April 2, 1946. L. J. MacGLASHAN 2,397,677

LIQUID FEEDING DEVICE

Filed Aug. 11, 1943

Fig. 1.

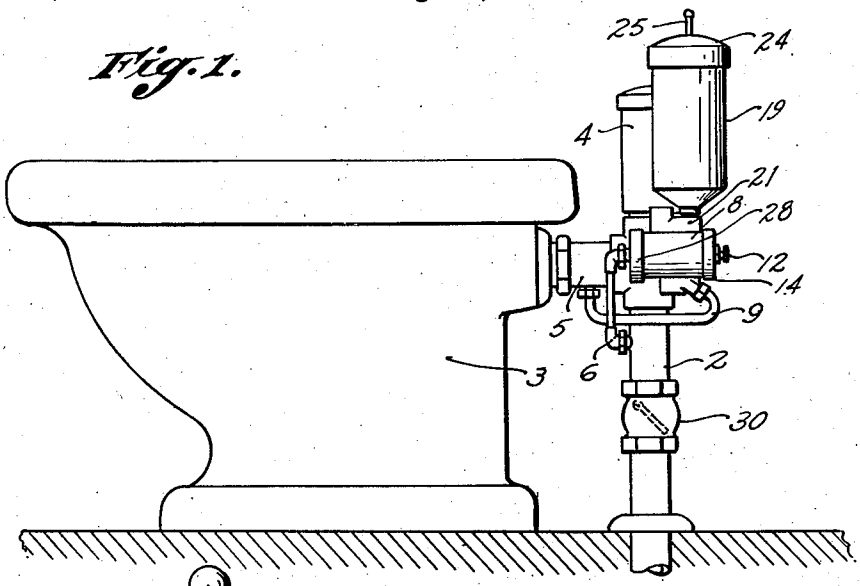


Fig. 2.

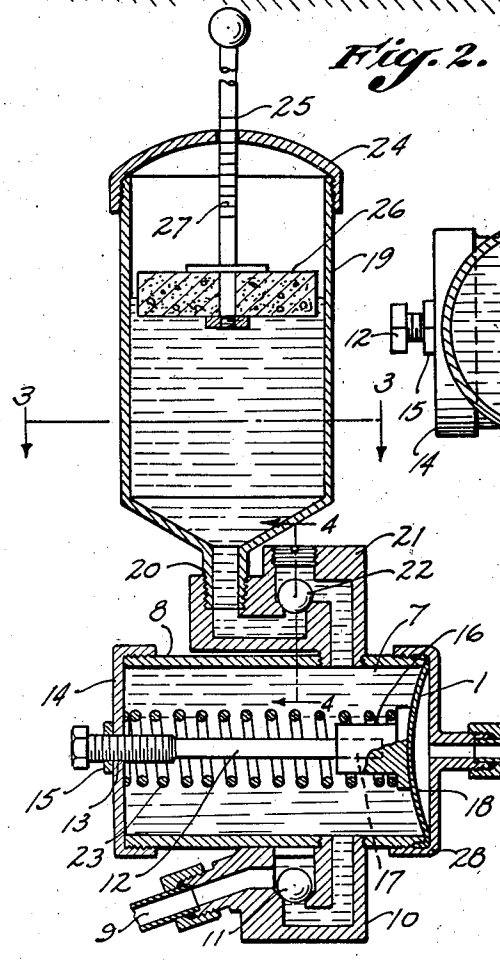


Fig. 3.

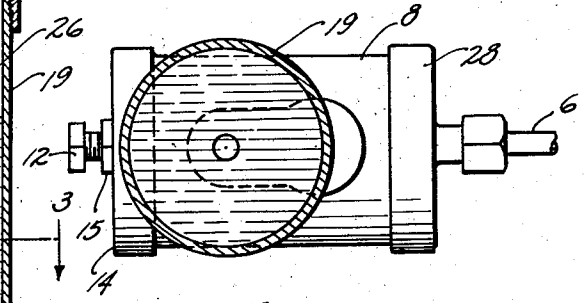
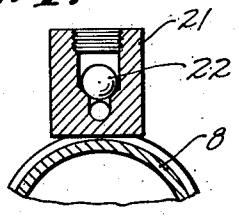


Fig. 4.



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LIQUID FEEDING DEVICE

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3 Claims. (Cl. 4—224)

This invention relates to apparatus for feeding quantities of a liquid into a receptacle, and while features of the invention may be employed in other situations, in the present specification, the invention is described as applied to a toilet bowl for feeding a disinfectant or deodorizer into the toilet bowl in small quantities.

Many devices have been employed for this general purpose, but most of them operate by providing a continuous drip of the deodorizer into the bowl. This involves a waste of the deodorizer where the bowl is not in constant use, and usually results in the odor of the disinfectant being so strong as to be very disagreeable.

Some such devices have been connected to the flushing apparatus so as to be operated automatically when the bowl is flushed, but this results in introducing the deodorizer into the bowl while the flushing operation is continuing, which of course tends to defeat the primary purpose of introducing the deodorizer, because most of the deodorizer passes down the soil pipe with the flush water.

One of the objects of this invention is to provide apparatus of simple construction which is controlled through the agency of the static pressure existing in a supply duct or pipe. In other words, my object is to utilize variations in static pressure to effect the feeding of a quantity of liquid into a receptacle which in the present instance is a toilet bowl; the drop in static pressure that occurs during the flushing operation bringing about the feeding movement of the deodorizer or disinfectant after the flushing operation ceases.

Another object of the invention is to provide simple apparatus that is particularly adapted for attachment to an ordinary toilet bowl and water supply pipe or duct in which the flush water normally stands under the usual pressure that is maintained in water service lines.

Another object of the invention is to provide a reservoir for the deodorizer connected up as a source of supply to the apparatus, together with means for indicating the amount of deodorizer in the reservoir.

Further objects of the invention will appear from the following specification and drawing illustrating an adaptation of the invention, by way of example, to the specific purpose of deodorizing a toilet bowl.

In the drawing:

Fig. 1 is a side elevation illustrating apparatus embodying this invention connected up to a toilet bowl and its water supply pipe;

Fig. 2 is a vertical central section through the apparatus upon a larger scale, but this section is represented as though viewed from the rear side of the parts as shown in Fig. 1, a portion of the indicating rod being broken away;

Fig. 3 is a horizontal section through the reservoir taken on the line 3—3 of Fig. 2; and

Fig. 4 is a vertical section on the line 4—4 of Fig. 2.

In practicing the invention when applied to a toilet bowl for example, I provide a movable pressure-responsive part such as a diaphragm 1 which is mounted in the apparatus in such a way that one side of this member is subjected to the pressure in the duct or water supply pipe 2 that conducts the flush water to the toilet bowl 3.

As shown, this pipe 2 is connected to a flush valve 4 having a handle (not illustrated) for operating it. When this valve is opened, the flush water which is under the usual pressure existing in water service lines, flows past the valve and through the flushing inlet 5 into the bowl.

In the present instance, the space on one side of the diaphragm 1 is maintained under the static pressure of pipe 2 by means of a pipe connection 6 (see Fig. 1). The diaphragm 1 is associated with a chamber 7 within a casing 8 which contains deodorizing liquid.

When the bowl is being flushed, the water in the pipe 2 flows past the connection 6 and a reduced static pressure immediately results so that the diaphragm 1 moves outwardly or toward the right as viewed in Fig. 2. This, of course, increases the effective capacity of the chamber 7, and more deodorizer liquid flows into it as will be presently described.

As soon as the flushing operation ceases, the service pressure in the pipes 2 and 6 is established again and the diaphragm is moved back by this static pressure to its normal position shown in Fig. 2. This cycle of movement of the diaphragm effects the feeding of a quantity of the deodorizer into the bowl 3 through a pipe connection 9 that leads out of the chamber 7 over into the flushing inlet 5. The pipe 9 is connected to the chamber 7 by a fitting 10 of trap type having a check valve 11 that prevents any back-flow into the chamber 7 from the flush pipe 5.

The chamber 7 is preferably provided with means for adjusting the amount of possible movement of the diaphragm 1, and for this purpose, I provide a long bolt having a stem 12 with a threaded shank 13 threaded into a tapped opening in the rear head 14, and held fixed in position by means of a check-nut 15.

This stem carries a movable head 16 with a

bore 17 that fits the diameter of the stem. The bottom of this bore 17 seats against the end of the stem to limit the movement of the diaphragm. The head 16 may have a concave face 18 to take the thrust of the diaphragm and if desired this face may be secured in any desired manner to the diaphragm.

When the static pressure falls during the flushing and the diaphragm 1 moves toward the right (see Fig. 2) a quantity of the deodorizing liquid may be fed into chamber 7 from a reservoir 19 that may be employed if desired to insure a plentiful supply of the deodorizer. This reservoir has an outlet neck 20 that may be threaded into a fitting 21 secured to the upper side of the casing 8 and provided with a check valve 22 that prevents any back-flow of the deodorizer into the reservoir and insures positive feeding of the deodorizer through the outlet valve 11 when the diaphragm moves over to its normal position.

The stop stem 12 is preferably provided with a coil spring 23 thrusting against the head 16 to assist in giving quick action of the diaphragm when it moves out, and also to give a yielding resistance to the return of the diaphragm to its normal position after a flushing operation has occurred.

If desired, the reservoir 19 may be provided with a removable cap 24 having a guide opening for a graduated stem 25 that is carried by a float 26. The side of this stem has a scale 27 the readings on which at the upper face of the cap will indicate approximately how much deodorizer is left in the reservoir.

A removable screw cap 28 clamps the edge of the diaphragm 1 to the end of the cylinder 8, and a check valve 30 is preferably placed in the supply line ahead of the pipe 6 to isolate the device from pressure variations in the line from causes other than the flushing operation.

The mode of operation will now be briefly restated.

As long as the static pressure in the duct or pipe 2 is maintained, no feed of the deodorizer occurs. When the flush valve 4 is operated, water flows up the pipe 2 to the bowl and the static pressure at the side of the diaphragm 1 becomes reduced, whereupon the diaphragm 1 moves outwardly in response to the urging of spring 23, thereby increasing the capacity of the chamber 7 at the left side of the diaphragm as shown in Fig. 2. This causes a small amount of deodorizer to move down past the valve 22 into the chamber 7. After the flushing operation has terminated, the normal static pressure at the right side of diaphragm 1 is resumed, which pushes the diaphragm back to its normal position, thereby forcing a quantity of the deodorizer past valve 11, and into the pipe connection 9, causing the delivery of a substantially equal amount of the deodorizer from this pipe 9, into the flushing inlet 5.

While the forms of my invention herein disclosed in detail are now deemed the preferred embodiments thereof, it is to be understood that they are merely illustrative of the broad scope of my invention defined by the appended claims.

I claim:

1. In a system for supplying flushing water to a toilet bowl through a flush-valve controlled pressure line wherein the pressure varies in response to opening and closing of the flush-valve, means for supplying a predetermined charge of liquid chemical to the bowl only immediately after each closure of the flush-valve, comprising a dispenser adapted to be maintained filled with the chemical, said dispenser being adapted to communicate with the bowl, pressure-responsive means defining with the walls of the dispenser the capacity thereof and operable in response to closure of the flush-valve to reduce the capacity of the dispenser whereby to force chemical therefrom into the bowl, and means operable only upon opening of the flush-valve to increase the capacity of the receptacle and to refill the same with liquid chemical.

2. In a system for supplying flushing water to a toilet bowl through a flush-valve controlled pressure line wherein the pressure varies in response to opening and closing the flush valve, pressure-responsive means for supplying a predetermined charge of liquid chemical to the bowl only immediately after each closure of the valve, comprising a chemical reservoir, a chemical dispenser, a conduit providing gravity flow of chemical from the reservoir to the dispenser, a check valve controlling said conduit and seating towards the reservoir, a second conduit adapted for providing communication from the dispenser to the bowl, a diaphragm providing one of the walls of the dispenser and defining with the remaining walls thereof the capacity of the dispenser, said diaphragm being flexible outwardly to increase the cubic capacity of the dispenser whereby to permit gravity flow of enough chemical from the reservoir past the check valve to the dispenser to fill the latter, and being flexible inwardly to displace chemical in the dispenser to the extent of said increased capacity, means adapted to provide constant communication between the line at a point ahead of the flush-valve and the outer surface of the diaphragm, said diaphragm being adapted to flex inwardly in response to pressure resulting from closure of the flush-valve, stop means for limiting the inward flexure of the diaphragm, and spring means associated with the diaphragm to flex the latter outwardly when the flush-valve is opened.

3. The system of claim 2 wherein the stop means is comprised of an axially adjustable rod disposed in the dispenser in position to be abutted by the diaphragm and wherein the spring means is disposed axially about the rod.

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