United States Patent [19]

Sargent et al.

[11] **3,908,202**

[45] **Sept. 30, 1975**

[54] **TOILET**

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[73] Assignee: **Thetford Corporation,** Ann Arbor, Mich.

[22] Filed: **Apr. 17, 1974**

[21] Appl. No.: **461,727**

[52] **U.S. Cl.** **4/10;** 4/79

[51] **Int. Cl.²** **E03D 9/00**

[58] **Field of Search** 4/10, 76, 89, 90, 79

[56] **References Cited**

UNITED STATES PATENTS

3,340,545	9/1967	Sargent	4/79
3,369,260	2/1968	Sargent et al.	4/79
3,540,590	11/1970	Schneider	4/10
3,577,569	5/1971	Sargent	4/79
3,713,177	1/1973	Tufts	4/90
3,811,135	5/1974	Drouhard	4/76
3,829,905	8/1974	Vanden Broek	4/79

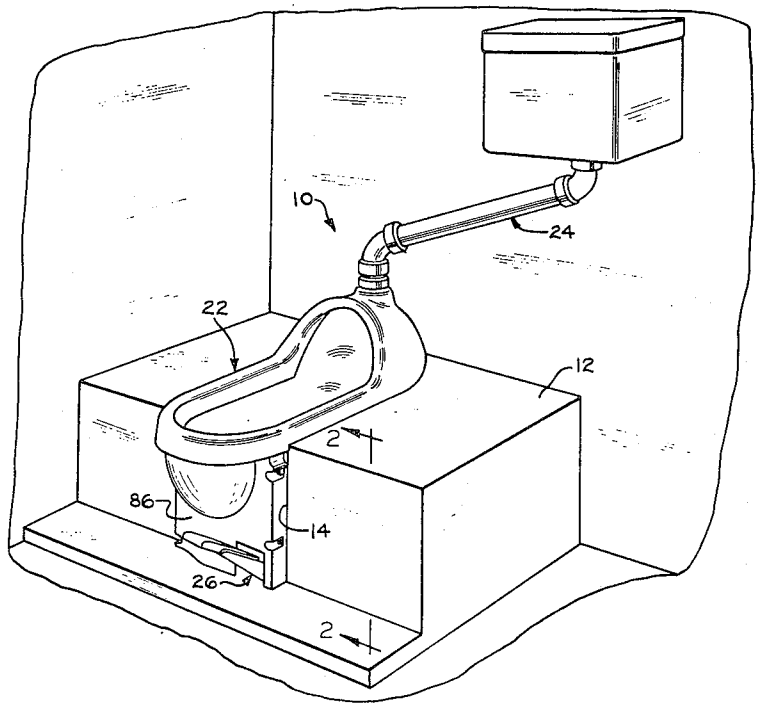
Primary Examiner—Robert I. Smith

Attorney, Agent, or Firm—Olsen and Stephenson

[57] **ABSTRACT**

Toilet apparatus especially adapted for use in oriental countries wherein water conservation is practiced and the user seeks to make minimal physical contact with the toilet facilities. The toilet apparatus is installed in a step-like structure that has a slot or recess in the step into which the bowl assembly is fitted with the major portion of the peripheral edge of the bowl assembly essentially flush with the top of the step so that the user can squat on the step out of contact with the bowl when using the toilet facilities. A valve assembly is secured to the bottom of the slot or recess for closing the outlet of the bowl and a measured quantity of water is available in a flush conduit for gravity feed flushing when a flush control means is actuated. To facilitate installation of the apparatus in step structures of irregular or inconsistant dimensions, the valve assembly and bowl have a telescoping joint to enable the installer to adjust the vertical position of the bowl relative to the mounted position of the valve assembly.

11 Claims, 11 Drawing Figures



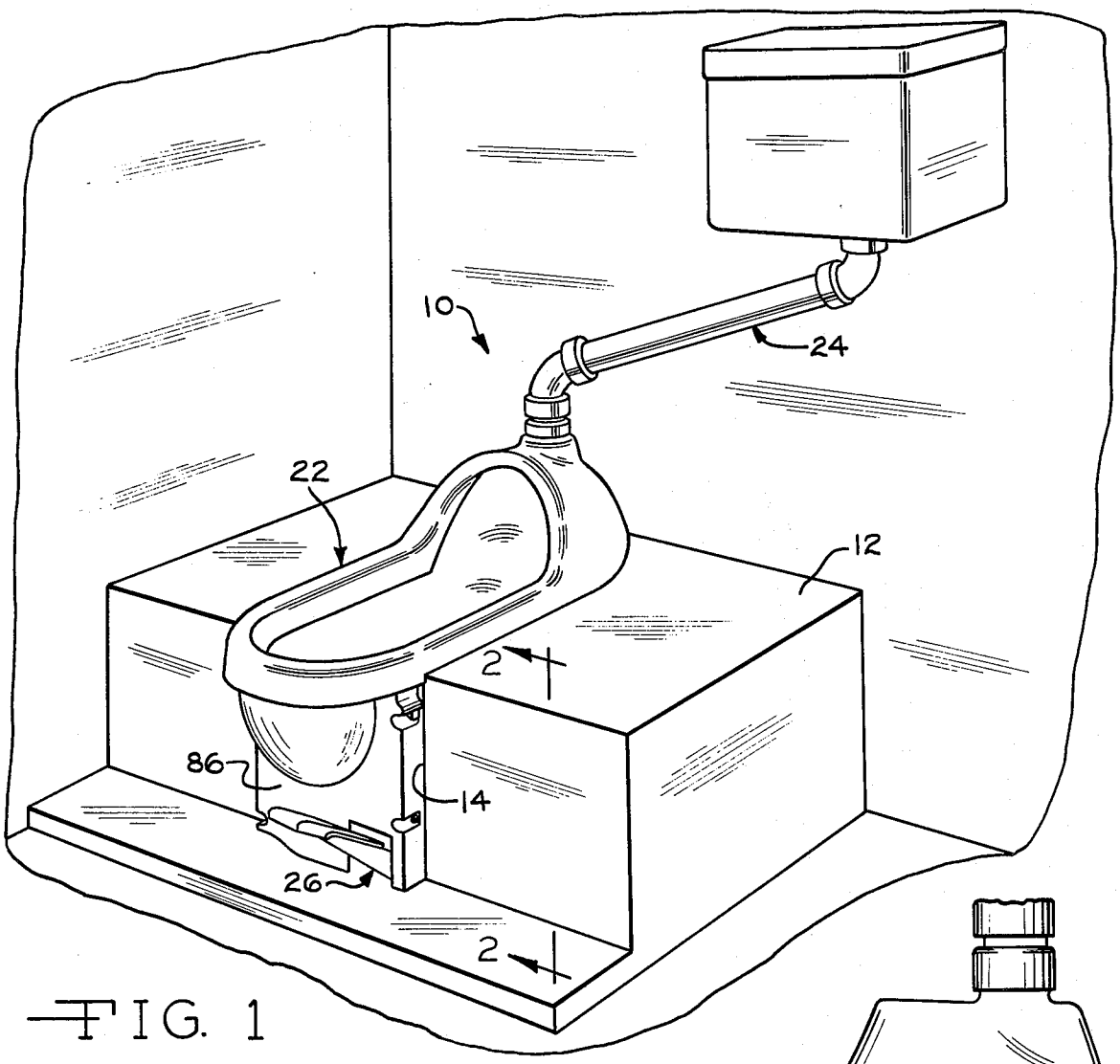
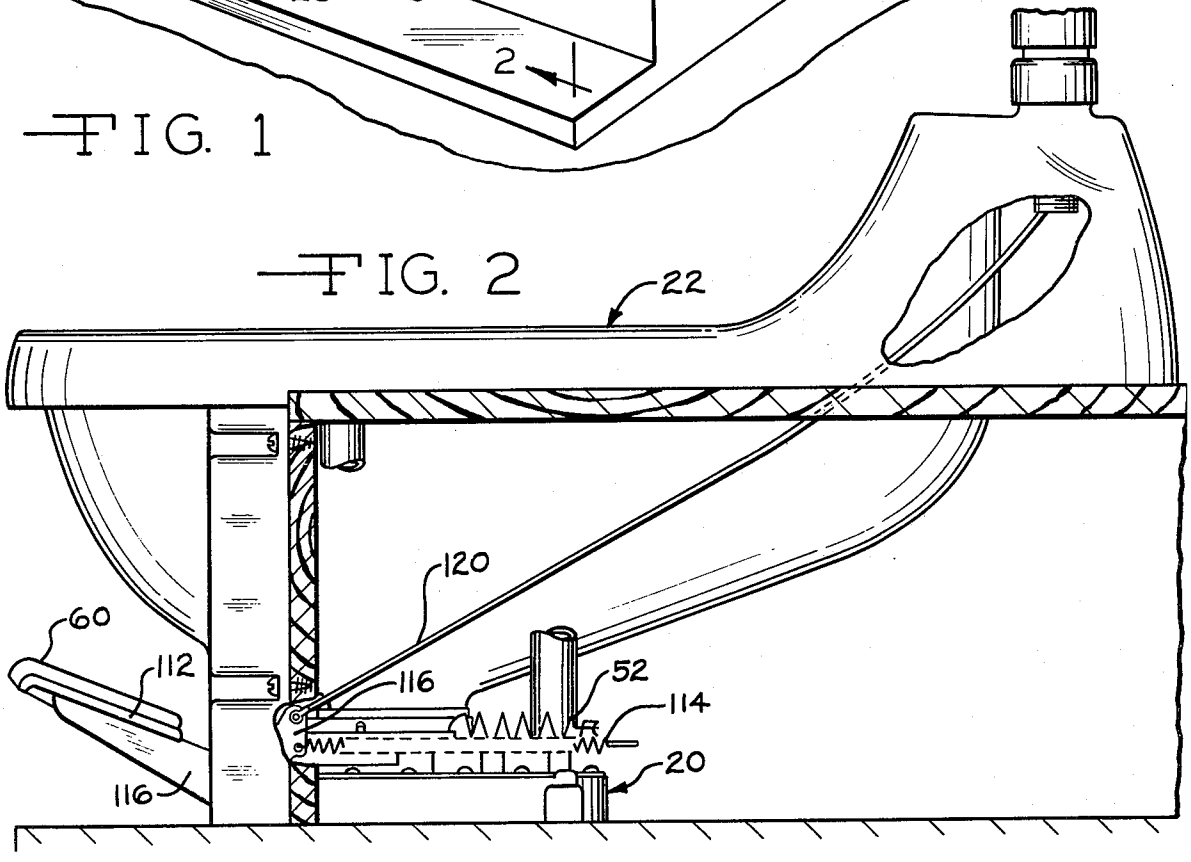


FIG. 1

FIG. 2



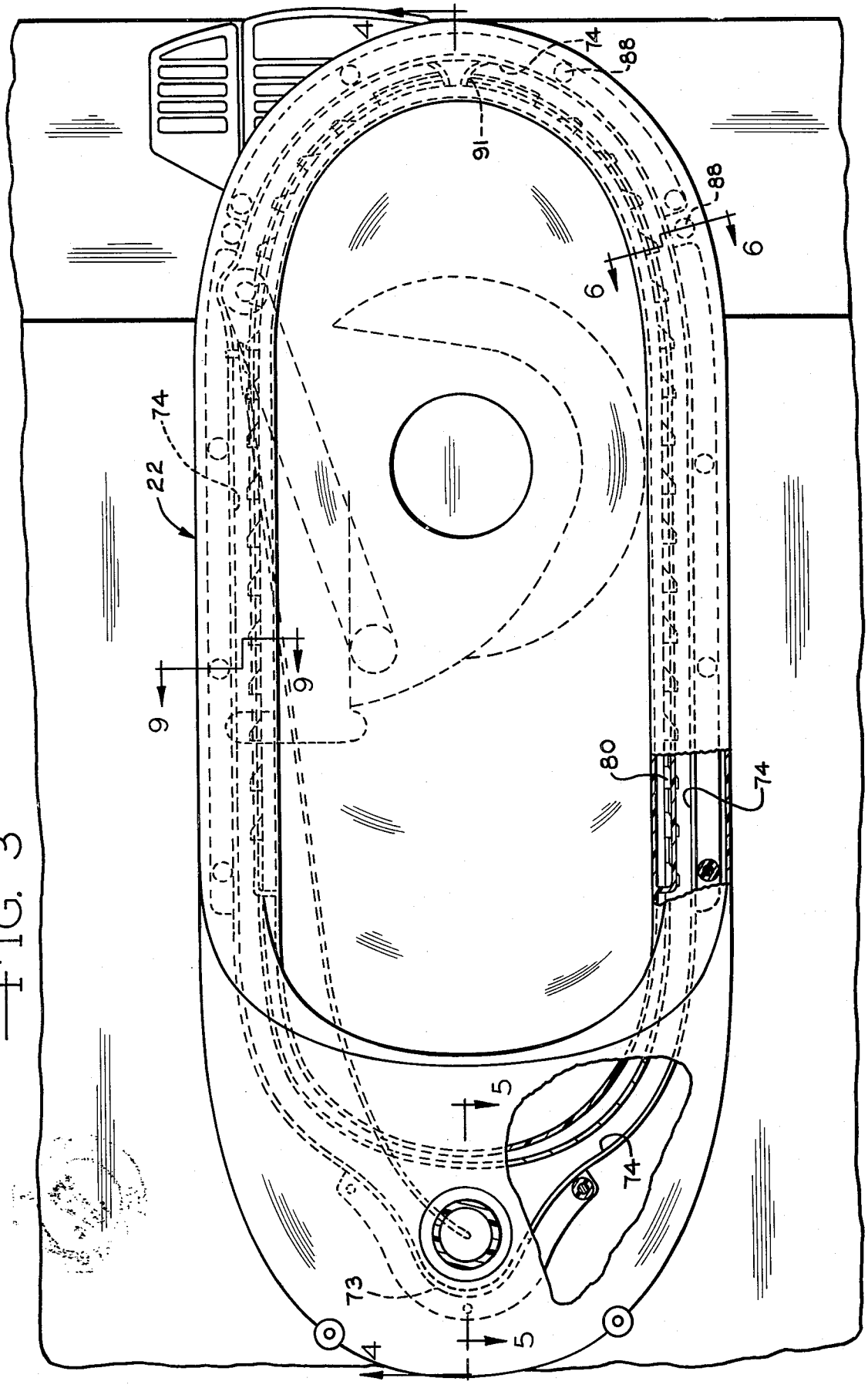
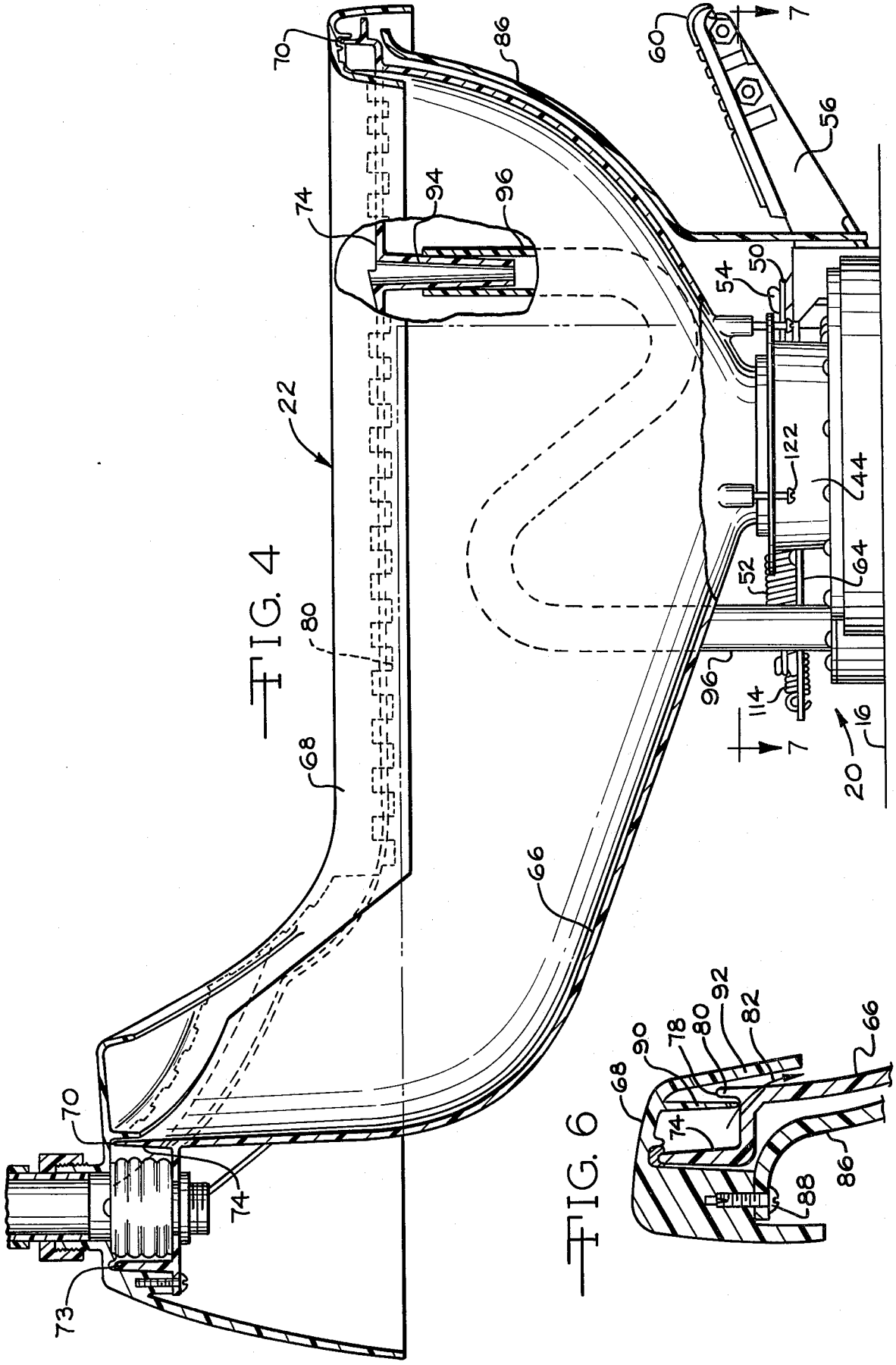


FIG. 3


70
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60
7
56
74
94
96
54
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22
122
44
52
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96
114
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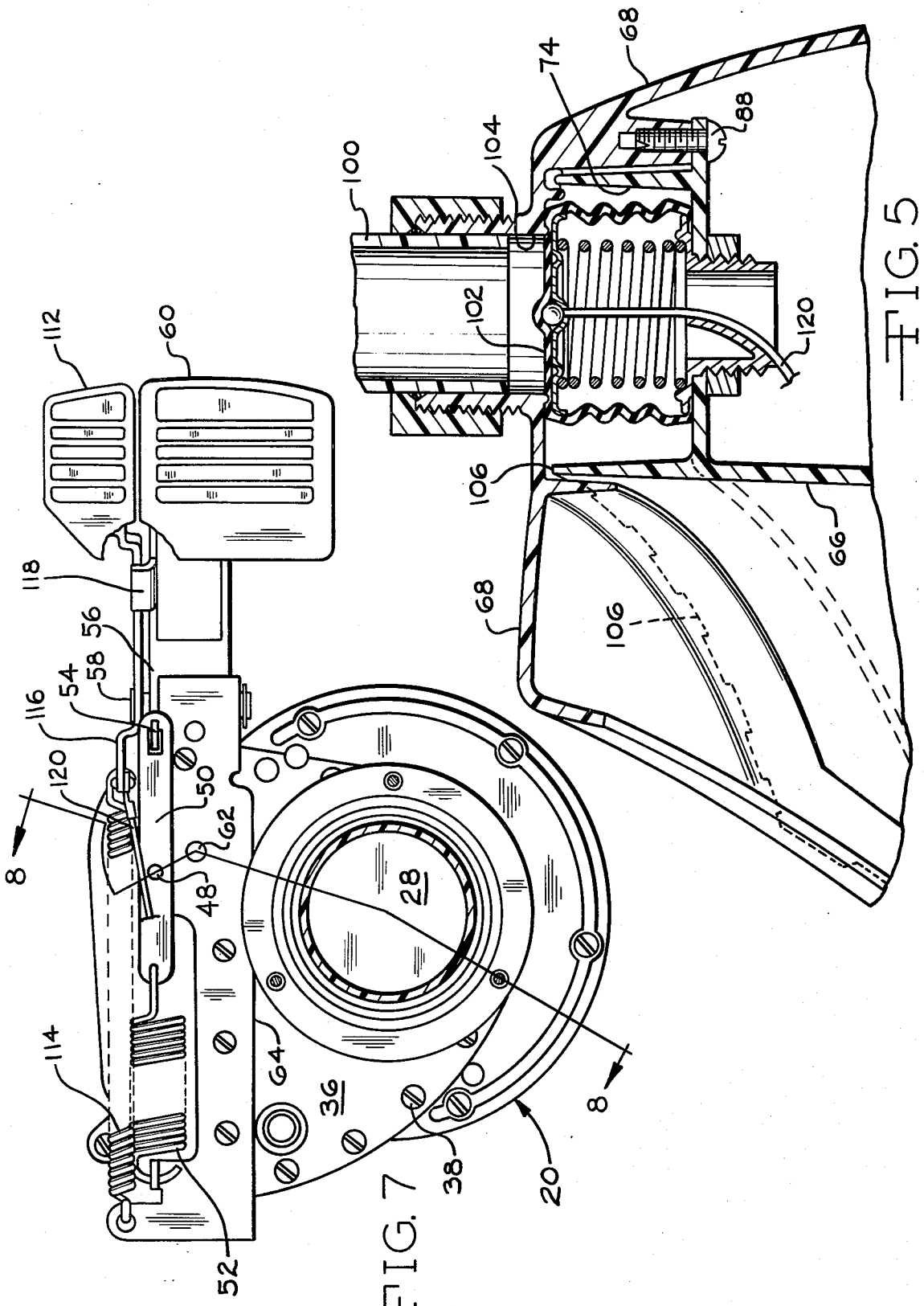
74
73

FIG. 4

68
90
78
80
92
82
66
74
86
88

FIG. 6


68
74
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104
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118
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116
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114
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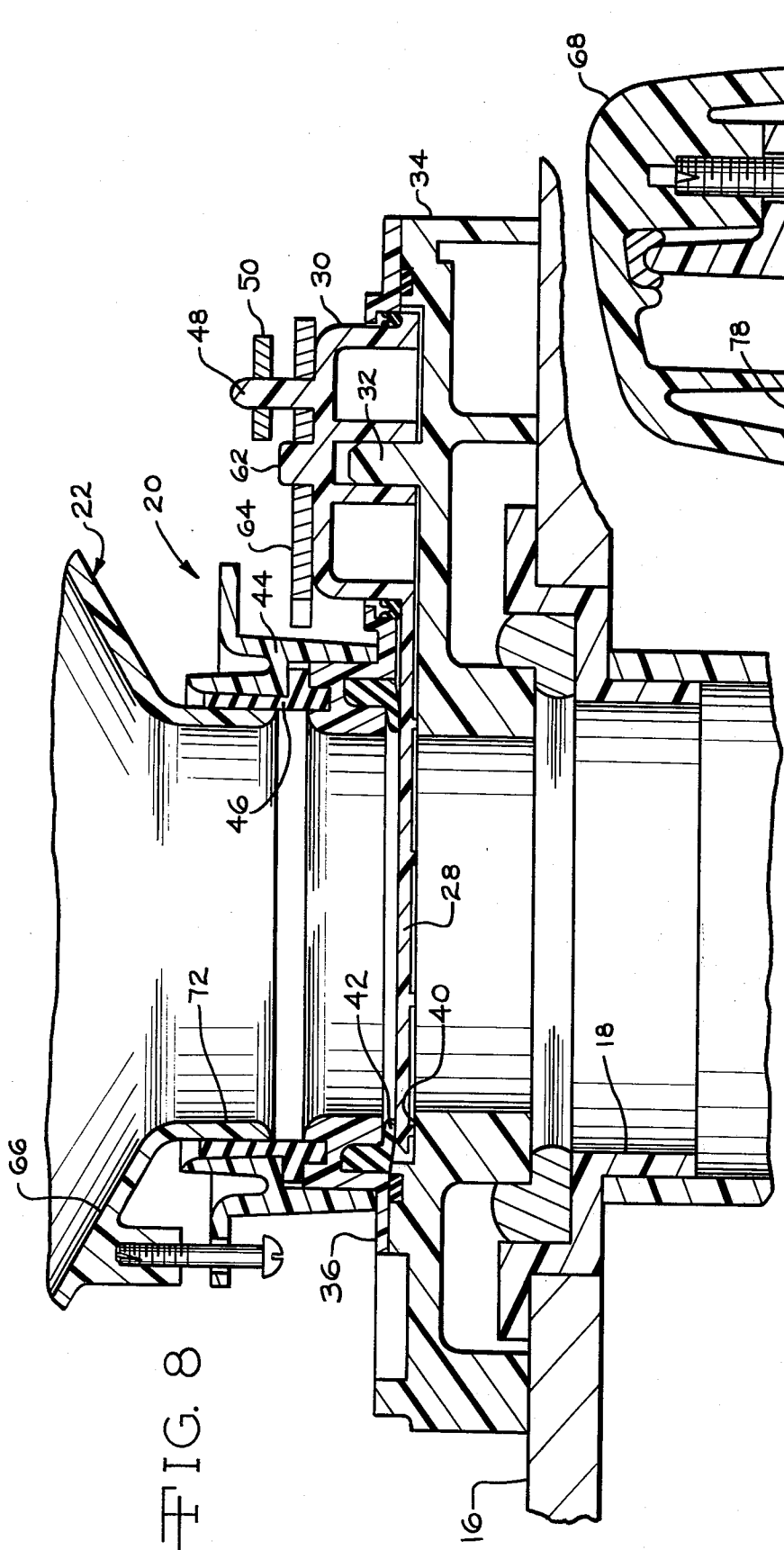
8

FIG. 5

FIG. 7


16
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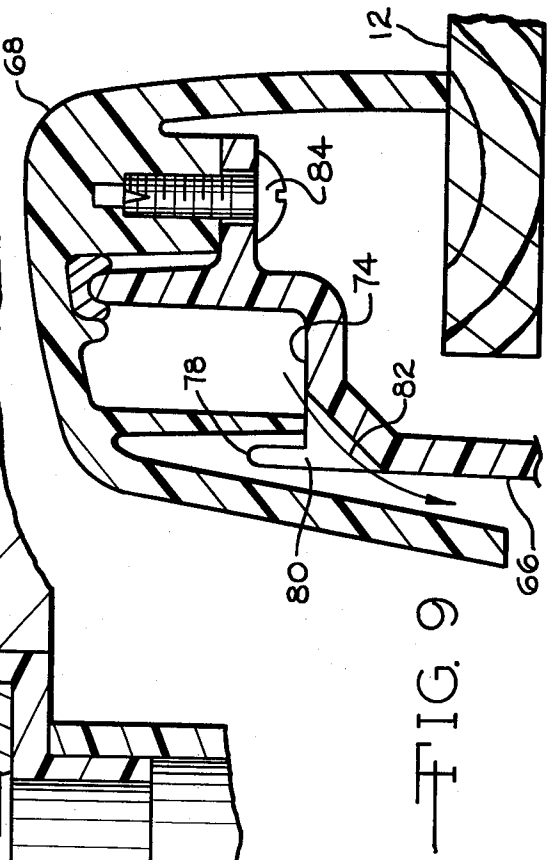
72

FIG. 8


12
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68
74
78
80
82
84

FIG. 9

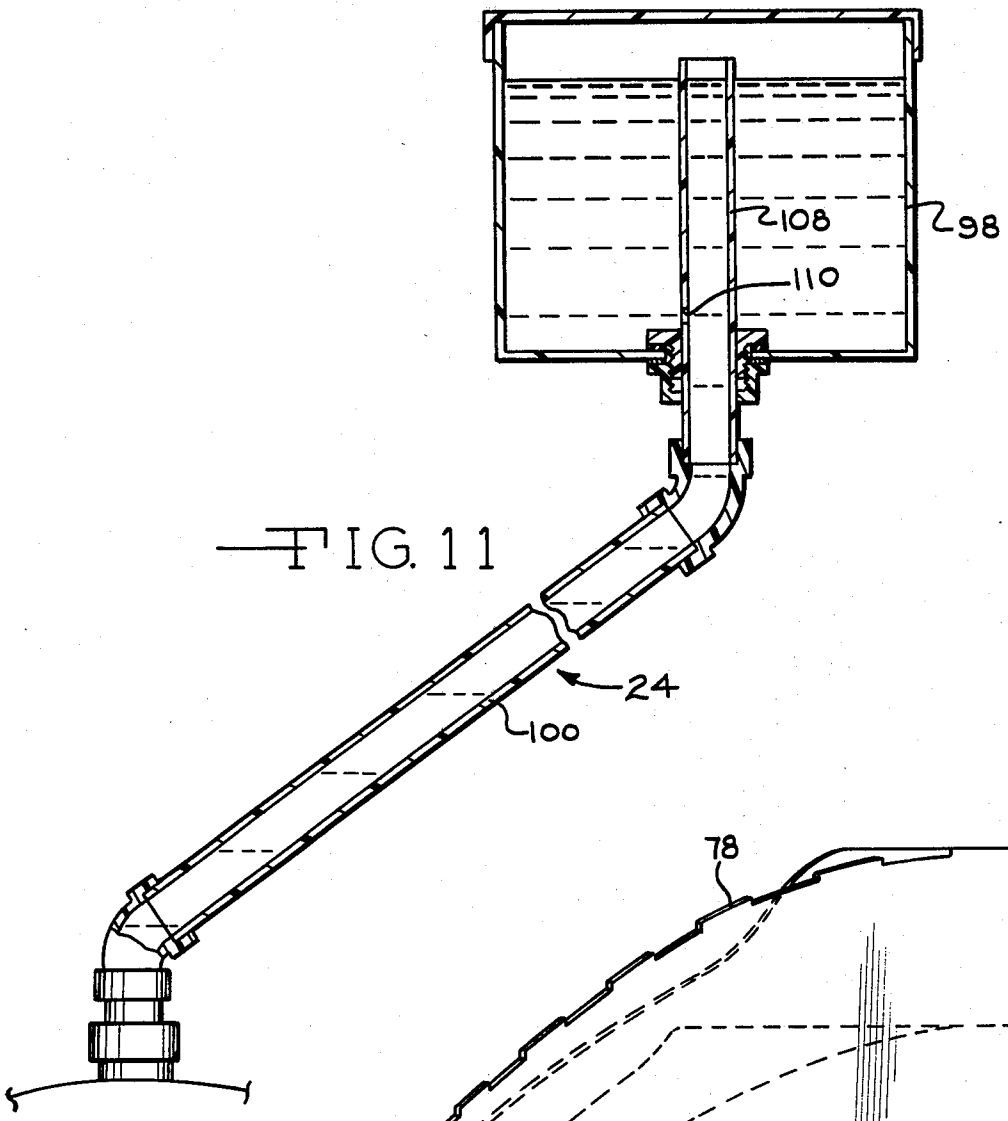

FIG. 11

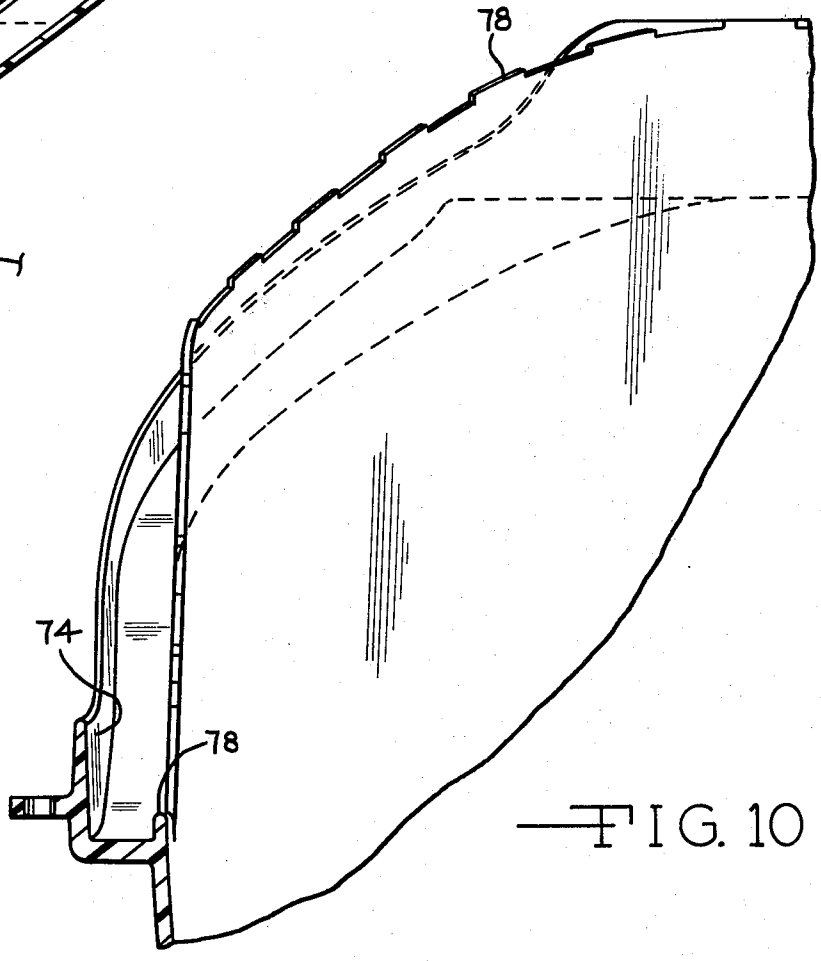

FIG. 10

TOILET

BACKGROUND OF THE INVENTION

The present invention relates to improvements in toilet apparatus of the type used in Japan and other oriental countries where the user seeks to avoid making physical contact with the toilet bowl assembly.

It is conventional practice in oriental countries to provide a toilet facility wherein a pan or tray is positioned in a step-like structure and the user squats on the step over the pan or tray out of physical contact therewith. There is a need for an improved facility of this character which provides a simple but effective flush arrangement, which conserves water usage by measuring a predetermined volume of water for each flush, which utilizes the flush water so as to clean the bowl in an optimum manner, and which enables installation to be made conveniently even though irregularities in dimensions may exist in the step-like structure in which the toilet facility is to be installed. These and similar needs exist for meeting the requirements of people in many countries of the world who desire toilet facilities that can be installed and used economically and in a trouble-free manner, and which conform to the customs of such people.

SUMMARY OF THE INVENTION

The present invention has overcome the inadequacies of the prior art and provides an improved toilet facility particularly adapted for people who are accustomed to oriental-style toilets.

According to one form of the present invention, an oriental-style toilet is provided which is adapted to be mounted in a recess in a step-like supporting structure with the top edge of the toilet bowl adjacent to the top surface of the step-like supporting structure and with the bottom outlet of the bowl adjacent to a discharge outlet in the bottom wall of the recess. The toilet comprises a valve assembly supported on the bottom wall of the recess over the discharge outlet and it includes a valve element movable between open and closed positions for opening and closing communication with the discharge outlet. The bowl assembly is supported on the step-like supporting structure and has a bowl with a bottom outlet connected with the valve assembly so that moving of the valve element to an open position will allow discharge of the contents of the bowl into the discharge outlet. The bowl assembly has a passageway adjacent to the upper periphery of the bowl for discharging flush water onto the inner surface of the bowl. A flush water supply assembly is provided which includes a water tank mounted at an elevated position above the passageway, a conduit in communication with the tank and the passageway for holding a predetermined volume of water, and valve means at the lower end of the conduit operable when moved to an open position to discharge the predetermined volume of water from the conduit into the passageway. Manually operable control means are provided to open the valve means and the valve assembly for the flushing operation.

In a preferred form of the invention, a restricted flow control means is positioned between the tank and the conduit for providing communication therebetween so that after the predetermined volume of water has been discharged from the conduit for flush purposes, the conduit can be recharged from the tank via the restricted flow control means. In this form of the invention, the restricted flow control means comprises a standpipe forming an extension of the conduit and located in the tank. The standpipe has a restricted aperature adjacent to the bottom wall of the tank through which water can flow from the tank into the conduit after a flushing operation has occured for recharging the conduit with water. The passageway adjacent to the upper periphery of the bowl is a channel which extends around the upper periphery of the bowl and has notches or slots in its inner wall to permit the flush water to flow from the channel onto the inner surface of the bowl for cleaning the same. The valve means at the lower end of the conduit preferably is a poppet valve which can be opened by the manually operable control means to allow the measured quantity of flush water in the conduit to be discharged by gravity into the channel and from there into the bowl for the flushing operation.

For purposes of making installations of this character, problems sometimes arise when mounting the bowl assembly on the step-like supporting structure and when fitting the valve assembly on the bottom wall of the recess in the step-like supporting structure. To facilitate making installations where irregularities in dimension may occur, a telescoping joint is provided between the valve assembly and the bottom of the bowl at the outlet thereof to permit vertical adjustment of the bowl assembly relative to the mounting of the valve assembly.

It is preferred that the manually operable control means be a foot pedal mounted on the valve assembly so that actuation of the foot pedal will move the valve element of the valve assembly between open and closed positions. The foot pedal is operably connected to the poppet valve at the lower end of the conduit by means of a cable so that when opening the valve assembly, the poppet valve will simultaneously be opened. To permit the user to introduce an additional charge of water into the toilet bowl after the flushing operation so as to provide a wet spot therein, an auxiliary pedal is associated with the foot pedal to enable the user to introduce an additional charge of water into the bowl while the valve assembly at the bottom is maintained in a closed position.

Thus, it is object of the present invention to provide an improved oriental-style toilet.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an oriental-style toilet embodying the present invention mounted in a step-like supporting structure;

FIG. 2 is an enlarged fragmentary section taken on the line 2-2 of FIG. 1;

FIG. 3 is a top plan view of the toilet with portions broken away to facilitate illustration of the invention;

FIG. 4 is a vertical section taken on the lines 4—4 of FIG. 3;

FIG. 5 is an enlarged fragmentary section taken on the lines 5—5 of FIG. 3, showing details of the poppet valve that normally closes communication between the flush water tank and the toilet bowl;

FIG. 6 is an enlarged fragmentary section taken on the lines 6—6 of FIG. 3, showing details of the channel in the upper peripheral portion of the toilet bowl;

FIG. 7 is a section taken on the lines 7—7 of FIG. 4, showing details of the valve assembly and foot pedal mechanism at the bottom outlet of the toilet bowl;

FIG. 8 is an enlarged fragmentary section taken on the lines 8—8 of FIG. 7;

FIG. 9 is an enlarged fragmentary section taken on the lines 9—9 of FIG. 3, showing the arrangement for supporting the bowl assembly on the upper surface of the step-like supporting structure;

FIG. 10 is an enlarged fragmentary vertical section of the toilet bowl with portions removed to show the configuration of the toilet bowl at the inner end thereof; and

FIG. 11 is a fragmentary vertical section through the water tank and conduit for supplying water to the toilet bowl.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Refering now to the drawings, the invention will be described in greater detail. The oriental-style toilet 10 is mounted in a step-like supporting structure 12 that has a recess 14 therein, and the bottom wall 16 thereof has a drain or discharge outlet 18 which may be directed to a holding tank, sewage system, or the like.

The oriental-style toilet 10 has a valve assembly 20 mounted on the bottom wall 16 over the discharge outlet 18. Connected to the valve assembly 20 and supported on the step-like supporting structure 12 is the bowl assembly 22, and connected to the bowl assembly 22 for supplying water for flushing purposes is the flush water supply assembly 24. Manually operable control means 26 are provided for actuating the valve assembly 20 and for actuating the flush water supply assembly 24 to provide flush water when desired to the bowl assembly 22.

The valve assembly 20 will now be described with particular reference to FIGS. 4, 7, and 8. This valve assembly is similar to the valve assemblies shown in U.S. Pat. Nos. 3,369,260 and 3,570,018, issued to Sargent et al. on Feb. 20, 1968, and Mar. 16, 1971, respectively. The valve assembly 20 has a slide valve element 28 which is pivotally mounted by its hub 30 on the pivot pin 32 which is an integral part of the housing 34. An upper plate 36 is secured to the housing 34 by a plurality of screws 38 and confines the slide valve element 28 between the recessed portion 40 and the annular seal 42. Secured onto the plate 36 is the annular collar 44 which retains around its inner periphery the seal ring 46. A pin 48 forms an integral part of the hub 30 and fitted thereon is the linkage 50 which has one end connected to the coil spring 52 and its other end to the end 54 of bellcrank lever 56. The bellcrank lever 56 is mounted for pivotal movement around the pin 58 in response to depressing the pedal 60, and when so pivoted, the end 54 of the bellcrank lever 56 will pull the linkage 50 against the action of the spring 52, and by doing so will also pull the pin 48. This will have the effect of rotating the hub 30 about the pin 32 and will cause the slide valve element 28 to pivot to an open position. When the pedal 60 is released, the spring 52 will cause the linkage 50 to return to the closed position shown in FIG. 7 which will result in returning the valve element 28 to its closed position. As can be seen best in FIG. 8, the valve element will pivot about the axis of the pins 32 and 62 the latter of which is retained against lateral displacement by means of the fixed plate 64 through which the pin 62 projects.

The bowl assembly 32 will next be described with particular reference to FIGS. 3, 4, and 10. The bowl assembly 22 includes two main components, the bowl 66 and the top wall cover 68 which is fitted over the upper periphery 70 of the upper edge of bowl 66. The bowl 66 has a depending annular sleeve 72 which defines the bottom outlet of the bowl, and as can be seen best in FIG. 8, the sleeve 72 is telescoped into the annular seal ring 46 of the valve assembly 20 so that it can be moved axially with respect thereto while maintaining an effective seal between these parts. The bowl 66 is elongated and relatively narrow and is positioned with its long axis extending inwardly into the recess 14 in the step-like structure 12. The inward end 73 of the upper peripheral portion of the bowl 66 is elevated as can be seen best in FIG. 4 with the apex or the highest point of the elevated portion being located on the longitudinal axis of the bowl 66. The upper peripheral portion of the bowl in conjunction with the top wall cover 68 defines a passageway in the form of a channel 74 which extends around the bowl 66. The inner wall 78 of the channel 74 includes a plurality of slots or notches 80 which will allow the flush water in the channel 74 to flow downward into the interior of the bowl 66 as shown by the indicator arrows 82 in FIGS. 6 and 9. As shown in FIG. 9, the top wall cover 68 is secured to the bowl 66 by a plurality of screws 84 and the top wall cover 68 is supported on the step-like supporting structure 12. A suitable decorative or protective front cover 86 may be positioned around the front surface of the bowl 66 and secured to the top cover 68 by plurality of screws 88, as shown in FIG. 6.

To provide even distribution of the water throughout the channel 74, a depending flange 90 is provided so that the water can be discharged into bowl 66 only through the slots 80. A further decorative flange 92 is also provided by the top cover 68 to conceal the slots 80. The size and distribution of the slots is such that a large portion of the water is carried to the outer end of the bowl, where it is directed into the bowl by the curved ends 91 of the outer wall of channel 74, thereby providing a vigorous scrubbing action in that portion of the bowl most subject to fouling by fecal matter.

Also formed as an integral part of the bowl 66 is the duct 94, FIG. 4, which is in communication with the channel 74 so that in case of bowl overfilling, excess water can be discharged into the duct 94 and the tube 96 which is connected thereto and which is in communication with the discharge side of valve assembly 20. The tube is constrained to form a trap and thereby provide a water seal, preventing escape of odors from the sewage receptacle below.

The flush water supply assembly 24 will now be described with particular reference to FIGS. 5 and 11.

The flush water supply assembly **24** includes the water tank **98**, the conduit **100**, and the valve means **102** which in the illustrated embodiment of the invention is a poppet valve. As seen best in FIG. **5**, the poppet valve **102** is mounted in the bottom wall of the channel **74** and is spring urged to close the inlet **104** in the top wall **68** to the passageway or channel **74**. Thus, depressing or lowering the poppet valve **102** will result in water from the conduit **100** rushing by gravity into the channel **74** where it can flow through the slots **80** to the interior of bowl **66**. The water can also flow through the notches **106** formed in the elevated portion of the channel **74** so as to flow down the rearmost surface of the inner wall of the bowl **66**. The conduit **100** includes as an extension thereof the standpipe **108** which has an aperature **110** therein providing restricted communication between the interior of the tank **98** and the conduit **100**. Thus, when valve **102** is opened, the column of water in the conduit **100** which is a measured quantity will rush into the channel **74** of the bowl **66** for flush purposes, and after the valve **102** is closed, the restricted orifice **110** will allow water to be refilled in the conduit **100** to provide another measured volume of water for a subsequent flush.

Manually operable control means **26** are provided for controlling the operation of the valve assembly **20** and the valve means **102**. These control means include the foot pedal **60** and its associated linkages and spring **52** for controlling operation of the slide valve element **28** and also the auxilliary pedal **112** which is pivotally supported on the pin **58** and is spring urged to the position shown in FIGS. **1** and **7** by the spring **114**. As can be seen in FIG. **7**, the spring **114** is fastened at one end to the plate **64** and is fastened at the other end to the free end of one arm of the bellcrank lever **116** to which the pedal **112** is connected. The bellcrank lever **56** includes the stop number **118** so that when depressing the pedal **60**, the stop will engage one arm of the bellcrank lever **116** to turn or pivot the bellcrank lever **116** about the pin **58** together with the bellcrank lever **56**. However, the pedal **112** can be depressed independently of the pedal **60** if this is desired. It will be observed that the bellcrank lever **116** also has connected to its one end the cable **120** which is connected at its other end to the valve means or poppet valve **102** so that when the pedal **112** is depressed, the bellcrank lever **116** will pivot thereby tensioning the cable **120** causing it to lower the poppet valve **102**. This action will allow the flush water to descent from the conduit **100** in the manner previously described. Thus, if it is desired to introduce water into the bowl before or after a flushing operation so as to provide a wet spot in the bowl or to soak off fouling in the bowl, this can be accomplished by depressing only the pedal **112**.

When installing the toilet **10** in the recess **14** of the setp-like supporting structure **12**, the valve assembly **20** will initially be disconnected from the bowl assembly **22** by removal of the screws **122** which are provided primarily for use during shipment. The valve assembly **20** can then be secured in place on the bottom wall **16** over the discharge outlet **18** employing conventional securing and sealing procedures. Thereafter, the sleeve **72** of the bowl assembly **22** can be pressed into the sealing ring **46** sufficiently far to provide a firm engagement of the bowl assembly against the step-like supporting structure **12**, as is shown in FIG. **9**. Thus, if the step-like supporting structure **12** is not constructed to proper height specifications, the toilet **10** can accommodate irregularities in dimensions and still provide a proper installation.

It is claimed:

1. An oriental-style toilet in combination with a step-like supporting structure, said toilet being mounted in a recess in said step-like supporting structure with the top edge of the toilet bowl adjacent to the top surface of the step-like supporting structure and the bottom outlet of the bowl adjacent to a discharge outlet in the bottom wall of said recess, said toilet comprising a valve assembly supported on the bottom wall of said recess over said discharge outlet and including a valve element movable between closed and open positions for closing and opening communication with said discharge outlet, a bowl assembly supported on said step-like supporting structure having a bowl with a bottom outlet connected with said valve assembly so that moving of said valve element to an open position will allow discharge of the contents of said bowl into said discharge outlet, said bowl assembly having a passageway adjacent to the upper periphery of said bowl for discharging flush water onto the inner surface of said bowl, and a flush water supply assembly including a water tank mounted at an elevation above said passageway, a conduit in communication with said tank and said passageway for holding a predetermined volume of water, and valve means at the lower end of said conduit operable when moved to an open position to discharge the predetermined volume of water from said conduit into said passageway, and manually operable control means operable to open said valve means and said valve assembly.

2. The combination that is defined in claim **1**, wherein a restricted flow control means is positioned between said tank and said conduit for providing communication therebetween so that after the predetermined volume of water has been discharged from said conduit for flush purposes the conduit can be recharged from the tank via said restricted flow control means.

3. The combination that is defined in claim **2**, wherein said restricted flow control means comprises an apertured standpipe in said tank.

4. The combination that is defined in claim **1**, wherein said bowl assembly comprises an elongated relatively narrow bowl, said bowl being positioned with its long axis extending inwardly into the recess in the step-like supporting structure, the inward end of the upper peripheral portion of said bowl being elevated with the apex of the elevated portion located on the long axis of the bowl, and said passageway comprises a channel formed around the upper peripheral portion of said bowl, said conduit having its lower end adjacent to the apex of the elevated peripheral portion for discharge into the elevated end of said channel, said channel having slots in its inner wall through which water can flow from said channel to the interior of said bowl.

5. The combination that is defined in claim **4**, wherein the valve means at the lower end of said conduit is a poppet valve, and said manually operable control means includes a pivotally mounted lever and a cable extending between said lever and said poppet valve and adapted to open said poppet valve when said lever is pivoted.

6. The combination that is defined in claim **1**, wherein the bottom of said bowl and said valve assem-

bly are connected by a telescoping joint so that the vertical dimension between the connection of the bowl with the valve assembly and the bowl assembly with said step-like supporting structure can be varied to accomodate irregularities in construction of the step-like supporting structure.

7. The combination that is defined in claim **6**, wherein said telescoping joint comprises an upstanding annular flange on said valve assembly, a sealing ring supported within said annular flange, and a depending annular sleeve defining the bottom outlet of said bowl, said sleeve being fitted into said sealing ring.

8. The combination that is defined in claim **1**, wherein said manually operable control means comprises a foot pedal pivotally mounted on said valve assembly, first means connected to said valve element and responsive to movement of said pedal for moving said valve element, and second means connected to said valve means and responsive to movement of said pedal for moving said valve means.

9. The combination that is defined in claim **8**, wherein said second means comprises a flexible cable connected at one end to said valve means and at the other end to said pedal and operable when tensioned in response to pivotal movement of said pedal to open said valve means.

10. The combination that is defined in claim **8**, wherein said second means includes an auxiliary pedal adapted to be depressed independently of the first-named pedal for opening said valve means for introducing water into said bowl when said valve element is in a closed position.

11. The combination that is defined in claim **8**, wherein said valve element is arranged to slide in a horizontal plane between its open and closed positions in response to movement of said pedal.

* * * * *