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TOILET FOR VEHICLES

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Fig. 2

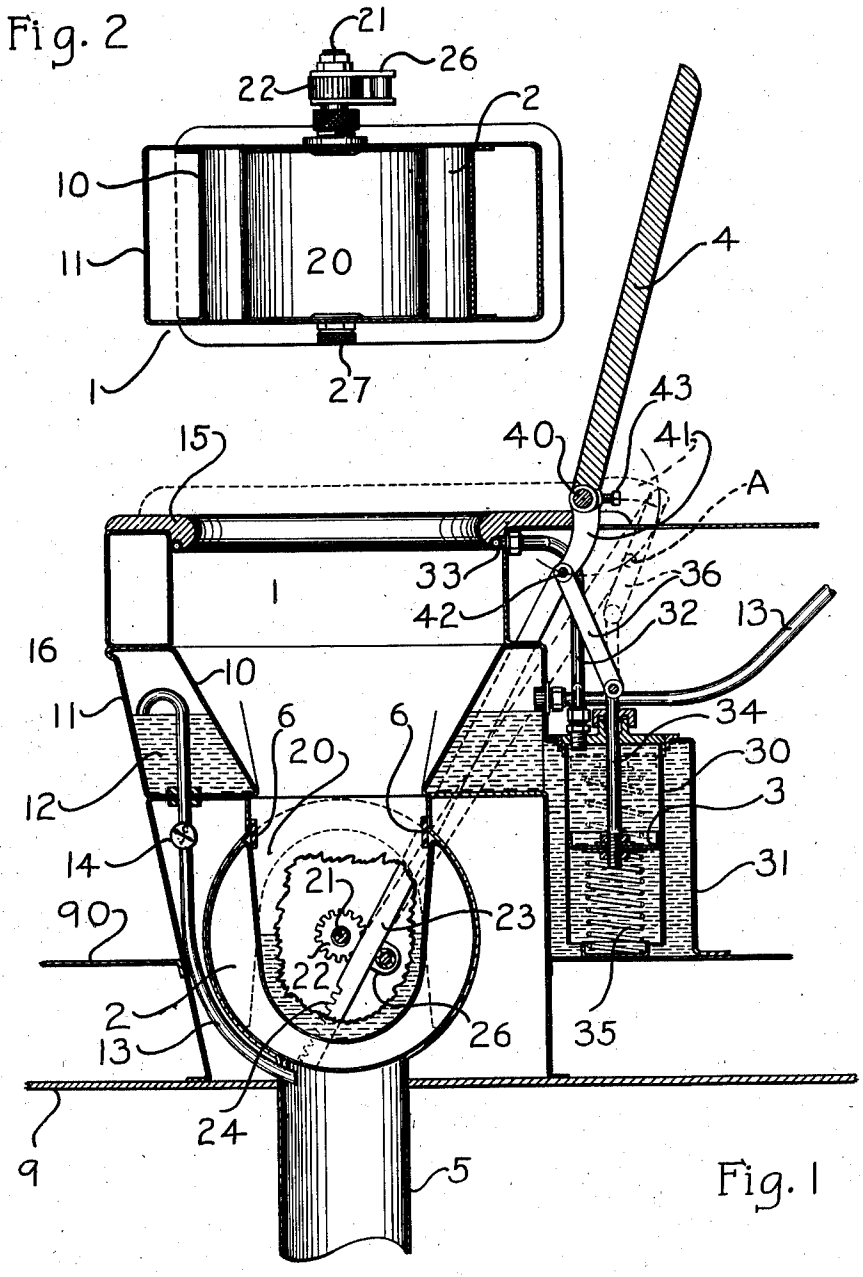


Fig. 1

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TOILET FOR VEHICLES

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8 Claims. (Cl. 4—77)

The disposition of body waste on vehicles traveling without stop for considerable periods of time is a problem for which no entirely satisfactory solution has heretofore been found, so far as I am aware. On railroad trains, of course, this presents no such problem as on busses, trailers, and airplanes, for the railroad runs upon its wholly owned right of way, and in populous areas toilet rooms are kept locked. With busses, traveling over public roads, different arrangements must be made than are in effect on railway cars, and the problem is accentuated in airplanes, for all such waste must be retained except in over-water flights, and in addition in airplanes, were it considered practicable to permit such material to be discharged immediately overboard, over land or over water, the relative wind moving past the airplane would immediately catch such waste, and it would in all probability come in contact with some part of the airplane. If it is attempted to lead it to a point distant from the airplane, or from the skin thereof, this entails a projecting element which creates serious drag. Moreover, if a toilet bowl in an airplane is left freely open to the atmosphere the relative wind may create undesirable suction, or occasional inrushes of air, due to bumps or similar conditions of the atmosphere, and this would create an undesirable situation. For high altitude airplanes a further factor enters, namely, that the interior of such airplanes must be supercharged to a pressure exceeding that of the surrounding atmosphere, and a free opening from the interior to the exterior cannot be permitted.

The present invention has for its object the production of a toilet for use in vehicles generally, and more particularly for use in airplanes, which will not be subject to disturbance in any way by atmospheric conditions, which can be used at all altitudes and with cabins that are supercharged, if desired, which will not be affected in any way by the relative air movements, by the use of which the waste material can be properly collected for later disposal, or which can, on over-water flights, be dumped immediately overboard, if desired.

It is a further object to provide such toilets in which will be incorporated automatic flushing means, properly correlated with the disposing means, which will require but a slight amount of water, which will use water otherwise normally wasted, and which will deliver that water at sufficient pressure, through the use of a pump means automatically brought into operation, to effect thorough and proper cleansing of the entire toilet bowl. It is a further object to provide such a toilet which shall be compact and light.

Other objects, and more particularly such as pertain to the mechanical details thereof, will become apparent as this specification progresses.

My invention comprises the novel parts, and the novel combination and arrangement thereof, as shown in the accompanying drawing, in a preferred form, and as will be hereinafter described and claimed.

In the accompanying drawing my invention has been shown in a form which is at present preferred by me.

Figure 1 is a longitudinal vertical section through the toilet, with parts broken away for better illustration.

Figure 2 is a transverse section through the toilet, substantially along the axis of the rotatable closure.

The device comprises a toilet bowl, generally designated by the numeral 1, of suitable shape and size, and carried by a suitable support, as indicated at 9. This might be the floor of the airplane, or the floor may be at a somewhat higher level, at 90. This bowl is, of course, open at its top and at its bottom, but its bottom is closed at all times by a closure 2, rotatable upon a shaft 21 and an opposite removable bearing pin. This closure contains a pocket 20 and is movable between a position as shown in full lines in Figure 1, wherein the pocket is upright for the reception of waste material from the bowl, into a dumping position such as is shown in the dash lines in Figure 1, where the waste material is dumped. To effect this movement I prefer that the closure 2 be of cylindrical form, as shown in Figure 2, fitting tightly within the outlet from the toilet bowl, and provided with suitable means to rotate it. Such means will be described in detail hereafter.

For lightness and for the purpose of forming a reservoir as part of a flushing system I prefer that the toilet bowl be made up of sheet metal, and that it be hollow. Thus it has an inner wall 10 and an outer wall 11, cooperating to form a reservoir 12, and water is delivered within this reservoir by a conduit 13 from a convenient supply source. Usually a wash basin is located in such a toilet room, and the waste water from the wash basin may drain through the conduit 13 into the reservoir 12, to be used over again for flushing the toilet bowl, thus conserving space, weight, and water. To prevent collection of an undue amount and weight of

water in the reservoir, an overflow pipe 13 may be provided, discharging past a check valve 14 into a discharge chute 5, beyond the closure 2, and having a siphon top, at 16, to prevent constant overflow from slopping about of the water as the plane sways or bobs about in the air. The check valve 14 prevents any inrush of air from the exterior, and the discharge through the lower end of conduit 13 helps to keep the chute 5 clean.

A pump chamber 31 is formed as a part of or communicates with the reservoir 12, and is placed at such a level that it will always be maintained substantially full of water. Within this chamber 31 is disposed a pump cylinder 30, freely open at its bottom for ingress of water from within the chamber 31, and within this cylinder 30 is reciprocable a pump piston 3, preferably having an upwardly faced leather cup or the like, so that upon its downward stroke it will take in water from the reservoir, and upon its upward stroke it will discharge this water through the conduit 32 to a ring 33 around the rim or beneath the seat 15 of the toilet bowl. This ring 33 may be provided with numerous small orifices (not shown) so that the water being discharged will meet with appreciable resistance and be discharged with considerable force against the walls of the bowl 1. In addition these small orifices will present resistance to ingress of air upon the down stroke of the pump, thereby largely eliminating the necessity for a check valve in the conduit 32, although one may be provided if deemed necessary or desirable. Similarly a check valve may be provided in the conduit 13, if needed, although ordinarily it will not be needed.

The pump is moved downwardly by a piston rod 34 extending through its top, and is moved upward automatically under the influence of a spring 35, which is compressed by the downward movement of the piston 3. The pump is connected to an actuating member which might take various forms, but the cover 4, hinged at 40, constitutes a convenient actuating means. An arm 41 swingable with the cover 4, and adjustable angularly relative thereto, as by a set screw 43, is connected to the piston rod 34 by means of a link 36. As the cover is raised from the dash line position of Figure 1 to the full line position, as of course must be done to use the toilet bowl, the piston 3 is moved downwardly in opposition to the spring 35, recharging the previously discharged cylinder above the piston with water from the reservoir, and upon swinging the seat downwardly the piston is caused to move upwardly by the spring 35, thereby effecting discharge of water through the orifices in the ring 33 into the interior of the toilet bowl. In the upwardly swung full line position of the cover, however, the tendency of the spring 35, acting through the link 36 and arm 41, is to hold the cover upraised and thrown back. Any suitable stop (not shown) limits movement of the parts in this direction. The pivot pin at 42 connecting the arm 41 and the link 36 must pass a dead center position before the action of the spring causes the cover to continue its downward movement and effect discharge of the water. It may be pointed out, too, that the resistance of the water to passage through the small orifices in the ring 33 acts as a dashpot to prevent slamming of the cover, but once the pin 42 has passed dead center the force of the spring 35 is sufficient to insure that the cover will be moved downward to its fully closed position.

The closure 2 is likewise connected for actuation to the same actuating member that controls the pump, that is, in this instance to the cover 4, but bearing in mind that it is desirable to have an appreciable discharge of water down the sides of the toilet bowl before there is any inversion or dumping of the contents of the pocket 20, lost motion means are preferably provided in this latter connection, so that the closure 2 does not commence to rotate on its axis 21 until after the pump has discharged an appreciable amount of water. The connections might be so arranged that the pump has ceased its discharge before inversion of the pocket 20 takes place, but it is preferred to continue the discharge of water during the time that the closure 2 is rotating and to some degree thereafter, so that a residue of water shall remain in the bottom of the toilet bowl, to fall into the pocket 20 upon reversion of the pocket to its upright position. A flexible swipe 6 is positioned to engage the cylindrical surface of the closure 2, as the latter rotates, to keep it clean, and also serves as a seal to prevent leakage of the residue from above the closure 2 while the latter is inverted.

To accomplish such movement of the closure 2 there is provided upon its shaft 21 a pinion 22, with which is engageable a link 23, likewise connected by the pin 42 to the lever arm 41, and bearing at its lower end rack teeth, as indicated at 24. A stirrup 26, hung upon the shaft 21 and embracing the link 23, holds the latter in engagement with the pinion 22. The teeth of the pinion 22 are not continuous about its periphery, but are interrupted, as shown in Figure 1, to provide a flattened portion which bears upon the straight edge portion of the link 23, when parts are in the full line position. Upon downward swinging of the cover 4, however, the rack teeth 24 are drawn upward, so that when the pin 42 reaches substantially the position A they engage the teeth of the pinion 22 and initiate rotation of the pinion and of the closure 2. The closure commences to rotate, and eventually reaches the completely inverted position shown in dash lines, but in all positions it seals the toilet bowl from the discharge chute 5, which may communicate with the outside atmosphere, thus preventing any escape of pressure differentials or the increase of pressure within, due to a momentarily higher pressure without.

The discharge chute 5 may communicate with the outer atmosphere, if desired, and this may be done in oversea planes, or it may discharge the waste to a suitable receiver for later disposal, or to a chemical tank for treatment and subsequent disposal.

It is believed the operation of the device will now be self-evident. Upon raising the cover parts are restored to the full line position, the previously discharged pump cylinder being recharged with water from the reservoir, and any water remaining above the closure within the toilet bowl falling into the pocket 20. When it is desired to dispose of the contents of the pocket 20 the cover 4 is moved downwardly, water is first discharged from the orifices in the ring 33 immediately beneath the seat 15, the bowl is flushed, and the closure 2 then commences to rotate, the discharge of water continuing meanwhile, and until the pocket 20 has been completely inverted. Parts remain in these posi-

tions until the toilet is to be used again, whereupon the seat 4 is raised, returning parts to the full line position shown.

What I claim as my invention is:

1. A toilet for vehicles comprising a bowl having an opening in its bottom, a closure sealing said opening at all times, and having a pocket, the closure being movable to dispose the pocket for the reception of waste, or to dump the contents, a flushing system including a reservoir, a means to discharge water within the bowl, and a reciprocating pump operable in one direction to discharge water through such means, and in the other direction for recharging, a cover for the bowl movable to and from closed position, and operative connections including lost motion mechanism, between the cover, the closure, and the pump such that, upon movement of the cover towards closed position the pump will first discharge water into the pocket, as the latter stands in receiving position, and thereafter the closure will move to dump the pocket.

2. A toilet for vehicles comprising a bowl having an opening in its bottom, a closure sealing said opening at all times, and having a pocket, the closure being movable to dispose the pocket for the reception of waste, or to dump the contents, a flushing system including a reservoir, a means to discharge water within the bowl, and a reciprocating pump operable in one direction to discharge water through such means, and in the other direction for recharging, a cover for the bowl movable to and from closed position, and operative connections including lost motion mechanism between the cover, the closure, and the pump such that, upon movement of the cover towards closed position the pump will first discharge water into the pocket, as the latter stands in receiving position, and thereafter the closure will move to dump the pocket, and the pump discharge will continue during such movement of the closure.

3. A toilet for vehicles comprising a bowl having an opening in its bottom, a closure rotatable about a transverse axis, formed and positioned to seal such opening at all times, and having a pocket movable by such rotation from an upright receiving position to an inverted dumping position, a flushing system including a reservoir, a means to discharge water within the bowl, and a pump operable to discharge water from the reservoir through such means, a cover for the bowl hingedly mounted to swing upward from a closed position, a lever arm swingable with the cover, a pinion operatively connected to rotate the closure, a link connected to the lever arm, and having rack teeth engageable with the pinion, after a predetermined amount of downward swinging of the cover, to rotate the closure and to invert its pocket, and a second link connection from said lever arm to the pump, to effect discharge of water therefrom after a lesser amount of downward swinging of the cover, to flush the bowl and pocket prior to inversion of the pocket.

4. A toilet for vehicles comprising a bowl formed with inner and outer walls spaced to constitute a reservoir, the bowl having an opening in its bottom, a pocketed closure sealing said opening, and movable to dispose the pocket to receive waste, or to dump the contents, a flushing system including means to discharge water within the bowl and a pump to withdraw water from said reservoir and to deliver it to such means, a cover for the bowl movable to and from a closed position, and means controlled by movement of the cover to actuate said pump, and to move the closure and pocket into dumping position, and to return the closure and pocket to receiving position.

5. A toilet for vehicles comprising a bowl having an opening in its bottom, a pocketed closure located in and closing such opening, and rotatable to position the pocket for the reception of waste, or to invert it, a swipe fixed in position adjacent rotatable surfaces of the closure, and means operatively associated with the closure to discharge water into the bowl during and after rotation of the pocket from receiving position.

6. A toilet for vehicles such as aircraft comprising a bowl having an opening in its bottom communicating with the atmosphere, a closure located in and in all positions closing such opening, a cover for the bowl, a flushing system including a reservoir and means to discharge water therefrom within the bowl, means to effect movement of the closure to effect discharge of waste collected in the bowl, means operatively connected to the preceding means to effect discharge of water within the bowl prior to movement of the closure towards discharging position, and a siphon overflow conduit leading from the reservoir to the atmosphere, and including a check valve to prevent inrush of air.

7. A toilet for vehicles comprising a bowl having an opening in its bottom, a pocketed cylindrical closure for such opening, rotatable from a position wherein the pocket receives waste from the bowl to a dumping position, a pump connected for discharge into the bowl, an actuator, and an operative connection from said actuator to each of the pump and closure, including lost motion means, and formed and arranged to effect, in succession, discharge of water from the pump into the bowl and thence into the pocket, and then rotation of the closure to dumping position during continued discharge of water, and upon reverse operation of the actuator to return the closure to receiving position without discharge of water from the pump.

8. A toilet for vehicles comprising a bowl having an opening in its bottom, a pocketed closure for such opening, movable from a position wherein the pocket receives waste from the bowl to a dumping position, a cover for the bowl hingedly mounted to swing to covering position by gravity, means including a spring, a link, and an arm upon the cover operatively connected to swing the cover to closed position, but movable beyond a dead center position to hold the cover upraised, a pump connected to discharge water within the bowl through restricted orifices at a controlled rate, and operatively connected to the cover to discharge during closing movement of the cover, the water discharge system constituting a dash pot to control the closure of the cover, under the influences of said spring and of gravity, and an operative connection between said cover and said closure to move the latter to dumping position during movement of the cover to closed position.

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