A water saving toilet flushing system is disclosed having two substantially equally sized compartments contained within a single tank with each compartment containing a standard flush and fill control system including a water inlet connected to a water supply, a float control connected to the water inlet, a flush lever controlled by an exterior flush handle, and a flapper type outflow valve connected to the flush lever by a chain. The outflow of each compartment is through a Y-shaped outflow valve with one end in each compartment and an end connected to the toilet bowl. The compartments are sized such that the water from one compartment is sufficient to substantially remove liquid waste from the toilet bowl and each compartment is substantially similar in size so that either compartment may be used for the removal of liquid. Water from both compartments used together will substantially remove solids from the bowl. Accordingly, water consumption is reduced from that of a toilet using a standard tank.
Fig. 3
Fig. 6
WATER SAVING TOILET FLUSHING SYSTEM

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention generally relates to flushing mechanisms for toilets and, more particularly, to water saving toilet designs.

BACKGROUND OF THE INVENTION

[0002] Efficient and complete clearing of toilets has become a significant problem since the decrease of federally mandated flow volumes from 5 gpf (gallons per flush) to 1.6 gpf. Double flushing by the public and pressure systems by businesses have been developed to try to compensate for this decreased volume. These pressure systems are complicated, while double flushing defeats the purpose of water conservation. In response to this, new valve systems have been invented to try to produce dual flush volumes.

[0003] Many of these designs focused on alterations to the flushing mechanism allowing for both a low volume flush and a high volume flush. U.S. Pat. No. 5,813,089 to Wang, U.S. Pat. No. 5,881,399 to Kartoleksono, and U.S. Pat. No. 5,903,931 to Kohl, et al. are all examples of designs involving non-standard or modified flushing components inside a standard toilet tank to produce a dual flush mode toilet. The use of non-standard flush component increases manufacturing costs and can make finding replacement parts difficult for consumers.

[0004] Other designs focused on creating a dual tank arrangement allowing for differing flush volumes. U.S. Pat. No. 1,805,204 to Brown, U.S. Pat. No. 3,487,476 to Stern, and U.S. Pat. No. 5,761,749 to Chung all adopt this approach. The dual tank approach requires users to remember different flush procedures for different conditions.

[0005] There is a need for a water saving toilet tank which incorporates standard components and utilizes a simple flushing procedure. The present invention does this in a novel and unobvious way.

SUMMARY OF THE INVENTION

[0006] One embodiment of the present invention is a unique design for a water saving toilet tank. The tank incorporates two water compartments of substantially similar size. Each compartment incorporates its own water inflow, flushing means, and water outflow.

[0007] A further embodiment of the present invention pertains to a water saving toilet tank having two water compartments where each compartment incorporates its own water inflow, flushing means, and water outflow. The individual water outflows combine into a single outflow which connects to a toilet bowl.

[0008] Yet another embodiment of the present invention provides a water saving toilet tank which incorporates standard components.

[0009] A further embodiment of the present invention provides a water saving toilet tank which utilizes a simple flushing procedure.

[0010] Yet another embodiment of the present invention pertains to a toilet tank incorporating a plurality of apertures constructed and arranged for a water saving toilet.

[0011] Further objects, embodiments, forms, benefits, aspects, features, and advantages of the present invention may be obtained from the description, drawings, and claims provided herein.

DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a front, partial cross-sectional view of one embodiment of the present invention utilizing a cylinder type flush and fill system.

[0013] FIG. 2 is a front, partial cross-sectional view of another embodiment of the present invention utilizing a ball float type flush and fill system.

[0014] FIG. 3 is a front, partial cross-sectional view of another embodiment of the present invention utilizing a single member as the tank wall and compartment base.

[0015] FIG. 4 is a front, partial cross-sectional view of another embodiment of the present invention utilizing an outflow chamber.

[0016] FIG. 5 is a bottom cut away view of the tank body of FIG. 1 as taken along line 5-5 of FIG. 1.

[0017] FIG. 6 is a bottom view of the tank body of FIG. 4 as taken along line 6-6 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] For the purposes of promoting understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawing and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, and alterations and modifications in the illustrated device, and further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

[0019] The present invention relates to a water saving design for a toilet tank. In one embodiment of the present invention, the tank body of a water tank for a toilet is divided into two compartments of substantially equal size by a dividing wall. In the preferred embodiment the dividing wall does not allow fluid communication between the two compartments, although there may be fluid communication in other embodiments. Each compartment is preferably attached to a water supply through an intake valve and to the toilet bowl by an outflow aperture covered by a release valve. Preferably the water intake valve is located in the corresponding compartment through an aperture in the base of the compartment. In one embodiment the base of the compartments is defined by the base of the tank. In another embodiment, the base of the compartments is separate from the base of the tank. Each compartment is preferably also equipped with its own flush and fill system to allow for operation independent of the other compartment.

[0020] The compartments are sized and the fill system adjusted in such a way that water from one compartment is sufficient to substantially remove liquid waste from a toilet bowl. The compartments are sized and the fill system adjusted in such a way that when used together, the compartments contain water sufficient to substantially remove liquid and solid waste from a toilet bowl. In one embodiment
each compartment contains between about 1.0 and 1.5 gallons of water and more preferably between 1.1 and 1.3 gallons of water. Using 1.1 gallon compartments, a toilet incorporating the present invention would use 7.7 gallons of water during a six flush cycle assuming the typical ratio of five liquid removals to one solid removal. A standard 1.6 gallon single compartment tank would consume 9.6 gallons over the same cycle.

[0021] By utilizing substantially similarly sized compartments, the present invention eliminates the problem of users having to remember which flushing mechanism operates the desired flush volume. Either compartment may be used to substantially eliminate liquid waste, while both together will substantially eliminate solids. The use of separate flushing mechanisms to control flushing of each compartment eliminates confusion inherent in previous designs which utilized a single flushing mechanism requiring different actions to achieve the different flush volumes.

[0022] In a further embodiment of the present invention, a Y-shaped outflow pipe connects the outflow valve of each compartment to a common tank outflow. In the preferred embodiment this outflow pipe is substantially enclosed within a chamber inside the tank and substantially outside the individual tank compartments. This chamber is defined by the base of the tank compartments and the base of the tank. By enclosing the outflow pipe in a chamber inside the tank, the tank and the outflow tube base may be sized so that the present invention fits onto a preexisting standard toilet bowl without modification to the bowl.

[0023] In another embodiment of the present invention the Y-shaped outflow pipe is contained substantially within the individual tank compartments where only a portion of the outflow pipe base is located outside of the tank compartments. In yet another embodiment, an outflow chamber replaces the outflow pipe connecting the individual compartment outflows to a common tank outflow. This outflow chamber may be substantially contained within the individual tank compartments.

[0024] In the description to follow, the use of a hundred-series prefix (e.g. 2XX) with an element number (XX) refers to an element that is the same as the non-prefixes element (XX) previously described or depicted, except for the differences which are described or depicted hereafter.

[0025] The use of an “A” suffix with an element number (e.g. XXA) refers to an element that is the same as the non-suffixed element (XX) previously described or depicted, except that the element with the “A” suffix is located in the tank compartment opposite the corresponding non-suffixed element.

[0026] The embodiment of the present invention shown in FIG. 1 includes a toilet tank 10 divided into two compartments 15, 15A preferably of substantially equal size by a dividing wall 20. The compartments 15, 15A are divided in such a way that there is preferably no hydraulic contact between them through the dividing wall 20. Each compartment 15, 15A contains a standard cylinder type flush and fill system 25, 25A. In another embodiment (FIG. 2) a ball type flush and fill system (250) is utilized. It is understood that any flush and fill system known in the art may be utilized by the present invention.

[0027] In the embodiment illustrated in FIG. 1, the fill system is comprised of a float 50, 50A which controls an inflow valve 52, 52A supplied with water by an inflow tube 40, 40A through an inflow tube opening 1, 1A. The flush system is comprised of a flush lever 65, 65A which is actuated by an actuating member 60, 60A mounted to the tank body through an actuating member aperture 62, 62A; a flapper type valve 75, 75A which controls the flow of water through the outflow opening 70, 70A; and a chain 90, 90A connected to the flush lever 65, 65A. It is understood that the actuating member 60, 60A may be a lever, handle, button, infrared motion sensor, or any other flush-actuating device used by one of ordinary skill in the relevant art. It is further understood that the actuating member aperture 62, 62A may be located on any portion of the upper region of the tank body including the front, sides, and back surfaces. It is also understood that the chain 90, 90A may be a rod, wire, cable, or any other means for connecting said flush lever 65, 65A to said valve 75, 75A know to one of ordinary skill in the relevant art.

[0028] An overflow tube 80, 80A is connected to the outflow upper branch 35, 35A by an overflow tube outflow opening 82, 82A to prevent flooding should the water level rise too high. The overflow opening 70, 70A is connected by an overflow upper branch 35, 35A to the outflow 31. The outflow upper branch 35, 35A passes through the outflow tube opening 11, 11A located in the compartment base 24. The body of the overflow pipe 30 is preferably contained inside a chamber 22 located between the compartment base 24 and the tank base 26. Preferably the overflow pipe base 32 extends beyond the tank base 26 and is sized such that the outflow base 32 fits onto a standard toilet bowl (not shown) with little or no modification. In one embodiment, the outflow upper branches 35, 35A and the overflow base 32 are arranged and configured in such a way that the overflow pipe 30 is Y-shaped, having two supply branches that feed a common trunk.

[0029] Referring now to FIG. 3, the outflow pipe (330) is substantially contained within the tank compartments 315, 315A. In yet another embodiment (FIG. 4), an outflow chamber 434 connects the outflow openings 470, 470A to the outflow 431. The outflow chamber 434 is formed by the outflow chamber wall 436 at the base of the tank 410. Preferably the outflow chamber 434 is within the tank 410. The outflow chamber wall 436 is preferably integrally cast or molded with the tank compartments 415, 415A.

[0030] The operation of the compartment 15 located the left side of the tank 10 in FIG. 1 will now be described. It is understood that the operation of compartment 15A is substantially identical to that of compartment 15. In the embodiment illustrated in FIG. 1, compartment 15 and 15A are mirror images of each other. It is understood that in some other embodiments of the present invention they are not mirror images.

[0031] The toilet is flushed by engaging the actuating member 60 which actuates the flush lever 65. As the actuating member 60 is activated, the end of the flush lever 65 distal to the actuating member 60 is raised. Raising the flush lever 65 raises the chain 90 which in turn opens the flapper valve 75 allowing water to flow out of the compartment 15 through the compartment outflow opening 70 down the outflow pipe upper branch 35 to the Y-outflow pipe 30 and into the toilet bowl (not shown) through the outflow 31. After the compartment 15 is substantially drained, the flap-
per valve 75 is returned to the closed position by the action of gravity. Without water in the compartment 15 to support the float 50, gravity pulls the float 50 downward which in turn opens the inflow valve 52. Water from the inflow tube 40 begins to fill the compartment 15 through the inflow valve 52. As the water level W in the compartment 15 rises, the float 50 is buoyed by the water and rises along with the water. Once the water level W reaches a predetermined level, the float closes the inflow valve 52 and the flow of water into the compartment 15 ceases. Should either the float 50 or the inflow valve 52 malfunction and not stop the flow of water into the compartment 15, excess water will be drained out of the compartment 15 to prevent flooding via the overflow tube 80 which bypasses the flapper valve 75 and empties into the outflow tube upper branch 35.

[0032] The compartments 15, 15A are sized in such a way that each compartment 15, 15A contains a volume of water sufficient to substantially flush a toilet bowl containing only liquid waste. When combined, both compartments 15, 15A contain a volume of water sufficient to substantially flush a toilet bowl containing both liquid and solid waste. In one embodiment each compartment 15, 15A is sized to contain between about 1.0 and 1.5 gallons of water when the float 50, 50A closes the inflow valve 52, 52A. In another embodiment each compartment 15, 15A is sized to contain 1.1 gallons of water when the float 50, 50A closes the inflow valve 52, 52A. This sizing of the compartments 15, 15A allows for the use of one compartment 15, 15A to remove liquid waste and both compartments 15, 15A to remove solid waste. In one embodiment, the compartments 15, 15A are substantially equal in size so that either may be employed for a liquid only removal. The compartments 15, 15A may be of unequal size in other embodiments.

[0033] In one embodiment depicted in FIG. 5, the inflow tube 40, 40A enters the tank 510 through an inflow tube opening 501 in the compartment base 524. The outflow tube upper branch 35, 35A exists the tank 510 through an outflow tube opening 511 in the compartment base 524. It is understood that the present invention also contemplates a single outflow tube opening if the outflow tube is substantially contained within the tank compartments as shown in FIG. 3.

[0034] It is also understood that the present invention also contemplates a single outflow tube opening if an outflow chamber 434 is utilized as in FIG. 4. The outflow chamber 434 is formed by the outflow chamber wall 436 and the tank base 426. The outflow chamber is located at the bottom of the tank compartments 415, 415A below the dividing wall 420. The outflow chamber wall has one outflow opening 470, 470A covered by a corresponding outflow valve 475, 475A located in each tank compartment 415, 415A. Water from the tank compartments 415, 415A enters the outflow chamber 434 through the outflow openings 470, 470A and exits the tank 410 through the common outflow 431. As illustrated in FIG. 6, this embodiment of the present invention includes at least three apertures in the tank base 626: a common outflow opening 612 and two inflow tube openings 601, 601A.

[0035] While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes, modifications and equivalents that come within the spirit of the inventions disclosed are desired to be protected.

What is claimed is:
1. A water tank for a toilet, comprising:
a tank body divided into first and separate compartments;
a first intake valve located within said first compartment for providing water to said first compartment;
a second intake valve located within said second compartment for providing water to said second compartment;
a first release valve located within said first compartment and moveable between a closed position for storing water within said first compartment and an opened position for releasing water within said first compartment;
a second release valve located within said second compartment and moveable between a closed position for storing water within said second compartment and an opened position for releasing water within said second compartment; and
an actuating member operably coupled to one of said first release valve or said second release valve for moving said one release valve between the opened position and the closed position.
2. The water tank of claim 1 wherein said first and second compartments are of substantially equal volume.
3. The water tank of claim 1 which further comprises a second actuating member operably coupled to the other of said first release valve or said second release valve for moving said other release valve between the opened position and the closed position.
4. The water tank of claim 1 wherein said first and second compartments are configured and arranged such that each compartment contains a volume of water sufficient to substantially remove liquid waste, and a volume of water sufficient to substantially remove liquid and solid waste when flushed together.
5. The water tank of claim 1 wherein said first intake valve and said first release valve are configured and arranged to release about 1.0 gallons to 1.5 gallons of water from said first compartment and said second intake and said second release valve are configured and arranged to release about 1.0 gallons to 1.5 gallons of water from said second compartment.
6. The water tank of claim 1 wherein said first intake valve and said first release valve are configured and arranged to release about 1.1 gallons to 1.3 gallons of water from said first compartment and said second intake and said second release valve are configured and arranged to release about 1.1 gallons to 1.3 gallons of water from said second compartment.
7. The water tank of claim 1 which further comprises a Y-shaped pipe connecting said first release valve with said second release valve to form a common outflow.
8. The water tank of claim 7, which further comprises:
a base of said tank body;
a base of said first and second tank compartments; and
a chamber defined by said base of said tank body and said base of said first and second tank compartments.

9. The water tank of claim 8 wherein said Y-shaped pipe is located within said chamber.

10. The water tank of claim 1 which further comprises an outflow chamber connecting said first release valve with said second release valve to form a common outflow to said toilet bowl.

11. The water tank of claim 10 wherein said outflow chamber is substantially within said water tank.

12. An apparatus for a toilet, comprising:

a tank body divided into first and second separate water storage compartments by a vertical dividing member, each said first and second compartments having a bottom therein, said tank body including a common outlet;

said first compartment defining a first inlet aperture adapted and configured for supporting a water intake valve and defining a first outlet aperture in the bottom of said first compartment adapted and configured for providing stored water from said first compartment to said common outlet; and

said second compartment defining a second inlet aperture adapted and configured for supporting a water intake valve and defining a second outlet aperture in the bottom of said second compartment adapted and configured for providing stored water from said second compartment to said common outlet.

13. The apparatus of claim 12 wherein said first and second compartments are of substantially equal volume.

14. The apparatus of claim 12 wherein said first and second compartments are configured and arranged such that each compartment contains a volume of water sufficient to substantially remove liquid waste, and a volume of water sufficient to substantially remove liquid and solid waste when flushed together.

15. The apparatus of claim 12, further comprising:

a first intake valve and a first release valve configured and arranged to release about 1.0 gallons to 1.5 gallons of water from said first compartment; and

a second intake and a second release valve configured and arranged to release about 1.0 gallons to 1.5 gallons of water from said second compartment.

16. The apparatus of claim 12, further comprising:

a first intake valve and a first release valve configured and arranged to release about 1.1 gallons to 1.3 gallons of water from said first compartment; and

a second intake and a second release valve configured and arranged to release about 1.1 gallons to 1.3 gallons of water from said second compartment.

17. The apparatus of claim 12 which further comprises a Y-shaped pipe connecting said first and second outlet apertures to said common outlet.

18. The apparatus of claim 17 further comprising:

a base of said tank body;

a base of said first and second water storage compartments; and

a chamber defined by said base of said tank body and said base of said first and second water storage compartments.

19. The apparatus of claim 12 which further comprises an outflow chamber connecting said first outlet aperture and said second outlet aperture to said common outlet.

20. The apparatus of claim 19 wherein said outflow chamber is substantially within said water tank.

21. The apparatus of claim 12 wherein said first inlet aperture is in the bottom of said first compartment and said second inlet aperture is in the bottom of said second compartment.

22. The apparatus of claim 12 wherein each said first and second compartments include an upper region generally opposite the bottom, and which further comprises a first actuating member aperture defined in the upper region of said first compartment and constructed and arranged for supporting an actuating member and a second actuating member aperture defined in the upper region of said second compartment and constructed and arranged for supporting an actuating member.

23. A water tank for a toilet, comprising:

a tank body divided into first and second separate compartments each of a predetermined volume;

a first intake valve located within said first compartment for providing water to said first compartment;

a second intake valve located within said second compartment for providing water to said second compartment;

a first release valve located within said first compartment and moveable between a closed position for storing water within said first compartment and an opened position for releasing water from said first compartment; and

a second release valve located within said second compartment and moveable between a closed position for storing water within said second compartment and an opened position for releasing water from said second compartment;

wherein the predetermined volume of said first compartment is selected so that said first release valve releases between about one gallon and one and one-half gallons, and the predetermined volume of said second compartment is selected so that said second release valve releases between about one gallon and one and one-half gallons.

24. The water tank of claim 23 wherein the predetermined volume of the first compartment is substantially equal to the predetermined volume of the second compartment.

25. A water tank for a toilet, comprising:

a tank body divided into first and second separate compartments;

a first intake valve located within said first compartment and operable for providing water to said first compartment;

a second intake valve located within said second compartment and operable for providing water to said second compartment;
a first release valve located within said first compartment and moveable between a closed position for storing water within said first compartment and an opened position for releasing water within said first compartment;

a second release valve located within said second compartment and moveable between a closed position for storing water within said second compartment and an opened position for releasing water within said second compartment; and

wherein said first intake valve operates independently of said second intake valve, and said second intake valve operates independently of said first intake valve.

26. The water tank of claim 25 wherein said first release valve is moveable independently of said second release valve, and said second release valve is moveable independently of said first release valve.