternatively, the wash water may be filled in the drainage chamber 167 to the height (H2) which reaches the upper end of the outlet pipe 162 according to the arrangement of the drainage pipe 163.

[0074] At this time, the maximum water level of the wash water drawn into the drainage chamber 161 may be located in the drainage space 161a between the height (H1) to the upper end of the outlet hole 146 and the height (H2) to the upper end of the outlet pipe 162. An upper region of the wash water level stored in the drainage chamber 161 may have an air pocket 161b formed by the air not exhausted outside the drainage chamber 161.

[0075] Accordingly, the air pocket 161b formed in the drainage chamber 161 might interfere with the water currents caused by the impeller of the drainage pump 165 and then interfere with the smooth drainage from the drainage chamber 161.

[0076] Meanwhile, the embodiments of the present disclosure are provided to facilitate the operation of the impeller 166 of the drainage pump 165 by removing the air pocket formed in the drainage chamber 161 of the drainage unit 160.

[0077] Accordingly, the process of removing the air pocket may be repeatedly performed in the water supply step (S110), the preliminary washing step (S120), the main washing step (S130) and the rinsing step (S140) in which the water supply is performed. Alternatively, the process of removing the air pocket may be performed only in the water supply step (S110) in which wash water is supplied initially.

[0078] Hereinafter, it will be described in the present disclosure that the process of removing air pocket 161b is performed only in the water supply step (S110) for supplying the wash water initially.

[0079] Referring to the drawings, the operation of the drainage unit in accordance with one embodiment will be described.

[0080] FIG. 6 is a flow chart illustrating the operation of the drainage pump to remove an air pocket in accordance with one embodiment.

[0081] As mentioned above, the water supply step (S110) starts to be performed and the supplied wash water is drawn into the drainage chamber 161 via the outlet hole 146 of the sump 140. The supplied wash water may fill in the internal space of the drainage chamber 161.

[0082] In this instance, the wash water supplied to the drainage chamber 161 is filled until the height (H1) to the upper end of the outlet hole 146 located in the center of the drainage chamber 161. Alternatively, the supplied wash water may be filled until the height (H2) to the upper end of the outlet pipe 162 according to the arrangement of the drainage pipe 163.

[0083] The control unit may determine whether a water level of the wash water after the water supply step (S110) starts is located between the height (H1) to the upper end of the outlet hole 146 and the height (H2) to the upper end of the outlet pipe 162.

[0084] Meanwhile, the determination of the water level may be performed based on the water supply time. In other words, it is determined that the wash water level in the drainage chamber 161 is between the height (H1) to the upper end of the outlet hole 146 and the height (H2) to the upper end of the outlet pipe 162, when a preset time passes after the water supply starts.

[0085] Hence, the control unit operates the motor 168 intermittently to exhaust the air remaining in the drainage chamber 161 via the outlet pipe 162 (S220). The motor 168 is rotated in the same direction as the wash water is drained. The impeller 166 is rotated along the rotation of the motor 168 and the wash water together with air inside the drainage chamber 161 is exhausted along the rotation of the impeller 166.

[0086] The rotation of the motor 168 is performed intermittently. The intermittent rotation is performed approximately for 1~2 sec. and then paused approximately for 1.5~2.5 sec. and the intermittent rotation is repeatedly operated two through four times.

[0087] The wash water is fluctuated in the drainage chamber 161 and partially drained together with air by the intermittent rotation at the same time, so that the air pocket formed in the drainage chamber 161 may be minimized.

[0088] Next, referring to the accompanying drawings, the operation of the drainage unit in accordance with another embodiment will be described.

[0089] FIG. 6 is a flow chart illustrating the operation of the drainage pump to remove an air pocket in accordance with one embodiment.

[0090] As mentioned above, the water supply step (S110) is performed and the supplied wash water is drawn into the drainage chamber 161 via the outlet hole 146 of the sump 140. The wash water is drawn into the drainage chamber 161 may fill in the drainage chamber 161.

[0091] The wash water supplied to the drainage chamber 161 is filled until the height (H1) which reaches the upper end of the outlet hole 146 located in the center of the drainage chamber 161 or the height (H2) which reaches the upper end of the outlet pipe 162 according to the arrangement of the drainage pipe 163.

[0092] The control unit may determine whether a water level of the wash water after the water supply step (S110) starts is located between the height (H1) to the upper end of the outlet hole 146 and the height (H2) to the upper end of the outlet pipe 162.

[0093] Meanwhile, the determination of the wash water level may be performed based on the accumulation of the supplied wash water amount. In other words, once the wash water supply starts, a water flow sensor provided in the water supply unit determines whether the

wash water level in the drainage chamber 161 is located between the height (H1) to the upper end of the outlet hole 146 and the height (H2) to the upper end of the outlet pipe 162.

[0094] Hence, the control unit operates the motor 168 intermittently to exhaust the air remaining in the drainage chamber 161 via the outlet pipe 162 (S220). The motor 168 is rotated in the same direction as the wash water is drained. The impeller 166 is rotated along the rotation of the motor 168 and the wash water together with air inside the drainage chamber 161 is exhausted along the rotation of the impeller 166.

[0095] The rotation of the motor 168 is performed intermittently. The intermittent rotation is performed approximately for 1~2 sec. and then paused approximately for 1.5~2.5 sec. and the intermittent rotation is repeatedly operated two through four times.

[0096] The wash water is fluctuated in the drainage chamber 161 and partially drained together with air by the intermittent rotation at the same time, so that the air pocket formed in the drainage chamber 161 may minimized.

[0097] The foregoing embodiments are merely exemplary and are not to be considered as limiting the present disclosure. The present teachings can be readily applied to other types of methods and apparatuses. This description is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. The features, structures, methods, and other characteristics of the exemplary embodiments described herein may be combined in various ways to obtain additional and/or alternative exemplary embodiments. As the present features may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be considered broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds, are therefore intended to be embraced by the appended claims.

Claims

1. A method for controlling a dishwasher, comprising:

a water supply step (S110) for supplying wash water to the dishwasher;
a washing step (S130) for washing dishes using the wash water; and
an air exhausting step for exhausting air remaining in a path of wash water.

2. The method for controlling the dishwasher of claim 1, further comprising a rinsing step (S140) for rinsing

the washed dishes and/or a drying step (S150) for drying the rinsed dishes, wherein the air exhausting step is performed in at least one of the water supply step (S110), the washing step (S130), the rinsing step (S140) and the drying step (S150).

3. The method for controlling the dishwasher of claim 1 or 2, wherein the air exhausting step is started a preset time period after the water supply step (110) is started.

4. The method for controlling the dishwasher according to any one of the preceding claims, wherein the air exhausting step is started after a preset amount of wash water is supplied in the water supply step (S110).

5. The method for controlling the dishwasher according to any one of the preceding claims, wherein in the air exhausting step, a drainage unit (160) for draining the wash water is operated.

6. The method for controlling the dishwasher of claim 5, wherein in the air exhausting step, an impeller (166) is rotated in a preset direction in which air and/or wash water is drawn to move toward a drainage path (162, 163) of the drainage unit (160).

7. The method for controlling the dishwasher of claim 5 or 6, wherein in the air exhausting step, the drainage unit (160) is operated repeatedly and intermittently for a preset time period.

8. The method for controlling the dishwasher of claim 7, wherein in the intermittent operation, the drainage unit (160) is operated for 1 to 2 seconds and then paused for 1.5 to 2.5 seconds.

9. The method for controlling the dishwasher of claim 6 or 7, wherein the intermittent operation of the drainage unit (160) is repeated 2 to 4 times.

10. A dishwasher comprising:

a washing tub (120) defining a washing space for accommodating one or more dishes;
an injection unit (122, 124) for injecting wash water to the dishes;
a sump (140) provided underneath the washing tub (120);
a pump (180) for supplying and circulating wash water stored in the sump (140) to the injection unit (122, 124);
a drainage unit (160) for draining the wash water from the sump (140); and
a control unit configured to perform a method according to any one of the preceding claims.

11. The dishwasher according to claim 10, wherein the drainage unit (160) comprises:

a drainage chamber (161) defining a predetermined pumping space; 5
a drainage pump (165) connected to the drainage chamber (161) and including an impeller (166) for draining wash water from the drainage chamber (161); and
a drainage path (162, 163) for exhausting the 10
drained wash water.

12. The dishwasher according to claim 11, wherein air is exhausted from the drainage chamber (161) in the air exhausting step. 15

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FIG. 1

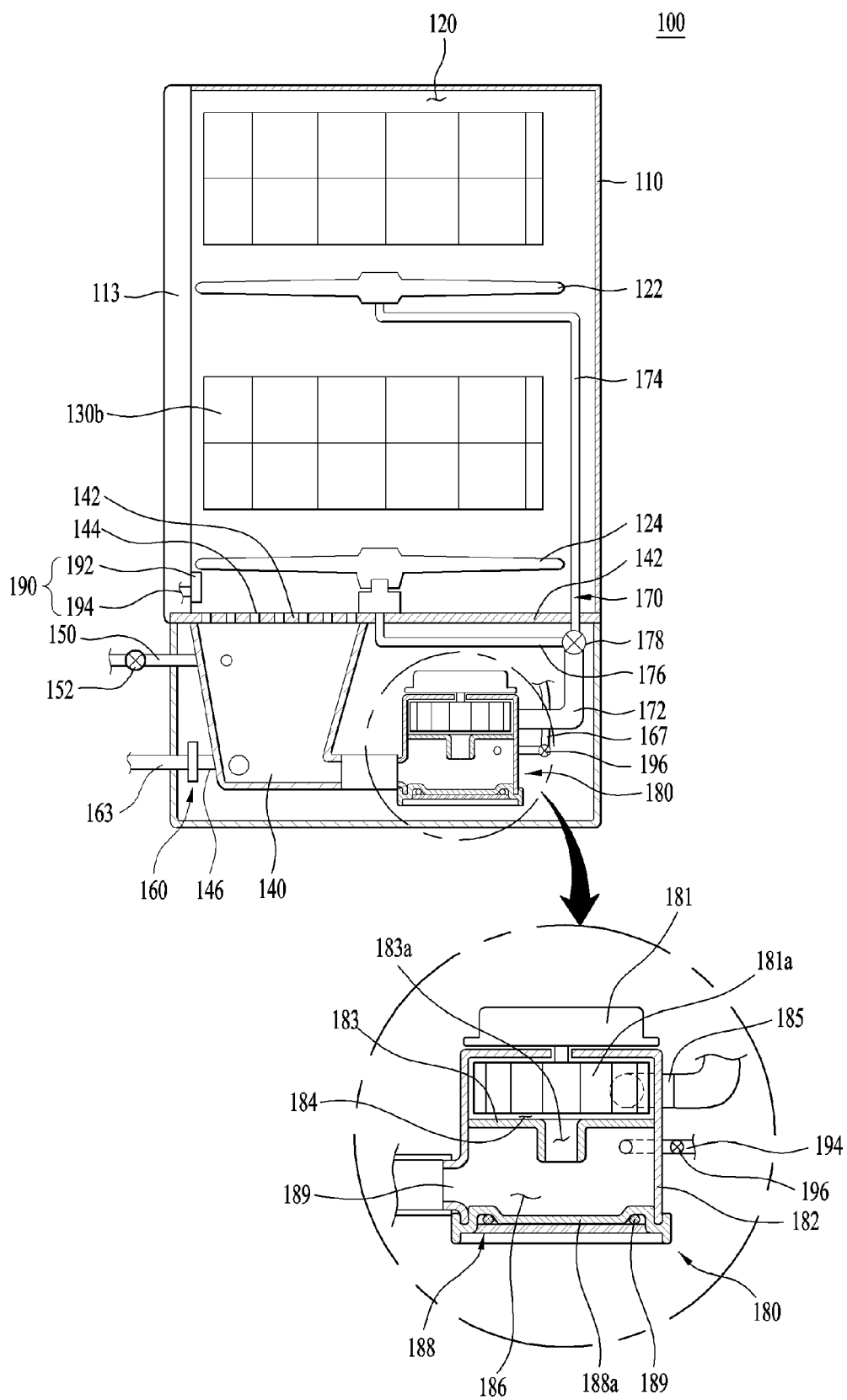


FIG. 2

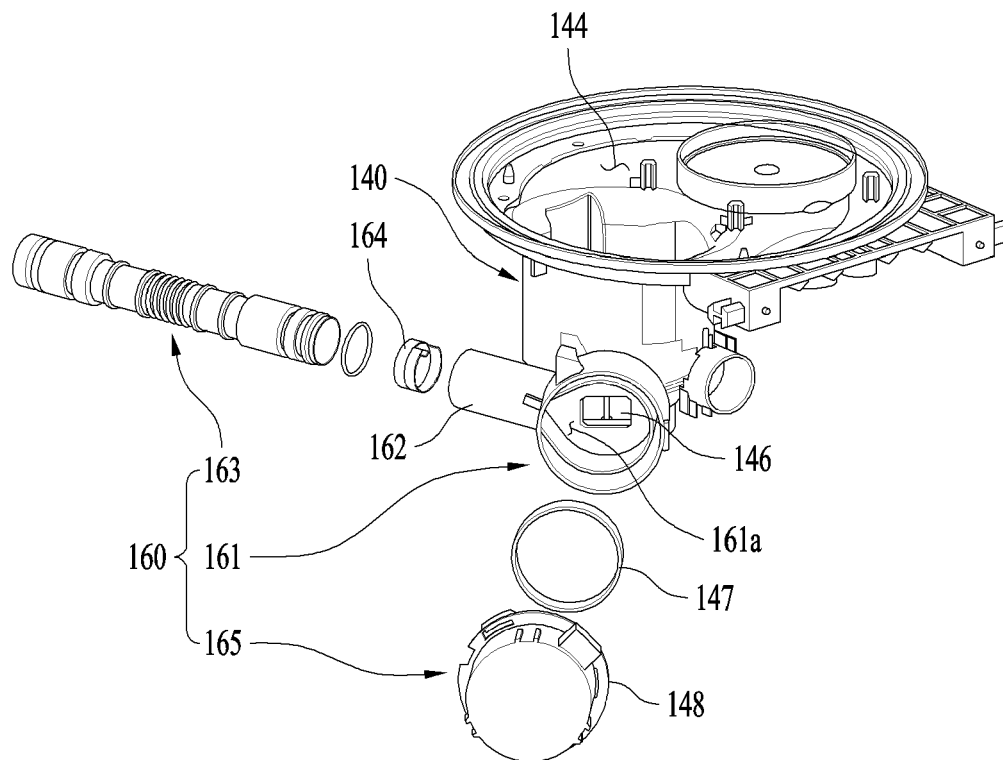


FIG. 3

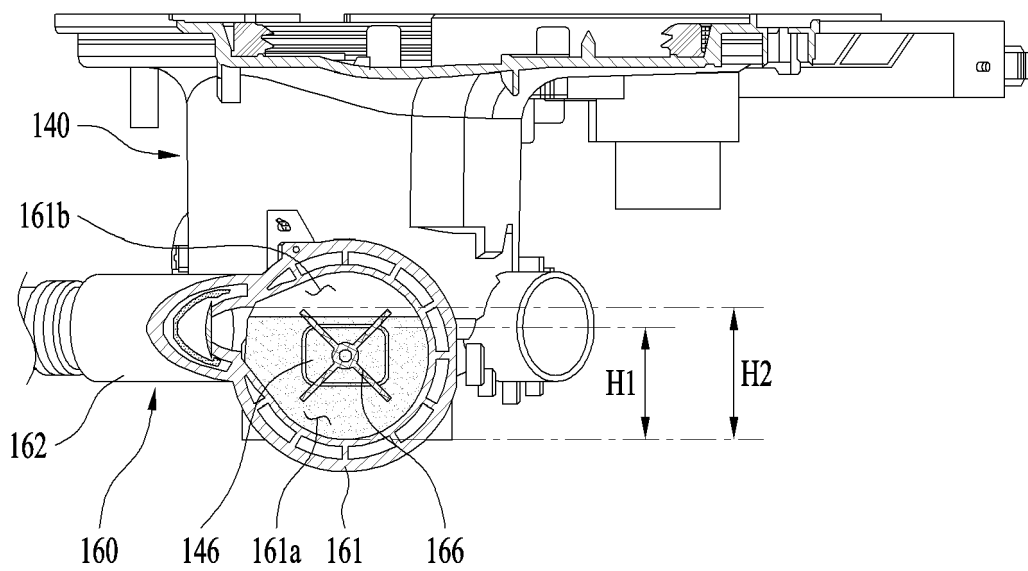


FIG. 4

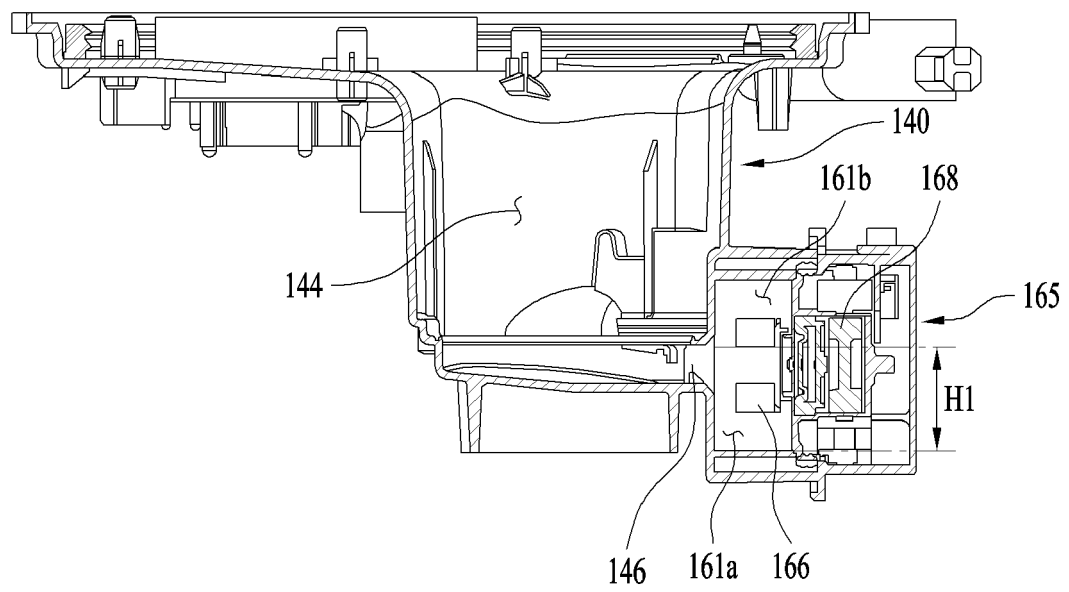


FIG. 5

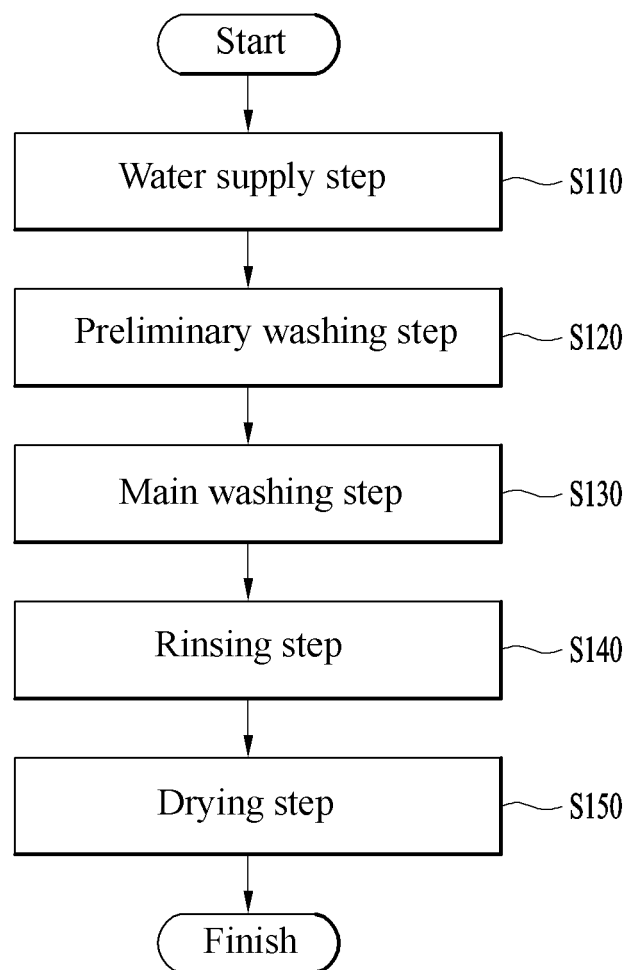


FIG. 6

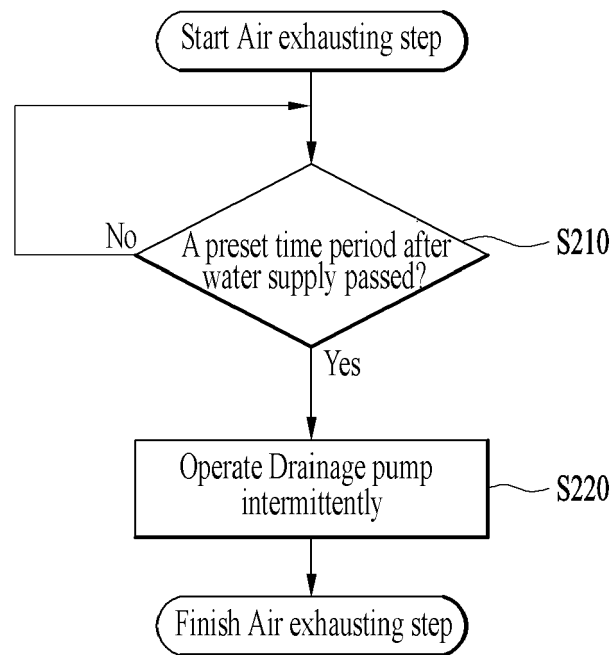
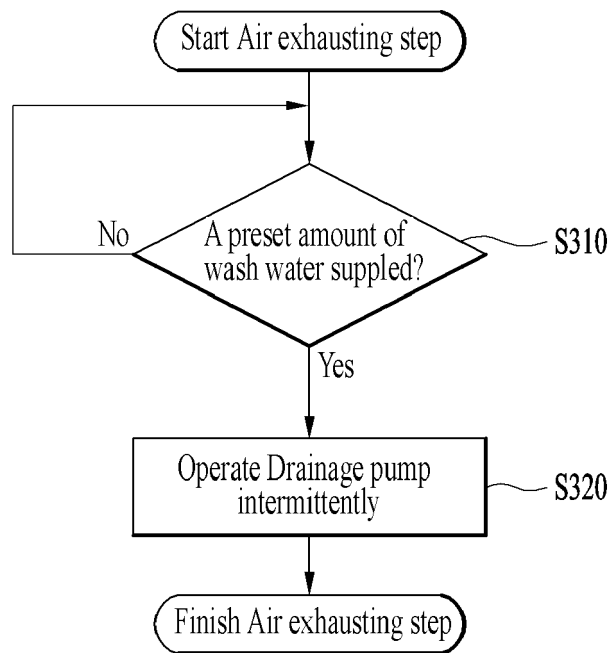


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 17 17 4574

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 009 165 A1 (BONFERRARO SPA [IT]) 31 December 2008 (2008-12-31) * paragraph [0003] - paragraph [0006] * * paragraph [0010] - paragraph [0016]; claims 1,6 *	1-7,9-12	INV. A47L15/00 A47L15/42
X	EP 1 942 219 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 9 July 2008 (2008-07-09) * paragraph [0002] * * paragraph [0039] - paragraph [0081]; figures 3-8 *	1-5,7-12	
X	US 2011/315174 A1 (PYO JOON HO [KR] ET AL) 29 December 2011 (2011-12-29) * paragraph [0029] - paragraph [0047]; figures 1-4 *	1-6, 10-12	
X	JP 2006 263109 A (SHARP KK) 5 October 2006 (2006-10-05) * paragraph [0041]; figures 1-5 *	1-6, 10-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 October 2017	Examiner Beckman, Anja
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 17 4574

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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23-10-2017

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15

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45

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55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2009165 A1	31-12-2008	NONE	
EP 1942219 A1	09-07-2008	EP 1942219 A1	09-07-2008
		US 2008163930 A1	10-07-2008
US 2011315174 A1	29-12-2011	CN 102355843 A	15-02-2012
		DE 112010001512 T5	14-06-2012
		KR 20100110548 A	13-10-2010
		US 2011315174 A1	29-12-2011
		WO 2010114217 A1	07-10-2010
JP 2006263109 A	05-10-2006	NONE	