ABSTRACT: A trapless water flush toilet bowl plumbing fixture including a trapless bowl mounted on a waste water discharge unit and a water seal ring diaphragm positioned between the bowl and waste water discharge unit, the said discharge unit having a ball valve mounted therein for a water seal frictional engagement with said diaphragm when the said ball valve is closed.
TRAPLESS TOILET BOWL FIXTURE AND RING DIAPHRAGM THEREFOR

BACKGROUND

1. Field of Invention
This invention relates to the art of sanitary plumbing systems and more particularly to the field of compact water flush toilet fixtures for use in mobile homes, cottages and other areas where space saving is a requirement.

2. Description of the Prior Art
The prior art with which we are familiar, in the sanitary plumbing field, that relates to devices for providing a water seal for the water discharge valve of a flush water toilet of the trapless type, are the rubber or plastic gaskets that have required an adjusting ring to obtain a proper seal and alignment of parts.

SUMMARY

In contrast with the prior plumbing art in the field of trapless toilet bowl fixtures, the present invention avoids the disadvantages found in such art in the following respects: the invention, together with the waste water valve of the waste water discharge unit provide a water seal for said fixture by means of a slidable frictional engagement between the outer surface of said ball valve and the surface of the ring of low-frictional material molded into the ring diaphragm, the said low-frictional material being sufficiently elastic to adjustably maintain a seal when the ball valve is in its closed position.

Another advantage is that it eliminates the use of an adjusting ring to obtain a satisfactory seal. Still another advantage is that it reduces the possibility of water leakage from the retained supply of water in the bowl. It also reduces the time of assembly of parts and labor cost of installation.

Other advantages more or less ancillary to the foregoing will appear in the following description and the accompanying drawing of the invention.

THE DRAWING

Referring to the drawing:

FIG. 1 is an elevational view of a trapless toilet fixture illustrating one embodiment of the invention, parts being broken away to show the diaphragm in place;

FIG. 2 is a perspective view of the diaphragm of FIG. 1; and

FIG. 3 is a sectional view of the diaphragm taken on a line 3-3 of FIG. 2 and showing the facing material of the diaphragm bonded in place.

THE PREFERRED EMBODIMENTS

The trapless toilet bowl plumbing fixture is shown with the water seal ring diaphragm in place as an essential part of the new waste water discharge unit of said plumbing fixture as shown in FIG. 1 of the drawing. The water seal ring diaphragm is shown in detail in FIGS. 2 and 3 of the drawing.

It will be seen that the invention comprises a ring diaphragm A in combination with a water discharge unit B of a trapless toilet bowl plumbing fixture and a toilet bowl C.

The said water seal ring diaphragm A comprises a ring 10 and a ring facing band 11. It has a substantially uniform thickness 12 and with 13 and has an integral upturned ring flange 14 forming the ring opening 15. The said ring opening 15 has a diameter, preferably of 3 inches, and corresponding to the face of the waste water discharge opening 44 shown adjacent the base of said bowl C and an outside diameter 16 corresponding to the outside diameter of the bottom wall 43 of the bowl C.

The said ring portion 10 preferably is made of a solvent resistant rubber or other material having substantially the same properties as said rubber.

The said ring facing band 11 has a ring opening 17 substantially equal to said ring opening 15 of said ring 10 and has an upturned ring flange 18 adjacent said opening 17. The said ring facing band 11 is embedded and bonded into the lower surface 19 of said ring 10 and the flange portion 18 thereof is embedded and bonded into the adjacent portion of said ring flange 14 of said ring 10 so that the exposed surfaces of the ring 10 and the ring facing band 11 fall within the same plane.

The said ring facing band 11 of diaphragm A is a band of solvent resistant material having a low coefficient of friction and inherent lubricity such as tetrifuoroethylene resin.

The said water discharge unit B includes a vertically positioned tubular portion 20, a ball valve 21, a rotor shaft 22 and a rotor stud 23 mounted in axial alignment on opposite sides of said ball valve 21 and a flush water assembly 24 mounted on the outer surface of said tubular portion 20.

The said tubular portion 20 of said water discharge unit B has a lower section 25 having an inside diameter, preferably of 5 inches, and a V-shaped upper section 26. The said lower section 25 has a floor flange 27 forming its bottom wall and two axially aligned horizontal openings 28 and 28A in the wall thereof to receive said rotor shaft 22 and rotor stud 23. Said rotor shaft 22 extends through said opening 28 and is connected to said flush water assembly 24.

The said V-shaped upper section 26 has its inner wall 29 forming a truncated cone with the diameter of its opening 30 slightly larger than said diaphragm opening 15, the outer wall 31 thereof having a diameter equal to the outside diameter 16 of said diaphragm 10.

The said ball valve 21 is preferably made of a solvent resistant plastic, having a spherical segment 32 having a sufficient area of its outer surface 33 to overlap the opening 17 of said ring facing band 11 and frictionally engage the surface thereof adjacent its flange to provide a water seal for said bowl C when such segment 32 is in an upright position. The said ball valve 211 has a pair of vertical parallel side panels 34 extending downwardly from said segment 32. The said rotor shaft 22 and rotor stud 23 are each mounted on a side panel 34 in axial alignment with the horizontal axis of a sphere, of which said segment 32 is a part, and in which its axis is perpendicular to said horizontal axis to provide for the partial rotation of said segment 32 to open and close said ball valve 21.

The said ball valve 21 has two axially aligned semicircular openings 35 in its wall between said panels 34 which have a diameter at least equal to the diameter of said opening 15 of the ring 10 to provide a passage clear of obstructions when the ball valve is rotated to its open position.

The said flush water assembly 24 includes a water supply connection 36, a cam actuated valve 37 connected to said water supply connection 36 and a handle 38 connected to said cam actuated valve 37 and connected to said rotor shaft 22. The said handle 38 may supply water to the bowl and discharge the flush water as desired.

The said toilet bowl C includes a trapless bowl portion 40 having a hollow top rim water channel 41 with a water supply from said cam actuated valve 37 connected thereto, apertures 41A in said water channel 41 adjacent the bowl wall 42 to provide a curtain of flowing water on said wall 42 when said valve 21 is open and a bottom wall 43 thereof having a diameter substantially equal to the diameter of said outer wall 30 of said upper section 26 of the tubular portion 20 and a discharge opening 44 therein substantially equal to the opening 15 of said ring diaphragm 10.

In assembling the trapless toilet the ring diaphragm A is mounted on the V-top 26 of said member B with the ring facing band 11 thereof adjacent said V-top surface and the flange 14 upstanding and with the spherical segment 32 of the ball valve 21 in frictional engagement with said segment 32 of said ball valve 21. The toilet bowl C is then mounted upon said ring diaphragm A so that the discharge opening 44 is in alignment with the opening 15 of said ring 10 of said Diaphragm A. The discharge unit B and the toilet bowl C are assembled, the parts are held in place and sealed with a plastic ring 45 generally U-shaped and an adjustment band 46 mounted on the outer surface of said ring 45.

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Having thus described this invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains to make and use the same, and having set forth the best mode contemplated of carrying out this invention, we state that the subject matter which we regard as being our invention is particularly pointed out and distinctly claimed in what is claimed, it being understood that equivalents or modifications of, or substitutions for, parts of the above specifically described embodiment of the invention may be made without departing from the scope of the invention as set forth in what is claimed.

We claim:

1. A trapless water flush toilet bowl fixture and a water seal ring diaphragm therefor of the class described comprising:
   a. a trapless toilet bowl having a top rim with a water channel therein, water discharge apertures in said rim adjacent the inner surface of the bowl wall and a waste water outlet opening centrally of the bottom wall of said bowl,
   b. a bowl supporting waste water discharge member having a generally tubular body with a floor flange adjacent its lower end and a V-shaped upper section, the inner wall of said upper section forming a truncated cone having a diameter of its opening substantially the equal to the diameter of said bowl outlet opening,
   c. bowl valve means rotatively mounted in the wall of said tubular body adjacent said upper section thereof and having a horizontal axis of rotation,
   d. handle means mounted on said waste water discharge member adjacent the exterior surface thereof and having a connection to said ball valve means for the rotation thereof and a connection to a water supply valve for regulating the supply of flush water for said bowl, and
   e. a ring diaphragm having a diameter substantially equal to the top of said bowl supporting member and a ring opening diameter substantially equal to the waste water outlet of said bowl, the said ring diaphragm having an integral upstanding flange adjacent said ring opening, a plastic facing ring means having a low coefficient of friction embedded in the surface of said flange adjacent the flange joint facing said ring opening, the said ring diaphragm being positioned between said bowl bottom wall and the top of said waste water discharge member with their respective openings in axial alignment and having said ring diaphragm in frictional engagement with said ball valve means to provide a water seal when said valve means is closed.

2. The toilet bowl fixture as defined in claim 1 in which said ball valve means has a hollow spherical upper segment overlapping the opening of said ring diaphragm, a pair of depending side panels integral with said segment and having an integral rotor shaft and an integral rotor stud on the respective outer walls of said panels, the said rotor shaft and rotor stud having their axis of rotation in alignment with the center of a sphere of which said upper spherical segment is a part.

3. The ball valve means as defined in claim 2 in which said ball valve means is a solvent resistant plastic and has cutaway portions between said panels and adjacent said upper segment to provide an unobstructed passageway in said tubular body when said ball valve is open.

4. The ring diaphragm as defined in claim 1 in which said ring diaphragm is a solvent resistant rubber and has an upstanding flange adjacent the ring opening.

5. The ring diaphragm as defined in claim 4 in which said ring diaphragm has a ring facing band having a low coefficient of friction embedded into its lower surface and flange for a water seal frictional engagement with the upper spherical segment of said ball valve when said valve is closed.

6. The ring diaphragm as defined in claim 5 in which said ring facing band is tetrafluoroethylene resin.