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(54) **WATERLESS URINAL**

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(57) **ABSTRACT**

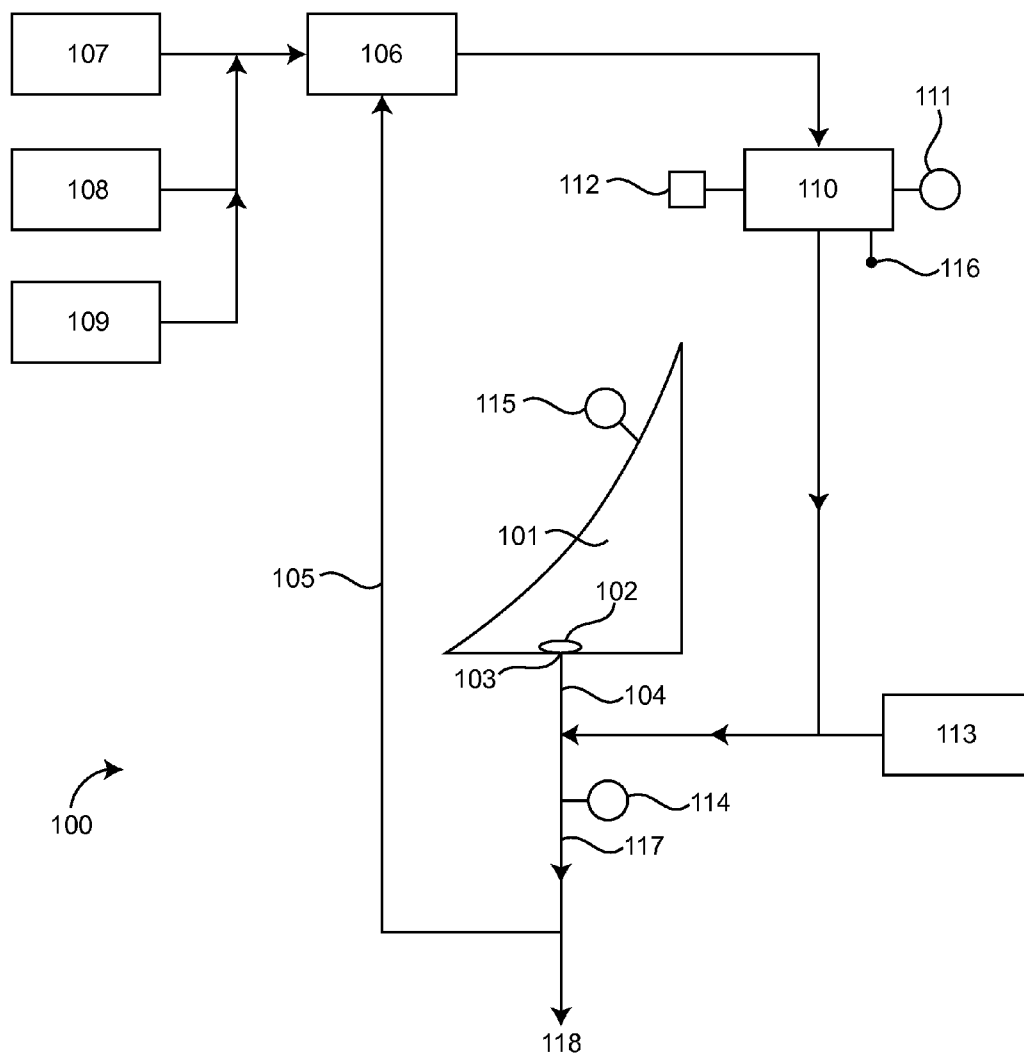
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A system for disposing of bodily waste includes at least one receptacle that includes a receptacle drain outlet. The at least one receptacle is configured to receive and direct a first waste to the receptacle drain outlet. A passageway includes a first passageway inlet that is coupled to the receptacle drain outlet. The first passageway is configured to receive and direct the first waste to an external area. A flushing system includes a source of a second waste and includes an activation device that introduces the second waste into the passageway in response to a signal. The second waste flushes a buildup associated with the first waste from the passageway.

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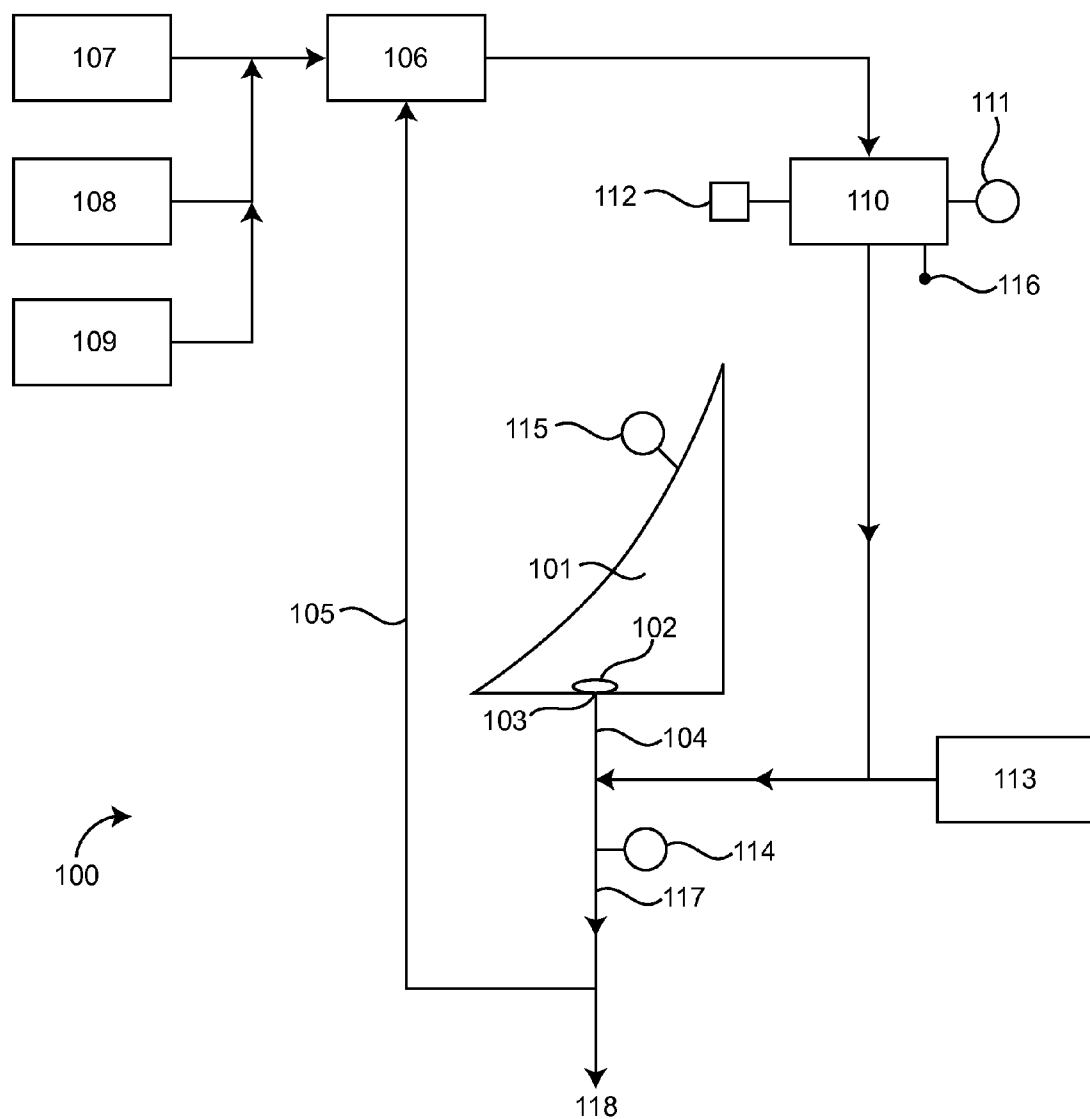


Fig. 1

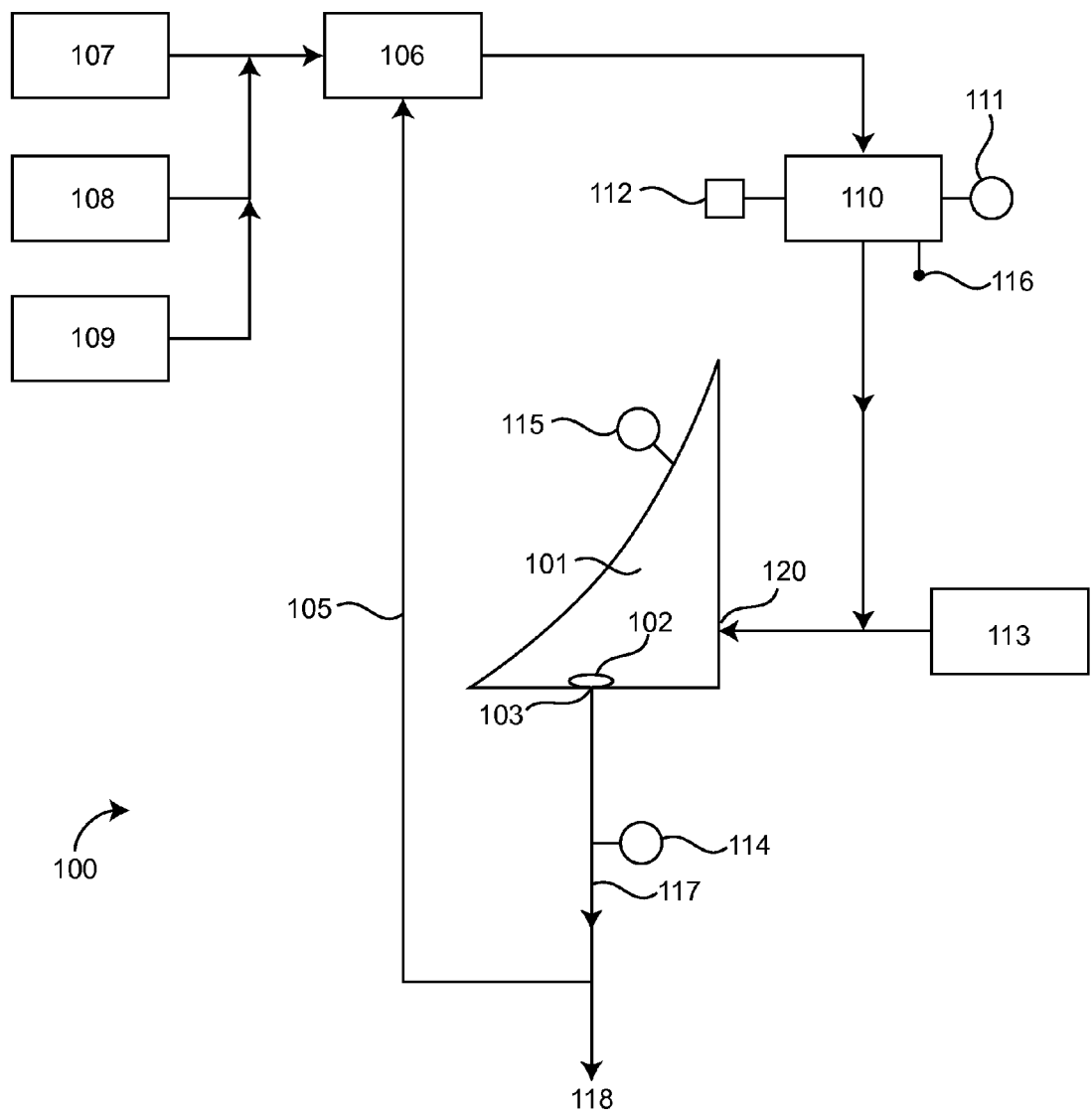


Fig. 2

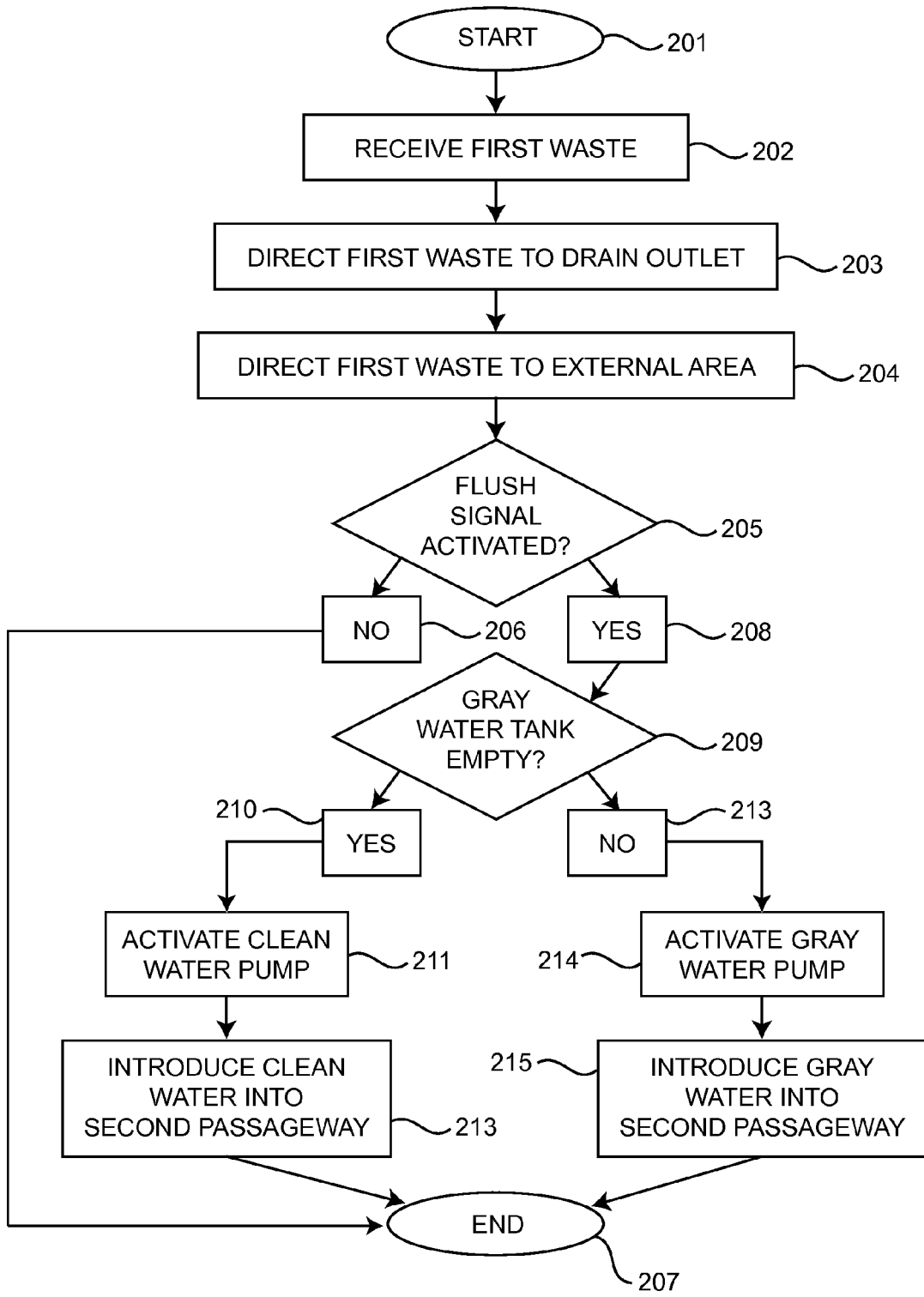


Fig. 3

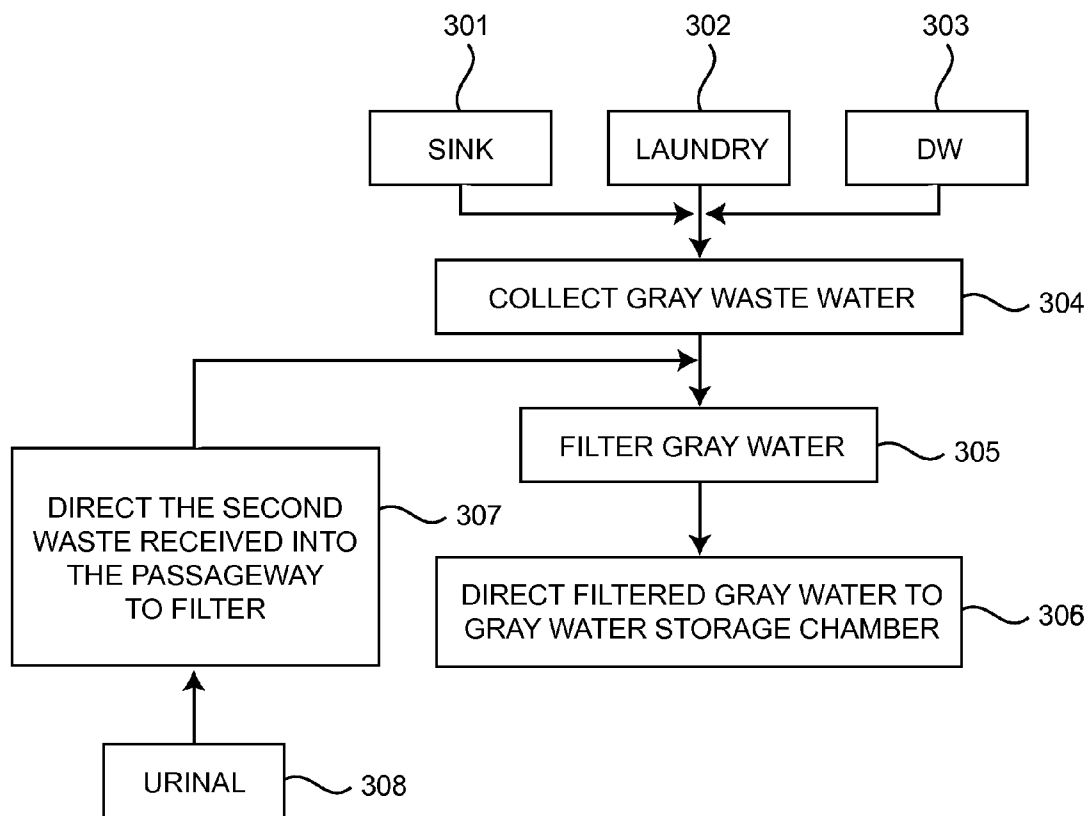


Fig. 4

WATERLESS URINAL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention pertains to the field of water conservation and, more particularly, to systems and methods for maintaining a waterless urinal.

[0003] 2. Description of Related Art

[0004] People have become increasingly concerned with issues relating to the use of water. In particular, there is a growing concern that humans are using fresh water at a faster rate than it can naturally be replenished. Additionally, processing water for human use consumes large amounts of energy during cleaning, pumping, delivery, and wastewater treatment. Finally, there is a need to conserve water for future generations and for local wildlife. Accordingly, economic interests and concern over damage to the environment have generated interest in ways to reduce consumption of water.

[0005] Demand for water results in part from water consumption in people's homes. For example, in an average household, water may be used in toilets, sinks, and dishwashing and laundry machines. While many household appliance manufacturers have recently introduced appliances that use less energy and water, there is a substantial need for toilets that use lower amounts of water. Currently, toilets are typically mandated to flush no more than 1.6 gallons of water per flush.

[0006] Conventional waterless urinals typically require bi-weekly maintenance at minimum to prevent buildup inside the drain pipe. This maintenance usually requires a number of systematic steps including: manually removing the urinal's drain ring, dumping a bucket of water down the drain, pouring an acidic solution down the drain, letting the solution stand for a period of time, dumping another bucket of water and then pouring in a dosage of scented oil for vapor lock. If these procedures are not routinely followed, a problem of solid buildup may occur within the drain pipe. Thus, making and using waterless urinals and toilets is met with various challenges. In particular, the time-consuming cleaning and maintenance of waterless urinals must be balanced against the goal of water conservation.

SUMMARY OF THE INVENTION

[0007] In view of the foregoing, embodiments according to aspects of the present invention provide systems and methods for managing water consumption while also minimizing the amount of time and money necessary for cleaning and maintaining the waterless urinal. For example, some embodiments provide flushing of the system with gray (recycled) water in order to remove buildup.

[0008] In an example embodiment, a system for disposing of bodily waste includes at least one receptacle that includes a receptacle drain outlet. The at least one receptacle is configured to receive and direct a first waste to the receptacle drain outlet. A passageway includes a first passageway inlet and a second passageway inlet. The first passageway inlet is coupled to the receptacle drain outlet. The first passageway is configured to receive and direct the first waste to an external area. A flushing system connects the second passageway inlet to a source of a second waste and includes an activation device that introduces the second waste into the passageway via the

second passageway inlet in response to a signal. The second waste flushes a buildup associated with the first waste from the passageway.

[0009] In another example embodiment, the at least one receptacle also includes a receptacle inlet to which the flushing system connects the receptacle to the source of the second waste. The second waste then enters the passageway through the receptacle drain outlet.

[0010] In some embodiments, the at least one receptacle includes a urinal and the first waste is urine. The second waste may include gray water. The gray water may come from a source that includes at least one of a laundry machine, a dish washing machine, and a sink. In addition, the flushing system may include a treatment system for treating the second waste before introducing it into the passageway or receptacle. Additionally, the system may further include a signal source for generating the automated signal, wherein the signal source includes at least one of a proximity sensor detecting a presence of a user of the at least one of a receptacle, a heat rate change sensor detecting the first waste received into the passageway, a buildup sensor detecting the buildup associated with the first waste, a timer, and a light switch operated in an area of the at least one receptacle.

[0011] These and other aspects of the present invention will become more apparent from the following detailed description of the preferred embodiments of the present invention when viewed in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 illustrates an example system for disposing bodily waste according to aspects of the present invention.

[0013] FIG. 2 illustrates another example system for disposing bodily waste according to aspects of the present invention.

[0014] FIG. 3 illustrates a flowchart for an example system for disposing bodily waste according to aspects of the present invention.

[0015] FIG. 4 illustrates a flowchart for an example gray water delivery and treatment system according to aspects of the present invention.

DETAILED DESCRIPTION

[0016] Referring to FIG. 1, an example system 100 for disposing bodily waste according to aspects of the present invention is illustrated. The system 100 includes a receptacle 101, a drain outlet 102, a passageway 117, and an automatic flush activation device 112. The receptacle 101 is configured to receive and direct a first waste to the drain outlet 102. Although the receptacle 101 in the example system 100 may be a urinal and the first waste received by the receptacle 101 may be urine, it is understood that the features of the system 100 are applicable to any types and configurations of toilets for the disposal of liquid and/or solid waste, including urinals, sit-down toilets, squat toilets, etc.

[0017] In one embodiment, the receptacle 101 may include a recessed surface to minimize build-up and retention of waste in the receptacle. The receptacle 101 may further include a coating to minimize odors, discoloration, and adhesion of waste to the receptacle surface and further to maximize the ease of cleaning. The coating may also possess strong hydrophobic properties that cause the urine to easily run down to the passageway 117.

[0018] The passageway 117 includes a first passageway inlet 103 and a second passageway inlet 104. The first passageway inlet 103 is coupled to the drain outlet 102. The passageway 117 is configured to receive and direct the first waste to an external area. The second passageway inlet 104 is connected to a source of second waste. The source of second waste may include gray water, stored in the gray water storage chamber 110. The gray water may be industrial water generated from domestic processes such as washing dishes, laundry, and bathing. The industrial water collected from a laundry machine 109, a dishwashing machine 108, and/or a sink 107 is treated in the treatment system 106 prior to being stored in the storage chamber 110. After passing through the treatment system 106, the treated industrial water may be directed to a gray water storage chamber 110. The gray water storage chamber 110 may include a water level meter 111, which indicates whether the storage chamber 110 has a sufficient amount of water to flush the build-up in the passageway 117 or receptacle 101. The gray water storage chamber 110 may also be connected to the second passageway inlet 104. The second passageway inlet 104 may also be connected to a public water source 113.

[0019] The waste flowing out of passageway 117 may be recycled via conduit 105 to the treatment system 106. After passing through the treatment system 106, the treated waste may be directed to the storage chamber 110.

[0020] The passageway 117 may further include a build-up sensor 114 which monitors the amount of waste build-up in the passageway 117. The build-up sensor may be configured to activate the automatic flushing device 112 when the amount of build-up in the passageway 117 exceeds the predetermined threshold level. In another embodiment, the automatic flushing device 112 may be configured to be activated each time the receptacle receives the first waste. In that embodiment, the automatic flushing device 112 may be activated via the sensor 115 which may be a heat sensor, proximity sensor, timer, or any other suitable detection system. In yet another alternative embodiment, the passageway 117 may be flushed manually by the user of the system 100. The flushing system in that embodiment may be analogous to the flushing systems found in conventional toilets and urinals—the user manually flushes the toilet or urinal after each use.

[0021] Referring to FIG. 2, another embodiment of the system 100 for disposing bodily waste is shown. The embodiment includes a receptacle 101, a drain outlet 102, a passageway 117, and an automatic flush activation device 112. The receptacle 101 is configured to receive and direct a first waste to the drain outlet 102, and receive and direct a second waste via a receptacle inlet 120 to the drain outlet 102.

[0022] The passageway 117 includes a first passageway inlet 103. The first passageway inlet 103 is coupled to the drain outlet 102. The passageway 117 is configured to receive and direct the first and second wastes to an external area. The source of the second waste may include gray water, stored in the storage chamber 110. The industrial water collected from a laundry machine 109, a dishwashing machine 108, and/or a sink 107 is treated in the treatment system 106 prior to being stored in the storage chamber 110. The storage chamber 110 may include a water level meter 111, which indicates whether the storage chamber 110 has a sufficient amount of water to flush the build-up in the passageway 117. The storage chamber 110 may also be connected to the receptacle inlet 120. The receptacle inlet 120 may also be connected to a public water source 113 as shown in FIG. 2. Alternatively, the gray water

and the water from the public water source 113 may be directed to the receptacle 101 by separate conduits.

[0023] In general, it is contemplated that the gray water may be directed to the passageway 117 according to any arrangement of passageways, inlets, etc. from any source. Moreover, it is contemplated that gray water may be directed to any portion of the system for flushing or cleaning.

[0024] Referring to FIG. 3, an example process according to aspects of the present invention is shown. The receptacle 101 is configured to receive the first waste in act 202. The receptacle is further configured to direct the first waste to the drain outlet 102 in act 203. The passageway 117 is configured to direct the first waste via the first passageway inlet 103 to an external area as shown in act 204. If the automatic flushing device 112 is not activated, the passageway 117 is not flushed as shown in acts 206 and 207. If the automatic flushing device 112 is activated, the passageway 117 is flushed. In one embodiment, the passageway 117 is flushed with gray water from the storage chamber 110 as shown in acts 213-15. If the storage chamber 110 does not have an amount of water sufficient to flush the passageway 117, the passageway 117 is flushed with city water as shown in acts 210-12.

[0025] Referring to FIG. 4, an example industrial water collection system is shown. The sink 301, laundry 302, and/or dish washing machine 303 is directed via conduits to the treatment system as shown in acts 304 and 305. Following treatment, the water is directed to the gray water storage chamber as shown in act 306. Furthermore, in one embodiment, the receptacle waste flowing out of passageway 117 of FIG. 1 is also directed via conduit 105 to the treatment system as shown in act 307. In an alternative embodiment, the receptacle waste may be sent to the city sewage system 118 of FIG. 1.

[0026] While the present invention has been described in connection with a number of exemplary embodiments and implementations, the present inventions are not so limited, but rather cover various modifications, and equivalent arrangements.

What is claimed is:

1. A system for disposing of bodily waste, comprising:
 - at least one receptacle including a receptacle drain outlet, the at least one receptacle being configured to receive and direct a first waste to the receptacle drain outlet;
 - a passageway including a first passageway inlet and a second passageway inlet, the first passageway inlet being coupled to the receptacle drain outlet, and the first passageway being configured to receive and direct the first waste to an external area; and
 - a flushing system connecting the second passageway inlet to a source of a second waste, the flushing system including an activation device introducing the second waste into the passageway via the second passageway inlet in response to a signal, the second waste flushing from the passageway a buildup associated with the first waste.
2. The system according to claim 1, wherein the at least one receptacle includes a urinal and the first waste includes urine.
3. The system according to claim 1, wherein the second waste includes gray water.
4. The system according to claim 3, wherein the source of the second waste includes at least one of a laundry machine, a dish washing machine, and a sink.
5. The system according to claim 1, wherein the flushing system further includes a treatment system for treating the second waste before introducing it into the passageway.

6. The system according to claim 1, wherein the flushing system further includes a recycling system for receiving and recycling the second waste received into the passageway, the recycled second waste being reintroduced into the passageway by the flushing system.

7. The system according to claim 1, further comprising a signal source for generating the signal, wherein the signal source includes at least one of a proximity sensor detecting a presence of a user of the at least one receptacle, a heat rate change sensor detecting the first waste received into the passageway, a buildup sensor detecting the buildup associated with the first waste, a timer, and a light switch operated in an area of the at least one receptacle.

8. The system according to claim 1, wherein the flushing system includes a storage chamber for collecting and storing the second waste from the source before the second waste is introduced into the passageway.

9. The system according to claim 1, wherein the at least one receptacle is associated with a manually operated flush valve operated by a user of the receptacle to flush the at least one receptacle and the passageway.

10. The system according to claim 1, wherein the at least one receptacle is at least partially covered with a coating that minimizes odor and discoloration of and adhesion to a surface of the receptacle.

11. A system for disposing of bodily waste, comprising:
at least one receptacle including a receptacle drain outlet and a receptacle inlet, the at least one receptacle being configured to receive and direct a first waste to the receptacle drain outlet;
a passageway including a first passageway inlet, the first passageway inlet being coupled to the receptacle drain outlet, and the first passageway being configured to receive and direct the first waste to an external area; and
a flushing system including a source of a second waste, the flushing system including an activation device introducing the second waste into the first passageway in response to a signal, the second waste flushing from the passageway a buildup associated with the first waste.

12. The system according to claim 11, wherein the at least one receptacle includes a urinal and the first waste includes urine.

13. The system according to claim 11, wherein the second waste includes gray water.

14. The system according to claim 11, wherein the flushing system delivers the second waste to the passageway via the receptacle drain outlet.

15. The system according to claim 11, wherein the flushing system further includes a treatment system for treating the second waste before introducing it into the receptacle.

16. The system according to claim 11, wherein the flushing system further includes a recycling system for receiving and recycling the second waste received into the receptacle, the recycled second waste being reintroduced into the receptacle by the flushing system.

17. The system according to claim 11, further comprising a signal source for generating the signal, wherein the signal source includes at least one of a proximity sensor detecting a presence of a user of the at least one receptacle, a heat rate change sensor detecting the first waste received into the passageway, a buildup sensor detecting the buildup associated with the first waste, a timer, and a light switch operated in an area of the at least one receptacle.

18. The system according to claim 11, wherein the flushing system includes a storage chamber for collecting and storing the second waste from the source before the second waste is introduced into the first passageway.

19. The system according to claim 11, wherein the at least one receptacle is associated with a manually operated flush valve operated by a user of the receptacle to flush the at least one receptacle and the passageway.

20. The system according to claim 11, wherein the at least one receptacle is at least partially covered with a coating that minimizes odor and discoloration of and adhesion to a surface of the receptacle.

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