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(72) Inventors:
• **CAI, Yantao**
Foshan, Guangdong 528311 (CN)
• **ZHANG, Yaohua**
Foshan, Guangdong 528311 (CN)
• **XIONG, Haoping**
Foshan, Guangdong 528311 (CN)
• **LI, Xiang**
Foshan, Guangdong 528311 (CN)

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(74) Representative: **Treeby, Philip David William et al**
Maucher Jenkins
Seventh Floor Offices
Artillery House
11-19 Artillery Row
London SW1P 1RT (GB)

(71) Applicant: **Foshan Shunde Midea Washing
Appliances
Manufacturing Co., Ltd.**
Foshan, Guangdong 528311 (CN)

(54) **WATER TANK AND DISHWASHER**

(57) The present application discloses a water tank and a dishwasher. The water tank comprises a first cavity and a ventilation flow channel, the first cavity is provided with an inner container connection port, and water higher than a preset water level of the first cavity is suitable for flowing into an inner container of the dishwasher through the inner container connection port, the ventilation flow channel is communicated with the first cavity and the outside, at least part of the ventilation flow channel extends from one side to the other side of the inner container connection port, the ventilation flow channel comprises a first gas port communicated with the first cavity, and the first gas port is formed in one side of the inner container connection port. By providing the inner container con-

nection port, water can be injected into the inner container of the dishwasher through the inner container connection port to achieve water inflow into the inner container of the dishwasher, and additionally, the first cavity can store a certain amount of water, thereby absorbing external heat; at least part of the ventilation flow channel extends beyond the inner container connection port to both sides of the inner container connection port, so that the water in the first cavity can be prevented from flowing to the outside through the ventilation flow channel when the water tank is tilted in the front-back direction, and the water in the first cavity can only be injected into the inner container of the dishwasher through the inner container connection port.

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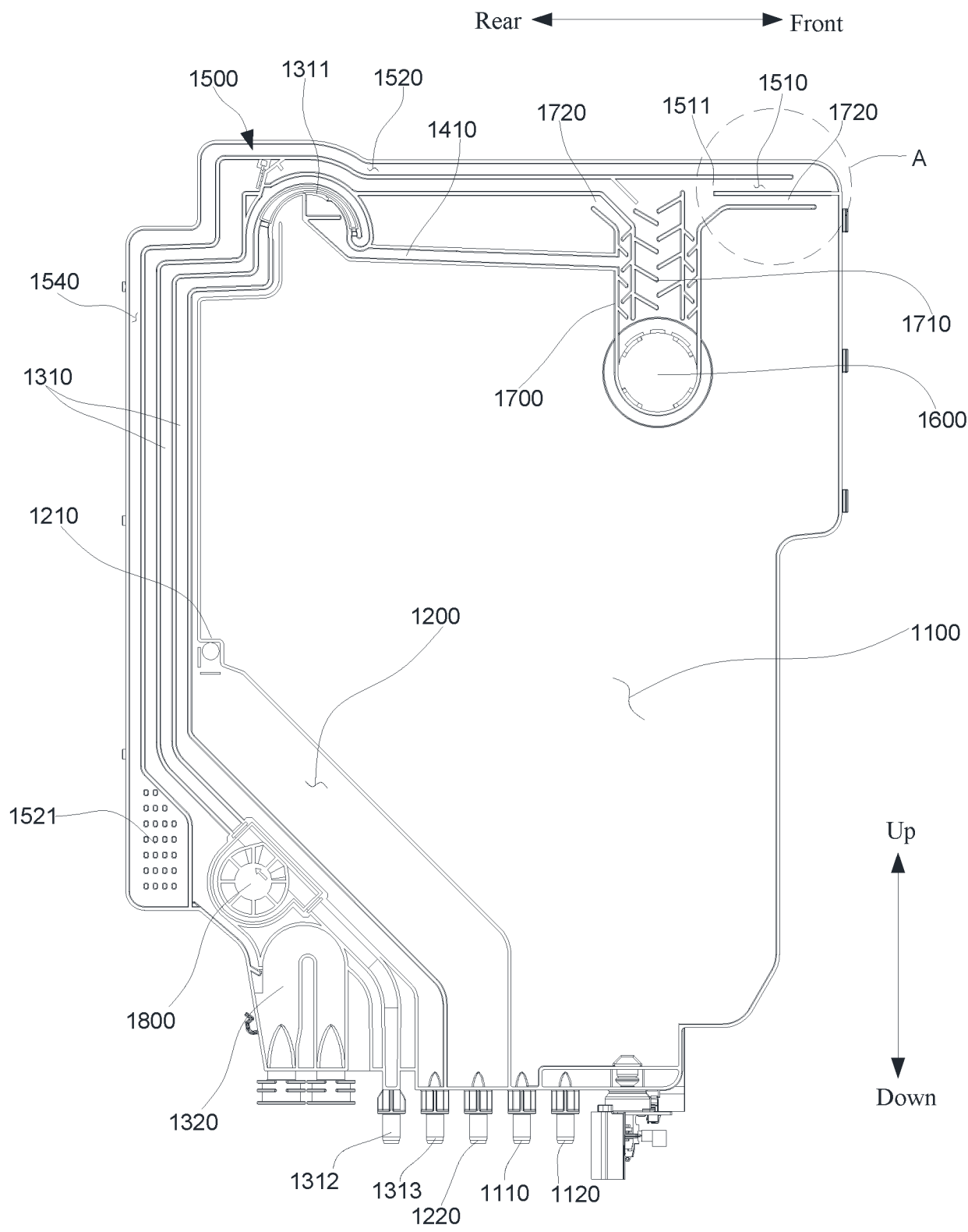


FIG. 2

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priorities to Chinese patent application No. 202311290104.6, titled "WATER TANK AND DISHWASHER" and filed with China National Intellectual Property Administration on October 07, 2023, and Chinese patent application No. 202322683463.X, titled "WATER TANK AND DISHWASHER" and filed with China National Intellectual Property Administration on October 07, 2023, the entire contents of which are incorporated herein in their entireties by reference.

FIELD

[0002] The present disclosure relates to the field of dishwasher technologies, and more particularly, to a water tank and a dishwasher.

BACKGROUND

[0003] Dishwashers consume a large amount of heat during operation, resulting in high energy consumption. How to reduce the energy consumption and improve energy efficiency has become a problem to be solved in the industry.

SUMMARY

[0004] The present disclosure aims to solve at least one of the technical problems in the related art. To this end, the present disclosure provides a water tank.

[0005] To achieve the above-described objective, the present disclosure provides a water tank. The water tank includes: a first cavity having an inner container connection port, where water above a predetermined water level in the first cavity is adapted to flow into an inner container of a dishwasher through the inner container connection port; and a ventilation flow channel, where the first cavity is in communication with an outside through the ventilation flow channel. The ventilation flow channel at least partially extends from one side to another side of the inner container connection port. The ventilation flow channel includes a first air port in communication with the first cavity. The first air port is disposed on the one side of the inner container connection port.

[0006] In some embodiments of the present disclosure, the ventilation flow channel includes a first flow segment and a second flow segment that are in communication with each other. The second flow segment extends from the one side to the other side of the inner container connection port. The first flow segment is located on the one side and disposed at the second flow segment, in such a manner that a U-shaped flow channel is formed by the first flow segment and a part of the second flow segment. The first air port is formed at the first flow segment and opens towards the other side.

[0007] In some embodiments of the present disclosure, the ventilation flow channel includes a second flow segment. The second flow segment is at least partially inclined downward.

[0008] In some embodiments of the present disclosure, the second flow segment is at least partially arched upward.

[0009] In some embodiments of the present disclosure, the first flow segment is located below the second flow segment.

[0010] In some embodiments of the present disclosure, the ventilation flow channel extends along a periphery of the water tank.

[0011] In some embodiments of the present disclosure, the water tank further includes: a condensation flow channel extending upward from the inner container connection port and having an overflow port, wherein the water above the predetermined water level in the first cavity flows through the overflow port and flows into the inner container of the dishwasher through the inner container connection port, and wherein the overflow port is in communication with the first air port; a condensation rib disposed in the condensation flow channel; a water inflow channel adapted to supply water to the first cavity and having a pressure relief port; and a pressure relief flow channel in communication with each of the pressure relief port and the condensation flow channel, where a connection between the pressure relief flow channel and the condensation flow channel is located below the overflow port.

[0012] In some embodiments of the present disclosure, the pressure relief port is positioned higher than the overflow port and lower than the first air port.

[0013] In some embodiments of the present disclosure, the overflow port is enclosed by a flow channel wall of the condensation flow channel and a flow channel wall of the ventilation flow channel.

[0014] In some embodiments of the present disclosure, the water tank further includes a water flow channel. The water flow channel and the pressure relief flow channel are superimposed. The water flowing into the overflow port at least partially passes through the water flow channel from bottom to top.

[0015] In some embodiments of the present disclosure, the water tank includes: a first inlet in communication with the water inflow channel and adapted to be connected to an external water source; a first outlet in communication with the water inflow channel and adapted to be connected to a soft water inlet of a water softener; a second inlet in communication with the first cavity and adapted to be connected to a soft water outlet of the water softener; and a third outlet in communication with the first cavity and adapted to be connected to the inner container of the dishwasher to discharge water from the first cavity.

[0016] The present disclosure further provides a dishwasher including the above-described water tank.

[0017] Technical solutions of the present disclosure

provide the inner container connection port. In a process of feeding the water into the first cavity, the water can be fed into the inner container of the dishwasher through the inner container connection port, achieving water supply into the inner container of the dishwasher. Also, the first cavity can store a certain amount of water, in such a manner that external heat can be absorbed and energy consumption can be saved. By providing the ventilation flow channel, the ventilation flow channel is at least partially positioned over the inner container connection port and extends to both sides of the inner container connection port, which can prevent the water in the first cavity from flowing to the outside through the ventilation flow channel when the water tank is tilted. In this way, the water in the first cavity can only be fed into the inner container of the dishwasher through the inner container connection port, preventing leaked water from wetting a surrounding environment of the dishwasher.

[0018] Other advantages of the present disclosure will be provided in part in the following description, or will in part become apparent from the following description or be learned from practicing of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In order to clearly explain technical solutions according to embodiments of the present disclosure or in the related art, drawings used in the description of the embodiments or the related art are briefly described below. Obviously, the drawings as described below are merely some embodiments of the present disclosure. Based on these drawings, other designs can be obtained by those skilled in the art without creative effort.

FIG. 1 is a schematic view of a water tank according to some embodiments.

FIG. 2 is a schematic view of a partial structure of a water tank according to some embodiments.

FIG. 3 is an enlarged view of a part marked as A in FIG. 2.

FIG. 4 is a schematic view of a partial structure of a water tank according to some embodiments.

FIG. 5 is an enlarged view of a part marked as B in FIG. 4.

FIG. 6 is an enlarged view of a part marked as C in FIG. 4.

FIG. 7 is an enlarged view of a part marked as D in FIG. 4.

FIG. 8 is a schematic view of a water softener according to some embodiments.

Description of reference numerals of the accompanying drawings:

[0020]

water tank 1000, first cavity 1100, second inlet 1110, third outlet 1120, second cavity 1200, water flow channel port 1210, second outlet 1220, water inflow channel 1310, pressure relief port 1311, first inlet 1312, first outlet 1313, water discharging flow channel 1320, pressure relief flow channel 1410, water flow channel 1420, ventilation flow channel 1500, first flow segment 1510, first air port 1511, second flow segment 1520, second air port 1521, U-shaped flow channel 1530, third flow segment 1540, inner container connection port 1600, condensation flow channel 1700, condensation rib 1710, overflow port 1720, flow meter 1800;
water softener 2000, water softening chamber 2100, soft water inlet 2110, soft water outlet 2120, regeneration chamber 2200, regeneration water inlet 2210.

[0021] The realization of objectives, functional features, and advantages of the present disclosure will be further described in conjunction with embodiments and with reference to the accompanying drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0022] Technical solutions according to embodiments of the present disclosure will be described clearly and completely below in combination with accompanying drawings of the embodiments of the present disclosure. Obviously, the embodiments described below are only a part of the embodiments of the present disclosure, rather than all embodiments of the present disclosure. On a basis of the embodiments of the present disclosure, all other embodiments obtained by those skilled in the art without creative efforts shall fall within the protection scope of the present disclosure.

[0023] It should be noted that, each orientation indication (such as up, down, left, right, front, rear, ...) in the embodiments of the present disclosure is used only for explaining a relative positional relation, movements, etc., between components in a particular pose (as illustrated in the figures). If the particular pose is changed, the orientation indication is changed accordingly.

[0024] In the present disclosure, unless otherwise clearly specified and limited, terms such as "connect", "fix", and the like should be understood in a broad sense. For example, it may be a fixed connection or a detachable connection or connection as one piece; mechanical connection or electrical connection or communication; direct connection or indirect connection through an intermediate; internal communication of two components or the interaction relationship between two components. For the person skilled in the art, the specific meaning of

the above-described terms in the present disclosure can be understood according to specific circumstances.

[0025] In addition, description related to "first", "second", and the like in the present disclosure is only used for descriptive purposes, and cannot be understood as indicating or implying relative importance or implicitly indicating the number of indicated technical features. Therefore, the features associated with "first" and "second" may explicitly or implicitly include at least one of the features. Further, combinations can be performed on the technical solutions according to various embodiments, but these combinations must be based on the fact that they can be realized by those of ordinary skilled in the art. When a combination of the technical solutions is contradictory or unattainable, the combination of the technical solutions neither exists nor falls within the protection scope of the appended claims of the present disclosure.

[0026] The present disclosure provides a water tank 1000. The water tank 1000 will be described in detail below in conjunction with a dishwasher.

[0027] As illustrated in FIG. 1, FIG. 2, and FIG. 3, in some embodiments of the present disclosure, the water tank 1000 includes a first cavity 1100 and a ventilation flow channel 1500. The first cavity 1100 has an inner container connection port 1600. The first cavity 1100 is in communication with an inner container of a dishwasher through the inner container connection port 1600. Water above a predetermined water level in the first cavity 1100 may flow out of the first cavity 1100 through the inner container connection port 1600 and then flow into the inner container of the dishwasher. The first cavity 1100 is in communication with an outside through the ventilation flow channel 1500 to achieve air pressure balance. The ventilation flow channel 1500 is at least partially positioned over the inner container connection port 1600 and extends to both sides of the inner container connection port 1600. The ventilation flow channel 1500 includes a first air port 1511. The first air port 1511 is disposed on one side of the inner container connection port 1600 and is in communication with the first cavity 1100. By providing the inner container connection port 1600, in a process of feeding the water into the first cavity 1100, the water can be fed into the inner container of the dishwasher through the inner container connection port 1600, achieving water supply into the inner container of the dishwasher. Also, the first cavity 1100 can store a certain amount of water, in such a manner that external heat can be absorbed and energy consumption can be saved. The external heat includes but is not limited to ambient heat and heat emitted from the inner container. Similarly, the ventilation flow channel 1500 is configured that the ventilation flow channel 1500 is at least partially positioned over the inner container connection port 1600 and extends to the both sides of the inner container connection port 1600, which can prevent the water in the first cavity 1100 from flowing to the outside through the ventilation flow channel 1500 when the water tank 1000 is tilted. In this way, the water in the first cavity 1100 can only be fed

into the inner container of the dishwasher through the inner container connection port 1600, preventing water from overflowing and then wetting a surrounding environment of the dishwasher, and enabling the water tank 1000 to achieve an anti-overflow function when tilted.

[0028] In an exemplary embodiment of the present disclosure, the dishwasher has the inner container. A dish rack and a spray arm are disposed in the inner container. The dish rack may be configured to load tableware, and the spray arm is configured to spray water to wash the tableware. The dishwasher has a washing pump. An inlet of the washing pump is in communication with the inner container, and an outlet of the washing pump is in communication with the spray arm. During operation, the dishwasher feeds a certain amount of water into the inner container. The washing pump pumps the water from the inner container and delivers the water to the spray arm, and the spray arm then sprays the water to wash the tableware. The water sprayed from the spray arm then falls back into the inner container and is further pumped by the washing pump, forming a cycle. To improve a cleaning effect on the tableware, the water in the inner container is heated. For example, the washing pump is integrated with a heating element, which heats the water simultaneously in a process of the washing pump pumping the water. Generally speaking, the inner container is made of metal sheet or plastic. Even if the inner container is not made of metal sheet or plastic, the inner container can hardly achieve thermal insulation, thus emitting heat to the outside. In this embodiment, by providing the water tank 1000, the heat emitted from the inner container can be absorbed by the water tank 1000.

[0029] The water tank 1000 may be mounted on the inner container and placed in close contact with the inner container. The first cavity 1100 may temporarily store a certain amount of water. During the operation of the dishwasher, the heat emitted from the inner container may be absorbed by the water in the first cavity 1100, preventing loss of the heat, and serving to preserve the heat for the inner container. The water in the first cavity 1100 is also configured to be supplied to the inner container to provide washing water. Since the water in the water tank 1000 has absorbed the heat emitted from the inner container, the water in the water tank 1000 has a higher temperature compared to municipal water. Therefore, if the water in the first cavity 1100 is input into the inner container, electricity required for heating in a washing process will be reduced compared with only heating the municipal water, in such a manner that the energy consumption is reduced. It should be understood that the water tank 1000 can not only absorb the heat emitted from the inner container, but also absorb ambient heat.

[0030] For example, when the dishwasher is in operation (assuming the dishwasher is used for a first time), the dishwasher generally has a plurality of washing cycles. During a first washing cycle, water is first filled into the first cavity 1100 and simultaneously introduced into the inner container. During this washing cycle, the water in the

inner container is heated, and the heat emitted from the inner container is absorbed by the water in the first cavity 1100. Also, the water in the first cavity 1100 also absorbs the ambient heat. During a second washing cycle, the water in the first cavity 1100 may be introduced into the inner container, and then the water in the first cavity 1100 is replenished. It should be understood that, if the water in the first cavity 1100 introduced into the inner container is insufficient for a washing cycle, it is necessary to continue introducing the municipal water into the inner container. Since the water in the first cavity 1100 has already absorbed both the heat emitted from the inner container and the ambient heat during the first washing cycle, the amount of electricity consumed to heat the water in the inner container during the second washing cycle is reduced. In addition, after the dishwasher finishes washing the tableware, the first cavity 1100 may also be filled with water. This part of water may absorb the ambient heat. When the dishwasher is used next time, a temperature of the water in the first cavity 1100 may be higher than the municipal water, which also enables a reduction in the energy consumption.

[0031] The first cavity 1100 has the inner container connection port 1600. The inner container connection port 1600 is in communication with the first cavity 1100 and is connected to the inner container of the dishwasher. The inner container of the dishwasher has a corresponding opening, and the inner container connection port 1600 is connected to the opening at the inner container, in such a manner that the first cavity 1100 is in communication with the inner container of the dishwasher. In a process of feeding the water into the first cavity 1100, a water level in the first cavity 1100 gradually rises until the water level in the first cavity 1100 reaches a predetermined height (predetermined water level). When the water level continues to rise, the water in the first cavity 1100 that is above the predetermined water level flows into the inner container of the dishwasher through the inner container connection port 1600 until a water level in the inner container reaches a predetermined height, thereby stopping the water inflow. At this time, the inner container contains water for circulation washing, and the first cavity 1100 of the water tank 1000 stores corresponding water.

[0032] Before feeding the water into the first cavity 1100, the first cavity 1100 contains air. If the air is not discharged, it may be difficult to feed the water into the first cavity 1100. Therefore, the ventilation flow channel 1500 is provided, and the first cavity 100 is in communication with the outside through the ventilation flow channel 1500, in such a manner that pressure balance between the inside and outside of the water tank 1000 can be maintained. The outside here refers to external atmosphere. For example, the ventilation flow channel 1500 has the first air port 1511 at one end of the ventilation flow channel 1500, and the first air port 1511 is in communication with the first cavity 1100. It should be understood that, since the first cavity 1100 needs to be in

communication with the outside through the first air port 155, it means that the first air port 1511 needs to be designed to be at a higher level than the inner container connection port 1600 or the predetermined water level (with normal placement of the water tank 1000 as a reference). The ventilation flow channel 1500 has a second air port 1521 at the other end of the ventilation flow channel 1500, and the second air port 1521 is in communication with the outside. Since the inner container is in communication with the first cavity 1100 through the inner container connection port 1600, the inner container is in communication with the outside. When feeding the water into the first cavity 1100, the air in the first cavity 1100 may pass through the first air port 1511, flow through the ventilation flow channel 1500, and then be discharged to the outside through the second air port 1521. As the dishwasher needs to heat the water during the operation, a certain amount of water vapor may be generated in the inner container, leading to a relatively high pressure inside the inner container. Since the inner container is in communication with the outside through the ventilation flow channel 1500, the pressure balance between the inner container and the outside can be ensured, thus ensuring a washing operation to be performed normally.

[0033] Since the first cavity 1100 is in communication with the outside through the ventilation flow channel 1500, when the water tank 1000 is tilted along with the dishwasher, the water in the first cavity 1100 may easily overflow to the outside through the ventilation flow channel 1500 and wet a mounting environment of the dishwasher. Therefore, provision of the ventilation flow channel 1500 is particularly important. In this embodiment, the following configuration is adopted to prevent overflow of the water in the first cavity 1100: the ventilation flow channel 1500 is at least partially positioned over the inner container connection port 1600 and extends to two opposite sides of the inner container connection port 1600. It should be noted that the two opposite sides here specifically refer to: in conjunction with the orientation illustrated in FIG. 2, if a vertical line is drawn through approximately a center of the inner container connection port 1600, a front side and a rear side of the vertical line are the two opposite sides of the inner container connection port 1600. The ventilation flow channel 1500 at least partially extends from the front side (one side) to the rear side (the other side). It should be understood that, alternatively, the one side may be regarded as the rear side, and the other side may be regarded as the front side. For example, the ventilation flow channel 1500 is at least partially located above the inner container connection port 1600 and extends to the rear side and the front side of the inner container connection port 1600. The first air port 1511 is located on the front side of the inner container connection port 1600. In this way, when the water is stored in the first cavity 1100 and the first cavity 1100 is tilted along with the dishwasher, a large amount of water can be prevented from overflowing to the outside

through the ventilation flow channel 1500.

[0034] Taking the scenario where the dishwasher tilts forward as an example, combined with the orientation illustrated in FIG. 2, when the water tank 1000 is in a state of tilting forward along with the dishwasher, the inner container connection port 1600 is positioned at a higher level relative to the first air port 1511, and the water in the water tank 1000 may flow into the inner container through the inner container connection port 1600. At the same time, the water may also enter the ventilation flow channel 1500 through the first air port 1511 until a water level in the ventilation flow channel 1500 is the same as the water level in the first cavity 1100. In this process, a large amount of water in the first cavity 1100 has entered the inner container of the dishwasher through the inner container connection port 1600, so only a small amount of water enters the ventilation flow channel 1500. In particular, the inner container connection port 1600 is usually designed to be larger than the first air port 1511. In this case, the amount of water entering the ventilation flow channel 1500 may be less. Since the ventilation flow channel 1500 at least partially extends to the two opposite sides of the inner container connection port, a part of the ventilation flow channel 1500 located on the rear side of the inner container connection port 1600 is positioned at a higher level than the inner container connection port 1600 in this state. Even if the water enters the ventilation flow channel 1500, the water may not quickly overflow to the outside. In a process of resetting the dishwasher, the ventilation flow channel 1500 is tilted at a certain stage, in such a manner that the water entering the ventilation flow channel 1500 can fall back to the first cavity 1100 under an action of gravity. In this way, the water entering the ventilation flow channel 1500 is prevented from being discharged to the outside after the dishwasher is reset.

[0035] Taking the scenario where the dishwasher tilts backward as an example, combined with the orientation illustrated in FIG. 2, the water tank 1000 is in a state of tilting backward along with the dishwasher. At this time, the first air port 1511 is positioned at a higher level relative to the inner container connection port 1600, and the water in the water tank 1000 may flow into the inner container through the inner container connection port 1600 until the water level in the first cavity 1100 is lower than the inner container connection port 1600. In this tilting process, the water in the first cavity 1100 has already quickly entered the inner container through the inner container connection port 1600, causing the water level in the first cavity 1100 to be lower than the first air port 1511. In this way, the water is prevented from entering the ventilation flow channel 1500. In particular, the inner container connection port 1600 is usually designed to be larger than the first air port 1511. In this case, it is difficult for the water in the first cavity 1100 to enter the ventilation flow channel 1500 through the first air port 1511 in a process of the water tank 1000 tilting backward.

[0036] In some embodiments of the present disclosure, the ventilation flow channel 1500 includes a second

flow segment 1520 and a first flow segment 1510. The second flow segment 1520 is in communication with the first flow segment 1510. The first flow segment 1510 is located on the one side (front side) of the inner container connection port 1600. The second flow segment 1520 extends from the first flow segment 1510 to the other side (rear side) of the inner container connection port 1600. The second flow segment 1520 is connected to the first flow segment 1510. A U-shaped flow channel 1530 is formed by a part of the second flow segment 1520 and the first flow segment 1510. The first air port 1511 is formed at the first flow segment 1510 and opens towards the other side (rear side).

[0037] In an exemplary embodiment of the present disclosure, the U-shaped flow channel 1530 is formed by the second flow segment 1520 and the first flow segment 1510, that is, a flow channel wall of the first flow segment 1510 may block sloshing water, preventing the water from directly rushing into the ventilation flow channel 1500. For example, when the water tank 1000 is tilted backward along with the dishwasher, if the water tank 1000 tilts backward at a relatively high speed, the water in the first cavity 1100 may shake rapidly. Before the water has time to flow into the inner container through the inner container connection port 1600, the water may overflow to the outside through the first air port 1511. By providing a structure of the U-shaped flow channel 1530, which is in a downward inverted U-shaped state in a tilting process, the water in the first cavity 1100 may impact the flow channel wall of the first flow segment 1510. A flow direction of this part of the water roughly intersects with the first flow segment 1510 and is blocked by the first flow segment 1510. In this way, when the water tank 1000 tilts backward quickly, the water in the first cavity 1100 can be prevented from flowing into the ventilation flow channel 1500.

[0038] Assuming that a small amount of water enters the ventilation flow channel 1500 under certain circumstances, in order to promote this part of water to flow back to the first cavity 1100 more quickly, as illustrated in FIG. 2 and FIG. 3, the second flow segment 1520 is at least partially inclined downward. Taking the scenario where the ventilation flow channel 1500 includes the first flow segment 1510 and the second flow segment 1520 as an example, the second flow segment 1520 is inclined upward from the first flow segment 1510 (from another perspective, the second flow segment 1520 is inclined downward). When the dishwasher is tilted forward, the water in the first cavity 1100 flows into the inner container through the inner container connection port 1600 until the water level is lower than the inner container connection port 1600. At this time, a part of the water enters the first flow segment 1510 and the second flow segment 1520. When the water tank 1000 is returned to its upright position (reset), the water in the second flow segment 1520 and the first flow segment 1510 can quickly flow out of the ventilation flow channel 1500 through the first air port 1511 under an action of an inclined part of the second

flow segment 1520, and then flow back to the first cavity 1100 or the inner container.

[0039] Further, as illustrated in FIG. 2, in some embodiments of the present disclosure, the second flow segment 1520 may be at least partially arched upward, which can prevent the water in the second flow segment 1520 from being discharged to the outside. When the dishwasher is tilted forward, the water in the first cavity 1100 flows into the inner container through the inner container connection port 1600 until the water level is lower than the inner container connection port 1600. At this time, a part of the water enters the first flow segment 1510 and the second flow segment 1520. When the water tank 1000 is returned to its upright position, the water in the second flow segment 1520 may not have time to flow back to the first cavity 1100 due to rapid return of the water tank 1000 to its upright position. By at least partially arching of the second flow segment 1520, the above-described part of the water can be prevented from flowing to the outside through the ventilation flow channel 1500. In particular, when the second flow segment 1520 is at least partially inclined downward, the water can be further guided to flow back to the first cavity 1100.

[0040] As illustrated in FIG. 2 and FIG.3, in some embodiments of the present disclosure, the first flow segment 1510 is designed below the second flow segment 1520 to simplify a structure. Since the first flow segment 1510 has the first air port 1511, and the first air port 1511 needs to be in communication with the first cavity 1100, the inner container connection port 1600, and the inner container. The first air port 1511 is designed to be at a higher level than the inner container connection port 1600. Based on the fact that the second flow segment 1520 needs to extend from the one side to the other side of the inner container connection port 1600, the second flow segment 1520 is designed to at a higher level than the first flow segment 1510. In this way, a communication path between the first air port 1511 and the first cavity 1100, and a communication path between the inner container connection port 1600 and the inner container can be shortened, enabling a gas to flow smoother.

[0041] As illustrated in FIG. 2, in some embodiments of the present disclosure, the ventilation flow channel 1500 is designed to extend along a periphery of the water tank 100, which avoids occupying a space of the first cavity 1100 and facilitates arrangement of various structures.

[0042] In an exemplary embodiment of the present disclosure, the ventilation flow channel 1500 is disposed around the periphery of the water tank 1000, which allows the ventilation flow channel 1500 to surround the first cavity 1100 without occupying the space of the first cavity 1100. If the ventilation flow channel 1500 is disposed in a middle part of the first cavity 1100, the first cavity 1100 inevitably needs to make way for the ventilation flow channel 1500, increasing structural complexity. Further, generally speaking, the water tank 1000 not only includes the first cavity 1100 but may also include other structures,

such as a water inflow channel 1310 and a water discharging flow channel 1320. Disposing the ventilation flow channel 1500 around the periphery of the first cavity 1100 can also make way for other structures, making the arrangement of various structures more convenient.

[0043] For example, in addition to the first flow segment 1510 and the second flow segment 1520 described above, the ventilation flow channel 1500 also includes a third flow segment 1540. The third flow segment 1540 is in communication with the second flow segment 1520. The second flow segment 1520 and the first flow segment 1510 are disposed at an upper part of the water tank 1000 and extend in a front-rear direction. The third flow segment is disposed at a rear side of the water tank 1000 and extends in an up-down direction.

[0044] As illustrated in FIG. 2, in some embodiments of the present disclosure, the water tank 1000 includes a condensation flow channel 1700. By providing the condensation flow channel 1700, condensation of steam overflowing from the inner container is achieved, preventing the steam from reaching the first cavity 1100 and then being discharged to the outside through the ventilation flow channel 1500.

[0045] In an exemplary embodiment of the present disclosure, the condensation flow channel 1700 extends from the inner container connection port 1600, that is, one end of the condensation flow channel 1700 is connected to the inner container connection port 1600, enabling the condensation flow channel 1700 to be in communication with the inner container connection port 1600. The condensation flow channel 1700 extends upward, in such a manner that the other end of the condensation flow channel 1700 is positioned at a higher level relative to the inner container connection port 1600, and forms an overflow port 1720. It should be understood that the overflow port 1720 is positioned at a higher level than the inner container connection port 1600 but needs to be at a lower level than the first air port 1511. The overflow port 1720 needs to be in communication with the inner container connection port 1600 and the first air port 1511. In this way, when the water level in the first cavity 1100 continues to rise, the water overflows the overflow port 1720 and enters the condensation flow channel 1700, and then flows into the inner container through the inner container connection port 1600. Since the first air port 1511 is positioned at a higher level, in the case that the water level does not reach the first air port 1511 during normal water inflow, the water may not overflow to the outside through the first air port 1511.

[0046] When the dishwasher performs washing, the water in the inner container may be heated. Therefore, steam in the inner container may enter the condensation flow channel 1700 through the inner container connection port 1600. The so-called condensation flow channel 1700 is provided with a plurality of condensation ribs 1710, which increases a condensation area, condensing the steam and preventing the steam from overflowing to the outside.

[0047] As illustrated in FIG. 2, FIG. 4, and FIG. 6, the water tank 1000 has the water inflow channel 1310, at which a flow meter 1800 is disposed. The water inflow channel 1310 is connected to an external water source. The so-called external water source refers to the water supplied to the dishwasher for its operation, such as the municipal water. The water inflow channel 1310 may be connected to a water tap through a pipeline, or the water inflow channel 1310 may be connected to a water storage tank to receive the external water source. The water transported through water inflow channel 1310 needs to be measured by the flow meter 1800 to facilitate counting of a water injection volume. For example, the flow meter 1800 may be embedded in water tank 1000. In order to prevent backflow in the water inflow channel 1310 when receiving external water sources, for example, if negative pressure occurs in the pipeline corresponding to the water tap, the backflow would occur, the water inflow channel 1310 may have a pressure relief port 1311 at the water inflow channel 1300. The pressure relief port 1311 needs to be in communication with the outside to avoid a backflow phenomenon. Generally speaking, a part of the water inflow channel 1310 needs to be designed to be curved, forming an upward arched structure. The pressure relief port 1311 is disposed at a lower portion of this part of the water inflow channel 1310. The water transported through the water inflow channel 1310 passes over the pressure relief port 1311 under an action of inertia and continues to flow and be transported, while enabling communication with the outside. Of course, a structure of the pressure relief port 1311 is not limited thereto, and pressure relief ports of dishwashers in related art also adopt other structures.

[0048] The water tank 100 has a pressure relief flow channel 1410 in communication with each of the condensation flow channel 1700 and the pressure relief port 1311. That is, since the condensation flow channel 1700 is in communication with the outside through the first air port 1511, the pressure relief port 1311 is also in communication with the outside, thus maintaining the air pressure balance. A connection between the condensation flow channel 1700 and the pressure relief flow channel 1410 needs to be designed lower than the overflow port 1720. In this way, when water inflows abnormally, excessive water may be fed into the first cavity 1100. At this time, the first cavity 1100 has a relatively high pressure. In this way, the water in the water inflow channel 1310 may flow out directly through the pressure relief port 1311 under an action of the relatively high pressure of the first cavity 1100, that is, the pressure relief port 1311 at this time becomes a flow relief port. The water flows directly into the condensation flow channel 1700 through the pressure relief flow channel 1410, enters the inner container connection port 1600, and then flows into the inner container. Since the connection between the condensation flow channel 1700 and the pressure relief flow channel 1410 is at a lower level relative to the overflow port 1720, in the case of abnormal water inflow, a large

amount of water can be avoided to be ejected to the outside through the ventilation flow channel 1500.

[0049] It should be understood that, since the condensation rib 1710 is disposed in the condensation flow channel 1700, and the overflow port 1720 is closer to the first air port 1511, in the case of the abnormal water inflow, the first cavity 1100 has a large water pressure. If the pressure relief flow channel 1410 is not provided, all the water can only be ejected from the overflow port 1720. Due to obstruction of the condensation rib 1710, the ejected water splatters, in such a manner that a part of the water enters the ventilation flow channel 1500 through the first air port 1511. In addition, it is precisely due to the obstruction of the condensation rib 1710 that the ejected water does not have time to flow downward through the inner container connection port 1600 into the inner container, which may cause the water level in the condensation flow channel 1700 to rise and cause a part of the water to directly enter the ventilation flow channel 1500 from the first air port 1511, and then overflow to the outside. In this embodiment, the pressure relief flow channel 1410 is provided, which acts as a flow diverter for the overflow port 1720 and prevents the water from spraying out of the overflow port 1720 and forming a jet flow. Moreover, since the connection part between the condensation flow channel 1700 and the pressure relief flow channel 1410 is farther from the first air port 1511 compared to the overflow port 1720, the path for water flowing through the pressure relief flow channel 1410 to reach the inner container connection port 1600 becomes shorter, thereby enabling faster discharge.

[0050] In some embodiments of the present disclosure, the pressure relief port 1311 is positioned to be higher than the overflow port 1720 and lower than the first air port 1511, in such a manner that the pressure relief port 1311 is extremely close to the overflow port 1720. In this way, when the abnormal water inflow occurs, pressure relief of the pressure relief port 1311 can respond quickly. This is because, at the moment the water inflows abnormally, the amount of water entering the first cavity 1100 increases and a pressure becomes higher. When the pressure reaches a critical point, the water in the water inflow channel 1310 is discharged through the pressure relief port 1311. The pressure formed at the above-described critical point is equivalent to a pressure generated when a hypothetical water level is at the same height as the pressure relief port 1311. Since the pressure relief port 1311 is close to the overflow port 1720, this hypothetical water level can be reached quickly, enabling rapid response.

[0051] As illustrated in FIG. 2, in some embodiments of the present disclosure, when the condensation flow channel 1700 is provided, the overflow port 1720 is enclosed by a flow channel wall of the condensation flow channel 1700 and a flow channel wall of the ventilation flow channel 1500 (first flow segment 1510). In this way, when the water tank 1000 is tilted, the water in the first cavity 1100 can be better restricted from passing through

instantly and in large quantities. For some dishwashers that are temporarily tilted and then returned to their upright positions, such arrangement can more effectively prevent the water from shaking and entering the ventilation flow channel 1500.

[0052] As illustrated in FIG. 4 and FIG. 7, in some embodiments of the present disclosure, since the pressure relief flow channel 1410 is provided, in order to avoid the pressure relief flow channel 1410 from blocking the flow of the water, the water tank 1000 has a water flow channel 1420. The water flow channel 1420 and the pressure relief flow channel 1410 are superimposed. The so-called superposition is in a thickness direction of the water tank 100, which can save space. In a process of gradually rising the water level in the first cavity 1100, the water at least partially passes through the water flow channel 1420 from bottom to top, and then flows into the overflow port 1720.

[0053] As illustrated in FIG. 2, FIG. 4, and FIG. 5, in some embodiments of the present disclosure, the water tank 1000 further includes a second cavity 1200. The second cavity 1200 in the water tank 1000 is adapted to be in communication with the first cavity 1100. A certain amount of water is stored in the second cavity 1200, so the water in the second cavity 1200 can also absorb the external heat, serving to preserve the heat for the inner container. Water in the second cavity 1200 flows from the first cavity 1100. By providing a water flow channel port 1210, when the water level in the first cavity 1100 is high than the water flow channel port 1210 in a process of feeding the water into the first cavity 1100, the water in the first cavity 1100 enters the second cavity 1200 through the water flow channel port 1210 until the water in the second cavity 1200 reaches a predetermined water level. The water in the second cavity 1200 is different from the water in the first cavity 1100 in that the water in the second cavity 1200 is not used for the washing cycle, but for regeneration of a water softener 2000.

[0054] It should be understood that, the municipal water is generally used as the water required for the operation of the dishwasher. The municipal water contains a relatively high amount of soluble calcium and magnesium (not limited to calcium and magnesium; calcium and magnesium are used as examples). However, since a water temperature is relatively high during the washing cycle of the dishwasher, scale is likely to form in a circulating water circuit of the dishwasher, affecting water circulation. Moreover, excessively high levels of calcium and magnesium may also affect effectiveness of a detergent. Therefore, the dishwasher is provided with the water softener 2000, and the water entering the inner container must first be softened by the water softener 2000 to remove calcium and magnesium from the water.

[0055] In the related art, as illustrated in FIG. 8, the water softener 2000 has two chambers, namely a water softening chamber 2100 and a regeneration chamber 2200. The water softening chamber 2100 is provided with a water softening resin. The municipal water flows into

the water softening chamber 2100 and then flows out from the water softening chamber 2100. Calcium and magnesium ions in the water are absorbed by the water softening resin, thus reducing hardness of the water.

When the water softening resin reaches a saturated state after adsorbing calcium and magnesium, water softening capacity of the water softening resin decreases. In this case, it is necessary to regenerate the water softening resin, and regeneration of the water softening resin requires the use of the regeneration chamber 2200.

[0056] The regeneration chamber 2200 is filled with regeneration salt. The regeneration chamber 2200 has a regeneration water inlet 2210. The municipal water or softened water is fed into the regeneration chamber 2200 through the regeneration water inlet 2210 to form brine. The brine is controlled to flow from the regeneration chamber 2200 into the water softening chamber 2100. The brine takes away calcium and magnesium in the water softening resin, restoring softening performance of the water softening resin. After regenerating the water softening resin, the brine needs to be discharged from the water softening chamber 2100.

[0057] In other words, water in the water softener 2000 flows through two paths. One path is that the water flows into the water softening chamber 2100, and after being softened, the water is discharged from the water softening chamber 2100 and fed into the inner container. The other path is that the water flows into the regeneration chamber 2200, then flows from the regeneration chamber 2200 into the water softening chamber 2100 to regenerate the water softening capacity of the water softening resin, and finally is discharged from the water softening chamber 2100. Since the water softener 2000 is a common component in the field of dishwashers, only a brief description is provided above. For a specific structure of the water softener, reference may be made to the related art.

[0058] Since the water softener 2000 needs to undergo the regeneration, the second cavity 1200 of the water tank 1000 is in communication with the regeneration water inlet 2210. In this way, when the regeneration of the water softener 2000 is required, the water in the second cavity 1200 is discharged into the water softener 2000 to regenerate the water softening resin inside the water softener 2000. As a result, the water tank 1000 not only has functions of heat preservation and energy saving, but also can realize the regeneration of the water softener 2000.

[0059] The water tank 1000 is described below in conjunction with the water softener 2000. As illustrated in FIG. 8, the water softener 2000 includes a soft water inlet 2110, a soft water outlet 2120, and the regeneration water inlet 2210. The soft water inlet 2110 and the soft water outlet 2120 are separately in communication with the water softening chamber 2100 of the water softener 2000. The regeneration water inlet 2210 is in communication with the regeneration chamber 2200 of the water softener 2000. There is a flow channel that can be

switched on or off between the water softening chamber 2100 and the regeneration chamber 2200. The water tank 1000 includes a first inlet 1312, a first outlet 1313, a second inlet 1110, a second outlet 1220, and a third outlet 1120. The first inlet 1312 and the first outlet 1313 are respectively located at both ends of the water inflow channel 1310, and in communication with the water inflow channel 1310. The first inlet 1312 is connected to the external water source, for example, connected to a water tap through a pipeline. The first outlet 1313 is connected to the soft water inlet 2110. The second inlet 1110 is connected to the soft water outlet 2120.

[0060] A water inflow process for the first washing cycle of the dishwasher is as follows. The water is fed into the water tank 1000, and the water enters the water inflow channel 1310 through the first inlet 1312, then flows out from the first outlet 1313 and enters the water softening chamber 2100 through the soft water inlet 2110. The water is softened in the water softening chamber 2100. The water then flows out from the soft water outlet 2120 and continues to be fed into the first cavity 1100 through the second inlet 1110. In a process of filling the first cavity 1100, the water in the first cavity 1100 enters the second cavity 1200 through the water flow channel port 1210. When the water in the first cavity 1100 reaches the predetermined water level, the water then flows into the inner container through the inner container connection port 1600. When the water level in the inner container reaches the predetermined water level, water inflow is stopped, and the dishwasher uses the water in the inner container to perform the first washing cycle.

[0061] After the dishwasher completes the first washing cycle, the water in the inner container needs to be discharged. Then the second washing cycle is performed. A water inflow process for the second washing cycle is as follows. The water in the first cavity 1100 is discharged into the inner container through the third outlet 1120, and then water is supplied from the external water source. Similar to the water inflow process of the first washing cycle, when the water in the first cavity 1100 reaches the predetermined water level or when the water in the inner container reaches the predetermined water level, the water inflow is stopped, and the dishwasher uses the water in the inner container to perform the second washing cycle. It can be seen that through the inner container connection port 1600 and the third outlet 1120, two ways for supplying water to the inner container are provided. When the water level in the first cavity 1100 reaches a certain level, the water flows from the inner container connection port 1600 into the inner container, ensuring that a certain amount of water is stored in the first cavity 1100 when the dishwasher is in a washing cycle. The third outlet 1120 is used to discharge the water in the first cavity 1100 into the inner container. Since the water in the first cavity 1100 absorbs the external heat, energy consumption of the washing cycle can be reduced.

[0062] After the dishwasher completes washing, the

first cavity 1100 and the second cavity 1200 contain softened water, which is reserved for use in the next operation of the dishwasher.

[0063] When the water softener 2000 needs to be regenerated, a flow channel between the water softening chamber 2100 and the regeneration chamber 2200 is controlled to be opened. The water in the second cavity 1200 flows into the regeneration chamber 2200 through the second outlet 1220. The formed brine enters the water softening chamber 2100, regenerates the water softening resin in the water softening chamber 2100, and is then discharged from the water softening chamber 2100.

[0064] The present disclosure further provides a dishwasher. The dishwasher includes the water tank 1000 in the above-described embodiments. The water tank 1000 may be mounted on the inner container and placed in close contact with the inner container. For example, the water tank 1000 may be mounted at a left side or a right side of the inner container. The water in the water tank 1000 can absorb the external heat. It should be understood that, in this embodiment, since the water tank 1000 of the dishwasher adopts all the technical solutions of the above-described embodiments, the water tank 1000 of the dishwasher has at least all the beneficial effects brought by the technical solutions of the above-described embodiments, which will not be described in detail here.

[0065] Although preferred embodiments of the present disclosure are described above, the scope of the present disclosure is not limited to the embodiments. Any equivalent structure transformation made within the concept of the present disclosure using the contents of the specification and the accompanying drawings of the present disclosure, or any direct or indirect application of the contents of the specification and the accompanying drawings of the present disclosure in other related fields, shall fall within the scope of the present disclosure.

Claims

1. A water tank, comprising:

a first cavity having an inner container connection port, wherein water above a predetermined water level in the first cavity is adapted to flow into an inner container of a dishwasher through the inner container connection port; and
a ventilation flow channel, wherein the first cavity is in communication with an outside through the ventilation flow channel, wherein:

the ventilation flow channel at least partially extends from one side to another side of the inner container connection port; and
the ventilation flow channel comprises a first air port in communication with the first cavity, the first air port being formed on the one

- side of the inner container connection port.
2. The water tank according to claim 1, wherein the ventilation flow channel comprises a first flow segment and a second flow segment that are in communication with each other, wherein:
 - the second flow segment extends from the one side to the other side of the inner container connection port;
 - the first flow segment is located on the one side of the inner container connection port, a U-shaped flow channel being formed by the first flow segment and a part of the second flow segment; and
 - the first air port is formed at the first flow segment and opens towards the other side of the inner container connection port.
 3. The water tank according to claim 1 or 2, wherein the ventilation flow channel comprises a second flow segment, wherein the second flow segment is at least partially inclined downward.
 4. The water tank according to claim 3, wherein the second flow segment is at least partially arched upward.
 5. The water tank according to claim 2, wherein the first flow segment is located below the second flow segment.
 6. The water tank according to any one of claims 1 to 5, wherein the ventilation flow channel extends along a periphery of the water tank.
 7. The water tank according to any one of claims 1 to 6, further comprising:
 - a condensation flow channel extending upward from the inner container connection port and having an overflow port, wherein the water above the predetermined water level in the first cavity flows through the overflow port and flows into the inner container of the dishwasher through the inner container connection port, and wherein the overflow port is in communication with the first air port;
 - a condensation rib disposed in the condensation flow channel;
 - a water inflow channel adapted to supply water to the first cavity and having a pressure relief port; and
 - a pressure relief flow channel in communication with each of the pressure relief port and the condensation flow channel, wherein a connection between the pressure relief flow channel and the condensation flow channel is located
 8. The water tank according to claim 7, wherein the pressure relief port is positioned higher than the overflow port and lower than the first air port.
 9. The water tank according to claim 7 or 8, wherein the overflow port is enclosed by a flow channel wall of the condensation flow channel and a flow channel wall of the ventilation flow channel.
 10. The water tank according to any one of claims 7 to 9, further comprising a water flow channel, wherein:
 - the water flow channel and the pressure relief flow channel are superimposed; and
 - water flowing into the overflow port at least partially passes through the water flow channel from bottom to top.
 11. The water tank according to claim 10, further comprising:
 - a first inlet in communication with the water inflow channel and adapted to be connected to an external water source;
 - a first outlet in communication with the water inflow channel and adapted to be connected to a soft water inlet of a water softener;
 - a second inlet in communication with the first cavity and adapted to be connected to a soft water outlet of the water softener; and
 - a third outlet in communication with the first cavity and adapted to be connected to the inner container of the dishwasher to discharge water from the first cavity.
 12. A dishwasher, comprising the water tank according to any one of claims 1 to 11.

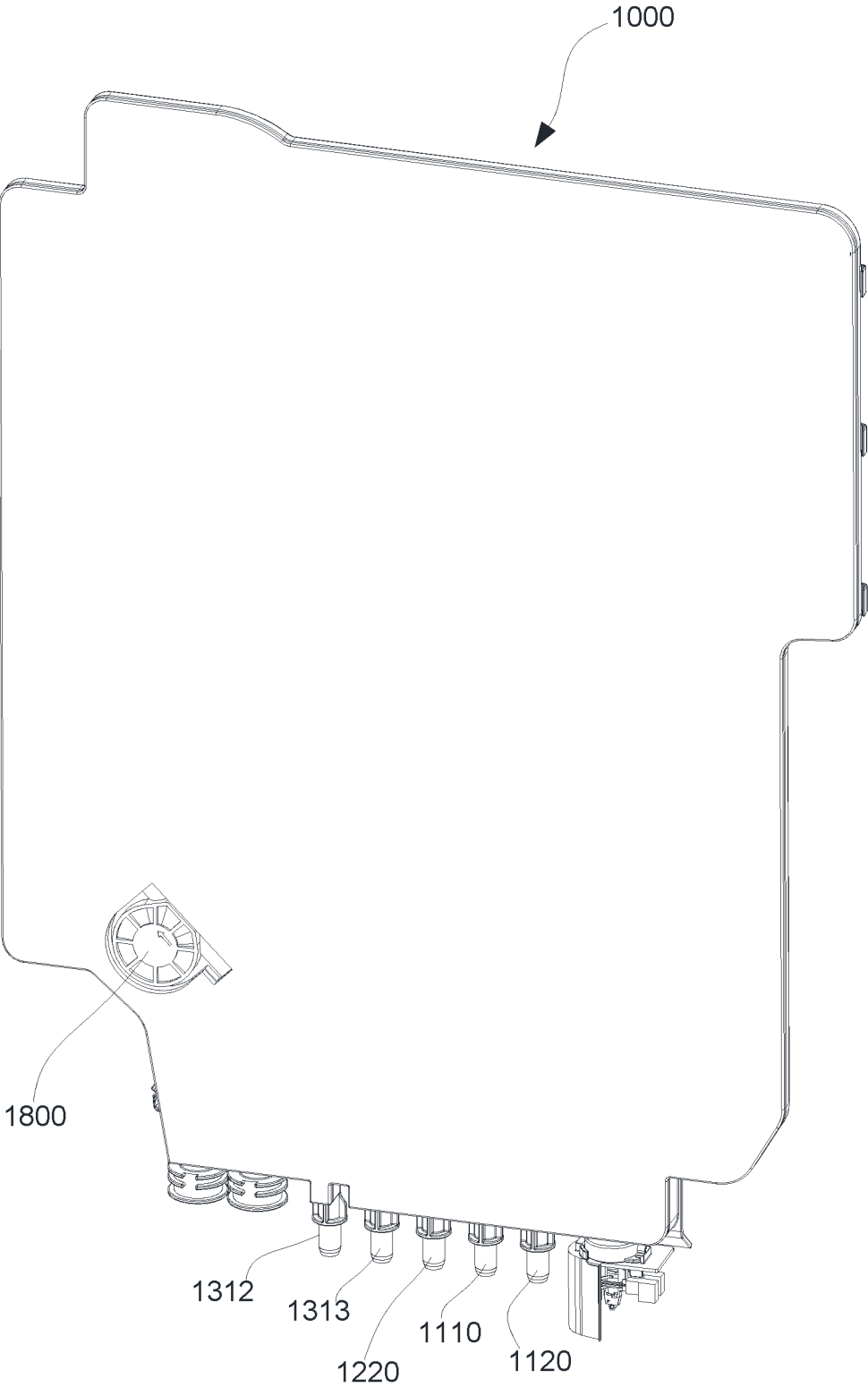


FIG. 1

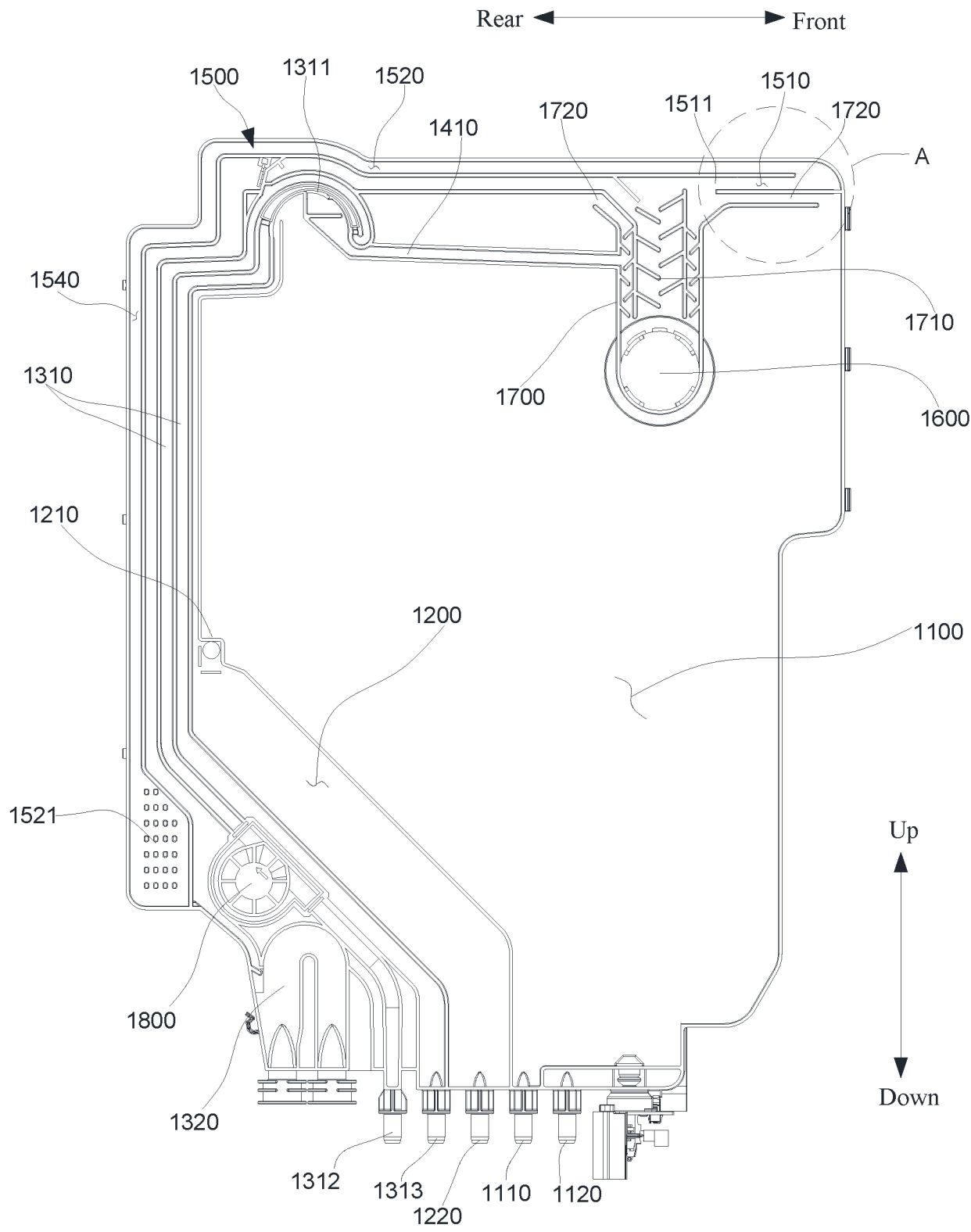


FIG. 2

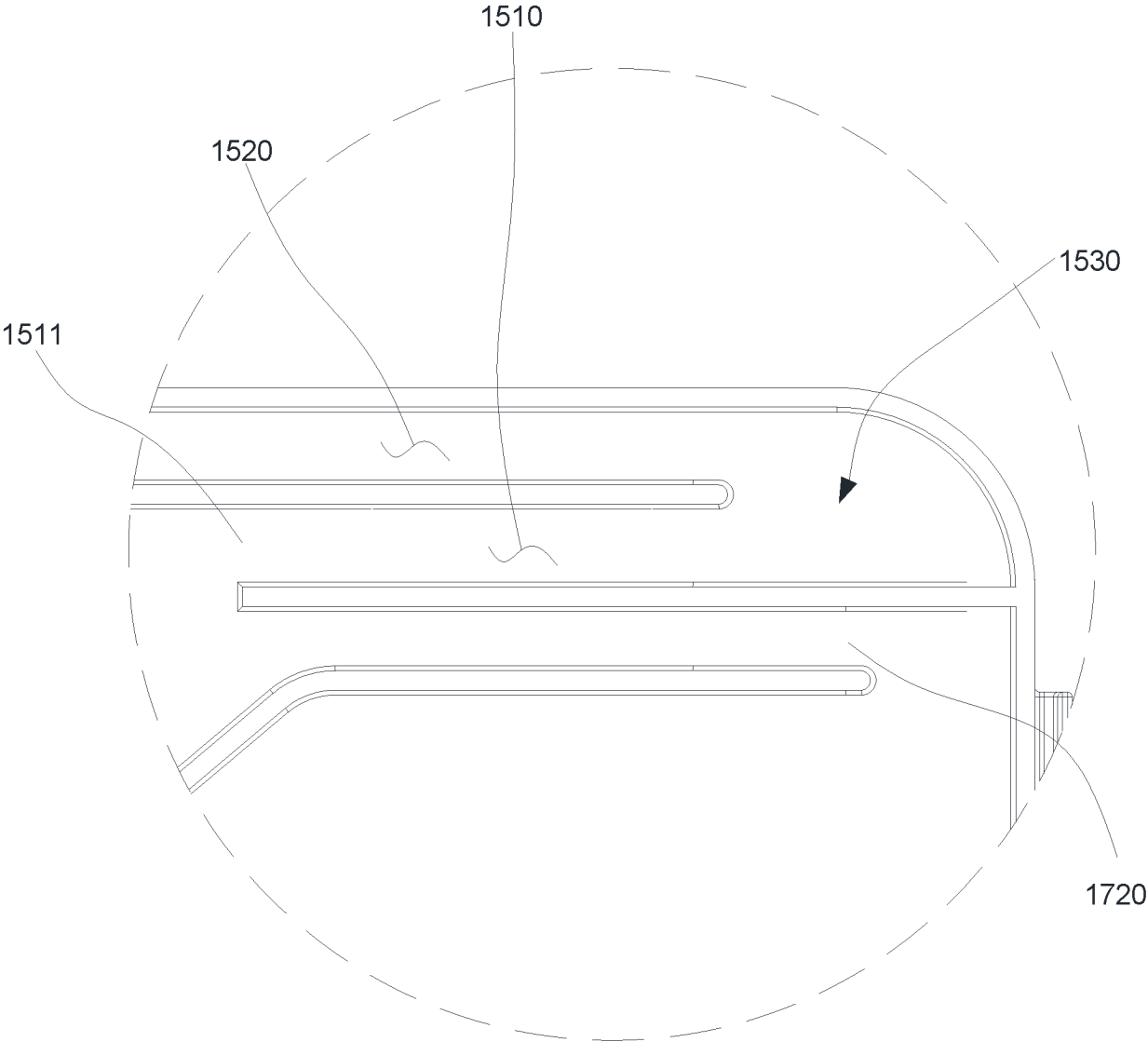


FIG. 3

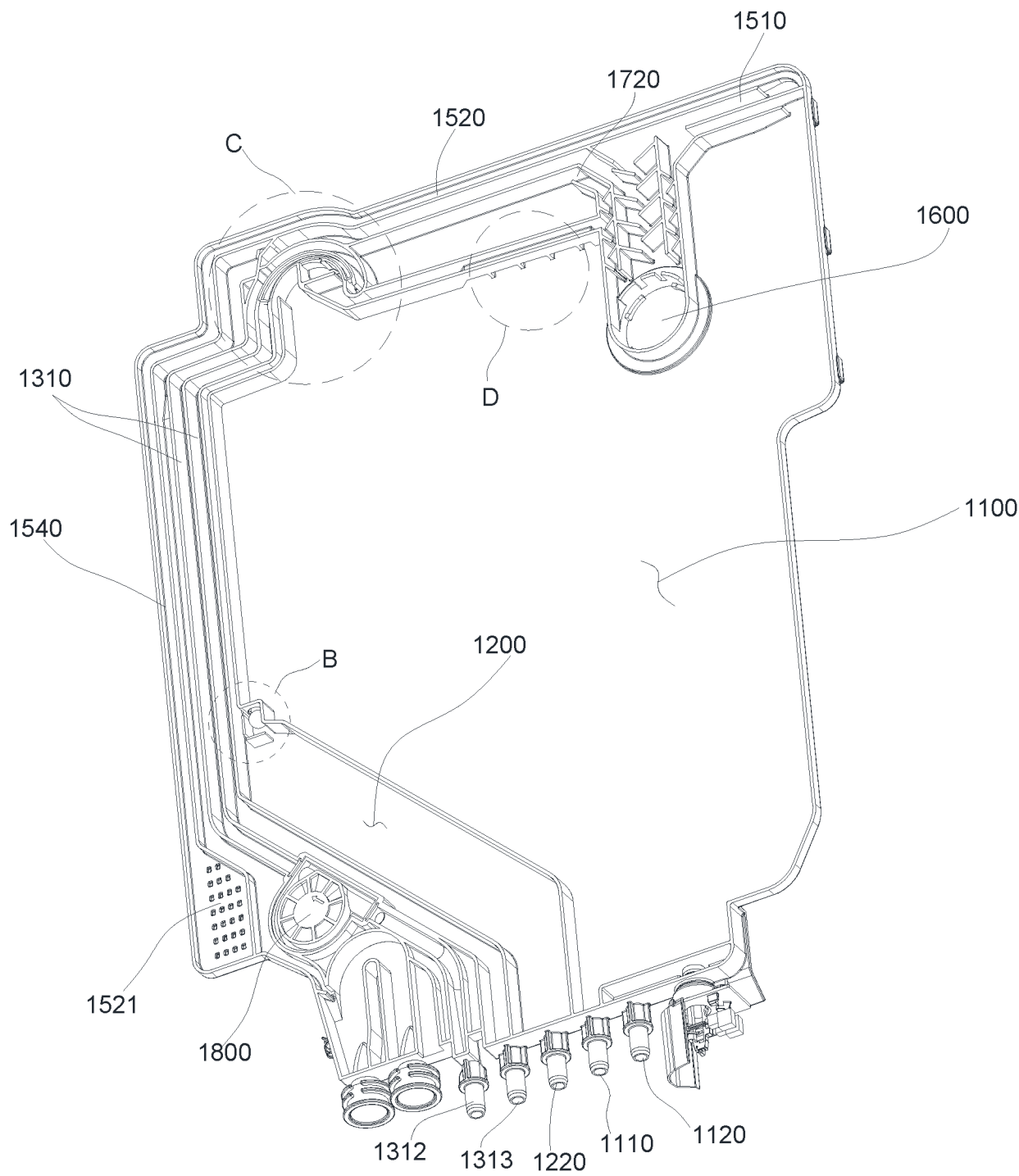


FIG. 4

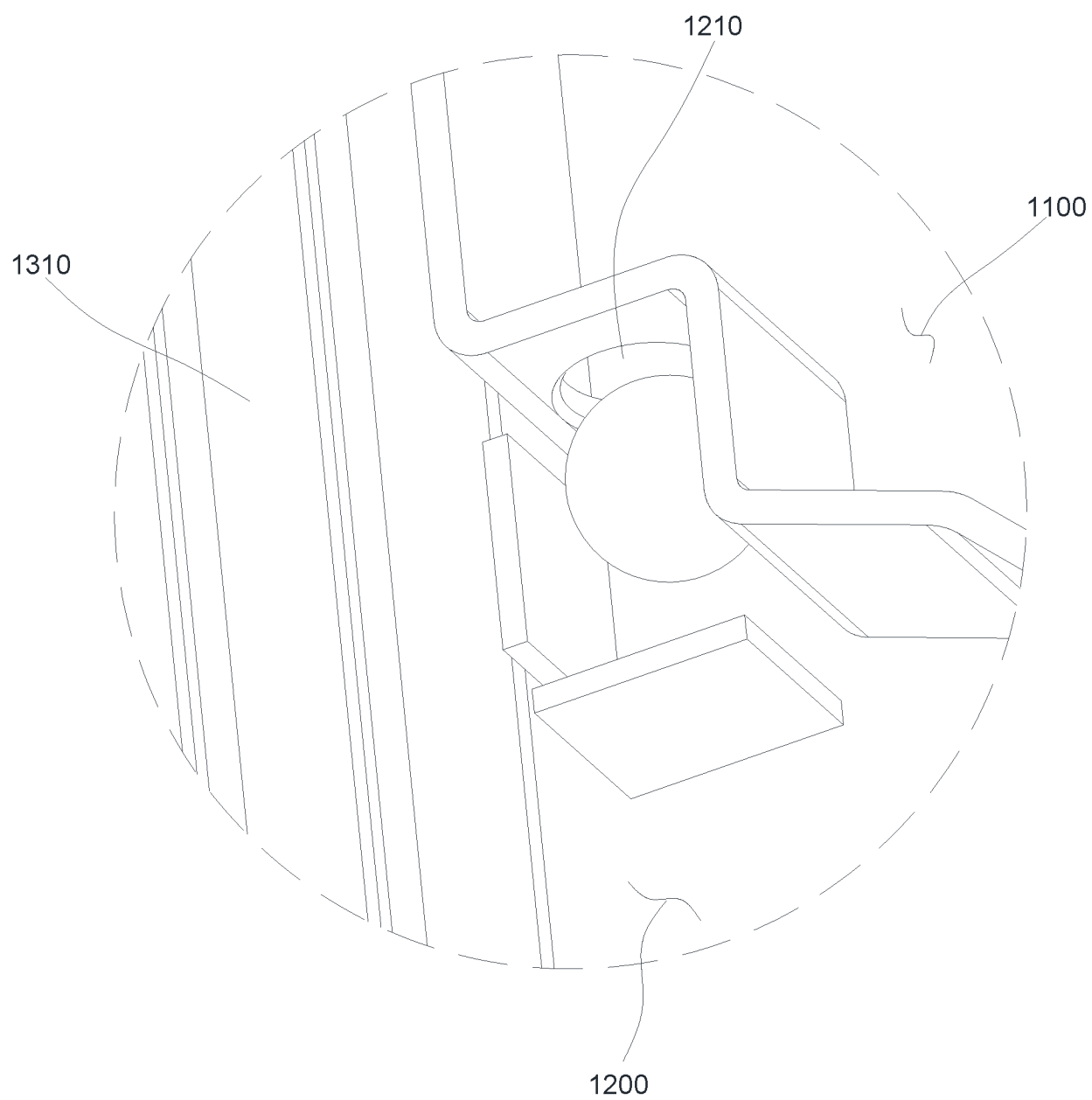


FIG. 5

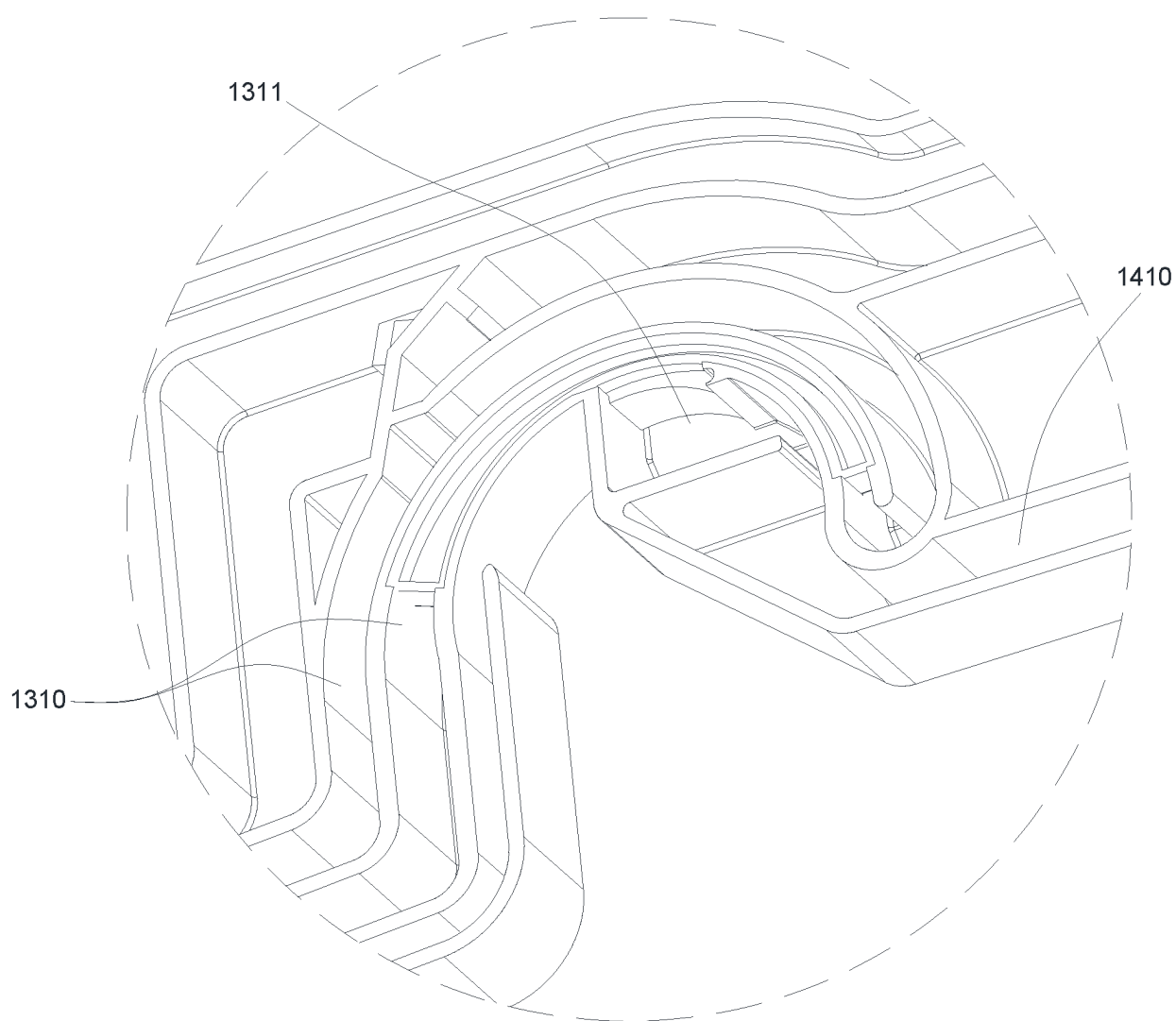


FIG. 6

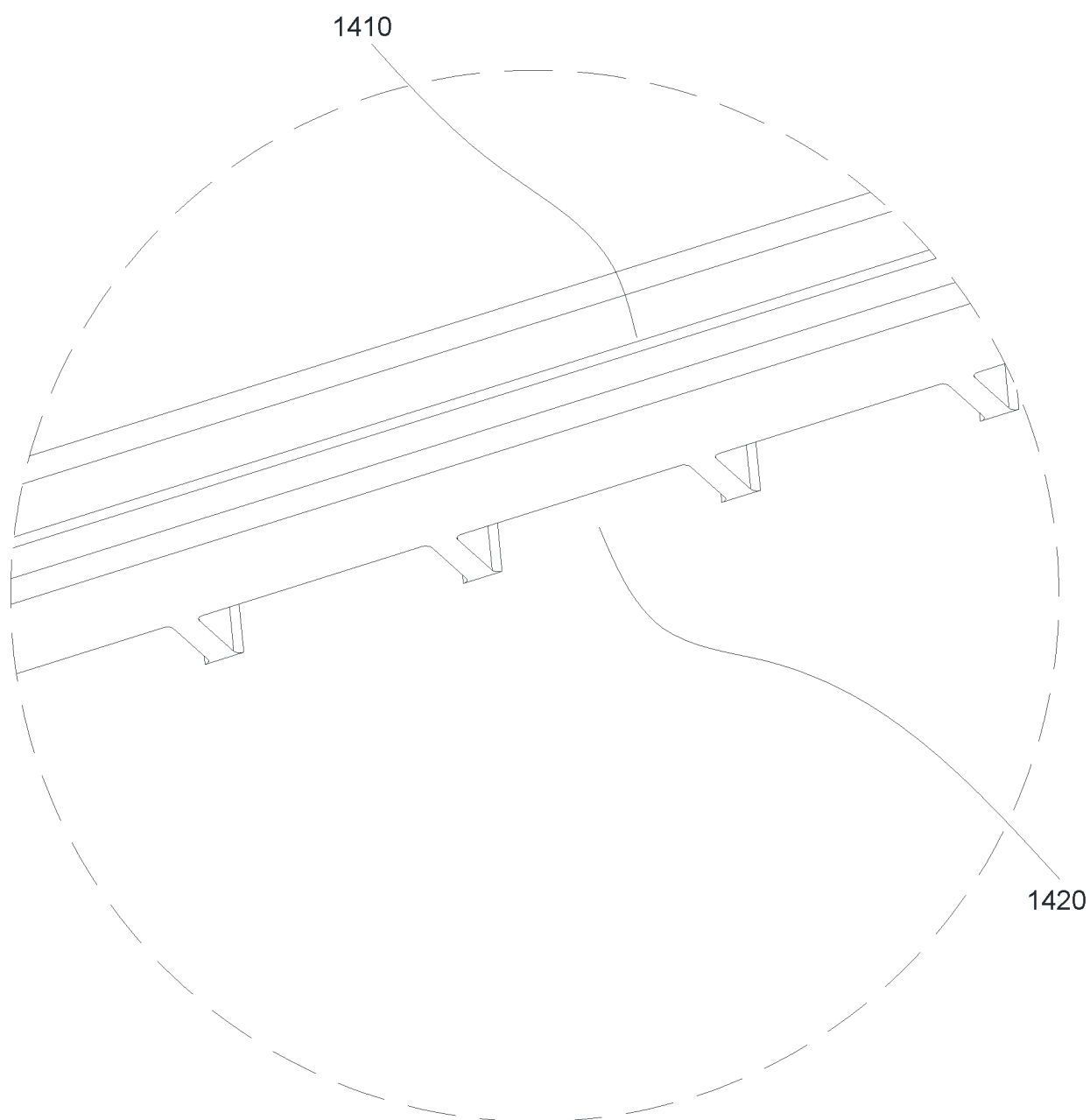


FIG. 7

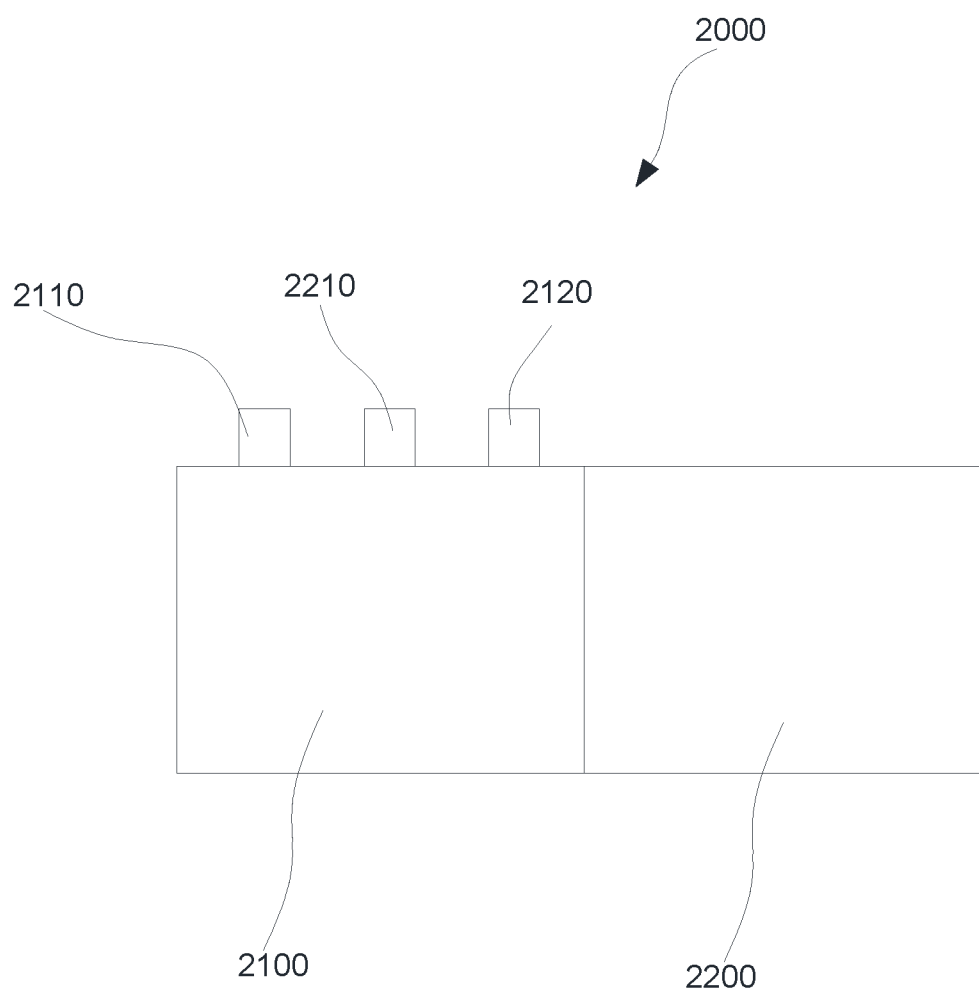


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2024/109306

A. CLASSIFICATION OF SUBJECT MATTER

A47L15/42(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)

IPC: A47L

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)

CNABS, CNTXT, WPABS, ENTXT, ENTXTC, VEN, 百度, BAIDU: 美的, 蔡延涛, 张耀华, 熊好平, 李翔, 洗碗, 水箱, 储水, 贮水, 呼吸, 压力, 气压, 通道, 流路, dishwash+, water, tank, stor+, pressure, breath+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 220800956 U (FOSHAN SHUNDE MIDEA WASHING APPLIANCES MFG CO., LTD.) 19 April 2024 (2024-04-19) claims 1-12	1-12
A	CN 213216788 U (GUANGDONG SAIPU APPLIANCES MANUFACTURING CO., LTD.) 18 May 2021 (2021-05-18) description, paragraphs [0038]-[0072], and figure 4	1-12
A	CN 209996251 U (FOSHAN VIOMI ELECTRIC APPLIANCE TECHNOLOGY CO., LTD. et al.) 31 January 2020 (2020-01-31) entire document	1-12
A	CN 205083412 U (FOSHAN SHUNDE MIDEA WASHING APPLIANCES MANUFACTURING CO., LTD. et al.) 16 March 2016 (2016-03-16) entire document	1-12
A	US 2023148829 A1 (SAMSUNG ELECTRONICS CO., LTD.) 18 May 2023 (2023-05-18) entire document	1-12

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 13 September 2024	Date of mailing of the international search report 28 September 2024
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088	Authorized officer Telephone No.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2024/109306

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	220800956	U	19 April 2024	None	
CN	213216788	U	18 May 2021	None	
CN	209996251	U	31 January 2020	None	
CN	205083412	U	16 March 2016	None	
US	2023148829	A1	18 May 2023	None	

REFERENCES CITED IN THE DESCRIPTION

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