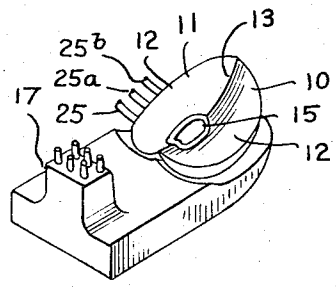
Sept. 12, 1967 R. T. CELLA 3,340,544

ZERO GRAVITY TOILET

Filed Feb. 28, 1966

Fig. 1.



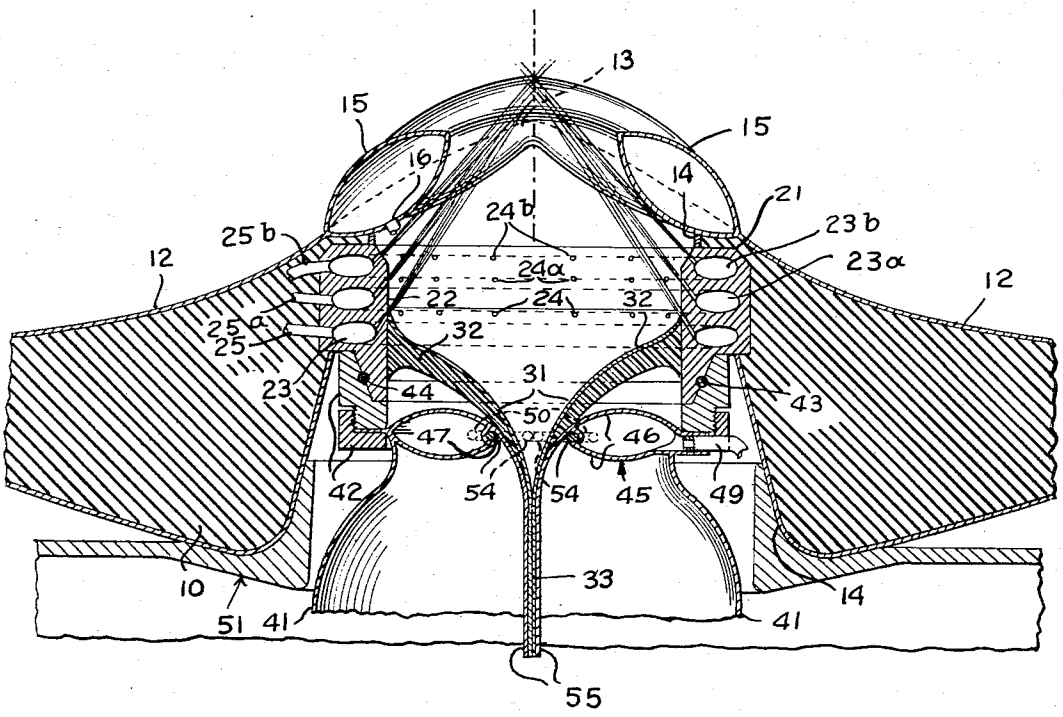


Fig. 2.

INVENTOR.
RICHARD T. CELLA
BY

ATTORNEY

United States Patent Office 3,340,544 Patented Sept. 12, 1967

3,340,544

ZERO GRAVITY TOILET

Richard T. Cella, 35 Park Ave., New York, N.Y. 10016

Filed Feb. 28, 1966, Ser. No. 530,437
7 Claims. (Cl. 4—10)

This application is a continuation-in-part of my co-pending application Ser. No. 446,633, filed Apr. 8, 1965, in which the common subject matter is being claimed.

This invention relates to toilets adapted for use under zero gravity conditions and has for an object to provide a toilet of the above type having novel and improved characteristics.

The invention is particularly intended for use in space capsules but may also be found useful for bed patients in hospitals or the like.

The nature of 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 perspective view of a toilet embodying the invention; and

FIG. 2 is a transverse vertical section, on a larger scale, showing the structure of the parts.

Referring to the drawing more in detail the invention is shown as embodied in a compact device comprising a positioning pad **10** on which the person sits. The pad **10** is formed with an upper surface **11** shaped to conform to the contour of the body with a pair of concave portions **12** separated by a central rib **13**. The pad has a central hole **14** which is surrounded on the upper surface of the pad by an inflatable sealing ring **15**. The ring is adapted, when inflated, to contact the body to form an effective seal around the hole **14** of the pad. The ring **15** is connected by a duct **16** to a valve panel **17** which forms a part of the equipment and is connected to an air cylinder, not shown.

A cylindrical housing **21** is disposed in the hole **14** and is fixed to the pad **10**. The housing **21** is formed with a central bore **22** registering with the hole **14** and forming a continuation thereof and has an annular passage **23** communicating with the bore **22** by radial passages **24** to form a flush ring as will be described. The annular passage **23** is connected to the valve panel **17** to be connected thereby to the air supply bottle or to a water supply bottle or to a bottle containing cleansing foam.

The housing **21** also has annular passages **23***a* and **23***b* provided with rings of openings **24***a* and **24***b* positioned to introduce cones of spray into the passage **14**, the cones of spray from the various rows of openings **24**, **24***a* and **24***b* meeting in an apex at a point adjacent the body of the user. The annular passages **23***a* and **23***b* are connected by ducts **25***a* and **25***b* respectively to the valve panel **17** to be connected thereby to sources of a settable resin and a setting agent, to be described.

A valve **31** in the form of a tubular sleeve of suitable material has a circular upper end **32** attached to the inner surface of the bore **22** of the housing **21** in a position to hang downwardly within the bore. The sleeve **31** is composed of a material which is sufficiently resilient to assume and retain a flat ribbon form which at its lower end **33** is coiled up upon itself so that the sleeve normally forms a closure valve for the bore **22** but it may be opened and extended by the application of air pressure from the flush ring **23**.

A bag **41** is carried by a coupling ring **42** having an inner surface formed with a resilient lip **43** adapted to snap over a resilient ring **44** carried on the outer surface of the housing **21** for coupling the bag to the apparatus.

The coupling ring **42** carries a closure valve **45** in the form of a pair of inflatable, semi-circular diaphragms **46** which are normally in contact along their diametric edges **47** to form a closure for the bag **41**. Elastic strips **54** extend along the edges **47** of the diaphragm **46**, and carry a depending tube **55** through which the sleeve **31** extends when the diaphragms are in open position. The diaphragms **46** are connected by passages **49** in the coupling ring **42** and a duct **50** to the valve panel **17** to receive compressed air for opening the valve. When air is supplied to the diaphragms **46** their diametric edges **47** are drawn apart to form an opening to the bag **41**.

The pad **10** and housing **21** are supported on a hollow base **51** within which the bag **41** is contained.

When the device is to be used the bag **41** is coupled to the housing **21**, the pad and bag placed on the base **51** and the assembly brought into contact with the body. By suitable manipulation of the valves on the valve panel **17** the sealing ring **15** is inflated to provide a seal with the body. Air is then applied to the valve diaphragms **46** to open the valve **45** after which air is supplied to the flush passage **23** to cause the sleeve valve **31** to unroll and pass down through the open valve **45**. After use wash water or foam is supplied to the flush ring **23**. For cleansing purposes the valve panel **17** is manipulated to supply a settable resin and a setting agent to the annular passages **23***a* and **23***b* respectively. When these materials come into contact at the apex of the spray in the passage **14** the resin sets to form a hard plug. Air pressure is then supplied through the annular passage **23** to force the resin plug downwardly through the passage **14** and through the valve **45** into the bag **41**. The resin plug cleanses the passages as it advances.

As an example, the resinous material may comprise sodium-carboxymethylcellulose and the setting agent may comprise a saturated solution of aluminum potassium-sulphate. As a further example, sodium-algenate in water solution may be set up by a glycerine solution of calcium-sulphate.

Air pressure is released from the diaphragms **46** and from the sealing ring **15** to permit the sleeve **31** to be withdrawn from the valve **45** and to flatten out and recoil to form a closure for the housing **21** after which the bag may be uncoupled.

While the apparatus has been shown as involving three separate annular passages **23**, **23***a* and **23***b*, one or two passages may be employed provided the control panel is arranged to supply the selected fluid to the passage or passages. For supplying the resin and setting agent simultaneously, a single annular passage may be used provided the passage is divided into a pair of semi-circular parts through which the two materials can be supplied separately as required.

What is claimed is:

1. The method of operating a toilet having a member to be sealed against the body and provided with a passage communicating with a waste receiver, under zero gravity conditions, which comprises the steps of introducing through said passage against the body a settable resin in liquid form and a setting agent under conditions to cause the resin to set in the form of a plug and introducing fluid pressure above said plug to force said plug through said passage into said container for thereby purging said passage.

2. The method set forth in claim **1** in which the settable resin is sodium-carboxymethylcellulose.

3. The method set forth in claim **2** in which the setting agent is aluminum potassium-sulphate.

4. The method set forth in claim **1** in which the resin is sodium algenate in water and the setting agent is a glycerine solution of sodium-sulphate.

5. A toilet for use under zero-gravity conditions comprising a member to be sealed against the body and having a passage therethrough adapted to communicate with a waste receiver, a plurality of separate ducts having discharge openings disposed to inject liquids into said passage in the form of a spray, the spray from said ducts meeting in an apex at a point adjacent the body.

6. Apparatus as set forth in claim 5 in which said ducts terminate in separate annular passages surrounding said first passage, each of said last passages having a ring of openings for the discharge of said fluids into said first passage.

7. Apparatus as set forth in claim 5 in which means is provided to introduce a settable resin into one of said ducts and to introduce a setting agent into another of said ducts under conditions to form a plug of resin and means is provided to introduce a fluid under pressure through another of said ducts for forcing said plug through said first passage for purging the same.

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LAVERNE D. GEIGER, *Primary Examiner.*

H. K. ARTIS, *Assistant Examiner.*