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(54) Automatic flushing system for toilet and electronic bidet toilet having the same

(57) An automatic flushing system for toilet and an electronic bidet toilet having the same are disclosed. The automatic flushing system for toilet has an overflow passage connecting an overflow port of a tank or a vacuum breaker to a toilet bowl. The overflow passage includes a first overflow line having a first end fixedly connected to a tank overflow port and a second end fixedly connected to a rim outlet of the toilet bowl, and a second overflow line having a first end fixedly connected to a vacuum breaker overflow port and a second end fixedly connected to a jet outlet of the toilet bowl. According to the present utility model, the overflow problem of the water and vacuum breaker is solved and generation of bubbles in the vacuum breaker during overflowing is eliminated.

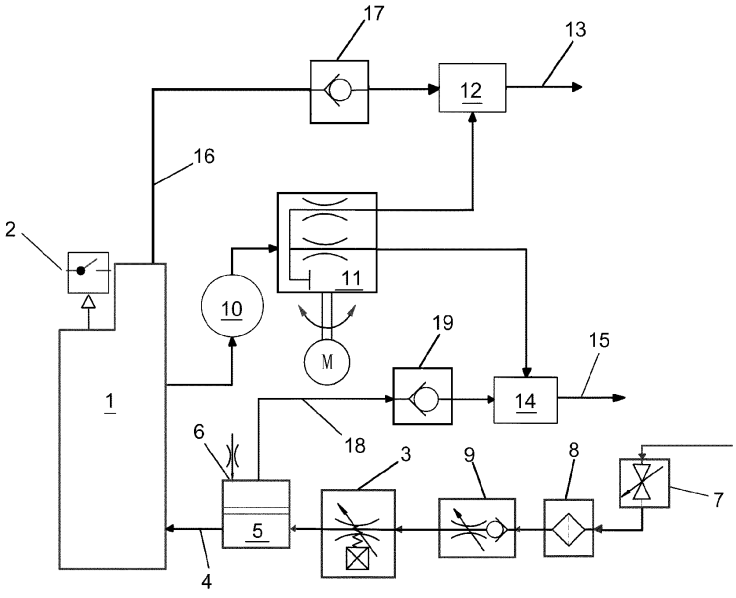

FIG.1

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Description

Technical Field

[0001] The present utility model relates to an automatic flushing system for toilet and an electronic bidet toilet (EBT) having the system.

Description of the Related Art

[0002] A tank of an EBT is provided with a float switch, which activates an electromagnetic inlet valve when the water level in the tank is lowered after flushing, and which deactivates the electromagnetic inlet valve when the water level rises up to a predetermined level so as to prevent overflow of water due to further increase of water. In the case of malfunction of the float switch or the electromagnetic inlet valve, water in the tank may leak out from an interface with a tank cover or from a vent hole in the side wall of the tank.

[0003] In addition, a vacuum breaker is disposed in a water inlet line of the toilet to prevent reflux of waste water, and the vacuum breaker may also be subjected a problem of overflow. As to the overflow problem of the vacuum breaker, a known solution is to connect an air inlet of the vacuum breaker to the vent hole of the tank via an overflow tube so as to allow the excessive water in the vacuum breaker to flow into the tank through the overflow tube. However, this solution fails to solve the overflow problem of both the tank and the vacuum breaker, and moreover, bubbles may be generated in the vacuum breaker during overflowing.

Summary of the Utility Model

[0004] An objective of the present utility model is to provide an automatic flushing system for toilet, which can solve the overflow problem of a tank and a vacuum breaker of the toilet.

[0005] A first aspect of the present utility model provides an automatic flushing system for toilet, which comprises a tank and a vacuum breaker, and further comprises at least one overflow passage connecting an overflow port of the tank or the vacuum breaker to a toilet bowl.

[0006] In a favorable embodiment, the at least one overflow passage includes a first overflow line having a first end fixedly connected to a tank overflow port and a second end fixedly connected to a rim outlet of the toilet bowl, and a second overflow line having a first end fixedly connected to a vacuum breaker overflow port and a second end fixedly connected to a jet outlet of the toilet bowl.

[0007] In another favorable embodiment, the at least one overflow passage includes a first overflow line having a first end fixedly connected to a tank overflow port and a second end fixedly connected to a jet outlet of the toilet bowl, and a second overflow line having a first end fixedly connected to a vacuum breaker overflow port and a second end fixedly connected to a rim outlet of the toilet bowl.

[0008] Preferably, the first overflow line includes a first check valve which is normally open in a direction from the first end to the second end of the first overflow line and blocks flow in an opposite direction, and the second overflow line includes a second check valve which is normally open in a direction from the first end to the second end of the second overflow line and blocks flow in an opposite direction.

[0009] Further preferably, the first check valve is vertically mounted with an end thereof which opens to the tank overflow port being located upward, and the second check valve is vertically mounted with an end thereof which opens to the vacuum breaker overflow port being located upward.

[0010] Further preferably, the first and second check valves each include a valve seat and a floating ball below the valve seat.

[0011] A second aspect of the present utility model provides an EBT having the aforesaid automatic flushing system for toilet.

[0012] According to the present utility model, by arranging an overflow passage communicating the overflow port of the tank or the vacuum breaker with a rim outlet or a jet outlet of the toilet bowl, overflow problem of the tank or the vacuum breaker can be solved, and bubbles in the vacuum breaker during overflowing is eliminated.

[0013] In addition, a reflux of waste water via the overflow passage during flushing can be prevented by arranging a check valve in the overflow passage, in particular in the overflow line for the vacuum breaker.

[0014] In addition, by vertically mounting the check valve in the overflow line with the valve seat being located above the floating ball, the reflux can be effectively prevented with a simple structure.

Brief Description of the Drawings

[0015]

Fig. 1 is a schematic view of an automatic flushing system for toilet according to an embodiment of the present utility model.

Fig. 2 is a structural view of a check valve used in the automatic flushing system for toilet shown in Fig. 1.

Detailed Description of Preferred Embodiments

[0016] Fig. 1 schematically shows an automatic flushing system for toilet according to an embodiment of the present utility model. The automatic flushing system for toilet according to the present utility model may be applied to an EBT capable of automatically flushing after use of the toilet by a user. For example, an infrared inductive probe may be provided on the front side wall of the tank to initiate flushing when detecting that the user

has just left after using the toilet. As an alternative, a pressure sensor may be provided at the bottom of the toilet seat to detect seating on the toilet seat and leaving of a user and to accordingly initiate flushing.

[0017] The automatic flushing system for toilet comprises a tank 1. As shown in Fig. 1, a float switch 2, which is connected with a float inside the tank 1, is attached to the tank 1. After flushing, water level in the tank 1 is lowered and the float accordingly drops due to the gravity. Then, the float switch 2 is turned on and an electromagnetic inlet valve 3 is correspondingly opened, and tap water from a water supply pipe flows into the tank 1 through a water inlet line 4. With increase of water inside the tank 1, the float rises as the floating force overcomes the gravity force. When the float rises up to a predetermined water level, the float switch 2 is turned off and the electromagnetic inlet valve 3 is correspondingly closed, and water inflow of the tank 1 is stopped.

[0018] In order to prevent reflux of waste water in the water inlet line 4 when a negative pressure occurs due to various reasons, a vacuum breaker 5 is disposed in the water inlet line 4. The vacuum breaker 5 has an air inlet 6 which, in a normal state, is covered by a plate. When a negative pressure occurs in the water inlet line 4, the plate is pushed aside under the action of outside atmospheric pressure, so that external air can flow into the vacuum breaker 5 via the air inlet 6 to compensate negative pressure in the water inlet line 4. A master shut-off valve 7, a filter 8 and a non-return flux regulator 9 are disposed between the water supply line and the vacuum breaker 5, and the structures and functions of these components are well-known to those skilled in the art and thus detailed description thereof are omitted herein.

[0019] The outlet or flushing port of the tank 1 is connected to a distribution valve 11 via a pressure pump 10. The distribution valve 11 switches water from the tank 1 under control of a stepper motor M, such that the water selectively flows to the rim outlet of the toilet bowl via a first adaptor 12 and a first hose 13 or flows to the jet outlet of the toilet bowl via a second adaptor 14 and a second hose 15. The stepper motor M and the distribution valve 11 may control the water from the tank 1 such that it flows to both the rim outlet of the toilet bowl and the jet outlet of the toilet bowl, and may control a flow rate ratio therebetween.

[0020] In case of malfunction of the float in the tank 1 or the float switch 2 connected thereto, or in case of malfunction of the electromagnetic inlet valve 3, water may keep on flowing into the tank 1, resulting in that the excessive water in the tank 1 leaks out form an interface with the tank cover. In view of this, the automatic flushing system for toilet according to present utility model is provided with a first overflow system, which comprises a tank overflow port within the tank 1 and a first overflow line 16 connecting the tank overflow port to the first adaptor 12. The tank overflow port is located inside the tank above the predetermined water level at which the float switch 2 is turned off. When all the components of the system are in normal operation, the water level in the tank 1 will not exceed the predetermined water level, so the first overflow system need not to work. When the water level in the tank 1 exceeds the predetermined water level and reaches the tank overflow port due to failure of the float and the like, the excessive water outflows from the tank overflow port and flows to the first adaptor 12 via the first overflow line 16, and then flows to the rim outlet of the toilet bowl via the first hose 13 and enters into the toilet bowl. As shown in Fig. 1, the first overflow system is further provided with a first check valve 17 in the first overflow line 16. The first check valve 17 is normally open in a direction from the tank overflow port to the first adaptor 12 and blocks flow in a direction from the first adaptor 12 to the tank overflow port.

[0021] In order to solve the overflow problem of the vacuum breaker 5, the automatic flushing system for toilet according to the present utility model is further provided with a second overflow system, which comprises a vacuum breaker overflow port and a second overflow line 18 connecting the vacuum breaker overflow port to the second adaptor 14. As shown in Fig. 1, the second overflow system is provided with a second check valve 19 in the second overflow line 18. The second check valve 19 is normally open in a direction from the vacuum breaker overflow port to the second adaptor 14 and blocks flow in a direction from the second adaptor 14 to the vacuum breaker overflow port. The excessive water in the vacuum breaker 5 outflows from the vacuum breaker overflow port and flows to the second adaptor 14 via the second overflow line 18, and then flows to the jet outlet of the toilet bowl via the second hose 15 and enters into the toilet bowl.

[0022] Fig. 2 illustrates a schematic structure of the first check valve 17 and the second check valve 19. Each of the check valves, as shown in Fig. 2, is vertically mounted and includes a valve seat 20 and a floating ball 21 located below the valve seat 20. An end of the first check valve 17 which opens to the tank overflow port is located upward, while the other end which opens to the rim outlet of the toilet bowl is located downward. An end of the second check valve 19 which opens to the vacuum breaker overflow port is located upward, while the other end which opens to the jet outlet of the toilet bowl is located downward. The water overflowing from the tank 1 or the vacuum breaker 5 forces the floating ball 21 to move downwardly away from the valve seat 20, so that the check valve is kept open in a direction toward the rim outlet or the jet outlet of the toilet bowl. On the other hand, the flushing water flowing into the first overflow line 16 or the second overflow line 18 during flushing presses the floating ball 21 upwardly against the valve seat 20. Even in a non-flushing state or when a reflux occurs due to negative pressure in the water inlet line 4, the floating force of the waste water in the first overflow line 16 or the second overflow line 18 will press the floating ball 21 against the valve seat 20. Therefore, it is possible to ensure that the check valve is kept in a closed state in a

direction toward the tank overflow port or the vacuum breaker overflow port, thereby preventing the waste water flowing into the tank or the vacuum breaker via the overflow system.

[0023] In the above embodiment described with reference to Fig. 1, the overflow port of the tank 1 is connected to the rim outlet of the toilet bowl via the first overflow line 16, and the overflow port of the vacuum breaker 5 is connected to the jet outlet of the toilet bowl via the second overflow line 18. However, the present utility model is not limited to this. The first overflow line 16 may connect the overflow port of the tank to the jet outlet of the toilet bowl, and the second overflow line 18 may connect the overflow port of the vacuum breaker to the rim outlet of the toilet bowl.

[0024] In addition, although the automatic flushing system for toilet in the above embodiment is provided with a first overflow system for the tank 1 and a second overflow system for the vacuum breaker 5, the present utility model is not limited to this. In another embodiment, it is possible to provide only one overflow system for connecting the overflow port of the tank to the rim outlet or the jet outlet of the toilet bowl. In still another embodiment, it is possible to provide only one overflow system for connecting the overflow port of the vacuum breaker to the jet outlet or the rim outlet of the toilet bowl.

[0025] While the preferred embodiments of the present utility model have been described hereinabove, they shall not be construed as limiting or restricting this utility model, and various improvements and modifications may be made by those skilled in the art without departing from the scope of the present utility model. Other embodiments can also be obtained by those skilled in the art with reference to the disclosure herein. The description and the embodiments shall be considered as exemplary only, and the true scope of this utility model is defined by the annexed claims and their equivalents.

Claims

1. An automatic flushing system for toilet, comprising a tank and a vacuum breaker, **characterized by** at least one overflow passage connecting an overflow port of the tank or of the vacuum breaker to a toilet bowl.

2. The automatic flushing system for toilet according to claim 1, **characterized in that** the at least one overflow passage includes a first overflow line having a first end fixedly connected to a tank overflow port and a second end fixedly connected to a rim outlet of the toilet bowl, and a second overflow line having a first end fixedly connected to a vacuum breaker overflow port and a second end fixedly connected to a jet outlet of the toilet bowl.

3. The automatic flushing system for toilet according to claim 1, **characterized in that** the at least one overflow passage includes a first overflow line having a first end fixedly connected to a tank overflow port and a second end fixedly connected to a jet outlet of the toilet bowl, and a second overflow line having a first end fixedly connected to a vacuum breaker overflow port and a second end fixedly connected to a rim outlet of the toilet bowl.

4. The automatic flushing system for toilet according to claim 2 or 3, **characterized in that** the first overflow line includes a first check valve which is normally open in a direction from the first end to the second end of the first overflow line and blocks flow in an opposite direction, and the second overflow line includes a second check valve which is normally open in a direction from the first end to the second end of the second overflow line and blocks flow in an opposite direction.

5. The automatic flushing system for toilet according to claim 4, **characterized in that** the first check valve is vertically mounted with an end thereof which opens to the tank overflow port being located upward, and the second check valve is vertically mounted with an end thereof which opens to the vacuum breaker overflow port being located upward.

6. The automatic flushing system for toilet according to claim 5, **characterized in that** the first and second check valves each include a valve seat and a floating ball below the valve seat.

7. An electronic bidet toilet **characterized by** having the automatic flushing system for toilet according to any one of claims 1-6.

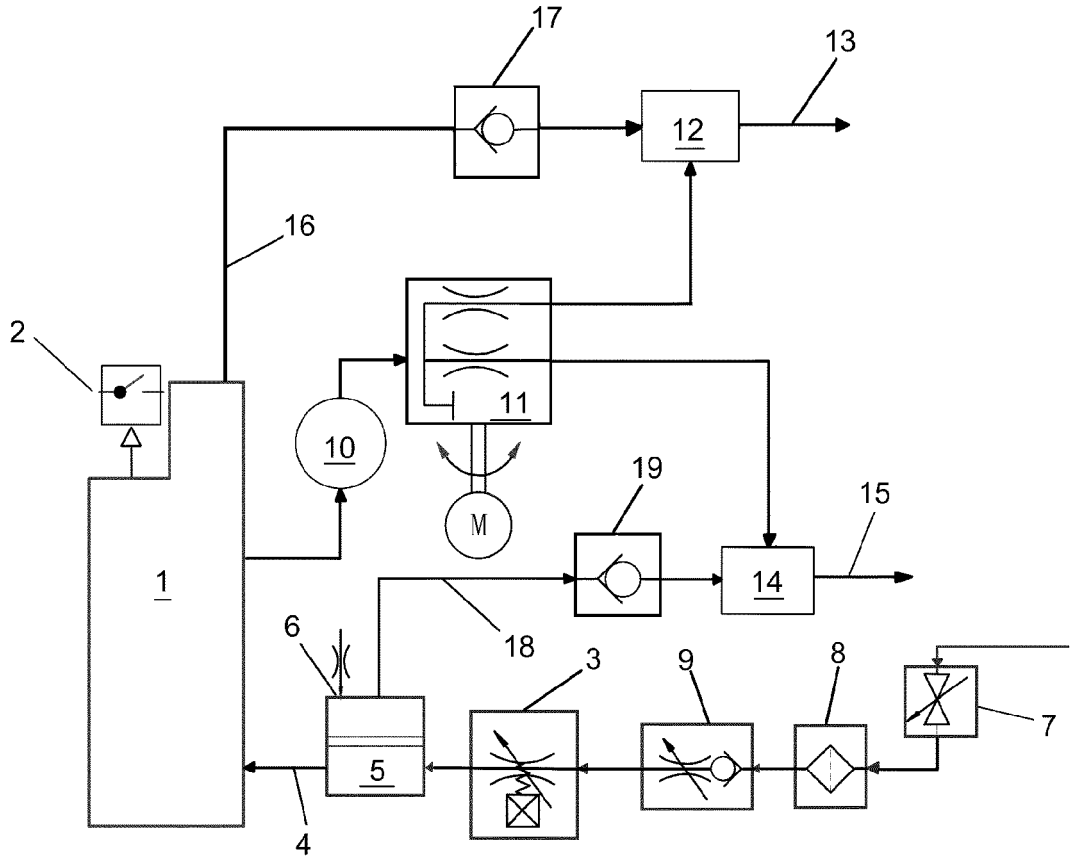

FIG.1

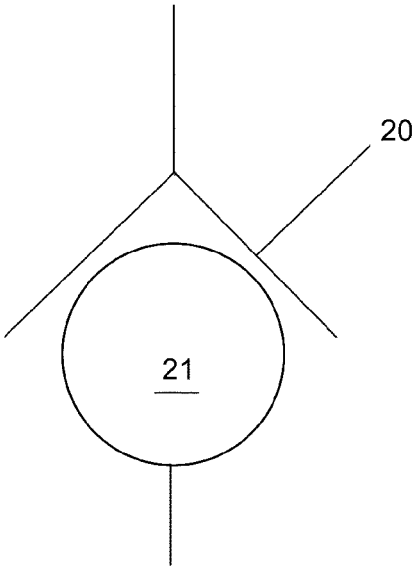

FIG. 2