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# (54) FLUSH TOILET

(57) Object:

To enhance an overflow performance.

Solution means:

A flush toilet according to an embodiment is a flush toilet that is washed with wash water to discharge waste and includes a water storage tank, a toilet main body, a wash water supply flow channel, and an overflow flow channel. The water storage tank stores wash water. The toilet main body includes a bowl that receive waste, a spout port that spouts wash water to an inside of the bowl, and a discharge trap including an inlet connected to a lower part of the bowl and forming a part of a discharge flow channel that discharges waste inside the bowl. The wash water supply flow channel extends from the water storage tank to the toilet main body. The overflow flow channel allows wash water to overflow when wash water inside the water storage tank exceeds a specified water level. The overflow flow channel includes an upstream end part extending to a position between the water storage tank and a water supply opening that supplies the water storage tank with wash water, and at least a part of wash water from the water supply opening directly flows into the upstream end part at a time of occurrence of overflow thereof.

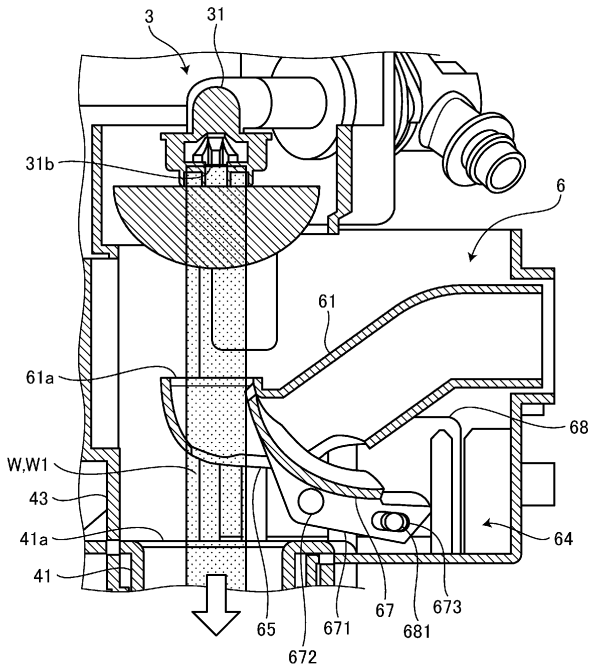


FIG. 4

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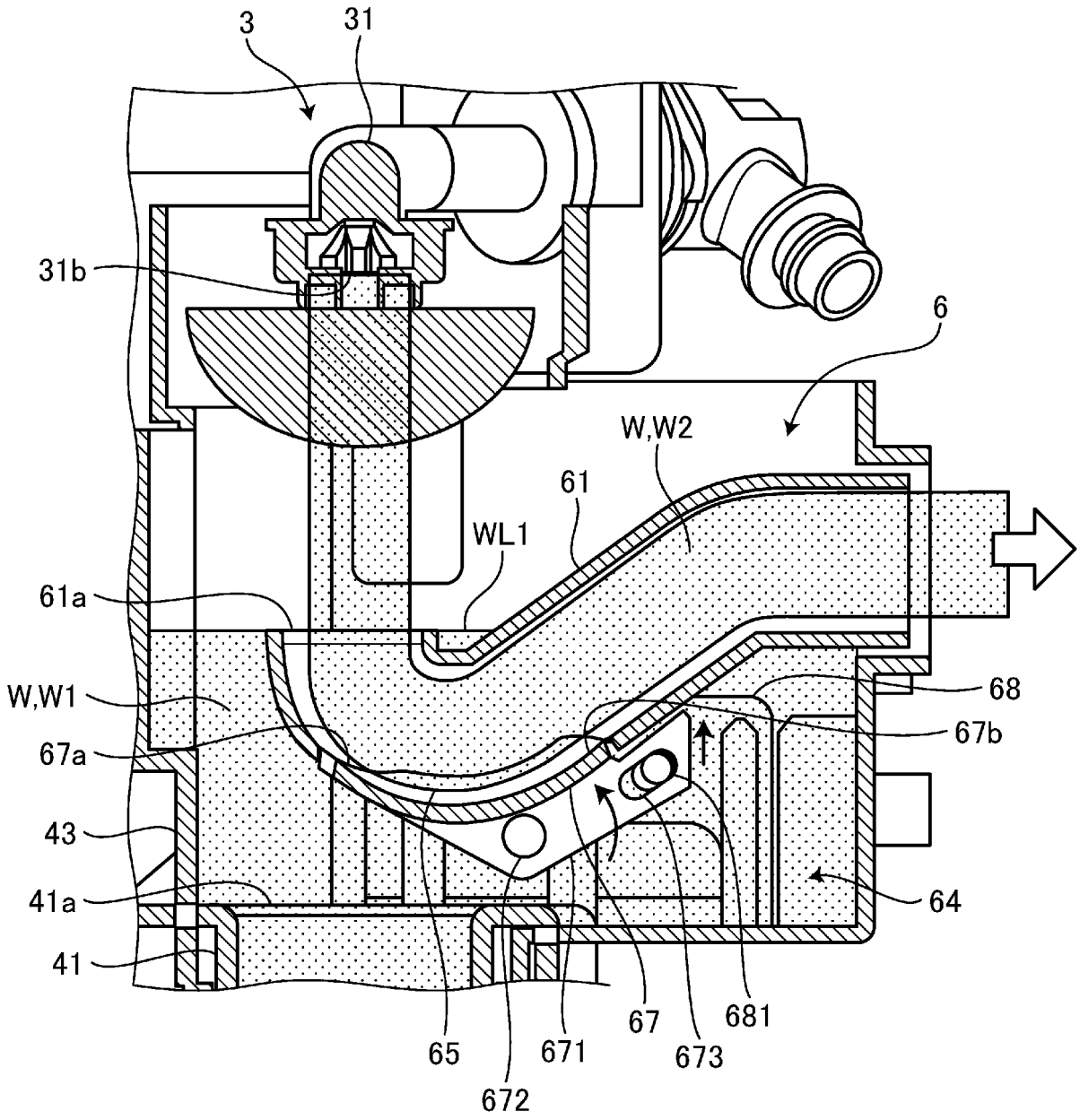
3
31
31b
6
W,W2
61
WL1
61a
W,W1
68
67b
67a
43
41a
64
41
65
672
671
67
673
681

FIG. 6

## Description

Technical Field

**[0001]** Embodiments of the disclosure relate to a flush toilet.

Background Art

**[0002]** A flush toilet has conventionally been known that is washed with wash water to discharge waste and includes a water storage tank that stores wash water, a wash water supply flow channel that extends from the water storage tank to a toilet main body, and an overflow flow channel that allows wash water to overflow when wash water inside the water storage tank exceeds a specified water level (e.g., see Patent Documents 1 and 2).

**[0003]** In a flush toilet described in Patent Document 1, wash water flows through a rim conduit and is discharged to the inside of a bowl of a toilet main body that receives waste to cause wash water inside a water storage tank to overflow.

**[0004]** In a flush toilet described in Patent Document 2, an overflow bypass flow channel extending from an upper part of a water storage tank is connected to a discharge flow channel at a downstream side of a place where a water seal is formed inside a discharge trap conduit, so as to cause wash water inside the water storage tank to overflow.

Citation List

Patent Literature

**[0005]**

Patent Document 1: JP 2017-48675 A
Patent Document 2: JP 2020-117927 A

Summary of Invention

Technical Problem

**[0006]** However, any conventional flush toilet as described above has room for further improvement in terms of enhancing overflow performance thereof.

**[0007]** In the flush toilet described in Patent Document 1, for example, if the water storage tank is set at a low position, odor or waste may flow back from a discharge flow channel. In the flush toilet described in Patent Document 2, a dedicated flow channel such as an overflow bypass flow channel extending to the discharge flow channel is included therein, so that weight increase of a ceramic body and degradation of a design thereof may be caused.

**[0008]** An object of an aspect of an embodiment is to provide a flush toilet that is capable of enhancing an overflow performance thereof.

Solution to Problem

**[0009]** A flush toilet according to an aspect of an embodiment is a flush toilet that is washed with wash water to discharge waste and includes a water storage tank that stores wash water, a toilet main body including a bowl that receives waste, a spout port that spouts wash water to an inside of the bowl, and a discharge trap including an inlet connected to a lower part of the bowl and forming a part of a discharge flow channel that discharges waste inside the bowl, a wash water supply flow channel extending from the water storage tank to the toilet main body, and an overflow flow channel that allows wash water to overflow when wash water inside the water storage tank exceeds a specified water level, wherein the overflow flow channel includes an upstream end part extending to a position between the water storage tank and a water supply opening that supplies the water storage tank with wash water, and at least a part of wash water from the water supply opening directly flows into the upstream end part at a time of occurrence of overflow thereof.

**[0010]** According to such a configuration, when wash water flows through the overflow flow channel at a time of occurrence of overflow thereof, it is possible to use force of wash water supplied from the water supply opening to the water storage tank, so that wash water reliably flows through the overflow flow channel. Thus, it is possible to enhance an overflow performance thereof. Specifically, kinetic energy of water supplied to the water storage tank is added to potential energy of overflowing wash water at a time of occurrence of normal overflow thereof, so that wash water flows through the overflow flow channel with a desired water force. Accordingly, wash water reliably flows through the overflow flow channel, so that it is possible to enhance an overflow performance thereof. According to such a configuration, it is possible to ensure an overflow performance thereof even if a position of the water storage tank is set to be low, so that it is possible to achieve a low profile while maintaining the overflow performance and hence it is possible to contribute to improvement of a design thereof. In this case, even if the water storage tank is set at a low position, it is possible to reduce or prevent occurrence of backflow of odor and waste from the discharge flow channel. No dedicated flow channel for drainage extending to the discharge flow channel is also needed, so that it is possible to reduce a weight thereof and it is also possible to improve a design thereof.

**[0011]** In the flush toilet described above, the upstream end part of the overflow flow channel overlaps with the water supply opening in a top view.

**[0012]** According to such a configuration, wash water from the water supply opening flows through the overflow flow channel. This makes it possible to use force of wash water supplied from the water supply opening to the water storage tank at a time of occurrence of overflow thereof, so that wash water reliably flows through the overflow flow channel.

**[0013]** In the flush toilet described above, the overflow flow channel includes a switching mechanism that forms the overflow flow channel at a time of occurrence of overflow thereof to receive wash water from the water supply opening at a higher position than when wash water flows normally.

**[0014]** According to such a configuration, a flow channel of wash water is switched between a time of occurrence of overflow thereof and a time when wash water flows normally and no overflow occurs so as to form an overflow flow channel at a time of occurrence of overflow thereof. Wash water from the water supply opening is supplied to the overflow flow channel at a time of occurrence of overflow thereof, so that the wash water from the water supply opening flows through the overflow flow channel. This makes it possible to use force of wash water supplied from the water supply opening to the water storage tank at a time of occurrence of overflow thereof, so that wash water reliably flows through the overflow flow channel.

**[0015]** In the flush toilet described above, the switching mechanism includes a float to form the overflow flow channel depending on a water level inside the water storage tank.

**[0016]** According to such a configuration, it is possible to form an overflow flow channel reliably at a time of occurrence of overflow thereof. It is possible to address overflow without using power, so that it is possible to address overflow even at a time of a power failure.

**[0017]** In the flush toilet described above, the switching mechanism is configured to rotate depending on a water level inside the water storage tank.

**[0018]** According to such a configuration, it is possible to provide a compact and simple configuration as compared to a mechanism that linearly moves depending on a water level inside the water storage tank, for example. Also, the switching mechanism has a compact and simple configuration so as to reduce malfunctions thereof, so that it is possible to form an overflow flow channel reliably at a time of occurrence of overflow thereof.

**[0019]** In the flush toilet described above, the switching mechanism includes a movable part that is rotatable depending on a water level inside the water storage tank, and at a time of occurrence of overflow thereof, an upstream end side of the movable part is positioned inside the overflow flow channel, and a downstream end side of the movable part is positioned outside the overflow flow channel.

**[0020]** According to such a configuration, it is possible to stop a rotational operation of the switching mechanism reliably at a specified position at a time of occurrence of overflow thereof. An overflow flow channel is formed by stopping a rotational operation of the switching mechanism at a specified position, so that it is possible to form an overflow flow channel reliably at a time of occurrence of overflow thereof.

## Advantageous Effects of Invention

**[0021]** It is possible for a flush toilet according to an aspect of an embodiment to enhance an overflow performance thereof.

## Brief Description of Drawings

**[0022]**

FIG. 1 is a schematic side view illustrating an overall configuration of a flush toilet according to an embodiment.

FIG. 2 is a schematic plan view illustrating an overall configuration of the flush toilet according to the embodiment.

FIG. 3 is a schematic perspective view illustrating a water storage tank and a wash water supply flow channel.

FIG. 4 is a schematic cross-sectional view (part 1) illustrating a water supply opening, the water storage tank, and an overflow flow channel.

FIG. 5 is a schematic perspective view illustrating the water storage tank and the overflow flow channel.

FIG. 6 is a schematic cross-sectional view (part 2) illustrating the water supply opening, the water storage tank, and the overflow flow channel.

## Description of Embodiments

**[0023]** Embodiments of a flush toilet as disclosed in the present application will be described below in detail with reference to the accompanying drawings. This invention is not limited to the embodiments described below.

## Overall Configuration of Flush Toilet

**[0024]** An overall configuration of a flush toilet 1 according to an embodiment will be described with reference to FIGS. 1 to 3. FIG. 1 is a schematic side view illustrating an overall configuration of the flush toilet 1 according to the embodiment. FIG. 2 is a schematic plan view illustrating an overall configuration of the flush toilet 1 according to the embodiment. FIG. 3 is a schematic perspective view illustrating a water storage tank 41 and a wash water supply flow channel 5.

**[0025]** FIGS. 1 to 3 may illustrate a three-dimensional Cartesian coordinate system that includes a Z-axis with a positive direction that is a vertically upward direction (an upper side). Hereinafter, for the purpose of illustration, a positive direction of an X-axis may be defined as a left side, a negative direction of the X-axis may be defined as a right side, a positive direction of a Y-axis may be defined as a front side, and a negative direction of the Y-axis may be defined as a back side, X-axis directions may be referred to as left-right directions, Y-axis directions may be referred to as front-back directions, and Z-

axis directions may be referred to as up-down directions.

**[0026]** As illustrated in FIGS. 1 and 2, the flush toilet 1 includes a toilet main body 2, a water supply part 3, a tank 4, the wash water supply flow channel 5, and an overflow flow channel 6. The flush toilet 1 is a so-called wall-mounted flush toilet in which the toilet main body 2 described later is fixed to a wall surface WS (or a front wall surface of a cabinet or the like) of a toilet room.

**[0027]** The toilet main body 2 is made of ceramic. The toilet main body 2 is not limited to being made of ceramic and may be made of resin or a combination of ceramic and resin, for example. The toilet main body 2 includes a bowl 21, a rim 22, a spout port 23, a discharge trap 24, and a skirt 27. The bowl 21 is formed in a recessed shape. The bowl 21 includes a bowl surface 21a that receives waste. The rim 22 is provided at an upper part of the bowl 21. The rim 22 is provided at an upper edge part of the bowl surface 21a.

**[0028]** The spout port 23 is formed inside the bowl 21 and discharges wash water from the tank 4 to the bowl surface 21a inside the bowl 21.

**[0029]** The discharge trap 24 forms a part of a discharge flow channel that discharges waste inside the bowl 21. One end side of the discharge trap 24 is connected to a lower part of the bowl 21, and the other end side thereof is connected to a discharge pipe 25. The one end side of the discharge trap 24 is an inlet 24a of the discharge trap 24 and also serves as an inlet of the discharge flow channel.

**[0030]** The discharge trap 24 includes a bent pipe 24b and a descending pipe 24c from an upstream side to a downstream side thereof. In the bent pipe 24b, an inlet on the upstream side (inlet 24a of the discharge trap 24) is connected to a lower part of the bowl 21. A discharge flow channel is formed that extends backward and downward from the inlet 24a to a lowest end part and then ascends to a back and upper top part 24e.

**[0031]** The descending pipe 24c forms a discharge flow channel that descends backward and downward from the top part 24e of the bent pipe 24b and is then connected to a discharge socket 26. A water seal (water seal surface WL0) is formed in a region on an upstream side (front side) of the top part 24e in the bent pipe 24b. The discharge pipe 25 connected to the other end side of the discharge trap 24 extends from a lower side of a floor surface FS to an upper side thereof and then bends toward a toilet main body 2 side (front side), and an inlet positioned at an upstream end of the discharge pipe 25 is connected to an exit 24f at a downstream end of the discharge trap 24 via the discharge socket 26.

**[0032]** The skirt 27 is provided so as to surround the bowl 21 and the discharge trap 24 from the outside. The skirt 27 is not limited to being a ceramic member provided integrally with the toilet main body 2 and may be, for example, a panel member made of resin or the like, provided separately from the toilet main body 2, and detachably attached to the toilet main body 2so as to cover the toilet main body 2 from the outside.

**[0033]** The water supply part 3 includes a water supply pipe 31. The water supply pipe 31 supplies wash water to the tank 4 described later. An upstream end side of the water supply pipe 31 is connected to a water supply source 32 such as a water supply. The water supply pipe 31 includes a stop cock 33 and a valve unit 34 in order from the water supply source 32 to a downstream side thereof.

**[0034]** The valve unit 34 includes a fixed flow valve (not illustrated), a diaphragm valve (not illustrated) that is an on-off valve provided on a downstream side of the fixed flow valve, and a solenoid valve (not illustrated) that opens and closes the diaphragm valve.

**[0035]** A water supply nozzle 31a is provided at a downstream end of the water supply pipe 31. The water supply nozzle 31a includes a water supply opening 31b that supplies wash water to the water storage tank 41 (see FIG. 3) described later. For example, when the diaphragm valve is opened by an operation of the solenoid valve of the valve unit 34, wash water supplied from the water supply source 32 to the water supply pipe 31 by a water supply pressure of a water supply or the like passes through the stop cock 33 and the fixed flow valve of the valve unit 34 where a flow rate thereof is adjusted to be constant, and then passes through the diaphragm valve. For example, wash water having passed through the valve unit 34 falls from the water supply opening 31b of the water supply nozzle 31a so as to be supplied from a supply opening 41a of the water storage tank 41 to an inside of the water storage tank 41.

**[0036]** As illustrated in FIG. 3, the tank 4 includes the water storage tank 41 and a pressurizing pump 42. The water storage tank 41 stores wash water supplied from the water supply opening 31b. The water storage tank 41 is incorporated into a lower part of the toilet main body 2. Wash water supplied from the water supply opening 31b is supplied to the inside of the water storage tank 41 (see FIG. 3), as described above. The water storage tank 41 includes the supply opening 41a that is an inlet for wash water from the water supply opening 31b at the upper surface of the water storage tank 41.

**[0037]** The pressurizing pump 42 pressurizes wash water from the water storage tank 41 so as to supply the wash water to the bowl 21 of the toilet main body 2. The pressurizing pump 42 is incorporated into the inside of the toilet main body 2. When the pressurizing pump 42 operates, wash water supplied to the inside of the water storage tank 41 flows through the wash water supply flow channel 5 described later, is supplied to the toilet main body 2, and further, flows through a main water conduit (not illustrated) provided in the toilet main body 2 and is supplied from the spout port 23 (also referred to as a rim spout port) to the inside of the bowl 21 (bowl surface 21a).

**[0038]** The flush toilet 1 also includes a controller (not illustrated) that controls an operation of the pressurizing pump. The controller may be provided at any position of the toilet main body 2. The water supply part 3 includes a float switch (not illustrated) that detects a water level

inside the tank. An open/close operation of the solenoid valve of the valve unit 34 is controlled by the controller on the basis of a water level inside a coupling unit 43 that is detected by the float switch. The coupling unit 43 is provided above the water storage tank 41. The coupling unit 43 forms a substantially closed space including the water supply opening 31b and the supply opening 41a of the water storage tank 41.

**[0039]** An operation of the pressurizing pump 42 is also controlled by the controller on the basis of a water level inside the tank that is detected by the float switch. For example, when a water level inside the coupling unit 43 that is detected by the float switch is equal to or less than a predetermined level, the solenoid valve of the valve unit 34 is opened and the diaphragm valve is opened. Accordingly, the water supply opening 31b of the water supply nozzle 31a is opened, and supply of wash water from the water supply opening 31b to the water storage tank 41 is started.

**[0040]** Simultaneously therewith, the pressurizing pump 42 is operated, so that wash water inside the water storage tank 41 is pumped from the pressurizing pump 42 to the main water conduit of the toilet main body 2, then flows through the rim conduit, and is supplied to the spout port 23. As a result, toilet flushing is executed by water spouting from the spout port 23 (rim water spouting), that is, toilet flushing based on a so-called "100% rim water spouting toilet flushing" is executed. When a water level inside the water storage tank 41 reaches a predetermined water level, the solenoid valve of the valve unit 34 is closed and the diaphragm valve is closed. Accordingly, the water supply opening 31b is blocked and the pressurizing pump 42 is stopped.

**[0041]** The wash water supply flow channel 5 is a flow channel extending from the water storage tank 41 to the toilet main body 2. The wash water supply flow channel 5 is a flow channel through which wash water pressurized by the pressurizing pump 42 flows toward the toilet main body 2. A downstream end side of the wash water supply flow channel 5 is connected to the spout port 23 via the rim conduit. The wash water supply flow channel 5 includes a spout end 51 on the downstream end side of the wash water supply flow channel 5. The wash water supply flow channel 5 may include the rim conduit (not illustrated) of the toilet main body 2.

**[0042]** The overflow flow channel 6 is a flow channel that allows, when wash water supplied to the water storage tank 41 exceeds a specified water level WL1 (see FIG. 6), such wash water to overflow. The overflow flow channel 6 includes an upstream end part 61 described later that extends to a position between the water storage tank 41 and the water supply opening 31b. In the overflow flow channel 6, at least a part of wash water from the water supply opening 3 1b directly flows into the upstream end part 61 of such an overflow flow channel 6 at a time of occurrence of overflow thereof.

Configuration of Overflow Flow Channel

**[0043]** Next, the configuration of the overflow flow channel 6 will be described with reference to FIGS. 4 to 6. FIG. 4 is a schematic cross-sectional side view illustrating the water supply opening 31b, the water storage tank 41, and the overflow flow channel 6, and is a view illustrating a normal state of the overflow flow channel 6. FIG. 5 is a schematic perspective view illustrating the water storage tank 41 and the overflow flow channel 6. FIG. 6 is a schematic cross-sectional side view illustrating the water supply opening 31b, the water storage tank 41, and the overflow flow channel 6, and is a view illustrating a state of the overflow flow channel 6 at a time of occurrence of overflow thereof. FIGS. 4 and 6 are also schematic cross-sectional views taken along line IV-IV in FIG. 2.

**[0044]** As illustrated in FIG. 4, the overflow flow channel 6 includes the upstream end part 61, a downstream end part 62 (see FIG. 3), an intermediate part 63 (see FIG. 3), and a switching mechanism 64. As described above, the upstream end part 61 is a site of the overflow flow channel 6 that is positioned inside the coupling unit 43 and extends to a position between the water storage tank 41 and the water supply opening 31b in a side view. The upstream end part 61 includes a receiving opening 61a that receives wash water W (W1, W2) from the water supply opening 31b of the water supply pipe 31. The receiving opening 61a is the most upstream end of the upstream end part 61 and is opened toward an upper side thereof.

**[0045]** The receiving opening 61a of the upstream end part 61 partially or entirely overlaps with the water supply opening 31b in a top view. The upstream end part 61 of the overflow flow channel 6 is not limited to arrangement of overlapping with the water supply opening 3 1b in a top view, and the upstream end part 61 does not have to overlap with the water supply opening 3 1b in a top view, for example, when the water supply opening 3 1b is provided in a side surface of the coupling unit 43 and the wash water W1 supplied from the water supply opening 31b is discharged laterally from the water supply opening 31b. In this case, a positional relationship is provided where the upstream end part 61 is positioned between the water storage tank 41 and the water supply opening 3 1b at least in up-down directions in a side view.

**[0046]** The downstream end part 62 is connected to the wash water supply flow channel 5. The intermediate part 63 is a flow channel between the upstream end part 61 and the downstream end part 62 in the overflow flow channel 6.

**[0047]** The switching mechanism 64 is provided at the upstream end part 61. As illustrated in FIGS. 4 and 5, the switching mechanism 64 includes a water passage hole 65, a stay 66, a movable part 67, and a float 68. The water passage hole 65 is a hole formed in a lower part of the upstream end part 61. The water passage hole 65 has a predetermined length in a flow direction of the wash

water W2 (see FIG. 6) in the overflow flow channel 6. The water passage hole 65 has a predetermined length that also allows the wash water W1 from the water supply opening 3 1b to pass therethrough in a direction orthogonal to a flow direction of the wash water W2.

**[0048]** The stay 66 is provided so as to extend downward from the upstream end part 61. The stay 66 rotatably supports the movable part 67. The movable part 67 is formed in a shape corresponding to the water passage hole 65. The movable part 67 has a shape that blocks the water passage hole 65 when the movable part 67 rotates upward about a rotary shaft described later as a fulcrum. The movable part 67 includes an interlocking piece 671 on a surface outside the overflow flow channel 6. The interlocking piece 671 is provided integrally with a surface outside the movable part 67.

**[0049]** The interlocking piece 671 includes a rotary shaft 672 on a one-end side that is a receiving opening 61a side (upstream side) of the upstream end part 61. The interlocking piece 671 is provided in a rotatable manner about the rotary shaft 672 as a fulcrum. Accordingly, the movable part 67 is rotatable about the rotary shaft 672 as a fulcrum.

**[0050]** The interlocking piece 671 includes a long hole 673 elongated in longitudinal directions of the interlocking piece 371 on a other-end side of the interlocking piece 671 that is an opposite side (downstream side) of the receiving opening 61a of the upstream end part 61. A pin 681 extending from the float 68 described later is inserted into the long hole 673.

**[0051]** The float 68 is provided in a linearly movable manner in up-down directions. When the water level WL1 (see FIG. 6) inside the coupling unit 43 rises at a time of occurrence of overflow thereof when the wash water W1 from the water storage tank 41 is not supplied to a toilet main body 2 side, the float 68 rises due to buoyancy depending on the water level WL1. The float 68 includes the pin 681 projecting in a horizontal direction from a side surface of the float 68. The pin 681 is inserted into the long hole 673 of the interlocking piece 671.

**[0052]** As illustrated in FIG. 6, when the float 68 rises, the rise of the float 68 causes the interlocking piece 671 to rotate upward, and when the interlocking piece 671 rotates upward, the movable part 67 rotates upward. Thus, the movable part 67 blocks the water passage hole 65, so as to form the overflow flow channel 6. When the overflow flow channel 6 is formed, the wash water W1 (see FIG. 4) from the water supply opening 31b flows through the overflow flow channel 6, is supplied to the spout port 23 (see FIG. 1), and is discharged from the spout port 23 to the inside of the bowl 21 (see FIG. 1).

**[0053]** When the overflow flow channel 6 is formed, the wash water W1 inside the coupling unit 43 is also supplied from the receiving opening 61a of the upstream end part 61 to the overflow flow channel 6.

**[0054]** As illustrated in FIG. 4, when the raised float 68 descends, the descent of the float 68 causes the interlocking piece 671 to rotate downward, and when the interlocking piece 671 rotates downward, the movable part 67 rotates downward. Thus, the movable part 67 opens the water passage hole 65.

**[0055]** Thus, a shape of the switching mechanism 64 changes, that is, a posture of the movable part 67 changes, so as to form the overflow flow channel 6 at a time of occurrence of overflow thereof such that the wash water W1 from the water supply opening 31b is received at a higher position than when wash water flows normally and no overflow occurs. In this case, a posture of the movable part 67 is changed by the float 68 that moves up and down depending on the water level WL1 inside the water storage tank 41, so as to form the overflow flow channel 6.

**[0056]** At a time of occurrence of overflow thereof, a posture of the switching mechanism 64 is maintained, while the overflow flow channel 6 has been formed, by a water force (water pressure) of the wash water W2 supplied from the water supply opening 31b.

**[0057]** For the movable part 67, it is more preferable that an upstream end 67a side of the movable part 67 is positioned inside the overflow flow channel 6 and a downstream end 67b side of the movable part 67 is positioned outside the overflow flow channel 6 in a state where the water passage hole 65 is blocked at a time of occurrence of overflow thereof. For example, packing made of resin may be provided on the upstream end 67a side and the downstream end 67b side of the movable part 67. Accordingly, it is possible to reduce or prevent water leakage from a connection part between the water passage hole 65 and the movable part 67 more reliably.

**[0058]** With the flush toilet 1 according to the embodiment described above, when the wash water W flows through the overflow flow channel 6 at a time of occurrence of overflow thereof, it is possible to use force of the wash water W supplied from the water supply opening 3 1b to the water storage tank 41, so that the wash water W reliably flows through the overflow flow channel 6. Thus, it is possible to enhance an overflow performance thereof. Specifically, kinetic energy of water supplied to the water storage tank 41 is added to potential energy of overflowing wash water W at a time of occurrence of normal overflow thereof, so that the wash water W flows through the overflow flow channel 6 with a predetermined water force. Accordingly, the wash water W reliably flows through the overflow flow channel 6, so that it is possible to enhance an overflow performance thereof. It is possible to ensure an overflow performance thereof even if a position of the water storage tank 41 is set to be low, so that it is possible to achieve a low profile while maintaining the overflow performance and hence it is possible to contribute to improvement of a design thereof. In this case, even if the water storage tank 41 is set at a low position, it is possible to reduce or prevent occurrence of backflow of odor and waste from the discharge flow channel. No dedicated flow channel for drainage extending to the discharge flow channel is also needed, so that it is possible to reduce a weight thereof and it is also possible to improve a design thereof.

**[0059]** The upstream end part 61 of the overflow flow channel 6 overlaps with the water supply opening 3 1b in a top view, so that the wash water W from the water supply opening 3 1b flows through the overflow flow channel 6. This makes it possible to use a force of the wash water W supplied from the water supply opening 3 1b to the water storage tank 41 at a time of occurrence of overflow thereof, so that the wash water W reliably flows through the overflow flow channel 6.

**[0060]** The switching mechanism 64 that forms the overflow flow channel 6 at a time of occurrence of overflow thereof is included, so that a flow channel of the wash water W is switched between a time of occurrence of overflow thereof and a time when wash water flows normally so as to form the overflow flow channel 6 at a time of occurrence of overflow thereof. The wash water W from the water supply opening 31b is supplied to the overflow flow channel 6 at a time of occurrence of overflow thereof, so that the wash water W from the water supply opening 31b flows through the overflow flow channel 6. This makes it possible to use a force of the wash water W supplied from the water supply opening 31b to the water storage tank 41 at a time of occurrence of overflow thereof, so that the wash water W reliably flows through the overflow flow channel 6.

**[0061]** The switching mechanism 64 includes the float 68 to form the overflow flow channel, so that it is possible to form the overflow flow channel 6 reliably at a time of occurrence of overflow thereof. It is possible to address overflow without using power, so that it is possible to address overflow even at a time of a power failure.

**[0062]** The switching mechanism 64 is configured to rotate, so that it is possible to provide a compact and simple configuration as compared to a mechanism that linearly moves depending on the water level WL1 inside the water storage tank 41, for example. The switching mechanism 64 has a compact and simple configuration so as to reduce malfunctions thereof, so that it is possible to form the overflow flow channel 6 reliably at a time of occurrence of overflow thereof.

**[0063]** At a time of occurrence of overflow thereof, a upstream end 67a side of the movable part 67 of the switching mechanism 64 is positioned inside the overflow flow channel 6 and a downstream end 67b side thereof is positioned outside the overflow flow channel 6, so that it is possible to stop a rotational operation of the switching mechanism 64 reliably at a specified position at a time of occurrence of overflow thereof. The overflow flow channel 6 is formed by stopping a rotational operation of the switching mechanism 64 at a specified position, so that it is possible to form the overflow flow channel 6 reliably at a time of occurrence of overflow thereof.

**[0064]** Further effects and modifications can be easily derived by a person having skill in the art. Hence, broader aspects of the present invention are not limited to the specific details and representative embodiments illustrated and described above. Therefore, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

Reference Signs List

**[0065]**

1 Flush toilet
2 Toilet main body
5 Wash water supply flow channel
6 Overflow flow channel
21 Bowl
22 Rim
23 Spout port
24 Discharge trap
24a Inlet
31b Water supply opening
41 Water storage tank
51 Spout end
61 Upstream end part
62 Downstream end part
64 Switching mechanism
67a Upstream end
67b Downstream end
68 Float
W Wash water
WL1 Water level

## Claims

1. A flush toilet that is washed with wash water to discharge waste, comprising:

a water storage tank that stores wash water;
a toilet main body including
a bowl that receives waste,
a spout port that spouts wash water to an inside of the bowl, and
a discharge trap including an inlet connected to a lower part of the bowl and forming a part of a discharge flow channel that discharges waste inside the bowl;
a wash water supply flow channel extending from the water storage tank to the toilet main body; and
an overflow flow channel that allows wash water to overflow when wash water inside the water storage tank exceeds a specified water level, wherein
the overflow flow channel includes an upstream end part extending to a position between the water storage tank and a water supply opening that supplies the water storage tank with wash water, and
at least a part of wash water from the water supply opening directly flows into the upstream end part at a time of occurrence of overflow thereof.

2. The flush toilet according to claim 1, wherein the upstream end part of the overflow flow channel overlaps with the water supply opening in a top view.

3. The flush toilet according to claim 2, wherein the overflow flow channel includes a switching mechanism that forms the overflow flow channel at a time of occurrence of overflow thereof to receive wash water from the water supply opening at a higher position than when wash water flows normally.

4. The flush toilet according to claim 3, wherein the switching mechanism includes a float to form the overflow flow channel depending on a water level inside the water storage tank.

5. The flush toilet according to claim 4, wherein the switching mechanism is configured to rotate depending on a water level inside the water storage tank.

6. The flush toilet according to claim 5, wherein

the switching mechanism includes a movable part that is rotatable depending on a water level inside the water storage tank, and
at a time of occurrence of overflow thereof, an upstream end side of the movable part is positioned inside the overflow flow channel, and a downstream end side of the movable part is positioned outside the overflow flow channel.

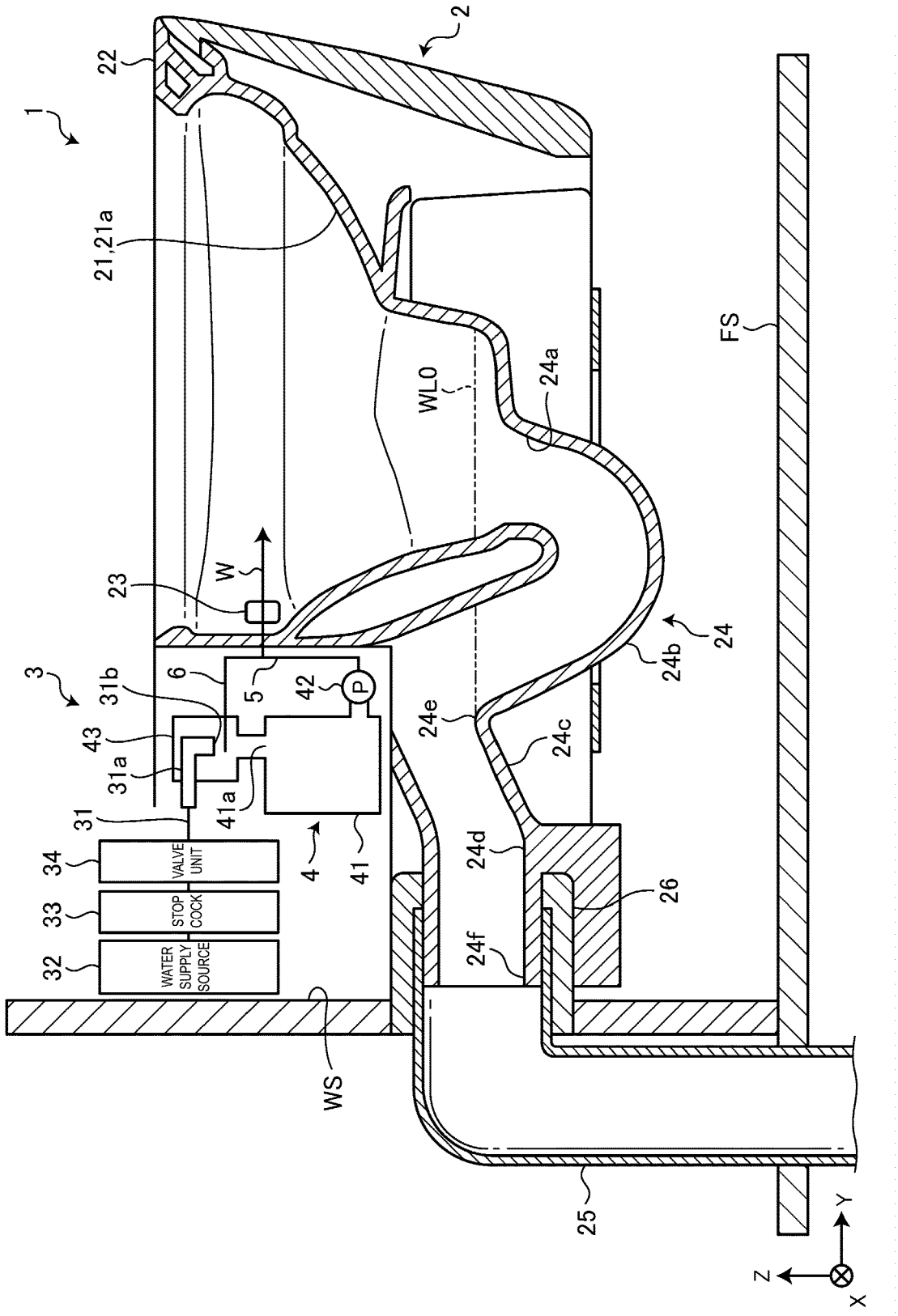
1
2
22
21,21a
WL0
24a
FS
W
23
3
31b
6
5
42
P
43
31a
41a
31
24e
24c
24b
24
4
41
24d
26
34
VALVE UNIT
33
STOP COCK
32
WATER SUPPLY SOURCE
24f
WS
25
Y
Z
X

FIG. 1

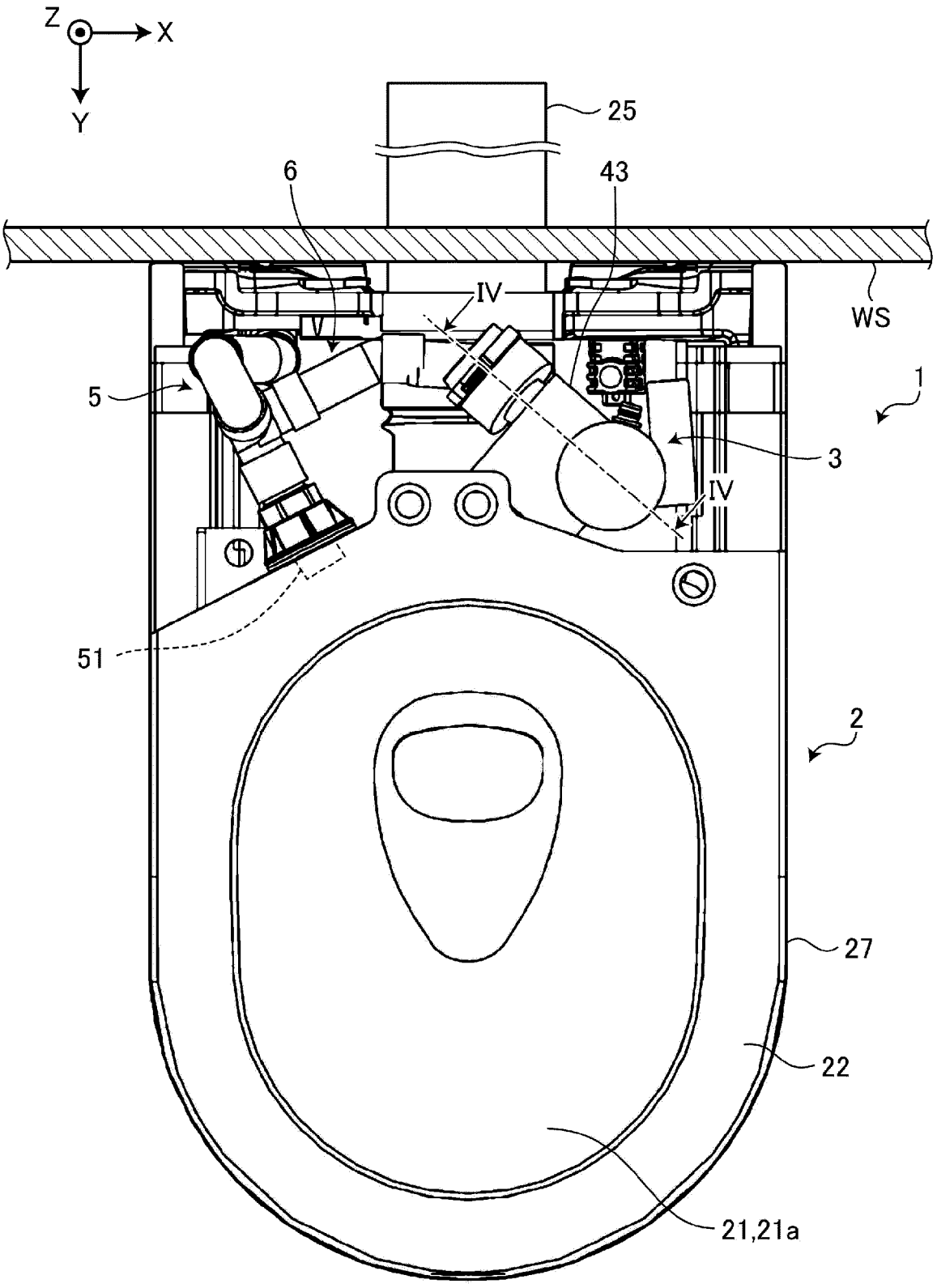


FIG. 2

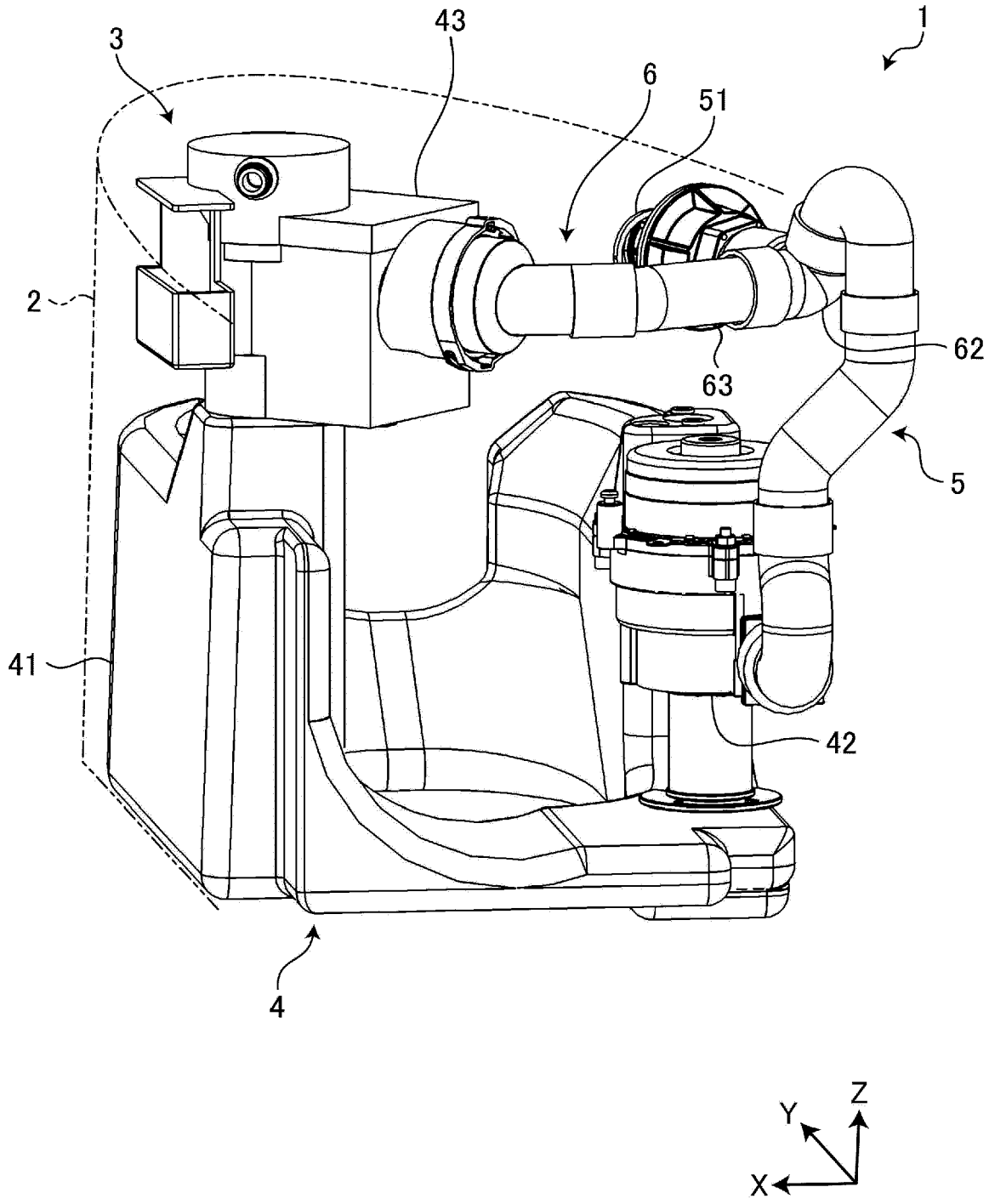


FIG. 3

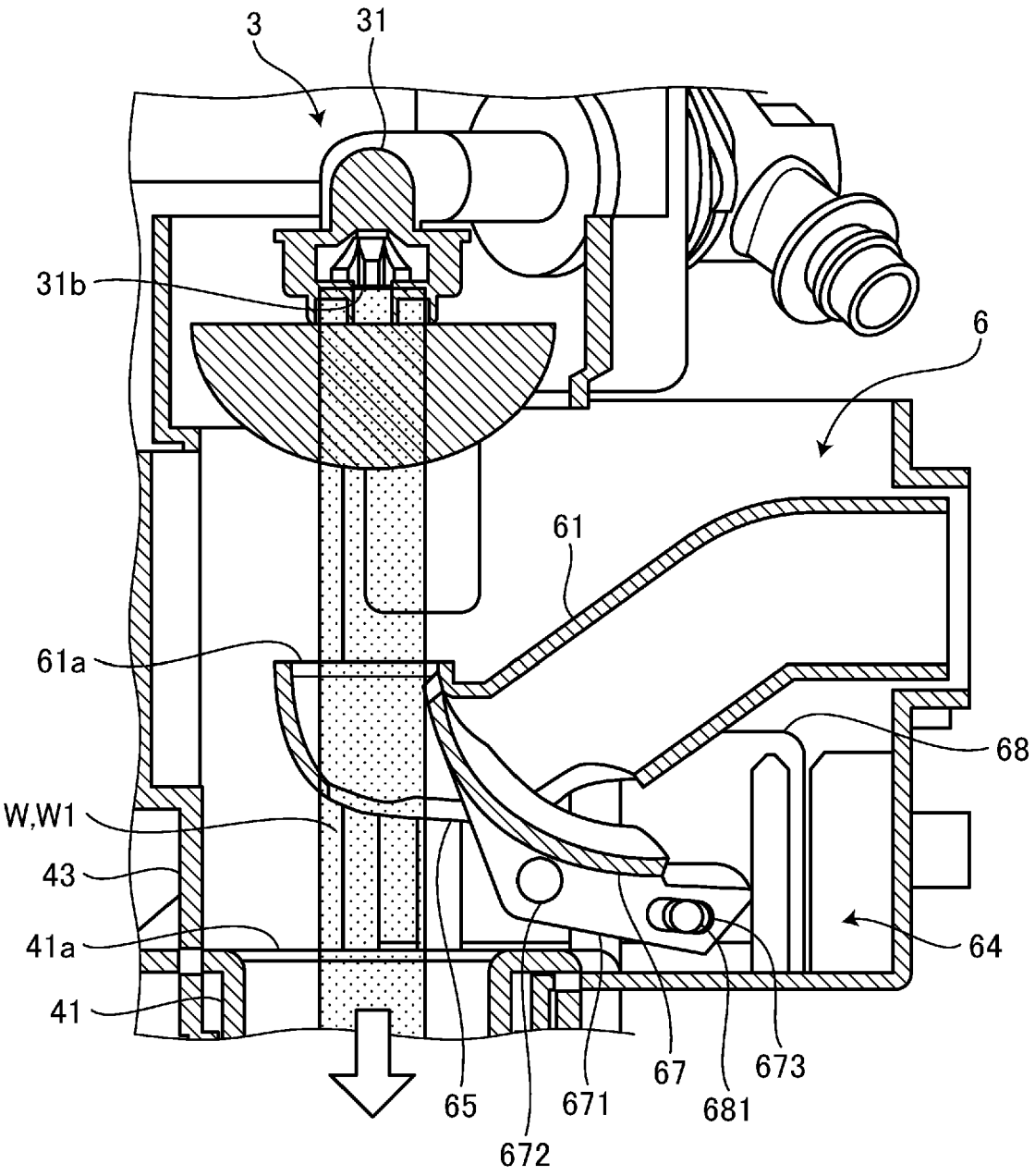


FIG. 4

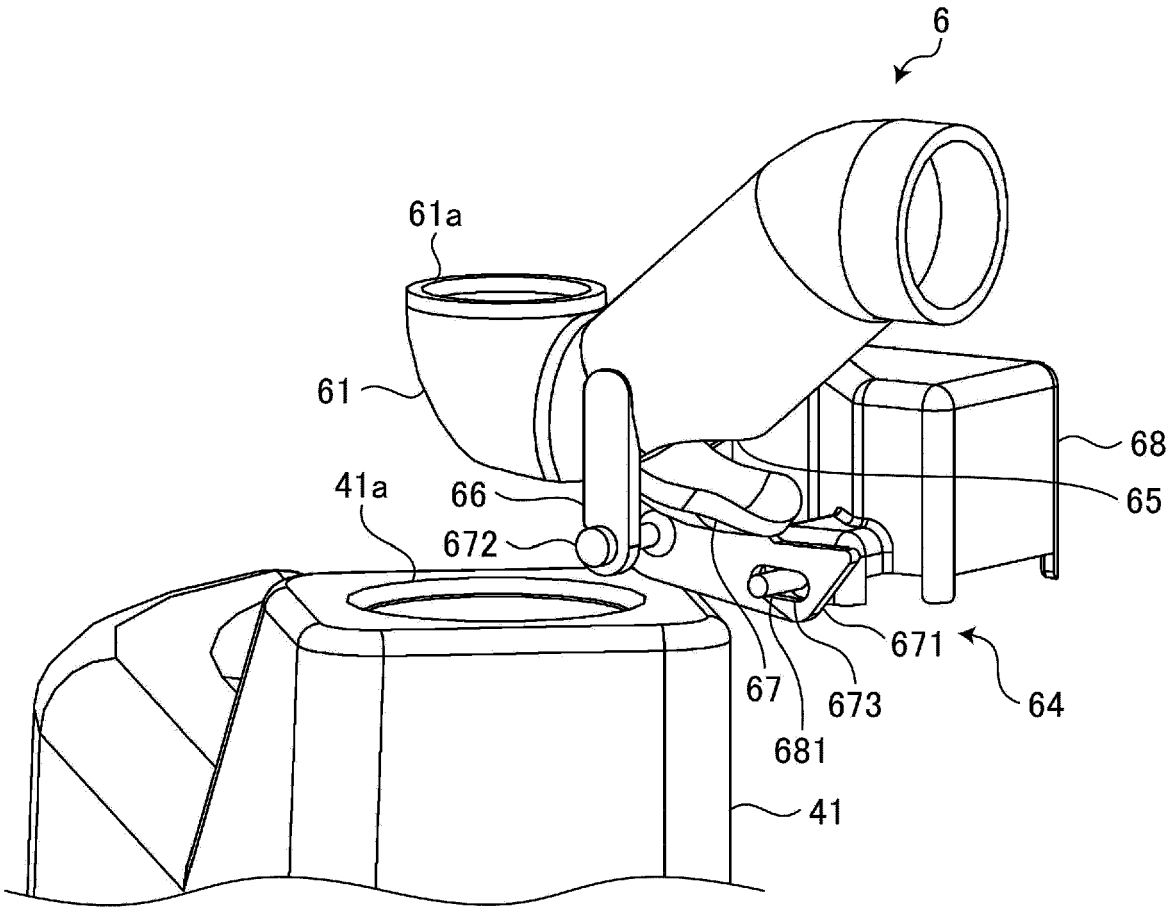


FIG. 5

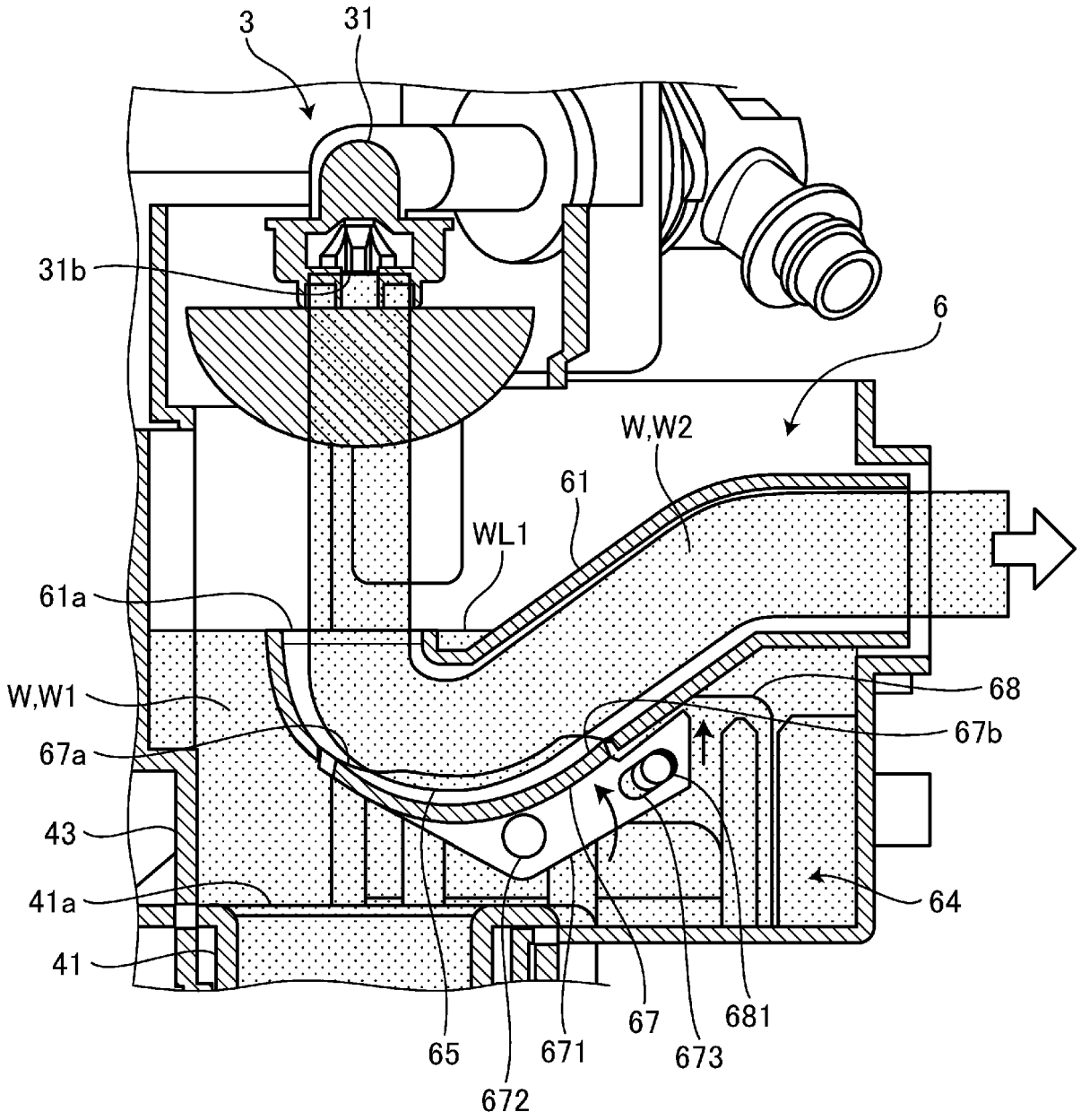
3
31
31b
6
W,W2
61
WL1
61a
W,W1
68
67b
67a
43
41a
64
41
65
671
67
681
673
672

FIG. 6

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Application Number
EP 24 17 1828

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| Munich | 17 September 2024 | Isailovski, Marko |

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