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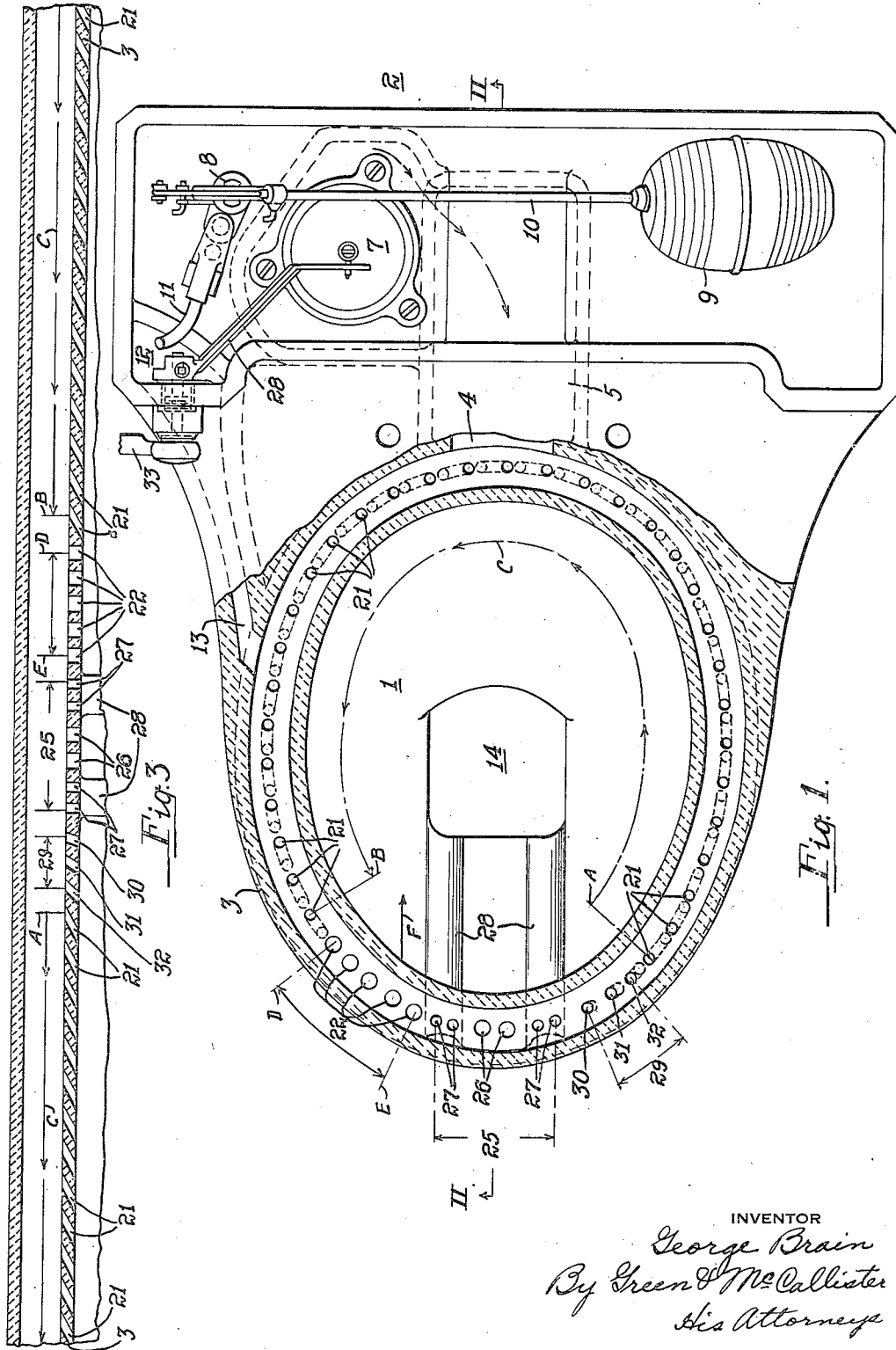
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CLOSET BOWL AND METHOD OF FLUSHING SAME

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2 Sheets-Sheet 1



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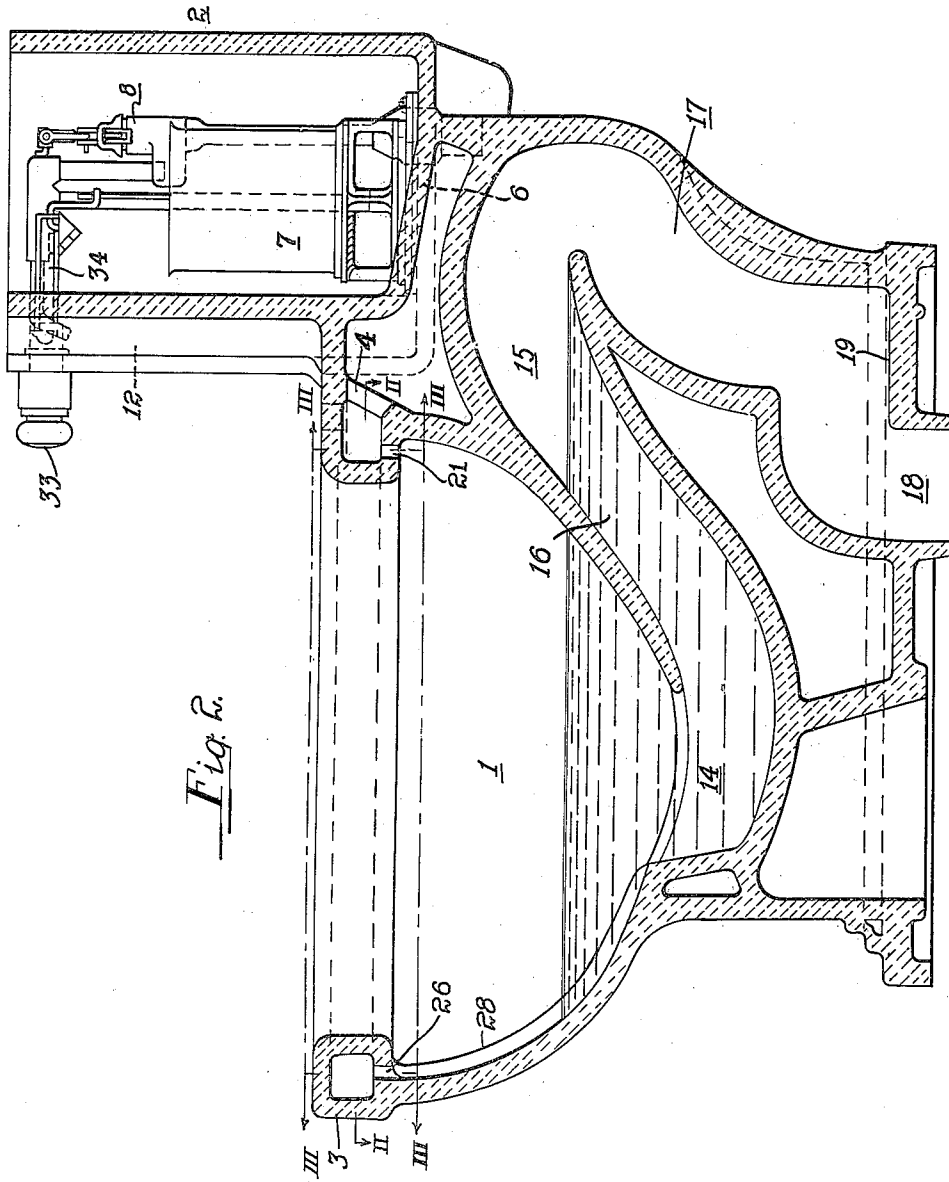
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UNITED STATES PATENT OFFICE

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CLOSET BOWL AND METHOD OF FLUSHING
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9 Claims. (Cl. 4-69)

This invention relates to closet bowls and methods of flushing the same; and this application is a continuation in part of my copending application Serial No. 634,180, filed September 21, 1932.

An object of this invention is the provision of an efficient method of flushing closet bowls.

Another object of the invention is the provision of a method of flushing closet bowls whereby fecal matter may be gathered towards the center of the bowl and into the trap without bringing the same into contact with the surface of the bowl.

A further object of the invention is the provision of a closet bowl that shall be simple in construction, efficient, and quiet in operation, and materially decrease the risk of loss during the process of manufacture.

A still further object of the invention is the provision of a closet bowl in which siphonic action may be attained without a siphon jet, and in which substantially all of the flushing water may be utilized for washing the pan.

A still further object of the invention is the provision of a closet bowl in which substantially all of the flushing water may be delivered to the pan through the rim by means of a single valved passage connecting the flush tank and the interior of the rim.

A still further object of the invention is the provision of a closet bowl having means for imparting a whirling spiral motion to the flush water, for initiating siphonic action without employing a siphon jet and means for folding the water, as it swirls around the pan, and dumping it into the trap on top of any fecal matter that may have been drawn into the same, and thereby push such matter through the siphon and into the soil line.

Other objects of the invention will, in part, be apparent and will, in part, be obvious from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a top plan view of a flush tank and closet bowl embodying the invention, the rim of the bowl being in section taken on line I—I of Fig. 2;

Fig. 2 is a view in section of the tank and bowl, taken on line II—II of Fig. 1; and

Fig. 3 is a developed view, in section, of the rim of the bowl, the section being taken on lines III—III of Fig. 2.

Throughout the drawings and the specification, like reference characters indicate like parts.

In practicing the method of flushing closet

bowls, in accordance with this invention, jets of flushing water are delivered at predetermined points around the periphery of the bowl, at its top, and directed at such an angle that a spiral sheet of water is formed which travels round the surface of the pan and downwardly towards the trap. The swirling sheet of water thus formed, travels down the pan in a spiral direction with centripetal motion completely washing the pan and gathering all fecal matter into a vortex which forms in the trap.

The method also includes the delivery of jets of water from the rim into the trap, in such direction, in relation to the up-leg of the siphon, that an under-current or under-tow is established under the pan water in the direction of and in the siphon up-leg which initiates siphonic action almost instantly after the flushing action is commenced. This siphonic action occurs before the pan wash water is dumped into the trap and also flushes a substantial part of the fecal matter before the dumping action takes place. The dumping of this spiral sheet of water into the trap completes the flushing action.

When the flushing action is commenced, the water level in the bowl or pan rises slightly, but the moment siphonic action has been initiated, as above described, the water in the center of the bowl drops perceptibly into the trap.

As the spiral sheet of water, above mentioned, is set in motion, the centripetal action thereof develops a whirling funnel-like formation of water the vortex of which is disposed in the trap at the entrance to the up-leg of the siphon. Because of this motion of the water, fecal contents in the bowl are drawn into the vortex and kept away from the surface of the pan.

In order that the swirling body of water traveling over the pan surface may be utilized to insure complete and positive flushing of the fecal contents, that is, to effect complete removal thereof through the siphon and into the soil line, the swirling water is obstructed and dumped into the trap, by means of intersecting streams of water delivered at a suitable point or points to the surface of the pan at one side of the jets which initiate siphonic action. The velocity and the weight of the water, which is dumped on top of the vortex of water in the trap and the remaining fecal contents therein, causes such contents to be pushed into, through and out of the up-leg of the siphon. On account of the siphonic action which is going on, such contents will be completely withdrawn from the trap of the bowl, the up-leg of the siphon, and ejected into the soil line.

In delivering the water to the bowl it is proposed to deliver it at a higher rate than it is withdrawn, by siphonic action, so that the benefits to be gained by the swirling funnel-like body of water washing over the pan of the bowl may be utilized to the fullest extent and so that siphonic action may be maintained continuously without interruption until the flushing operation has been completed.

The above-described method of flushing closet bowls may be applied to bowls having integral tanks or to bowls having separate or independent tanks, or to flush valve operated bowls. With either type, the water for flushing purposes is delivered through a single valved passage which leads from the tank to the rim of the bowl.

In the drawings, a closet bowl 1 and a flushing tank 2 are shown. The bowl and tank as illustrated, are formed integral with each other, although it is to be understood that the bowl and tank may be constructed as separate or individual units. The bowl is provided at its top with a continuous hollow rim 3 having an opening or port 4 at the rear of the bowl which is connected by a passageway 5 to a port 6 formed in the bottom of the tank. Port 6 is controlled by a flushing valve 7 of standard construction. The tank 2 is supplied with water through the usual inlet supply pipe (not shown) and the filling of the tank is automatically controlled, in the usual manner, by ball valve 8 and float 9 which is connected to the valve actuating lever 10. The ball valve is provided with a bypass or pipe 11 which supplies water to an overflow 12 formed in one corner of the tank. The overflow is connected by a passageway 13 which is separate from the passage connecting the rim port 4 to flushing valve 7. Water is supplied to the overflow when valve 8 is opened to insure that sufficient water will be delivered to the bowl after it has been flushed to form a water seal which prevents the escape of sewer gases.

The bowl includes a trap 14 formed in the bottom thereof and a siphon 15 comprising an up-leg 16 and a down-leg 17. The down-leg terminates in a port 18 adapted to be connected to a soil pipe (not shown). Port 18 is offset, with respect to the down-leg of the siphon, by means of a horizontal shelf or ledge 19 which causes the water that overflows the up-leg, when flushing water is delivered to the bowl, to pile up in the down-leg until the same is full. When the down-leg is full, siphonic action takes place in a manner well known in the art.

In order that the flush water delivered to the rim through port 4 may be given a spiral centripetal motion and cause it to form the whirling funnel-like formation of water, referred to in the above-described method, that travels as a sheet over the inner surface or pan of the bowl, the bottom of the rim is provided with a plurality of punchings or openings adjacent the periphery of the bowl. These openings or punchings are formed at such angles to the horizontal (see Fig. 3) that the water delivered to the pan through these openings will travel downwardly to the pan in a spiral direction.

The angle that these openings make with the horizontal may vary in different sections of the rim. For example, the openings or punchings 21 formed in the rim between lines A—B in the direction of arrow C, may be equally spaced and disposed at an angle of, say 30° to the horizontal. From D to E a plurality of openings 22, are formed, and these openings are so positioned that jets of water are delivered therefrom in the di-

rection of arrow F. These jets of water act to obstruct the whirling sheet of water developed by the jets of water issuing from punchings 21, fold the sheet under and dump or direct it into the trap. Continuing around the rim in the direction of arrow C, a group 25 of openings 26 and 27 is formed at the front of the bowl. These openings are preferably disposed at 90° to the horizontal so as to cause streams of water to flow straight down the pan towards the trap and initiate siphonic action at the beginning of the flushing action, i. e., as soon as water is delivered to the rim by the opening of valve 7.

In order that the streams of water issuing from openings 26 and 27 may be guided into the trap to effect the undertow or undercurrent relied on to initiate siphonic action, spaced ribs 28 are formed at the front of the bowl. These ribs are preferably parallel to each other, extend from rim 3 to the front edge of trap 14, and are positioned in alinement with the pairs of openings 27. Thus the water issuing from openings 27 is caused to flow down the sides of the ribs 28 while the water issuing from openings 26 is directed down the channel defined by these ribs and into the trap. These siphon-action producing streams are protected against interference from the streams of water issuing from openings 21 by the streams of water issuing from the group of openings 22. To accentuate the effectiveness of these siphonic-action producing streams, openings or punchings 26 are made larger in diameter than punchings or openings 27 so that an ample supply of swiftly flowing water may be directed into the pan to effect the necessary undercurrent in the pan water and running toward and up the up-leg of the siphon. This insures that siphonic action will start quickly and be well established before the body of pan water is dumped into the trap.

Continuing around the rim of the bowl in the direction of arrow C, a group 29 of openings 30, 31 and 32 is formed. It is preferred that these openings be punched at different angles with respect to each other and to the other openings in the rim. These openings are inclined in such direction as to discharge streams of water in the same general direction as the streams discharged by openings 21 located on the same side of the bowl. The angular direction of these openings may vary, but in practice I have found that if openings 30, 31 and 32 are punched at angles of 75°, 60° and 45° respectively, to the horizontal, satisfactory action is obtained.

When flush valve 7 is opened by means of a handle 33 and a lever 34 connected to the valve, water flows from tank 2 through port 4 into the rim filling the same. The water issuing from openings 26 and 27 flows down ridges 28 and the groove between them into the trap causing an undercurrent which flows up the up-leg 16 of the siphon and immediately initiates siphonic action. When siphonic action has started the water in the pan recedes drawing with it fecal matter.

The water issuing from punchings or openings 30, 31 and 32, and the group of openings 21 extending from A to B cause a whirling funnel-like sheet of water to form which travels around the pan, in the direction of arrow C, and downwardly towards the trap at which point the vortex of this body of water is formed. This swirling sheet of water gathers all remaining fecal matter and directs it into the vortex. As the water travels around the pan from A to B it is met with and

obstructed by the streams of water issuing from openings 22. These streams of water cut under the swirling sheet of water and change its course, and in doing so causes it to fold under, pile up
5 and spill or dump into the trap. The dumping of such a large quantity of water into the trap pushes all remaining fecal matter through the siphon into the soil line.

It is apparent by inspection of the drawings
10 that the dumping action above mentioned will occur after the siphonic action has been initiated by the streams issuing from openings 26 and 27 because some time is required for the water to travel around the pan. For this reason, as substantiated by actual operation of the bowl, from
15 75% to 90% of the fecal matter is removed by the siphonic action which goes on before the water is dumped into the trap to complete the flushing operation.

Since, as stated in the described method of flushing, the water is delivered to the bowl at a higher rate than it can flow out of the bowl through the siphon, there will be sufficient follow-up water to continue the siphonic action
20 after the dumping operation, above-described, takes place, and insure complete and positive flushing of the bowl.

In order that water may be delivered to the bowl at a higher rate than it is withdrawn therefrom through the siphon, the flow area of the passage leading from valve 7 to the rim port 4
25 is made larger than the flow area of the siphon; therefore, there will always be sufficient head of water in the bowl to insure sustained siphonic action.

By utilizing an arrangement of openings in the rim, as above described, siphonic action is attained without the use of siphon jets, and all the flush water is available as and utilized for washing purposes, because all of the water is delivered
30 through the rim punchings.

Since all the punchings are in the rim, and no siphon jets are present, the manufacture of the closet bowl is simplified, the risk of loss in the various stages of manufacture is materially reduced, and the amount of labor required is less than required for the manufacture of prior art siphon jet bowls.

While a particular arrangement of the punchings or passages in the rim have been described as being disposed at definite angles to the horizontal, it will be appreciated, and it is to be understood, that these angles may be varied
35 and that the grouping and spacing thereof may be arranged to suit particular requirements.

Having described what now appears to be a preferred form of the invention, it is to be understood that various modifications and changes may be made in the method of flushing and in the construction of the bowl without departing either from the spirit or the scope of the invention. Therefore, it is desired that only such limitations shall be placed on the invention as are imposed
40 by the prior art and the appended claims.

I claim:

1. The method of flushing a closet bowl of the siphon type, which consists in so delivering flushing water to the rim of the bowl as to cause such water to travel in a sheet over the inner surface of the bowl and in a spiral direction toward the trap of the bowl, directing a portion of such water from the rim into the trap to create an under-current in the siphon and initiate siphonic action, and in obstructing such spiral flow and di-
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recting it substantially radially into the trap of the bowl.

2. The method of flushing the pan of closet bowls of the siphon type to remove fecal matter, that comprises introducing jets of flush water
80 at predetermined points around the periphery of the top of the pan and directing such jets downwardly at an angle against the surface of the pan so as to impart a downward spiral motion to the water, simultaneously directing jets of water from the top of the pan into the siphon to establish an under-current in the up-leg of the siphon and initiate siphonic action, directing jets of water down the pan in advance of the siphon action producing jets for obstructing the spirally moving water, and deflecting substantially
85 90 all of such water into the trap to accentuate and maintain the siphonic action to effect a removal of all fecal contents from the bowl.

3. The method of flushing a closet bowl of the siphon type, that comprises supplying water to the rim of the bowl at a higher rate than it is discharged therefrom, initiating siphonic action by discharging streams of water from the rim into the trap in such fashion as to create an under-current in the up-leg of the siphon, causing a major portion of the water to flow from the rim as a sheet in a spiral direction around the bowl and downwardly towards the trap, and obstructing the spirally moving sheet at the front of the bowl by delivering jets from the rim that intersect the sheet of water so as to thereby cause substantially all of the water delivered to the bowl to be dumped into the trap on top of fecal matter therein and complete the flushing of the
95 100 105 110 bowl.

4. The method of flushing a closet bowl having a trap and a siphon adapted to connect the trap to a soil line that comprises delivering jets of flush water from the rim of the bowl at an angle less than 90° to the horizontal against the surface of the pan so as to cause the formation of a funnel-like whirling body of water having its vortex in the trap, thereby to collect fecal matter into the vortex, simultaneously delivering jets from the rim and guiding them into the trap to effect an under-current in the siphon and initiate siphonic action and then in obstructing such whirling body of water at a point adjacent to but in advance of the siphonic action producing jets by delivering jets of water straight down the pan so as to cause the whirling body of water to accumulate at the obstruction, change its course and dump into the trap on top of the vortex to complete the flushing operation.

5. A closet bowl having a trap and a siphon connecting the trap with an outlet and provided with a continuous rim to which the flush water is delivered, said rim having a plurality of outlets disposed to deliver jets of water into the trap in such direction that an undercurrent is directed up the up-leg of the siphon to initiate siphonic action, a plurality of angularly disposed outlets spaced circumferentially of the rim for delivering a whirling funnel-like sheet of water that travels in one direction around the bowl surface and a plurality of openings for directing streams of water in a direction to obstruct the whirling sheet of water at a point in advance of the opening from which the siphonic action producing streams issue.

6. A closet bowl of the siphon type having a continuous hollow rim to which water is admitted, said rim having two groups of openings, in which the openings of one of said groups are
130 135 140 145 150

arranged to deliver streams of water down the bowl into the up-leg of the siphon and down the bowl to one side of the trap, the streams directed into the siphon up-leg initiating siphonic action, the openings of the other group being angularly inclined in the same general direction around the rim for creating a swirling sheet of water that travels spirally and downwardly in the bowl, said sheet of water being obstructed by the streams directed down to the bowl to one side of the trap and caused to spill as a body into the trap to complete the flushing action.

7. A closet bowl of the siphon type having a continuous hollow rim to which water is admitted, said rim having two groups of openings, in which the openings of one of said groups are arranged to deliver streams of water down the bowl into the up-leg of the siphon and down the bowl to one side of the trap, the streams directed into the siphon up-leg initiating siphonic action, means for positively guiding the streams which initiate siphonic action into the siphon up-leg and in which the openings of the other group are angularly inclined in the same general direction around the rim for creating a swirling sheet of water that travels spirally and downwardly in the bowl, said sheet of water being obstructed by the streams directed down the bowl to one side of the trap and caused to spill as a body into the trap to complete the flushing action.

8. A closet bowl of the siphon type having a continuous hollow rim into which all flush water

is delivered, and a groove on the pan surface running from the rim to the trap and located on a side of the bowl opposite to that in which the siphon is contained, said rim having a plurality of openings positioned to deliver jets of water down the groove and into the siphon up-leg to initiate siphonic action and a plurality of openings disposed on one side of said groove for delivering streams of water down the pan in a direction parallel to the groove, said rim also having a group of angularly inclined openings spaced around the rim for creating a swirling sheet of water that travels in a spiral direction towards the streams of water that run parallel and to one side of the groove, said parallel streams obstructing the spirally moving sheet of water and dumping it as a body into the trap to complete the flushing operation.

9. The method of flushing a closet bowl of the siphonic action type that comprises delivering a quantity of flushing water to the rim of said bowl, initiating siphonic action by directing a portion of such flushing water from the rim directly down the pan and into the up-leg of the siphon while so directing the remainder of such water as to form a swirling spirally traveling mass over the pan of said bowl, and then collecting such swirling mass of water at a point substantially opposite to and in line with the up-leg and dumping the same directly into the trap to complete the flushing action.

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