

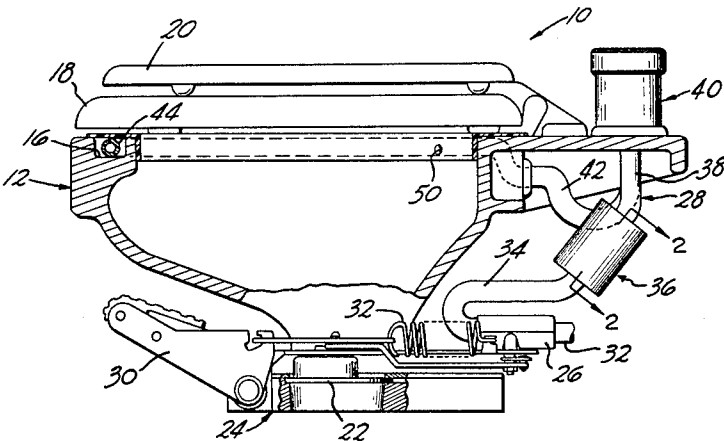
[72] Inventors **Ronald J. Sargent**
Ann Arbor;
Charles L. Sargent, Ypsilanti; Frank T.
Sargent, Clio; John A. Hoffman, Brighton,
Mich.
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[73] Assignee **Thetford Corporation**
Ann Arbor, Mich.

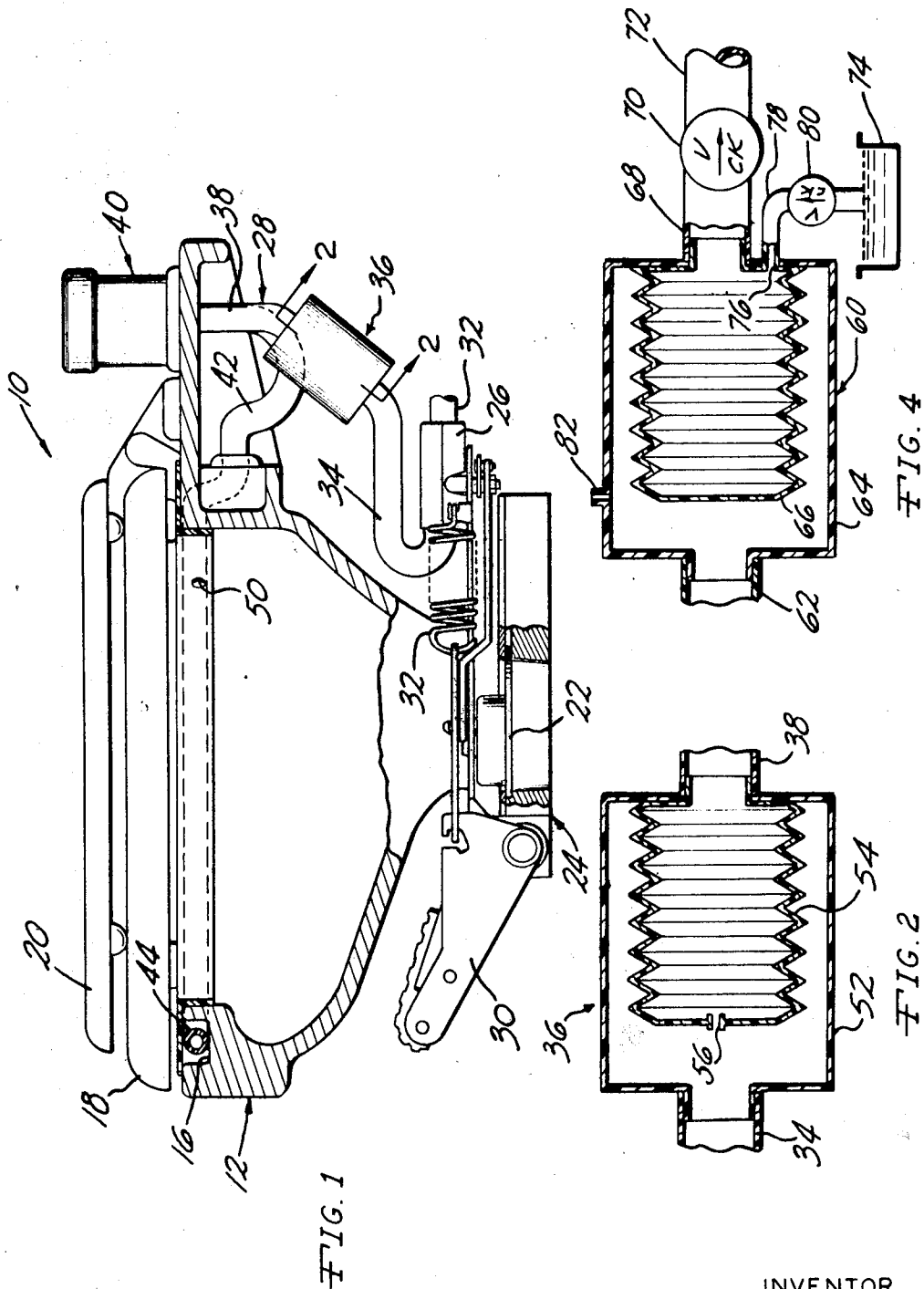
[54] **TOILET APPARATUS**
11 Claims, 4 Drawing Figs.

[52] U.S. Cl. **4/79**
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E03d 11/08
[50] Field of Search..... **4/79, 115;**
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73/269, 232; 251/(Inquired)

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Primary Examiner—Laverne D. Geiger			
Assistant Examiner—Henry K. Artis			
Attorney—Olsen and Stephenson			

ABSTRACT: A toilet having a flushing apparatus whereby a - fixed volume of water is discharged from a single nozzle into the bowl of the toilet in a vortex pattern.





INVENTOR
 RONALD J. SARGENT
 CHARLES L. SARGENT
 FRANK T. SARGENT
 BY JOHN A. HOFFMAN

Olsen and Stephenson
 ATTORNEYS

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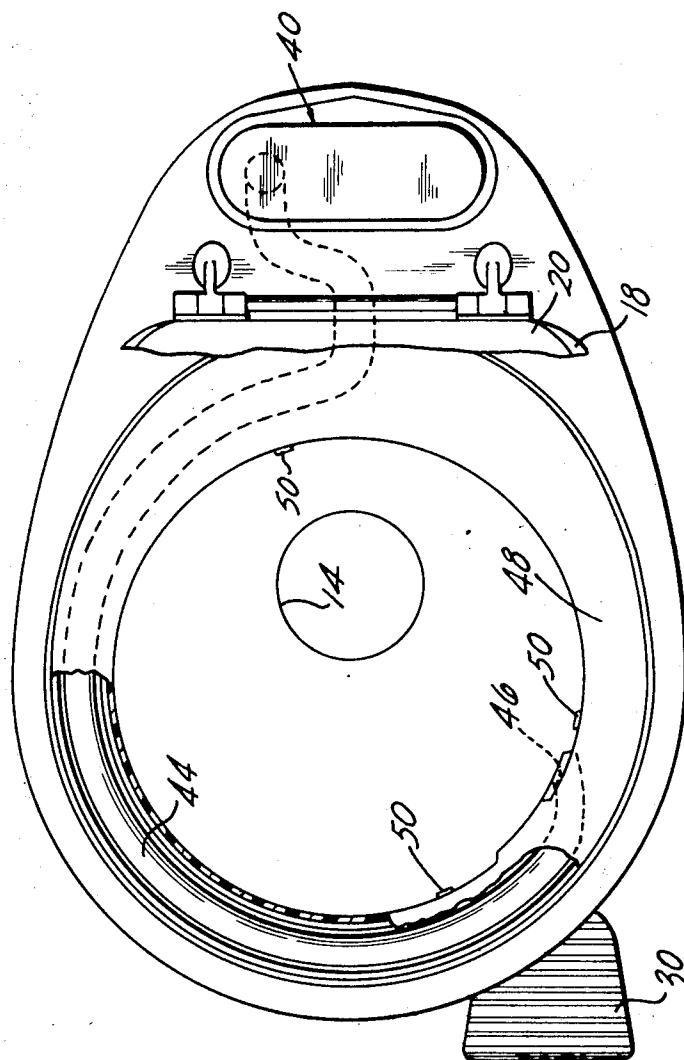


FIG. 3

INVENTOR
RONALD J. SARGENT
CHARLES L. SARGENT
FRANK T. SARGENT
BY JOHN A. HOFFMAN

Olsen and Stephenson
ATTORNEYS

TOILET APPARATUS

CROSS REFERENCE TO RELATED APPLICATION

The present invention is related to apparatus of the type disclosed in copending application Ser. No. 724,071, filed Apr. 25, 1968 in the name of Ronald J. Sargent et al.

BACKGROUND OF THE INVENTION

The present invention relates to toilets, and particularly to the flushing apparatus for toilets used in environments wherein water conservation is practiced.

It is conventional practice to provide toilets which have for flushing purposes a measured volume of water in a tank, and wherein the flush water is discharged from the tank into the toilet bowl from a flush ring located around the upper periphery of the bowl. Toilets of this character are satisfactory where water conservation is no problem. However, flushing apparatus of this type is unsatisfactory where water conservation must be practiced, because (1) excess amounts of water are used, and (2) the water that is used is not used in the most efficient manner.

SUMMARY OF THE INVENTION

The present invention has overcome the problems existing in the prior art and has provided a flushing apparatus wherein a single slug of water of essentially a fixed volume is discharged from a nozzle into the bowl of the toilet in a vortex pattern. This arrangement assures that the quantity of water used per flush is accurately measured, and in addition, that the water is discharged into the bowl in a flow pattern to provide optimum utilization of the measured volume of water.

According to a preferred form of the present invention, a toilet is provided having a bowl with an outlet at its bottom and an inlet water supply means for supplying flushing water to the bowl. The inlet supply means comprises a passageway, a measuring device in said passageway for measuring a preselected volume of water, a nozzle in communication with said measuring device and positioned to direct the preselected volume of water in a vortex pattern into said bowl, said measuring device being responsive to pressure from an external source to discharge the fixed volume of water to said nozzle. In the preferred form of the invention, the measuring device is responsive to the pressure of the water flowing from a source to said toilet for discharging the fixed volume of water to the nozzle. It is also contemplated that auxiliary apparatus can be utilized wherein gas or other fluid under pressure is utilized to actuate the measuring device for discharging the fixed volume of water to the toilet bowl. In still other arrangements it is contemplated that the measuring device can be manually actuated.

Accordingly, it is one of the objects of the present invention to provide an improved toilet which is constructed and arranged to conserve water used for flushing purposes.

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 side elevational view, partly in section, illustrating one embodiment of the present invention;

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

FIG. 3 is a top plan view, partly in section, of the embodiment of the invention shown in FIG. 1; and

FIG. 4 is a fragmentary section of a modified form of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

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.

Referring now to the drawings, the invention will be described in greater detail. The toilet 10 includes a bowl 12 having an outlet 14 at its bottom and a channel 16 around its upper periphery. A conventional seat 18 and cover 20 are mounted on the upper surface of the bowl 12. A closure valve member 22 normally closes the outlet 14. The closure valve member 22 is a component of the mechanism 24 for simultaneously opening and closing the closure valve member 22 and an associated flush water ball valve 26. The latter is a component of the inlet water supply means 28 for supplying flush water to the bowl 12. The mechanism 24 will not be described in detail, because it is described fully in U.S. Pat. No. 3,369,260, granted Feb. 20, 1968 to R. J. Sargent et al., to which reference is made for this purpose. Briefly, the mechanism 24 includes the foot lever 30 which is connected to the closure valve member 22 for opening the latter when the foot lever 30 is depressed and simultaneously for opening the ball valve 26 to permit water to flow from a source through the inlet supply means 28. When pressure is released on the foot lever 30, the spring 32 will function to close the closure valve member 22 and the ball valve 26.

The inlet water supply means 28 comprises the conduit 32, ball valve 26, conduit 34, measuring device 36, conduit 38, antisiphon device 40, conduit 42, tube 44, and the single discharge nozzle 46. The flexible tube 44 is retained in the channel 16 in the upper periphery of the bowl 12, and a cover plate 48 fits over the channel 16 and is secured in place in a suitable fashion, such as by the plurality of rivets 50. Thus, the inlet water supply means 28 provides a passageway for flush water from a source to the discharge nozzle 46.

Details of the antisiphon device 40 are omitted, because any conventional antisiphon device may be located in the inlet water supply means. One such antisiphon device that may be used is disclosed in the aforesaid U.S. Pat. No. 3,369,260.

Referring now to FIG. 2, the internal structure of the measuring device 36 can be seen. As there shown, a casing 52 is provided which has openings at its opposite ends to the conduits 34 and 38. Located within the casing 52 is a normally expanded bellows 54 which has its interior in communication with the conduit 38. Thus, when the bellows 54 is compressed, fluid, such as water, within the bellows will be discharged through the conduit 38 downstream to the bowl 12. The bellows 54 has a restricted aperture 56 communicating with the interior of the casing 52 for recharging the bellows 54 with water.

In normal operation, the bellows 54 will be in the expanded position shown in FIG. 2 and will be full of water. When it is desired to flush the toilet 10, the foot lever 30 will be depressed opening the closure member 22 and simultaneously opening the ball valve 26. This will have the effect of applying water pressure to the interior of the casing 52 causing the bellows 54 to collapse, urging the water through the conduit 38 to the nozzle 46 from which the water will be discharged in a vortex pattern into the bowl. As soon as the fixed volume or slug of water has been expelled from the bellows 54, flow will discontinue from the nozzle 46, and the foot lever 30 can be released. The casing 52 will be full of water at this time, and the bellows 54 will expand to its normal position shown in FIG. 2 at the rate that water can flow through the orifice 56. As soon as the bellows 54 has expanded to its full position, the flushing system will again be in readiness for a subsequent flushing operation. Thus, it can be seen that a fixed volume of water for flushing purposes is measured by the device 46, and the fixed volume of water can be discharged into the bowl of the toilet merely by exerting liquid pressure on the bellows 54 from the source of water. Also, it will be noted that a single outlet in the form of nozzle 46 is provided for discharge of the

water into the bowl so that optimum use of the water is utilized, particularly by virtue of the vortex pattern in which the water is injected into the toilet bowl.

It will be understood that other arrangements may also be utilized for carrying out the present invention. Attention is directed to FIG. 4, illustrating a modified form of the present invention wherein an auxiliary pressure system is utilized for discharging fluid from the measuring device 60. In this form of the invention a conduit 62 is provided which is in communication with a source of air or other compressed gas, such as freon, or the like. The compressed gas can flow to the interior of the casing 64 by virtue of opening a valve or the like, not shown, in the conduit 62. A bellows 66 is provided which is in communication with the conduit 68 for discharging water via the check valve 70 and the conduit 72 to the discharge nozzle 46, not shown in this FIG. The bellows 66 is in communication with a source of water 74 via the restricted aperture 76, conduit 78, and check valve 80. Thus, in this embodiment a passageway for flush water is provided from the source 74 to the nozzle 46, not shown in FIG. 4, via the bellows 66, and a separate passage means for a gas under pressure is provided including conduit 62, casing 64 and bleed hole 82.

In this embodiment of the invention the flushing operation is started by opening a valve in the line 62 so as to compress the normally expanded bellows 66, discharging the fixed volume of water therein through the inlet water supply means to the bowl 12 of the toilet. After the water has been discharged from the diaphragm 66, the flow of gas under pressure in conduit 62 can be discontinued, and by virtue of the bleed hole 82 in the casing 64, which will allow the compressed freon, or the like, to escape to reduce the pressure in casing 64, the bellows 66 will expand, siphoning water from the source 74 to again recharge itself in readiness for the next flushing operation.

It is also contemplated that the present invention can be carried out in the manner shown in the aforesaid copending application Ser. No. 724,071, wherein the bellows is collapsed by manually depressing the same.

We claim:

1. A toilet having a bowl with an outlet at its bottom and an inlet water supply means for supplying flush water to said bowl, said inlet supply means comprising a passageway, a measuring device in said passageway for measuring a preselected volume of water, and a nozzle in communication with said measuring device and positioned to direct the preselected volume of water in a vortex pattern into said bowl, said measuring device being responsive to fluid pressure from an external

source to discharge the fixed volume of water to said nozzle.

2. A toilet as is defined in claim 1, wherein said measuring device contains a chamber means of said preselected volume, said chamber means having an outlet through which the water is discharged and an inlet in communication with a source of water.

3. A toilet as is defined in claim 2, wherein said chamber means is a normally expanded resilient bellows.

4. A toilet having a bowl with an outlet at its bottom and an inlet water supply means for supplying flush water to said bowl, said inlet supply means comprising a passageway, a measuring device in said passageway for the measurement of a preselected volume of water, and a nozzle in communication with said measuring device and positioned to direct the preselected volume of water in a vortex pattern into said bowl, a fluid passage means associated with said passageway, said measuring device being in a pressure responsive position to the fluid in said passage means for acting in response to the pressure of said fluid to discharge the fixed volume of water to said nozzle.

5. A toilet as is defined in claim 4, wherein said passage means for a fluid is a segment of said passageway, and said fluid is water from said source.

6. A toilet as is defined in claim 5, wherein the inlet of said pressure means is a restricted aperture open to said passage means.

7. A toilet as is defined in claim 4, wherein said passage means for a fluid is separate from said passageway, and said fluid is a gas under pressure.

8. A toilet as is defined in claim 7, wherein the inlet of said pressure means is a restricted aperture in communication with said source of water.

9. A toilet as is defined in claim 5, wherein a normally closed valve is in said passageway upstream from said chamber means adapted when opened to direct water under pressure to said chamber means.

10. A toilet as is defined in claim 9, wherein a closure valve member is in a normally closed position in the outlet of said bowl, said normally closed valve being operably connected to said closure valve member to be opened and closed when said valve member is opened and closed.

11. A toilet having a bowl with an outlet at its bottom and an inlet water supply means for supplying flush water to said bowl, said inlet supply means comprising a passageway and means in said passageway to direct a selected volume of water in a vortex pattern into said bowl.

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