Aug. 20, 1968 R. T. CELLA 3,397,410

ROTARY VANE PRESSURE TOILET

Filed Feb. 4, 1966

Fig. 1.

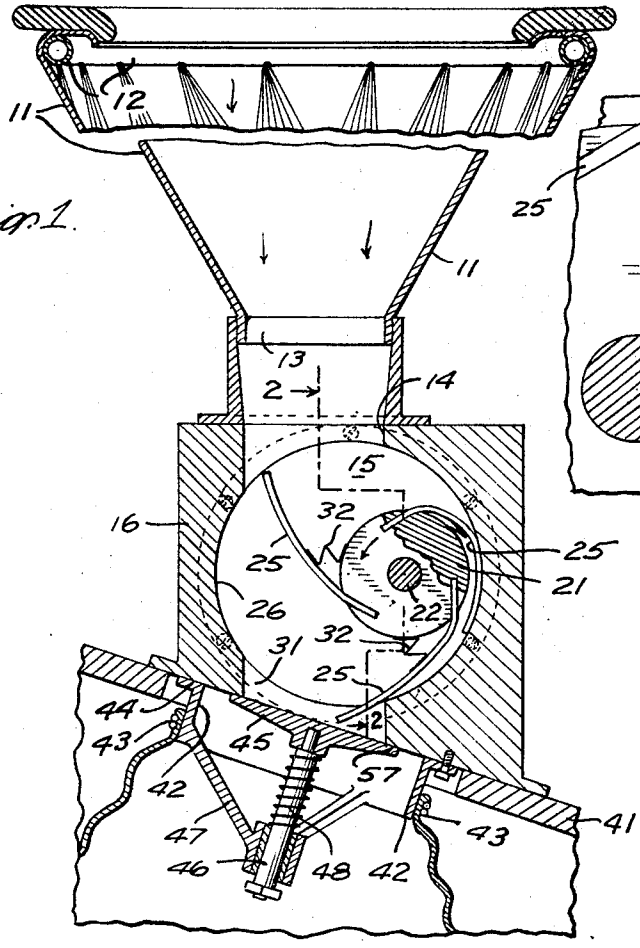


Fig. 3.

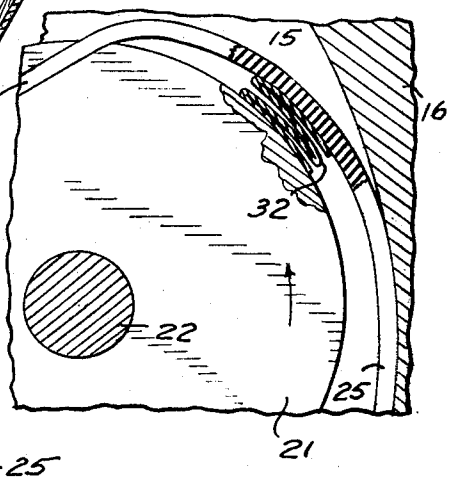


Fig. 2.

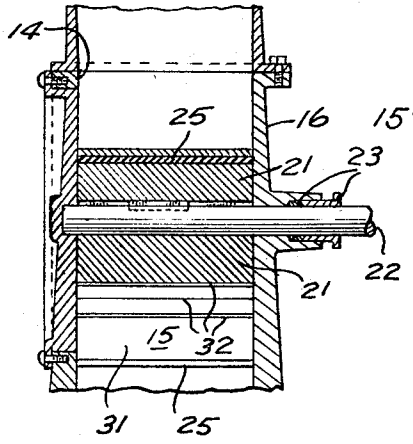
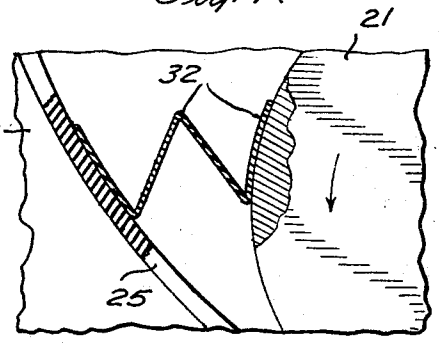


Fig. 4.



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ROTARY VANE PRESSURE TOILET

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ABSTRACT OF THE DISCLOSURE

A mechanically operated toilet including a housing having a cylindrical chamber with a peripheral inlet opening disposed beneath the toilet bowl, a peripheral outlet opening, a rotor in said chamber having flexible radial vanes to be contacted and flexed by said wall as they rotate, and displaced eccentrically in a direction to advance waste material with increasing pressure to said outlet opening, and a receiver having a spring loaded closure valve through which waste material from said outlet opening is forced under the pressure produced by said rotor.

This invention relates to mechanically actuated toilets and more particularly to a toilet having a rotary vane pump for evacuation.

An object is to provide a toilet of the above type which may be operated with a minimum of flush liquid.

Another object is to provide a toilet of the above type having novel and improved operating characteristics.

Other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The invention will be better understood from the following description, taken in connection with the accompanying drawing, in which a specific embodiment has been set forth for purposes of illustration.

In the drawing:

FIG. 1 is a vertical section through a toilet embodying the invention;

FIG. 2 is a partial section taken on the line 2—2 of FIG. 1;

FIG. 3 is a detail of a portion of a vane in highly flexed condition; and

FIG. 4 is a similar detail view of a portion of a vane in substantially unflexed condition.

Referring to the drawing more in detail the toilet is shown as embodying a bowl **11** having a perforated pipe **12** around its upper portion for introducing rinse water or a detergent at the end of the flush cycle. The bowl **11** tapers downwardly to an opening **13** communicating with an inlet opening **14** in a pump chamber **15**, formed in a housing **16**. The pump chamber **15** is cylindrical in section and carries an eccentrically mounted hub **21** fixed to a shaft **22** extending through a seal **23** and driven by a motor, not shown.

The hub **21** carries a series of flexible vanes **25** which are adapted to wipe against and to be flexed by the peripheral wall **26** of the pump chamber **15** as the hub **21** rotates.

The pump chamber **15** is formed with a discharge opening **31** substantially opposite the inlet opening and the hub **21** is displaced eccentrically in the chamber **15** in a direction such that the vanes **25** are increasingly flexed by the peripheral wall **26** as they advance in the zone of decreasing clearance between the hub and peripheral wall past the outlet opening **31** so that the material which passes the inlet opening is advanced under increasing pressure by the vanes **25** and is forced under pressure through the outlet opening **31**.

The vanes **25** are of a size to substantially conform to the cross-sectional area of the chamber **15** as they rotate so that any material in the chamber is positively advanced and fed by the vanes as they rotate in the chamber.

In order to prevent material from becoming lodged in the recess between the hub **21** and the vanes **25** at the trailing side of the vanes, this recess is closed by collapsible bellows **32** which extend from the hub **21** to the trailing side of the vanes **25** and is capable of expanding and collapsing as the vanes flex in passing around the pump chamber **15**. The vanes may be made of any suitable flexible material such as thin metal or natural or synthetic rubber or of other plastic material and the bellows **32** may be made of similar material.

A receiver **41** is disposed at the outlet opening **31** of the pump chamber **15** to receive the material under the pressure exerted by the vanes **25**. The receiver **41** is shown as composed of a bag the end of which is secured to a tubular valve housing **42** by cords **43**. The valve housing **42** has a flange **44** which may be removably attached to the under side of the housing **16**. The valve housing **42** carries a poppet valve **45** having a stem **46** slidable in a spider **47** carried by the housing **42**. The valve **45** seats against a valve seat **57** and is normally held closed by a spring **48** but is adapted to be opened by the pressure exerted by the material fed by the rotating vanes **25** through the discharge opening **31**. The arrangement is such that the waste material is held within the closed container from which it may be removed in any suitable manner as by removing the container to a cleaning zone.

The above described apparatus is particularly suitable for use in aircraft or in other places where large quantities of water are not readily available. In this device the flush cycle would include means for effecting operation of the motor driving the rotor vanes for a predetermined period and the introduction of a cleansing agent such as a detergent through the perforated pipe **12** for cleansing the sides of the bowl.

I claim:

1. A mechanically operated toilet comprising a bowl terminating downwardly in a discharge opening, a housing below said bowl having a chamber therein formed with a cylindrical peripheral wall disposed about a horizontal axis and having inlet and outlet openings extending through said peripheral wall at spaced points, the inlet opening being disposed in registration with the discharge opening of said bowl to receive waste material therefrom, and a rotor disposed in said chamber having a hub carrying a set of radially extending flexible vanes adapted to wipe against and be flexed by said peripheral wall as they advance for feeding said waste material from said inlet opening to said outlet opening, said hub being displaced eccentrically of said chamber in a direction such that the flexing of the said vanes increases as they advance in the zone of decreasing clearance between the hub and the peripheral wall past said outlet opening, a receiver for waste material having an inlet opening removably secure in registration with said outlet opening to receive waste material therefrom, and a spring closing inwardly opening valve disposed in the inlet opening of said receiver for closing same, said valve being openable in response to the pressure of waste material discharged through said outlet opening by the operation of said rotor.

2. A mechanically operated toilet as set forth in claim **1** in which expandable and compressible closure members are disposed between said hub and the portion of the trailing side of each vane adjacent the hub to enclose the area between the hub and the inner end of said vane and prevent waste material from becoming lodged therebetween.

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