March 13, 1962 P. H. BURN 3,024,468

MARINE TOILET SYSTEM

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Fig. 1.

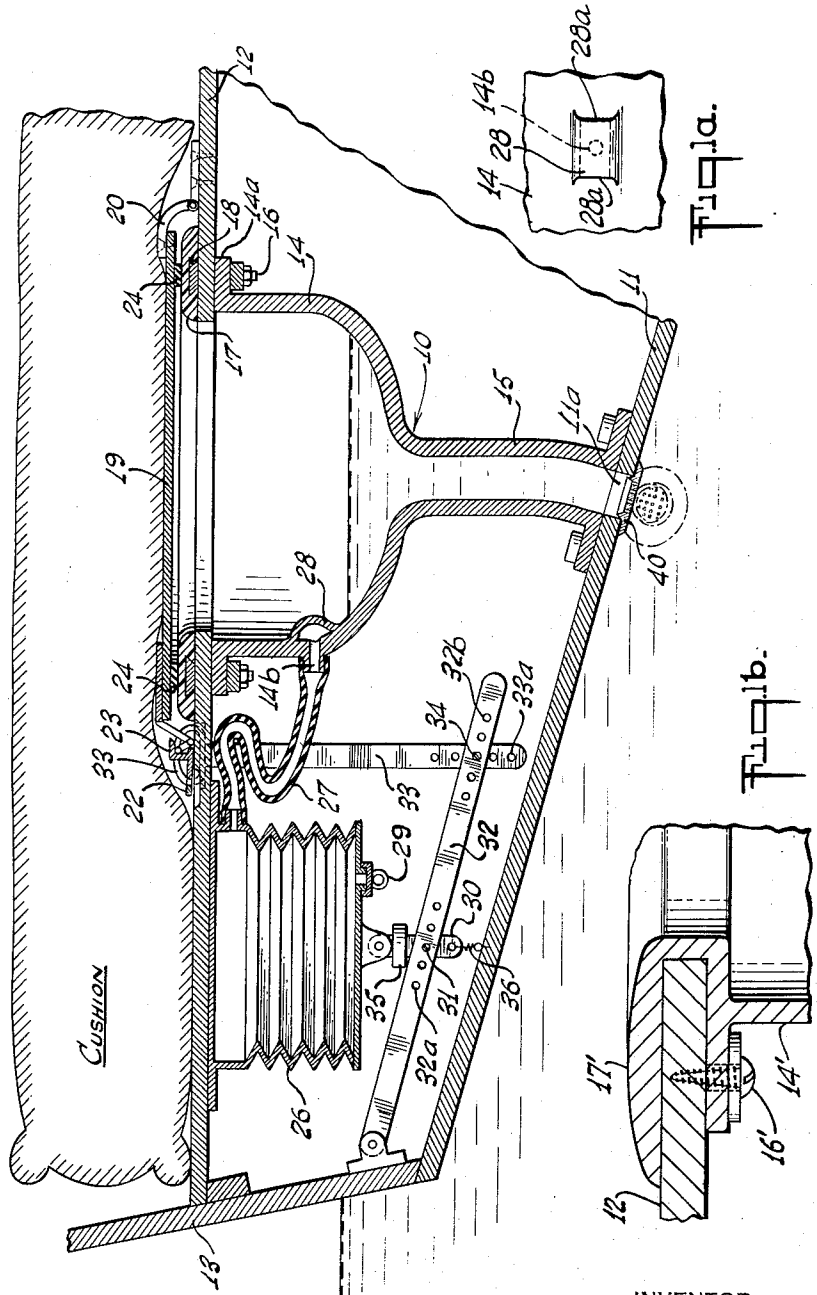


Fig. 1a.

Fig. 1b.

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FIG. 2.

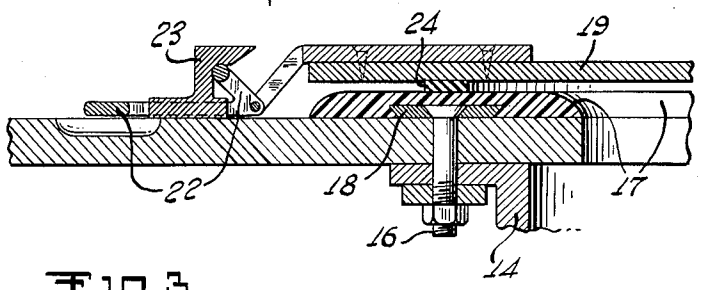


FIG. 3.

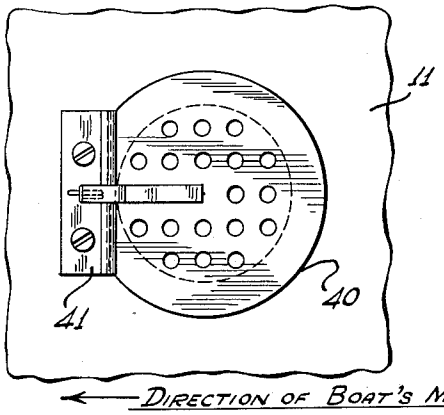
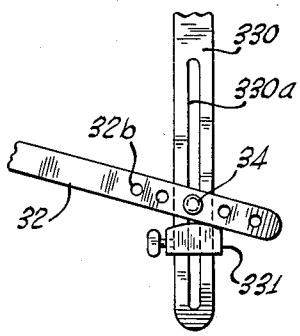


FIG. 4.



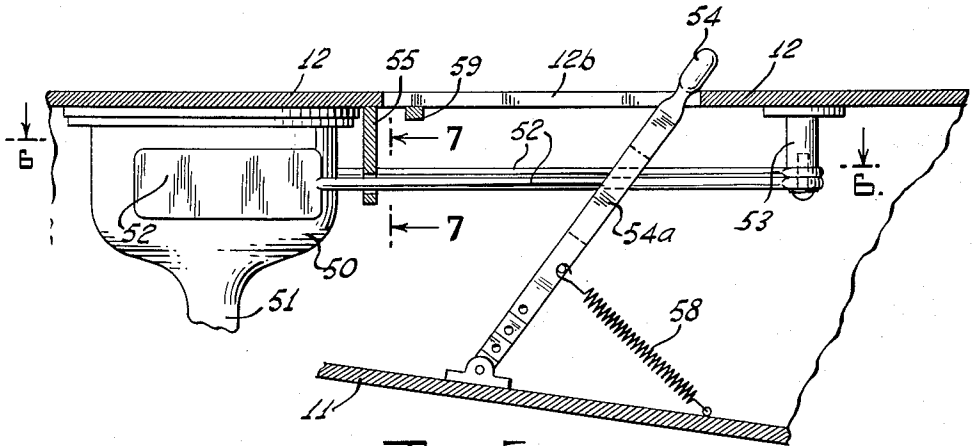


FIG. 5.

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FIG. 6.

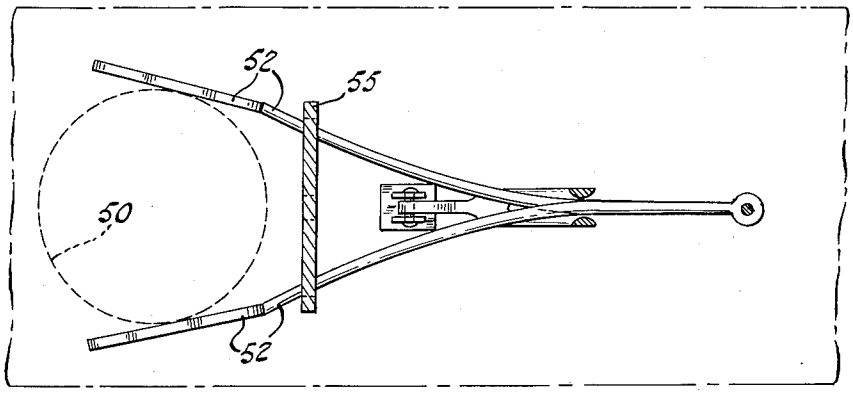


FIG. 7.

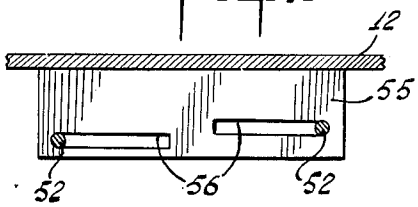


FIG. 9.

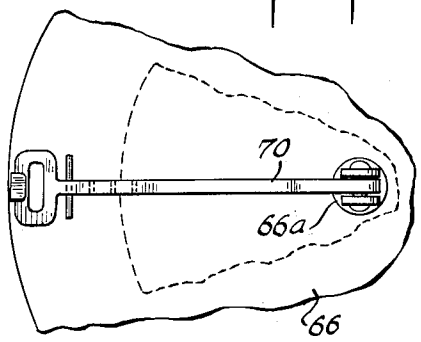
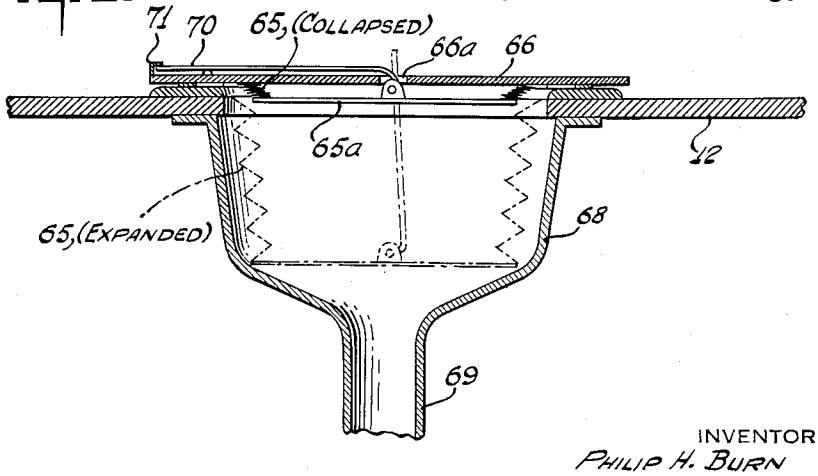


FIG. 8.



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3,024,468

MARINE TOILET SYSTEM

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Filed May 18, 1960, Ser. No. 29,857
15 Claims. (Cl. 4—77)

This invention relates to toilet systems and more particularly to marine toilet systems for shallow draft boats such as small cabin cruisers and the like.

An object of the invention is to provide a novel, pressure-flushed toilet system, particularly a pressure-flushed marine toilet system.

An object of the invention, more specifically, is to provide a pneumatically flushed toilet system, especially useful for shallow draft boats.

An object of the invention is to provide a novel marine toilet system, particularly for shallow draft boats, in which flushing is effected by producing a positive increase in air pressure above the surface of water in a toilet well.

An object of the invention is to provide a toilet system which employs a seat or bunk of a boat as a part of, and support for the toilet assembly, and to provide flexibility in the toilet well so it will conform and adjust to the angles and dimensions of the seat (or bunk) and hull.

An object of the invention is to provide improvements in a marine toilet system directed toward making the system simple, easy to install, inexpensive, light and compact, the improved system by reason of these qualities being especially suited for installation in small pleasure boats, inboard or outboard, or for installation in shallow draft boats in general.

A toilet system constructed according to the invention and installed in a boat requires only a single inflow and outflow duct between a toilet bowl and an opening in the bottom of the boat. The bowl and duct form upper and lower elements of a toilet well which will rise from the bottom of the boat to a height substantially above the water line of the boat. Water from around the boat will flow through the duct into the well to a level below the top of the bowl, leaving a substantial air space in the bowl above the surface of the water in the well. When it is desired to flush the well, a toilet cover will first be brought down into air-tight closure position on the well. With the well thus covered, flushing will then be effected by producing an increase in air pressure in the air space left in the well above the surface of the water therein, the increased air pressure being effective to discharge the contents of the well through the duct and the opening in the bottom of the boat. When flushing pressure is relieved, new water will come into the well through the boat opening and the duct.

An object of the invention is to provide a toilet system having reciprocable means for producing flushing air pressure in a toilet well or bowl.

An object of the invention is to provide a toilet system in which a bellows is operated to produce flushing air pressure.

It is also intended, especially but not only for very shallow draft boats, that the bellows have an appreciably greater volume than the normal contents of the toilet well, so that upon the return stroke of the bellows which follows the flushing stroke, new water will rise in the well above the draft level, thus providing improved cleaning effect.

In a first form of the invention, the bellows for producing flushing air pressure is mounted in a fixed location and connected by air hose or the like with the bowl portion of the toilet well.

In a second embodiment of the invention, the bowl portion of the toilet well is made of flexible material

and can be compressed and expanded in the manner of a bellows. The bowl portion itself in this embodiment therefore serves as a bellows to produce flushing air pressure against the water in the well. An attendant object may be stated to reside in provision of a collapsible toilet well and an air-tight cap therefor, flushing to be effected by collapsing the toilet well while air-tight capped.

In a third embodiment of the invention, the bellows is mounted to the underside of the toilet cover and brought into operative position inside the bowl when the cover is closed.

Another object is to provide an improved toilet seat and well structure, featuring in one form an integral or one-piece bowl and seat structure.

Other objects of the invention reside in any novel feature or combination of parts brought out in the following parts of the specification, including the claims, or shown in the drawings wherein:

FIG. 1 is a transverse section through a toilet system constituting the first embodiment of the invention, the system being shown as installed in a shallow draft boat;

FIG. 1*a* is a fragmentary view showing the front of a baffle element of the toilet well;

FIG. 1*b* is a fragmentary sectional view, on a larger scale than is FIG. 1, of a modification of the toilet seat and bowl structure, the modification involving an integral seat and bowl structure.

FIG. 2 is a detail section of a latch for the toilet cover shown in FIG. 1;

FIG. 3 is a detail bottom view of a sieved outlet valve or gate for the toilet well;

FIG. 4 is a detail showing of a modification of the handle connection to the operating lever for the bellows in FIG. 1;

FIG. 5 is a fragmentary sectional view through a second form of the invention;

FIG. 6 is a section along line **6**—**6** of FIG. 5;

FIG. 7 is a section along line **7**—**7** of FIG. 5;

FIG. 8 is a fragmentary sectional view through a third embodiment of the invention; and

FIG. 9 is a detail view of a handle used for operating the bellows shown in FIG. 8.

Referring to FIG. 1, an illustrative form of the novel toilet system is shown installed in a shallow draft boat. The system here comprises a well **10** vertically disposed between boat bottom **11** and a shelf **12** which can be a seat or bunk reaching from a side **13** of the boat all or part way across to the opposite side. The well **10** is slightly pliable so that it will conform to the slope of the boat bottom and to the dimension from the bottom **11** to the shelf **12**, both of which may vary with different installations. Sufficient pliability can be obtained by, for instance, making well **10**, or a length of the well, of pliable material such as flexible rubber or plastic. The upper portion of the well **10** is formed as a toilet bowl **14** and the lower portion of the well is a duct **15** leading from the bowl to an opening **11***a* in the boat bottom, the lower end of the duct being fastened in watertight connection to the boat bottom. The top of the bowl **14** is round or circular and formed with an outwardly bent rim **14***a* secured against the underside of the shelf **12** by bolts **16**. The shelf of course has a round or circular opening over the bowl, and the opening is bounded by a toilet seat **17** suitably fastened in place on the shelf. As shown in FIG. 1, the toilet seat is provided with a tapered annular channel which fits over a ring-shaped retainer **18** clamped in place by the bolts **16**, the toilet seat being of plastic material with sufficient pliability to alolw it to be sprung over the ring **18**. A cover **19** for the opening in the shelf **12** and for the bowl **14** is hinged by a hinge **20** to the shelf. The cover **19** also carries a pivoted latch member **22** which can be swung into and out of engage-

ment with a latch keeper 23 carried by the shelf 12. When the cover 19 is latched down in closed position, a rubber gasket 24 on the underside of the cover is in air-tight engagement with toilet seat 17.

FIG. 1*b* shows a fragment of a modified toilet seat and bowl structure of pliable material. In the modification, round seat 17' is integral with a round bowl 14'. The seat 17' is here formed as the top side of a round, upper rim flange of the bowl, the flange having an outward facing channel for pliantly receiving the margin of shelf 12 bounding the round toilet opening in the shelf. The well is flexible enough so that the channeled rim of the bowl can be flexed into fitted engagement with the margin of the toilet opening, preferably circular, in the shelf 12. The bowl can then be fastened in place by screws 16' extended through the lower side of the channeled bowl rim into the shelf 12.

The height of the well 10 exceeds the maximum water line for the boat by a substantial amount, so that with atmospheric pressure prevailing at the top of the well, the water from around the boat will normally flow through the opening 11*a* in the boat bottom and through the duct 15 into the well to the same level as the outside water line and the level of the water in the well will not be far above the neck of the toilet bowl. The far larger proportion of the bowl is above the water surface in the well and provides an air space which is sealed when the cover 19 is latched down in closed position. According to the invention, flushing of the well will then be made to occur by increasing the air pressure in the toilet bowl above the surface of the water in the well. The increased air pressure will be effective to scavenge the well through the duct 15 and the opening 11*a* in the bottom of the boat. When the air pressure is relieved, new water will flow into the well through the opening 11*a* and the duct 15.

In the embodiment shown in FIG. 1, the increase in air pressure to effect flushing is provided by an accordion type of bellows 26 located to one side of the bowl 14 and suspended from the underside of the shelf 12. A flexible air tube 27 has an effective down slope from a hole in the bellows to a hole 14*b* in the bowl 14, the latter hole still being appreciably higher than the water surface in the well. Any likelihood of water sloshing through tube 27 into the bellows is minimized by the effective slope of the tube and further minimized by the reverse curve in the tube and by a baffle 28 over the hole 14*b* in the bowl. Baffle 28, which appears in front view in FIG. 1*a*, is open at its opposite ends 28*a*. A small petcock 29 is provided in the bellows to drain off any accumulated moisture.

Connected to the bottom of the bellows is a link 30. A pin 31 projects from the link to be received in one of the holes 32*a* in a lever 32. The lever 32 is pivotally mounted to boat side 13 and since the distance between the boat side and the link 30 may vary in different installations, it is preferred to provide a plurality of holes 32*a* in the lever 32, thereby facilitating assembly. A handle 33 extends vertically from above the shelf 12 to the lever 32, a suitable slot being provided in the shelf through which the handle extends above the shelf to accessible position. The portion of the handle above the shelf is preferably shaped as a hand grip large enough to abut the shelf and be unable to pass through the slot therein. Below the shelf 12, the handle 33 has a plurality of holes 33*a*. By linking lever 32 with various ones of the holes 33*a*, the volume of the expanded bellows can be adjusted for best operation. Also the right hand end or free end of the lever 32 has a plurality of holes 32*b*. A pin 34 can be inserted through a hole 33*a* and a hole 32*b* to make a pivotal connection between the handle and the lever. The weight of the parts including link 30, lever 32 and handle 33 tends to maintain the bellows 26 in expanded condition. To insure normal expanded condition for the bellows, a weight such as 35 may be added to the link 30 or a coil spring 36 may be connected between the link and the bottom of the boat.

Assuming it is desired to flush the toilet well 10, the cover 19 is moved from open position to air-tight closure position in which it is latched down by elements 22—23. The handle 33 is then lifted to contract the bellows 26, forcing air from the bellows through the tube 27 into the air space, in the bowl 14, above the surface of the water in the well. Since the well is now sealed at the top by the cover 19, the effect of the air rushing from the bellows 26 into the bowl 14 is to raise the air pressure in the bowl high enough above atmospheric pressure to expel the contents of the well through the duct 15 and through the opening 11*a* in the boat bottom. The bellows 26 is of a size to contain a greater volume of air when expanded than the volume of water to be expelled from the well. When the flushing handle 33 is released, the bellows re-expands and new water flows into the well to higher than normal level. After thus flooding the well, the entire contents may be expelled by a second contraction of the bellows after which water will again rise in the well as the bellows expands. Thus the bowl is cleansed above the natural level of the water, which has particular importance in boats of comparatively shallow draft. The next time the seat cover 19 is raised, the water in the well will fall to its natural level.

In FIG. 4 is shown a modified arrangement for operating the lever 32 from the flushing handle. The flushing handle in the modification is designated 330 and is provided with a vertically elongated slot 330*a* in which the pin 34 engages. Below the lever 32, the flushing handle 330 carries an adjustable stop 331 for the lever. In this modification, the handle acts positively only in upward direction and can seat immediately while the bellows expands more slowly.

A water straining outlet valve 40 is preferably provided for the opening 11*a* in the boat hull. The valve is pivotally mounted by a hinge 41 to the underside of the boat hull and normally urged to closed position by the buoyancy of the material. If desired, a spring can be used to assist in closing the valve. Also, the location of the hinged connection of the valve is such that with the boat in forward motion, the force of the water stream will tend to close the valve. When the bellows 26 is contracted to produce flushing air pressure in the well 10, the pressure in the well is effective to swing the valve 40 to its open position shown in dotted lines in FIG. 1. The holes in valve 40 are preferably small so that, when in closed position, they will serve to dampen the movement of water into and out of the well due to wave or rocking movement while the cover 19 is raised.

FIGS. 5–7 show a second embodiment of the invention. In this embodiment, the bowl 50 is flexible enough to collapse and expand so as to lend itself to operation as a bellows for producing flushing air pressure. The bowl 50 and the duct 51 together form a well mounted, like the well in FIG. 1, between the boat bottom 11 and the shelf 12. Only enough is shown in connection with the second embodiment to distinguish it from the first. Thus, in FIGS. 5 to 7, the lower portion of dust 51 and its communication with a hole in the boat bottom do not have to be shown. Nor are the toilet seat and air-tight seat cover shown in FIGS. 5 to 7, although they are understood to be provided as in the first embodiment shown in FIG. 1.

Bowl 50 is pliable enough to be collapsed by a pair of paddle arms 52 when the arms are brought together and to revert to expanded state when the arms are separated. The arms 52 are pivotally mounted at the rear on a stud 53 depending from the shelf 12. Pivoted to the boat hull is a hand lever 54, the upper end of which projects above the shelf 12 through a slot 12*b* in the shelf. The intermediate portion 54*a* of the lever is bifurcated to straddle the rear portions of the paddle arms 52. These arms are so shaped that their rear portions

are in substantial alignment and their forward portions are divergent relatively to each other, the forward portions terminating as paddles straddling the bowl **50**. A bracket **55** depends from the shelf **12** and is formed with guide slots **56** for the forward portions of the arms **52**. As in the first embodiment, water in the well will stand low in the neck of the bowl **50**. To flush the well, the seat cover (not shown in FIGS. 5–7) is brought down to closure position. The hand lever **54** is then moved forwardly against the resistance of a spring **58**, forcing the paddle arms **52** together so as to collapse the bowl **50**. The contraction of the bowl develops flushing air pressure for expelling the contents of the well through the duct **51**. Ideally, the amount of water in the bowl should be substantially less than the amount the bowl can be collapsed. However, if the water should not be completely expelled upon a single contraction of the bowl, the hand lever **54** may be moved back and forth several times, and as a result, the water in the well will be refreshed satisfactorily. An adjustable stop **59** is provided for the forward stroke of the hand lever **54**.

It is understood that other means than that shown in FIGS. 5, 6 and 7 can be used, even direct manual pressure, for contracting or collapsing the bowl **50** so as to flush the well.

In FIGS. 8 and 9 is shown a third embodiment of the invention. In the third embodiment an accordion type bellows **65** has sealed attachment at its upper end to the underside of the seat cover **66**. The seat cover **66** corresponds to seat cover **19** in the FIG. 1 embodiment and can be latched down similarly in air-tight closure position on the toilet well. A bowl **68** and duct **69** constitute a well corresponding to well **10** of the FIG. 1 embodiment.

The seat cover **66** is centrally formed with an opening **66***a* for a rod-like handle **70** which is pivotally connected at the lower end to the rigid bottom disk **65***a* of bellows **65**. Opening **66***a* also serves as an air port through which air enters or escapes from the bellows. When handle **70** is lifted, it collapses the bellows. In the fully raised position of the handle, the bellows is fully collapsed substantially flat against the underside of the cover **66**. The handle can then be folded down onto the top of the cover and latched in its inactive position by a catch **71** on the cover. When it is desired to flush the well, the cover **66** is first closed. This brings the bellows **65** into the bowl **68**. The handle **70** is then released from its catch **71** and manipulated to expand the bellows. The volume of the expanded bellows is preferably in excess of the volume of liquid in the well at normal level. Expansion of the bellows produces increased air pressure in the air space, in the bowl, above the water surface in the well, the increased air pressure being effective to flush the well.

It is to be understood that instead of hand grasped means for operating the bellows in the various forms disclosed, foot pedal means may be provided. It is further understood that various changes can be made within the scope of mechanical skill without departing from the invention. It is intended therefore to be limited only as indicated by the following claims.

What is claimed is:

1. A toilet system for a boat, the system including a toilet bowl, means mounting the bowl inside the boat to reach from below the water line of the boat to a height appreciably above the water line, duct means connecting the bowl to an opening in the boat bottom and through which duct means water naturally flows into the bowl to a level determined by said water line and substantially below the top of the bowl, thereby defining an air space above water level in the bowl, a bowl cover settable from an open position to an air-tight closure position over the bowl and over the air space, and pneumatic flushing means for the bowl comprising a bellows communicating only with the air space and means for operating the bellows while the cover is in closure position for producing an increase in air pressure in the bowl above the water level therein to effective flushing pressure such as to expel the contents of the bowl through the duct means into the water around the boat, said last-mentioned means being further operative to reduce below normal the air pressure in the bowl after producing said increase.

2. The system as defined in claim 1, including means mounting the bellows outside the bowl and tubing connecting the interior of the bellows with the bowl above the water level therein and through which tubing the bellows, upon contraction, produces the mentioned flushing pressure in the bowl.

3. The system according to claim 2, the tubing having a downward gradient from the bellows to the bowl to prevent backing of water from the bowl into the bellows.

4. The system according to claim 1, the bowl having its sides made of flexible material and said bellows being comprised of the flexible bowl sides above the water level in the bowl, said means for operating the bellows including paddles straddling the bowl sides and mechanism for bringing the paddles toward each other to squeeze the bowl sides between them for producing the mentioned flushing air pressure for expelling the contents of the bowl.

5. The system according to claim 1, the bellows being mounted to the underside of the bowl cover and coming into operative position within the bowl upon the setting of the cover in the closure position.

6. A toilet mounted in a boat and comprising a well rising from the boat bottom to a height above the boat water line, the well having as its upper section a toilet bowl and having a duct leading from the bowl to an opening in the boat bottom to provide for inflow of water into the well to a level substantially below the top of the bowl, a bowl cover movable from open to closed position, and pneumatic flushing means for the well including reciprocable means operative on a forward stroke while the cover is in closed position for increasing above normal the air pressure in the well above the water level therein to a flushing air pressure such as to flush the well through the duct, the reciprocable means on its return stroke reducing below normal the air pressure in the well to permit the inflow of fresh water into the well through the duct and the opening in the boat bottom.

7. The invention according to claim 6, the reciprocable means comprising an air pump and manipulable means including an accessible element adjacent the well for operating the pump.

8. The invention according to claim 7, the air pump being a bellows, and a housing being provided for the bellows through which housing said element extends to externally manipulable position.

9. The invention according to claim 7, the air pump being a bellows carried by the underside of the bowl cover to occupy an operative position within the bowl while the cover is in closed position, said element being a handle accessible at the top side of the cover.

10. The invention according to claim 6, the bowl being of flexible and collapsible material and the reciprocable means including elements straddling the bowl and operable to squeeze the bowl between them for producing the flushing air pressure in the well.

11. A toilet system mounted in a boat and comprising a toilet well rising from the boat bottom to a seating height appreciably above the boat water line and communicating at the lower end with an opening in the boat bottom to provide for inflow of water into the well to a level substantially below the top of the well, a cap for the well settable from an open position to an air-tight well-capping position, at least the upper section of the well above the water level therein being of pliable material and collapsible by externally applied pressure for creating, while the well is air-tight capped, internal pressure

within the well for flushing its contents through the opening in the boat bottom.

12. A marine toilet including the combination with a shelf inside the boat to serve as a seat or bunk or the like, of a toilet well installed between the shelf and an immersion portion that is open through the boat hull, so that the water level in the toilet will be substantially that of the boat, with an air space in the well above water level, said shelf including a closure member sealed to said well over the air space, said well incorporating flexible material both above and below the water level so as to be compressible and so as to be flexibly and adjustably compliant upon installation to variation in angular relation and distance between the shelf and immersion portion of the boat hull.

13. A marine toilet including a well rising from the boat bottom to a height appreciably above the boat water line and communicating at the lower end with an opening in the boat bottom through which water can flow from around the boat into the well and through which the well contents can be discharged, and a strainer check valve provided at said opening and including a movable element for permitting the passage of solid matter from the well into the water outside the boat and preventing entrance of solid matter into the well and for damping surging of water into the well.

14. A toilet system mounted in a boat and comprising a toilet well rising from the boat bottom to a seating height appreciably above the boat water-line and communicating at the lower end with an opening in the boat bottom to provide for an inflow of water into the well to a level substantially below the top of the well, means including a cap for the well settable from an open position to an air-tight well-capping position thereby defining a well chamber having an upper portion which is closed above water level, the upper portion of said chamber including externally actuable means for decreasing the capacity of the well chamber for creating, while the well is air-tight capped, internal pressure within the well for flushing its contents through the opening in the boat bottom.

15. A toilet system mounted in a boat and comprising a toilet well rising from the boat bottom to a seating height appreciably above the boat water line and communicating at the lower end with an opening in the boat bottom to provide for inflow of water into the well to a level substantially below the top of the well and normally corresponding to the boat water line, thereby defining an air-volume above the water line, a cap for the well settable from an open position to an air-tight well-capping position, the system incorporating a bellows structure communicable only with said air-volume and operable while the well is air-tight capped for increasing air pressure in the well to effect flushing of the well contents through said opening in the boat bottom, said bellows structure having a volume appreciably larger than the normal water contents of the well so as to provide, upon returning to unoperated condition while the well is air-tight capped, for cleansing inflow of water into the well to a level above the normal water line level.

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