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(19) **United States**(12) **Patent Application Publication****Kwon et al.**(10) **Pub. No.: US 2009/0211614 A1**(43) **Pub. Date: Aug. 27, 2009**(54) **DISH WASHER****Publication Classification**(76) Inventors: **Soon Yong Kwon**, Busan (KR); **Ho June Song**, Daejeon (KR)(51) **Int. Cl.**
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KED & ASSOCIATES, LLP**P.O. Box 221200****Chantilly, VA 20153-1200 (US)**(57) **ABSTRACT**

A dish washer is disclosed, in which assembly of the dish washer is improved, and an error operation and trouble of a driver due to water leaked in a base can be avoided. To this end, the dish washer includes a tub (3) provided with a space for washing the dishes and a communication hole (3a) formed on the bottom, a base (100) fixed to the bottom of the tub (3), having a plane portion (100a) which is not connected with the outside, a sump assembly (200) provided in the plane portion of the base and fixed to the tub (3) while shielding the communication hole (3a) of the bottom, having a sump (220) and a driver (210), wherein washing water is received in the sump (220) and the driver (210) transmits a driving force to the sump (220), and a leakage sensing device (300) provided in the base (100), sensing a water level of washing water leaked in the base (100). Thus, assembly of the dish washer can be improved, and also life span of the driver can be increased.

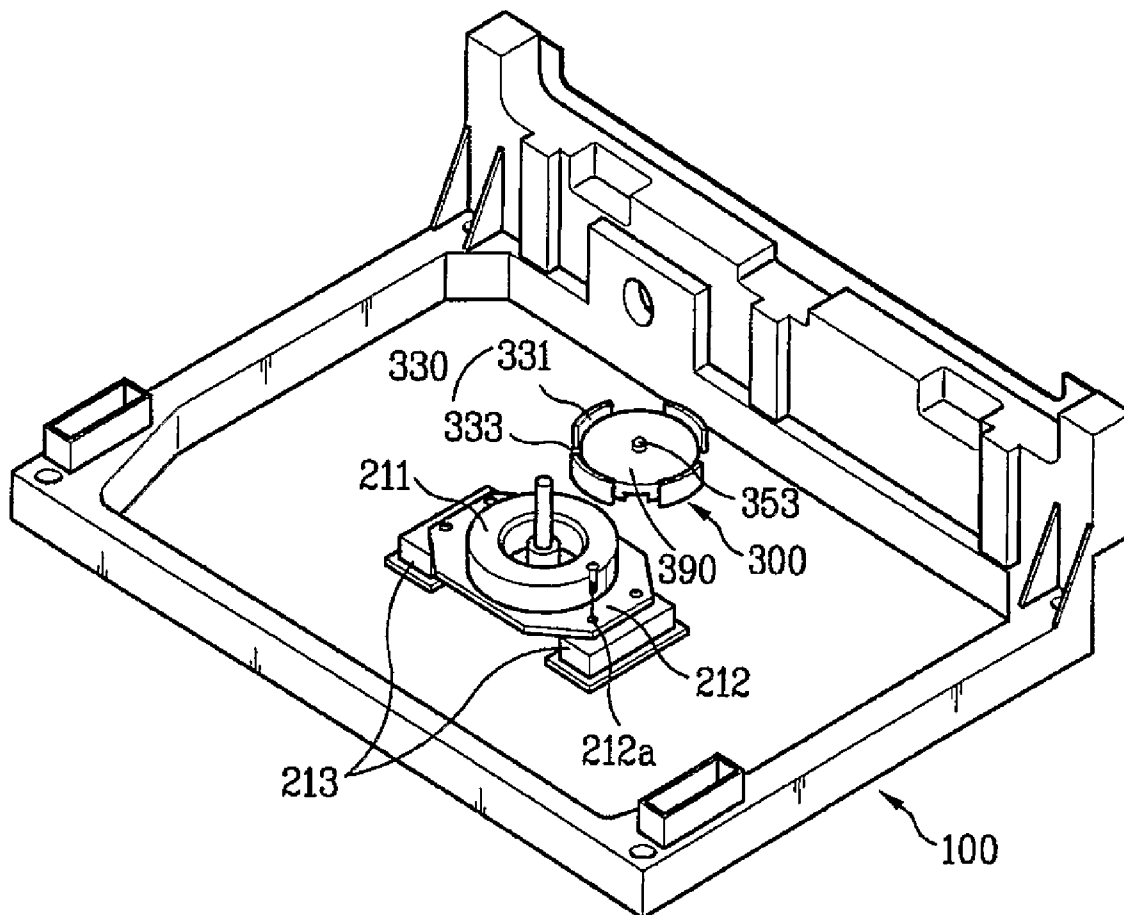
(21) Appl. No.: **11/997,271**(22) PCT Filed: **Aug. 29, 2006**(86) PCT No.: **PCT/KR2006/003394**

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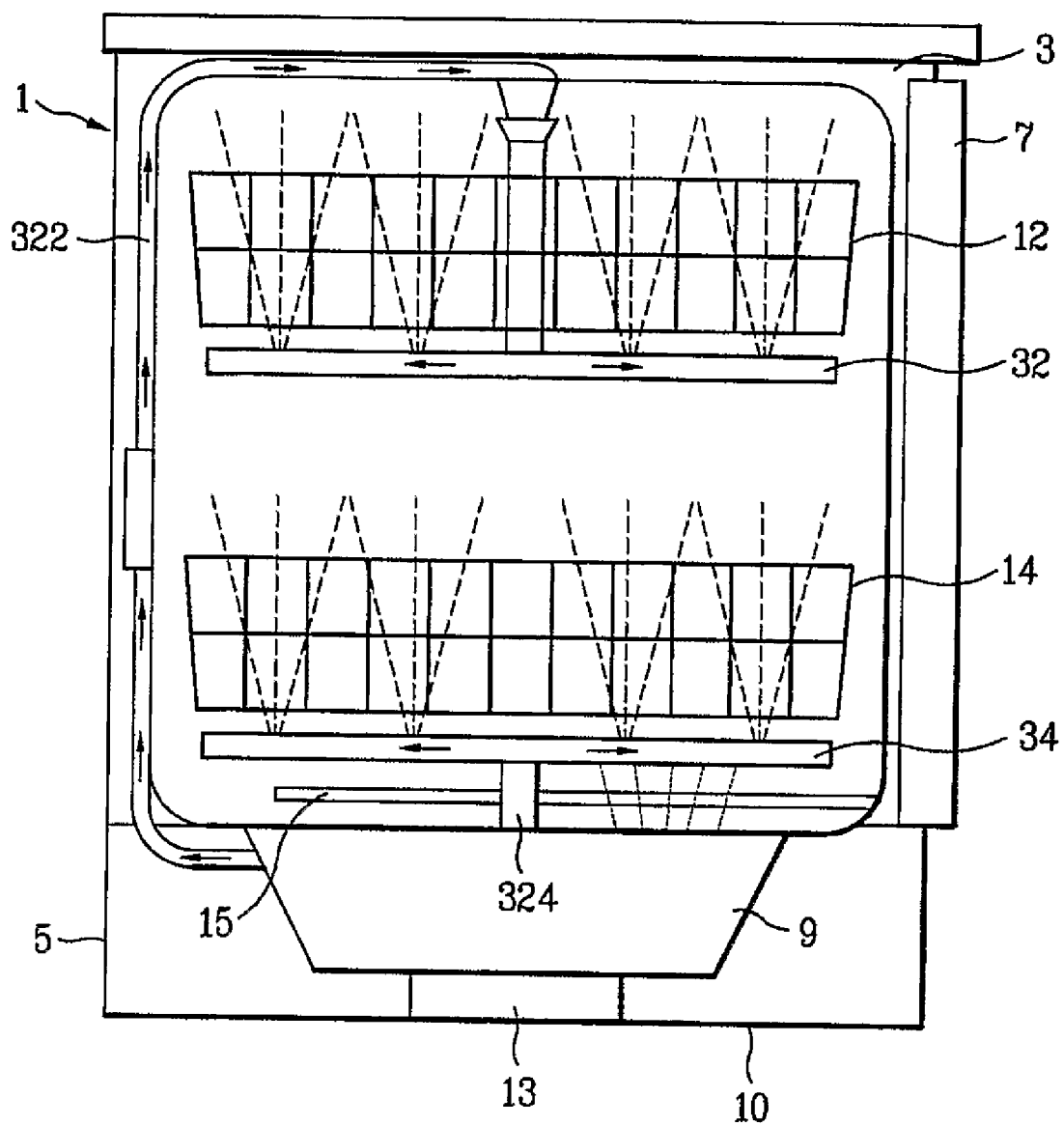
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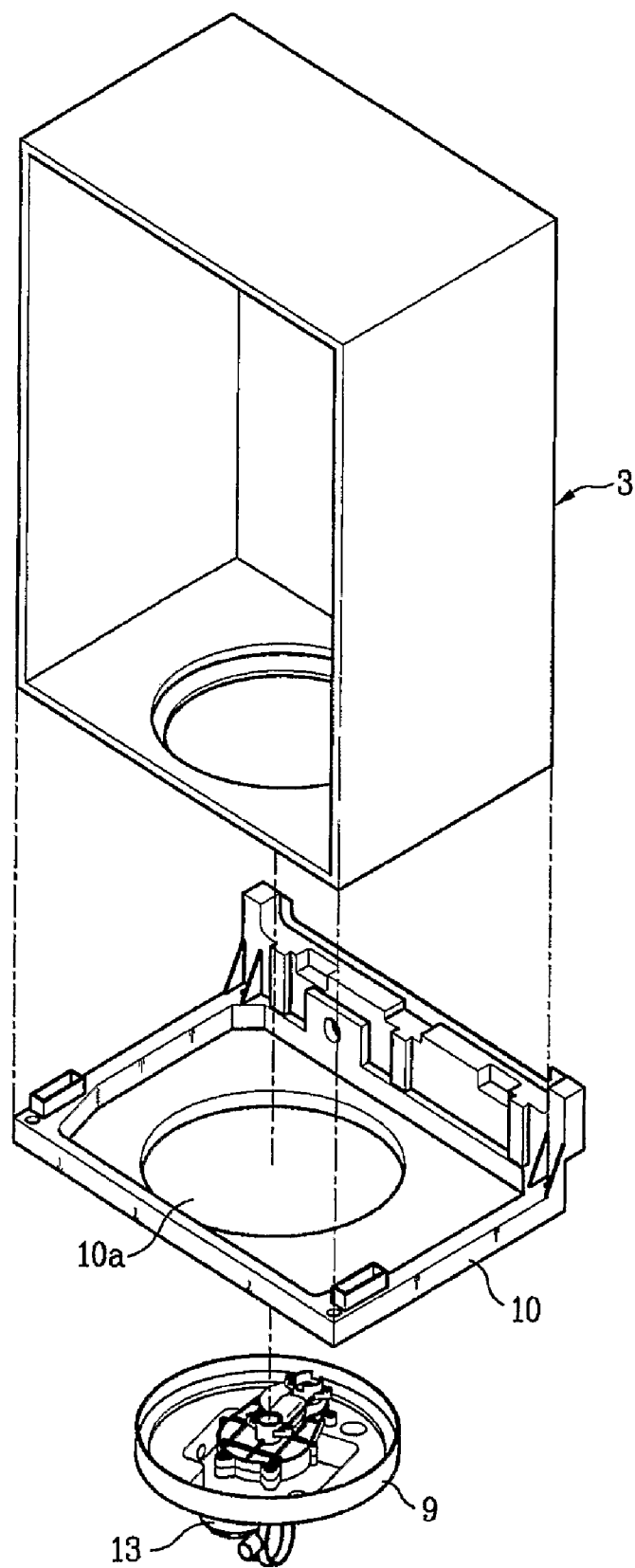
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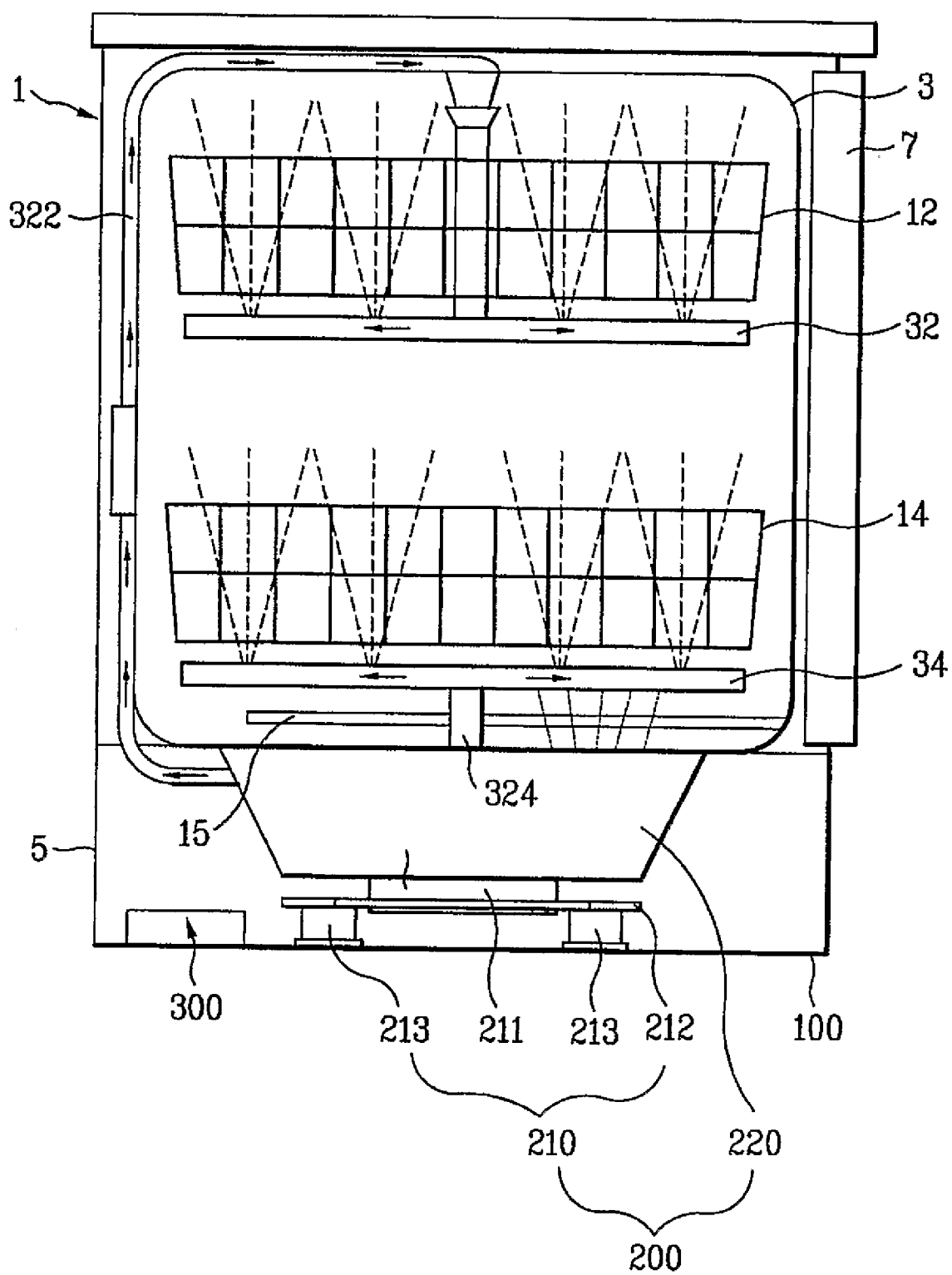
[Fig. 1]



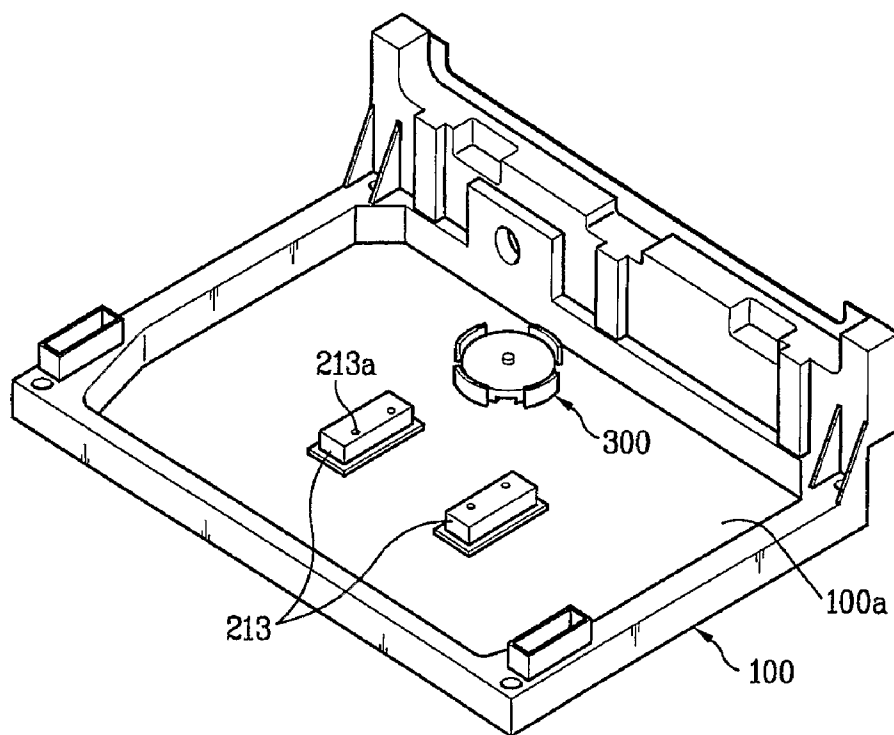
[Fig. 2]



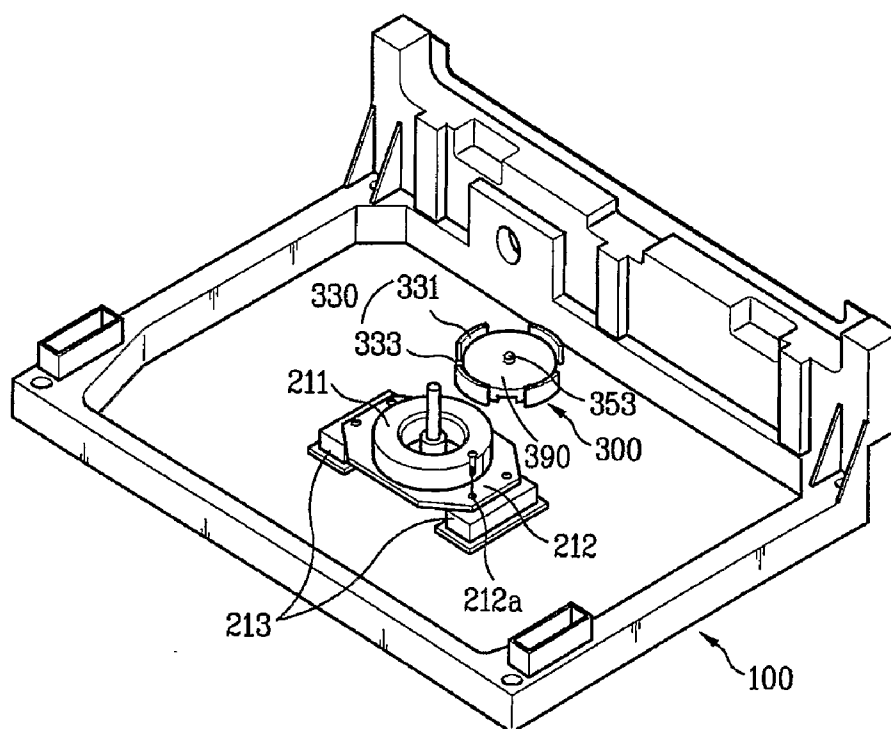
[Fig. 3]



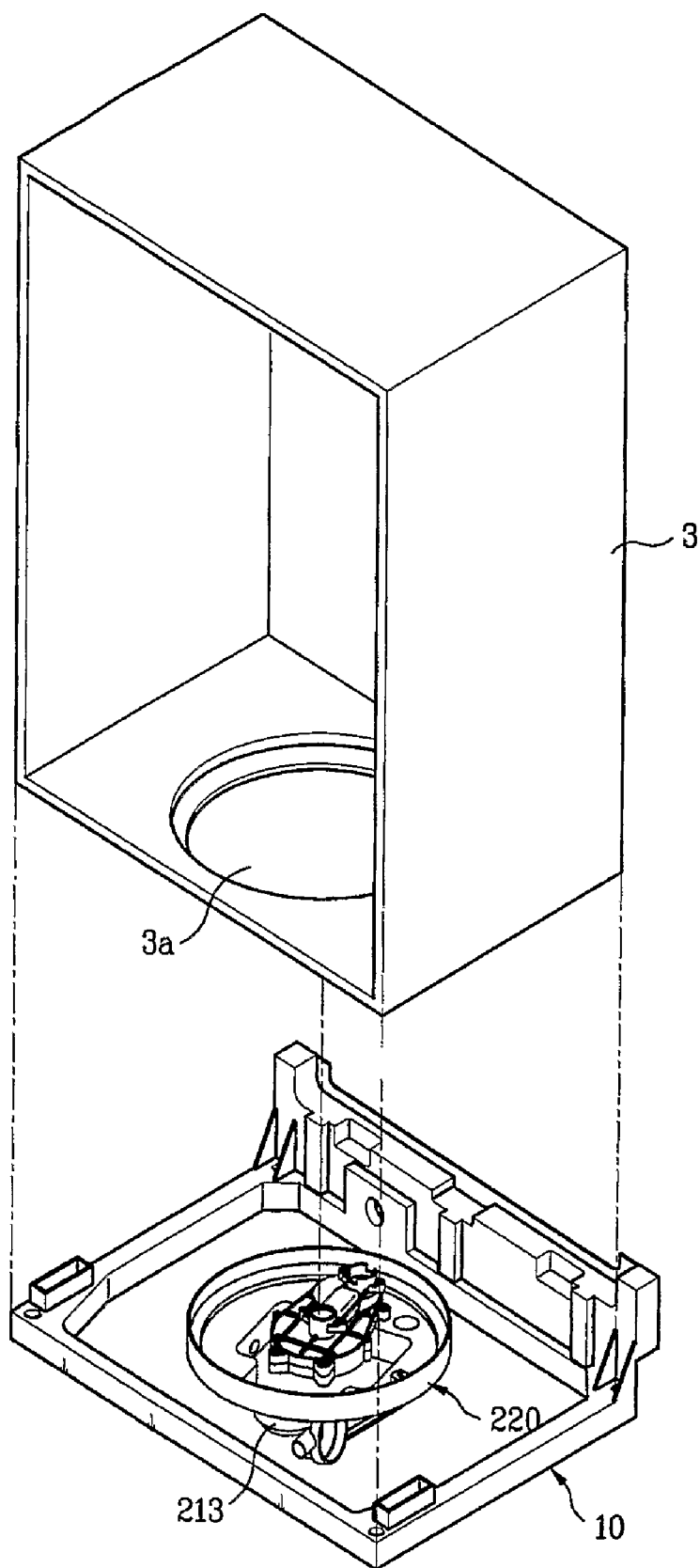
[Fig. 4]



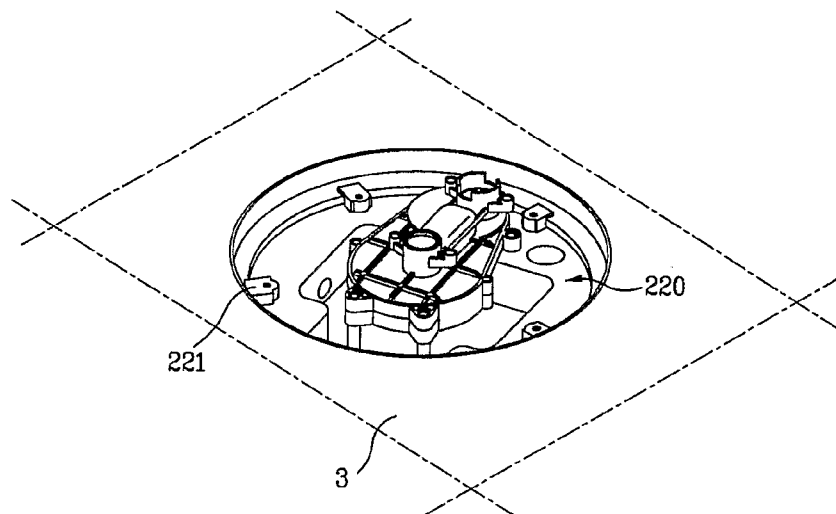
[Fig. 5]



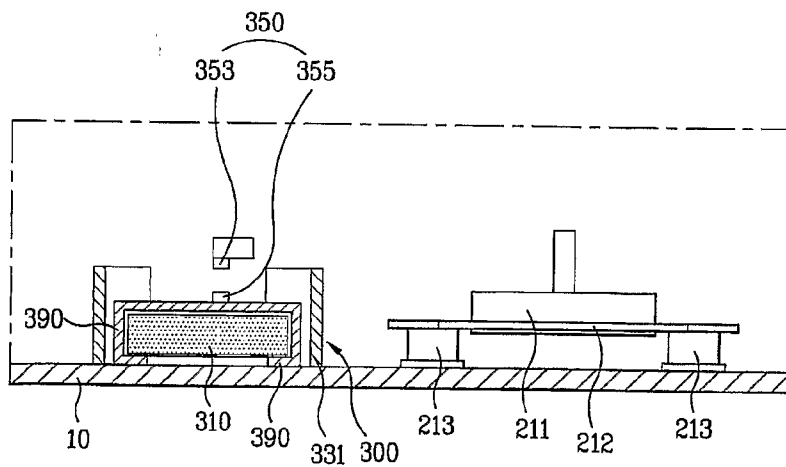
[Fig. 6]



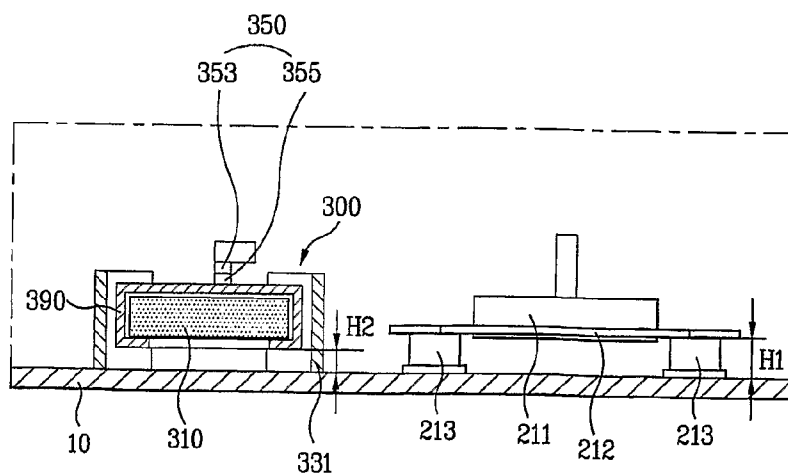
[Fig. 7]



[Fig. 8]



[Fig. 9]



DISH WASHER

TECHNICAL FIELD

[0001] The present invention relates to a dish washer, and more particularly, to an improved base structure of a dish washer.

BACKGROUND ART

[0002] Generally, a dish washer is to remove food or dirt remaining on the dishes through chemical decomposition and mechanical control of water pressure. Since the dish washer serves to perform various functions such as rinsing, sterilizing, and drying, in addition to a washing function, its demand from the moderns in busy daily life is on an increasing trend.

[0003] A related art dish washer will be described with reference to FIG. 1.

[0004] A related art dish washer 1 washes the dishes by spraying washing water to the dishes. The dish washer 1 includes a tub 3 provided with a space for washing the dishes, and a base 10 disposed below the tub 3 and provided with various parts for supplying washing water of high pressure to the tub 3.

[0005] The tub 3 and the base 10 will now be described.

[0006] A door 7 that can be opened and closed is provided on a front surface of the tub 3. An upper rack 12 and a lower rack 14 are provided inside the tub 3, wherein the dishes are arranged in the upper and lower racks 12 and 14. An upper spray arm 32 and a lower spray arm 34 are respectively provided below the upper rack 12 and the lower rack 14 to spray the washing water.

[0007] A heater 15 is provided at one side inside the tub 3 to form steam by heating the water remaining in the tub 3 during a drying stroke after a washing stroke is finished.

[0008] Meanwhile, a sump 9 is provided in the base 10 to receive the washing water, and a washing pump is provided in the sump 9. The washing pump serves to pump the washing water to supply the washing water to the upper spray arm 32 and the lower spray arm 34. In general, the sump 9, the upper spray arm 32 and the lower spray arm 34 are connected with one another by an upper connection pipe 322 and a lower connection pipe 324.

[0009] Also, the washing pump generally includes a motor 13 generating a driving force, and an impeller (not shown) connected with the motor 13.

[0010] An assembly process of the dish washer will be described with reference to FIG. 2.

[0011] As shown in FIG. 2, the base 10 is connected with a lower portion of the tub 3.

[0012] Next, the motor 13 is connected with the sump 9.

[0013] The sump 9 connected with the motor 13 is then connected with the lower portion of the tub 3 through a through hole 10a formed in the base 10.

[0014] The operation of the aforementioned related art dish washer will be described.

[0015] Once the dish washer 1 is operated, the washing water in the sump 9 is pumped by the washing pump and then supplied to the upper spray arm 32 and/or the lower spray arm 34. Accordingly, the washing water is sprayed from the upper spray arm 32 and the lower spray arm 34 to the dishes arranged on the upper rack 12 and/or the lower rack 14 so as to wash the dishes. The washing water may separately be supplied to the upper spray arm 32 and the lower spray arm

34. Alternatively, the washing water may simultaneously be supplied to the upper spray arm 32 and the lower spray arm 34.

[0016] The washing water sprayed to the dishes is again collected in the sump 9 through a collection hole (not shown) connected with the sump 9. At this time, since the washing water includes contaminant water generated by washing of the dishes, it can be filtered through a predetermined filtering means.

[0017] However, the aforementioned related art dish washer has the following problems.

[0018] First, if the washing water is filled in the base 10 of the dish washer due to a water leakage, the motor 13 provided on the base 10 is submerged in the water due to the leaked washing water. For this reason, problems occur in that the motor may be operated in error and may tend to cause a trouble.

[0019] Second, in order to fix the sump 9, which is connected with the motor 13, to the lower portion of the tub 3, after the tub 3 connected with the base 10 is turned upside down, the sump 9 is fixably inserted into the through hole 10a formed in the base 10. In this case, problems occur in that a user may feel inconvenience when turning the tub 3 upside down and fixing the sump 9 to the tub 3 through the narrow through hole 10a and that much working time is required.

[0020] Finally, the sump 9 fixed to the through hole 10a of the base 10 may easily be detached from the lower portion of the tub 3 due to load when external impact is applied thereto. For this reason, a problem occurs in that the sump 9 may be damaged.

DISCLOSURE OF INVENTION

[0021] Technical Problem

[0022] Accordingly, the present invention is directed to a dish washer that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0023] An object of the present invention is to provide a dish washer, in which assembly of the dish washer is improved, and an error operation and trouble of a driver due to water leaked in a base can be avoided.

[0024] Technical Solution

[0025] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a dish washer according to the present invention includes a tub provided with a space for washing the dishes and a communication hole formed on the bottom, a base fixed to the bottom of the tub, having a plane portion which is not connected with the outside, a sump assembly provided in the plane portion of the base and fixed to the tub while shielding the communication hole of the bottom, having a sump and a driver, wherein washing water is received in the sump and the driver transmits a driving force to the sump, and a leakage sensing device provided in the base, sensing a water level of washing water leaked in the base.

[0026] Advantageous Effects

[0027] The dish washer according to the present invention has the following advantages.

[0028] First, in the present invention, since a base is fixed to a tub after a sump assembly is fixed to a plane portion of the base, assembly can be improved.

[0029] Second, since the sump assembly is fixed to a lower portion of the tub in a state that it is fixed to the plane portion of the base, it is possible to prevent the sump assembly from

being detached from the tub or from being damaged even though impact is applied to the tub.

[0030] Finally, since the base is provided with a leakage sensing device, error operation and trouble of a driver, which may occur due to washing water leaked in the base, can be avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0032] FIG. 1 is a sectional view illustrating an inner structure of a related art dish washer;

[0033] FIG. 2 is an exploded perspective view of FIG. 1;

[0034] FIG. 3 is a sectional view illustrating an inner structure of a dish washer according to the preferred embodiment of the present invention;

[0035] FIG. 4 is a perspective view illustrating a base structure of a dish washer according to the preferred embodiment of the present invention;

[0036] FIG. 5 is a perspective view illustrating the state that a leakage sensing device and a driver are provided in a base of a dish washer according to the preferred embodiment of the present invention;

[0037] FIG. 6 is a perspective view illustrating the process step of fixing a sump assembly of a dish washer according to the preferred embodiment of the present invention to a tub;

[0038] FIG. 7 is a principal perspective view illustrating the state that a sump assembly of a dish washer according to the preferred embodiment of the present invention is fixed to a bottom of a tub; and

[0039] FIGS. 8 and 9 illustrate the operation of a leakage sensing device according to the preferred embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

[0040] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0041] Referring to FIG. 3, a dish washer according to the preferred embodiment of the present invention includes a tub 3 provided with a space for washing the dishes, a base 100 constituting a lower portion of a main body 1, a sump assembly 200 having a driver 210 and a sump 220, wherein the driver generates a driving force, and a leakage sensing device 300 provided in the base 100 to sense a proper water level of washing water leaked in the base 100.

[0042] Since the general constitution of the dish washer according to the present invention is the same as that of the related art dish washer, its repeated description will be omitted. Technical features of the dish washer according to the preferred embodiment of the present invention will be described in detail.

[0043] First, the tub 3 is provided inside the main body 1, and a space for washing the dishes is formed inside the tub 3. The tub 3 is provided with a communication hole 3a formed on the bottom.

[0044] The communication hole 3a is formed to communicate the sump 220 of the sump assembly 200 with the inside of the tub 3.

[0045] Also, it is preferable that the bottom of the tub 3 constituting the communication hole 3a is stepped downwardly along the circumference of the communication hole 3a. This is to hang clamp hooks of the sump 220 on the stepped portion of the communication hole 3a so that the sump 220 can firmly be fixed to the tub 3. The clamp hooks of the sump 220 will be described later.

[0046] The base 100 is fixed to the bottom of the tub 3 to constitute the lower portion of the dish washer.

[0047] The base 100 includes a plate shaped plane portion 100a. In this case, the plane portion 100a is formed so as not to communicate with the outside, whereby the sump assembly 200 can be provided therein.

[0048] As described above, the structure of the base 100 of the dish washer according to the present invention includes the plane portion 100a having no communication hole 10a formed on the base 100, unlike the related art base 10.

[0049] In other words, the present invention is characterized in that the sump assembly 200 is provided on the plane portion 100a of the base 100 as shown in FIG. 4.

[0050] The sump assembly 200 includes the driver 210 generating a driving force, and the sump 220 whose lower end portion is fixed to the driver 210.

[0051] The driver 210 serves to generate the driving force to pump the washing water received in the sump 220, and includes a motor 211, a motor bracket 212, and guide ribs 213.

[0052] At this time, the motor 211 serves to rotate an impeller (not shown) to pump the washing water received in the sump 220.

[0053] The motor bracket 212 serves to fix the motor 211 to the guide ribs 213. The motor bracket 212 may be formed in a single body with the motor 211. Alternatively, the motor bracket 212 may be formed separately from the motor 211.

[0054] In the preferred embodiment of the present invention, the motor 211 and the motor bracket 212 are formed in a single body.

[0055] At this time, the motor bracket 212 is externally extended from both sides of the motor 211, and is provided with a fitting hole 212a at the end, wherein the fitting hole 212a serves to fit the motor bracket 212 to the guide ribs 213.

[0056] As shown in FIG. 4, the guide ribs 213 are provided such that the motor 211 is spaced apart from the plane portion 100a of the base 100 at a predetermined height.

[0057] In other words, since the motor 211 is spaced apart from the plane portion 100a of the base 100 due to the guide ribs 213, it can be protected from the washing water until the water leaked in the base 100 reaches a certain amount.

[0058] To this end, the guide ribs 213 are extended from the plane portion 100a of the base 100 at a predetermined height.

[0059] Furthermore, it is preferable that the guide ribs 213 are respectively provided at both sides around an axis of the motor 211. A screw hole 213a is formed in a position corresponding to the fitting hole 212a of the motor bracket 212 above the guide ribs 213, whereby the motor bracket 212 can be screwed onto the guide ribs 213.

[0060] The washing water for washing the dishes is received in the sump 220, and the sump 220 is fixed to the driver 210 so that a pumping force from the driver 210 is given to the sump 220 so as to supply the washing water to the tub 3.

[0061] At this time, a plurality of clamp hooks **221** are provided on the sump **220** so that the sump assembly **200** can easily be fixed to the tub **200**.

[0062] The leakage sensing device **300** is provided inside the base **100**, and senses the water level of the washing water leaked in the base **100** to transmit a sensing signal, which allows the leaked washing water to be drained out, to a microcomputer (not shown) if the water level reaches a proper water level.

[0063] At this time, the proper water level means a water level directly before the leaked washing water reaches the motor.

[0064] As shown in FIGS. **8** and **9**, the leakage sensing device **300** includes a float **310** ascending and descending depending on the water level of the washing water leaked in the base **100**, a guide portion **330** guiding ascent and descent of the float **310**, and a sensor **350** sensing the water level of the washing water leaked in the base **100** to transmit the sensing signal to the microcomputer (not shown).

[0065] In this case, the float **310** is preferably formed of an expanded polystyrene (Styrofoam) having floating characteristics.

[0066] In the preferred embodiment of the present invention, although the float **310** is formed of a Styrofoam material, it is not limited to such a material. The float **310** may be formed of another material having floating characteristics. For example, the float **310** may be formed of a hollow floating material.

[0067] The guide portion **330** includes a plurality of guides **331** provided in the plane portion **100a** of the base **10** at a predetermined height, and inlets **333** provided between the respective guides **331** to allow inflow of the leaked washing water.

[0068] In this case, each of the guides **331** has an arc shaped cross section, and the float **310** of a cylinder corresponding to the arc of the guide **331** is provided at an inner side of the guide **331**.

[0069] In other words, the float **310** is provided inside the guide portion **330**, and ascends and descends in only an area defined by the guide **331** if the water flows into the guide portion **330** through the inlets **333** formed between the respective guides **331**.

[0070] At this time, a sensor guide **390** is preferably provided inside the guide portion **330** to ascend and descend along with the float **310**.

[0071] The sensor guide **390** is provided to surround the float **310**, and a first sensor **353** is provided above the sensor guide **390**.

[0072] Meanwhile, the float **310** ascends in the range of 8 mm to 10 mm from the plane portion **100a** of the base **100**. The height of the guide **331** is preferably designed by considering the height of the float **310** and the ascending height of the float **310**.

[0073] The sensor **350** includes the first sensor **353** and a second sensor **355**, wherein the first sensor **353** ascends and descends along with the float **310**, and the second sensor **355** is provided at a predetermined position to be in contact with the first sensor **353**, for example, below the sump, as the float **310** ascend, so as to transmit a signal of the first sensor **353** to the microcomputer.

[0074] Meanwhile, it is preferable that the height H1 of each of the guide ribs **213** that support the motor **211** is higher than the ascending height H2 of the float **310**. This is to prevent the lower portion of the motor **13** from being sub-

merged in the leaked washing water until the first sensor **353** is in contact with the second sensor **355** as the float **310** ascends due to the leaked washing water.

[0075] Hereinafter, the assembly process of the aforementioned dish washer will be described with reference to FIGS. **6** and **7**.

[0076] First, the motor **213** is provided below the sump **220**.

[0077] Next, the guide ribs **213** provided in the base **100** are screwed by using the motor bracket **212** provided in the motor **211**.

[0078] At this time, after the fitting hole **212a** formed in the motor bracket **212** is arranged to match the screw hole **213a** formed in the guide ribs **213**, the fitting hole **212a** is fixed to the screw hole **213a** by using a screw which is a separate fitting member.

[0079] Next, once the sump assembly **200** including the motor **211** and the sump **220** is provided on the base **100**, as shown in FIG. **6**, the base **100** is fixed to the lower portion of the tub **3**.

[0080] At this time, as shown in FIG. **7**, the upper portion of the sump **220** is fixed to the lower portion of the tub **3** by using the clamp hooks **221** provided above the sump **220**.

[0081] The clamp hooks **221** are fixably hung in a stepped portion of the bottom constituting the communication hole **3a** of the tub **3**.

[0082] As described above, after the sump assembly **200** is fixed to the plane portion **100a** of the base **100** as shown in FIG. **6**, the base **100** is fixed to the lower portion of the tub **3** unlike the related art assembly process where the sump assembly **200** is provided through the lower portion of the base **100** after the base **100** is fixed to the tub **3**. Accordingly, in the present invention, more convenient assembly can be carried out.

[0083] Furthermore, since the sump assembly **200** is doubly fixed to the base **100** and the bottom of the tub **3**, it is possible to prevent the sump assembly **200** from being detached from the tub **3** or from being damaged even though impact is applied to the main body during falling test and transportation.

[0084] Hereinafter, the operation of the aforementioned dish washer will be described with reference to FIGS. **8** and **9**.

[0085] First, if the washing water is leaked as the dish washer is driven, the leaked washing water is filled in the plane portion **100a** of the base **100**.

[0086] At this time, the washing water partially flows into the guide through the inlets **333** formed in the guide of the leakage sensing device **300**, and the float **310** is ascended by means of buoyancy.

[0087] As the float **310** is ascended, the sensor guide **390** provided with the first sensor **353** is ascended along with the float **310**.

[0088] Afterwards, the first sensor **353** provided in the sensor guide **390** is in contact with the second sensor **355** as the water level of the washing water flown into the guide portion **330** increases.

[0089] At this time, the leaked washing water is drained out without reaching the maximum water level of the leaked washing water to the bottom of the motor **211**.

[0090] This is because that the height of the guide ribs **213** that support the motor **211** is higher than the ascending height of the sensor guide **390** as described above.

[0091] Next, if the first sensor **353** is in contact with the second sensor **355**, the second sensor **355** transmits to the

microcomputer a signal indicating the state that the first sensor 353 is in contact with the second sensor 355.

[0092] Afterwards, the microcomputer operates a drain pump (not shown) provided in the base 100 to drain out the washing water received in the base 100.

[0093] In the aforementioned dish washer according to the present invention, the driver 210 is provided on the plane portion 100a of the base 100, and the base 100 is fixed to the bottom of the tub 3 in a state that the leakage sensing device 300 is provided, so that assembly between the base 100 and the tub 3 can be improved, and the driver can in advance be prevented from being operated in error and from being out of order due to the leaked washing water.

INDUSTRIAL APPLICABILITY

[0094] In the dish washer according to the present invention, excellent assembly among the base, the sump assembly and the tub can be obtained, and error operation and trouble of the driver can be avoided in advance even though the washing water is leaked in the base provided with the driver. Accordingly, the dish washer of the present invention can industrially be used.

1. A dish washer comprising: a tub provided with a space for washing dishes and a communication hole formed on a bottom thereof; a base fixed to the bottom of the tub, having a plane portion; a sump assembly provided in the plane portion of the base and fixed to the tub, the assembly having a sump and a driver, wherein washing water is received in the sump and the driver supplies a driving force to the sump; and a leakage sensing device provided in the base, sensing a water level of washing water leaked in the base.

2. The dish washer as claimed in claim 1, wherein the leakage sensing device includes: a float ascending and descending depending on the water level of the leaked washing water; a guide portion guiding ascent and descent of the

float; and a sensor sensing the water level of the leaked washing water to transmit a sensed signal to a microcomputer.

3. The dish washer as claimed in claim 2, wherein the float includes a material of Styrofoam.

4. The dish washer as claimed in claim 2, wherein the float is a hollow floating material.

5. The dish washer as claimed in claim 2, wherein the sensor includes: a first sensor ascending and descending along with the float; and a second sensor provided at a position corresponding to the first sensor to transmit information of water level to a microcomputer in contact with the first sensor if the washing water is received in the base until the washing water reaches the driver.

6. The dish washer as claimed in claim 2, wherein the sensor further includes a sensor guide that surrounds the float.

7. The dish washer as claimed in claim 1, wherein the driver includes: a motor; guide ribs provided in the plane portion of the base to space the motor apart from the plane portion; and a motor bracket for fixing the motor to the guide ribs.

8. The dish washer as claimed in claim 7, wherein the guide ribs have a height higher than the ascent height of the float.

9. The dish washer as claimed in claim 7, wherein the guide ribs are respectively provided at both sides around an axis of the motor.

10. The dish washer as claimed in claim 7, wherein the motor bracket is screwed onto the guide ribs.

11. The dish washer as claimed in claim 1, wherein the bottom of the tub constituting the communication hole is stepped.

12. The dish washer as claimed in claim 11, wherein the sump assembly further includes a plurality of clamp hooks provided above the sump to fixably hang the sump onto the stepped portion of the bottom.

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