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(54) **TOILET DEVICE**

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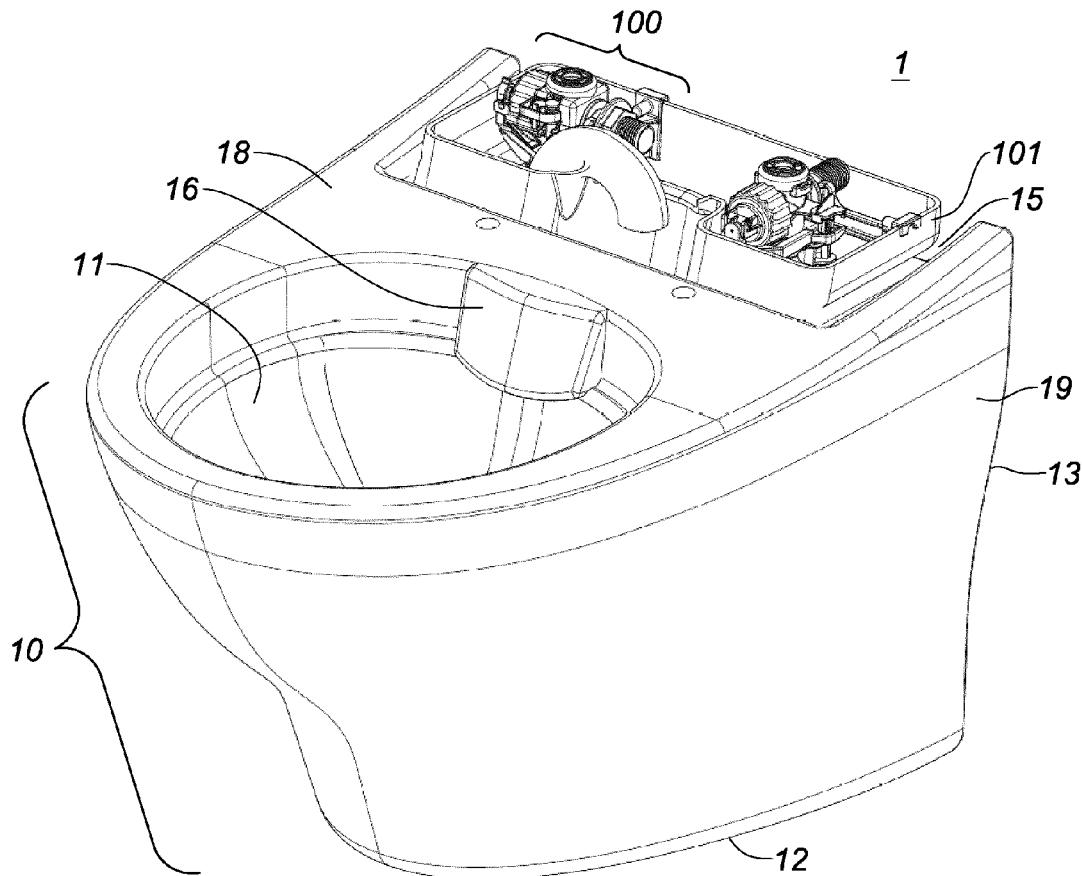
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(57) **ABSTRACT**

The invention relates to a device for toilets (1) comprising (i) a bowl (10) and (ii) a flushing device (100) juxtaposed with the bowl (10), which comprises a reservoir (101) able to contain a flushing liquid and in which are installed the means for ejection of the flushing liquid, comprising a column (114) connected to a pressurized water main and opening into the bowl (10) and a Venturi tube (130) interposed between the pressurized water main and the column (114), the Venturi tube (130) being positioned substantially at the bottom of the reservoir (101) to ensure reduction of pressure of the pressurized water and suction of the liquid contained in the reservoir (101) to drive the liquid into the bowl (10), and comprising a large flush float (127) or a small flush float (128) connected to a manual triggering actuator and a rod (126) controlling the arrival of pressurized water in the ejection means.



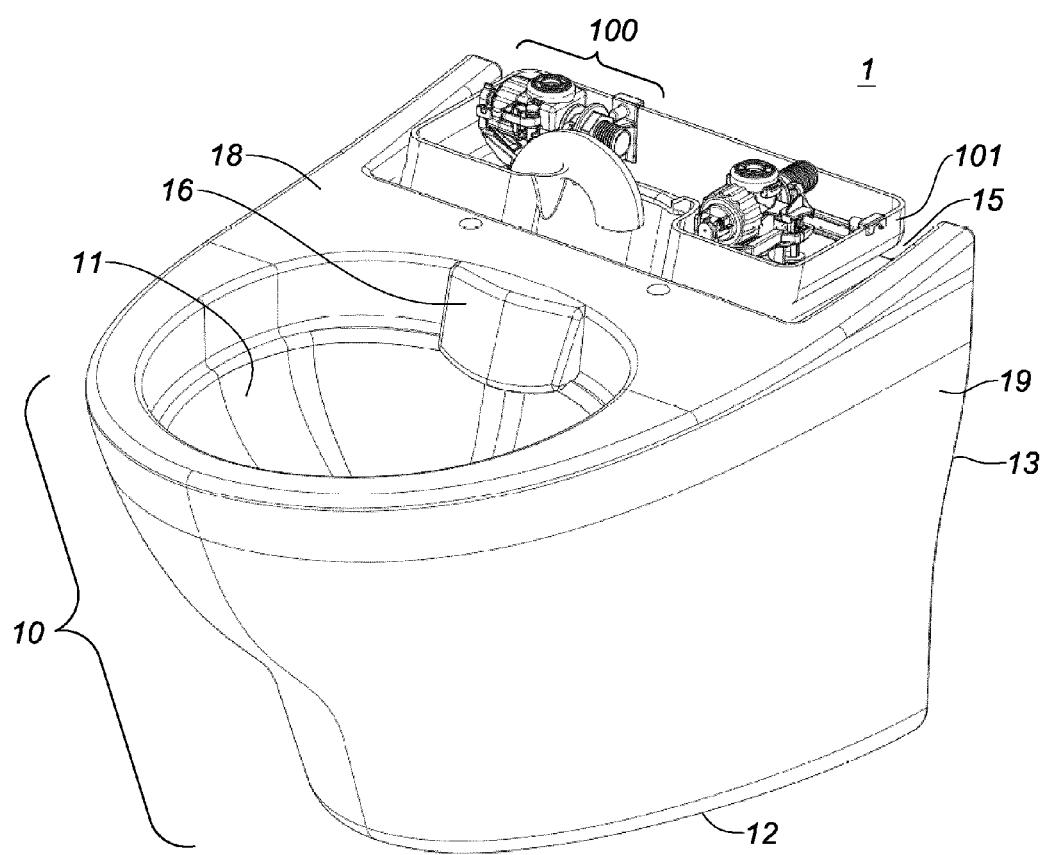


Fig. 1

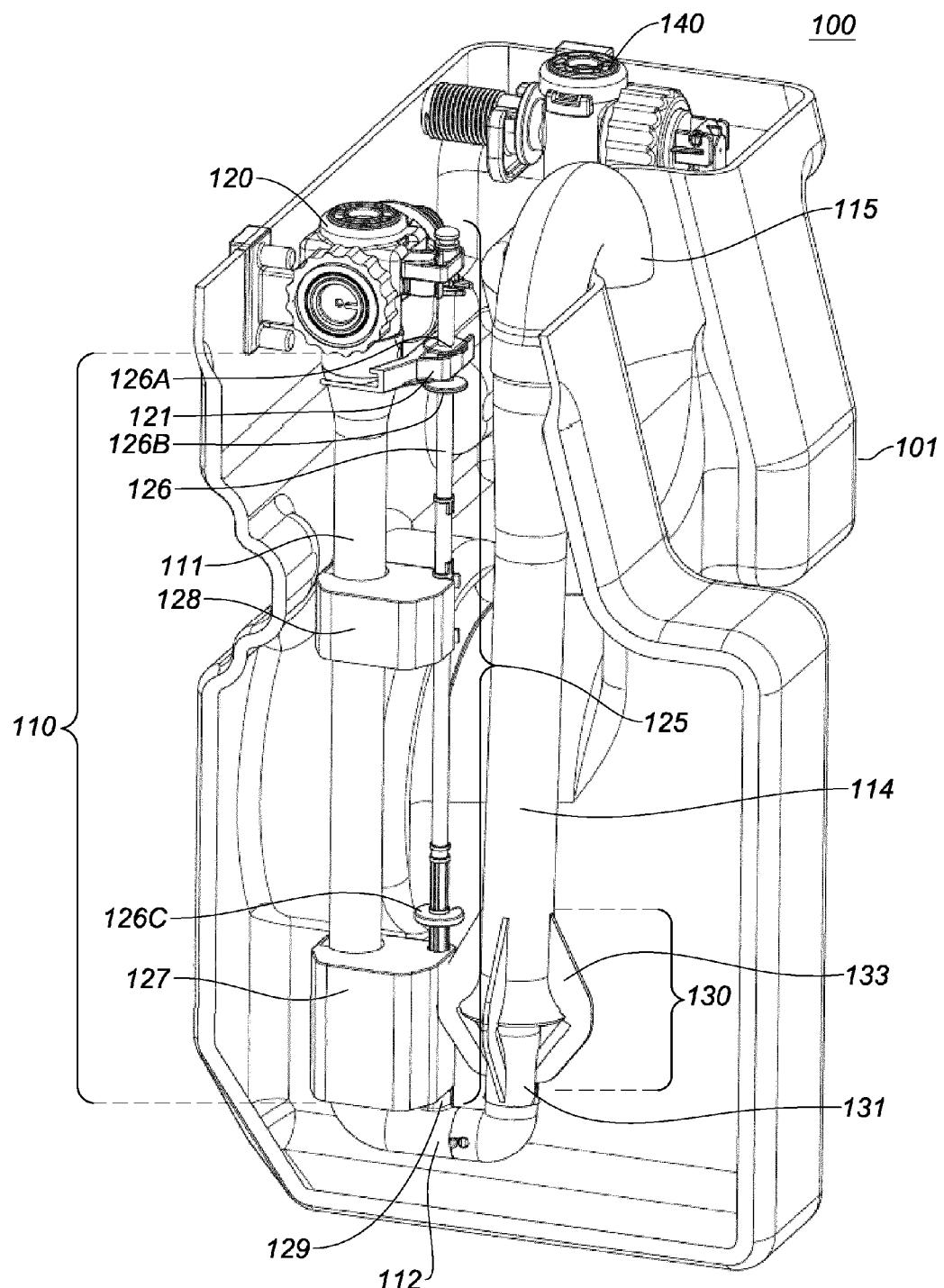


Fig. 2

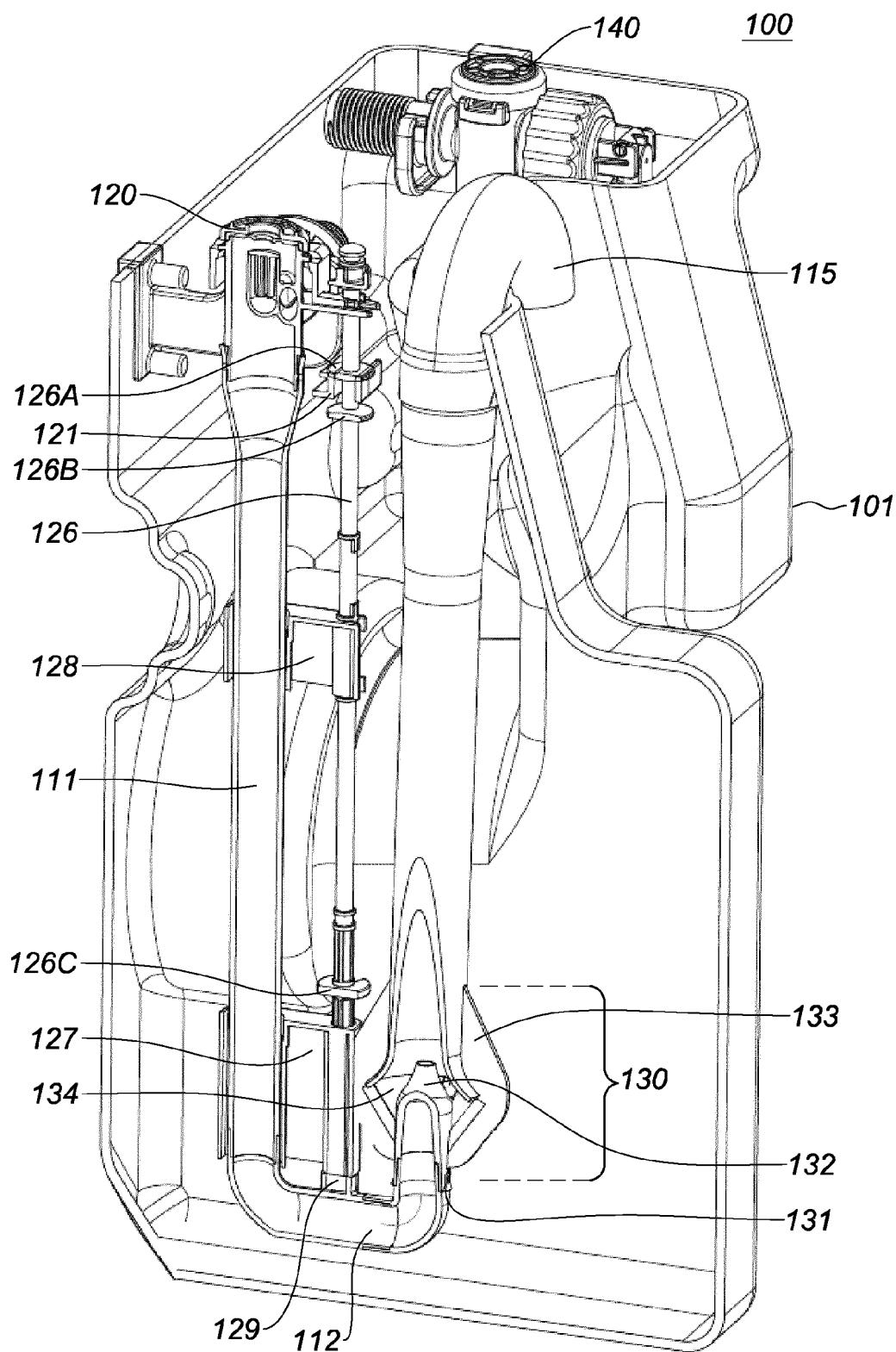


Fig. 3

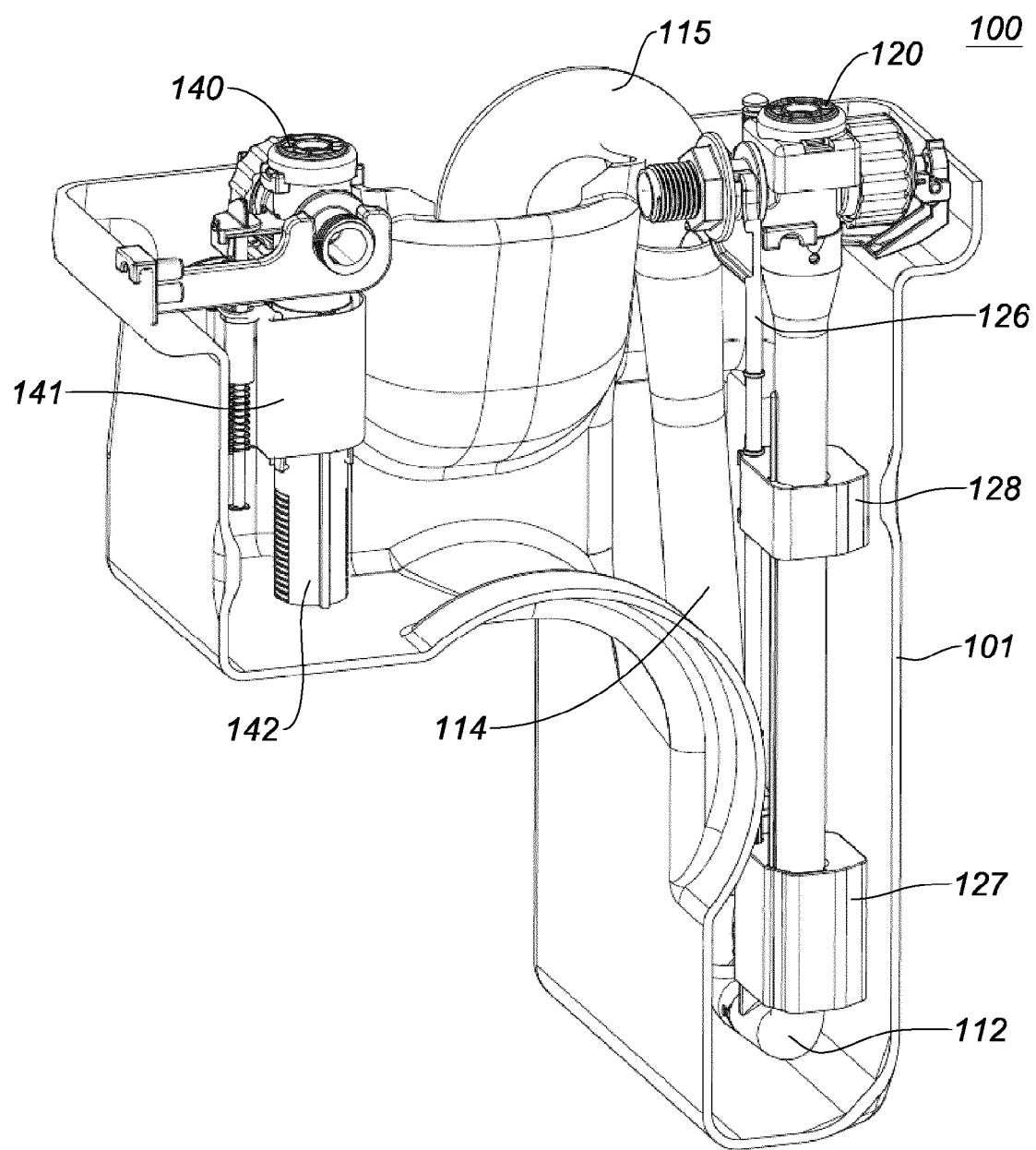


Fig. 4

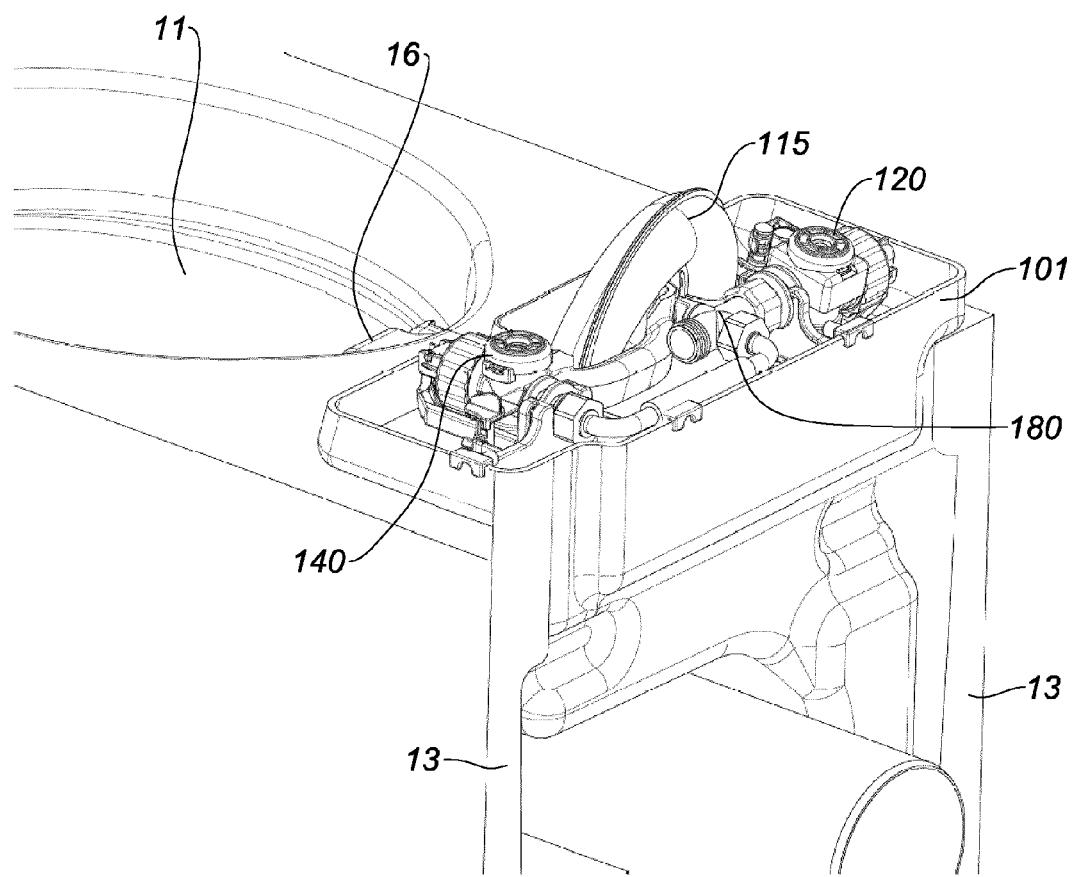


Fig. 5

TOILET DEVICE

RELATED APPLICATIONS

[0001] This application is a National Phase Application of Patent Application PCT/EP2015/067829 filed on Aug. 3, 2015, which claims the benefit of and priority to French Patent Application No. 14/57506 filed on Aug. 1, 2014, the contents each of which are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The present invention concerns a toilet device and more particularly a device for draining a flush tank.

BACKGROUND

[0003] The most widely spread toilet devices use gravity to empty the flush tank. Thus, the conventionally used mechanism includes a tank placed in height, connected to a bowl. The tank is closed by a movable obturator in its lower portion. When the user actuates the flush mechanism, the obturator is removed and the liquid falls in the bowl. Then, while the tank is emptying, the obturator obstructs the orifice of the tank in order to stop the flow of the liquid.

[0004] Thus, this system imposes a height positioning of the flush tank, which does not allow the manufacture of compact systems.

[0005] In addition, the wear of the mechanism for displacing the plug and the wear of the plug itself may cause water leakages in the bowl.

[0006] In this technical context, an aim of the present invention is to propose a device of compact toilets which, in addition, is not subject to the leakages problems which arise in the known devices.

BRIEF SUMMARY

[0007] According to a general definition, the invention relates to a toilet device comprising a bowl and a flush device positioned at the rear of the bowl. The flush device may comprise a tank which can contain a flushing liquid in which ejection means may be installed. The U-shaped ejection means may comprise a column connected to a pressurized water network and opening into the bowl. In addition, a Venturi tube may be connected between the pressurized water network and the column. The Venturi tube may be positioned substantially at the bottom of the tank in order to ensure the expansion of the pressurized water and a suction of the liquid contained in the tank in order to drive it into the bowl. The ejection means also comprise at least one large-flushing float, or one small-flushing float, connected to a manual trigger actuator and to a rod which controls the inflow of pressurized water into the ejection means.

[0008] Thus, the toilet device according to the invention uses the suction generated by the Venturi effect to empty the flush tank into the bowl.

[0009] Thus, the invention allows proposing a device of compact toilets, whose architecture obviates the need to use gravity. In addition, the device according to the invention avoids the leakages which are inherent to the devices of the prior art, because it includes no obturator.

[0010] According to one embodiment, the large-flushing float may be held by a magnet connected to the manual trig actuator controlling the inflow of pressurized water into the ejection means.

[0011] Thus, the invention uses advantageously the force exerted by the liquid contained in the flush tank on the large-flushing float, to control the inflow of pressurized water into the ejection means.

[0012] Furthermore, the use of a magnet connected to the manual trigger actuator allows the invention to present control elements which are not very sensitive to wear and which are resistant to moisture.

[0013] In addition, the rod may present a washer which allows the large-flushing float to exert a pressure on the rod in order to control the inflow of pressurized water into the ejection means.

[0014] Thus, the large-flushing float can slide on the rod between a position in which the float is magnetized by the magnet, and a position in which the float abuts against the washer and exerts a pressure on the rod.

[0015] According to another embodiment, the small-flushing float may be fastened to the rod which controls the inflow of pressurized water into the ejection means.

[0016] Advantageously, it is possible to combine several floats connected to the rod according to different embodiments, in order to obtain different controls of the inflow of pressurized water into the ejection means. Thus, it is possible to combine several floats in order to obtain different volumes of flushed liquid.

[0017] In addition, the rod may present two washers which allow controlling the inflow of pressurized water into the ejection means.

[0018] Furthermore, the Venturi tube may comprise a sleeve, inserted at the end of the connection to the pressurized water network, presenting a narrowing, and may comprise an opening which may bring the flushing liquid into communication with the pressurized water circulating in the ejection means, so as to drive the flushing liquid into the column.

[0019] Thus, by circulating throughout the narrowing of the ejection means, the pressurized water is accelerated and its pressure increases. When opening into the column, which presents a section larger than the section of the narrowing of the ejection means, the pressurized water undergoes a brutal expansion which generates a suction phenomenon. In addition, the column is also open onto the tank. Thus, the liquid present in the tank is sucked and driven into the column.

[0020] In this manner, the Venturi tube uses the pressurized water circulation to suck the liquid present in the flush tank.

[0021] According to a preferred embodiment, the column may present a flared collar which may delimit, with the sleeve, the opening bringing the flushing liquid into communication with the pressurized water.

[0022] Thus, the liquid present in the tank can be sucked in the column.

[0023] Preferably, at least three spacers may be assembled to said sleeve and may ensure the holding of the column.

[0024] In this manner, the spacers hold the column while guaranteeing the opening required for the suction of the liquid present in the tank.

[0025] Preferably, the ejection means may comprise a U-shaped ejection conduit, connected to a pressurized water network, comprising a descending portion, an elbow, the

Venturi tube and the column. This embodiment allowing to use an inflow of pressurized water at a standard height.

[0026] Furthermore, at least one valve connected to a pressurized water network may be connected to the ejection means.

[0027] Thus, it is possible to regulate the supply of the ejection means with water.

[0028] In addition, at least one valve connected to a pressurized water network may ensure filling the tank with water.

[0029] In this manner, the device according to the invention uses two distinct valves to fill the flush tank and to supply the ejection means.

[0030] According to a preferred embodiment, the bowl may present an anterior portion which may incorporate a cavity, and a posterior portion which may incorporate two lateral walls which may delimit a recess in which the flush device is inserted.

[0031] Furthermore, the bottom of the flush device may be positioned at a level lower than or equal to the level of the bottom of the cavity of the bowl.

[0032] Indeed, the use of the suction due to the Venturi effect for emptying the flush tank exempts the device according to the invention from a height positioning of the flush device. Hence, the device according to the invention allows positioning the flush device at a free level with respect to the bottom of the cavity of the bowl. Furthermore, the positioning of the bottom of the flush device at a level lower than or equal to the level of the bottom of the cavity of the bowl frees the device according to the invention from the risks of leakages related to the circulation of fluid by gravity which has to be necessarily closed by an obturator and also allows the device according to the invention to be compact.

[0033] Thus, the liquid present in the flush tank is located at the same level as the bowl.

[0034] In addition, the flush device may be completely included in the posterior portion of the bowl, between the two lateral walls, the seating surface of the bowl and the lower surface of said bowl.

[0035] In this manner, the flush device is completely incorporated in the bowl. The device according to the invention is thus compact and devoid of risks of leakages caused by the use of an obturator.

[0036] Moreover, a mechanical actuator may be adapted to trigger the closing of the pressurized water valve.

[0037] In addition, the mechanical actuator may comprise at least one magnet and at least one float floating in the liquid contained in the flush tank. Said at least one magnet and said at least one float may be adapted to trigger the closing of the pressurized water valve.

[0038] Thus, when the tank tends to be empty, the valve supplying the ejection means is closed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] Other features and advantages will come out from the following description with reference to the appended drawings which represent, as a non-limiting example, one embodiment of the invention.

[0040] FIG. 1 is a perspective view of the toilet device according to the invention;

[0041] FIG. 2 is a sectional perspective view of the flush tank of the toilet device according to the invention;

[0042] FIG. 3 is a sectional view of the flush tank and of the ejection means of the toilet device according to the invention;

[0043] FIG. 4 is a rear sectional view of the flush tank; FIG. 5 is a rear perspective view of the flush tank.

DETAILED DESCRIPTION

[0044] The present invention concerns a toilet device 1 shown in FIG. 1.

[0045] In the represented embodiment, the toilet device 1 comprises a suspended bowl 10 and a tank 101.

[0046] The bowl 10 comprises a seating surface 18, a planar surface 12 forming a bottom, two lateral walls 19 and a rear vertical portion 13 which may be fixed to a wall.

[0047] When fixing the bowl 10 to a wall, the seating surface 18 is positioned substantially parallel to the ground.

[0048] The bowl 10 further comprises a cavity 11 intended to receive liquids and a spillway 16 intended to discharge the flushed water into the bowl in order to clean it.

[0049] In addition, proximate to the vertical portion 13, the bowl 10 comprises a recess 15 intended to receive a flush device 100.

[0050] The flush device 100, which can be seen in FIGS. 2 to 4, comprises in particular a tank 101. When the tank 101 is installed, the bottom of said tank 101 is at a level similar to or lower than the level of the bottom of the cavity 11 of the bowl 10.

[0051] As will be seen, this is a significant feature of the invention.

[0052] Similarly, when the tank 101 is installed, the top portion of the tank 101 may be substantially at the same level as the seating surface 18 of the bowl 10.

[0053] The tank 101 may be made of a polymer adapted to the storage of a liquid and may be integrated in the rear portion 13 of the bowl 10, between the two lateral walls 19.

[0054] As shown in FIG. 2, a valve 120 for draining pressurized water is fastened in the top portion of the tank 101. The valve 120 supplies an ejection conduit 110. The ejection conduit 110 presents a U-shaped geometry and is composed of a descending tubular portion 111, of a bent tubular portion 112 and of an ascending tubular column 114.

[0055] Furthermore, an ejection elbow 115 is positioned at the outlet of the ascending portion 114. As can be observed in detail in FIG. 3, a Venturi tube 130 is positioned between the bent portion 112 and the column 114 of the conduit 110.

[0056] The Venturi tube 130 comprises, on the one hand, a sleeve 131 with a tubular section, presenting a section similar to the section of the bent portion 112, a conical section narrowing 132 opening into the column 114.

[0057] In the embodiment presented herein, four fins 133 are fastened to the sleeve 131. The column 114 rests on the four fins 133 so as to present a cylindrical opening 134 into the ejection conduit 110.

[0058] The control of the drain valve 120 is ensured by a mechanical actuator 125 driven by a manual large-flushing actuator and a manual small-flushing actuator.

[0059] The mechanical actuator 125 may comprise a small-flushing float 128 fastened on a descending rod 126, and a large-flushing float 127 sliding on the column 114 and the rod 126.

[0060] The large-flushing float 127 and the small-flushing float 128 may be made of expanded polystyrene or of any other material presenting a density lower than the density of water.

[0061] The rod 126 presents three pressure washers 126A, 126B and 126C.

[0062] A lever 121 is positioned between the washers 126A and 126B. The lever 121 drives the drain valve 120.

[0063] The washer 126C is located proximate to the large-flushing float 127.

[0064] In addition, the large-flushing float 127 is linked to a magnet 129 which is positioned on a wall of the bent portion 112.

[0065] Furthermore, as can be observed in FIG. 4, the flush device 100 comprises a filling valve 140.

[0066] The filling valve 140 allows filling the tank 101 after a water flushing operation.

[0067] For this purpose, the filling valve 140 is connected to a pressurized water network.

[0068] As shown in FIG. 5, a three-way valve 180 connects the valves 120 and 140 to a pressurized water network.

[0069] Thus, this three-way valve 180 allows feeding successively the drain valve 120 during the draining of the flush tank 101, and then supplying the filling valve 140 in order to fill the tank 101.

[0070] A filling float 141, slidably installed on a column 142 actuates the closing of the filling valve 140.

[0071] The operation of the toilet device 1 according to the invention is as follows.

[0072] It is specified that the following description starts from a situation in which the flush tank 101 is filled with water.

[0073] When the small-flushing actuator is triggered, the rod 126 is displaced so that the washer 126B exerts a pressure against the lever 121 in order to open the drain valve 120.

[0074] The small-flushing float 128, immersed in the flushing liquid then exerts a pressure on the rod 126 which holds the washer 126B against the lever 121.

[0075] When the large-flushing actuator is triggered, the large-flushing float 127 is separated from the magnet 129.

[0076] Having been separated from the magnet 129, the large-flushing float 127, immersed in the flushing liquid, exerts a pressure on the washer 126C of the rod 126. The rod 126 is displaced and the washer 126B presses on the lever 121 which opens and keeps open the drain valve 120.

[0077] Regardless of the triggered actuator, when the pressurized water coming from the drain valve 120 circulates in the Venturi tube 130, the section narrowing 132 creates a local acceleration of the fluid. When emerging from the section narrowing 132 into the column 114, the water accelerated accordingly undergoes a brutal expansion which generates a suction of the surrounding liquid. The opening 134 allows the fluid present in the tank 101 to penetrate into the column 114. In this manner, during the passage of the pressurized water, the suction generated by the Venturi tube 130 drives the fluid, present in the tank 101, into the column 114.

[0078] The fluid sucked accordingly into the column 114 is then evacuated, throughout the elbow 115 and the spillway 16, into the cavity 11 of the bowl 10.

[0079] The elbow 115 guarantees the proper orientation of the liquid flow during its evacuation into the cavity 11 of the bowl 10.

[0080] In the embodiment presented herein, the drain valve 120 is connected to the running water network and

supplies the ejection conduit 110. Thus, the water coming from the drain valve 120 is at a pressure substantially equal to three bars.

[0081] In the case of small flushing, when the liquid level in the tank 101 is such that the small-flushing float 128 is no longer fully immersed, the small-flushing float 128 does no longer exert a pressure on the rod 126, the washer 126A is then repositioned by gravity against the lever 121. The drain valve 120 is then closed.

[0082] In the case of large flushing, when the liquid level in the tank 101 is such that the large-flushing float 127 is no longer immersed, the large-flushing float is repositioned against the magnet 129 and the washer 126A is repositioned by gravity against the lever 121. The drain valve 120 is closed.

[0083] In order to fill the tank 101 after flushing, the filling valve 140 is open until the filling float 141 actuates the closing of said filling valve 140.

[0084] Therefore, the toilet device according to the invention offers the advantage of allowing to position the tank behind or under the bowl. It is thus possible to obtain a device of compact toilets. Furthermore, the configuration of the flushing device allows avoiding fluid leakages in the bowl.

1. A toilet device comprising (i) a bowl and (ii) a flush device juxtaposed to the bowl which comprises a tank which can contain a flushing liquid in which means for ejecting the flushing liquid are installed, comprising a column connected to a pressurized water network and opening into the bowl and a Venturi tube interposed between the pressurized water network and the column, the Venturi tube being positioned substantially at the bottom of the tank to ensure the expansion of the pressurized water and a suction of the liquid contained in the tank in order to drive it into the bowl, and comprising at least one large-flushing float or one small-flushing float connected to a manual trigger actuator and to a rod controlling the inflow of pressurized water into the ejection means.

2. The toilet device according to claim 1, characterized in that the large-flushing float is held by a magnet connected to the manual trigger actuator controlling the inflow of pressurized water into the ejection means.

3. The toilet device according to claim 1, characterized in that the rod presents a washer allowing the large-flushing float to exert a pressure on the rod to control the inflow of pressurized water into the ejection means.

4. The toilet device according to claim 1, characterized in that the small-flushing float is fastened to the rod controlling the inflow of pressurized water into the ejection means.

5. The toilet device according to claim 1, characterized in that the rod presents two washers allowing to control the inflow of pressurized water into the ejection means.

6. The toilet device according to claim 1, characterized in that the Venturi tube comprises a sleeve inserted at the end of the connection to the pressurized water network presenting a narrowing, and characterized in that the Venturi tube comprises an opening bringing the flushing liquid into communication with the pressurized water circulating in the ejection means, in order to drive the flushing liquid into the column.

7. The toilet device according to claim 1, characterized in that the column presents a flared collar delimiting, with the sleeve, the opening bringing the flushing liquid into communication with the pressurized water.

8. The toilet device according to claim **1**, wherein at least three fins are assemble to said sleeve and ensure the holding of the column.

9. The toilet device according to claim **1**, wherein the ejection means comprise a U-shaped ejection conduit, connected to a pressurized water network, comprising a descending portion, an elbow, the Venturi tube and the column.

10. The toilet device according to claim **1**, wherein at least one drain valve connected to a pressurized water network is connected to the ejection means.

11. The toilet device according to claim **1**, wherein at least one valve connected to a pressurized water network ensures filling the tank with water.

12. The toilet device according to claim **1**, wherein the bowl presents an anterior portion incorporating a cavity, and a posterior portion incorporating two lateral walls which delimit a recess in which the flush device is inserted.

13. The toilet device according to claim **1**, wherein the bottom of the flush device is positioned at a level lower than or equal to the level of the bottom of the cavity of the bowl.

14. The toilet device according to claim **1**, wherein the flush device is completely included in the posterior portion of the bowl, between the two lateral walls, the seating surface of the bowl and the lower surface of said bowl.

15. The toilet device according to claim **2**, characterized in that the rod presents a washer allowing the large-flushing

float to exert a pressure on the rod to control the inflow of pressurized water into the ejection means.

16. The toilet device according to claim **15**, characterized in that the small-flushing float is fastened to the rod controlling the inflow of pressurized water into the ejection means.

17. The toilet device according to claim **16**, characterized in that the rod presents two washers allowing to control the inflow of pressurized water into the ejection means.

18. The toilet device according to claim **17**, characterized in that the Venturi tube comprises a sleeve inserted at the end of the connection to the pressurized water network presenting a narrowing, and characterized in that the Venturi tube comprises an opening brining the flushing liquid into communication with the pressurized water circulating in the ejection means, in order to drive the flushing liquid into the column.

19. The toilet device according to claim **18**, characterized in that the column presents a flared collar delimiting, with the sleeve, the opening bringing the flushing liquid into communication with the pressurized water.

20. The toilet device according to claim **19**, wherein at least three fins are assemble to said sleeve and ensure the holding of the column.

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