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(54) TOILET FLUSHING ASSEMBLY AND SEQUENCE

TOILETTENSPÜLANORDNUNG UND SEQUENZ

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• **MAROTZ, Ben**

Kohler

Wisconsin 53044 (US)

(30) Priority: **17.11.2009 US 619760**

(74) Representative: **Wightman, David Alexander**

Barker Brettell LLP

100 Hagley Road

Edgbaston

Birmingham

West Midlands B16 8QQ (GB)

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(73) Proprietor: **Kohler Co.**

Kohler, WI 53044 (US)

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(72) Inventors:

• **STAUBER, Joseph**

Sheboygan Falls

Wisconsin 53085 (US)

• **DENZIN, Peter, W.**

Glenbeulah

Wisconsin 53023 (US)

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Description

[0001] The present invention relates to plumbing fixtures such as toilets. In particular, the present invention relates to the flush assembly and flush sequencing for toilets.

[0002] Conventional toilets utilize a single mechanical flush sequence to evacuate waste from the toilet bowl, rinse the bowl, and possibly to refill a water tank. Simple mechanical components such as gravity operated flap-valves and float controlled fill valves are normally used to control the passage of water through the bowl and the filling of the tank. The trade-off for such a simple mechanical flush assembly is wasted water consumption in low waste conditions and inadequate or inconsistent rinsing of the bowl in high waste conditions.

[0003] Over time there have been numerous revisions and improvements made to the conventional toilet. For example, several toilets have been devised with electronically controllable flush, rinse and fill components, see e.g., U.S. patents 5,548,850 and 6,332,229. These patents also disclose toilets with alternate flush sequences. And, more forceful rinsing action has been achieved using jet components, such as disclosed by U.S. patent 2,715,228. However, as of yet the flush control components and sequencing of conventional toilets has often been insufficient to achieve an efficient and adequate flush in varied waste load conditions.

[0004] There is thus a need for toilets with advanced flush assemblies and sequencing to better address problems with known toilets.

[0005] A toilet having the features in the preamble of claim 1 is known from WO 02/44483. It is also known to provide toilets with a double flush (see for example US 1281457; US 383858 and US 2005/028260).

[0006] The prior art also includes US 2008/276362; US 2008/072372; US 6998552; and DE 10109152.

[0007] In one aspect the invention provides a toilet as defined in claim 1. Preferred features are the subject of claims 2 to 10. The toilet has a bowl with a bowl outlet and a rim having a rim outlet. A flush valve operates to control flow through the bowl outlet. A rim supply valve operates to control flow into the bowl rim. The toilet flushes water through the bowl during a flush sequence in which the rim supply valve and the flush valve are both opened and closed twice, first during a pre-rinse cycle and subsequently during a rinse cycle. The rim supply valve and the flush valve are closed at the beginning and end of the cycles and open therebetween. During the pre-rinse cycle the rim supply valve is opened and closed prior to the flush valve opening and closing, and during the rinse cycle the flush valve is opened and closed between the rim supply valve opening and closing.

[0008] In another embodiment the toilet is selectively operable in first and second flush sequences. The first flush sequence includes a pre-rinse cycle in which the toilet flushes water through the bowl by opening and closing the rim supply valve and the flush valve once. The

second flush sequence includes the pre-rinse cycle and a rinse cycle in which the rim supply valve and the flush valve are both opened and closed twice, first during the pre-rinse cycle and subsequently during the rinse cycle.

During the pre-rinse cycle the rim supply valve is opened and closed prior to the flush valve opening and closing, and during the rinse cycle the flush valve is opened and closed between the rim supply valve opening and closing

[0009] In still another aspect the invention provides a flush sequence for a toilet as defined in claim 11. Preferred features are the subject of claims 12 to 16. The flush sequence includes initiating a pre-rinse cycle and subsequently initiating a rinse cycle for the same flush event. The pre-rinse cycle includes opening the supply valve to flow water to the rim and pass water through the rim outlet into the bowl, closing the supply valve, opening the flush valve to empty the bowl through the bowl outlet, and closing the flush valve. The rinse cycle includes opening the supply valve to flow water to the rim and pass water through the rim outlet to the bowl, opening the flush valve to evacuate the bowl through the bowl outlet, closing the flush valve and closing the supply valve.

[0010] To improve flush performance, the flush sequence, particularly the rinse cycle, can further include using an eductor to increase the flow rate of rinse water into the bowl.

[0011] Additionally, the flush sequence can include an electronic control which controls the open and close operation of the flush valve and the rim supply valve. In addition to the rim water supply, the electronic control can control filling and output flow from a reservoir water supply, such as toilet tank. And, level sensors, such as mounted in the bowl and/or the water supply reservoir, can be coupled to the electronic control for sending bowl and reservoir level input signals to the electronic control, and thereby control fill levels in both.

[0012] Hence, the invention provides an advanced electronically controlled toilet which provides an improved flush. To save water in low-waste conditions, the toilet can be operated in a quick or short flush mode, in which the bowl is briefly rinsed by water from the bowl rim. For higher waste conditions, the user can select a long or dual rinse mode in which the bowl is pre-rinsed with water from the rim to empty the waste and then rinsed again, this time with rim water which may be eductor-assisted. To do this, the electronic control opens and closes the rim supply valve and the bowl flush valve one time during the pre-rinse cycle and a second time during the regular rinse cycle. Thus, fully opening and closing these valves twice during a single flush event. Additional electronic control and sensing can be provided to further automate and regulate the flushing operation.

[0013] The foregoing and still other advantages of the invention will appear from the following description. In that description reference is made to the accompanying drawings which form a part hereof and in which there is shown by way of illustration a preferred embodiment of

the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a perspective view of a toilet according to the present invention with its lid down;
 FIG. 2 is a perspective view of the toilet of FIG. 1 with its lid up;
 FIG. 3 is a side view of the toilet with the bowl, the trapway, and the plumbing components shown in phantom lines;
 FIG. 4 is a cross-sectional side view of the toilet taken along line 4-4 of FIG. 1;
 FIG. 5 is a cross-sectional side view of the toilet taken along line 5-5 of FIG. 1;
 FIG. 6 is a front lower left side view of some of the internal plumbing components of the toilet of FIG. 1;
 FIG. 7 is a simplified schematic of the plumbing of the toilet of FIG. 1;
 FIG. 8 is a process chart of a long flush sequence for the toilet of FIG. 1; and
 FIG. 9 is a process chart of a short flush sequence for the toilet of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring now to FIGS. 1-5, a toilet 10 is shown that is configured to have two flushing sequences. Although the specifics of the flushing sequences will be described in more detail below, an overview of the components of the toilet 10 and their connectivity will be described first to provide a structural context for the flushing sequences. Although a two-part modular construction is shown, it should be appreciated that the toilet 10 need not be of a modular design and could be of a more conventional toilet assembly. Accordingly, the modular assembly is only one example of a toilet that may utilize the flushing sequences described below.

[0016] As best seen in FIGS. 1 and 2, the toilet 10 includes a frontal basin portion 12 and a rear backpack portion 14. In the embodiment shown, the toilet 10 is designed to be a modular assembly in which, generally speaking, the rear backpack portion 14 supports and/or houses many of the functional components of the toilet 10 while the frontal basin portion 12 is one of several possible front-side attachments which is adapted to be connected to the rear backpack portion 14. As different front-side attachments may be made, the toilet 10 can take on various appearances using a single rear backpack portion 14. Moreover, the rear backpack portion 14 may be configurable to receive various components that provide accessory functions to the toilet such as a bidet wand, automatic seat and/or lid lifting mechanisms, air circulating functions, music accessories, and so forth.

[0017] The frontal basin portion 12 includes a bowl 16 extending from a bowl rim 18 at the top of the bowl 16 to

a bowl opening 20 proximate the bottom of the bowl 16. The bowl rim 18 includes a channel 22 (best seen in FIG. 4) which selectively receives water which may then be directed into the bowl 16 during a flushing sequence via apertures or rim openings in an underside of the bowl rim 18. The bowl opening 20 may be placed in selective communication with a trapway 24 by a flush valve 26 that is located therebetween.

[0018] The flush valve 26 is electromechanically controlled by a control board 28 (e.g., a controller or electrical control, and as schematically illustrated in FIG. 7) which is located in the rear backpack portion 14 of the toilet 10. This control board 28 is electronically coupled to a motor 30 which is mechanically coupled to the flush valve 26 via a linkage 32 such as a belt or a chain. When the motor 30 drives the linkage 32, the flush valve 26 may be actuated from an open position to a closed position or vice-versa. In the closed position, shown in FIGS. 3 and 4, an arcuate surface 34 of the flush valve 26 forms a seal about the bowl opening 20 at the bottom of the bowl 16 such that any water and waste contents located in the bowl 16 are substantially retained in the bowl 16. Then, in the open position (not shown), the flush valve 26 is rotatably actuated from the close position to remove the seal between the bowl 16 and the trapway 24 such that the contents of the bowl 16 can pass from the bowl 16 into the trapway 24 such as during a flushing operation. Although a flush valve 26 that is rotatable is shown, other types of valves could also be used to selectively place the bowl 16 in fluid communication with the trapway 24.

[0019] The trapway 24 is a tube-like passage that snakes under the bowl 16 and rearwards in a sideways S-shape from the bowl opening 20 to a trapway end 36 which connects to an opening in the floor which connects to a waste line pipe (not shown) or the like. The geometry of the trapway 24 is such that a first leg 38 of the trapway 24 proximate the flush valve 26 extends downward to a dip 40, a second leg 42 of the trapway 24 extends upward from the dip 40 to a weir 44, and a third leg 46 of the trapway 24 extends downward from the weir 44 to connect to the opening in the floor. To prevent the escape of trapped sewer gases from the waste water line into the bowl 16 (and into the atmosphere surrounding the toilet 10), water may be captured in the space between the dip 40 and the weir 44 to form a water seal in the trapway 24.

[0020] A water level sensor 48 (schematically illustrated in FIG. 7) may also be coupled to the bowl 16 to detect a level of the water in the bowl 16. The water level sensor 48 may be electronically coupled to the control board 28 to indicate the current state of water in the bowl 16 (e.g., a water level of the bowl 16) via a signal. The water level sensor 48 may be utilized to detect the water level in the bowl 16 and to stop the feeding of water to the bowl 16 during a flush sequence during a fill step or in the event that a blockage in the trapway 24 or the like prevents water from emptying from the bowl 16.

[0021] Now with additional reference to FIGS. 5, 6, and

7, the rear backpack portion 14 supports and houses the plumbing utilized in performing the flushing sequences. Beginning at the source, a water supply 50 (illustrated schematically in FIG. 7) provides water to the other plumbing components. The water supply 50 is connected with the toilet 10 via an inlet line 52 that comes in from the behind the rear backpack portion 14 of the toilet 10. The inlet line 52 is connected to a solenoid valve 54. The solenoid valve 54 may be electronically controlled by the control board 28, to selectively place the inlet line 52 in fluid communication with a tank 56 via a tank fill line 58 (i.e., a filler) or the bowl rim 18 via a rim line 60. The rim line 60 is placed in fluid communication with the bowl rim 18 via a spud connection or the like at an end 68 of the rim line 60. Although a single solenoid valve 54 is shown in FIGS. 3 to 6, a separate rim supply valve 54a and fill valve 54b may also be used as illustrated in the schematic of FIG. 7.

[0022] Notably, the tank 56 (or water supply reservoir) is also placed in communication with the rim line 60 via an eductor line 62 which connects to the rim line 60 to form an eductor 64. This eductor 64 may assist in providing a particularly strong flow of water to the rim 18 when water from the tank 56 supplements the water being supplied via the rim line 60.

[0023] Additionally, a float switch 66 may be located in the tank 56. When the water level in the tank 56 exceeds a pre-determined threshold level, typically causing a portion of the float switch 66 to rise within the tank 56, this displacement of a portion of the float switch 66 may cause the closing of a shutoff valve (possibly either by a direct mechanical connection between the float switch 66 and the shutoff valve or by a sending an electrical signal to the control board 28 which operates the shutoff valve) which temporarily closes off the water supply 50 from the other plumbing components.

[0024] With reference to FIG. 7, a summary of the connectivity of the control board 28 to the various components may be made. With respect to the bowl 16, the control board 28 may be electrically coupled to the water level sensor 48 and the motor 30 that controls the open or closed state of flush valve 26. With respect to the plumbing components in the rear backpack portion 14, the control board 28 is electrically coupled to the solenoid valve 54 (illustrated in FIG. 7 as separate rim supply valve 54a and fill valve 54b) which controls the flow of water from the water supply 50 into the tank 56 and into the rim 18. Further, the control board 28 may receive a status of the state of the water level in the tank 56 via the float switch 66. Although not previously described, the control board 28 is also electronically coupled to a short flush button 70 and a long flush button 72. Of course, rather than being buttons, these could be any of a number of types of controls, switches, buttons, or the like. The short flush button 70 and the long flush button 72 may be used to start a short flushing sequence or a long flushing sequence that will now be described.

[0025] Referring now to FIG. 8, a long flush sequence

800 is shown. The long flush sequence 800 is initiated when the long flush button 72 is pressed according to step 802. Once the control board 28 detects the operation of the long flush button 72, the control board 28 instructs the various components to perform a pre-rinse, rinse, and fill of the bowl 16.

[0026] The pre-rinse cycle begins with the control board 28 instructing the rim supply valve 54a to open and then close according to step 804 to pre-rinse the bowl 16. This pre-rinse cycle may remove debris, such as toilet paper, stuck on the walls of the bowl 16 above the water fill line. Only a small amount of water may be used to perform the pre-rinse of the bowl 16.

[0027] Next, according to step 806, the flush valve 26 is opened to remove waste from the bowl 16 while the rim supply valve 54a remains closed. This is a short, water efficient step, which removes the waste from the bowl 16. The flush valve 26 is then closed to seal the bowl opening 20 of the bowl 16 according to step 808.

[0028] Once the pre-rinse cycle is completed, the rinse cycle begins. After the flush valve 26 closed, the rim supply valve 54a is opened according to step 810 to start the bowl rinse cycle. After a sufficient amount of water has been introduced into the bowl 16, the flush valve 26 is opened according to step 812 to evacuate the water accumulated during the rinse cycle from the bowl 16. While the flush valve 26 is opened, water may continued to be supplied to the rim 18 to rinse the bowl 16. After a period of time, the flush valve 26 is closed according to step 814 to seal the bowl 16 and the rim supply valve 54a is closed according to step 816 to end the bowl rinse cycle.

[0029] Notably, while the rim supply valve 54a is opened and supplying water to the rim 18 via the rim line 60 either during the pre-rinse cycle or the rinse cycle, the eductor 64 may be used to increase the rate at which water is supplied to the rim 18. As the water introduced from the tank 56 to the rim line 60 via the eductor line 62 increases the flow rate of the rinse water into the bowl rim 18, the water is supplied more quickly and in such a manner as to more effectively and efficiently rinse the bowl 16. At greater flow rates, better bowl rinsing can be performed more quickly and with less water than with eductor-less flush mechanisms.

[0030] After the bowl rinse cycle is complete, then the fill cycle begins to refill the bowl 16 for another use of the toilet 10. During the fill cycle, the fill valve 54b is open and then closed according to step 818 to supply water to the water tank 56 (which may have been partially or fully depleted during the pre-rinse and rinse cycles) and to re-fill the bowl 16. The fill valve 54b remains open until the bowl 16 and the tank 56 are refilled. The determination of the levels of water in the bowl 16 and tank 56 may be determined by the water level sensor 48 and the float switch 66, respectively. Of course, a stop condition for refilling the bowl could potentially be based on one of or both of the water level sensor 48 and the float switch 66 or could be based on some other sensor or timing mech-

anism.

[0031] It should be appreciated that during the fill cycle, the rim supply valve 54a may be closed and, accordingly, the rate of flow of water into the bowl 16 may be comparatively slower than during the pre-rinse and/or rinse cycle. Of course, depending the particular plumbing configuration, the bowl re-fill may be accomplished using an additional bowl fill valve or by using the rim supply valve 54a either alone or in combination with the fill valve 54b.

[0032] Referring now to FIG. 9, a short flush sequence 900 is illustrated which may be generally used for the elimination of light or low waste, such as urine or perhaps small amounts of bath tissue, from the bowl 16. Upon pressing the short flush button 70 according to step 902, the short flush sequence 900 is initiated. First, a pre-rinse cycle occurs in which the rim supply valve 54a is open and then closed according to step 904 to supply a shot of water to the rim 18 and clear any waste or debris from the walls of the bowl 16. Next, the flush valve 26 is opened to remove the water and waste from the bowl 16 via the trapway 24 according to step 906. After the water and waste are eliminated from the bowl 16, the flush valve 26 is closed according to step 908. The fill valve 54b is then open and closed to re-fill the water in the bowl 16 and the tank 56 according to step 910. Of course, as described above, the re-fill step may be achieved by opening the fill valve 54b or by opening one or more other valves to fill the tank 56 and bowl 16.

[0033] Thus, a toilet is disclosed that is capable of performing two flush sequences. The longer of the two flush sequences is engineered with the removal of solid waste or the like from the bowl. The shorter of the two flush sequences is engineered with the removal of light waste or the like from the bowl. Given the benefits of water conservation, these flush sequences aim to use an appropriate amount of water for the task at hand.

[0034] Further, these flush sequences may utilize a pre-rinse cycle which helps to more efficiently use the water of the flushing sequence. In contrast to conventional flush cycles, which may have water continuously fed to the bowl via the rim while water continually drains from the bowl opening, the rim supply valve 54a may be opened and closed to provide an initial shot of water to pre-rinse the walls and then opened again after the bowl has been evacuated. By shutting off the rim supply valve in between the pre-rinse cycle and the subsequent rinse cycle, the amount of water used over the flush cycle is reduced.

[0035] While a specific embodiment of the present invention has been shown, various modifications falling within the breadth and scope of the invention will be apparent to one skilled in the art. For example, one or more jets may assist in vacating water and waste from the bowl. Thus, the following claims should be looked to in order to understand the full scope of the invention.

INDUSTRIAL APPLICABILITY

[0036] Disclosed is a plumbing fixture, such as a toilet having an advanced flush control assembly and sequencing providing efficient water consumption with adequate rinsing of the bowl.

Claims

1. A toilet, comprising:

a bowl (16) having a bowl outlet (20) and a rim (18) having a rim outlet (22);
a flush valve (26) operable to control flow through the bowl outlet (20);
a rim supply valve (54;54a) operable to control flow into the bowl rim (18); and
a controller (28) configured to open and close both the flush valve (26) and the rim supply valve (54;54a) and to operate said valves

characterized in that:

during a first flush sequence, the rim supply valve (54;54a) and the flush valve (26) are both opened and closed twice, first during a pre-rinse cycle and subsequently during a rinse cycle, the rim supply valve (54;54a) and the flush valve (26) being closed at a start and end of the cycles and open between the start and end of the cycles,
wherein during the pre-rinse cycle the rim supply valve (54;54a) is opened and closed prior to the flush valve (26) opening and closing, and during the rinse cycle the flush valve (26) is opened and closed between the rim supply valve (54;54a) opening and closing.

2. The toilet of claim 1, wherein the rinse cycle includes flowing rinse water into the bowl (16) from the rim outlet (22) via an eductor (64).

3. The toilet of claim 1, further including a water supply reservoir (56) having a filler (54;54b) operable by the electronic control (28).

4. The toilet of claim 3, further including a level sensor (48) mounted in the bowl (16) and coupled to the electronic control (28) for sending bowl level input signals to the electronic control (28).

5. The toilet of claim 4, further including a supply water sensor (66) mounted at the water supply reservoir (56) and coupled to the electronic control (28) for sending reservoir level input signals to the electronic control (28).

6. The toilet of claim 1, wherein the controller (28) is configured to open and close both the flush valve

- (26) and the rim supply valve (54;54a) and to operate said valves in the first flush sequence and a second flush sequence, wherein the second flush sequence includes the pre-rinse cycle in which the controller (28) is configured to flush water through the bowl (16) by opening and closing the rim supply valve (54;54a) and the flush valve (26) once.
7. The toilet of claim 6, wherein the rinse cycle includes flowing rinse water into the bowl (16) from the rim outlet (22) via an eductor (64).
8. The toilet of claim 6, further including a water supply reservoir (56) having a filler (54;54b) operable by the electronic control (28).
9. The toilet of claim 8, further including a level sensor (48) mounted in the bowl (16) and coupled to the electronic control (28) for sending bowl level input signals to the electronic control (28).
10. The toilet of claim 9, further including a supply water sensor (66) mounted at the water supply reservoir (56) and coupled to the electronic control (28) for sending reservoir level input signals to the electronic control (28).
11. A flush sequence for a toilet having a bowl (16) with a bowl outlet (20) closable by a flush valve (26) and a supply valve (54;54a) for controlling flow of water to a rim (18) having a rim outlet (22) in communication with the bowl (16), the flush sequence comprising:
- initiating a pre-rinse cycle, including:
- opening the supply valve (54;54a) to flow water to the rim (18) and pass water through the rim outlet (22) into the bowl (16);
- closing the supply valve (54;54a);
- opening the flush valve (26) to empty the bowl (16) through the bowl outlet (20);
- closing the flush valve (26);
- initiating a rinse cycle, including:
- opening the supply valve (54;54a) to flow water to the rim (18) and pass water through the rim outlet (22) into the bowl (16);
- opening the flush valve (26) to evacuate the bowl (16) through the bowl outlet (20);
- closing the flush valve (26); and
- closing the supply valve (54;54a).
12. The flush sequence of claim 11, wherein the rinse cycle further includes passing water into the bowl (16) via an eductor (64).

13. The flush sequence of claim 11, wherein the toilet includes an electronic control (28) and wherein the flush valve (26) and the rim supply valve (54;54a) are operated by the electronic control (28) to open and close.
14. The flush sequence of claim 13, further including filling a water supply reservoir (56) having a filler (54;54b) operable by the electronic control (28).
15. The flush sequence of claim 14, further including sending bowl level input signals to the electronic control (28) using a level sensor (48) mounted in the bowl (16) and coupled to the electronic control (28).
16. The flush sequence of claim 15, further including sending reservoir level input signals to the electronic control (28) using a supply water sensor (66) mounted at the water supply reservoir (56) and coupled to the electronic control (28).

Patentansprüche

1. Eine Toilette, die Folgendes aufweist:

eine Schüssel (16) mit einem Schüssel-Abfluss (20) und einem Rand (18) mit einem Rand-Abfluss (22);

einen Spülblock (26), der den Durchfluss durch den Schüssel-Abfluss (20) steuert;

ein Rand-Zuflussventil (54; 54a), das den Durchfluss in den Schüssel-Rand (18) steuert; und

einen Regler (28), der so gestaltet ist, dass er den Spülblock (26) und das Rand-Zuflussventil (54; 54a) öffnen und schließen und die besagten Ventile betätigen kann, **dadurch gekennzeichnet, dass:**

während einer ersten Spülsequenz das Rand-Zuflussventil (54; 54a) und das Spülventil (26) zweimal geöffnet und geschlossen werden, zuerst während eines Vorspülzyklus und danach während eines Spülzyklus, das Rand-Zuflussventil (54; 54a) und das Spülventil (26) sind dabei zu Beginn und am Ende der Zyklen geschlossen und zwischen dem Beginn und dem Ende der Zyklen geöffnet,

wobei während des Vorspülzyklus das Rand-Zuflussventil (54; 54a) vor dem Öffnen und Schließen des Spülventils (26) geöffnet und geschlossen wird, und während des Spülzyklus das Spülventil (26) zwischen dem Öffnen und Schließen des Rand-Zuflussventils (54; 54a) geöffnet und geschlossen wird.

2. Die Toilette gemäß Anspruch 1, wobei der Spülzyklus den Zufluss von Spülwasser in die Schüssel (16) vom Rand-Abfluss (22) über einen Ejektor (64) einschließt.
3. Die Toilette gemäß Anspruch 1, die darüberhinaus einen Wasserbehälter (56) mit einem Einfüllstutzen (54; 54b) einschließt, der über einen elektronischen Regler (28) bedienbar ist.
4. Die Toilette gemäß Anspruch 3, die darüberhinaus einen Füllstandssensor (48) einschließt, der an der Schüssel (16) montiert und mit dem elektronischen Regler (28) gekoppelt ist, um Schüssel-Füllstands-Eingangssignale an die elektronische Steuerung (28) zu senden.
5. Die Toilette gemäß Anspruch 4, die darüberhinaus einen Leitungswasser-Sensor (66) einschließt, der am Wasserbehälter (56) montiert und mit dem elektronischen Regler (28) gekoppelt ist, um Behälter-Füllstands-Eingangssignale an die elektronische Steuerung (28) zu senden.
6. Die Toilette gemäß Anspruch 1, wobei der Regler (28) so gestaltet ist, dass er das Spülventil (26) und das Rand-Zuflussventil (54; 54a) öffnen und schließen und die besagten Ventile in der ersten Spülsequenz und einer zweiten Spülsequenz betätigen kann, wobei die zweite Spülsequenz den Vorspülzyklus einschließt, bei dem der Regler (28) so gestaltet ist, dass er Wasser durch die Schüssel (16) spült, indem er das Rand-Zuflussventil (54; 54a) und das Spülventil (26) einmal öffnet und schließt.
7. Die Toilette gemäß Anspruch 6, wobei der Spülzyklus den Zufluss von Spülwasser in die Schüssel (16) vom Rand-Abfluss (22) über einen Ejektor (64) einschließt.
8. Die Toilette gemäß Anspruch 6, die darüberhinaus einen Wasserbehälter (56) mit einem Einfüllstutzen (54; 54b) einschließt, der über einen elektronischen Regler (28) bedienbar ist.
9. Die Toilette gemäß Anspruch 8, die darüberhinaus einen Füllstandssensor (48) einschließt, der an der Schüssel (16) montiert und mit dem elektronischen Regler (28) gekoppelt ist, um Schüssel-Füllstands-Eingangssignale an die elektronische Steuerung (28) zu senden.
10. Die Toilette gemäß Anspruch 9, die darüberhinaus einen Leitungswasser-Sensor (66) einschließt, der am Wasserbehälter (56) montiert und mit dem elektronischen Regler (28) gekoppelt ist, um Behälter-Füllstands-Eingangssignale an die elektronische Steuerung (28) zu senden.
11. Eine Spülsequenz für eine Toilette, die eine Schüssel (16) mit einem Schüssel-Abfluss (20) umfasst, der durch ein Spülventil (26) verschließbar ist, und ein Zuflussventil (54; 54a) für die Steuerung des Wasserzuflusses in einen Rand (18), der einen Rand-Abfluss (22) in Verbindung mit der Schüssel (16) umfasst, die Spülsequenz weist dabei Folgendes auf:
 - die Einleitung eines Vorspülzyklus, der Folgendes einschließt:
 - die Öffnung des Zuflussventils (54; 54a), um Wasser in den Rand (18) fließen zu lassen und Wasser durch den Rand-Abfluss (22) in die Schüssel (16) zu leiten;
 - das Schließen des Zuflussventils (54; 54a);
 - die Öffnung des Spülventils (26), um die Schüssel (16) durch den Schüssel-Abfluss (20) zu leeren; das Schließen des Spülventils (26);
 - die Einleitung eines Spülzyklus, der Folgendes aufweist:
 - die Öffnung des Zuflussventils (54; 54a), um Wasser in den Rand (18) fließen zu lassen und Wasser durch den Rand-Abfluss (22) in die Schüssel (16) zu leiten;
 - die Öffnung des Spülventils (26), um die Schüssel (16) durch den Schüsselabfluss (20) zu leeren;
 - das Schließen des Spülventils (26); und
 - das Schließen des Zuflussventils (54; 54a).
 12. Die Spülsequenz gemäß Anspruch 11, wobei der Spülzyklus darüberhinaus den Zufluss von Wasser in die Schüssel (16) über einen Ejektor (64) einschließt.
 13. Die Spülsequenz gemäß Anspruch 11, wobei die Toilette einen elektronischen Regler (28) einschließt und wobei das Spülventil (26) und das Rand-Zuflussventil (54; 54a) von einem elektronischen Regler (28) geöffnet und geschlossen werden.
 14. Die Spülsequenz gemäß Anspruch 13, die darüberhinaus das Füllen eines Wasserbehälters (56) über einen Einfüllstutzen (54; 54b) einschließt, der über den elektronischen Regler (28) bedienbar ist.
 15. Die Spülsequenz gemäß Anspruch 14, die darüberhinaus das Senden von Schüssel-Füllstands-Eingangssignalen an den elektronischen Regler (28) einschließt, unter Verwendung eines Füllstandssensors (48), der an der Schüssel (16) montiert und mit dem elektronischen Regler (28) gekoppelt ist.
 16. Die Spülsequenz gemäß Anspruch 15, die darüber-

hinaus das Senden von Behälter-Füllstands-Eingangssignalen an den elektronischen Regler (28) einschließt, unter Verwendung eines Leitungswasser-Sensors (66), der am Wasserbehälter (56) montiert und mit dem elektronischen Regler (28) gekoppelt ist.

Revendications

1. Une toilette, comprenant :

une cuvette (16) possédant une sortie de cuvette (20) et un rebord (18) possédant une sortie de rebord (22),
un robinet de chasse d'eau (26) conçu de façon à commander un écoulement au travers de la sortie de cuvette (20),
une vanne d'alimentation de rebord (54, 54a) conçue de façon à commander un écoulement dans le rebord de cuvette (18), et
un dispositif de commande (28) configuré de façon à ouvrir et fermer à la fois le robinet de chasse d'eau (26) et la vanne d'alimentation de rebord (54, 54a) et à actionner lesdites vanne et robinet,

caractérisé en ce que :

au cours d'une première séquence de chasse, la vanne d'alimentation de rebord (54, 54a) et le robinet de chasse d'eau (26) sont tous les deux ouverts et fermés deux fois, d'abord au cours d'un cycle de pré-rinçage et subséquentement au cours d'un cycle de rinçage, la vanne d'alimentation de rebord (54, 54a) et le robinet de chasse d'eau (26) étant fermés à un début et une fin des cycles et ouverts entre le début et la fin des cycles,

où, au cours du cycle de pré-rinçage, la vanne d'alimentation de rebord (54, 54a) est ouverte et fermée avant l'ouverture et la fermeture du robinet de chasse d'eau (26), et, au cours du cycle de rinçage, le robinet de chasse d'eau (26) est ouvert et fermé entre l'ouverture et la fermeture de la vanne d'alimentation de rebord (54, 54a).

2. La toilette selon la Revendication 1, où le cycle de rinçage comprend l'écoulement d'eau de rinçage dans la cuvette (16) à partir de la sortie de rebord (22) au travers d'un éjecteur (64).

3. La toilette selon la Revendication 1, comprenant en outre un réservoir d'alimentation en eau (56) possédant un dispositif de remplissage (54, 54b) actionnable par la commande électronique (28).

4. La toilette selon la Revendication 3, comprenant en outre un capteur de niveau (48) monté dans la cu-

vette (16) et couplé à la commande électronique (28) destiné à l'envoi de signaux d'entrée de niveau de cuvette à la commande électronique (28).

5. La toilette selon la Revendication 4, comprenant en outre un capteur d'eau d'alimentation (66) monté sur le réservoir d'alimentation en eau (56) et couplé à la commande électronique (28) destiné à l'envoi de signaux d'entrée de niveau de réservoir à la commande électronique (28).

6. La toilette selon la Revendication 1, où le dispositif de commande (28) est configuré de façon à ouvrir et fermer à la fois le robinet de chasse d'eau (26) et la vanne d'alimentation de rebord (54, 54a) et de façon à actionner lesdits robinet et vanne dans la première séquence de chasse et une deuxième séquence de chasse, où la deuxième séquence de chasse comprend le cycle de pré-rinçage dans lequel le dispositif de commande (28) est configuré de façon à chasser de l'eau au travers de la cuvette (16) par l'ouverture et la fermeture une fois de la vanne d'alimentation de rebord (54, 54a) et du robinet de chasse d'eau (26).

7. La toilette selon la Revendication 6, où le cycle de rinçage comprend l'écoulement d'eau de rinçage dans la cuvette (16) à partir de la sortie de rebord (22) au travers d'un éjecteur (64).

8. La toilette selon la Revendication 6, comprenant en outre un réservoir d'alimentation en eau (56) possédant un dispositif de remplissage (54, 54b) actionnable par la commande électronique (28).

9. La toilette selon la Revendication 8, comprenant en outre un capteur de niveau (48) monté dans la cuvette (16) et couplé à la commande électronique (28) destiné à l'envoi de signaux d'entrée de niveau de cuvette à la commande électronique (28).

10. La toilette selon la Revendication 9, comprenant en outre un capteur d'eau d'alimentation (66) monté sur le réservoir d'alimentation en eau (56) et couplé à la commande électronique (28) destiné à l'envoi de signaux d'entrée de niveau de réservoir à la commande électronique (28).

11. Une séquence de chasse pour une toilette possédant une cuvette (16) avec une sortie de cuvette (20) pouvant être refermée par un robinet de chasse d'eau (26) et une vanne d'alimentation (54, 54a) destinée à la commande d'un écoulement d'eau vers un rebord (18) possédant une sortie de rebord (22) en communication avec la cuvette (16), la séquence de chasse comprenant :

le lancement d'un cycle de pré-rinçage,

comprenant :

l'ouverture de la vanne d'alimentation (54, 54a) de façon à écouler de l'eau vers le rebord (18) et à faire passer de l'eau au travers de la sortie de rebord (22) dans la cuvette (16),
la fermeture de la vanne d'alimentation (54, 54a),
l'ouverture du robinet de chasse d'eau (26) de façon à vider la cuvette (16) au travers de la sortie de cuvette (20),
la fermeture du robinet de chasse d'eau (26),

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le lancement d'un cycle de comprenant :

l'ouverture de la vanne d'alimentation (54, 54a) de façon à écouler de l'eau vers le rebord (18) et à faire passer de l'eau au travers de la sortie de rebord (22) dans la cuvette (16),
l'ouverture du robinet de chasse d'eau (26) de façon à évacuer la cuvette (16) au travers de la sortie de cuvette (20),
la fermeture du robinet de chasse d'eau (26), et
la fermeture de la vanne d'alimentation (54, 54a).

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- 12.** La séquence de chasse selon la Revendication 11, où le cycle de rinçage comprend en outre le passage d'eau dans la cuvette (16) au travers d'un éjecteur (64).

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- 13.** La séquence de chasse selon la Revendication 11, où la toilette comprend une commande électronique (28) et où le robinet de chasse d'eau (26) et la vanne d'alimentation de rebord (54, 54a) sont actionnés par la commande électronique (28) de façon à s'ouvrir et se fermer.

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- 14.** La séquence de chasse selon la Revendication 13, comprenant en outre le remplissage d'un réservoir d'alimentation en eau (56) possédant un dispositif de remplissage (54, 54b) actionnable par la commande électronique (28).

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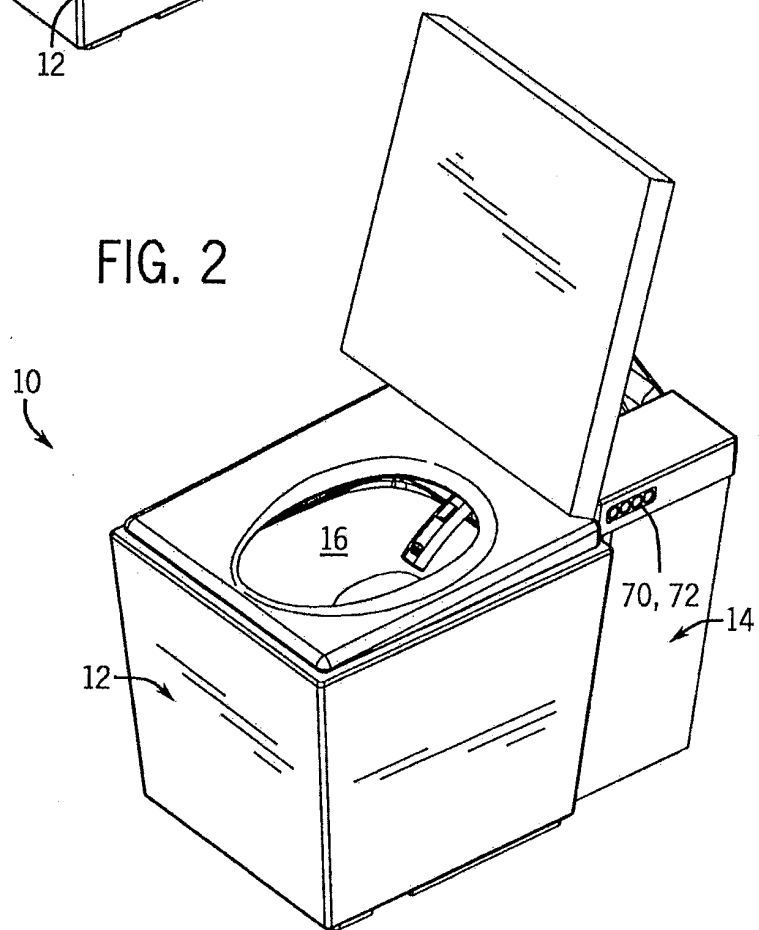
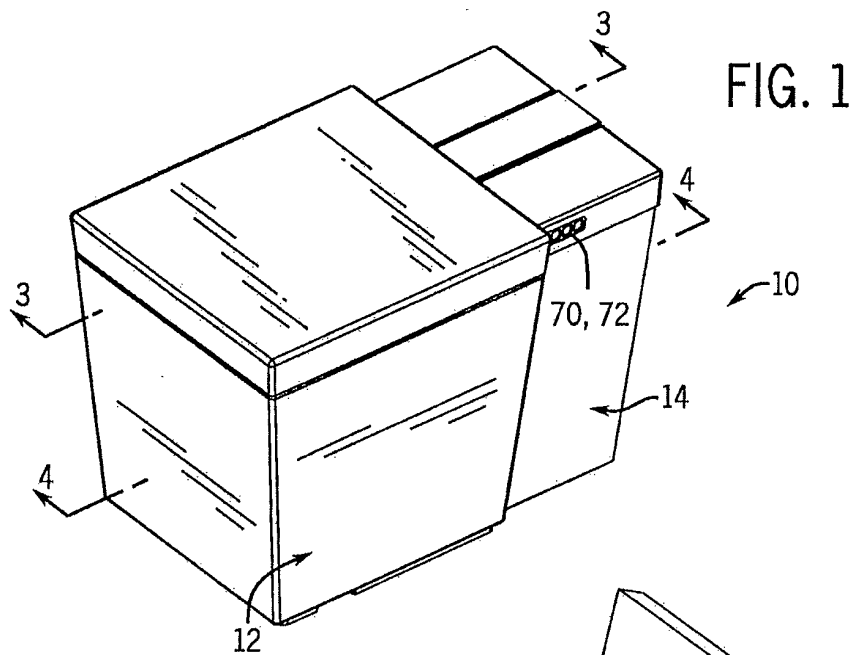
- 15.** La séquence de chasse selon la Revendication 14, comprenant en outre l'envoi de signaux d'entrée de niveau de cuvette à la commande électronique (28) au moyen d'un capteur de niveau (48) monté dans la cuvette (16) et couplé à la commande électronique (28).

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- 16.** La séquence de chasse selon la Revendication 15, comprenant en outre l'envoi de signaux d'entrée de niveau de réservoir à la commande électronique (28)

au moyen d'un capteur d'eau d'alimentation (66) monté sur le réservoir d'alimentation en eau (56) et couplé à la commande électronique (28).



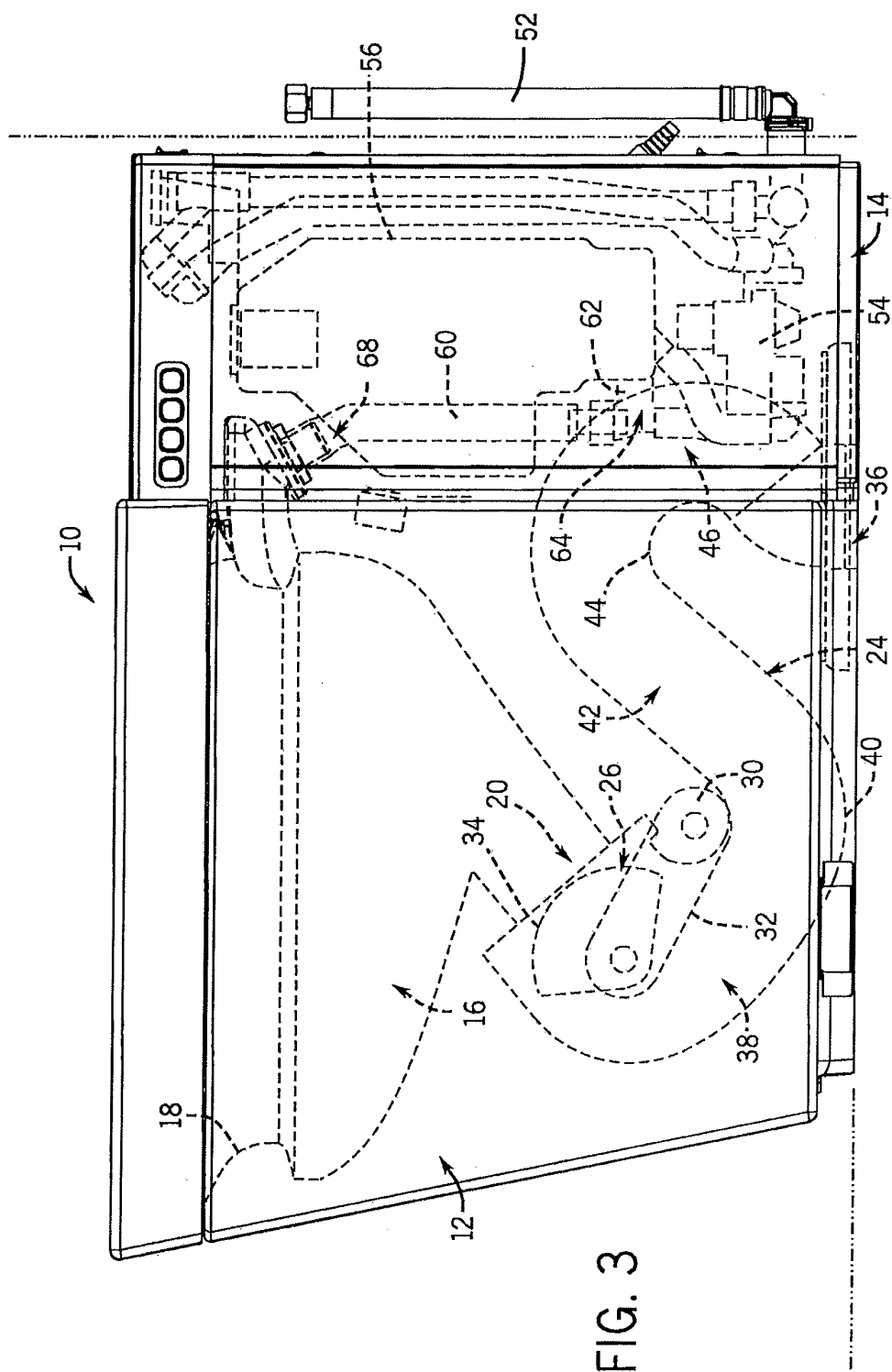
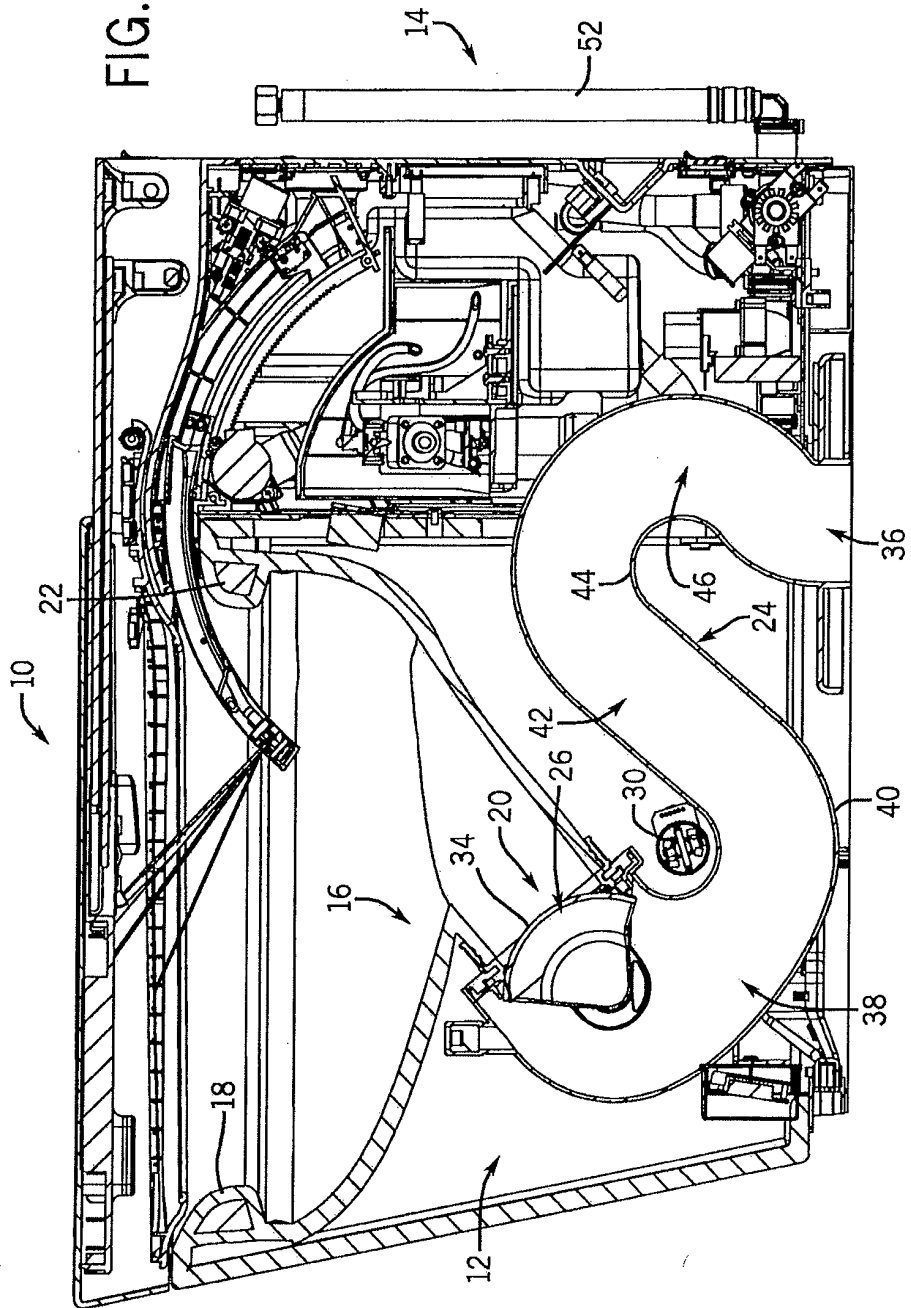


FIG. 3

FIG. 4



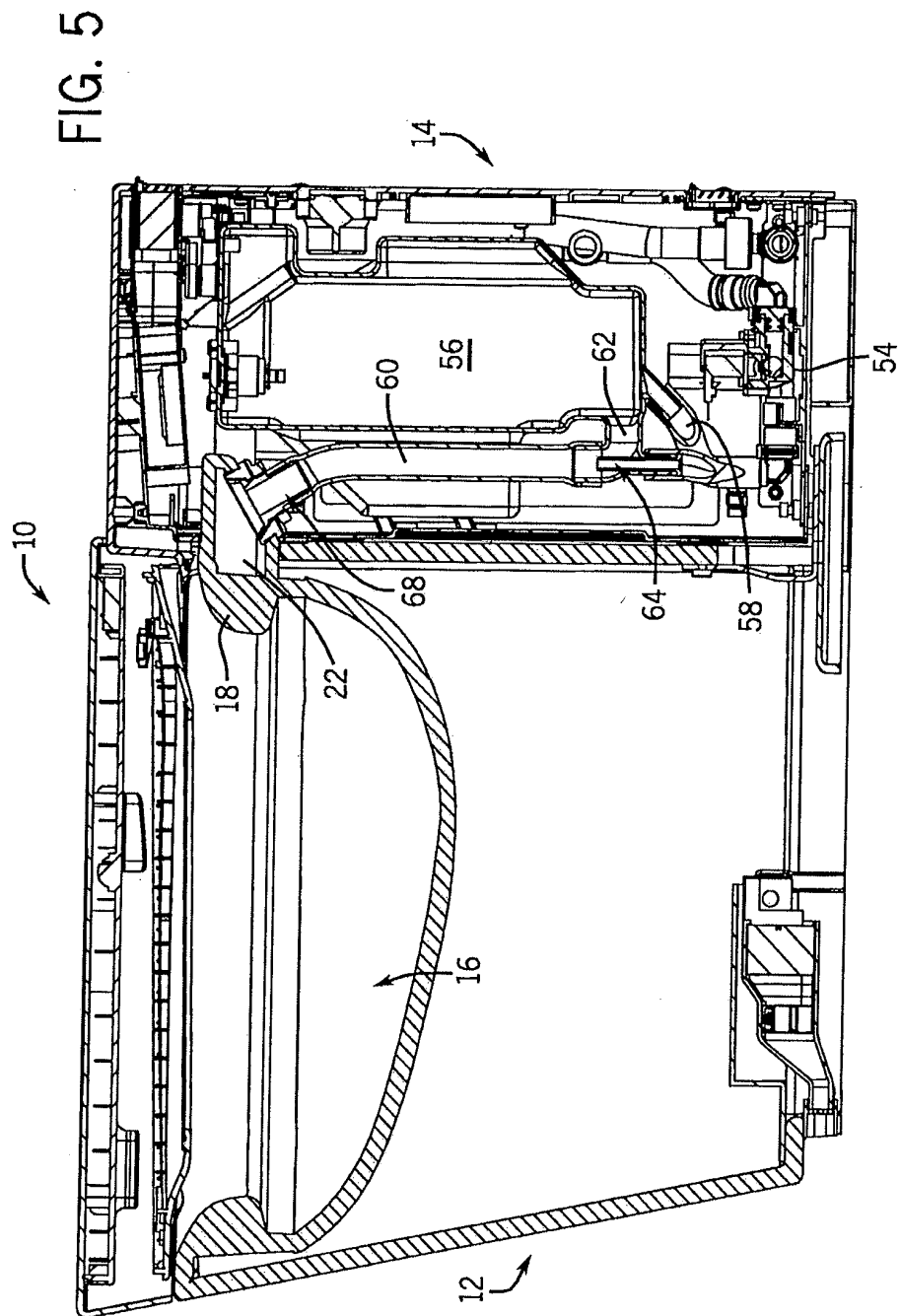
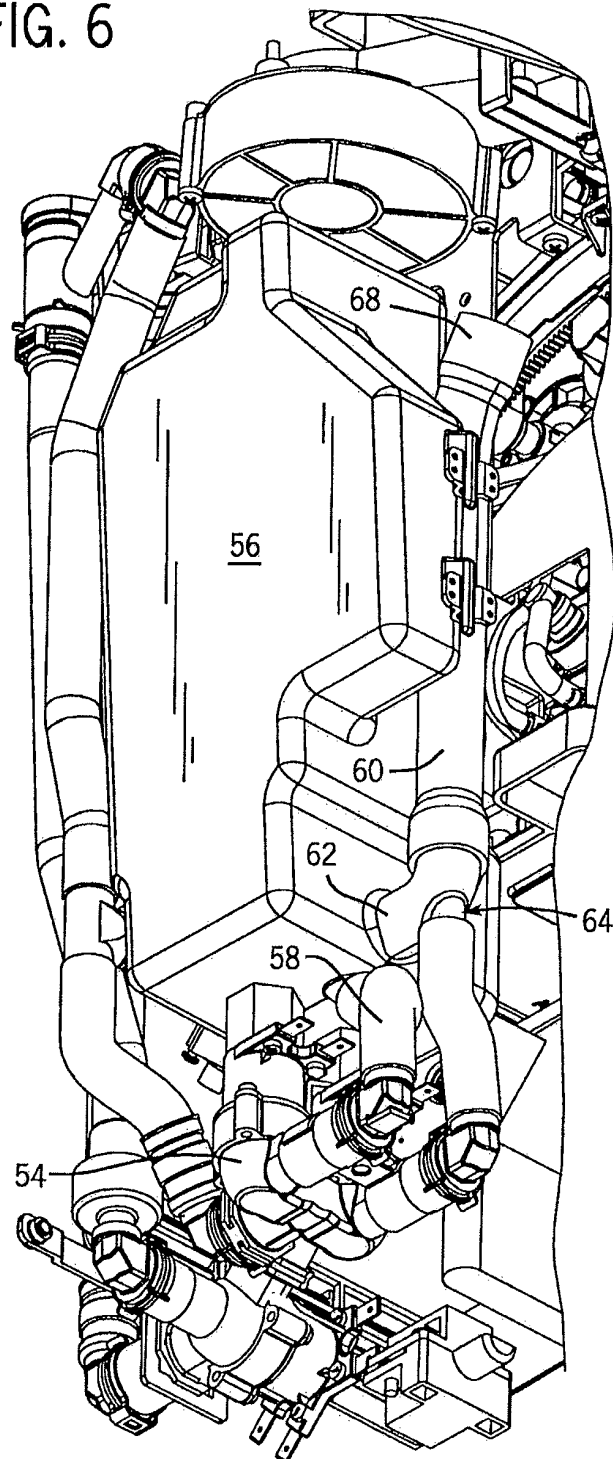
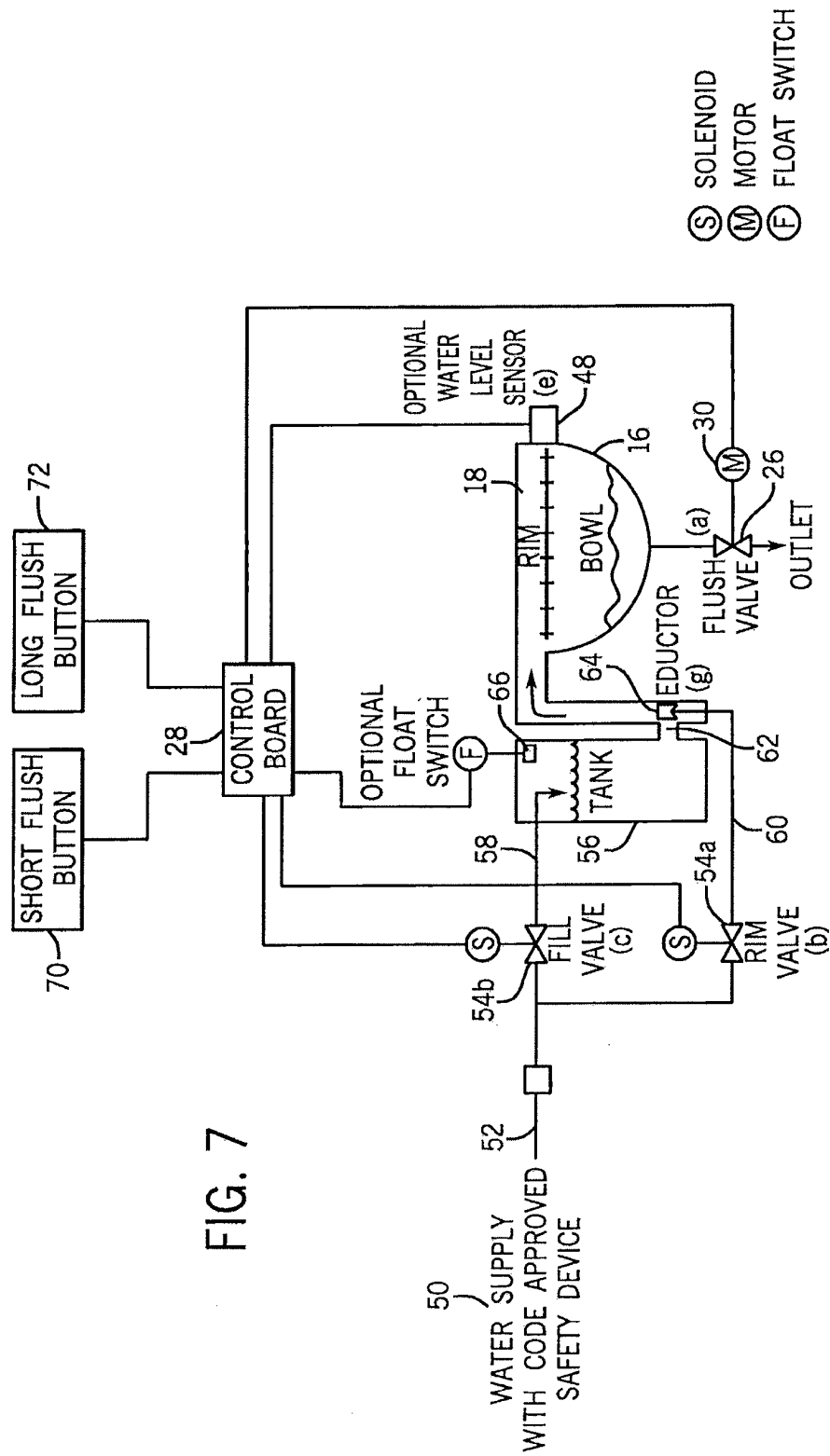


FIG. 6





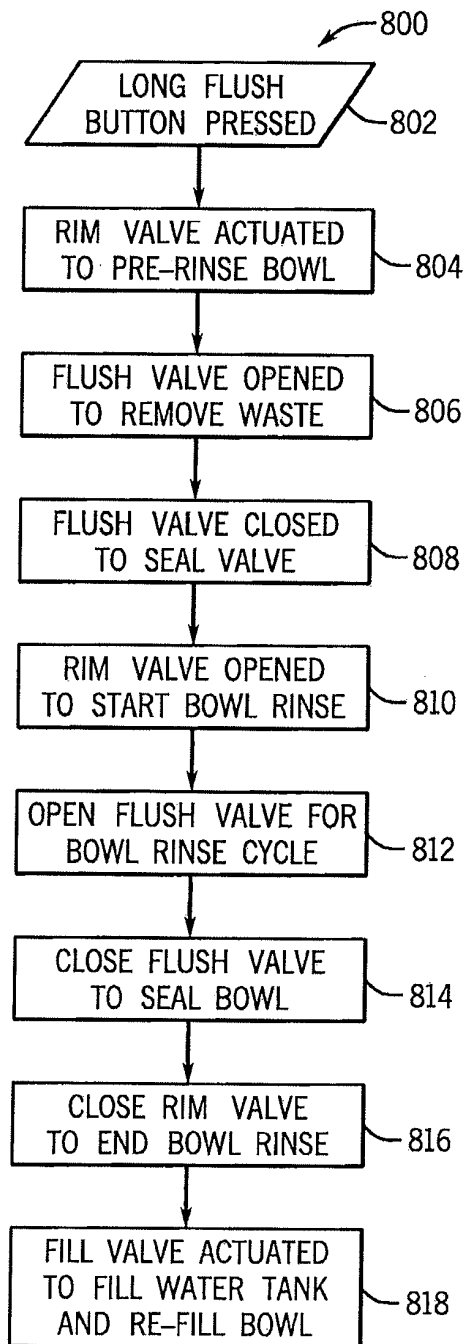


FIG. 8

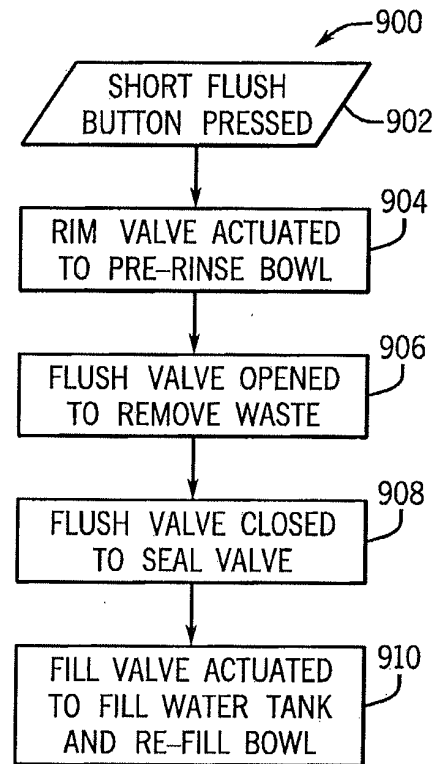


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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