ANTI SPLASH TOILET

FIELD OF THE INVENTION

[0001] The present invention relates to a toilet. More particularly, the present invention relates to a toilet with improved sanitation and minimizes water splash during usage.

BACKGROUND OF THE INVENTION

[0002] Toilet is a necessary facility to dispose liquid and solid waste from human beings whether at home, in the office or at public places. Fig. 1 illustrates a cross-sectional view of a conventional flush toilet 100. A toilet typically includes a water tank (not shown), a bowl 150, and a siphon pipe 190 to discharge waste from the bowl. The bowl has a reservoir 170 to collect waste. In a normal condition prior to flush, the reservoir is filled with water to a level generally defined by the height of the trap water. When the lever of the toilet is pulled, water falls out to fill the bowl, either from the tank, or from a flush rim which encircles the bowl.

[0003] However, there are problems associated with the use of these toilets. After a toilet has been used, the toilet is flushed in order to dispose off the liquid and solid waste and to clean the bowl. The toilet bowl refills with water in order to be used again. After the toilet bowl has been refilled, the water supply to the toilet will shut off, and the water in the bowl will become stationary. When the water is stationary, the surface tension of the water holds the water surface together. When the liquid or solid waste is released into the still water of the bowl, the surface tension of the water breaks, and the water may splash onto the user and/or outside of the toilet, resulting in unsanitary conditions.

[0004] Additionally, the bowl of the conventional toilet as shown in Fig. 1 in one situation is filled with a large volume of water as defined by H_A. This is non-economical and might not provide efficient cleaning of toilet after use. In another situation, the bowl of the conventional toilet is filled with small volume of water as defined by H_B, causing waste to adhere to the wall of the upper portion of the bowl. Such phenomenon is undesirable and unhygienic. More particularly, the bowl and the water in the reservoir which was not completely flushed may be

filled with germs and small particles of solid waste. These germs could cause various infections to humans, and this condition is extremely uncalled for particularly at public toilets where there are a lot of users.

[0005] From the foregoing discussion, it is desirable to provide an efficient and splash free toilet.

SUMMARY OF THE INVENTION

[0006] The invention relates to improving sanitation and reducing splash during usage of a toilet. In one aspect of the invention, a toilet is presented. The toilet includes a bowl having a first and a second surface. The first surface forms an upper portion of the bowl whereas the second surface forms a bottom portion of the bowl. The second surface includes a receiving portion for waste disposal when filled with water. The receiving portion comprises a sloping surface with depth of water being shallowest at a front end and deepest at a back end of the receiving portion to facilitate movement of the waste.

[0007] In accordance with another embodiment of the invention, the toilet includes a receiving portion having a sloping surface. The toilet further comprises a collection reservoir located behind the back of the bowl and in communication with the sloping surface. Splash is reduced and improved sanitation is achieved during usage.

[0008] A method of discharging waste from a toilet is disclosed in another aspect of the invention. The method includes providing a toilet bowl with a first and second surface. The second surface when filled with water forms a receiving portion for waste disposal. The receiving portion has a sloping surface with sufficient length and depth to facilitate movement of waste and reduces splash during usage. The method further comprises providing a collection reservoir behind the back of the bowl, wherein the collection reservoir is not visible to the user.

[0009] These and other objects, along with advantages and features of the present invention herein disclosed, will become apparent through reference to the following description and the accompanying drawings. Furthermore, it is to be understood that the features of the various

embodiments described herein are not mutually exclusive and can exist in various combinations and permutations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In the drawings, like reference characters generally refer to the same parts throughout the different views. Also, the drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention. Various embodiments of the present invention are described with reference to the following drawings, in which:

[0011] Fig. 1 shows a cross-sectional view of a convention toilet; and

[0012] Figs. 2a-b shows cross-sectional and top views of a toilet in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The present invention relates to a toilet. The invention can be applied to various types of toilets. For example, the invention can be applied to sitting or squatting type of toilets. Other types of toilet are also useful. Figs. 2a-b show cross-sectional and top views of a toilet in accordance with one embodiment of the invention. The toilet 200, in one embodiment, comprises a first, second and third portions. The first portion 210 of the toilet, for example, includes a water tank or reservoir with a removable lid (not shown). The tank is typically located above the toilet. The tank is filled with water to a predetermined level through a valve connected to a pipe provided by the public water system. The water level is controlled by a float actuated valve. The first portion of the toilet further includes a lever or a button to activate the release of the water. Other means for activating the release of water from the tank are also useful.

[0014] The tank has an opening 215 in its bottom portion which is in communication with an opening in an upper portion of a water chamber 220 underneath the tank. A flapper valve blocks the passage formed by the openings and is held in place over the opening by the pressure of the water within the tank. When the lever is pulled by the user, the flapper valve is lifted to release

the water from the tank by a coupler, such as a chain, rod or guide arm which is attached to the lever. Other means to lift the flapper valve are also useful. Water falls from the tank through the openings and passes through the chamber and released through a rear end of a flush rim. Providing water to the toilet without the use of a tank is also useful.

[0015] In one embodiment, the second portion 230 of the toilet includes toilet seat case and a toilet lid (not shown) to cover a toilet bowl. The second portion of the toilet further includes a flush rim 240 and a toilet bowl 250. The flush rim, in one embodiment, includes water outlets in its front end 242 and rear end 244. Providing water outlets from other positions of the flush rim is also useful. In one embodiment, the length of the flush rim from its front end 242 to its rear end 244 is about 36 cm. Other lengths are also useful. The toilet bowl, in accordance with one embodiment of the invention, comprises a first or side surface 252 and a second or bottom surface 254. The side surface forms an upper portion of the toilet bowl while the bottom surface forms a bottom portion of the toilet bowl which is in communication with a third portion 280 of the toilet behind the bowl and beneath the water chamber.

[0016] In one embodiment, the bottom surface of the toilet bowl comprises a sloping surface with a slope S_B. The sloping surface, for example, comprises a flat surface. Other types of surfaces may also be useful. An end of the bottom surface 266 and back of the bowl 264 form an opening to a collection reservoir 270 located in a third portion of the toilet behind the bowl and beneath the first portion of the toilet. Unlike conventional toilets, the collection reservoir in accordance with one embodiment of the invention, is not visible to the user. By locating the collection reservoir away and behind the receiving portion, splashing when waste is disposed into the bowl is minimized. Additionally, the waste is removed from the receiving portion which can improve sanitation. The third portion of the toilet further includes a pipe 290 in communication with the collection reservoir. The pipe, in one embodiment, is an inverted U-shaped pipe having a rising 292, horizontal 294 and falling 296 sections. Such configuration provides a siphon effect during flushing. Providing other shapes of pipe is also useful.

[0017] When in use, the toilet is provided with a liquid pool, such as water. In one embodiment, the liquid pool occupies a back portion of the bowl and fills the reservoir. The pool forms a receiving portion of the bowl. The length L_C of the pool should be sufficient to enable solid waste from a user to contact the pool or receiving portion. Preferably, the length of the pool should be sufficient to enable solid waste from a user to contact the pool or receiving portion without contacting other portions of the bowl. Typically, L_C is about 15 to 25 cm from the rear end of the flush rim to a front end 262 of the receiving portion. Preferably, L_c is about 22 cm from the rear end of the flush rim to the front end of the receiving portion. Other lengths may also be useful, for example, depending on design, size and application.

[0018] Due to the sloping bottom surface of the bowl, the depth of the pool is shallowest at the front end 262 of the receiving portion and increases in depth to its deepest at the back of the bowl 264. In one embodiment, the depth of the pool should be sufficiently shallow to prevent splashing when solid waste contacts the receiving portion. On the other hand, the pool should be sufficiently deep to facilitate movement of the waste to the collection reservoir. For example, the maximum depth (H_{max}) of the pool should be about 5.8 to 12.8 cm. Preferably, H_{max} is about 8 cm. Other maximum depths may also be useful.

[0019] In one embodiment, S_B is sufficient to facilitate sliding the solid waste backwards to the collection reservoir when it contacts the bottom surface of the bowl. For example, S_B can be constant and having angle θ_A of about 15 - 30°. Providing a bottom surface with a non-constant slope, such as one with an increasing gradient, is also useful. For example, the sloping surface comprises first portion near the front end 262 of the receiving portion and a second portion near the back end 266 of the receiving portion. The first portion comprises a first angle θ_1 and the second portion comprises a second angle θ_2. In one embodiment, θ_2 is greater than θ_1. Such configuration improves the flow rate of the waste to be disposed from the toilet. Providing other number of portions to the sloped surface with increasing gradient is also useful.

[0020] The sloping surface, in accordance with one embodiment of the invention, comprises

a length of about 22.8 – 25.5 cm from the front end to the rear end of the bottom surface of the receiving portion. Other lengths may also be useful. In an alternative embodiment, the sloping surface can be extended further towards and beneath the first portion of the toilet. The extended sloping surface beneath the first portion of the toilet, for example, can have a higher gradient relative to the sloping surface at the second portion of the toilet. The extended sloping surface, in this embodiment, forms a portion of the collection reservoir. Such configuration increases the flow rate of the waste towards the collection reservoir which is in communication with the extended sloping surface. Providing a constant slope to the extended sloping surface is also useful.

[0021] The toilet, in accordance with one embodiment of the invention, is made of ceramic materials. For example, the toilet bowl is typically made of ceramic materials such as clay called vitreous china. Providing other types of material is also useful. The toilet seats are typically made of plastic, such as polystyrene or wood or a combination thereof. Other materials can also be used.

[0022] As described, the present invention reduces or minimizes splash and facilitates movement of solid waste to a collection reservoir. This reduces odor from the waste. Additionally, waste is unlikely to adhere to the toilet since it contains liquid. Hence, sanitation is improved.

[0023] The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The foregoing embodiments, therefore, are to be considered in all respects illustrative rather than limiting the invention described herein. Scope of the invention is thus indicated by the appended claims, rather than by the foregoing description, and all changes that come within the meaning and range of equivalency of the claims are intended to be embraced therein.

[0024] What is claimed is:

CLAIMS

1. A toilet comprising:

a bowl having a first surface and a second surface,

the first surface forms an upper portion of the bowl, and

the second surface forms a bottom portion of the bowl, wherein the second surface includes a receiving portion for waste disposal when filled with water, the receiving portion having a sloping surface with depth of water being shallowest at a front end and deepest at a back end of the receiving portion to facilitate movement of the waste, wherein such configuration reduces splash and odor during usage.

2. The toilet of claim 1 wherein the sloping surface comprises a flat surface.

3. The toilet of claim 1 wherein the receiving portion comprises a length of about 15 to 25 cm from a rear end of a flush rim of the toilet to a front end of the receiving portion.

4. The toilet of claim 1 wherein maximum depth of the receving portion is about 5.8 to 12.8 cm.

5. The toilet of claim 1 wherein the sloping surface comprises a constant slope.

6. The toilet of claim 5 wherein angle of the sloping surface is about 15 to 30°.

7. The toilet of claim 1 wherein the sloping surface comprises non-constant slope.

8. The toilet of claim 7 wherein the sloping surface comprises a first portion having a first angle θ_1 near a front end of the receiving portion and a second portion having a second angle θ_2

near a back end of the receiving portion.

9. The toilet of claim 8 wherein θ_2 is greater than θ_1.

10. The toilet of claim 1 wherein the sloping surface comprises a length of about 22.8 -25.5 cm from a front end to a rear end of a bottom surface of the receiving portion.

11. The toilet of claim 1 further comprises a collection reservoir which is located behind the bowl and in communication with the sloping surface.

12. The toilet of claim 11 wherein the sloping surface further comprises an extended sloping surface which forms a portion of the collection reservoir having a higher gradient relative to the sloping surface of the receiving portion.

13. A toilet comprising:

a bowl having a first surface and a second surface,

the first surface forms an upper portion of the bowl, and

the second surface forms a bottom portion of the bowl, wherein the second surface includes a receiving portion for waste disposal when filled with water, the receiving portion having a sloping surface; and

a collection reservoir located behind the back of the bowl and in communication with the sloping surface, wherein such configuration reduces splash and improves sanitation during usage.

14. The toilet of claim 13 wherein the sloping surface having depth of water being shallowest at a front end and deepest at a back end of the receiving portion.

15. The toilet of claim 13 wherein the sloping surface comprises a flat surface.

16. The toilet of claim 15 wherein maximum depth of the receving portion is about 5.8 to 12.8 cm.

17. The toilet of claim 13 wherein the sloping surface comprises a constant slope.

18. The toilet of claim 13 wherein angle of the sloping surface is about 15 to 30°.

19. The toilet of claim 13 wherein the sloping surface comprises a first portion having a first angle θ_1 near a front end of the receiving portion and a second portion having a second angle θ_2 near a back end of the receiving portion, wherein θ_2 is greater than θ_1.

20. A method of discharging waste from a toilet comprising:

providing a toilet bowl with a first surface and a second surface,

wherein the second surface when filled with water forms a receiving portion for waste disposal, the receiving portion having a sloping surface with sufficient length and depth to facilitate movement of waste and reduces splash during usage; and

providing a collection reservoir behind the back of the bowl, wherein the collection reservoir is not visible to the user.