

[54] **TOILET CONSTRUCTION**
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3,454,967 7/1969 Corliss 4/77
3,593,345 7/1971 Wells 4/77
3,601,820 8/1971 Sargent et al. 4/92
3,713,177 1/1973 Tufts et al. 4/10 X
3,747,130 7/1973 Sargent et al. 4/78

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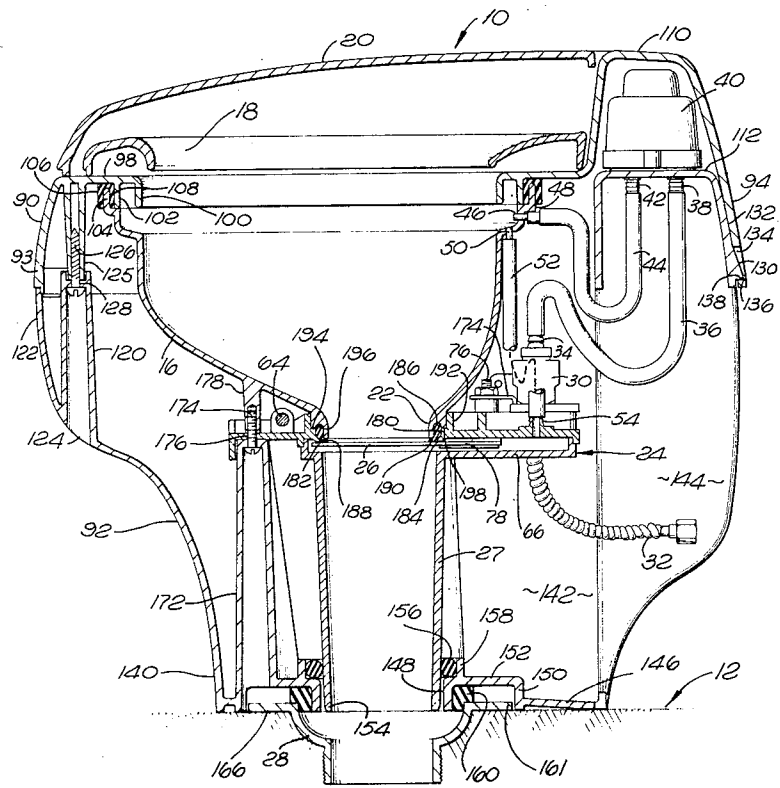
[52] U.S. Cl. **4/80, 4/10**
[51] Int. Cl. **E03d 5/012, E03d 11/00**
[58] Field of Search 4/79, 1, 8, 9, 10, 17, 4/66, 68, 76, 77, 78, 79, 80, 84, 92, 115, 203, 252 R, 86, 87

[56] **References Cited**

UNITED STATES PATENTS			
245,319	8/1881	Robertson.....	4/84
537,288	4/1895	Howard	4/82
611,458	9/1889	McLaren	4/17
3,308,481	3/1967	O'Brien et al.	4/79

[57] **ABSTRACT**
A toilet comprising a base structure which is divided into separate upper and lower sections. The lower section is mounted on a support, while the upper section is releasably secured to the lower section from outside the lower section which allows access to the internal parts of the toilet without removing the base from the support or disconnecting the inlet water line. The front and side walls of the base are devoid of any openings, except for the control lever, so that water cannot splash into the interior of the toilet base.

12 Claims, 5 Drawing Figures



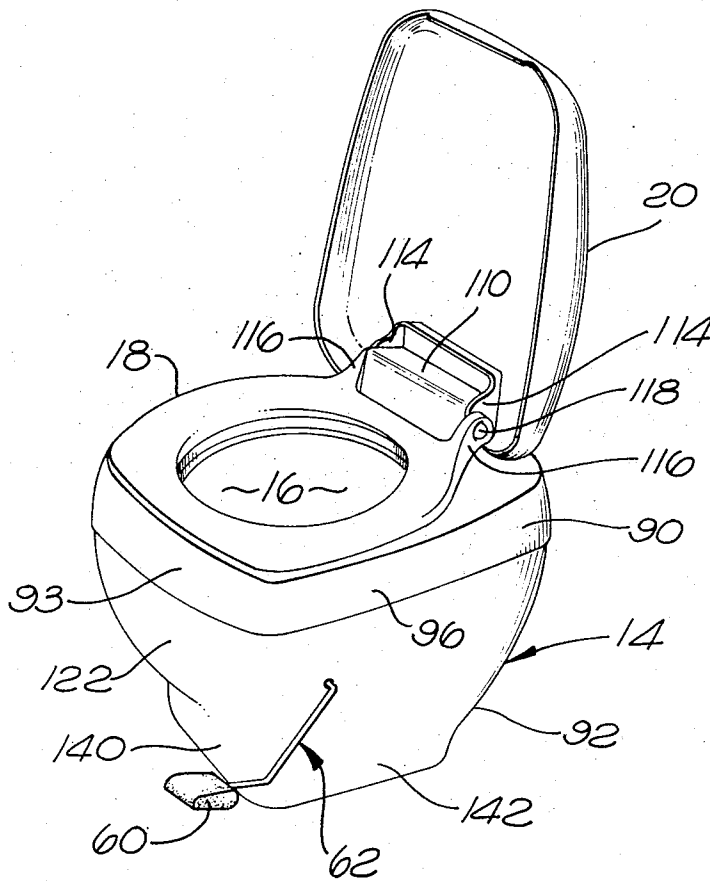


FIG.1.

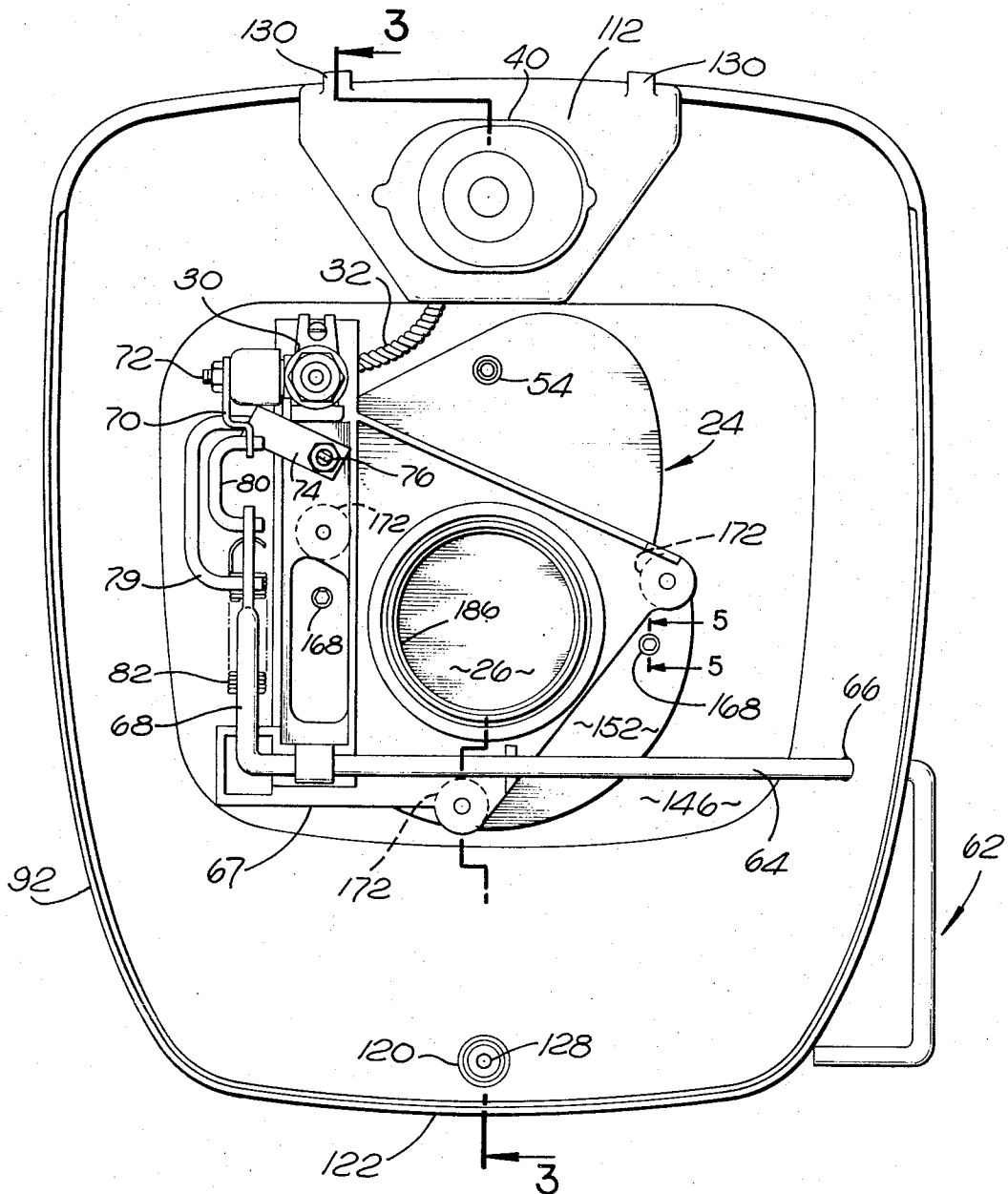


FIG.3.

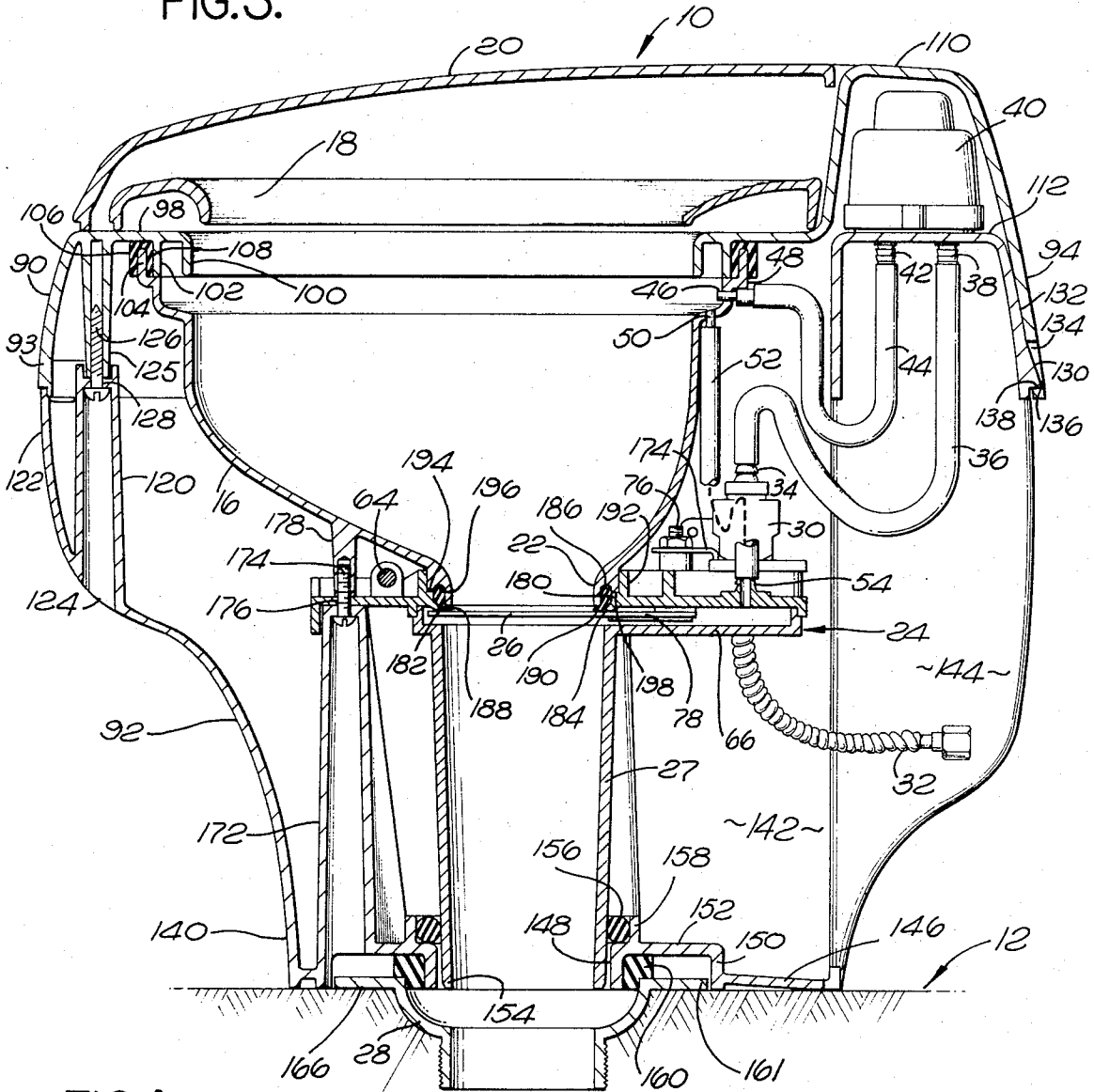


FIG.4.

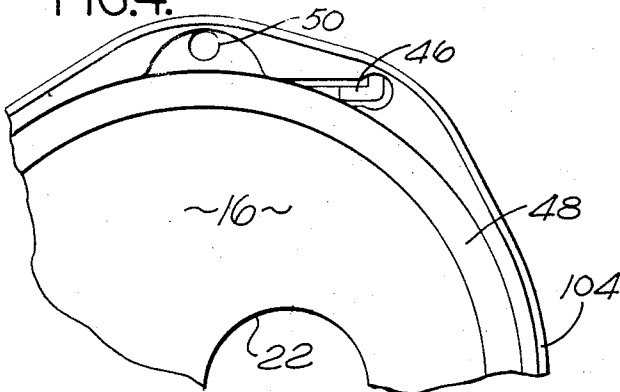
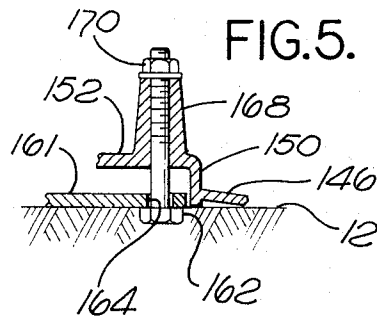


FIG.5.



TOILET CONSTRUCTION

BACKGROUND OF THE INVENTION

This invention relates generally to toilets and, more particularly, to an improved flush-type toilet construction which is particularly suited for use in recreational vehicles.

While the present invention will be described particularly in connection with recreational vehicle toilets, it will be appreciated that the invention may be embodied in any flush-type toilet, including permanently installed home-type toilets or the like.

The increased demand in recent years for recreational vehicles, such as house trailers, campers, and the like, has raised the need for flush-type toilets which are simple in construction and, therefore, relatively inexpensive and which may be easily disassembled for repair or replacement of parts within the interior of the toilet.

One form of a flush-type toilet suitable for recreational vehicles is disclosed in U.S. Pat. No. 3,369,260 to Sargent et al. The toilet disclosed in this patent utilizes a gate valve for controlling the flow of water from the discharge outlet of the bowl of the toilet and a rotary valve for controlling the flow of water into the bowl. A foot pedal and linkage is provided for opening and closing the gate valve and the water valve simultaneously. A plenum is integrally formed about the rim of the bowl which collects water when the gate valve is opened. After the gate valve is closed, water from the plenum drains into the bowl to provide a suitable body of water in the bowl for a water seal and additional flushing operations. The control linkage for the gate valve and water valve is completely exposed near the bottom of this toilet. While such an arrangement might be convenient for the repair and replacement of parts in the control linkage of the toilet, such linkage -- not being enclosed -- is readily subjected to contamination or rust caused by urine or water which might splash upon the toilet if it is mounted in a shower, which is common in recreational vehicles. It is, therefore, desirable that the operating parts of the flush valve and water valve be enclosed within a housing.

U.S. Pat. No. 3,601,820 to Sargent et al discloses a toilet structure similar to that described in the aforementioned Sargent et al patent except that the control linkage for the valves of the toilet are mounted within a substantially closed housing, thus providing some protection for such parts. However, the front wall of the housing or base of the toilet is provided with a relatively large aperture through which the foot pedal for controlling the valves extends. Hence, water or urine can still splash into the interior of the toilet to contaminate the parts or cause rust. This toilet employs an annular cover ring which is separably mounted to the base of the toilet. However, the cover ring cannot be removed from the base unless the base is removed from the floor. As a consequence, access to the interior of the base of the toilet for performing repairs or replacement of parts can be achieved only by removing the toilet from the floor and disconnecting the inlet water line from the toilet. It is apparent that removing the toilet base from the floor is a time-consuming and inconvenient procedure for gaining access to the interior of the toilet.

Another form of recreational vehicle toilet is disclosed in U.S. Pat. No. 3,308,481 to O'Brien et al. This

toilet comprises a pedestal which is integrally formed with a toilet bowl. The pedestal is mounted over an inner housing which carries the water valve and the operating mechanism for the flush valve of the toilet. The pedestal is provided with an outwardly extending floor flange which allows the pedestal to be secured to the floor by means of bolts passing through the flange. The floor flange provides an area for collecting water or urine which may cause contamination and rusting of the exposed flange bolts. In addition, like the toilet disclosed in the aforementioned U.S. Pat. No. 3,601,820 the Sargent et al toilet must be removed from the floor in order to obtain access to the inner housing which carries the flush and water valves and control mechanism therefor. As a consequence, it is also inconvenient to perform maintenance on this toilet.

The purpose of the present invention is to overcome the attendant disadvantages of the prior art toilets by providing a construction which permits the user to readily gain access to the interior of the toilet for performing maintenance or repair without requiring the toilet base to be removed from the supporting floor. Another object of the invention is to provide a toilet which eliminates outwardly extending floor flanges and front apertures to thereby minimize areas where contamination might occur.

SUMMARY OF THE INVENTION

According to the principal aspect of the present invention, there is provided an improved toilet construction comprising a base structure which is adapted to be mounted on a support, such as the floor of a recreational vehicle. The base structure is divided into separate upper and lower sections. The upper section which carries the seat for the toilet is releasably secured to the lower section from outside the lower section whereby the upper section may be removed from the lower section to obtain access to the interior of the lower section without removing the latter from the floor support. Thus, maintenance and repair of the parts in the interior of the toilet are greatly facilitated. In addition, the lower section of the base has front and side walls which are completely closed except for a small opening in one side wall through which the operating arm for the flush and water valves of the toilet extends. Thus, the parts in the interior of the toilet are protected from any water or urine which might be splashed upon the walls of the base. Moreover, because the upper section of the toilet base structure is removable from the lower section, the lower section may be mounted to the floor support through the interior thereof, thus avoiding the necessity of having outwardly extending floor flanges on the bottom of the base. It will be appreciated that by this design of the toilet base, areas for collection of water, which would otherwise produce contamination or rust of mounting bolts, are avoided. Other aspects and advantages of this invention will become more apparent from the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the toilet construction of the present invention with the lid of the toilet shown in its raised position;

FIG. 2 is a plan view of the lower section of the toilet, the upper section and the bowl being removed;

FIG. 3 is a vertical sectional view taken along line 3—3 of FIG. 2 with the upper section of the toilet mounted in place, the hoses in the toilet being shown on a reduced scale so that the other parts of the toilet may be more clearly seen;

FIG. 4 is a fragmentary plan view of the toilet bowl utilized in the toilet construction of the present invention, showing the inlet and outlet ports therefor; and

FIG. 5 is a vertical sectional view taken along line 5—5 of FIG. 2 showing the details of the arrangement for mounting the lower section of the toilet to the floor support.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, there is illustrated the toilet construction of the present invention, generally designated 10, which is mounted on a floor support 12, which may be the floor of a recreational vehicle or the like. In general, the toilet comprises a base structure 14 in which a bowl 16 is mounted. A seat 18 and a lid 20 are provided for the bowl. The discharge outlet 22 of the bowl 16 is connected to a flush valve assembly 24 which is fixedly mounted in the base structure 14. The flush valve assembly comprises a gate valve having a horizontally movable valve blade 26 which is movable from a position as seen in FIG. 3 closing the discharge outlet 22, to a second position remote from the discharge outlet wherein water will exit from the bowl and pass through a cylindrical outlet port 27 on the valve assembly 24 to a sewer drain 28 mounted in the floor support 12. A rotary water valve 30 is mounted on the flush valve assembly 24. The inlet (not shown) of the water valve is connected to a flexible copper conduit 32 which is coupled to a water inlet line, not shown. The outlet 34 of the water valve is connected by a flexible plastic hose 36 to one port 38 of a vacuum breaker valve 40. The vacuum breaker valve may be of any conventional design and constitutes no part of the present invention. However, it is preferred that a vacuum breaker be utilized as described in copending application of Milette et al entitled "Vacuum Breaker Valve", Ser. No. 332,371, filed on Feb. 14, 1973, now U.S. Pat. No. 3,788,342, assigned to the assignee of the present application. The outlet port 42 of the vacuum breaker valve is connected by an additional flexible hose 44 to an outlet port 46 at the rim 48 of the bowl 16. An overflow port 50 is also provided at the rim 48 which receives a small amount of water discharged from the inlet port 46 during each flushing operation. This water is conveyed by means of an S-shaped flexible hose 52 to a port 54 on the flush valve assembly 24. The water flowing through the hose 52 to the port 54 serves to rinse out the flush valve assembly. Also, the hose 52 and port 54 provide a by-pass flow path around the valve blade 26 to allow water to escape from the outlet 27 of the valve assembly 24 in the event the level of water in the bowl 16 rises to the height of the outlet port 50. The water in the S-shaped hose 52 between the ports 50 and 54 serves as a water trap to prevent waste gases from passing through the system.

A foot pedal 60 (seen only in FIG. 1) is connected to the end of a control lever 62 near the front portion of the toilet. The lever 62 is in the form of a cylindrical metal rod which has a horizontally extending portion 64 that extends through a small opening 266 in the upper wall portion of the base structure 14. The lever

is mounted on the housing 67 of the flush valve assembly 24 for pivotal movement about the longitudinal axis of the horizontally extending portion 64 thereof. The inner end 68 of the lever 62 is bent at a right angle to the horizontally extending portion 64. An actuating arm 70 is fixedly connected to the rotatable stem 72 of the water valve 30. A second actuating arm 74 is fixedly connected to a rotatable vertically extending shaft 76. The shaft is fixed to the shank portion 78 of the gate valve blade 26. A link 79 is pivotally connected at one end to the end 68 of the lever 62 and at its opposite end to the actuating arm 74 for the valve blade 26. A second link 80 is pivotally connected at one end to the end 68 of the lever 62 and at its opposite end to the actuating arm 70 of the water valve. A coil spring 82 normally biases the end 68 of the lever 62 downwardly and thus the pedal 60 to its uppermost position as seen in FIG. 1. When the pedal 60 is depressed, the lever 62 will pivot about the longitudinally extending axis of the horizontal section 64 thereby lifting the inner end section 68. Initial lifting of the end section 68 will cause the actuating arm 70 to move upwardly rotating the valve stem 62 to open the water valve 30 and introduce water through the port 46 into the bowl 16. Further lifting of the end section 68 will cause the actuating arm 74 to rotate in a counter clockwise direction as viewed in FIG. 2, thereby rotating the shaft 76 and hence the valve blade 26 fixed thereto. Hence, the valve blade will be shifted to its open position allowing the contents of the bowl 16 to be flushed through the outlet 26 of the valve assembly 24 to the sewer drain 28. When the pedal 60 is released, the valve blade 26 will shift to its closed position and the water valve 30 will close, in sequence, so that a body of water will remain in the bowl to provide a water seal at the discharge outlet of the bowl. For further description of the details of structure and operation of the flush valve assembly 24, reference may be made to the copending application of Milette et al entitled "Toilet Valve Assembly", Ser. No. 347,858, filed on Apr. 4, 1973, now U.S. Pat. No. 3,835,479, filed concurrently herewith and assigned to the assignee of the present application. It should be noted that the flush valve assembly 24 described herein is given by way of example only and constitutes no part of the present invention. Other flush valve assemblies may be utilized if desired in the toilet construction of the present invention.

According to an important feature of the present invention, the base structure 14 of the toilet is divided into separate upper and lower sections 90 and 92, respectively, the line of division between such sections being adjacent the upper end of the base structure. The upper section 90 of the base structure includes generally vertically extending front and rear walls 93 and 94 and vertically extending side walls 96 which are continuous with one another. An annular flange portion 98 extends inwardly from the upper edge of the front, rear and side walls of the upper section 90 over the rim 48 of the bowl 16. The inner edge 100 of the flange portion 98 is bent downwardly to provide a protective cover for water which exits from the inlet 46 at the rim of the bowl. The flange portion 98 also embodies a downwardly extending cylindrical wall 102 spaced from the inner edge 100. A cylindrical upper wall portion 104 at the rim 48 of the bowl surrounds the wall 102. An annular sealing element 106 is provided between the flange 98 and the rim 48. This sealing ele-

ment has an inverted U-shaped configuration in cross-section whereby the element may be mounted over the cylindrical wall portion 104 at the rim to engage both the bottom surface of the flange portion 98 and the outer surface 108 of the cylindrical wall 102 of the flange.

At the rear of the flange portion 98 of the upper section 90, there is formed a centrally located upstanding hollow enclosure 110 into which the vacuum breaker 40 extends thereby providing a cover for the vacuum breaker. The vacuum breaker 40 itself is fixedly mounted on an upstanding supporting section 112 formed adjacent the rear portion of the lower section 92 of the toilet base.

The lid 20 is formed with two downwardly extending flanges 114 which are disposed on opposite sides of the upstanding hollow enclosure 110 on the upper section 90. The rear portion of the toilet seat is formed with a pair of upstanding projections 116 which are disposed on opposite sides of the two flanges 114 on the lid 20. A pivot pin 118 extends horizontally through each projection 116, flange 114 and the adjacent side wall of the hollow enclosure 110 so that the seat 18 and lid 20 are pivotally mounted for up and down movement on the upper section 90 of the toilet base.

A hollow upstanding boss 120 is integrally formed in the upper front port 122 of the lower section 92 of the toilet base. The boss opens at a downwardly facing portion 124 of the upper front port 122 of the base. A hollow cylindrical projection 125 integral with the flange portion 98 on the upper section 90 extends downwardly and coaxial with the boss 120. A self-threading screw 126 extends upwardly through an opening 128 at the top of the boss 120 and is threadably engaged in the hollow projection 125 to secure the front portion of the upper section 90 to the lower section 92 of the toilet base. A pair of tabs 130 are formed on the outer surface of the upper rear wall portion 132 of the lower section 92 of the base. These tabs engage in corresponding openings 134 formed in the rear wall 94 of the upper section 90. The tabs 130 embody downwardly facing shoulders 136 which engage the bottom edges 138 of the apertures 134 to retain the rear portion of the upper section 90 onto the lower section 92 of the toilet base. Thus, the screw 126 and the tabs 130 serve to releasably secure the upper section 90 of the toilet base to the lower section.

The lower portion of the lower section 92 of the toilet base is formed by a generally upstanding front wall 140 and generally upstanding side walls 142. The rear of the base structure 14 is formed with a vertically extending recess defined by a pair of upstanding walls 144, only one of such walls being seen in FIG. 3. The recess formed by the walls 144 opens into the interior of the base structure 14 whereby the conduit 32 may be connected to an inlet water line, not shown, exterior of the toilet. The base structure 14 is provided with a slightly inclined floor 146 which is integral with the lower front wall 140 and side walls 142. The floor is formed with a pair of spaced concentric cylindrical walls 148 and 150 joined by an annular section 152. The inner wall 148 defines a central aperture which is coaxial with the discharge outlet 22 of the bowl. The lower end 154 of the valve outlet 27 extends into the aperture 148. An O-ring 156 is disposed between the outer surface of the outlet 27 and an upstanding cylindrical wall 158 formed on the annular section 152 of the floor 146. A

second resilient sealing ring 160 is disposed between the annular section 152 of the floor and a flange 161 on the sewer drain 28. The lower section of the base structure 14 is fixedly mounted to the floor support 12 by means of a pair of bolts 162 as best seen in FIGS. 2 and 5. The bolts extend through apertures 164 formed in the flange 161 on the sewer drain and through bosses 168 formed on the annular section 152 of the floor 146 of the toilet base. A nut 170 is threadably engaged on the upper end of each bolt 162 to firmly hold the base structure 14 on the support 12.

Three hollow bosses 172 extend upwardly from the annular section 152 of the toilet floor 146. The housing 66 of the flush valve assembly 24 is supported by the upper ends of the bosses 172. The bowl 16 is mounted on top of the housing 66. Screws 174 extending upwardly through the upper ends of the bosses 172 pass through openings 176 in the housing 66. These screws are threadably engaged in corresponding downwardly extending projections 178 formed on the bottom of the toilet bowl 16.

To mount the toilet 10 on the support 12, the valve assembly 24 and the bowl 16 are mounted on top of the bosses 172 as seen in FIG. 3 and an elongated screw driver is extended upwardly through the hollow bosses to drive the screws 174 into the projections 178 on the bowl to firmly secure the bowl and valve assembly 24 to the lower section 92 of the toilet base. The lower section 92 is then mounted on the floor support 12 so that the floor bolts 162 extend upwardly through the bosses 168 on the toilet floor 146. The operator then threads the nuts 170 on the floor bolts 162 through the upper open portion of the lower section 92 of the toilet. After the lower section is firmly secured to the support 12, the upper section 90 is positioned on top of the lower section 92 of the toilet. By pressing the upper section 90 onto the lower section 92, the tabs 130 will become engaged within the apertures 134 in the upper section so that the rear wall 94 of the upper section will be frictionally retained on the rear portion 132 of the lower section of the toilet. Thereafter, the screw 126 is inserted upwardly through the hollow boss 120 and threaded into the downwardly extending projection 124 on the upper section 90. Thus, it will be appreciated that when it is desired to perform any repairs or replace any parts within the interior of the toilet 10, the upper section 90 is removed by simply removing the single screw 126 at the front of the toilet, and the upper section may be removed to provide access to the interior of the toilet base 14. Therefore, by the construction of the toilet 10 of the present invention, it is not necessary to remove the toilet base from the floor support 12 when it is desired to perform some operation within the interior of the toilet. In addition, it is not necessary to disconnect the conduit 32 from the water inlet line. Thus, repair and maintenance of the toilet is greatly facilitated. In addition, because the toilet is mounted on the support 12 through the interior of the toilet, outwardly extending mounting flanges on the base of the toilet are not required. Also, only a single small opening 66 is required in the side wall of the toilet through which the operating lever 62 extends. As a consequence, there are no enlarged openings in the front or side walls of the toilet through which water or urine could enter into the interior of the toilet to cause contamination or rusting of the nuts and bolts at the floor 146 of the toilet.

Referring again to the flush valve assembly 24, the valve housing 66 is formed with a circular port 180 adjacent the discharge outlet 22. A lip 182 extends downwardly and radially inwardly from the surface of the port 180, providing a downwardly facing annular valve seat 184. A resilient sealing ring 186, formed of rubber or the like, is slidably mounted in the port 180. The lower portion 188 of the ring 186 flares radially inwardly to seat upon the lip 182. The bottom edge 190 of the sealing ring 186 extends below the valve seat 184 to sealingly engage with the upper surface of the gate valve blade 26. An upstanding short cylindrical wall 192 surrounds and is spaced outwardly from the port 180. An upwardly facing annular ledge 194 joins the surface of the port 180 to the wall 192. An annular groove 196 opens at the bottom of the discharge outlet of the bowl 16 and receives the upper portion of the sealing ring 186. A downwardly facing annular shoulder 198 at the bottom of the discharge outlet rests upon the ledge 194 on the valve housing. Thus, the seal 186 serves a double function of both a valve seal and a toilet bowl gasket. The seal may be readily replaced by simply removing the bowl 16 from the valve assembly 24 after the toilet base 14 has been removed from the support 12. Therefore, it is not necessary that the valve assembly be disassembled to replace the valve seal, thus avoiding the necessity of the user contacting waste material which may reside within the interior of the valve housing.

What is claimed is:

1. A toilet construction comprising:
 - a hollow base structure adapted to be mounted on a flat support over a drain opening in said support, said base structure having an open bottom;
 - a bowl mounted within said base structure having a discharge outlet;
 - flush valve means adjacent to said discharge outlet for controlling the flow of water therethrough;
 - conduit means extending downwardly from said flush valve means to said open bottom of said base structure for connection to said drain opening;
 - water valve means within said base structure but outside said bowl for controlling the flow of water from a water source to said bowl;
 - a seat for said bowl;
 - said base structure being divided into separate hollow upper and lower sections, said upper section carrying said seat and having its perimeter overlying the perimeter of said lower section;
 - means releasably securing said upper section to said lower section from outside said lower section;
 - means connecting said bowl to said lower section;
 - said upper section being disconnected from said bowl whereby said upper section is separable from said bowl; and
 - said lower section being adapted to be fixedly mounted to said support, whereby said upper section may be removed from said lower section to obtain access to the interior of said lower section without removing the lower section from said support.
2. A toilet construction as set forth in claim 1 wherein:
 - said lower section of said base structure has a front wall and a pair of side walls, one of said side walls having an opening therethrough;

said flush valve means having an operating arm extending through said opening; and
said front wall and side walls being devoid of any apertures other than said actuating arm opening.

3. A toilet construction as set forth in claim 1 including:

means removably mounting said bowl, flush valve means and water valve means to said lower section of said base structure.

4. A toilet construction as set forth in claim 1 wherein:

said lower section is formed with a floor therein having a central aperture generally coaxial with said discharge outlet;

a plurality of hollow upstanding bosses on said floor opening at the bottom thereof; and

fastening means extending through the upper end of each hollow boss for securing said flush valve means and said bowl to said lower section.

5. A toilet construction as set forth in claim 1 wherein said flush valve means includes:

a wall having an inlet port therein adjacent to said discharge outlet, the portion of said wall surrounding said inlet port having upper and lower surfaces, a movable valve means adjacent to and below said lower surface for closing said inlet port, a resilient sealing ring extending about the inner periphery of said inlet port, said sealing ring having a lower surface extending below said wall lower surface to engage said valve means;

said sealing ring having an upper surface extending above said wall upper surface;

said sealing ring being slidably mounted in said inlet port from above said wall; and

said discharge outlet engaging said upper surface of said sealing ring whereby said ring functions as a combined valve and bowl seal.

6. A toilet construction as set forth in claim 1 wherein:

said bowl has an upper rim;

said upper section having a flange extending over said upper rim; and

sealing means are provided between said flange and said upper rim.

7. A toilet construction as set forth in claim 1 wherein:

the upper edge of said lower section engages the lower edge of said upper section.

8. A toilet construction as set forth in claim 1 having a lid and including:

means pivotally mounting said seat and said lid to a rear portion of said upper section, with said lid overlying said seat.

9. A toilet construction as set forth in claim 1 including:

means for attaching said lower section to said support, said lower section having generally upstanding front and side walls adjacent to said support, said attaching means being located within the confines of said walls.

10. A toilet construction comprising:

a hollow base structure divided into separate upper and lower sections, said lower section having an open bottom and being adapted to be mounted on a flat support over a drain opening therein;

means releasably securing said upper section to said lower section from outside said lower section;

a bowl in said base structure having a discharge outlet;
 flush valve means within said lower section adjacent to said discharge outlet for controlling the flow of water therethrough;
 water valve means within said lower section for controlling the flow of water from a water source to said bowl;
 means for attaching said lower section to said support;
 said lower section having generally upstanding front and side walls adjacent to the bottom thereof;
 said attaching means being located within the confines of said walls whereby said attaching means is accessible through said lower section when said upper section is removed therefrom;
 one of said side walls having an opening therein;
 said flush valve means having an operating arm extending through said opening; and
 said front wall and side walls being devoid of any apertures other than said actuating arm opening.

11. A toilet construction as set forth in claim 10 wherein: said upstanding front and side walls extend to the bottom of said lower section.

12. A toilet construction comprising:
 a hollow base structure divided into separate upper

and lower sections, said lower section having an open bottom and being adapted to be mounted on a flat support over a drain opening therein;
 means releasably securing said upper section to said lower section from outside said lower section;
 a bowl in said base structure having a discharge outlet;
 flush valve means within said lower section adjacent to said discharge outlet for controlling the flow of water therethrough;
 water valve means within said lower section for controlling the flow of water from a water source to said bowl;
 means for attaching said lower section to said support;
 said lower section having generally upstanding front and side walls adjacent to the bottom thereof;
 said attaching means being located within the confines of said walls whereby said attaching means is accessible through said lower section when said upper section is removed therefrom;
 said lower section being formed with a floor therein having an aperture adapted to be positioned in alignment with said drain opening; and
 said attaching means extending through said floor.

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