Feb. 4, 1941. W. J. COLLISON 2,230,285

FLUSH TANK CONTROL

Filed May 19, 1938

Fig. 1.

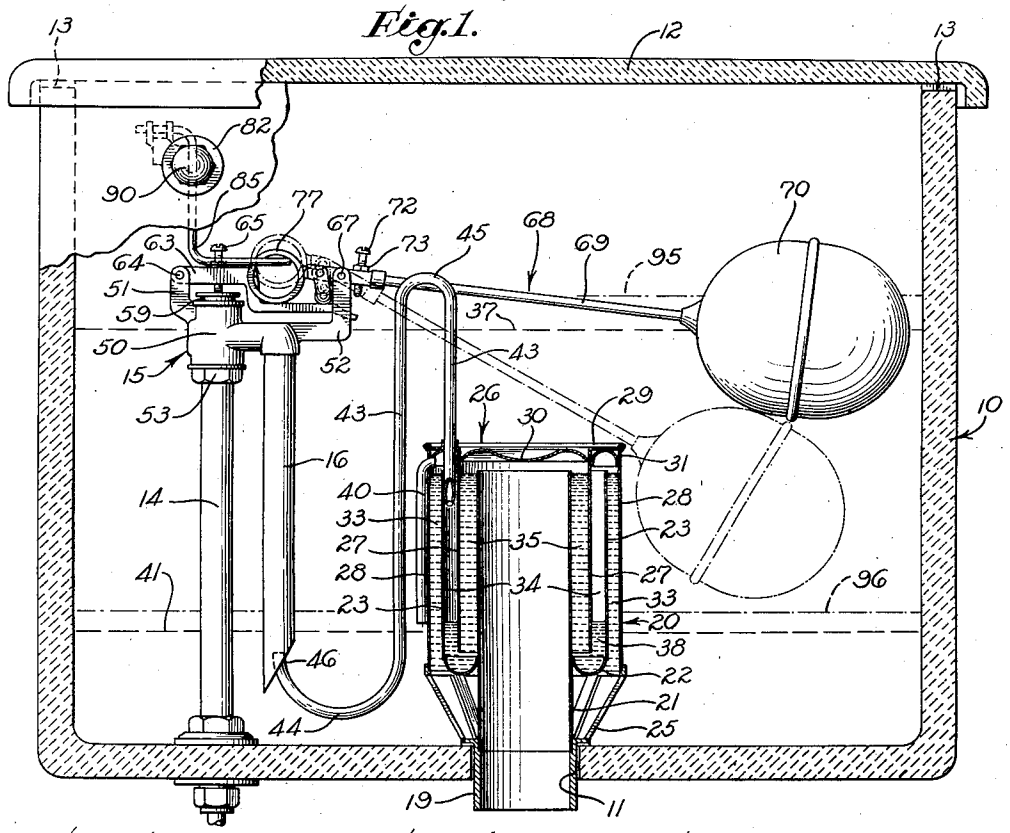


Fig. 4.

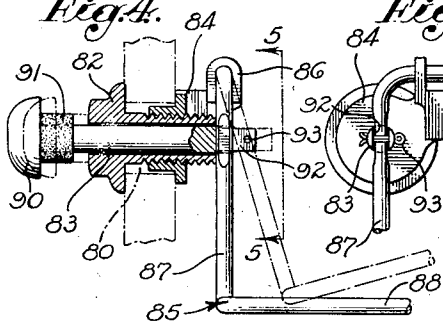


Fig. 5.

Fig. 2.

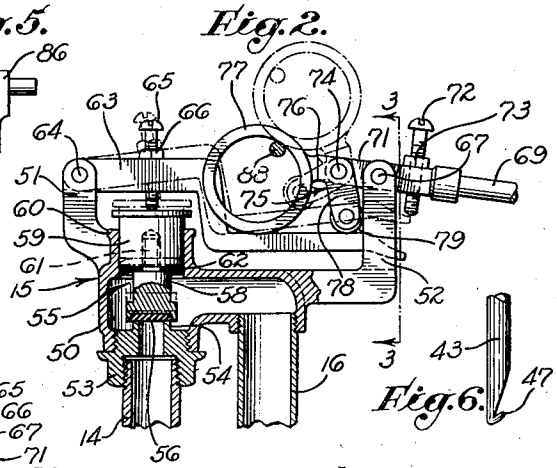


Fig. 6.

Fig. 7.

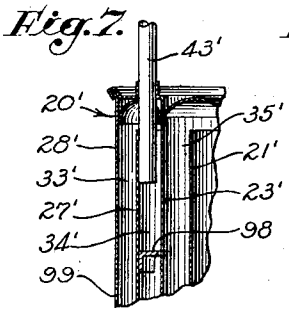
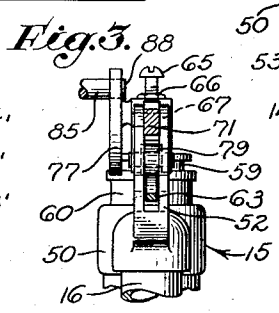


Fig. 3.



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2,230,285

FLUSH TANK CONTROL

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Application May 19, 1938, Serial No. 208,921

6 Claims. (Cl. 4—42)

My invention relates to flush tanks for toilets and the like, more particularly flush tanks having submerged discharge siphons, and is directed to an improved form of siphon and improved means for controlling the action of the siphon. The present application is a continuation-in-part of my copending application, Serial No. 135,787, filed April 8, 1937, entitled "improvement in Flush tank with outlet siphon" now matured into Patent 2,120,856.

Submerged discharge siphons, as heretofore employed in the art, have been characterized by sundry disadvantages. In some constructions the control mechanisms are cumbersome or tend to get out of order, or include elements that must be renewed at frequent intervals; in other arrangements, siphonic action is not reliable or is unduly delayed, or causes excessive and obnoxious noise. The general object of my invention is to avoid all of these disadvantages by providing a flush tank assembly in which the discharge siphon is reliable in action, substantially free of objectionable noise and free of moving parts, and in which the siphon is controlled by a simple, positive, and foolproof control mechanism.

A discharge siphon of the type to which my invention pertains has a sinuous passage including at least two up-legs and an intermediate air trap whereby the combined heads of the up-legs may balance pressure of the water submerging the siphon. In the prior art, various expedients have been employed for initiating discharge flow through such a siphon. In some arrangements, siphonic action is started by increasing the head of the water in which the siphon is submerged; in other arrangements the siphon balance is upset by releasing the air trapped between the two up-legs. The disadvantage of the first arrangement is excessive delay in the siphonic action, and, in the second arrangement, numerous disadvantages arise from the necessity of tubes and air-tight valves for remote control of the air trap. An object of my invention is to incorporate the first arrangement in a flush tank control in combination with liquid-discharge means effective in the siphon itself to initiate siphonic flow, to the end that these two factors may cooperate to cause prompt siphonic action.

A more specific object of my invention with respect to the liquid-discharge means in the siphon is to have the single means serve both the function of initiating siphonic discharge and the function of refilling the toilet bowl served after cessation of siphonic action.

A feature of my invention is the discovery that such a liquid-discharge means in the siphon may be constructed and arranged to discharge sufficient volume with sufficient force to be effective for promptly initiating siphonic discharge without being effective to destroy the requisite air trap in the siphon while the flush tank is being refilled.

One specific object of my invention is to provide a substantially noiseless vent arrangement for admitting air to the air trap after cessation of siphonic discharge; and a further and important object is to provide automatic and adjustable means for insuring free communication through such vent for a time interval adequate to provide the required quantity of air in the trap.

Another object of my invention is to provide an improved valve mechanism for controlling the supply of water to the flush tank.

The above and other objects and advantages of my invention will be apparent from the detailed description to follow, taken with the accompanying drawing.

In the drawing:

Fig. 1 is a longitudinal vertical section through a flush tank incorporating my invention;

Fig. 2 is an enlarged elevation partly sectioned of the valve mechanism of Fig. 1;

Fig. 3 is a view partly in section taken as indicated by the line 3—3 of Fig. 2;

Fig. 4 is an enlarged section showing the manual control of the valve mechanism;

Fig. 5 is a view taken as indicated by the line 5—5 of Fig. 4;

Fig. 6 is an enlarged side elevation of the discharge end of the refill tube employed in Fig. 1; and

Fig. 7 is a fragmentary vertical section through a siphon unit showing an alternative arrangement for the refill tube.

Fig. 1 shows a conventional toilet flush tank generally designated 10 having an outlet 11 and a cover or lid 12, the tank having the usual vent recesses 13 in its upper edge. Water is supplied to the tank through the usual stand-pipe 14, the discharge from which is controlled by a valve generally designated 15, the discharge passing from the valve into a downwardly extending discharge pipe 16.

Water is discharged from the tank into a discharge pipe 19 at the port 11 through a normally submerged discharge siphon generally designated 20. The siphon 20 is of the type that has a continuous sinuous passage forming two up-legs and providing an air trap whereby the combined heads of the up-legs balance the nor-

mal pressure of liquid submerging the siphon. The art is conversant with two types of siphons providing such a fluid balance, one type being formed simply by a pipe of sinuous configuration, the other type being formed by telescoped members of cup-like configuration. Although it is to be understood that the principles of my invention are equally applicable to both types of siphons, the present disclosure will be limited to the latter type.

The drawing illustrates one manner in which such a siphon may be constructed. Extending upwardly into the tank is a cylindrical wall 21 that is a continuation of the discharge pipe 19 and forms the inner cylindrical wall of the siphon. Embracing this wall 20 with a watertight joint is a cup-like member comprising an annular bottom wall 22 of arcuate cross-sectional configuration and a cylindrical wall 23 concentrically spaced from the wall 21. Mounted on a spider 25 around the inner siphon wall 21 is an inverted cup member, generally designated 26, that has an inner cylindrical wall 27 between the cylindrical wall 21 and the cylindrical wall 23 and has an outer cylindrical wall 28 that surrounds the cylindrical wall 23 in spaced relation thereto. The inverted cup member 26 may be fabricated from sheet metal in a manner indicated in the drawing, the various parts being stamped out with sheet metal dies. In this particular construction the material that forms the inner wall 27 is flanged over as indicated at 29 and seamed to the upper edge of the outer cylinder wall 28. A disc 30, preferably of undulating cross-sectional configuration, is then soldered into position, sealing the space defined by the cylindrical wall 27. Finally, an annular sheet metal wall 31 of arcuate cross-sectional configuration is inserted in the annular space between the walls 27 and 28 and soldered into place.

The described construction forms an annular siphon passage of sinuous character, which passage is divided into an outer up-leg 33, an intermediate down-leg 34, and an inner up-leg 35, the outer up-leg opening from the interior of the flush tank and the inner up-leg communicating with the discharge pipe 19. It will be noted that in the construction shown, arcuate walls are provided at the various turns in the siphonic passage to minimize friction.

In the normal submerged state of the siphon with the water in the tank at a normal level 37, a state of equilibrium exists in which pressure supporting the head of water in the inner up-leg 35 is transmitted by air under pressure in the down-leg 34 to the top of the water column in the up-leg 33 so that the heads of water in the two up-legs of the siphon combine to balance the normal head of water in the tank effective at the entrance to the up-leg 33, it being understood, of course, that the small column 38 of water at the bottom of the down-leg 34 lessens the effectiveness of the head in the up-leg 35. It is apparent, then, that the down-leg 34 and the upper end of the up-leg 33 serve as an air trap or air lock that is necessary for equilibrium with a submerged siphon.

In the preferred form of my invention, a vent tube 40 extends downwardly from the air trap of the siphon to a point near the level to which it is desired that the water fall in the operation of the flush tank. The disposition of the vent tube 40 determines that level, because the admission of air into the siphon when the liquid level of the tank is substantially below normal breaks the siphonic action. Thus, with the vent tube 40 disposed as shown in Fig. 1, the water in the tank will drop to approximately the level 41 before the siphon stream breaks. Subsequent rise in the water level seals the lower end of the vent tube 40 and traps in the siphon a quantity of air that is gradually compressed above atmospheric pressure as the water level in the tank approaches normal. It is apparent, then, that a quantity of air admitted into the siphon through the vent tube 40 has, first, the function of terminating the siphonic action and, later, the function of normally preventing discharge flow through the siphon.

For refilling the bowl served by the flush tank after the cessation of siphonic flow, I provide a refill pipe 43 that has one bend 44 below the lowest water level 41 and a second bend 45 above the normal water level 37, the inlet end 46 of the refill tube extending into the discharge pipe 16 to receive flow therefrom. A feature of my invention is the conception that this refill tube may be employed to initiate siphonic action either alone or in cooperation with some other flow-initiating means. In the preferred form of my invention, the refill tube 43 enters the air trap of the siphon from above and extends partially downward into the down-leg 34 of the siphon. As best shown in Fig. 6, the discharge end of the refill tube 43 is, by preference, cut at an angle, the tip of the tube being bent to form a flange 47 across the path of flow to serve as a baffle or diverting means to dissipate to a required extent the energy of the liquid discharge from the refill tube into the air trap.

The valve 15 includes a body 50 having integral therewith two bifurcate brackets 51 and 52 for the valve control mechanism. Threaded into the inlet portion of the valve body and serving as means for connecting the valve to the standpipe 14 is a bushing 53 that provides an annular valve seat 54. Normally resting on the valve seat is a valve member generally designated 55, the valve member carrying the usual washer 56 for contact with the valve seat. In the preferred form of my invention the valve member 55 includes a valve head 58 and a cylindrical valve-guide 59 that extends in a freely sliding manner through a cylindrical portion 60 of the valve body. The valve head 58 has a stem 61 threaded into the valve-guide 59, and a suitable washer 62 may be retained between the valve head and the guide to minimize the flow of water out of the valve body around the valve-guide.

The mechanism for controlling the valve 15 includes a valve lever 63 pivotally mounted by a pin 64 on the bracket 51, with the swinging end of the lever extending between the arms of the bracket 52. The valve lever 63 is adjustably related to the valve member 55 by means of a screw 65 that extends through the valve lever in a position to abut the upper end of the valve-guide 59, the screw being adjustably secured by a suitable nut 66.

Mounted in the second bracket 52 by a pin 67 is a float lever, generally designated 68, that has a relatively long arm 69 carrying a float 70 and a relatively short arm 71 that extends over the valve lever 63. Extending through the long arm of the float lever is a screw 72 secured by a nut 73, the screw being disposed to move against and thereby to depress the free end of the valve lever 63 when the float approaches the lowermost water level 41. Pivotally mounted on the arm 71 of the float lever by a suitable pin 74 is a bell-crank 75

having one arm 76 formed with an integral ring 77 and a shorter arm 78, the shorter arm preferably carrying a roller 79. The ring 77 may be regarded as a trigger for releasing the valve, as will be later described.

While any suitable means may be employed to actuate this trigger, I prefer to employ the manually operable means shown in Figs. 4 and 5. Extending through a suitable aperture 80 in the wall of the flush tank is a tubular member 82 that slidingly retains an operating plunger 83, the tubular member being secured by a suitable bushing 84. On the interior of the tank is an angular lever 85 pivoted in a bracket 86 that is integral with the bushing 84, the lever having an intermediate portion 87 that swings in the plane of the plunger and having an operating end 88 that extends into the ring 77. The plunger has a suitable button 90 on its external end and, preferably, is provided with a collar 91 of rubber or other resilient material to cushion the movement of the button against the tubular member 82. The inner end of the plunger is cut away to provide a suitably extensive longitudinal slot 92 that engages the intermediate portion 87 of the angular lever 85, a cotter pin 93 extending across the end of the slot to prevent escape of the angular lever. Whenever the plunger 83 is shifted inwardly, it forces the angular lever 85 from the normal position of the lever to the position indicated by dotted lines in Fig. 4, which movement of the angular lever raises the ring 77 from its normal disposition to the position shown in dotted lines in Fig. 2.

In the normal disposition of the mechanism between flushing operations, the plunger 83 is at its outermost position, as shown in Fig. 4, having been moved to that position by gravitation of the angular lever 85. The operating end 88 of the angular lever extends through the ring 77 of the bell-crank 75, the bell-crank being in its normal disposition as shown in full lines in Figs. 1 to 3. The short arm 78 of the bell-crank is disposed at such an angle that it presses both against the bracket 52 and against the valve lever 63 under force transmitted from the float 70. It is apparent that the float keeps the valve 15 closed since the downward pressure on the valve lever 63 exerted through the roller 79 is transmitted through the screw 65 to the valve-guide 59.

Inward movement of the plunger 83 caused by pressing the button 90 causes the angular lever 85 to lift the ring 77, thereby tripping the "trigger," since lifting of the rings swings the shorter arm 78 of the bell-crank to a disposition releasing the valve lever 63, as indicated in dotted lines in Fig. 2. The releasing movement of the bell-crank causes the float 70 to be slightly depressed, but subsequently the float, being out of operative engagement with the valve, is free to rise as additional water enters the tank. When the water reaches a maximum level such as indicated at 95, siphonic flow starts in the siphon 20 and water passes into the discharge pipe 19.

Siphonic flow is occasioned by two independent factors, first, the increase in pressure head in the tank tending to overbalance the siphon head, and, second, the effect of the discharge from the refill pipe 43 into the down-leg 34 of the siphon. Either one of these factors is sufficient alone to initiate siphonic discharge from the tank. It is a feature of my invention that, by arranging for the two factors to be effective simultaneaously, I minimize the time interval between pressing of the button 90 and the beginning of flushing discharge from the tank. I have found by experiments with one of my devices that if the refill tube is plugged or disconnected leaving only the first factor operative, the delay in operation is extended to an interval of eighteen to twenty seconds. If the refill tube is employed without permitting the water level to rise above normal, in which case only the second factor is operative, flow is started after a delay of something more than ten seconds. By arranging for both the factors to be operative simultaneously, I reduce the time of operation approximately to an interval of six to ten seconds, depending upon the pressure of the water in the supply line that is connected to the stand-pipe 14. The delay period is also influenced by the rate and velocity of flow through the refill tube and is therefore affected by the diameter of the refill tube. The starting time of six to ten seconds achieved by using a five-sixteenths inch refill tube is increased to an interval of nine to twelve seconds if a one-quarter inch refill tube is substitued.

When the water level drops below the lower end of the vent tube 40, air passes into the siphon through the vent tube and causes siphonic action to cease. A feature of my invention is that the vent tube arrangement shown breaks the siphonic flow in a substantially noiseless manner. Since a certain time interval is required for sufficient air to pass through the vent tube to break siphonic flow, the lowest water level 41 is spaced below the end of the vent tube.

I have found that the quantity of air necessary to serve as an air lock between periods of flush tank operation substantially exceeds the quantity of air necessary to break siphonic flow. Because of this fact, and also because some of the air employed to break siphonic flow may be carried through the siphon, it is necessary that air be admitted through the vent tube 40 for a substantial period of time after siphonic flow terminates. Since water entering the tank through the pipe 16, however, tends to cause the water level to rise promptly to a level sealing the lower end of the vent tube, some provision must be made to delay such sealing action. A feature of my invention is the conception that such provision may be had by simply adding the screw 72 to depress the valve lever 63 as the water approaches the lowermost level 41. While it is apparent that the screw 72 could be set to close the valve entirely, thereby making the flush tank inoperative, nevertheless, in practice, I have found that there is a considerable range of tolerance for the adjustment of the screw within which range the flow into the tank will be throttled near the lowermost water level to retard the rise of the water sufficiently to permit the admission of ample air through the vent tube into the air trap space of the siphon. The range of throttled flow may extend from the lowermost water level 41 to, for example, a water level indicated at 96 in Fig. 1.

During the period that the water level is rising in the tank, the refill tube 43 is continuously discharging water into the down-leg 34 of the siphon. Between the period that the water level in the tank is rising from the lowermost level 41 to the level at which it seals the vent tube 40, the water supplied by the refill tube fills both the inner up-leg 35 and the intermediate down-leg 34 and overflows both into the discharge pipe 19 and into the outer up-leg 33 into the tank proper. The proportion of the water that overflows into the pipe 19 during this interval may be

increased either by cutting away a portion of the upper edge of the wall **21** or by having that upper edge slightly lower than the upper edge of the siphon wall **23**.

After the vent tube is sealed, the water rising in the vent tube and in the outer up-leg **33** progressively raises the pressure of the air trapped in the siphon, which rise in pressure depresses the column of water in the intermediate down-leg **34** of the siphon so that all of the subsequent flow from the refill tube **43** passes into the discharge pipe **19**, the refilling of the toilet bowl continuing as long as the valve **15** is open. Throughout the period in which the water level in the tank is rising above the entrance of the vent tube **40**, the head of the water in the tank taken at the inlet of the siphon will equal the combined heads of the siphon up-legs **33** and **35** less the head of water in the down-leg **34**. In the maintenance of such balance during the period of water rise in the tank, the level of water in the down-leg **34** will progressively drop, the various elements involved being so dimensioned and disposed that the final normal level of the water in the down-leg **34** is relatively close to the lower end of the siphon wall **27**. The amount of increase in water level in the tank above the level **37** necessary to start siphonic action, flow from the refill tube being disregarded, depends upon the spacing of the water level in the down-leg **34** above the bottom edge of the wall **27**.

It has been noted that with the normal water levels in the tank and the siphon legs, flow from the refill tube **43** is effective to initiate siphonic flow. It is apparent, then, that if water continued to be supplied through the refill tube with full force as the water levels rise when the tank is being refilled, the flow from the refill tube might initiate siphonic flow before the normal water levels are reached. Such a possibility is precluded, however, by the fact that the nearer the normal water levels are approached, the more the float **70** reduces flow through the valve **15**. It is significant, then, that at the start of the cycle of flush tank operation, fluid is discharged through the refill tube with full force, but is throttled down at the end of the cycle of operation when the normal water levels are being restored, and a feature of my invention is the conception that the difference in action of the refill tube at the two ends of the operating cycle makes it practical to employ the refill tube for initiating siphonic flow. When it is desirable to destroy the air lock, the refill tube discharges in a relatively violent manner; when, on the contrary, it is desirable to conserve the body of air in the siphon, the refill flow is automatically subdued to the required degree.

Various factors determine the effectiveness of the stream discharged from the refill tube. As previously noted, the effectiveness of the refill tube discharge increases with the diameter of the refill tube. Another factor is the size of the sinuous siphon passage, particularly that portion constituting the down-leg **34**, relative to the volume of refill flow. The effectiveness of the discharge from the refill tube may be attributed to other factors such as the fact that kinetic energy is imparted to the inner up-leg **35** serving to upset equalization of the siphon head with the tank head, or the fact that the discharge from the refill tube involves a certain Venturi effect that upsets the balance by relieving the air pressure on the water column in the up-leg **35**, or the fact that the stream discharged from the refill tube entrains air in the air lock delivering the entrained air into the inner up-leg **35**. It is also to be noted that when the mechanism is tripped to initiate the operating cycle, discharge through the refill tube in full force takes place abruptly and favors flow through the up-leg **35** of the siphon rather than in the opposite direction both because of the direction in which the discharge end of the refill tube is disposed and because the water in the up-leg **35** has less mass and therefore less inertia than the water in the opposite direction.

It is within the scope of my conception to design the refill tube for reliance primarily on any one of these factors or functions. It is necessary, of course, that the effectiveness of the refill tube be restricted to a certain range since, on the one hand, the action must be violent enough to initiate siphonic discharge, but, on the other hand, should not be so violent as to carry air out of the siphon while the water level is rising. Within this range, the adjustment of the discharge from the refill tube is not critical. In practice I design the refill tube with ample effectiveness in mind and then resort to some simple expedient for cutting down the effectiveness to the required operative range. The provision of the diverting flange **47** on the discharge end of the refill tube is such an expedient.

When the push-button **90** is released, the weight of the angular lever causes the lever to drop to its normal disposition, forcing the push-button outward. The bell-crank is then free to rotate to its normal angular disposition. During the drop in the water level in the tank, the short arm **71** of the float lever rotates upwardly increasing the distance between the pin **74** on which the bell-crank is pivoted and the valve lever **63**. When this distance exceeds the length of the short arm **75** of the bell-crank, including the roller on the end of the arm, the preponderant weight of the longer arm **76** of the bell-crank causes the bell-crank to rotate carrying the roller **79** against the bracket **52** as shown in dotted lines in Fig. 1. The bell-crank is then in an effective disposition for depressing the valve lever **63** to close the valve as the float **70** moves upward with the rising water level. The normal water level may, of course, be varied by adjusting the screw **65**.

The purpose of Fig. 7 is to indicate some of the modifications that may be made in my invention, prime numbers being employed to designate elements corresponding to elements in the preferred form previously described. It will be noted that the refill tube **43** has an unimpeded discharge end. The kinetic energy of the discharge from this tube is, however, dissipated to a desirable extent by a small baffle **98** in the path of the discharge stream. It will be further noted that the vent tube is omitted, the function of the vent tube being provided by a small vent aperture **99** in the outer siphon wall **28**. Such a vent aperture is fully as effective as the vent tube arrangement, but is not as quiet in operation.

The features of the arrangement shown and described combine and cooperate to provide a desirable character of flush tank operation. The water is discharged with adequate force and rapidity, but with substantially none of the noise that characterizes the usual flush tank operation. The construction is not susceptible to break-down and no attention nor adjustments are necessary to maintain the flush tank in service. A note-

worthy feature is the absence of any type of discharge valve for the tank. The only parts subject to wear are those functionally related to the inlet valve to the tank.

For the purpose of this disclosure and to illustrate the principles involved, I have described a preferred embodiment of my invention in specific detail, but those skilled in the art will realize that various changes and modifications may be made without departing from the essence of my concept. I reserve the right to all such changes and modifications that properly come within the scope of my appended claims.

I claim as my invention:

1. The combination with a flush tank having a discharge port, a liquid supply means, a valve for the supply means, and automatic means for closing said valve when liquid in the tank rises to a normal level, of: a normally sunbmerged discharge siphon leading to said discharge port, said siphon having a passage providing an outer up-leg, an inner up-leg and an intermediate down-leg whereby air trapped above the outer up-leg and in the intermediate down-leg cooperates with the liquid in the two up-legs to balance the normal head of liquid in the tank; and means to discharge liquid downwardly into said down-leg of the siphon to initiate siphonic flow from the tank.

2. The combination with a flush tank having a discharge port, a supply pipe, a valve for the supply pipe, and a float, of: means to operatively connect said float with said valve to close the valve as the liquid level in the tank rises to a normal level, said means being movable between effective and ineffective dispositions and being adapted when in the ineffective disposition with the float at normal level to move automatically to the effective disposition when the float descends substantially below the normal level; a normally submerged discharge siphon leading to said discharge port, said siphon having a passage providing an outer up-leg, an inner up-leg and an intermediate down-leg whereby air trapped above the outer up-leg and in the intermediate down-leg cooperates with the liquid in the two up-legs to balance the normal head of liquid in the tank; a vent tube extending from the interior of said siphon to a level near but above the inlet end of said outer up-leg of the siphon, said vent tube being disposed to communicate with the space in the siphon occupied by said trapped air to break flow from the siphon with relatively little noise before the water level reaches said lower end of said outer up-leg of the siphon; and means adapted to operatively connect said float with said valve to partially close the valve as the liquid level in the tank approaches its lowermost level below the lower end of said vent tube to delay the subsequent rise of the liquid level to permit air to flow through said tube into the siphon for a substantial time interval.

3. The combination with a flush tank having a discharge port, a liquid-supply valve, and automatic means for closing said valve when liquid in the tank rises to a normal level, of: a normally submerged sinuous discharge siphon communicating with said port, said siphon having two up-legs and providing an air trap intermediate the two up-legs whereby the combined heads of said up-legs balance the normal pressure of liquid submerging the siphon; siphon-initiating means fed by the supply stream from said valve to discharge liquid into said siphon at a rate, velocity, and direction to destroy said air trap and initiate siphonic discharge from the tank; and means to throttle down said valve as the liquid in the tank rises to normal, whereby the liquid stream discharged into said siphon by said siphon-initiating means is throttled as the combined heads of said up-legs approach balance with the normal head of the liquid submerging the siphon.

4. The combination with a flush tank having a discharge port, a liquid-supply valve, and automatic means for closing said valve when liquid in the tank rises to a normal level, of: a normally submerged sinuous discharge siphon communicating with said port, said siphon having two up-legs and providing an air trap intermediate the two up-legs whereby the combined heads of said up-legs balance the normal pressure of liquid submerging the siphon; means to discharge a stream of liquid into said siphon at a rate, velocity, and direction to destroy said air trap and initiate siphonic discharge from the tank; and means to dissipate at least a portion of the kinetic energy of said stream to keep said stream from forcing air from the air trap when the tank is being refilled.

5. The combination of a flush tank having a discharge port, and supply means to deliver a stream of liquid into the tank when the liquid in the tank is below a normal level, of: a normally submerged sinuous discharge siphon communicating with said port, said siphon having two up-legs and providing an air trap intermediate the two up-legs whereby the combined heads of said up-legs balance the normal pressure of liquid submerging the siphon; a vent tube extending from the interior of said siphon to a level near but above the inlet end of said siphon, said vent tube being disposed to communicate with said air trap to break flow from the siphon with relatively little noise before the liquid level drops to said inlet end of the siphon; and means to throttle flow into the tank from said supply means when the liquid level in the tank drops below the lower end of said vent tube thereby to provide a substantial time interval for air to flow through said tube into the siphon.

6. The combination with a flush tank having a discharge port, a liquid supply means, a valve for the supply means, and automatic means for closing said valve when liquid in the tank rises to a normal level, of: a normally submerged sinuous discharge siphon communicating with said port, said siphon having two up-legs and providing an air trap intermediate the two up-legs whereby the combined heads of said up-legs balance the normal pressure of liquid submerging the siphon; a vent tube extending from the interior of said siphon to a level near but above the inlet end of said siphon, said vent tube being disposed to communicate with said air trap to break flow from the siphon with relatively little noise before the liquid level drops to said inlet end of the siphon; and automatic means constructed and arranged to partially close said valve when the liquid level in the tank is below the lower end of said vent tube to provide a substantial time interval for air to pass into the siphon through said vent tube.

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