

July 10, 1962

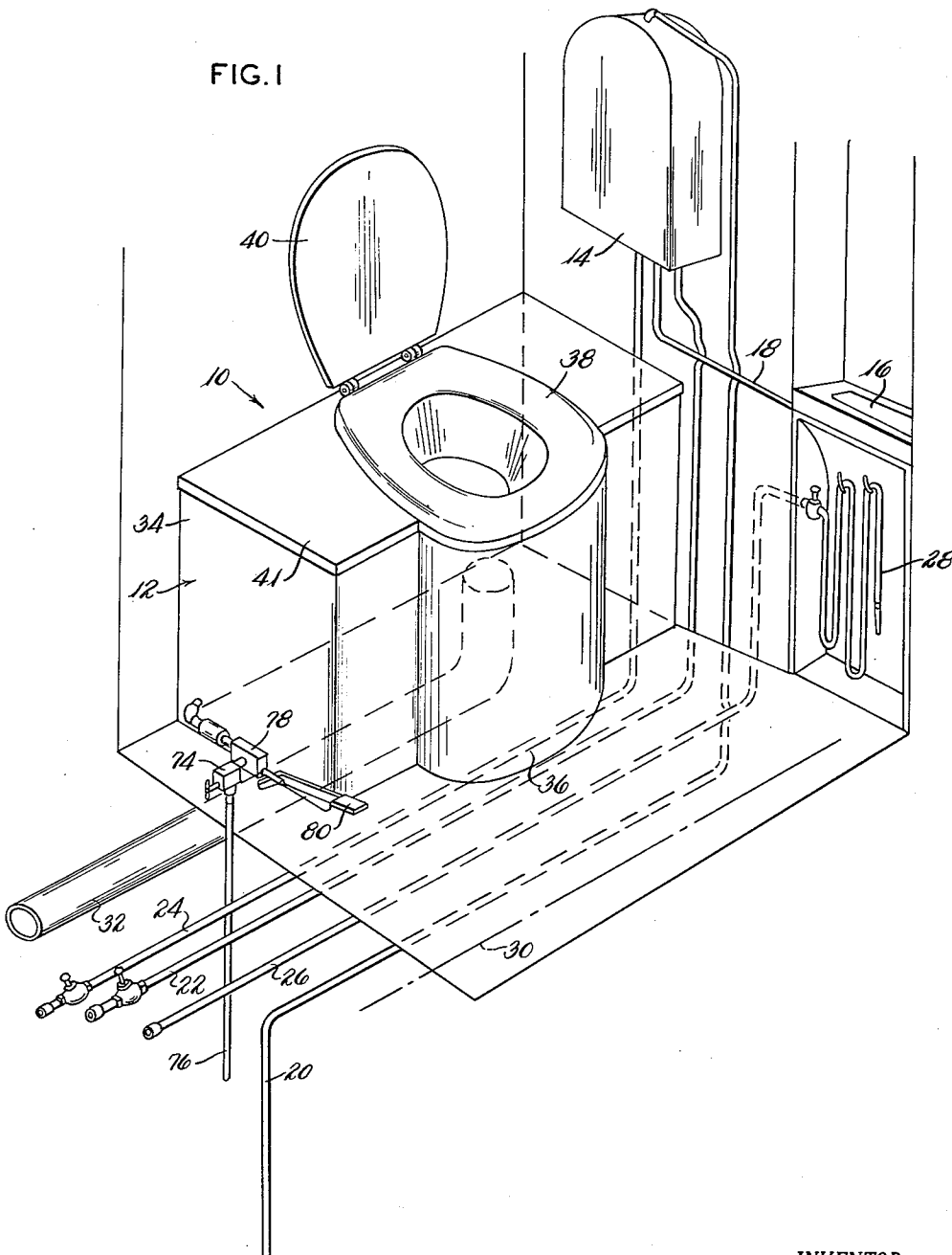
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VEHICLE TOILET

3,042,933

Filed Oct. 7, 1960

4 Sheets-Sheet 1

FIG. 1



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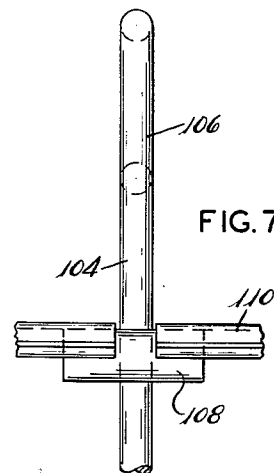
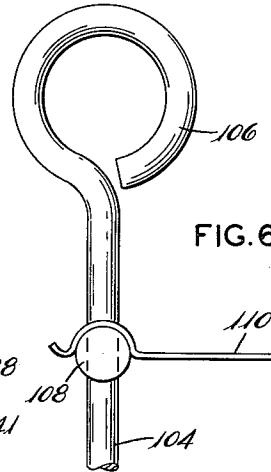
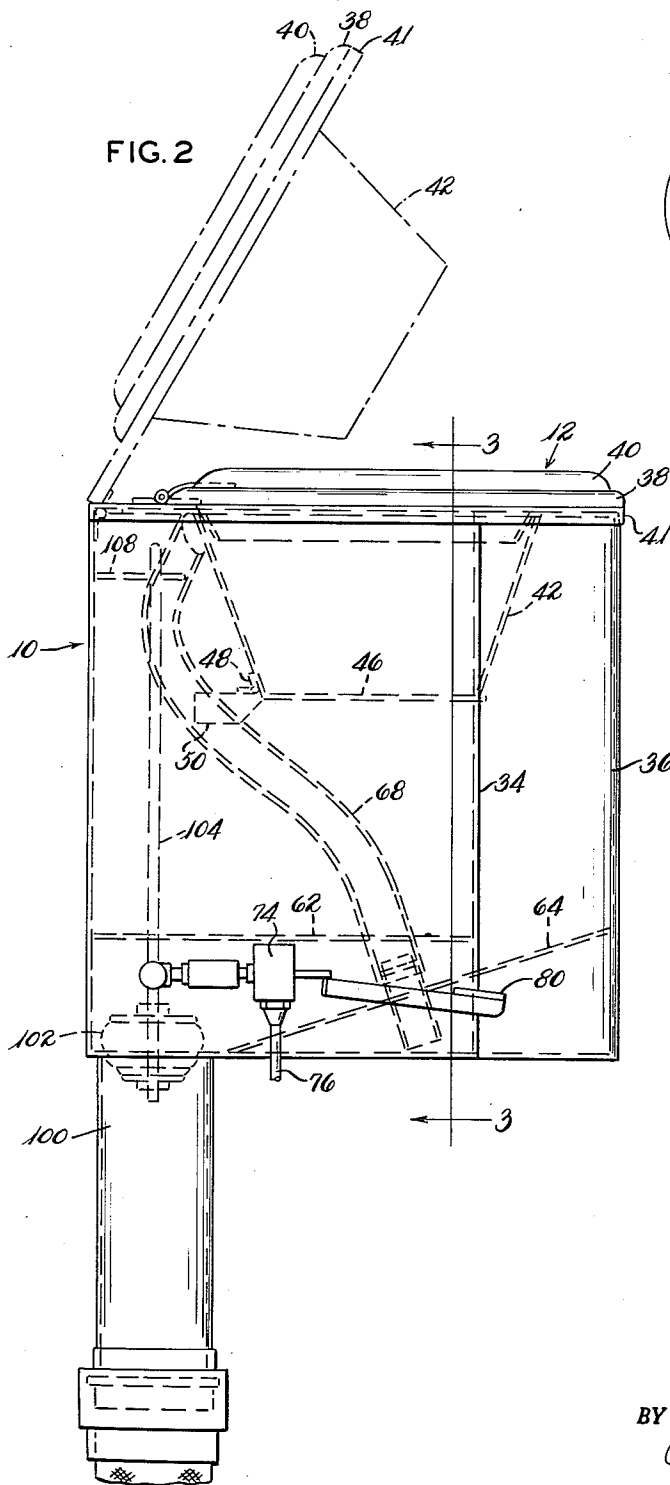
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4 Sheets-Sheet 2



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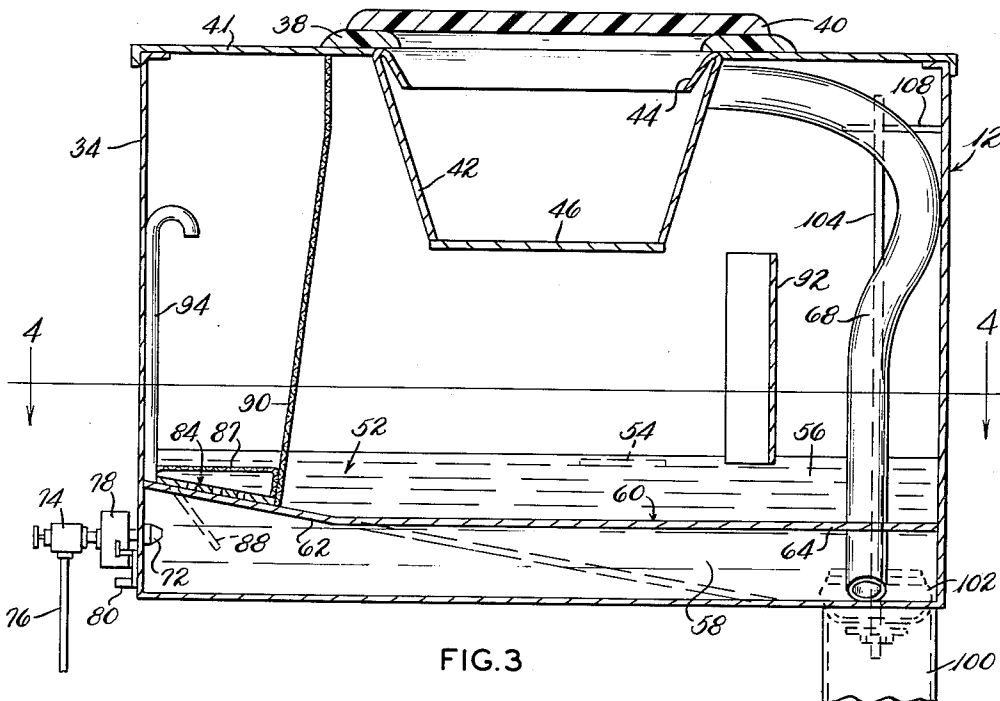


FIG. 3

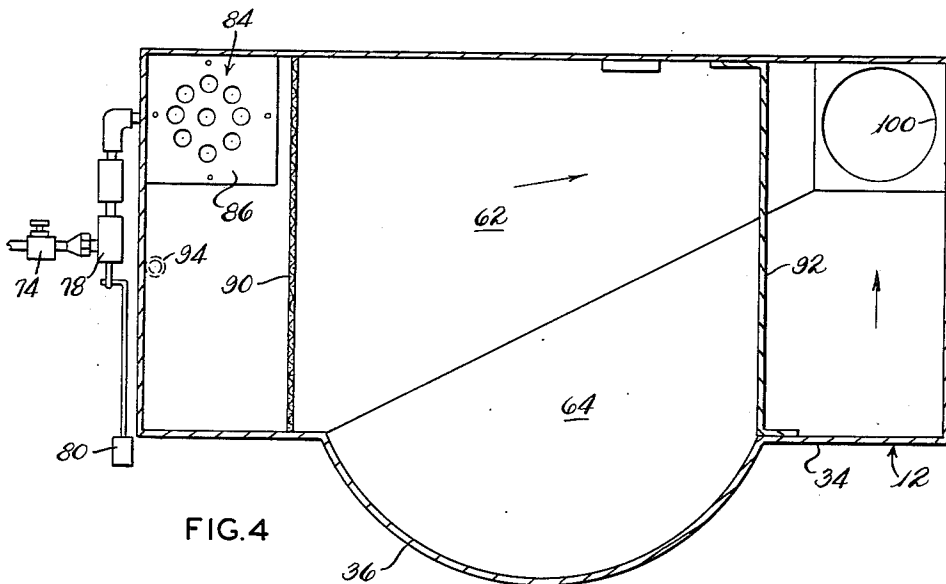


FIG. 4

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4 Sheets-Sheet 4

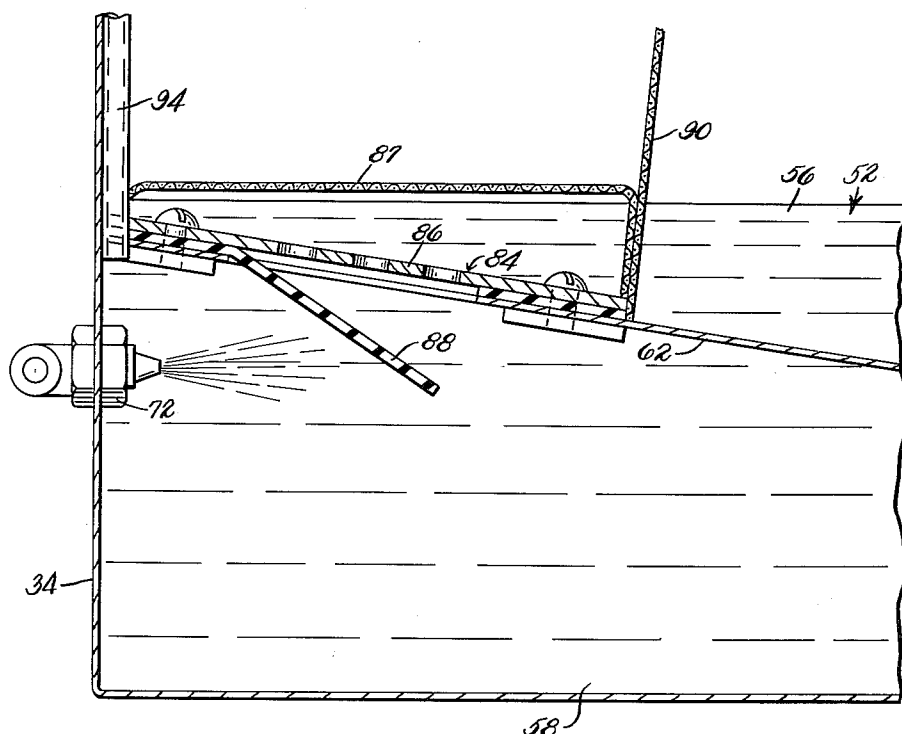


FIG.5

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VEHICLE TOILET

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8 Claims. (Cl. 4—8)

This invention relates to vehicle toilets, and, more particularly, is concerned with water type closets for use on buses, airplanes, and the like, the closets having a waste storage compartment which is cleaned out, for example after every trip.

It is the general object of the invention to provide an improved, relatively inexpensive, and easily operated toilet for vehicles and characterized by a minimum of odor, sanitarness, relatively small space, and ease of servicing.

Another object of the invention is to provide a toilet for buses and the like and incorporating a body of water for flushing the toilet, the water after flushing having the bulk material separated from the reasonably clear liquid, with the clear liquid being reused for subsequent flushing.

Another object of the invention is to provide a toilet of the type described wherein the acceleration and deceleration of the vehicle aids in keeping the screens or other filtering means open which are used for separating the bulk materials from the reusable water.

Another object of the invention is the provision of a unit of the character set forth which adapts itself to use in conjunction with a water storage tank and a lavatory.

Another object of the invention is to provide a flushing toilet self-contained in one unit, in which, by the addition of chemicals and filters the water can be reused for flushing, thereby eliminating need of excess space and weight required for conventional water storage tanks and septic tanks.

The foregoing objects of the invention and other objects which will become apparent as the description proceeds, are achieved by the provision of a vehicle toilet including a seat, a bowl positioned beneath the seat, means closing the bottom of the bowl but adapted to open upon the flushing of the toilet, a body of water positioned below the bowl, partition means separating the water into a clear area and a bulk carrying area, means for forcing water from the clear area into the bowl to provide a flushing action, said flushing water returning to the bulk carrying area, means allowing the return of substantially clear water from the bulk carrying area to the clear area, and valve and conduit means for drawing off the water and bulk from the bulk carrying area.

For a better understanding of the invention reference should be had to the accompanying drawings wherein FIG. 1 is a perspective view, and partially broken away, of a vehicle toilet and lavatory combination incorporating the principles of the invention;

FIG. 2 is an end elevation of the toilet portion of the combination shown in FIG. 1;

FIG. 3 is a longitudinal vertical cross-sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a horizontal cross-sectional view taken substantially on line 4—4 of FIG. 3;

FIG. 5 is an enlarged fragmentary cross-sectional view of the flapper valve portion and air jet of FIG. 3;

FIG. 6 is an enlarged fragmentary view of the mechanism for holding shut the plug valve in the waste dump pipe; and

FIG. 7 is a front elevation of the mechanism of FIG. 6. In the drawings, the numeral 10 in FIG. 1 indicates generally a combination assembly including a toilet indicated as a whole by the numeral 12, a water storage tank

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14 and a lavatory basin 16 adapted to be supplied by water from the tank 14 by way of a conduit 18. The tank 14 has an overflow pipe 20 extending to the outside of the vehicle and a conduit 22 for filling the tank, and still another conduit 24, if found desirable, for flushing out the tank 14. A conduit 26 extending to the outside of the vehicle runs to a position underneath the lavatory bowl 16 and is connected to a flexible hose 28. This hose is employed to flush out and fill the toilet 12 and is operated by an attendant when the vehicle is back at its home station, and following the removal of the waste materials from the toilet, all as hereinafter more fully described.

Preferably the toilet 12 is positioned at the side of the vehicle with the longitudinal axis of the vehicle extending in the direction as shown by the chain-dotted line 30 so that the movement of the vehicle acts to help clear the screen or filtering means incorporated in the toilet, as hereafter described. Associated with the toilet 12 is a waste dump pipe 32 extending to the outside of the vehicle.

Now having more particular reference to the construction of the toilet itself, this being shown in FIGS. 2 through 7 of the drawings, the toilet 12 is built in the form of a metal tank 34 having a rounded centrally positioned front portion 36, all of this being made from sheet metal, for example, stainless steel, with the thickness of the sheet metal being somewhat exaggerated in the drawings to better illustrate the construction of the apparatus. The tank 34—36 carries at its top a hinged seat 38 and a hinged lid 40, the seat and lid normally being hinged to the cover 41 of the tank so that the cover assembly can be swung during cleaning of the toilet, into the dotted line position seen in FIG. 2 of the drawings.

Carried by the cover 41 is a toilet bowl 42 of an inverted conical truncated shape, with the bowl 42 being provided with a flushing ring 44. The bottom of the bowl 42 is normally closed by a closure 46 hinged for example at 48 and provided with a counterweight 50 whereby the closure 46 is normally held against the bottom of the bowl 42, but with the closure being adapted to tilt and open up the bottom of the bowl when the weight carried by the closure is sufficient to overbalance the counterweight 50.

Water indicated by the numeral 52 fills the lower portion of the tank 34—36, for example to the level provided by an angle iron 54 fastened on the back side wall of the tank. In one typical embodiment of the toilet of the invention 7 gallons of water is utilized, the water filling the lower portion of the tank in the manner illustrated. The water 52 in the tank is divided into an upper portion 56 or compartment, which may be called a bulk or solids carrying portion, and a lower portion 58 or compartment, which may be called a clear water or water pressure portion, by means of a partition 60, in the manner best seen in FIG. 3.

The partition 60 may be formed in two integral parts, one part 62 being in a flat plane and sloping downwardly from the left-hand side of FIG. 3 to the base of the tank near the right rear corner thereof (as seen in FIG. 4), a part 64 in a flat plane and tilting downwardly from the front of the tank to engage the tank bottom near the right rear corner thereof. Stated in another manner, the partition 60 is made with a diagonal positioned bend running from the front left corner to the right rear corner to provide two inclined planes draining towards drain plug 100.

A conduit 68 connects the lower body or compartment 58 of water with the inside of the flushing ring 44 of the bowl 42, and the water in the lower body or compartment is adapted to be pressurized to force the water through the conduit 68 and effect the flushing of the bowl

42. In order to effect this pressurizing operation an air jet 72, having an opening, for example, of .040 to .060 inch, is connected through the wall of the tank 34 to a pressure regulator valve 74 in turn connecting to an air pressure conduit 76, extending, for example, to the air brake tanks of a bus. An air valve 78 connected between the jet 72 and the pressure regulator 74 is adapted to be opened by means of a foot trip lever 80 to supply air through the jet 72 and pressurize the lower body or compartment 58 of clear water.

Means are provided for filtering out the water and liquid from the upper or bulk carrying body or compartment 56 of the water 52 and for returning this water and liquid to the lower body or compartment 58 for reuse. Such means comprise a water return valve indicated as a whole by the numeral 84 in FIG. 5 and including a perforated plate 86 removably covered on its bottom side with a rubber flap valve 88 which normally hangs down in the position shown in FIG. 5 to allow the return of water into the lower body or compartment 58. However, the valve means 84 is positioned in association with the air jet 72 so that the jet of air when it is introduced into the body or compartment 58 serves to move the rubber flap 88 back against the perforated plate 86 and effectively seal the valve 84. An additional filter screen 87 may be positioned over the perforated plate 86, the screen 87 being capable of being picked out and cleaned. This screen should be utilized if valve 84 is tending to clog and not function properly. Also associated with the valve 84 is a strainer screen and baffle 90 which extends vertically of the tank 34, and which allows water and liquids to flow through it and then through the valve 84 for return to the lower body 58, but which keeps bulky materials in the upper body or compartment 56. Inclining the screen 90 in conjunction with the inclining of the partition 60 tends to cause solids to settle away from the screen thereby helping to prevent clogging thereof.

It will be seen that the screen baffle 90 is positioned transversely of the longitudinal axis of the vehicle in order that the accelerating and decelerating movements of the vehicle will cause the water in the upper compartment 56 to swish back and forth and help keep the screen baffle from clogging up. In order to reduce excessive movement of the water and the material in the upper body 56 a baffle plate 92 of a Z-shape is secured between the front and back walls of the tank 34 towards the right-hand end of FIG. 3, the baffle plate 92 terminating just below the surface of the water 52.

To prevent any air lock in the lower body or compartment 58 which would tend to keep the flapper valve 88 always in a closed position a relief tube 94 having a relatively small bore connects the lower body or compartment 58 of water with the air reservoir above the level of the water 52.

Positioned at the right rear corner of the tank 34 and extending downwardly therefrom is a waste dump pipe 100 which is connected to the conduit 32 heretofore described. The waste dump pipe 100 is normally closed by a plug valve 102 carried on a rod or stem 104. The upper end of the stem 104, as best seen in FIGS. 6 and 7, is formed with a handle 106, and is provided with a short cross bar 108 welded to the stem 104. The cross bar 108 releasably locks underneath a spring clip 110 secured to the back upper corner of the tank 34.

In the operation of the apparatus described water 52 is used to fill the tank to the level indicated by the angle iron 54, this normally being done by an attendant from hose 28 stored underneath the lavatory sink 16, and with the seat 38 and bowl 42 of the toilet being raised. At this time the attendant makes certain that plug valve 102 is firmly closing waste dump pipe 100, with the upper end of valve rod 104 being held as seen in FIGS. 6 and 7 under spring clip 110. The hose 28 is supplied with water from conduit 26 from the outside of the vehicle, for example before the vehicle starts on a passenger run. The toilet is now ready for use.

After the toilet has been used the lever 80 is tripped to supply a jet of air into the lower body or compartment 58 to close valve 84 and to pressurize the water so that it is discharged through conduit 68 and the flushing ring 44 to flush out the bowl 42. At such time the weight of the water in the bowl overcomes counterweight 50 and the water and any material in the bowl is dumped into the upper body or compartment 56 of water. The release of lever 80 and the flow of air through relief tube 94 now allows valve 84 to open and water flows through screen baffle means 90 and valve 84 back into the lower body or compartment 58, with all solids or bulky material being retained in the upper compartment or body 56.

The toilet can be used a considerable number of times, each time operating as described. Upon the return of the vehicle to its home station, or to some servicing station the toilet is serviced by an attendant who raises the lid 38 and bowl 42 into the dotted line position shown in FIG. 2 and thereafter the valve rod 104 is pulled out from under the spring clip 110 and the plug valve 102 raised to discharge the bulky waste material through the waste dump pipe 100 and conduit 32. The conduit 26 is connected to a source of water and the attendant then operates the hose 28 to further clean out the tank and prepare it for its next run. During this cleaning operation the lever 80 can be periodically thrown to help renew the freshness of the water in the lower body or compartment 58, but when this is done the seat 38 and bowl 42 should be lowered at least partially into horizontal position so that the water flows from the bowl 42 back into the tank.

Once the toilet has been cleaned, the plug valve 102 is reset in the waste dump pipe 100 and the upper end of the valve rod 104 locked under the spring clip 110 whereupon the water with the proper amount of chemical added is brought back to its initial level and the toilet is again ready for operation.

It may be desirable to have the upper end of the valve rod 104, when released, engage with the hinged support for the seat 38 and bowl 42 so that the seat and bowl can be held in a raised position, or so that the opening of the valve 102 can be combined with the lifting of the seat 38 and bowl 42. The conduit 68 is normally made flexible so that it maintains its connection with the flushing ring 44 even though the seat 38 and bowl 42 are raised during the cleaning operation in the manner described.

It should be understood that chemicals are normally employed in the water solutions used in the toilet of the invention to help control odor and sanitariness. But this invention is not concerned with the details of those chemicals or with whether they are added automatically each time the toilet is flushed or otherwise.

While a certain representative embodiment and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. A toilet for buses and the like including a tank, water filling the lower portion of the tank, partition means across the lower portion of the tank dividing the water into a lower body and an upper body, a toilet seat hinged to the top of the tank, an inverted truncated bowl carried by the seat and terminating in a downward direction a spaced distance above the surface of the water, a flushing ring carried by the top of the bowl, a hinged closure for the bottom of the bowl, a counterweight normally holding the closure shut, a conduit connecting the lower body of water with the flushing ring, an air pressure jet for pressurizing the lower body of water to force it with a flushing action through the flushing ring and bowl, a flush lever for controlling the supply of air to the air pressure jet, a flapper valve in the partition means and connecting the upper body of water with the lower body, said valve being so positioned in relation to the air pressure jet that the opera-

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tion thereof closes the flapper valve, perforated baffle means in the tank above the partition means and separating the larger portion of the upper body of water from the flapper valve, a pressure relief tube having a relatively small bore connecting the lower body of water with the air space in the tank above the upper body of water, a waste dump pipe connected to the upper body of water in the tank, and a releasable plug valve normally closing the pipe, said partition means sloping downwardly towards said dump pipe.

2. A toilet for buses and the like including a tank, water filling the lower portion of the tank, partition means across the lower portion of the tank dividing the water into a lower body and an upper body, a toilet seat on the top of the tank, an inverted truncated bowl positioned below the seat and terminating in a downward direction a spaced distance above the surface of the water, a flushing ring carried by the top of the bowl, a hinged closure for the bottom of the bowl, means normally holding the closure shut, a conduit connecting the lower body of water with the flushing ring, an air pressure jet for pressurizing the lower body of water to force it with a flushing action through the flushing ring and bowl, a flush lever for controlling the supply of air to the air pressure jet, a flapper valve in the partition means and connecting the upper body of water with the lower body, said valve being so positioned in relation to the air pressure jet that the operation thereof closes the flapper valve, perforated baffle means in the tank above the partition means and separating the larger portion of the upper body of water from the flapper valve, a pressure relief tube having a relatively small bore connecting the lower body of water with the air space in the tank above the upper body of water, a waste dump pipe connected to the upper body of water in the tank, and a releasable plug valve normally closing the pipe, said partition means sloping downwardly towards said dump pipe.

3. A toilet for buses and the like including a tank, water filling the lower portion of the tank, partition means across the lower portion of the tank dividing the water into a lower body and an upper body, a toilet seat on the top of the tank, an inverted truncated bowl positioned below the seat and terminating in a downward direction a spaced distance above the surface of the water, a flushing ring carried by the top of the bowl, a hinged closure for the bottom of the bowl, means normally holding the closure shut, a conduit connecting the lower body of water with the flushing ring, an air pressure jet for pressurizing the lower body of water to force it with a flushing action through the flushing ring and bowl, a flush lever for controlling the supply of air to the air pressure jet, a flapper valve in the partition means and connecting the upper body of water with the lower body, said valve being so positioned in relation to the air pressure jet that the operation thereof closes the flapper valve, perforated baffle means in the tank above the partition means and separating the larger portion of the upper body of water from the flapper valve, a pressure relief tube having a relatively small bore connecting the lower body of water with the air space in the tank above the upper body of water, a waste dump pipe connected to the upper body of water in the tank, and a releasable plug valve normally closing the pipe.

4. A toilet for buses and the like including a tank, water filling the lower portion of the tank, partition means across the lower portion of the tank dividing the water into a lower body and an upper body, a toilet seat on the top of the tank, an inverted truncated bowl positioned below the seat and terminating in a downward direction a spaced distance above the surface of the water, a flushing ring carried by the top of the bowl, a hinged closure for the bottom of the bowl, means normally holding the closure shut, a conduit connecting the lower body of water with the flushing ring, an air pressure jet for pressurizing the lower body of water to force it with a flushing action

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through the flushing ring and bowl, a flush lever for controlling the supply of air to the air pressure jet, a valve in the partition means and connecting the upper body of water with the lower body, said valve being closed only upon operation of the air pressure jet, perforated baffle means in the tank above the partition means and separating the larger portion of the upper body of water from the flapper valve, a waste dump pipe connected to the upper body of water in the tank, and a releasable plug valve normally closing the pipe.

5. In combination a vehicle, a toilet seat in the vehicle, a bowl positioned beneath the seat, means closing the bottom of the bowl but adapted to open upon the flushing of the toilet, means positioned below the bowl confining a body of water, said means having partition means separating the body of water into a clear area and a bulk carrying area, means for forcing water from the clear area into the bowl to provide a flushing action, said flushing water returning to the bulk carrying area, screen and baffle means positioned within the means confining the body of water and allowing the return of substantially clear water in a given return path from the bulk carrying area to the clear area, normally open valve means in the return path of the water from the bulk carrying area to the clear area, said means for forcing water also closing the last-named valve means during the flushing of the toilet, and valve and conduit means for drawing off the water and bulk from the bulk carrying area, said screen and baffle means being positioned substantially normal to the direction of travel of the vehicle so that accelerations and decelerations of the vehicle help keep the means open.

6. A toilet including a seat, a bowl positioned beneath the seat, means closing the bottom of the bowl but adapted to open upon the flushing of the toilet, means positioned below the bowl confining a body of water, said means having partition means separating the body of water into a clear area and a bulk carrying area, means for forcing water from the clear area into the bowl to provide a flushing action, said flushing water returning to the bulk carrying area, screen and baffle means allowing the return of substantially clear water in a given return path from the bulk carrying area to the clear area, normally open valve means in the return path of the water from the bulk carrying area to the clear area, said means for forcing water closing the last-named valve means during the flushing of the toilet, and valve and conduit means for drawing off the water and bulk from the bulk carrying area.

7. A toilet including a seat, a bowl positioned beneath the seat, means closing the bottom of the bowl but adapted to open upon the flushing of the toilet, means positioned below the bowl confining a body of water, said means having partition means separating the body of water into a clear area and a bulk carrying area, means allowing the return of substantially clear water in a given return path from the bulk carrying area to the clear area, valve means in the return path of the water from the bulk carrying area to the clear area, means for closing the valve and for simultaneously forcing the water from the clear area into the bowl with a flushing action, said flushing water returning to the bulk carrying area, and valve and conduit means for drawing off the water and bulk from the bulk carrying area.

8. A toilet including a seat, a bowl positioned beneath the seat, means positioned below the bowl confining a body of water, said means having partition means separating the body of water into a clear area and a bulk carrying area, means allowing the return of substantially clear water in a given return path from the bulk carrying area to the clear area, a one way valve normally open positioned in the return path of the water from the bulk carrying area to the clear area allowing water to flow from the bulk carrying area to the clear area, means

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for closing the valve and for simultaneously forcing the water from the clear area into the bowl with a flushing action, said flushing water returning to the bulk carrying area, and valve and conduit means for drawing off the water and bulk from the bulk carrying area.

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