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(54) **WASHING MACHINE**

(57) Provided is a washing machine which can reduce number of parts for a structure for absorbing water and draining water into a washing tank. The washing machine (1) includes: an outer tank (3) capable of storing water; a washing tank (5) contained in the outer tank (3), having a through hole (23) for allowing water to flow between the washing tank (5) and the outer tank (3) and used for containing washings and rotatable; water paths (4) for absorbing water stored in the outer tank (3); an exhaust port (11) for draining water absorbed through the water paths (4) into the washing tank (5) from above Z1; and blades (40) integrally arranged on a bottom wall (21) of the washing tank (5) to deliver water stored in the outer tank (3) into the water paths (4) by rotating with the washing tank (5) integrally.

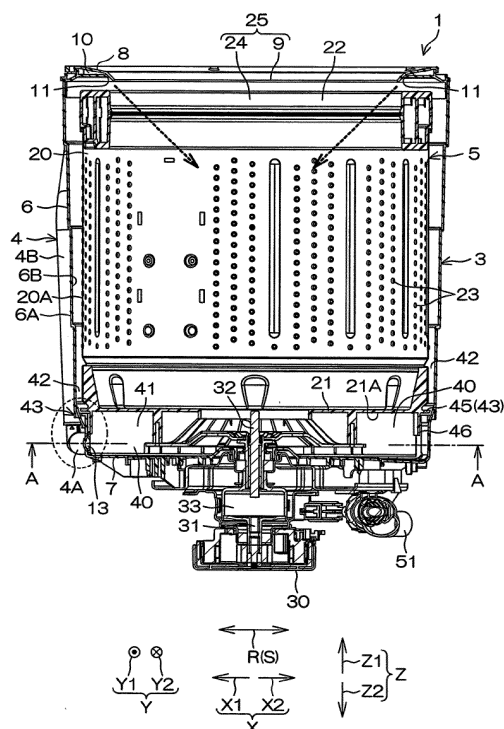


FIG. 2

Description

TECHNICAL FIELD

[0001] The present invention relates to a washing machine.

BACKGROUND

[0002] In a washing machine in the following patent literature 1, a rotary wing for stirring washings is rotationally and freely arranged at a bottom of a washing/dewatering tank; and a pumping wing is rotationally and freely arranged below the rotary wing.

[0003] A drive shaft of a drive motor is directly connected with the rotary wing; and the pumping wing is connected with the rotary wing by a planetary gear mechanism. After being delivered to the rotary wing, a torque of the drive motor is delivered to the pumping wing by the planetary gear mechanism.

[0004] A pumping path is arranged on an inner side wall of the washing/dewatering tank. When the pumping wing rotates, a detergent stored in the washing/dewatering tank is sent into the pumping path by the pumping wing and rises in the pumping path; and then detergent is returned into the washing/dewatering tank from an exhaust port of the pumping path.

Existing technical literature

Patent literature

[0005] Patent literature 1: Japan specifically disclosed No. 2010-94248 bulletin

Topic to be solved by the invention

[0006] In the washing machine in the following patent literature 1, to deliver detergent stored in the washing/dewatering tank back to the washing/dewatering tank by the pumping path, the pumping ring and the planetary gear mechanism for delivering torque to the pumping wing from the rotary wing need to be arranged, so the number of parts is increased.

SUMMARY

[0007] The present invention is achieved under such background. The present invention aims at providing a washing machine capable of reducing the number of parts in a structure for absorbing water and draining water into the washing tank.

Method for solving the topic

[0008] The washing machine provided in the present invention includes an outer tank capable of storing water; a washing tank contained in the outer tank, having a

through hole for allowing water to flow between the washing tank and the outer tank and used for containing washings and rotatable; water paths for absorbing water stored in the outer tank; an exhaust port for draining water absorbed through water paths into the washing tank from above; and blades integrally arranged on a bottom wall of the washing tank to deliver water stored in the outer tank into water paths by rotating with the washing tank integrally.

[0009] In addition, in the present invention, a plurality of the water paths are arranged at an outer side of the outer tank.

[0010] In addition, in the present invention, receiving ports in the water paths to receive water stored in the outer tank are arranged near the bottom wall of the washing tank.

[0011] In addition, in the present invention, the receiving ports are set to be as high as the blades.

[0012] In addition, in the present invention, the receiving ports are configured to face a direction between a normal direction relative to a rotary direction of the washing tank and a tangential direction relative to the rotary direction.

[0013] In addition, in the present invention, a labyrinth structure, for preventing water stored in the outer tank from leaking to a gap between the outer tank and the washing tank above the receiving ports, is arranged.

[0014] In addition, in the present invention, the outer tank is formed with a drainage port for draining water in the outer tank, and an overflow port for allowing water above a specified water level in the outer tank to overflow outside the outer tank; and water paths, the drainage port and the overflow port are respectively separated.

Effects of the invention

[0015] According to the present invention, the washing tank for containing washings can be rotationally contained in the outer tank in the washing machine. The water paths can absorb water stored in the outer tank. The absorbed water can be drained to the washing tank by the drainage port from above. The washing in the washing tank passes through the through hole of the washing tank. Therefore, water can flow between the washing tank and the outer tank.

[0016] Thus, water can be used for washing when circulating, and thus water can be saved. In addition, when washings are washed, detergent in the washing tank can blister through drainage of water and falling strength in the washing tank. Therefore, washings can be effectively washed by the blistering detergent. In addition, clearing power can be improved by water drained from the washing tank from the above and mechanical force, generated by water falling, acting on washings; washings can be rinsed effectively, and thus the rinsing operation time can be shortened.

[0017] The bottom wall of the washing tank is integrally provided with blades which rotate integrally with the

washing tank for delivering water stored in the outer tank into the water paths. Thus, water in the outer tank can be largely delivered into the water paths by a synergistic effect of centrifugal force generated on water in the outer tank due to the rotation of the washing tank and the blades. Thus, quantity of water absorbed by the water paths can be increased.

[0018] Since the blades are integrally arranged on the washing tank, if the blades and the washing tank are integrally formed, other parts are not arranged again. In addition, since the blades and the washing tank rotate integrally, a mechanism for rotating the blades independently is not arranged. Therefore, the number of the parts can be reduced in a structure for absorbing water and draining water into the washing tank.

[0019] In addition, according to the present invention, water in the outer tank can be largely absorbed through a plurality of water paths. In addition, under a condition that the water paths are arranged at the outer side of the outer tank, compared with a condition that the water paths are arranged in the outer tank, since the water paths can be freely designed, the pressure and flow rate of water absorbed by the water paths can be freely regulated.

[0020] In addition, according to the present invention, since the receiving ports of the water paths are arranged near the bottom wall of the washing tank, the receiving ports are located at a position for directly receiving water stored in the outer tank. Therefore, quantity of water absorbed by the water paths can be increased by largely receiving water in the outer tank by the receiving ports.

[0021] In addition, according to the present invention, since the receiving ports of the water paths are set to be as high as the blades, the receiving ports are located at the position near the blades for delivering water into the water paths. Therefore, quantity of water absorbed by the water paths can be increased by largely receiving water delivered by the blades at the receiving ports.

[0022] In addition, according to the present invention, since the receiving ports of the water paths are confirmed to face a direction between the normal direction relative to the rotary direction of the washing tank and a tangential direction relative to the rotary direction, the receiving ports are located at a flowing destination of water delivered by the rotary blades. Therefore, quantity of water absorbed by the water paths can be increased by largely receiving water delivered by the blades at the receiving ports.

[0023] In addition, according to the present invention, the labyrinth structure can restrain water stored in the outer tank to overflow to the gap between the outer tank and the washing tank above the receiving port of the water paths. Thus, water delivered by the blades can be effectively received at the receiving ports instead of overflowing to the gap between the outer tank and the washing tank; and thus quantity of water absorbed by the water paths can be increased.

[0024] In addition, according to the present invention, the water paths, the drainage port and the overflow port

are respectively separated. Therefore, water stored in the outer tank is not affected by water flowing through steps near the drainage port and the overflow port; and water is stably absorbed and drained into the washing tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Fig. 1 is a stereoscopic diagram illustrating an internal structure of a washing machine 1 of one embodiment observed from above in the present invention; Fig. 2 is a vertical section view illustrating an internal structure of a washing machine 1;

Fig. 3 is an amplifying diagram illustrating a main part of Fig. 2;

Fig. 4 is a section view in A-A direction of Fig. 2;

Fig. 5 is a diagram illustrating a first variation example applied to Fig. 4;

Fig. 6 is a diagram illustrating a second variation example applied to Fig. 4.

[0026] A list of reference numerals:

- 1: washing machine;
- 3: outer tank;
- 4: water path;
- 5: washing tank;
- 6A: peripheral surface;
- 11: exhaust port;
- 13: receiving port;
- 21: bottom wall;
- 23: through hole;
- 40: blade;
- 42: gap;
- 43: labyrinth structure;
- 50: drainage port;
- 52: overflow port;
- P: normal direction;
- Q: tangential direction;
- S: circumference;
- Z1: upper side.

DETAILED DESCRIPTION

[0027] An implementation mode of the present invention is specifically explained below with reference to drawings.

[0028] Fig. 1 is a stereoscopic diagram illustrating an internal structure of a washing machine 1 of one embodiment observed from above in the present invention.

[0029] It should be noted that a gesture of a washing machine 1 in Fig. 1 prevails under a condition of mentioning a direction of the washing machine 1. An up-down direction in Fig. 1 is consistent with an up-down direction Z (vertical) of the washing machine 1. A left-right direction in Fig. 1 is consistent with a left-right direction X of the

washing machine 1. In the up-down direction Z, an upper side is called as an upper side Z1 and a lower side is called as a lower side Z2. In the left-right direction X, a left side is called as a left side X1 and a right side is called as a right side X2. An orthogonal direction of the up-down direction Z and the left-right direction X is a front-rear direction Y of the washing machine 1. In the front-rear direction Y, a front side is called as a front side Y1 and a rear side is called as a rear side Y2. The left-right direction X as well as the front-rear direction Y are included in a horizontal direction H (transverse).

[0030] The washing machine 1 includes an enclosure 2, an outer tank 3, water paths 4 and a washing tank 5.

[0031] The enclosure 2 is a hollow body with a roughly cuboid shape; and the outer tank 3, the water paths 4 and the washing tank 5 are contained in the enclosure 2.

[0032] The outer tank 3 is supported by the enclosure 2 through a plurality of hanger rods (not shown in the drawings) with springs and damping mechanisms. The outer tank 3 is in a cylindrical shape having an axis extending along the up-down direction Z, and is made from resin. A circumference of the cylindrical outer tank 3 is called as a circumference S; and a radial direction of the outer tank 3 is called as a radial direction R. The outer tank 3 has a cylindrical side wall 6 extending along the up-down direction Z, a discoid bottom wall 7 flatly extending along the horizontal direction H and blocking a lower end of the side wall 6, and an annular wall 8 extending fully to an inner side of radial direction R from the upper end of the side wall 6 and the circumference S. A peripheral surface 6A of the side wall 6 is an outer side of the outer tank 3. Water can be stored in the outer tank 3 from the side of the bottom wall 7.

[0033] An opening 9 divided by an inner periphery of the annular wall 8 is formed on the upper end of the outer tank 3. The inner part of the outer tank 3 is exposed to the upper side Z1 by the opening 9. The annular wall 8 has an inner space 10 extending along the circumference S and an exhaust port 11 for cutting the inner periphery part of the annular wall 8 along the circumference S and exposing the inner space 10 to the inner side of the radial direction R. The annular wall 8 has a plurality of (four, herein) protrusions 12. A plurality of protrusions 12 are separated in the circumference S. It is observed from the upper side Z1 that the protrusions extend in a roughly triangular shape from an outer periphery part of the annular wall 8 to the outer side of the radial direction R. Each protrusion 12 is a hollow body forming one part of the inner space 10; and the protrusions 12 are respectively arranged at four corners of the roughly quadrangular enclosure 2 when being viewed from above in configuration.

[0034] The water paths 4 are slender tubes made from resin; and a plurality of water paths are arranged on the peripheral surface 6A of the side wall 6 in such a manner that the quantity of the water paths is the same as that (four herein) of the protrusions 12. Each water path 4 has a lower end part 4A extending from the lower end part of

the side wall 6 of the outer tank 3 to the outer side of the radial direction R along the horizontal direction H, a middle part 4B bending from the lower end part 4A and extending to the upper side Z1 along the peripheral surface 6A, and an upper end part 4C extending from the middle part 4B to the upper side Z1 and connected with the protrusion 12 from the lower side Z2. The middle part 4B does not need to extend linearly along the up-down direction Z, and can be bent at one side or can extend along the upper side Z1 by a bent side.

[0035] Like the protrusions 12, the water paths 4 are respectively configured at four corners of the enclosure 2. Each water path 4 has a receiving port 13 at a connection part of the lower end part 4A and the side wall 6 of the outer tank 3; and the inner space of each water path 4 is communicated with the inner part of the outer tank 3 by the receiving port 13. The inner space of each water path 4 is communicated with the inner space 10 of the annular wall 8 of the outer tank 3 by the connection part of the upper end part 4C and the protrusion 12.

[0036] The washing tank 5 is formed as a cylindrical shape having the axis extending along the up-down direction Z, and is slightly smaller than the outer tank 3. Washings are contained in the washing tank 5. The washing tank 5 has a metal side wall 20 forming the cylindrical shape extending along the up-down direction Z; a resin bottom wall 21 flatly extending along the horizontal direction H, blocking the lower end of the side wall 20 and forming the discoid shape; and a resin balancing ring 22 assembled at the upper end of the washing tank 5. A plurality of through holes 23 are respectively formed in the side wall 20 and bottom wall 21.

[0037] The balancing ring 22 is an annular hollow body having an inner space for containing liquid and is coaxially assembled with the upper end part of the side wall 20. As described below, when the washing tank 5 rotates, the rotary balance of the washing tank 5 is maintained by the movement of the liquid in the balancing ring 22. The opening 24 divided by the inner periphery of the balancing ring 22 is formed at the upper end of the washing tank 5. The inner part of the washing tank 5 is exposed to the upper side Z1 through the opening 24.

[0038] The washing tank 5 is contained in the outer tank 3 and is almost coaxially configured with the outer tank 3. Therefore, the circumference of the washing tank 5 is the circumference S and the radial direction of the washing tank 5 is the radial direction R. The opening 24 of the washing tank 5 is communicated with the opening of the outer tank 3 from the lower side Z2. The openings 9 and 24 in a communication state form an access 25 of washings. Washings can be throw into and take out of the washing tank 5 from the upper side Z1 through the access 25 by users of the washing machine 1. In the washing tank 5 contained in the outer tank 3, the bottom wall 21 is opposite to the bottom wall 7 of the outer tank 3 from the upper side Z1 by separating a gap.

[0039] Water stored in the outer tank 3 passes through the through holes 23 respectively located in the side wall

20 and bottom wall 21 of the washing tank 5; therefore, water can flow between the outer tank 3 and the washing tank 5. Thus, a water level in the water tank 3 is approximately consistent with a water level in the washing tank 5.

[0040] Fig. 2 is a vertical section view illustrating an internal structure of a washing machine 1. Fig. 3 is an amplifying diagram illustrating a main part surrounded by a circle in Fig. 2. Fig. 4 is a section view in A-A direction of Fig. 2. The following description refers to Fig. 2 and Fig. 3 mainly.

[0041] The washing machine 1 includes a motor 30 which generates a torque by power drive. The motor 30 is configured at the lower side Z2 of the bottom wall 7 of the outer tank 3 in the enclosure 2. The motor 30 has an output shaft 31 for outputting torque. The output shaft 31 extends to the upper side Z1 from the motor 30. A transmission shaft 32 extending to the upper side Z1 is coaxially configured at the upper side Z1 of the output shaft 31. The output shaft 31 is connected with the transmission shaft 32 by a transmission mechanism 33 composed of a retarding mechanism and the like.

[0042] The transmission shaft 32 passes through a center part of a circle of the bottom wall 7 of the outer tank 3 and extends to the upper side Z1. An upper end part of the transmission shaft 32 is connected with the center part of the circle of the bottom wall 21 of the washing tank 5. Torque generated by the motor 30 is delivered to the transmission shaft 32 via the output shaft 31 and the transmission mechanism 33. Therefore, the washing tank 5 takes the transmission shaft 32 as a rotary center to rotate together with the transmission shaft 32. The rotary direction of the washing tank 5 is consistent with the circumference S.

[0043] The washing tank 5 rotates under a state that detergent has been dissolved in water stored in the outer tank 3. Thus, the washing operation of washings contained in the washing tank 5 is executed. After the washing operation, the washing tank 5 rotates under a state that the outer tank 3 supplies water. Therefore, rinsing operation of washings contained in the washing tank 5 is executed. The washing tank 5 rotates at a high speed under a state of performing drainage of the outer tank 3. Therefore, the dewatering operation of washings contained in the washing tank 5 is executed.

[0044] Associated with the water paths, a plurality of blades 40 protruded to the lower side Z2 are integrally arranged on the lower surface 21A of the bottom wall 21 of the washing tank 5. Each blade 40 is formed in a plate shape which is thin in the circumference S and which linearly extends along the radial direction R; and the blades 40 are radially configured (refer to Fig. 4) by using the center of the circle of the bottom wall 21 as a reference. The blades 40 are made from resin and integrally formed with the bottom wall 21. Under a state of not contacting with the outer tank 3, the blades 40 are configured at the gap 41 between the bottom wall 21 and the bottom wall 7 of the outer tank 3 along the up-down direction Z.

[0045] The receiving port 13 at the lower end part 4A of each water path 4 is arranged near the bottom wall 21 of the washing tank 5. Specifically, the receiving port 13 is set to be as high as the blades 40.

[0046] When the washing tank 5 rotates by receiving torque of the motor 30, the blades 40 at the bottom wall 21 of the washing tank 5 rotate integrally with the washing tank 5. Therefore, the blades 40 feed water stored in the outer tank 3. Specifically, water stored in the gap between the bottom wall 21 of the washing tank 5 and the bottom wall 7 of the outer tank 3 is delivered into the receiving port 13 of each water path 4. Thus, water stored in the outer tank 3 is continuously delivered to the receiving port 13 of each water path 4 through the rotating blades 40; and water is received into the water paths 4 by the receiving port 3.

[0047] Water received into the water path 4 is pushed by subsequent water. Therefore, water rises in the water paths 4. Water rising to the upper end part 4C of the water paths 4 flows into the inner space 10 of the annular wall 8 from the protrusions 12 (refer to Fig. 1) of the annular wall 8 of the outer tank 3. As shown by a dotted arrow, water is drained into the washing tank 5 from the exhaust port 11 at the inner periphery part of the annular wall 8 and falls to an inclined down direction in the washing tank 5.

[0048] Like this, the water paths 4 absorb water stored in the outer tank 3; and the exhaust port 11 drains water absorbed by the water paths 4 into the washing tank 5 from the upper side Z1. Water in the washing tank 5 passes through the through holes 23 of the washing tank 5. Therefore, water flows between the washing tank 5 and the outer tank 3.

[0049] Thus, water circulates when water is used for washing, and thus water can be saved. Washings in the washing tanks 5 are stirred by the rotating washing tank 5 and water drained from the upper side Z1. In addition, when washings are washed, detergent in the washing tank 5 can blister through drainage of water and falling strength in the washing tank 5. Therefore, washings can be effectively washed by the blistering detergent. In addition, by water drained into the washing tank 5 from the upper side Z1, mechanical force generated by water falling is applied to washings, clearing power can be improved, and washings can be rinsed effectively, and thus the rinsing operation time can be shortened.

[0050] As shown in Fig. 4, the blades 40 integrally arranged at the bottom wall 21 of the washing tank 5 rotate integrally with the washing tank 5. Thus, water stored in the outer tank 3 is delivered into the receiving port 13 of the water paths 4 as shown by a bold line arrow. Therefore, water in the outer tank 3 can be largely delivered into the water paths 4 by a synergistic effect of centrifugal force generated on water in the outer tank 3 due to the rotation of the washing tank 5 and the blades 40. Thus, quantity of water absorbed by the water paths 4 can be increased.

[0051] Since the blades 40 are integrally arranged at

the washing tank 5, no other part is required to be arranged if the blades 40 are integrally formed with the washing tank 5 as described above. In addition, since the blades 40 and the washing 5 rotate integrally, no mechanism for rotating the blades 40 independently need to be arranged. Thus, the number of parts can be reduced in a structure for absorbing water and draining water into the washing tank 5.

[0052] Water in the outer tank 3 can be largely absorbed by a plurality of water paths 4. Since each water path 4 is arranged at the peripheral surface 6A of the side wall 6 of the outer tank 3, namely, outside the outer tank 3, the water paths 4 can be freely designed compared with a condition that the water paths 4 are arranged in the outer tank 3. Thus, the pressure and flow rate of water absorbed by the water paths 4 can be freely regulated. Specifically, if the water paths 4 are thickened and the inner spaces of the water paths 4 are enlarged, water quantity can be increased; and if the water paths 4 are thinned and the inner spaces of the water paths 4 are reduced, water pressure can be increased.

[0053] As shown in Fig. 3, the receiving port 13 of each water path 4 is arranged near the bottom wall 21 of the washing tank 5, so the receiving port is directly located at the position for receiving water stored in the outer tank 3. Therefore, quantity of water absorbed by the water paths 4 can be increased by largely receiving water in the outer tank 3 through the receiving port 13. Specifically, since the receiving port 13 of the water path 4 is set to be as high as the blades 40, the receiving port 13 is located near the blades 40 for delivering water into the water paths 4. Therefore, quantity of water absorbed by the water paths 4 can be increased by receiving a great number of water delivered by the blades 40 through the receiving port 13.

[0054] To make the washing tank 5 smoothly rotate in the outer tank 3, the gap 42 is ensured between the inner peripheral surface 6B of the side wall 6 of the outer tank 3 and the outer peripheral surface 20A of the side wall 20 of the washing tank 5. The gap 42 is formed in a ring extending along the circumference S and enclosing the washing tank 5. It can be imagined that water can overflow to the gap 42 at the upper side Z1 of the receiving port 13 when water stored in the outer tank 3 is delivered into the receiving port 13 by the rotating blades 40. Therefore, the labyrinth structure 43 for preventing water from overflowing to the gap 42 is arranged on the washing machine 1.

[0055] The labyrinth structure 43 includes one part of the lower end part of the inner peripheral surface 6B of the side wall 6 of the outer tank 3, namely, a flat surface 44 extending to the outer side in the radial direction R. The flat surface 44 is located at the upper side Z1 of the receiving port 13. The labyrinth structure 43 further includes a transverse flange 45 extending from the low end part of the outer peripheral surface 20A of the side wall 20 of the washing tank 5 to the outer side of the radial direction R and an annular vertical flange 46 extending

from the whole domain of the circumference S at the lower end of the side wall 20 to the lower side Z2.

[0056] The transverse flange 45 is formed in a thin-plate shape in the up-down direction Z. The transverse flange 45 can also be form in a ring extending along the circumference S. The lower surface 45A of the transverse flange 45 is opposite to the flat surface 44 from the upper side Z1 across the gap 47, and the lower surface 45A and the flat surface 44 extend in parallel along the horizontal direction H. The gap 47 is a thin space along the up-down direction Z.

[0057] The lower end of the vertical flange 46 is located at the upper side Z1 of the receiving port 13 of each water path 4. Each blade 40 is convexly configured at the lower side Z2 of the lower end of the vertical flange 46. The outside end part of each blade 40 in the radial direction R and the vertical flange 46 are located at the same position; and each blade 40 is configured to be near the receiving port 13 of the water paths 40 from the inner side of the radial direction R. The vertical flange 46 is opposite to the part of the lower side Z2 of the flat surface 44 relative to the inner peripheral surface 6B of the side wall 6 and the whole domain of circumference S from the inner side of the radial direction R across the gap 48. The gap 48 is the thin annular space in radial direction R; and the lower side Z2 is communicated with the inner side of gap 47 in radial direction R.

[0058] The gaps 47 and 48 are the narrowest parts in the gap between the outer tank 3 and the washing tank 5. In addition, before arriving at the gap 42 of the upper side Z1 of the receiving port 13 of each water path 4, water stored in the outer tank 3 must rise in the gap 48 firstly; then a flowing direction of the water is changed in a roughly right angle at the upper end part of the gap 48; and the water flows through the gap 47 along the radial direction R. Therefore, water stored in the outer tank 3 is hard to reach the gap 42 across the gaps 47 and 48.

[0059] Therefore, since water is not allowed to overflow to the gap 42 between the outer tank 3 and the washing tank 5, water delivered by the blades 40 can be effectively received by the receiving port 13. Thus, quantity of water absorbed by the water paths 4 can be increased. It shall be noted that since the lower end parts of the gaps 47 and 48 have little vibration in the washing tank 5 when the washing tank 5 rotates, the rotary washing tank 5 does not contact with the outer tank 3 even if the gaps 47 and 48 are narrow. On the other hand, to prevent the upper part with great vibration in the rotary washing tank 5 from contacting with the outer tank 3, the gap 42 is enlarged in a ladder manner (refer to Fig. 2) to an outer side of the radial direction R as the gap 42 faces the upper side Z1.

[0060] Referring to the water paths 4 located at left end in Fig. 4, the receiving port 13 of each water path 4 is configured to face a direction between a normal direction P relative to the circumference S and a tangential direction Q relative to the circumference S. That is to say, the receiving port 13 is configured to face the inclined direc-

tion K towards the normal direction P and the tangential direction Q. It shall be noted that the washing tank 5 in the present embodiment rotates in a direction reverse to the direction of the receiving port 13 (anti-clockwise direction in Fig. 4).

[0061] In this case, the receiving port 13 of the water path 4 is located at a flowing target of water delivered by the blades 40 integrally rotating with the washing tank. Therefore, quantity of water absorbed by the water paths 4 can be increased by receiving a large number of water delivered by the blades 40 through the receiving port 13.

[0062] Fig. 5 is a diagram illustrating the first variation example applied to Fig. 4.

[0063] Referring to Fig. 5, a drainage port 50 for draining water in the outer tank 3 is formed in one position on the circumference S at the bottom wall 7 of the water tank 3. The drainage port 50 is connected with a drainage path 51 (refer to Fig. 2) for draining out of the washing machine 1. An overflow port 52 for overflowing water above the specified water level in the outer tank 3 to overflow out of the outer tank 3 is formed in the position at the side wall 6 of the outer tank 3 away from the bottom wall 7 to the upper side Z1 by a specified distance. The overflow port 52 is connected with an overflow path 53 for leading water overflowing from the overflow port 52 to the drainage path 51.

[0064] Each water path 4 is preferably separate from the drainage port 50 and the overflow port 52. Specifically, the drainage port 50 and the overflow port 52 are respectively configured between two adjacent water paths 4 in the circumference S. More preferably, the drainage port 50 and the overflow port 52 are respectively configured at a position where the drainage port 50 and the overflow port 52 are spaced by a roughly equal distance from the adjacent water path 4 in the circumference S. Through such a structure, water stored in the outer tank 3 can be stably absorbed and drained into the washing tank 5 instead of being affected by water flowing through the steps 60 near the drainage port 50 and the overflow port 52.

[0065] Fig. 6 is a diagram illustrating the second variation example applied to Fig. 4. In the above embodiment and the first variation example, each blade 40 at the lower surface 21A of the bottom wall 21 of the washing tank 5 is formed in a plate shape which is thin in the circumference S and which extends linearly along the radial direction R, and the blades 40 are radially configured by taking the center of the circle of the bottom wall 21 (refer to Fig. 4 and Fig. 5) as a reference. However, as shown in Fig. 6, the blades 40 can also be formed in the plate shape which is thin in the circumference S and which bends and extends crossed with the radial direction R from the lower side Z2 through observation. Specifically, each blade 40, observed from the lower side Z2, is radially configured by taking the center of the circle of the bottom wall 21 as a reference; and the blades are bent in such a manner that one side of the blade faces the outer side of the radial direction R and the other side faces the same direction

of the circumference S (anti-clockwise direction in Fig. 6).

[0066] The present invention is not limited to the contents of the above embodiments, and can be changed within the scope recorded in claims.

[0067] For example, in the above embodiment, number of the water paths 4 is four, and can be freely altered. In addition, each water path 4 can have different shape.

[0068] The blades 40 are integrally formed with the bottom wall 21 of the washing tank 5, or can also be fixed on the bottom wall 21 by screws and other connection components after the blades 40 are independently formed with the bottom wall 21.

[0069] As described above, under a condition that the washing tank 5 rotates to the direction reverse to that of the receiving port 13, the receiving port 13 of each water path 4 is configured to face a direction between the normal direction P relative to the circumference S and the tangential direction Q relative to the circumference S (refer to Fig. 4). Under a condition that the washing tank 5 rotates along the positive and negative directions instead of one direction, the receiving port 13 is configured to face the normal direction P. Thus, regardless of the rotation direction of positive direction or negative direction of the washing tank 5, the receiving port 13 can equally receive water delivered by the blades 40.

[0070] Washings in the washing tank 5 is stirred by the rotating washing tank 5 and water drained by the water paths 4 from the upper side Z1. In order to stir washings, a rotating stirrer can be additionally arranged in the washing tank 5.

[0071] The materials of the above components are only examples. For example, the bottom wall 21 of the washing tank 5 may be not fully made from resin; and the part connected with the transmission shaft 32 can be made of metal.

[0072] A vertical washing machine 1, of which a rotating center of the washing tank 5 extends along the up-down direction Z, is illustrated in the description. However, the washing tank 5 can also be obliquely configured in such a manner that the rotating center of the washing tank 5 obliquely extends relative to the up-down direction Z.

Claims

1. A washing machine, comprising:

- an outer tank, capable of storing water;
- a washing tank, contained in the outer tank, having a through hole for allowing water to flow between the washing tank and the outer tank, and used for containing washings and rotatable;
- water paths, for absorbing water stored in the outer tank;
- an exhaust port, for draining water absorbed through the water paths into the washing tank

from above; and
 blades, integrally arranged on a bottom wall of
 the washing tank to deliver water stored in the
 outer tank into the water paths by rotating with
 the washing tank integrally.

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2. The washing machine according to claim 1, wherein
 a plurality of the water paths are arranged at an outer
 side of the outer tank.

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3. The washing machine according to claim 1 or 2,
 wherein
 receiving ports in the water paths to receive water
 stored in the outer tank are arranged near the bottom
 wall of the washing tank.

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4. The washing machine according to claim 3, wherein
 the receiving ports are set to be as high as the blades.

5. The washing machine according to claim 3 or 4, wherein
 the receiving ports are configured to face a direction
 between a normal direction relative to a rotary direc-
 tion of the washing tank and a tangential direction
 relative to the rotary direction.

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6. The washing machine according to any one of claims
 3 to 5, wherein
 a labyrinth structure, for preventing water stored in
 the outer tank from leaking to a gap between the
 outer tank and the washing tank above the receiving
 port, is arranged.

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7. The washing machine according to any one of claims
 1 to 6, wherein
 the outer tank is formed with a drainage port for drain-
 ing water in the outer tank, and an overflow port for
 allowing water above a specified water level in the
 outer tank to overflow outside the outer tank; and
 the water paths, the drainage port and the overflow
 port are respectively separated.

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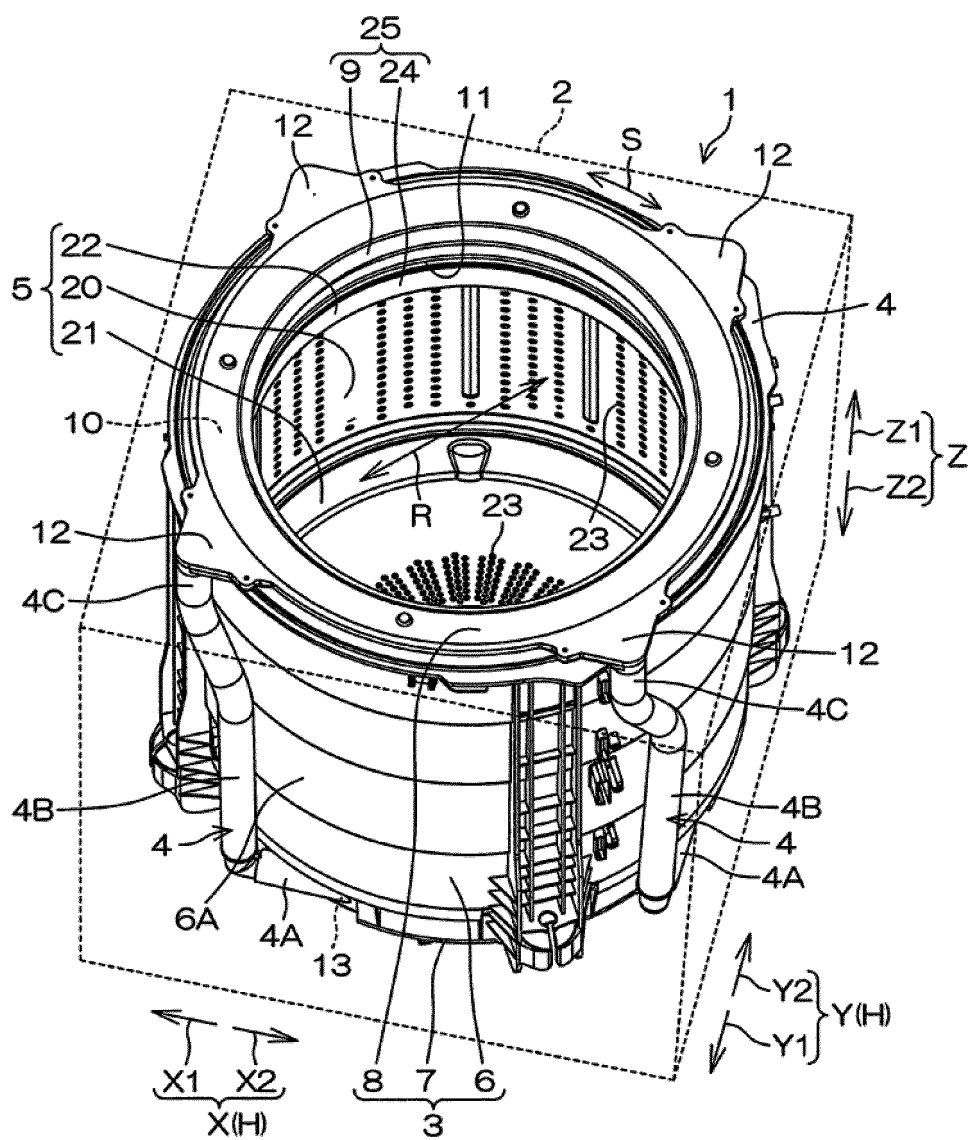


FIG. 1

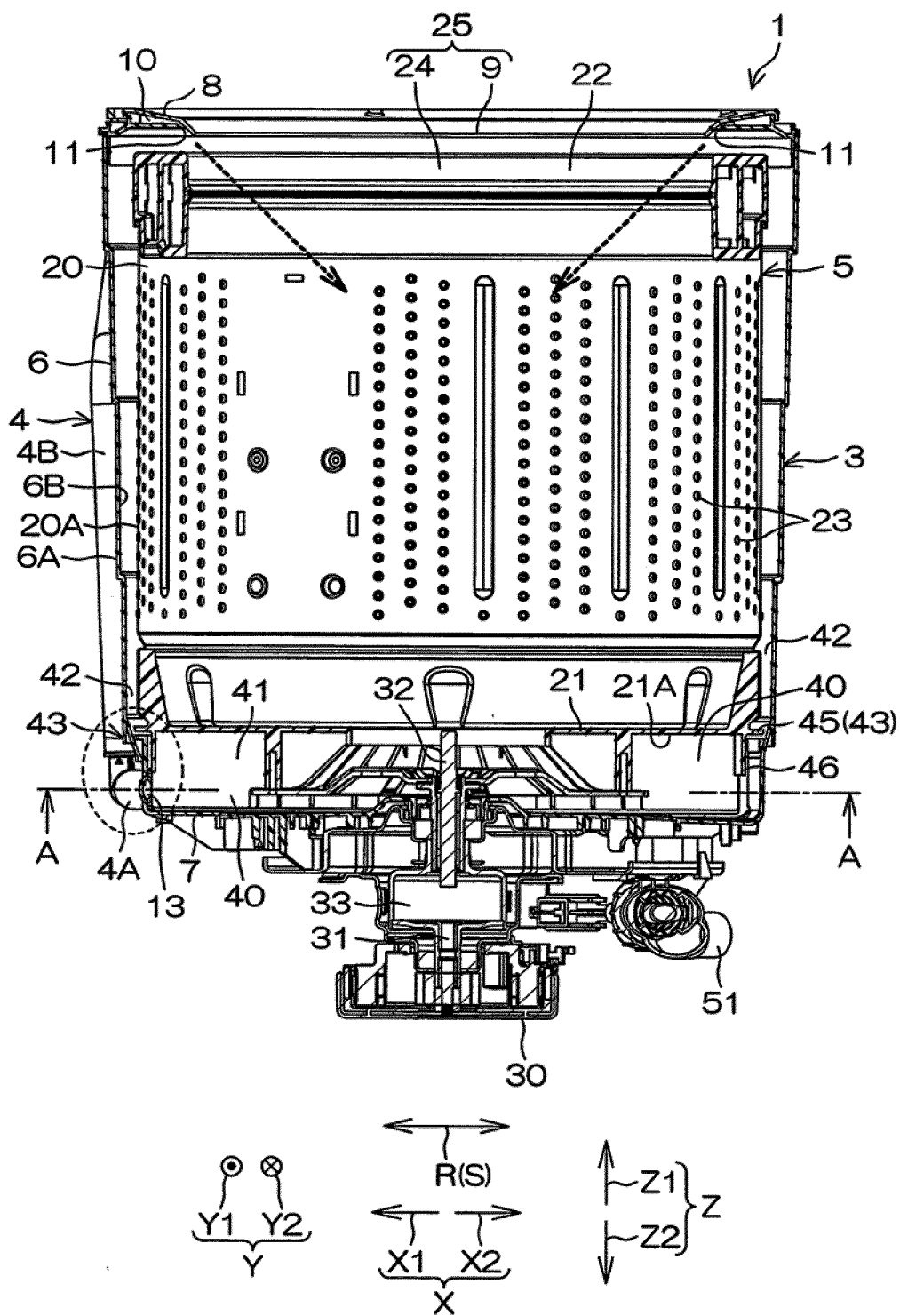


FIG. 2

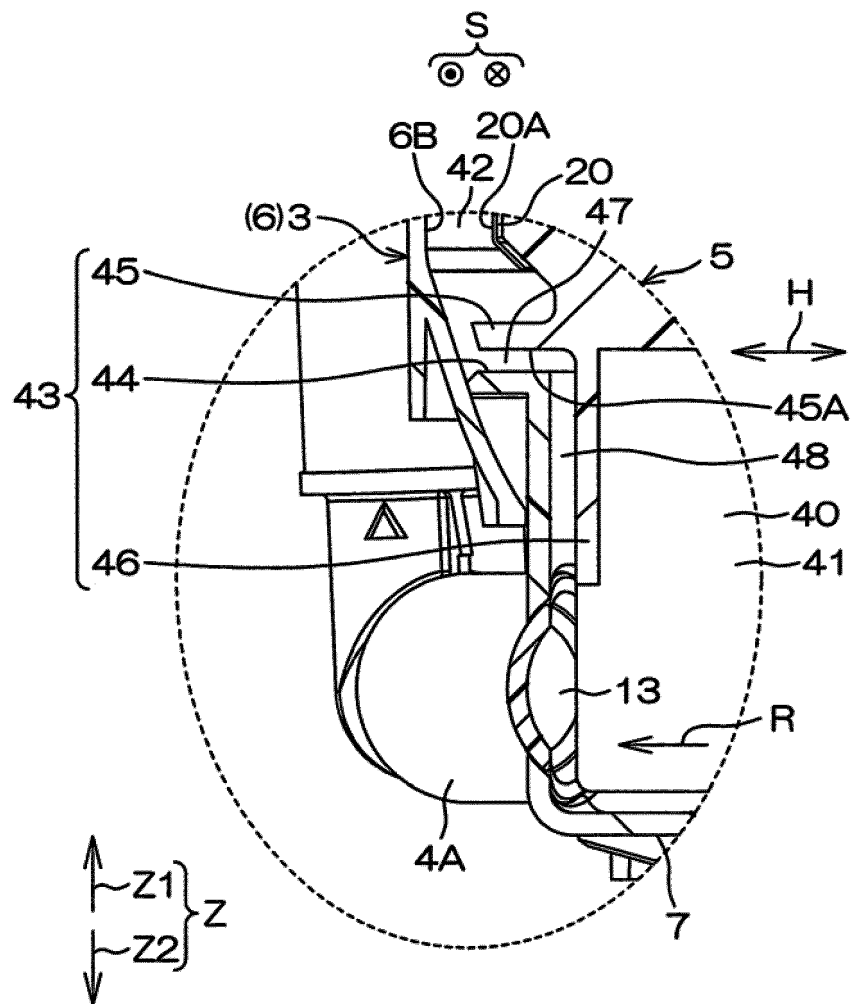


FIG. 3

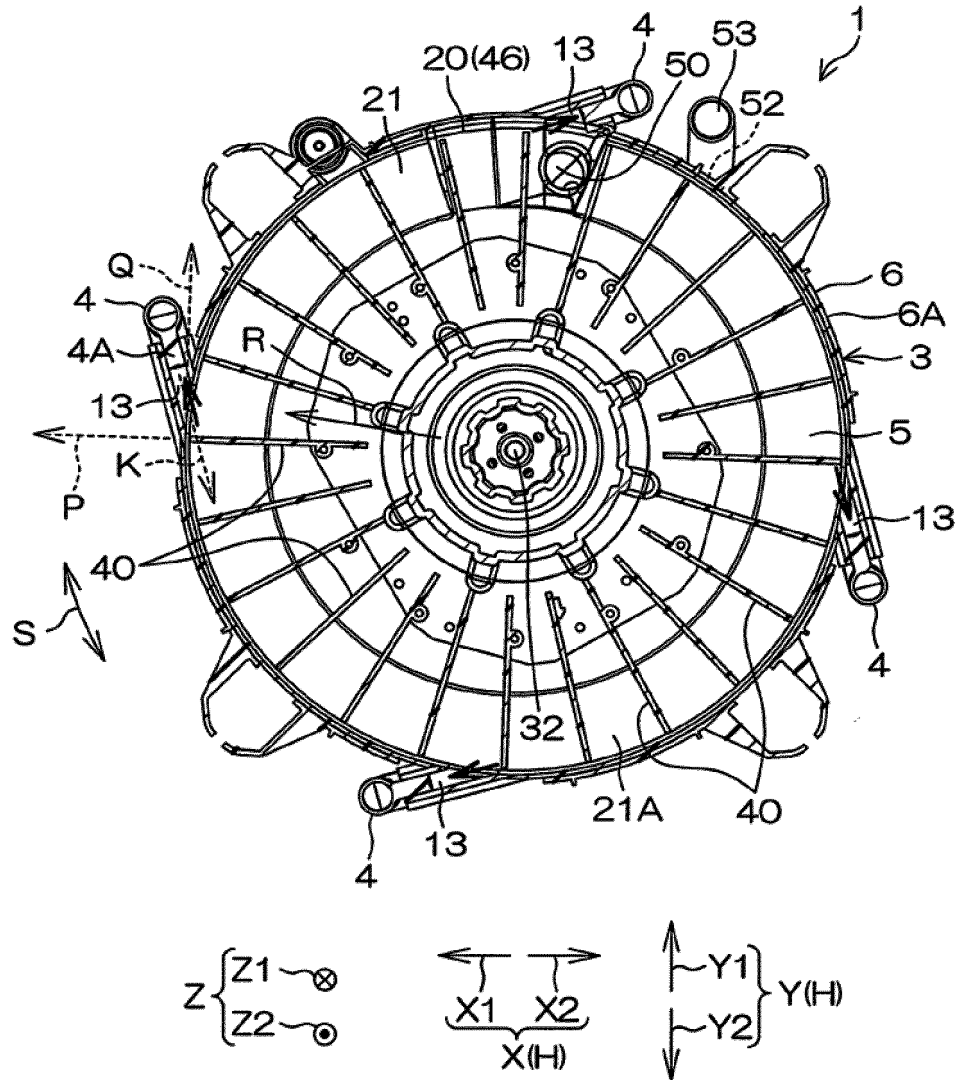


FIG. 4

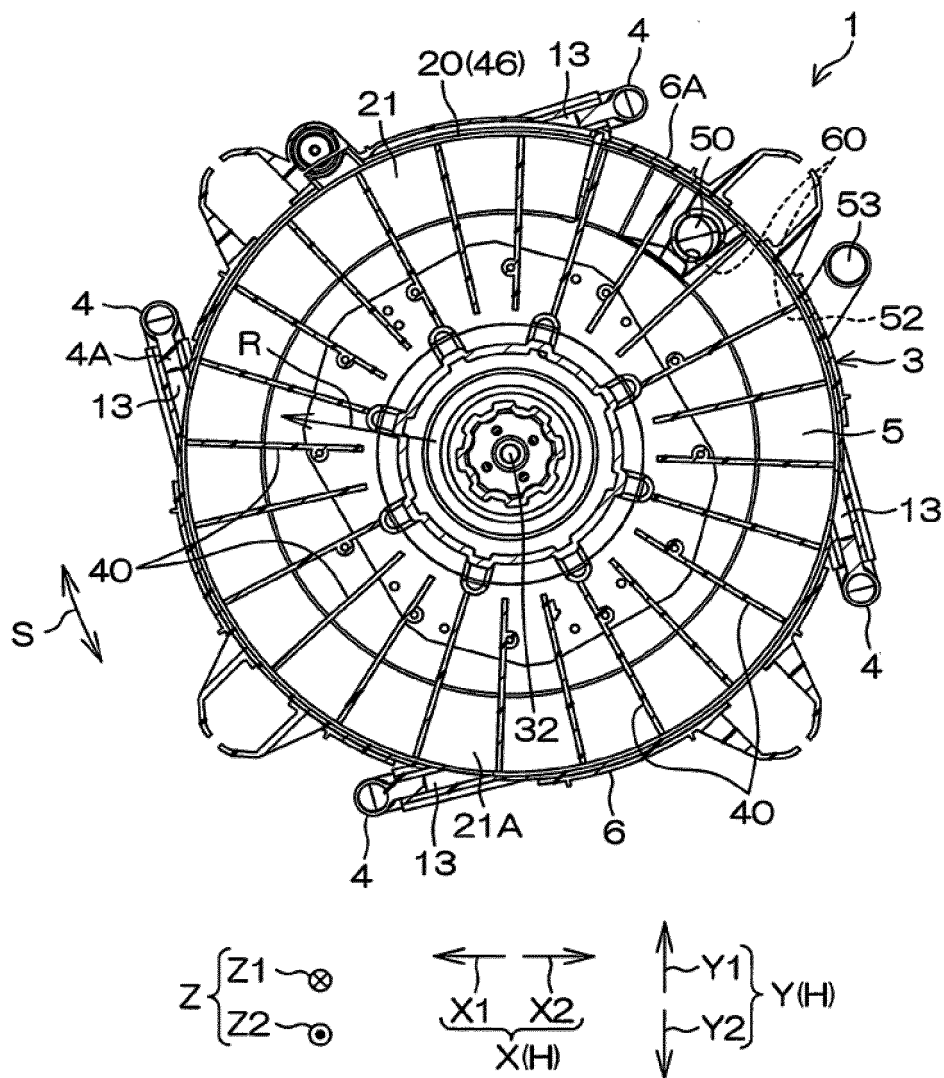


FIG. 5

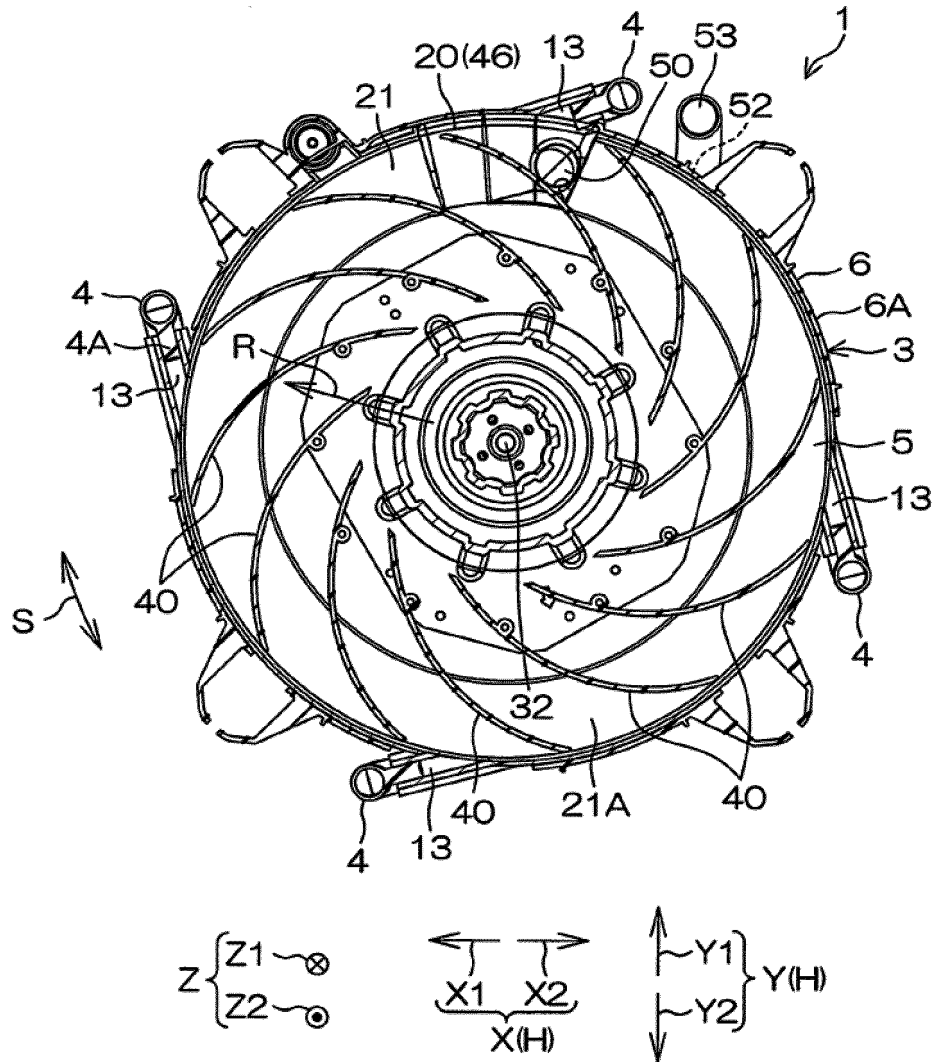


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/095668

A. CLASSIFICATION OF SUBJECT MATTER D06F 39/08 (2006.01) i; D06F 39/12 (2006.01) i According to International Patent Classification (IPC) or to both national classification and IPC																					
B. FIELDS SEARCHED																					
Minimum documentation searched (classification system followed by classification symbols) D06F																					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) VEN; CNABS; CNTXT: impeller, agitator, stirrer, blade, stir, pulsator, turbine, turbo, drum, basket, cylinder, buffer, tumble, roller, water, tub, tank, barrel, cask, container, underside, subface, basal, bottom, backface, fundal, fundus, base, footwall, low+, rotat+, roll+																					
C. DOCUMENTS CONSIDERED TO BE RELEVANT																					
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>JP 2005110753 A (MATSUSHITA ELECTRIC IND CO., LTD.) 28 April 2005 (28.04.2005) description, paragraphs [0021]-[0054], and figures 1-16</td> <td>1-5, 7</td> </tr> <tr> <td>X</td> <td>JP 2011139742 A (PANASONIC CORP.) 21 July 2011 (21.07.2011) description, paragraphs [0020]-[0052], and figures 1-5</td> <td>1-4, 7</td> </tr> <tr> <td>X</td> <td>JP 03133488 A ((MATSUSHITA ELECTRIC IND CO., LTD.) 06 June 1991 (06.06.1991) description, page 2, column 3, embodiment, the first paragraph to page 4, column 2, the third paragraph, and figures 1-10</td> <td>1-4, 7</td> </tr> <tr> <td>X</td> <td>CN 103789966 A (HITACHI APPLIANCES INC.) 14 May 2014 (14.05.2014) description, paragraphs [0026]-[0122], and figures 1-13</td> <td>1, 3, 4, 7</td> </tr> <tr> <td>X</td> <td>CN 203498659 U (SHANGHAI XIAOZHENZHU ELECTRICAL APPLIANCE CO., LTD.) 26 March 2014 (26.03.2014) description, paragraphs [0018]-[0033], and figures 1-3</td> <td>1, 3, 4, 7</td> </tr> <tr> <td>A</td> <td>JP 2005110753 A (MATSUSHITA ELECTRIC IND CO., LTD.) 28 April 2005 (28.04.2005) the whole document</td> <td>6</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	JP 2005110753 A (MATSUSHITA ELECTRIC IND CO., LTD.) 28 April 2005 (28.04.2005) description, paragraphs [0021]-[0054], and figures 1-16	1-5, 7	X	JP 2011139742 A (PANASONIC CORP.) 21 July 2011 (21.07.2011) description, paragraphs [0020]-[0052], and figures 1-5	1-4, 7	X	JP 03133488 A ((MATSUSHITA ELECTRIC IND CO., LTD.) 06 June 1991 (06.06.1991) description, page 2, column 3, embodiment, the first paragraph to page 4, column 2, the third paragraph, and figures 1-10	1-4, 7	X	CN 103789966 A (HITACHI APPLIANCES INC.) 14 May 2014 (14.05.2014) description, paragraphs [0026]-[0122], and figures 1-13	1, 3, 4, 7	X	CN 203498659 U (SHANGHAI XIAOZHENZHU ELECTRICAL APPLIANCE CO., LTD.) 26 March 2014 (26.03.2014) description, paragraphs [0018]-[0033], and figures 1-3	1, 3, 4, 7	A	JP 2005110753 A (MATSUSHITA ELECTRIC IND CO., LTD.) 28 April 2005 (28.04.2005) the whole document	6
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<table border="1"> <tr> <td>Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451</td> <td>Authorized officer ZHANG, Zhen Telephone No. (86-10) 62084588</td> </tr> </table>	Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer ZHANG, Zhen Telephone No. (86-10) 62084588																			
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Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2015/095668

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		TW 201420835 A	01 June 2014
CN 203498659 U	26 March 2014	None	

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