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(54) LOW WATER LEVEL TOILET

(57) A low water level toilet. A toilet body (1) is provided with a water storage tank (11), a toilet bowl (12), a ring-shaped flushing water-delivery channel (13) and a spraying water-delivery pipe (14); the water storage tank (11) is provided with a water inlet device (2), a drain valve (3) and a ring-shaped flushing water-supply component (4) therein, one end of the ring-shaped flushing water-supply component (4) being connected to the ring-shaped flushing water-delivery channel (13), and the other end being connected to the water inlet device (2); the ring-shaped flushing water-supply component (4) is provided with an ejecting mechanism connected to the water storage tank (11), when water flows from the water inlet device (2) to the ring-shaped flushing water-delivery channel (13), negative pressure is generated in the ejecting mechanism, such that water stored in the water storage tank (11) is sucked towards the ring-shaped flushing water-delivery channel (13); the spraying water-delivery pipe(14) is independently arranged in the toilet body (1), and the spraying water-delivery pipe (14) is provided with only two openings, namely a water inlet connected to the output of the drain valve (3) and a water spray opening (141) connected to the bottom of the toilet bowl (12); in a non-draining state, the drain valve (3) seals the water inlet of the spraying water-delivery pipe(14) to isolate the end of the spraying water-delivery pipe (14), where the water inlet is located, from the outside air.

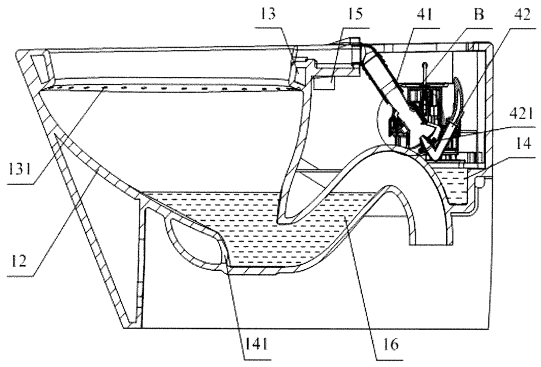

Figure 5

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Description

FIELD

[0001] The present application relates to the technical field of sanitary wares, and particularly relates to a low water level toilet.

BACKGROUND

[0002] At present, most toilets use ceramic materials, and with the increasing popularity and use of the toilets, the amount of generated ceramic waste is also increasing. Therefore, people are increasingly inclined to designs of toilets using less materials, so as to save resources and reduce pollution.

[0003] Reference is made to Figure 1, which is a schematic view showing the structure of a toilet in the conventional technology.

[0004] The toilet includes a water storage tank 01, a toilet bowl 02 and a subsequent sewage drain pipe 07 and so on.

[0005] A drain valve is provided in the water storage tank 01, and when the drain valve is opened, water in the water storage tank 01 flows into a common sub water channel 03, and then flows into a flush-ring water delivery pipe 04 and a spraying-type water delivery pipe 05. The flush-ring water delivery pipe 04 is arranged at a surface of a toilet seat, and the flush-ring water delivery pipe 04 is provided with flushing holes 041 for flushing the toilet bowl 02 from top to bottom. One end of the spraying-type water delivery pipe 05 is a spraying opening 051 for flushing a bottom of the toilet bowl 02. Because the water storage tank 01 is required to supply water to the flush-ring water delivery pipe 04, the water storage tank 01 is required to be designed to have a height above the surface of the toilet seat, so that a working water level of the water storage tank 01 can be ensured to be higher than the surface of the toilet seat, to provide enough potential energy to drive the water to flow into the flush-ring water delivery pipe 04 to clean the toilet bowl 02, and to generate siphonage at the same time. However, the higher the water storage tank 01 is, the more the ceramic is used, thus, not only the production costs are increased, the resource consumption and environmental pollution are also increased.

TECHNICAL ISSUE

[0006] In a case that the water storage tank of the toilet is designed to be flush with the surface of the toilet seat, the consumption of ceramic materials will be greatly reduced. It is estimated that with this design, the consumption of ceramic materials can be reduced about 12 kilograms for one toilet. However, since the working water level of the water storage tank is lower than the surface of the toilet seat, that is, the water in the water storage tank cannot flow into a pipe at the toilet seat to flush the toilet bowl, and with such low potential energy, the sewage drain pipe can hardly generate siphonage.

[0007] Therefore, an issue to be addressed by those skilled in the art is to ensure flushing efficiency while reducing the resource consumption and the production costs.

TECHNICAL SOLUTION FOR TECHNICAL ISSUE

TECHNICAL SOLUTION

[0008] In view of this, a low water level toilet is provided according to the present application, to reduce resource consumption and production costs, as well as to ensure flushing efficiency.

[0009] In order to achieve the above objects, the following technical solutions are provided according to the present application.

[0010] A low water level toilet includes a toilet body, wherein the toilet body is provided with a water storage tank, a toilet bowl, a flush-ring water delivery pipe configured to flush a peripheral wall of the toilet bowl, and a spraying-type water delivery pipe configured to flush a bottom of the toilet bowl; a water intake device and a drain valve are provided in the water storage tank, and a flush-ring water supply component is further provided in the water storage tank, the flush-ring water supply component has one end in communication with the flush-ring water delivery pipe, and another end in communication with the water intake device; the flush-ring water supply component is provided with an ejecting mechanism in communication with the water storage tank, and when water flows from the water intake device to the flush-ring water delivery pipe, negative pressure is generated in the ejecting mechanism, to suck water stored in the water storage tank towards the flush-ring water delivery pipe; and

wherein, the spraying-type water delivery pipe is independently arranged in the toilet body, and the spraying-type water delivery pipe is provided with only two openings, including a water inlet in communication with an output end of the drain valve and a water spray opening in communication with the bottom of the toilet bowl; and

wherein, in a non-draining state, the drain valve seals the water inlet of the spraying-type water delivery pipe to isolate the end, where the water inlet is located, of the spraying-type water delivery pipe from outside air.

[0011] Preferably, in the low water level toilet, a top surface of the water storage tank and a top surface of the toilet bowl lie in a same plane.

[0012] Preferably, in the low water level toilet, the ejecting mechanism includes an ejecting pipe in communication with the flush-ring water delivery pipe and a water intake pipe in communication with a water outlet of the water intake device; and

an end, facing the water intake pipe, of the ejecting pipe is an outwardly flared opening; and an end, inserted into the outwardly flared opening, of the water intake pipe is

an inwardly necked opening.

[0013] Preferably, the low water level toilet further includes a switching device configured to switch the water intake device between two states, to allow the water intake device to be in communication with the flush-ring water supply component or in communication with the water storage tank.

[0014] Preferably, in the low water level toilet, the switching device includes:

a rotation shaft rotatably arranged on the ejecting pipe; and

a baffle connected to the rotation shaft and configured to open or close an inner channel of the ejecting pipe.

[0015] Preferably, the low water level toilet further includes a linkage device connected to the switching device and the drain valve, and a drain button of the low water level toilet is connected to the linkage device; and when the drain button is pressed, the linkage device drives the rotation shaft to rotate, and the baffle opens the ejecting pipe; and

a water level in the water storage tank drops, a buoy of the drain valve falls, the drain valve is closed and drives the linkage device to reset, the rotation shaft is no longer limited by the linkage device, and under an action of water flow in the ejecting pipe, the baffle drives the rotation shaft to rotate to close the ejecting pipe.

[0016] Preferably, in the low water level toilet, the switching device further includes a switching floater connected to the rotation shaft; and

when a water level in the water storage tank is maintained at a rated water level, the switching floater remains stationary, and the baffle is in a state of opening the ejecting pipe; and

when the water level in the water storage tank drops, the switching floater falls to drive the rotation shaft to rotate, and the baffle closes the ejecting pipe.

[0017] Preferably, in the low water level toilet, the switching device further includes a water replenishment adjusting block arranged on an inner wall of the ejecting pipe;

a gap is provided between a free end of the baffle and an inner side face, facing an interior of the ejecting pipe, of the water replenishment adjusting block; and the water replenishment adjusting block is a movable block movable in an axial direction of the ejecting pipe;

the inner side face of the water replenishment adjusting block is obliquely arranged along the axial direction of the ejecting pipe, and the water replenishment adjusting block has a protruding end sticking out of an outer wall of the ejecting pipe; and

the outer wall of the ejecting pipe is provided with a dividing rule arranged corresponding to the protruding end.

[0018] Preferably, in the low water level toilet, the switching device includes a second communicating pipe in communication with the water storage tank, a first communicating pipe in communication with the flush-ring water supply component, a water intake tube in communication with the water outlet of the water intake device, and a water distribution switch configured to switch the water intake tube between two states, to allow the water intake tube to be in communication with the second communicating pipe or in communication with the first communicating pipe.

[0019] Preferably, in the low water level toilet, the switching device further includes:

a switch linkage component connected to the water distribution switch;

a switch buoy connected to the switch linkage component, wherein during a falling process of the switch buoy, the water distribution switch is driven to switch from a state that the water intake tube is in communication with the first communicating pipe to a state that the water intake tube is in communication with the second communicating pipe; and

a time-delay cavity having an opening facing upward, wherein the switch buoy is located inside the time-delay cavity, and a bottom of the time-delay cavity is provided with a water leaking opening.

[0020] Preferably, the low water level toilet is further provided with an overflow pipe mutually independent with respect to the spraying-type water delivery pipe, wherein the overflow pipe is integrally formed with the water storage tank or independently arranged inside the water storage tank, and the overflow pipe is in communication with the flush-ring water delivery pipe.

[0021] It can be seen from the above technical solutions that, in the low water level toilet according to the present application, during a flushing process, the water intake device is connected to a water supply system, and water provided by the water intake device is directly delivered to the flush-ring water delivery pipe through the flush-ring water supply component, and when the water passes through the ejecting mechanism of the flush-ring water supply component, negative pressure is generated in the ejecting mechanism. Since the ejecting mechanism is in communication with the water storage tank, the water stored in the water storage tank flows into the ejecting mechanism, then flows to the flush-ring water delivery pipe along the flush-ring water supply component, and then flows out from flushing holes in the flush-ring water delivery pipe, to flush downward from the surface of the toilet seat of the toilet bowl. One end of the spraying-type water delivery pipe is in communication with the output end of the drain valve, the drain valve is opened, the water in the water storage tank flows from the water inlet of the spraying-type water delivery pipe into the spraying-type water delivery pipe through the drain valve, then flushes the bottom of the toilet bowl via the water spray opening of the spraying-type water delivery pipe, and

then is drained out via a sewage drain pipe at the bottom of the toilet bowl. When the flushing process is finished, the drain valve is closed, the water inlet of the spraying-type water delivery pipe that is in communication with the output end of the drain valve is closed, another end, that is the water spray opening is closed by the water in the toilet bowl. Since the spraying-type water delivery pipe is an independent pipe, and the only two openings, that is the water inlet and the water spray opening, are both closed, especially for the water inlet at a relatively high water level, when the drain valve is closed, the water inlet is closed; the water spray opening is closed by the water in the toilet bowl, thus under the atmospheric pressure, the water in the spraying-type water delivery pipe will not flow out from the water spray opening, but fills the spraying-type water delivery pipe, that is, the spraying-type water delivery pipe is filled with water.

BENEFICIAL EFFECTS

[0022] With the above arrangements, a pipeline pressure of the water intake device is effectively utilized, and in conjunction with the ejecting mechanism of the flush-ring water supply component, water is allowed to flow upward, therefore, the position of the bottom surface of the water storage tank can be effectively lowered. The position of the water inlet of the spraying-type water delivery pipe is lowered, which effectively reduces the height of the spraying-type water delivery pipe in the vertical direction. Thus, in a situation that the lateral dimension of the spraying-type water delivery pipe is unchanged, a path length of the spraying-type water delivery pipe is decreased, which reduces the energy loss in the spraying-type water delivery pipe. When the flushing process is performed again, because the spraying-type water delivery pipe is filled with water, the water in the spraying-type water delivery pipe directly flushes the bottom of the toilet bowl through the water spray opening, an operation of discharging the air in the spraying-type water delivery pipe is avoided, thus reducing the energy loss, improving potential energy utilization, and speeding up water pressure transfer, such that the efficiency for generating siphonage is increased, which increases the flushing efficiency. The bottom surface of the water storage tank is arranged to be lower than the surface of the toilet seat of the toilet bowl, so that under the condition that the water storage tank has the same volume, the material consumption of the low water level toilet is effectively reduced, thereby reducing the resource consumption and the production costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] For more clearly illustrating embodiments of the present application or the technical solutions in the conventional technology, drawings referred to describe the embodiments or the conventional technology will be briefly described hereinafter. Apparently, the drawings in the following description are only some examples of the present application, and for those skilled in the art, other drawings may be obtained based on these drawings without any creative efforts.

Figure 1 is a schematic view showing the structure of a toilet in the conventional technology;

Figure 2 is a schematic view showing the structure of a low water level toilet according to a first embodiment of the present application;

Figure 3 is a schematic view showing the low water level toilet in a first state according to the first embodiment of the present application;

Figure 4 is a partially enlarged view of portion A in Figure 3;

Figure 5 is a schematic view showing the low water level toilet in a second state according to the first embodiment of the present application;

Figure 6 is a partially enlarged view of portion B in Figure 5;

Figure 7 is a schematic view showing the structure of a switching device and a flush-ring water supply component according to the first embodiment of the present application;

Figure 8 is an exploded schematic view showing the switching device and the flush-ring water supply component according to the first embodiment of the present application;

Figure 9 is a schematic top view showing the switching device and the flush-ring water supply component according to the first embodiment of the present application;

Figure 10 is a schematic sectional view showing the switching device and the flush-ring water supply component according to the first embodiment of the present application;

Figure 11 is a schematic view showing the structure of a low water level toilet according to a second embodiment of the present application;

Figure 12 is a schematic view showing the structure of a switching device and a flush-ring water supply component according to the second embodiment of the present application;

Figure 13 is a schematic view showing the structure of a low water level toilet according to a third embodiment of the present application;

Figure 14 is a schematic sectional view showing the low water level toilet according to the third embodiment of the present application;

Figure 15 is a schematic view showing the structures of a switching device and a water intake device according to the third embodiment of the present application;

Figure 16 is a sectional view showing the switching device and the water intake device in a first state according to the third embodiment of the present application;

Figure 17 is a sectional view showing the switching device and the water intake device in a second state according to the third embodiment of the present application;

Figure 18 is a schematic view showing the structure of a flush-ring water supply component according to the third embodiment of the present application.

DETAILED DESCRIPTION

[0024] A low water level toilet is provided according to the present application, to reduce resource consumption and production costs, and ensure flushing efficiency.

[0025] The technical solution according to the embodiments of the present application will be described clearly and completely as follows in conjunction with the accompany drawings in the embodiments of the present application. It is obvious that the described embodiments are only a part of the embodiments according to the present application, rather than all of the embodiments. All the other embodiments obtained by those skilled in the art based on the embodiments in the present application without any creative work belong to the scope of protection of the present application.

[0026] Referring to Figures 2 to 6, Figure 2 is a schematic view showing the structure of a low water level toilet according to a first embodiment of the present application; Figure 3 is a schematic view showing the low water level toilet in a first state according to the first embodiment of the present application; Figure 4 is a partially enlarged view of portion A in Figure 3; Figure 5 is a schematic view showing the low water level toilet in a second state according to the first embodiment of the present application; and Figure 6 is a partially enlarged view of portion B in Figure 5.

[0027] A low water level toilet is provided according to an embodiment of the present application, which includes a toilet body 1, a water intake device 2, a drain valve 3, a flush-ring water supply component 4 and a switching device 5. The toilet body 1 is provided with a water storage tank 11, a toilet bowl 12, a flush-ring water delivery pipe 13 and a spraying-type water delivery pipe 14. The flush-ring water delivery pipe 13 is located near a surface of a toilet seat of the toilet bowl 12, and is used to flush a peripheral wall of the toilet bowl 12. The spraying-type water delivery pipe 14 is in communication with both a bottom of the water storage tank 11 and a bottom of the toilet bowl 12, and is used to flush the bottom of the toilet bowl 12. The water intake device 2, the drain valve 3 and the flush-ring water supply component 4 are all arranged inside the water storage tank 11. One end of the flush-ring water supply component 4 is in communication with the flush-ring water delivery pipe 13, and another end of the flush-ring water supply component 4 is in communication with the water intake device 2. The flush-ring water supply component 4 is provided with an ejecting mechanism in communication with the water storage tank 11. When water flows from the water intake device 2 to the flush-ring water delivery pipe 13, negative pressure is generated in the ejecting mechanism, such that water stored in the water storage tank 11 is sucked towards the flush-ring water delivery pipe 13.

[0028] The spraying-type water delivery pipe 14 is independently arranged in the toilet body 1, and the spraying-type water delivery pipe 14 is provided with only two openings, including a water inlet in communication with an output end of the drain valve 3 and a water spray opening 141 in communication with the bottom of the toilet bowl 12. That is, the spraying-type water delivery pipe 14 is a closed pipe, and the only two openings thereof are the water inlet and the water spray opening 141. The water inlet of the spraying-type water delivery pipe 14 is in communication with the output end of the drain valve 3, and the water spray opening 141 of the spraying-type water delivery pipe 14 is in communication with the bottom of the toilet bowl 12.

[0029] For the low water level toilet according to the embodiment of the present application, during a flushing process, the water intake device 2 is connected to a water supply system, and water provided by the water intake device 2 is directly delivered to the flush-ring water delivery pipe 13 through the flush-ring water supply component 4, and when the water passes through the ejecting mechanism of the flush-ring water supply component 4, negative pressure is generated in the ejecting mechanism. Since the ejecting mechanism is in communication with the water storage tank 11, the water stored in the water storage tank 11 flows into the ejecting mechanism, then flows to the flush-ring water delivery pipe 13 along the flush-ring water supply component 4, and then flows out from flushing holes 131 in the flush-ring water delivery pipe 13, to flush downward from the surface of the toilet seat of the toilet bowl 12. One end of the spraying-type water delivery pipe 14 is in communication with the output end of the drain valve 3, the drain valve 3 is opened, the water in the water storage tank 11 flows from the water inlet of the spraying-type water delivery pipe 14 into the spraying-type water delivery pipe 14 through the drain valve 3, then flushes the bottom of the toilet bowl 12 via the water spray opening 141 of the spraying-type water delivery pipe 14, and then is drained out via a sewage

drain pipe 16 at the bottom of the toilet bowl 12. When the flushing process is finished, the drain valve 3 is closed, the water inlet of the spraying-type water delivery pipe 14 that is in communication with the output end of the drain valve 3 is closed, another end (where the water spray opening 141 is located) of the spraying-type water delivery pipe 14 is closed by the water in the toilet bowl 12. Since the spraying-type water delivery pipe 14 is an independent pipe, and the only two openings (the water inlet and the water spray opening 141) thereof are both closed, especially for the water inlet at a relatively high water level, when the drain valve 3 is closed (that is, in a non-draining state), the water inlet is closed, the drain valve 3 seals the water inlet of the spraying-type water delivery pipe 14 to isolate the end of the spraying-type water delivery pipe 14, where the water inlet is located, from the outside air; the water spray opening 141 is closed by the water in the toilet bowl 12, thus under the atmospheric pressure, the water in the spraying-type water delivery pipe 14 will not flow out from the water spray opening 141, but fills the spraying-type water delivery pipe 14, that is, the spraying-type water delivery pipe 14 is filled with water.

[0030] With the above arrangements, a pipeline pressure of the water intake device 2 is effectively utilized, and in conjunction with the ejecting mechanism of the flush-ring water supply component 4, water is allowed to flow upward, therefore, the position of the bottom surface of the water storage tank 11 can be effectively lowered. The position of the water inlet of the spraying-type water delivery pipe 14 is lowered, which effectively reduces the height of the spraying-type water delivery pipe 14 in the vertical direction. Thus, in a situation that the lateral dimension of the spraying-type water delivery pipe 14 is unchanged, a path length of the spraying-type water delivery pipe 14 is decreased, which reduces the energy loss in the spraying-type water delivery pipe 14. When the flushing process is performed again, because the spraying-type water delivery pipe 14 is filled with water, the water in the spraying-type water delivery pipe 14 directly flushes the bottom of the toilet bowl 12 through the water spray opening 141, an operation of discharging the air in the spraying-type water delivery pipe 14 is avoided, thus reducing the energy loss, improving potential energy utilization, and speeding up water pressure transfer, such that the efficiency for generating siphonage is increased, which increases the flushing efficiency. The bottom surface of the water storage tank 11 is arranged to be lower than the surface of the toilet seat of the toilet bowl 12, so that under the condition that the water storage tank 11 has the same volume, the material consumption of the low water level toilet is effectively reduced, thereby reducing the resource consumption and the production costs.

[0031] Further, a top surface of the water storage tank 11 and a top surface of the toilet bowl 12 lie in a same plane. With the above arrangement, the water storage tank 11 (at least a water surface inside the water storage tank 11) is not required to be higher than the surface of the toilet seat of the toilet bowl 12. It should be understood that, the height of the water storage tank 11 is not limited by the position of the flush-ring water delivery pipe 13, thereby facilitating the production of the toilet body 1, effectively reducing the material consumption of the toilet body 1, reducing the volume of the low water level toilet, and further facilitating the installation of the low water level toilet. The top surface of the water storage tank 11 may also be higher or lower than the top surface of the toilet bowl 12.

[0032] The ejecting mechanism of the flush-ring water supply component 4 includes an ejecting pipe 41 in communication with the flush-ring water delivery pipe 13 and a water intake pipe 42 in communication with a water outlet of the water intake device 2. The ejecting mechanism employs the Venturi principle, as long as a diameter of an end, facing the water intake pipe 42, of the ejecting pipe 41 is greater than a diameter of an end, facing the ejecting pipe 41, of the water intake pipe 42, when the water rapidly flows from the water intake pipe 42 to the ejecting pipe 41, negative pressure is generated, which sucks the water stored in the water storage tank 11 towards the ejecting pipe 41. In this embodiment, the end, facing the water intake pipe 42, of the ejecting pipe 41 is an outwardly flared opening 411, and an end, inserted into the outwardly flared opening 411, of the water intake pipe 42 is an inwardly necked opening 421. The outwardly flared opening 411 cooperates with the inwardly necked opening 421, to form a Venturi structure. Since the flush-ring water supply component 4 is located inside the water storage tank 11, the outwardly flared opening 411 is in communication with the water storage tank 11. After the water delivered by the water intake device 2 passes through the inwardly necked opening 421, the pressure at a joint between the outwardly flared opening 411 and the inwardly necked opening 421 drops, thus the water in the water storage tank 11 is driven to enter the ejecting pipe 41 from the outwardly flared opening 411, and then flows toward the flush-ring water delivery pipe 13 together with the water delivered by the water intake device 2. With the above arrangements, a flush volume of the flush-ring water delivery pipe 13 is effectively increased.

[0033] In this embodiment, an end, opposite to the water intake pipe 42, of the ejecting pipe 41 is in communication with the flush-ring water delivery pipe 13 through a connecting hose 43.

[0034] Further, the low water level toilet also includes a switching device 5 configured to switch the water intake device 2 between two states, to allow the water intake device 2 to be in communication with the flush-ring water supply component 4 or the water storage tank 11. That is, through the switching of the switching device 5, the communication between the water intake device 2 and the flush-ring water supply component 4 or the communication between the water intake device 2 and the water storage tank 11 is realized. One end of the flush-ring

water supply component 4 is in communication with the flush-ring water delivery pipe 13, another end of the flush-ring water supply component 4 is in communication with the water intake device 2, thus in a case that the water intake device 2 is in communication with the flush-ring water supply component 4, the water delivered out of the water outlet of the water intake device 2 passes through the flush-ring water supply component 4 and then flows into the flush-ring water delivery pipe 13; and in a case that the water intake device 2 is in communication with the water storage tank 11, the water delivered out of the water outlet of the water intake device 2 flows into the water storage tank 11. By operating the switching device 5, the communication between the water intake device 2 and the flush-ring water supply component 4 and the communication between the water intake device 2 and the water storage tank 11 are regulated, which facilitates the regulation of an amount of the water supplied from the water intake device 2 to the flush-ring water delivery pipe 13 and the water storage tank 11.

[0035] As shown in Figures 7 to 10, in a first embodiment, the switching device 5 includes a baffle 51 and a rotation shaft 52. The rotation shaft 52 is rotatably arranged on the ejecting pipe 41, the baffle 51 is connected to the rotation shaft 52 and is used for opening or closing an inner channel of the ejecting pipe 41. As shown in Figure 4, when the baffle 51 closes the inner channel of the ejecting pipe 41, the water delivered by the water intake pipe 42 flows into the water storage tank 11 through the opening (the outwardly flared opening 411) of the ejecting pipe 41. As shown in Figure 6, when the baffle 51 opens the inner channel of the ejecting pipe 41, the water delivered by the water intake pipe 42 flows into the flush-ring water delivery pipe 13 along the ejecting pipe 41. That is, it is only needed to control the rotation shaft 52 to rotate, thus the structure is simple, and the control is convenient.

[0036] In order to allow the switching device 5 to switch automatically, the low water level toilet further includes a linkage device 6 connected to the switching device 5 and the drain valve 3, and a drain button 8 of the low water level toilet is connected to the linkage device 6. When the drain button 8 is pressed, the linkage device 6 drives the rotation shaft 52 to rotate, and the baffle 51 opens the ejecting pipe 41.

[0037] The water level in the water storage tank 11 drops, a buoy of the drain valve 3 falls, the drain valve 3 is closed and drives the linkage device 6 to reset, the rotation shaft 52 is no longer limited by the linkage device 6, and thus under the action of the water flow in the ejecting pipe 41, the baffle 51 drives the rotation shaft 52 to rotate to close the ejecting pipe 41.

[0038] In this embodiment, the rotation shaft 52 is provided with a switch connecting block 53, the linkage device 6 is provided with a linkage connecting block 61 connected to the switch connecting block 53, and the linkage connecting block 61 is insertedly connected to a connecting slot of the switch connecting block 53. When it is required to flush the toilet, the drain button 8 is pressed, the drain valve 3 is opened, and one end of the linkage device 6 falls, another end of the linkage device 6 that is provided with the linkage connecting block 61 rises, thereby driving the switch connecting block 53 to move in a trend of moving upward, to allow the rotation shaft 52 to rotate. Taking the direction shown in Figure 8 as an example, the rotation shaft 52 rotates anticlockwise, to drive the baffle 51 to rotate, thereby opening the ejecting pipe 41. When the flushing process is finished, the water level in the water storage tank 11 drops, the buoy of the drain valve 3 falls, the drain valve 3 is closed and drives the linkage device 6 to reset, the rotation shaft 52 is no longer limited by the linkage device 6, and under the action of the water flow in the ejecting pipe 41, the baffle 51 drives the rotation shaft 52 to rotate to close the ejecting pipe 41. Taking the direction shown in Figure 8 as an example, the baffle 51 drives the rotation shaft 52 to rotate clockwise, thereby closing the ejecting pipe 41. The above arrangement facilitates the switching operation.

[0039] As shown in Figure 9, when it is required to flush the toilet, the linkage connecting block 61 for driving the linkage device 6 rises, and in turn drives the switch connecting block 53 to move in the trend of moving upward, to allow the rotation shaft 52 to rotate. When the flushing process is finished, the linkage connecting block 61 of the linkage device 6 falls, the downward movement of the switch connecting block 53 is not limited; the water flow in the ejecting pipe 41 flows to impact the baffle 51, and then drives the baffle 51 to rotate.

[0040] The switch connecting block 53 may also be embodied as a gear wheel, and the linkage connecting block 61 may be embodied as a gear rack engaged with the gear wheel.

[0041] As shown in Figures 11 and 12, in a second embodiment, the switching device 5 further includes a switching floater 55 connected to the rotation shaft 52. When the water level in the water storage tank 11 is maintained at a rated water level, the switching floater remains stationary, and the baffle 51 is in a state of opening the ejecting pipe 41; and when the water level in the water storage tank 11 drops, the switching floater 55 falls to drive the rotation shaft 52 to rotate, and the baffle 51 closes the ejecting pipe 41. As shown in Figure 12, when water is not flushed, the switching floater 55 floats at the rated water level, the baffle 51 attaches to an inner wall of the ejecting pipe 41 under the action of the switching floater 55, and the ejecting pipe 41 is opened. After the drain valve 3 is opened, the water level in the water storage tank 11 falls, the switching floater 55 falls with the falling of the water level, which drives the rotation shaft 52 to rotate clockwise, to drive the baffle 51 to rotate, thereby closing the ejecting pipe 41. With the above arrangement, the switching device 5 and the drain valve 3 are separately arranged, thereby facilitating repair and maintenance.

[0042] As shown in Figures 10 and 12, in both the first

embodiment and the second embodiment, the switching device 5 is further provided with a water replenishment adjusting block 54. The water replenishment adjusting block 54 is arranged on the inner wall of the ejecting pipe 41. A gap is provided between a free end of the baffle 51 and an inner side face of the water replenishment adjusting block 54. The arrangement of the water replenishment adjusting block 54 facilitates the adjustment of the gap between the free end of the baffle 51 and the inner side face, facing an interior of the ejecting pipe 41, of the water replenishment adjusting block 54. In a case that the switching device 5 allows the water intake device 2 to be in communication with the water storage tank 11, due to the above gap structure, water can still flow from the water intake device 2 to the flush-ring water supply component 4, so that water can be replenished into the toilet bowl 12 to function as water seal. The arrangement of the water replenishment adjusting block 54 facilitates the adjustment of the size of the gap.

[0043] In this embodiment, the water replenishment adjusting block 54 is movable in an axial direction of the ejecting pipe 41, and the inner side face of the water replenishment adjusting block 54 is obliquely arranged along the axial direction of the ejecting pipe 41. In a process that the water replenishment adjusting block 54 moves in the axial direction of the ejecting pipe 41, a distance (that is, the size of the gap) between the inner side face of the water replenishment adjusting block 54 and the free end of the baffle 51 is adjusted.

[0044] The water replenishment adjusting block 54 may also be allowed to move in a radial direction of the ejecting pipe 41, or water replenishment adjusting blocks 54 having different thicknesses may also be used for substitution, which will not be described in detail herein.

[0045] In this embodiment, the water replenishment adjusting block 54 is provided with a serrated face cooperating with the ejecting pipe 41, to improve the positioning effect of the water replenishment adjusting block 54.

[0046] Further, the water replenishment adjusting block 54 is provided with a protruding end sticking out of an outer wall of the ejecting pipe 41; and the outer wall of the ejecting pipe 41 is provided with a dividing rule corresponding to the protruding end. By adjusting the protruding end corresponding to the dimension of the dividing rule, the distance between the inner side face of the water replenishment adjusting block 54 and the free end of the baffle 51 is adjusted.

[0047] As shown in Figures 13 to 17, in a third embodiment, the water inletting of the water intake device 2 is controlled by a switch lifting rod 58' and a water intake buoy 52' controlling the switch lifting rod 58'. The switching device 5 includes a second communicating pipe 56', a first communicating pipe 57', a water intake tube and a water distribution switch 51'. The second communicating pipe 56' is in communication with the water storage tank 11, the first communicating pipe 57' in communication with the flush-ring water supply component 4, the water intake tube is in communication with the water outlet of the water intake device 2, and the water distribution switch 51' is configured to switch the water intake tube between two states, to allow the water intake tube to be in communication with the second communicating pipe 56' or the first communicating pipe 57', that is, through the switching of the water distribution switch 51', the communication between the water intake tube and the second communicating pipe 56' or the communication between the water intake tube and the first communicating pipe 57' is realized.

[0048] As shown in Figure 18, in this embodiment, similarly an ejecting mechanism is provided in the flush-ring water supply component 4, the ejecting mechanism includes an ejecting pipe 41 and a water intake pipe 42, and a diameter of the water intake pipe 42 is smaller than a diameter of the ejecting pipe 41. In this embodiment, preferably, the ejecting pipe 41 and the water intake pipe 42 are embodied as an integral structure, and this position is provided with an opening (not shown in the figure) in communication with the water storage tank 11. The ejecting mechanism forms a Venturi structure having one end connected to the water intake device 2 through a water intake hose 7 and another end connected to the flush-ring water delivery pipe 13 through the connecting hose 43.

[0049] Further, in order to realize automatic switching of the switching device 5, the switching device 5 further includes a switch linkage component 55' and a switch buoy 53'. The switch lifting rod 58' is connected to the water intake device 2 and the water intake buoy 52', and when the water intake buoy 52' falls, the water intake device 2 is opened for inletting water. A time-delay cavity 54' has an opening facing upward, the switch buoy 53' is located inside the time-delay cavity 54', and the time-delay cavity 54' is provided with a water leaking opening at its bottom. In a process of water descending in the water storage tank 11, the water in the time-delay cavity 54' flows out from the water leaking opening, and the delayed duration depends on the size of the water leaking opening. The switch buoy 53' falls with the increase of the amount of water leaked from the time-delay cavity 54', thereby driving the switch linkage component 55' to rotate. As shown in Figures 16 and 17, in this embodiment, the switch linkage component 55' drives the water distribution switch 51' to rotate anticlockwise, thereby driving the water distribution switch 51' to switch from a state that the water intake tube is in communication with the first communicating pipe 57' to a state that the water intake tube is in communication with the second communicating pipe 56'. After the time-delay cavity 54' is emptied, the switch buoy 53' falls to the lowest point.

[0050] In this embodiment, the low water level toilet is further provided with an overflow pipe 15 mutually independent with respect to the spraying-type water delivery pipe 14. The overflow pipe 15 is integrally formed with the water storage tank 11 or independently arranged inside the water storage tank 11, and the overflow pipe 15 is in communication with the flush-ring water delivery pipe

13.

[0051] According to the embodiment in which the overflow pipe 15 is integrally formed with the water storage tank 11, an overflow inlet of the overflow pipe 15 is located at a side wall of the water storage tank 11. The above arrangement effectively facilitates overflow draining. That is, an overflow opening is directly machined in an inner wall of the water storage tank 11, so that water will flow out from the overflow opening when there is too much water in the water storage tank 11.

[0052] Preferably, the overflow opening 15 is in communication with the flush-ring water delivery pipe 13. It is also possible that an independent channel is provided in an entity portion of the toilet body 1 of the toilet, so that the water from the overflow pipe 15 can flow into the toilet bowl 12.

[0053] According to the embodiment in which the overflow pipe 15 is independently arranged inside the water storage tank 11, one end of the overflow pipe 15 is in communication with the toilet bowl 12, another end of the overflow pipe 15 is fixed inside the water storage tank 11. An opening at an end portion of the end, located inside the water storage tank 11, of the overflow pipe 15 is the overflow inlet, and the end, in communication with the toilet bowl 12, of the overflow pipe 15 is a water outlet. The overflow pipe 15 may be located inside the toilet body 1, or may also be located outside the toilet body 1.

[0054] It should be understood that, the spraying-type water delivery pipe 14 and the overflow pipe 15 are mutually independent, and are not in communication with each other.

[0055] The above embodiments in this specification are described in a progressive manner. Each of the embodiments is mainly focused on describing its differences from other embodiments, and references may be made among these embodiments with respect to the same or similar portions among these embodiments.

[0056] Based on the above description of the disclosed embodiments, those skilled in the art are capable of carrying out or using the present application. It is obvious for those skilled in the art to make many modifications to these embodiments. The general principle defined herein may be applied to other embodiments without departing from the spirit or scope of the present application. Therefore, the present application is not limited to the embodiments illustrated herein, but should be defined by the broadest scope consistent with the principle and novel features disclosed herein.

INDUSTRIAL APPLICABILITY

[0057] With the above arrangements, a pipeline pressure of the water intake device is effectively utilized, and in conjunction with the ejecting mechanism of the flush-ring water supply component, water is allowed to flow upward, therefore, the position of the bottom surface of the water storage tank can be effectively lowered. The position of the water inlet of the spraying-type water delivery pipe is lowered, which effectively reduces the height of the spraying-type water delivery pipe in the vertical direction. Thus, in a situation that the lateral dimension of the spraying-type water delivery pipe is unchanged, a path length of the spraying-type water delivery pipe is decreased, which reduces the energy loss in the spraying-type water delivery pipe. When the flushing process is performed again, because the spraying-type water delivery pipe is filled with water, the water in the spraying-type water delivery pipe directly flushes the bottom of the toilet bowl through the water spray opening, an operation of discharging the air in the spraying-type water delivery pipe is avoided, thus reducing the energy loss, improving potential energy utilization, and speeding up water pressure transfer, such that the efficiency for generating siphonage is increased, which increases the flushing efficiency. The bottom surface of the water storage tank is arranged to be lower than the surface of the toilet seat of the toilet bowl, so that under the condition that the water storage tank has the same volume, the material consumption of the low water level toilet is effectively reduced, thereby reducing the resource consumption and
the production costs.

Claims

1. A low water level toilet, comprising a toilet body (1), wherein the toilet body (1) is provided with a water storage tank (11), a toilet bowl (12), a flush-ring water delivery pipe (13) configured to flush a peripheral wall of the toilet bowl (12), and a spraying-type water delivery pipe (14) configured to flush a bottom of the toilet bowl (12); and a water intake device (2) and a drain valve (3) are provided in the water storage tank (11), and
wherein, a flush-ring water supply component (4) is further provided in the water storage tank (11), the flush-ring water supply component (4) has one end in communication with the flush-ring water delivery pipe (13) and another end in communication with the water intake device (2); the flush-ring water supply component (4) is provided with an ejecting mechanism in communication with the water storage tank (11), and when water flows from the water intake device (2) to the flush-ring water delivery pipe (13), negative pressure is generated in the ejecting mechanism, to suck water stored in the water storage tank (11) towards the flush-ring water delivery pipe (13); and
wherein, the spraying-type water delivery pipe (14) is independently arranged in the toilet body (1), and the spraying-type water delivery pipe (14) is provided with only two openings, comprising a water inlet in communication with an output end of the drain valve (3) and a water spray opening (141) in communication with the bottom of the toilet bowl (12); and in a

non-draining state, the drain valve (3) seals the water inlet of the spraying-type water delivery pipe (14) to isolate the end, where the water inlet is located, of the spraying-type water delivery pipe (14) from outside air.

2. The low water level toilet according to claim 1, wherein a top surface of the water storage tank (11) and a top surface of the toilet bowl (12) lie in a same plane.

3. The low water level toilet according to claim 1, wherein the ejecting mechanism comprises an ejecting pipe (41) in communication with the flush-ring water delivery pipe (13) and a water intake pipe (42) in communication with a water outlet of the water intake device (2);
an end, facing the water intake pipe (42), of the ejecting pipe (41) is an outwardly flared opening (411), and
an end, inserted into the outwardly flared opening (411), of the water intake pipe (42) is an inwardly necked opening (421).

4. The low water level toilet according to claim 3, further comprising a switching device (5) configured to switch the water intake device (2) between two states, to allow the water intake device (2) to be in communication with the flush-ring water supply component (4) or in communication with the water storage tank (11).

5. The low water level toilet according to claim 4, wherein the switching device (5) comprises:

a rotation shaft (52) rotatably arranged on the ejecting pipe (41); and
a baffle (51) connected to the rotation shaft (52) and configured to open or close an inner channel of the ejecting pipe (41).

6. The low water level toilet according to claim 5, further comprising a linkage device (6) connected to the switching device (5) and the drain valve (3), and a drain button (8) of the low water level toilet is connected to the linkage device (6); and
when the drain button (8) is pressed, the linkage device (6) drives the rotation shaft (52) to rotate, and the baffle (51) opens the ejecting pipe (41); and
a water level in the water storage tank (11) drops, a buoy of the drain valve (3) falls, the drain valve (3) is closed and drives the linkage device (6) to reset, the rotation shaft (52) is no longer limited by the linkage device (6), and under an action of water flow in the ejecting pipe (41), the baffle (51) drives the rotation shaft (52) to rotate to close the ejecting pipe (41).

7. The low water level toilet according to claim 5, wherein the switching device (5) further comprises a switching floater (55) connected to the rotation shaft (52); and
when a water level in the water storage tank (11) is maintained at a rated water level, the switching floater (55) remains stationary, and the baffle (51) is in a state of opening the ejecting pipe (41); and
when the water level in the water storage tank (11) drops, the switching floater (55) falls to drive the rotation shaft (52) to rotate, and the baffle (51) closes the ejecting pipe (41).

8. The low water level toilet according to claim 5, wherein the switching device (5) further comprises a water replenishment adjusting block (54) arranged on an inner wall of the ejecting pipe (41);
a gap is provided between a free end of the baffle (51) and an inner side face, facing an interior of the ejecting pipe (41), of the water replenishment adjusting block (54), and the water replenishment adjusting block (54) is a movable block movable in an axial direction of the ejecting pipe (41);
the inner side face of the water replenishment adjusting block (54) is obliquely arranged along the axial direction of the ejecting pipe (41), and the water replenishment adjusting block (54) has a protruding end sticking out of an outer wall of the ejecting pipe (41); and
the outer wall of the ejecting pipe (41) is provided with a dividing rule arranged corresponding to the protruding end.

9. The low water level toilet according to claim 4, wherein the switching device (5) comprises a second communicating pipe (56') in communication with the water storage tank (11), a first communicating pipe (57') in communication with the flush-ring water supply component (4), a water intake tube in communication with the water outlet of the water intake device (2), and a water distribution switch (51') configured to switch the water intake tube between two states, to allow the water intake tube to be in communication with the second communicating pipe (56') or in communication with the first communicating pipe (57').

10. The low water level toilet according to claim 9, wherein the switching device (5) further comprises:

a switch linkage component (55') connected to the water distribution switch (51');
a switch buoy (53'), connected to the switch linkage component (55'), of a water intake buoy, wherein during a falling process of the switch buoy (53'), the water distribution switch (51') is driven to switch from a state that the water intake tube is in communication with the first communicating pipe (57') to a state that the water intake tube is in communication with the second com-

municating pipe (56'); and
a time-delay cavity (54') having an opening facing upward, wherein the switch buoy (53') is located inside the time-delay cavity (54'), and a bottom of the time-delay cavity (54') is provided with a water leaking opening.

11. The low water level toilet according to any one of claims 1 to 10, wherein the low water level toilet is further provided with an overflow pipe (15) mutually independent with respect to the spraying-type water delivery pipe (14), the overflow pipe (15) is integrally formed with the water storage tank (11) or independently arranged inside the water storage tank (11), and the overflow pipe (15) is in communication with the flush-ring water delivery pipe (13).

12. The low water level toilet according to claim 5, wherein the rotation shaft (52) is provided with a switch connecting block (53), the linkage device (6) is provided with a linkage connecting block (61) connected to the switch connecting block (53), and the linkage connecting block (61) is insertedly connected to the switch connecting block (53).

13. The low water level toilet according to claim 12, wherein the switch connecting block (53) is arranged as a gear wheel, and the linkage connecting block (61) is arranged as a gear rack configured to engage with the gear wheel.

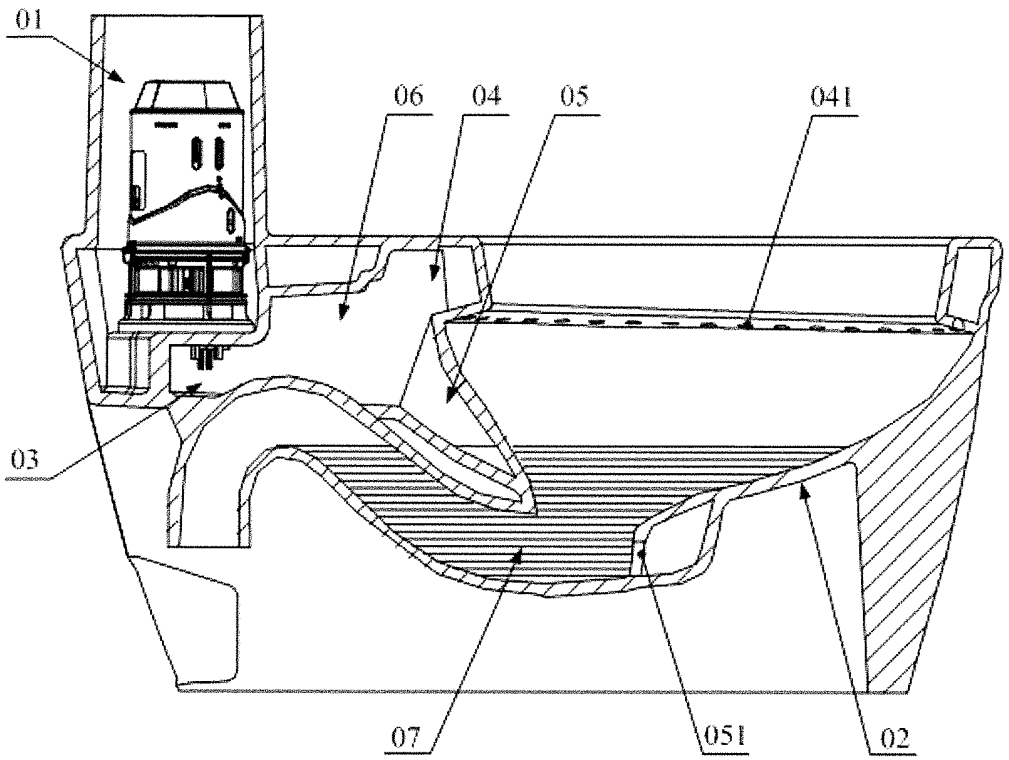

Figure 1

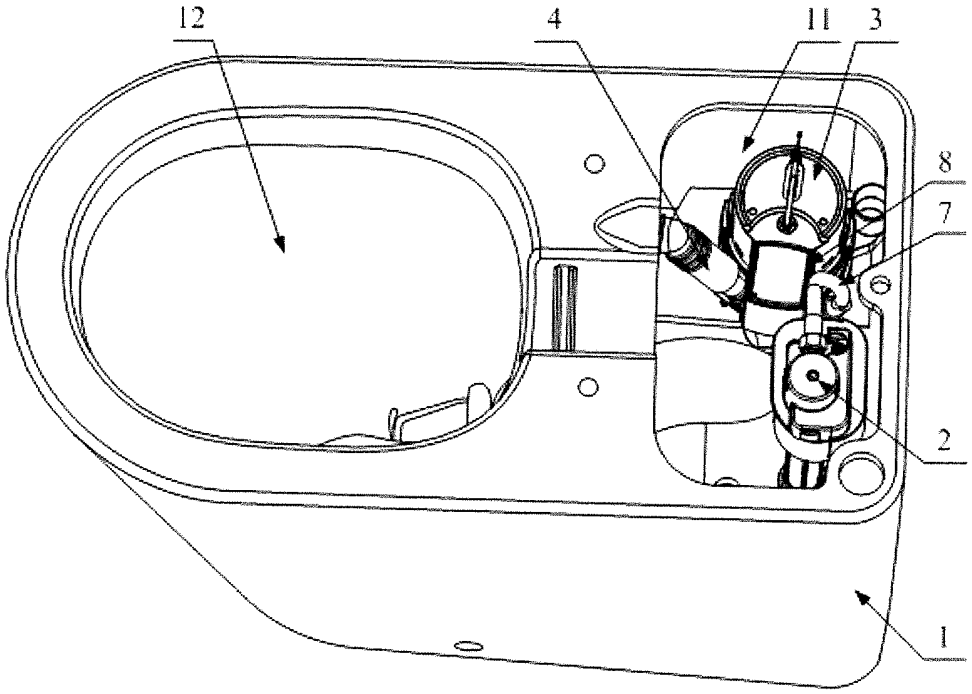

Figure 2

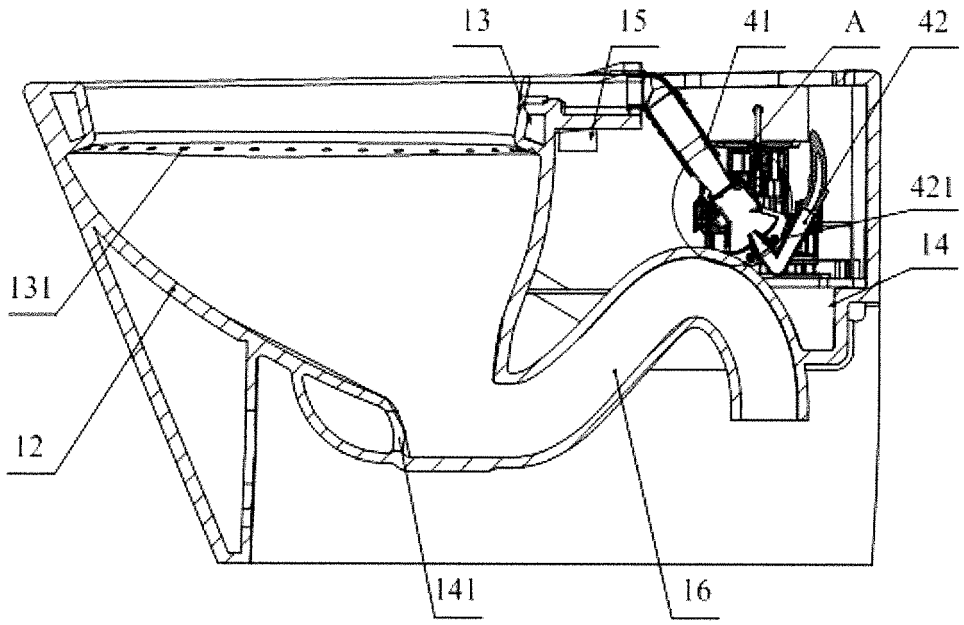

Figure 3

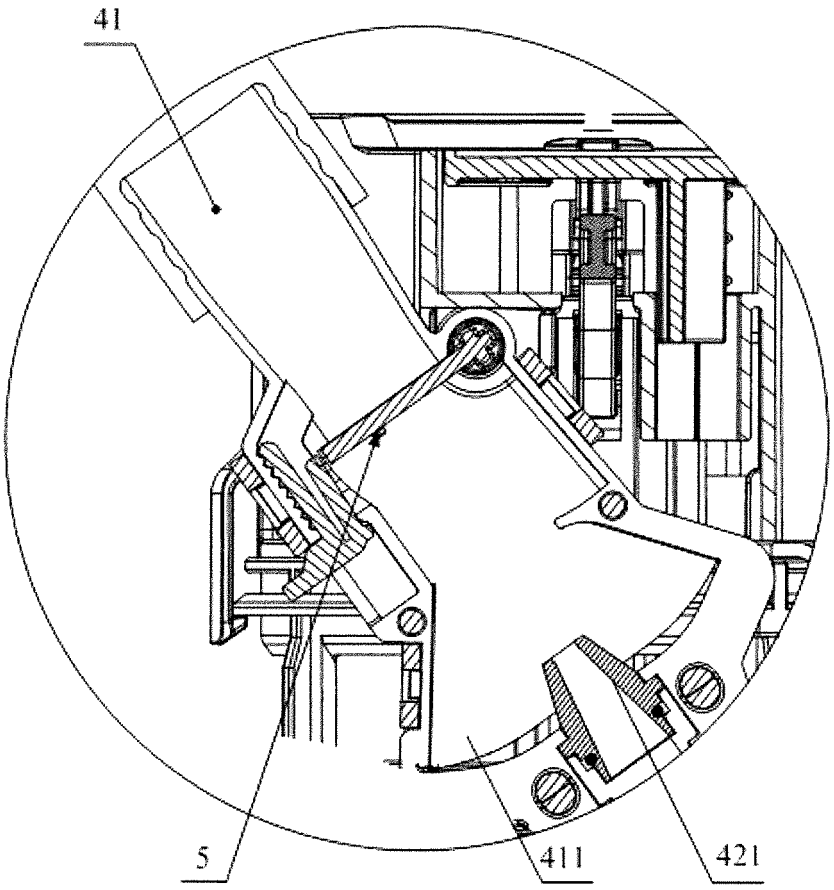

Figure 4

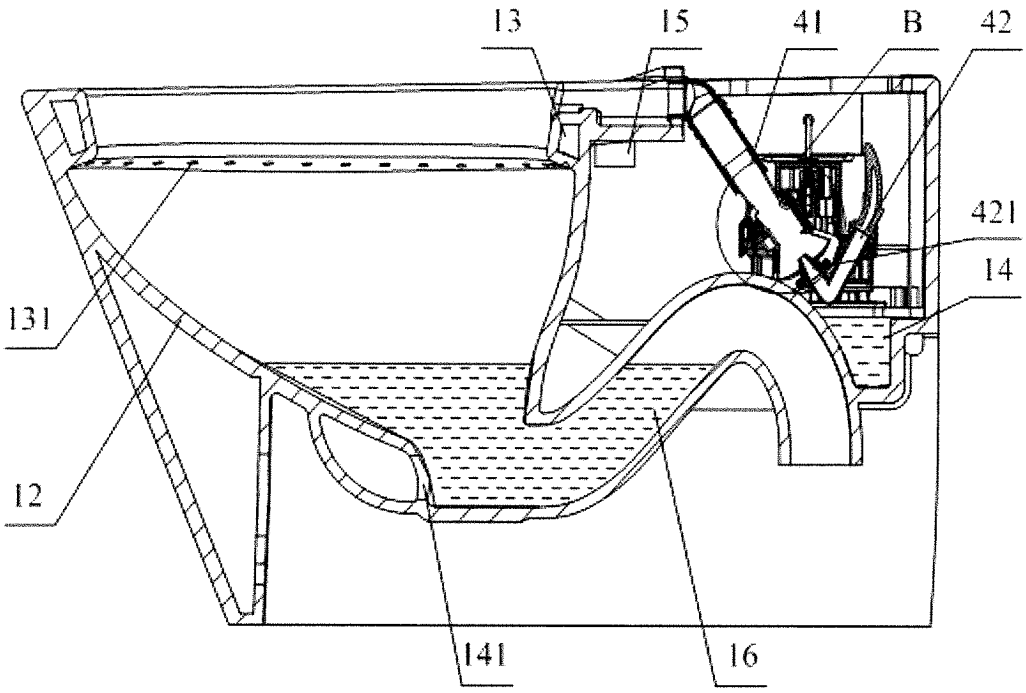

Figure 5

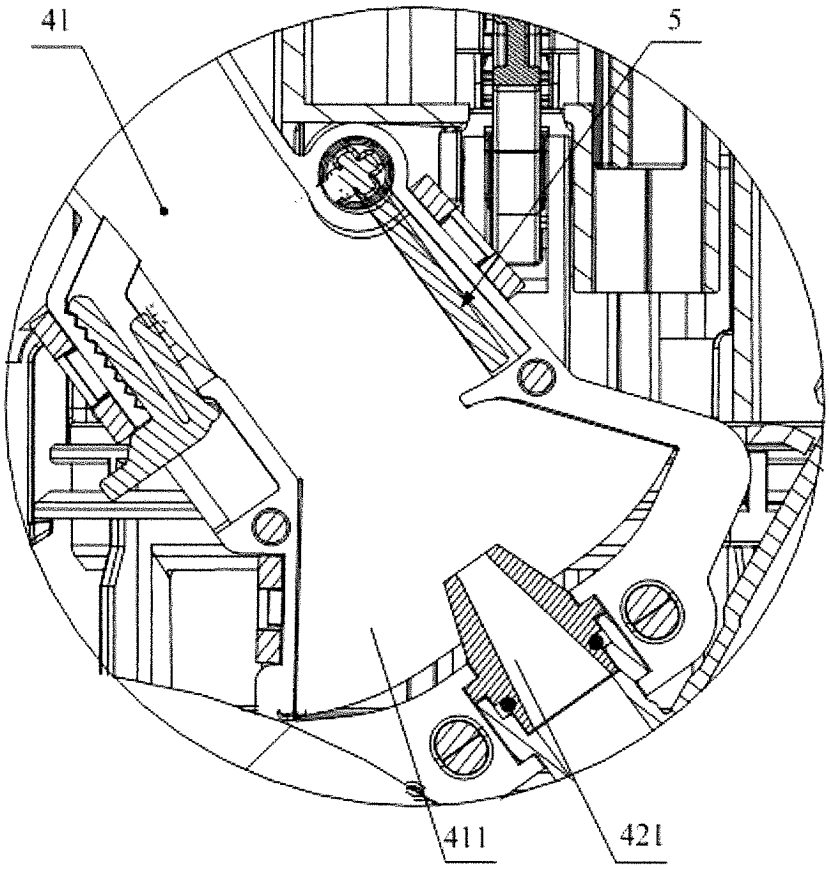

Figure 6

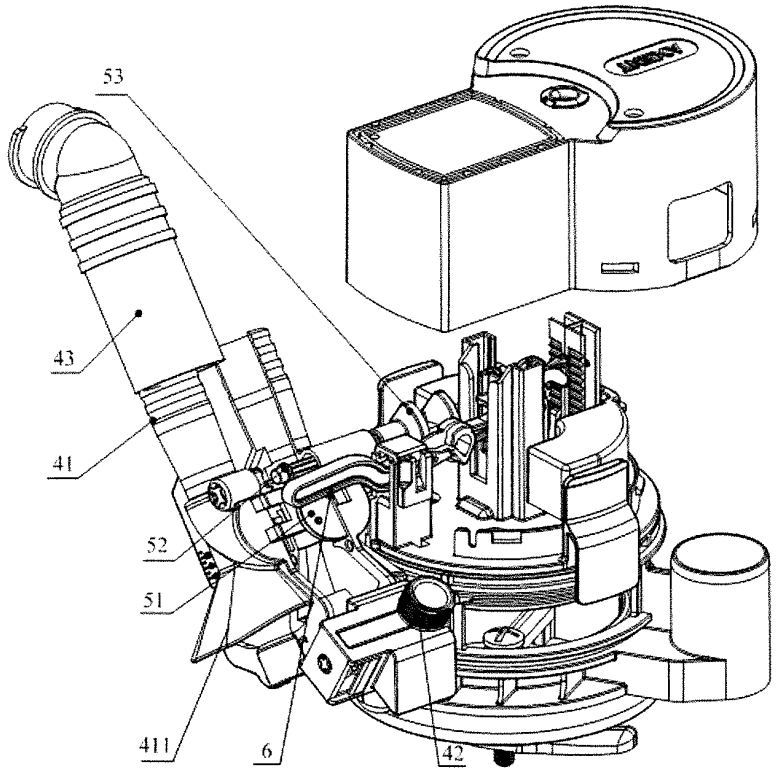

Figure 7

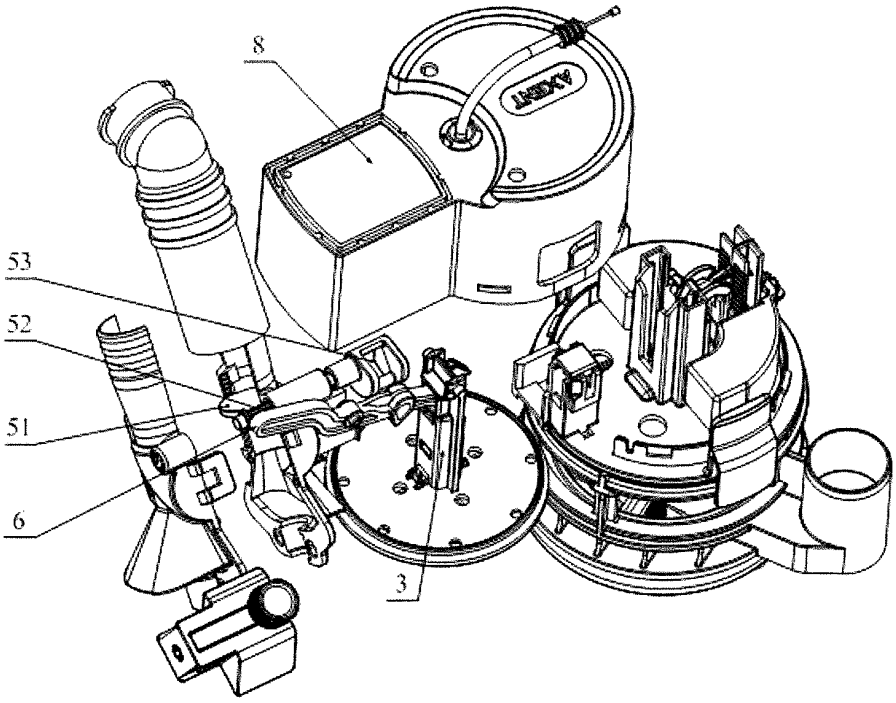

Figure 8

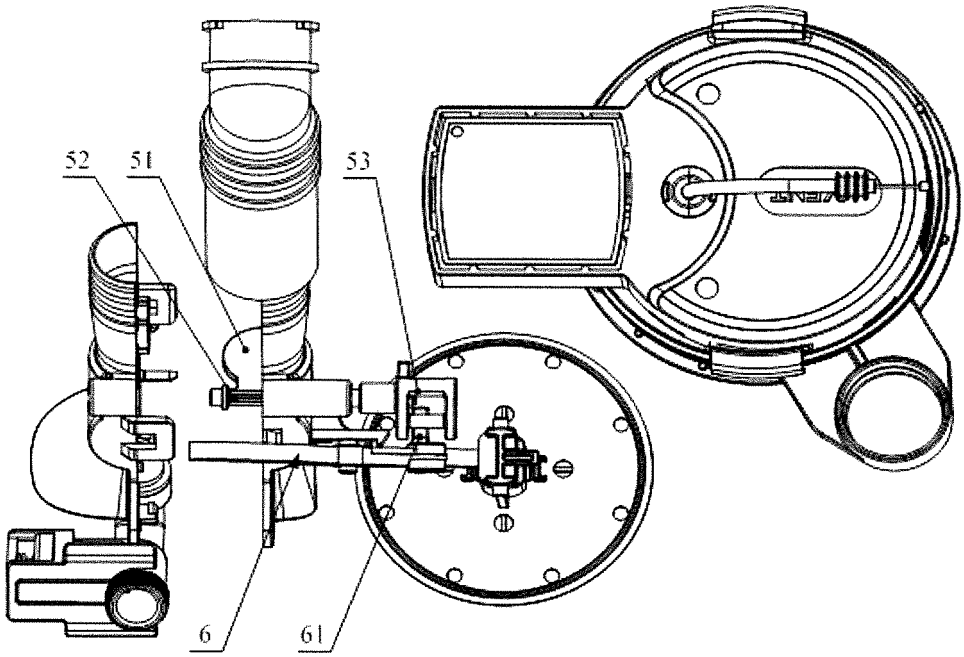

Figure 9

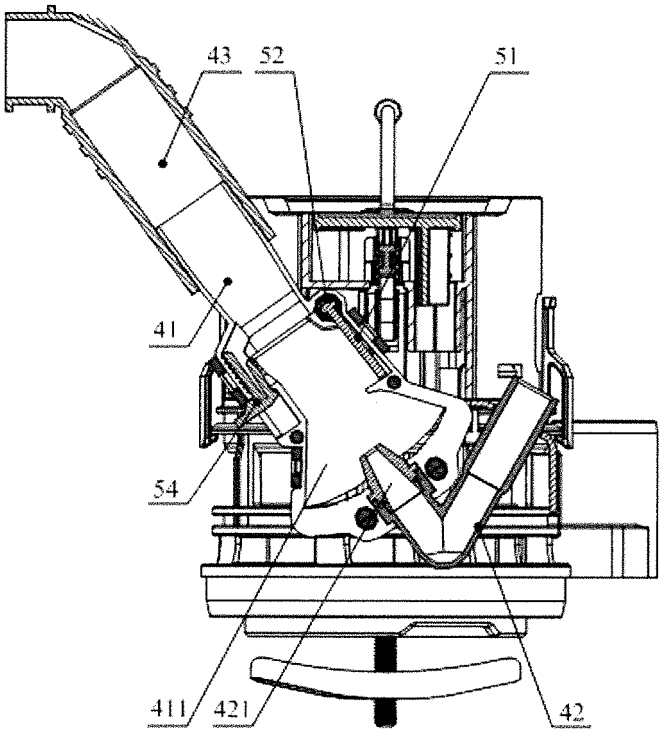

Figure 10

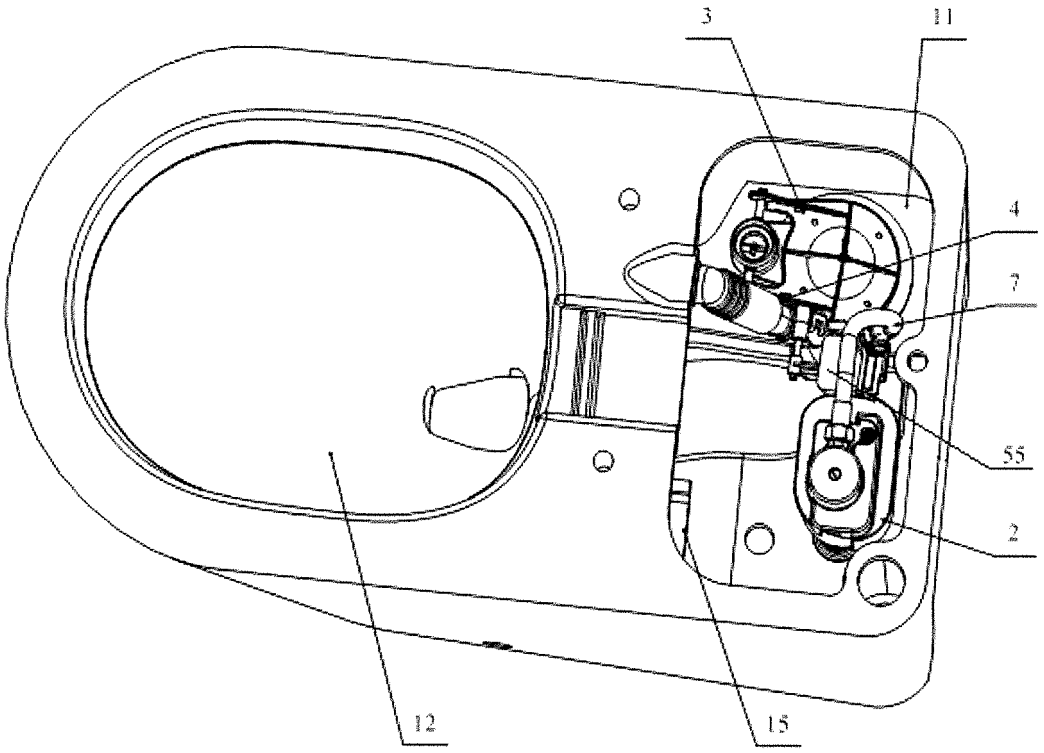

Figure 11

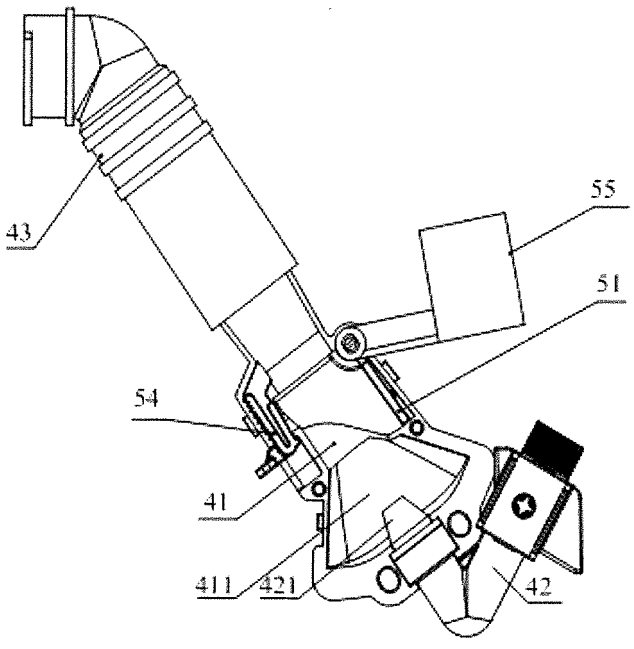

Figure 12

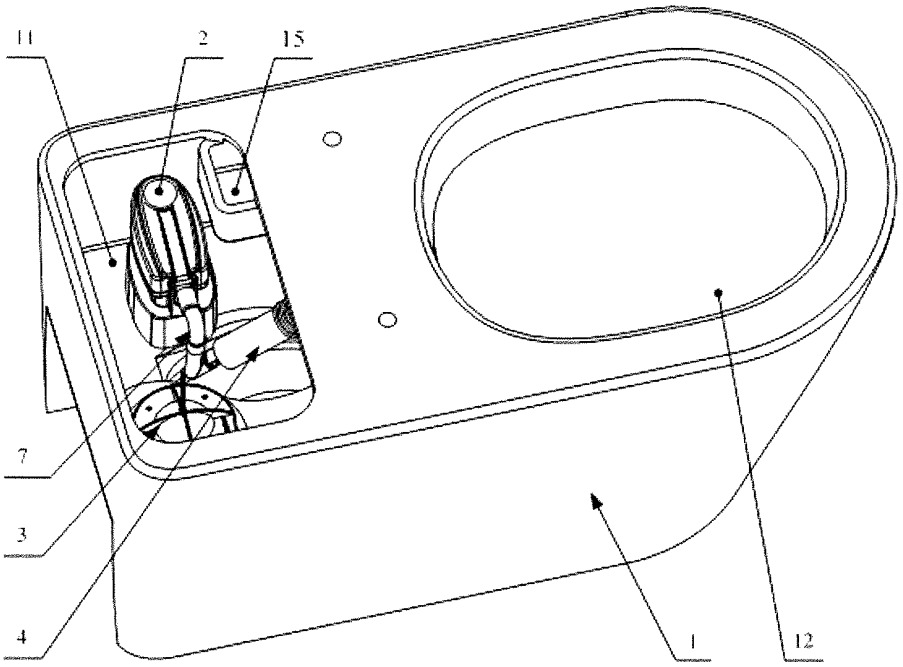

Figure 13

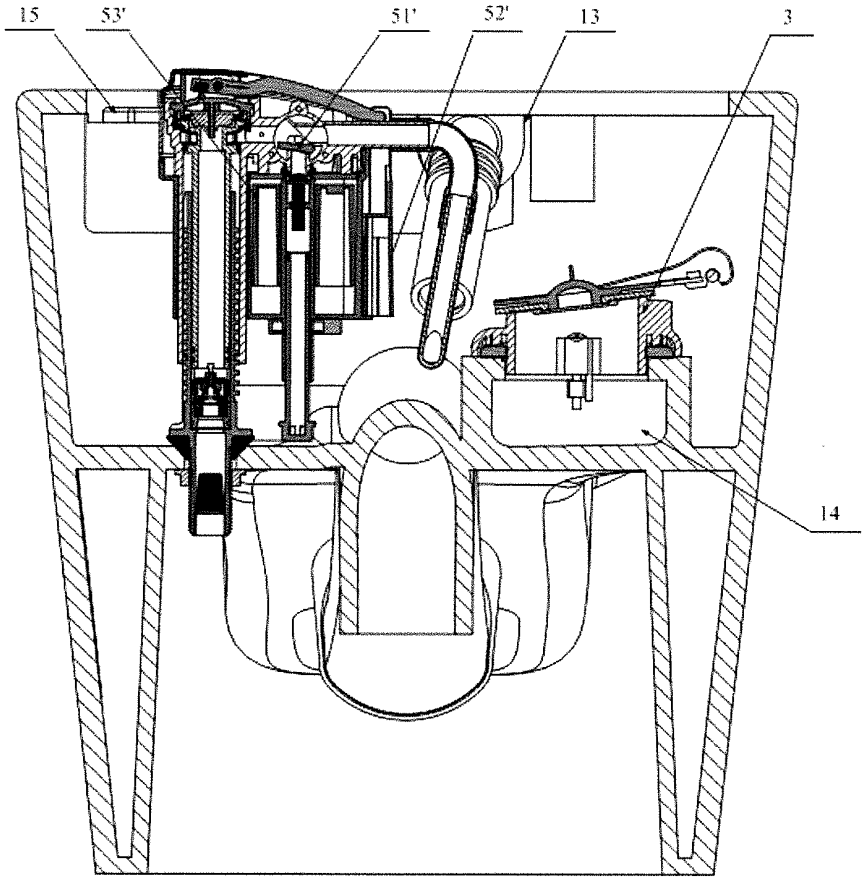

Figure 14

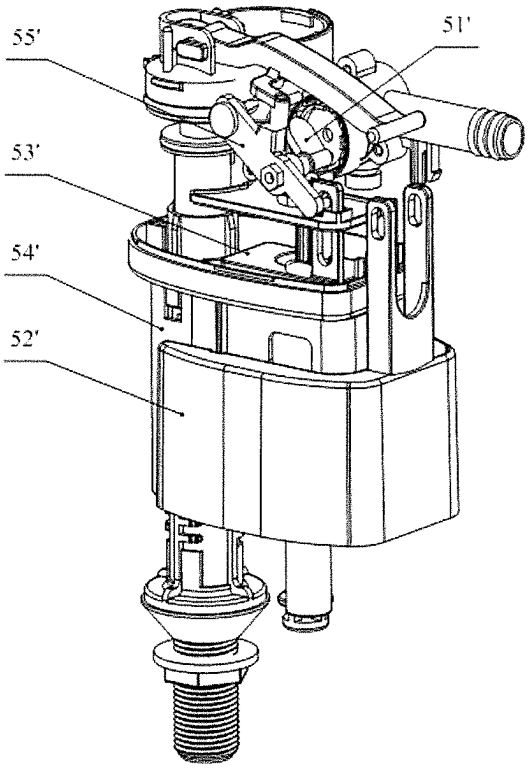

Figure 15

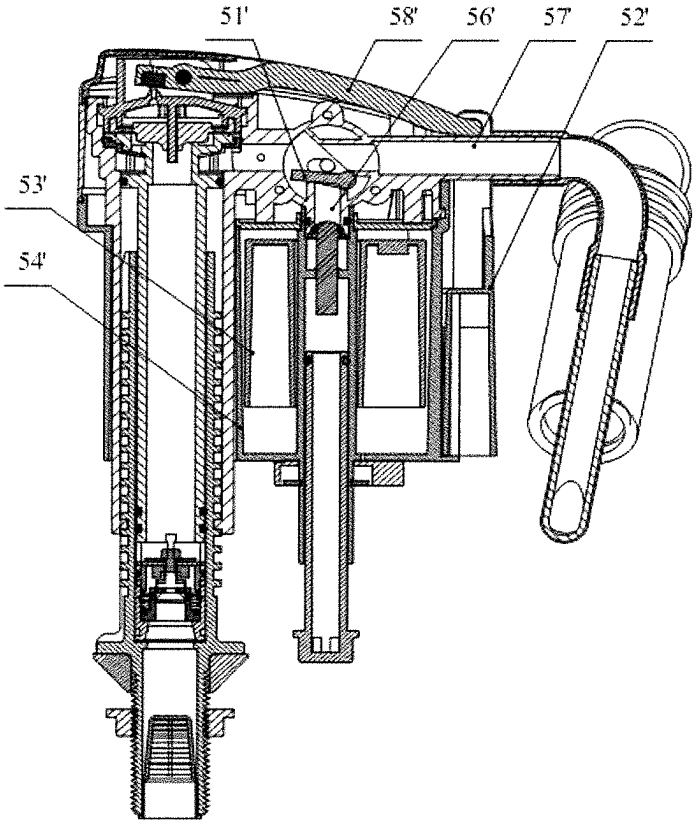

Figure 16

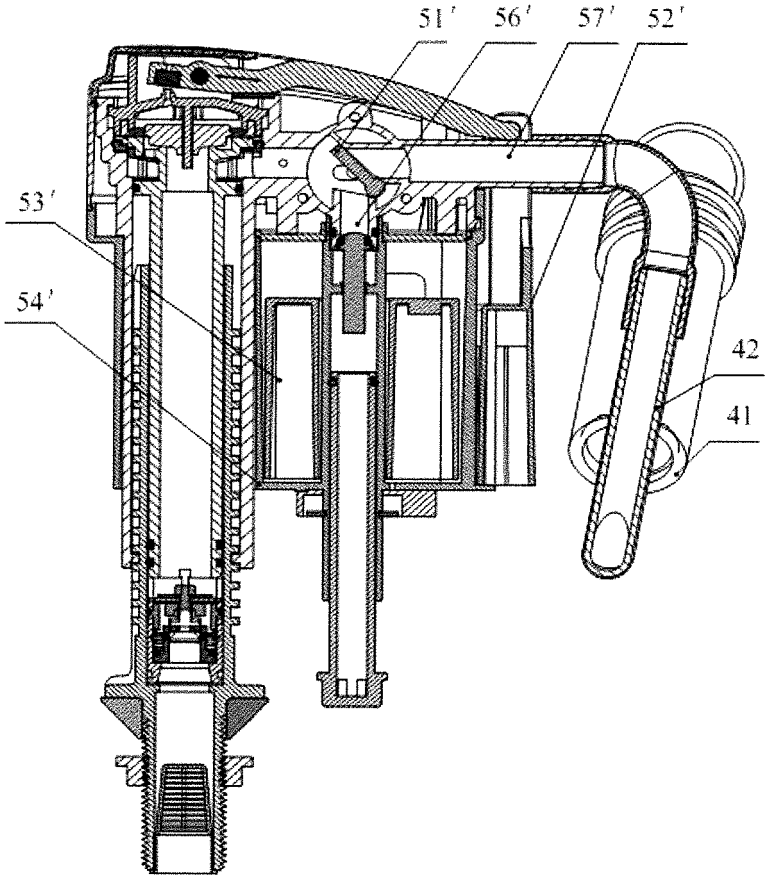

Figure 17

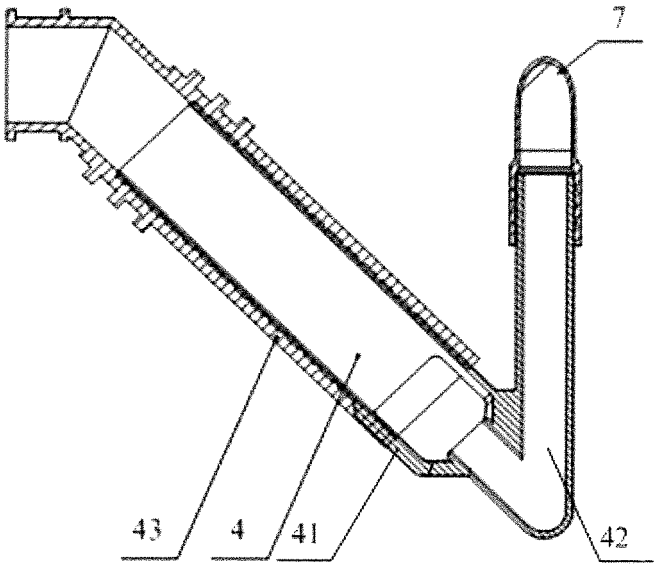

Figure 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/076081

A. CLASSIFICATION OF SUBJECT MATTER

E03D 1/24 (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)

E03D 1; E03D 11; F16K 33

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; SIPOABS; VEN; CNKI: brush cycle; TOTO; perisporium, scrub+, eject+, ring, negative w pressure

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 105735439 A (AXENT TECHNOLOGY (XIAMEN) CO., LTD.), 06 July 2016 (06.07.2016), claims 1-11, and description, paragraphs [0071] and [0073]	1-13
PX	CN 205475543 U (AXENT TECHNOLOGY (XIAMEN) CO., LTD.), 17 August 2016 (17.08.2016), claims 1-10, and description, paragraphs [0064], [0071] and [0073]	1-13
X	CN 203200866 U (XIAMEN LOTA INTERNATIONAL CO., LTD.), 18 September 2013 (18.09.2013), description, paragraphs [0022]-[0031], and figures 1-6	1-4, 9, 11
X	CN 103122653 A (XIAMEN LOTA INTERNATIONAL CO., LTD.), 29 May 2013 (29.05.2013), description, paragraphs [0017]-[0025], and figures 1-6	1-4, 9, 11
A	CN 201228384 Y (BEIJING XINQI INDUSTRY AND TRADE CO.), 29 April 2009 (29.04.2009), the whole document	1-13
A	CN 202214796 U (QUANZHOU KEMU INTELLIGENT KITCHEN AND TOILET CO., LTD.), 09 May 2012 (09.05.2012), the whole document	1-13
A	JP 2016011500 A (TOTO LTD.), 21 January 2016 (21.01.2016), the whole document	1-13

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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

"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

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 2017 (17.04.2017)	**09 May 2017 (09.05.2017)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **OU, Lan** Telephone No.: (86-10) **62084996**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/076081

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0945557 A2 (GEBERIT TECHNIK AG), 29 September 1999 (29.09.1999), the whole document	1-13

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/076081

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 105735439 A	06 July 2016	None	
CN 205475543 U	17 August 2016	None	
CN 203200866 U	18 September 2013	None	
CN 103122653 A	29 May 2013	CN 103122653 B	08 April 2015
CN 201228384 Y	29 April 2009	None	
CN 202214796 U	09 May 2012	None	
JP 2016011500 A	21 January 2016	None	
EP 0945557 A2	29 September 1999	EP 0945557 A3	02 February 2000
		CA 2266766 A1	24 September 1999
		US 6148449 A	21 November 2000
		DE 59908389 D1	04 March 2004
		AT 258625 T	15 February 2004
		EP 0945557 B1	28 January 2004
		CN 1232906 A	27 October 1999
		DE 29900260 U1	24 June 1999

Form PCT/ISA/210 (patent family annex) (July 2009)