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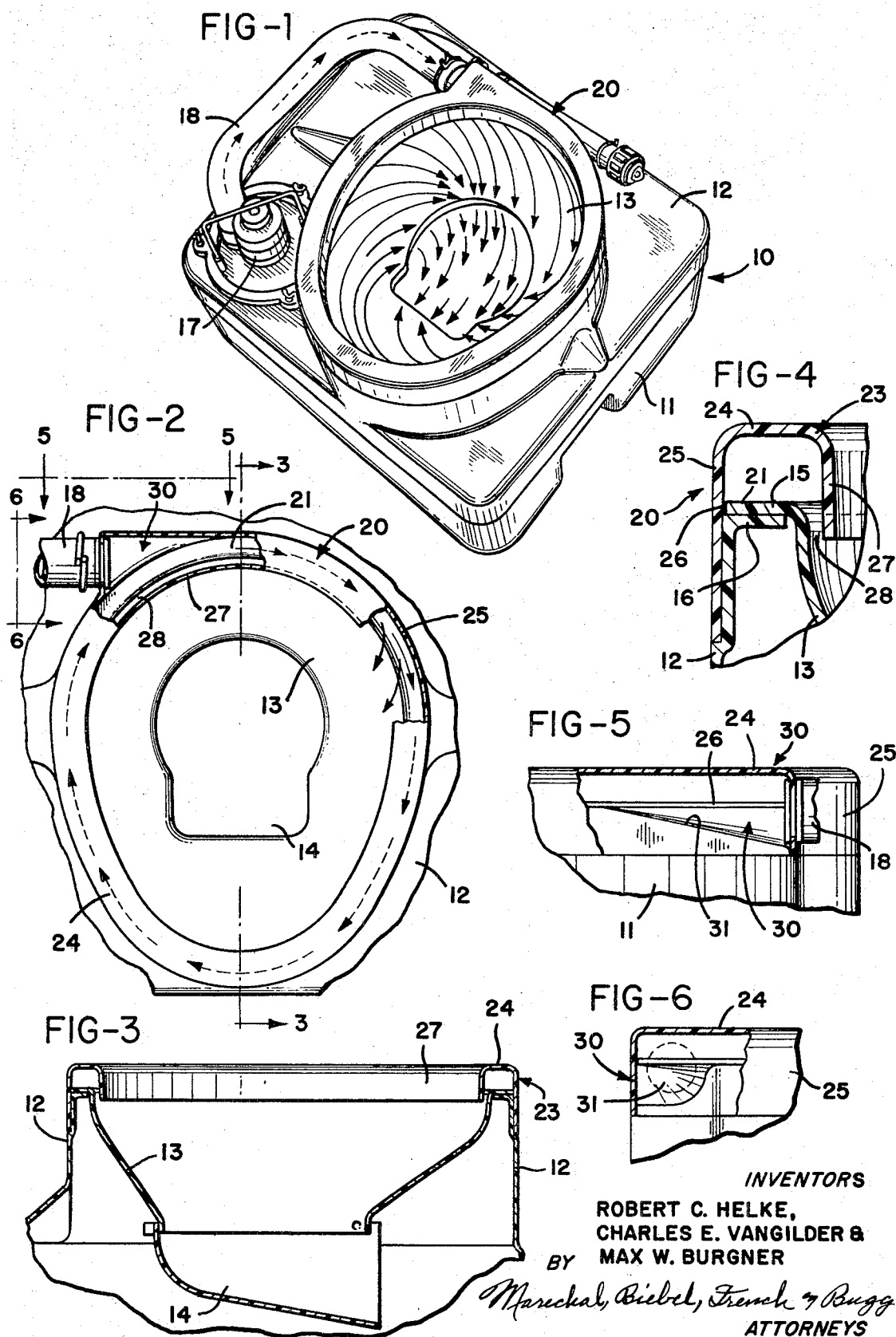
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FLUSHING MANIFOLD FOR PORTABLE TOILETS

Filed Dec. 9, 1968

2 Sheets-Sheet 1



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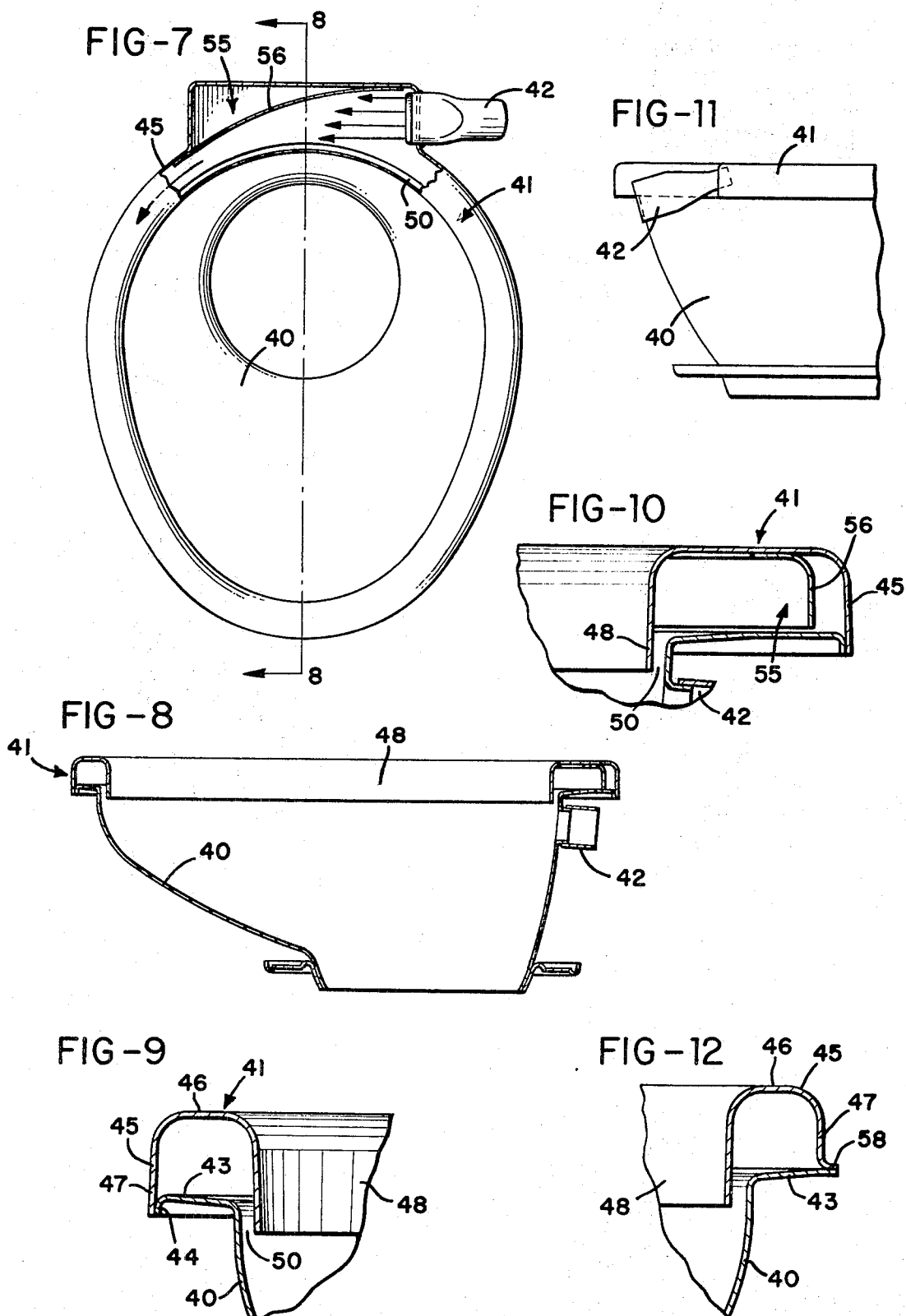
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FLUSHING MANIFOLD FOR PORTABLE TOILETS
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U.S. Cl. 4-10

7 Claims

ABSTRACT OF THE DISCLOSURE

In an improved flushing manifold for a toilet, flushing liquid is introduced into the flushing manifold tangentially and flows through a continuous slot surrounding the toilet bowl so that the liquid circulates around and through the manifold and flows downwardly and around the bowl thereby increasing the distance through which the liquid moves while in contact with the bowl to provide improved cleansing action.

RELATED APPLICATIONS

Reference is hereby made to copending applications Ser. No. 782,240, entitled Sewage System, and Ser. No. 597,642, now Pat. No. 3,487,475, entitled Pneumatically Operated Self-Contained Sewage System, assigned to the same assignee as the present invention.

BACKGROUND OF THE INVENTION

In self-contained sewage systems, such as described in U.S. Pat. No. 3,067,433, a flushing manifold is provided to direct filtered liquid downwardly across the toilet bowl. The toilet includes a main holding tank, a toilet bowl emptying into the tank, a filter situated in the tank, and a pump to draw liquid from the tank into the filter and to direct the filtered liquid into the flushing manifold. The flushing manifold typically includes a plurality of slots or holes through which the filtered liquid flows. The cleansing action provided by such a flushing manifold may be impaired whenever any one of the holes becomes clogged, and cleaning of such a manifold is made more difficult due to the great number of holes usually employed.

SUMMARY OF THE INVENTION

This invention relates to an improved flushing manifold for use in a toilet wherein the flushing liquid is directed downwardly across the surface of the bowl at an angle which increases the effective length of travel of the flushing liquid and thus causes a corresponding increase in the cleansing action. The improved flushing manifold of this invention is much easier to maintain than prior art manifolds since it forms a continuous slot extending completely around the bowl and is thus less subject to clogging.

In some prior art toilets where the liquid is directed downwardly straight into the bowl, large pump pressures may cause the flushing liquid to splash or form "rooster tails" where the downward flow of flushing liquid from opposite sides of the bowl meets. With the present invention, however, a uniform flush pattern is obtained over large variations in input pressure. This is of particular advantage in a portable toilet system wherein the pump pressure may vary due to variable voltage to an electric pump, or air pressure in the case of a flushing toilet such as described in the above mentioned copending application Ser. No. 597,642.

A part of the flushing manifold of the present invention is formed by a substantially horizontally disposed surface formed integrally with the toilet bowl, this surface extending around the entire outer periphery of the bowl. An inverted U-shaped member has its horizontal surface spaced vertically above the horizontal surface of the bowl,

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and the outer downwardly extending portion of this member engages the outer circumferential surface of the bowl in watertight relation. The inner downwardly extending portion of the member is spaced from the bowl and extends below the top surface of the bowl to form an open slot which extends continuously around the bowl and which will direct flushing liquid downwardly against the surface of the bowl. Filtered liquid is introduced tangentially into the flushing manifold so that a part of the flushing liquid circulates completely around the manifold due to centrifugal force, with a portion of the liquid flowing downwardly and at an angle across the entire surface of the bowl.

In one embodiment of the invention, the substantially horizontally disposed surface is actually inclined downwardly toward the bowl at a small angle to insure that no flushing liquid remains in the flushing manifold. This embodiment is preferably used with those toilets where the bowl is not periodically removed but remains fixed, such as in large aircraft. Another embodiment of the invention employs a molded plastic or fiberglass bowl and flushing manifold, and this embodiment is preferably used for small trailers, aircraft, boats and the like.

Accordingly, it is an object of this invention to provide an improved flushing manifold for use with self-contained toilet systems wherein flushing liquid passes through a continuous slot formed completely around the circumference of the bowl and which is therefore relatively free of clogging and which is easy to clean; to provide an improved flushing manifold which includes a portion of the bowl itself as a component of the flushing manifold; and to provide an improved flushing manifold wherein flushing liquid is directed downwardly across the bowl at an angle to increase the effective length of the flow of flushing liquid thereby to improve its cleansing action.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a self-contained portable toilet incorporating the flushing manifold constructed according to this invention;

FIG. 2 is a plan view of the flushing manifold with a portion thereof broken away to reveal its construction;

FIG. 3 is a cross sectional view taken along line 3-3 in FIG. 2;

FIG. 4 is an enlarged cross sectional view of the flushing manifold and a portion of the toilet bowl;

FIG. 5 is a plan view, partly in cross section, showing an entrance chamber wherein the flushing liquid is directed from the main holding tank into the flushing manifold, this view being taken along line 5-5 in FIG. 2;

FIG. 6 is an elevational view showing a portion of the entrance chamber, this view being taken along the line 6-6 in FIG. 2;

FIG. 7 is a plan view of another embodiment of this invention;

FIG. 8 is a cross sectional view taken along line 8-8 in FIG. 7;

FIG. 9 is an enlarged cross sectional view showing the flushing manifold;

FIG. 10 is an enlarged cross sectional view showing the entrance chamber which receives the flushing liquid from the main holding tank and directs it into the flushing manifold;

FIG. 11 is an elevational view of a portion of a toilet incorporating the flushing manifold of this invention; and

FIG. 12 is a cross sectional view of an alternative method of forming the flushing manifold, particularly for use with that embodiment shown in FIG. 7.

DETAILED DESCRIPTION OF THE EMBODIMENT

In FIGS. 1-6, one form of a self-contained toilet system employing the flushing manifold constructed according to this invention is shown. The toilet including a main holding tank 10 constructed of molded plastic or fiberglass comprising a lower section 11 and an upper section 12 which supports a toilet bowl 13. The contents of the toilet bowl 13 are directed into the main holding tank 10 by a deflector 14 which may be formed integrally with the bowl 13, or alternatively, the deflector may be hinged to permit it to be moved out of the way and to allow the contents of the bowl 13 to empty directly into the main holding tank 10.

The bowl 13, as shown in FIG. 4, includes a horizontally extending member 15 extending completely around the bowl. The member 15 rests against a flange 16 formed with the upper section 12. Alternatively, the bowl 13 may be formed integrally with the upper section 12, however, the construction shown allows the bowl 13 to be formed from a material having a different color or composition from that used to form the upper section 12.

Returning to FIG. 1, a pump 17 draws liquid from the holding tank 10 through a filter (not shown) and directs the liquid upwardly through a hose 18 into the flushing manifold 20. Details of the toilet, including pump, filter, and drain valve, may be found in the above mentioned copending application Ser. No. 782,240.

A flushing manifold 20 includes a generally horizontally disposed upper surface 21 of the member 15. This surface 21 extends completely around the outer periphery of the bowl 13. As shown in FIG. 4, an inverted U-shaped member 23 has a horizontal surface 24 spaced vertically from the surface 21, and an outer downwardly extending portion 25 which engages the outer circumferential surface 26 of the bowl 13 in watertight relation. The outer surface of the housing 12 is so formed that the downwardly extending portion 25 of the U-shaped member fits flush therewith to give a smooth appearance to the exterior of the toilet. An inner downwardly extending portion 27 of the U-shaped member is spaced from the bowl 13 and extends below the top surface to form an open slot 28 which extends continuously around the bowl 13.

The U-shaped member 23 fits closely against the upper section 12 and the member 15, and sealing means, such as epoxy, insures that no flushing liquid will seep between these parts.

Flushing liquid from the hose 18 is directed into an entrance chamber 30, shown in detail in FIGS. 5 and 6. The shape of this chamber is designed to minimize turbulence in the flushing liquid as it transitions from the hose 18 to the flushing manifold 20. The chamber 30 includes an upwardly sloping surface 31 formed on the upper section 12 to direct the liquid upwardly so that all of the liquid from the pipe flows tangentially into the area between the surface 21 and the U-shaped member 23. Since the liquid flows tangentially around the manifold 20, centrifugal force tends to force the liquid against the outer downwardly extending portion 25, however, some liquid will flow downwardly through the slot 23 throughout the entire circumference of the manifold. Thus, all of the liquid is not directed downwardly into the bowl at any particular location, but rather a small amount of liquid will flow downwardly at an angle through the slot 28 completely around the bowl 13. Since this liquid has a forward velocity, it will flow downwardly across the bowl at a substantial angle thus increasing its effective cleaning action since it travels a longer distance than the liquid which exits from prior art type manifolds.

Since the slot 28 through which the flushing liquid is directed into the bowl is continuous, no clogging will occur in the vent that solid particles pass through the filter and enter the flushing manifold. Furthermore, cleaning of the manifold is simplified since clean water may be directed into the manifold in the same manner as the flushing

liquid and thus flow completely around the interior surface of the manifold. There are no recesses or pockets to catch contaminated liquid. Also, in the event that solid particles do become lodged in the slot 28, they may be easily detected and removed without disassembling the toilet.

Another embodiment of the invention wherein the toilet bowl 40 is preferably formed from metal is shown in FIGS. 7-12. In this embodiment, flushing liquid is directed into a manifold 41 from a pipe 42 which is mounted so that the flushing liquid flows upwardly and tangentially into the manifold.

The manifold 41 is formed in part by a generally horizontally disposed surface 43 formed integrally with the bowl 40. Actually, the surface 43 slopes toward the bowl at an angle of approximately 3° in order to insure that no flushing liquid remains in the manifold. At the outer circumferential extent of the surface 43 the material is bent vertically downwardly at 44, as clearly shown in FIGS. 9 and 10.

The remainder of the manifold includes a U-shaped member 45 having its horizontal surface 46 spaced vertically from the surface 43, and its outer downwardly extending portion 47 so dimensioned that it engages the downwardly bent portion 44 completely around the circumference of the bowl. The inner downwardly extending portion 48 is spaced from the surface of the bowl 40 and projects below the surface 43 to form a continuous slot 50 through which the flushing liquid flows. The outer downwardly extending portion 47 of the U-shaped member 45 is secured to the downwardly extending flange 44 formed at the outer circumferential extent of the bowl by suitable means, such as by epoxy or by welding.

The U-shaped member 45 includes an enlargement at 55 which forms a part of an entrance chamber into which the flushing liquid is introduced. A baffle 56 is secured to the member 45 to direct the flushing liquid into the manifold 41 smoothly and without an excessive amount of turbulence.

At least a part of the flushing liquid introduced into the manifold 41 from pipe 42 will flow completely around the manifold, and the flushing liquid will flow downwardly through the slot 50 and across the bowl at an angle thus increasing the effective cleaning action of the liquid.

The embodiment shown in FIG. 7 allows the pipe 42 which introduces the flushing liquid to be mounted on either side of the enlarged portion 40 thus simplifying installation of the toilet. The baffle 56 can be mounted to direct the flow either clockwise or counterclockwise around the manifold, depending upon the location of the source of flushing liquid relative to the bowl.

An alternative method of fabrication is shown in FIG. 12 where the top surface 43 of the bowl is formed without a downwardly turned flange and wherein the outer downwardly extending portion 47 of the U-shaped member 40 includes an outwardly turned flange 58 formed so that it will contact the upper surface to form a watertight seal. Again, the U-shaped member may be sealed to the bowl by welding, epoxy or other suitable means.

Thus, an improved flushing manifold for use particularly with self-contained toilets has been described wherein flushing liquid is introduced tangentially to the bowl. This liquid flows downwardly through a continuous open slot which extends completely around the top of the bowl, thereby minimizing the chance of clogging and facilitating the cleaning of the toilet. Since the liquid flows downwardly and around the bowl, more efficient and effective cleaning action is obtained from the same quantity of flushing liquid.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. A flushing manifold for a toilet bowl including means mounted at the top of the toilet bowl for carrying flushing liquid around said bowl including a substantially horizontally disposed surface located adjacent the upper surface of said bowl and extending completely around said bowl and a member spaced vertically from said horizontally disposed surface to form therewith a liquid carrying channel,
means forming a slot in said liquid carrying means, said slot arranged to direct the liquid downwardly and against the surface of said bowl, said means including a downwardly extending portion of said member which is spaced from said bowl and which extends below said horizontally disposed surface to form said slot to direct flushing liquid against the surface of said bowl, and
means for introducing flushing liquid tangentially into said liquid carrying means so that the liquid circulates around and through said means and flows downwardly through said slot and across the surface of the bowl at an angle to cause cleaning thereof.
2. A flushing manifold as defined in claim 1 wherein said means for carrying flushing liquid includes a substantially horizontally disposed surface located adjacent the upper surface of said bowl, said surface extending completely around said bowl; and
a member spaced from said horizontal surface to form therewith a liquid carrying channel, said member including a downwardly extending portion which is spaced from said horizontal surface and which extends therebelow to form a slot which directs flushing liquid against the surface of said bowl.
3. A flushing manifold as defined in claim 1 wherein said substantially horizontally disposed surface is integrally formed with said bowl.
4. A flushing manifold as defined in claim 1 wherein said horizontally disposed surface includes a downwardly extending portion at its outer circumferential extent, and wherein said downwardly extending portion of said spaced

member engages the downward portion of said surface to form a watertight seal.

5. The flushing manifold as defined in claim 1 wherein said spaced member includes an outwardly extending portion which engages said horizontally disposed surface at its outward circumferential extent to form therewith a watertight seal.

6. The flushing manifold as defined in claim 1 wherein said downwardly extending portion of said spaced member engages the outer extent of said horizontally disposed surface to form therewith a watertight seal.

7. In a self-contained toilet including a main holding tank, a toilet bowl emptying into said tank, a flushing manifold surrounding said bowl, a filter, and a pump to draw liquid from said tank through said filter and supply it into said manifold, the improvement comprising

a substantially horizontally disposed surface located adjacent to and at the top of said bowl, said surface extending around the top of said bowl;

an inverted U-shaped member spaced vertically from said surface to form therewith a flushing manifold, the lower portion of the outer downwardly extending portion of said member engaging said surface in watertight relation, and the inner downwardly extending portion of said member being spaced from the interior surface of said bowl and extending below said top surface to form an open slot which extends continuously around said bowl; and

means for introducing flushing liquid tangentially into said flushing manifold so that the liquid circulates around and through said manifold and flows downwardly through said slot and across the surface of said bowl.

References Cited

UNITED STATES PATENTS

2,486,736 11/1949 Dodson ----- 4-10

LEONARD H. GERIN, Primary Examiner