

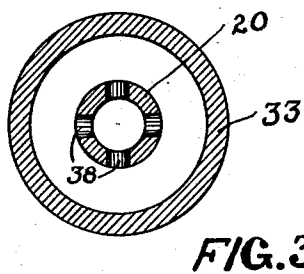
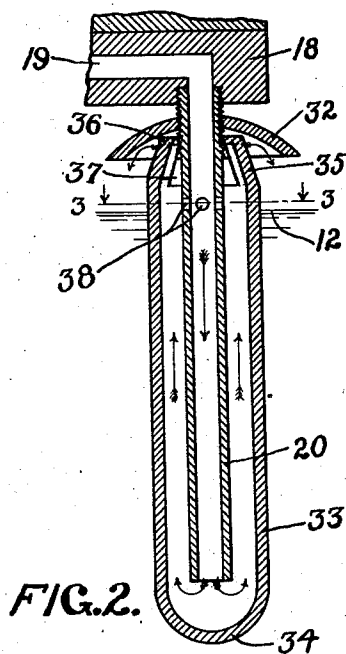
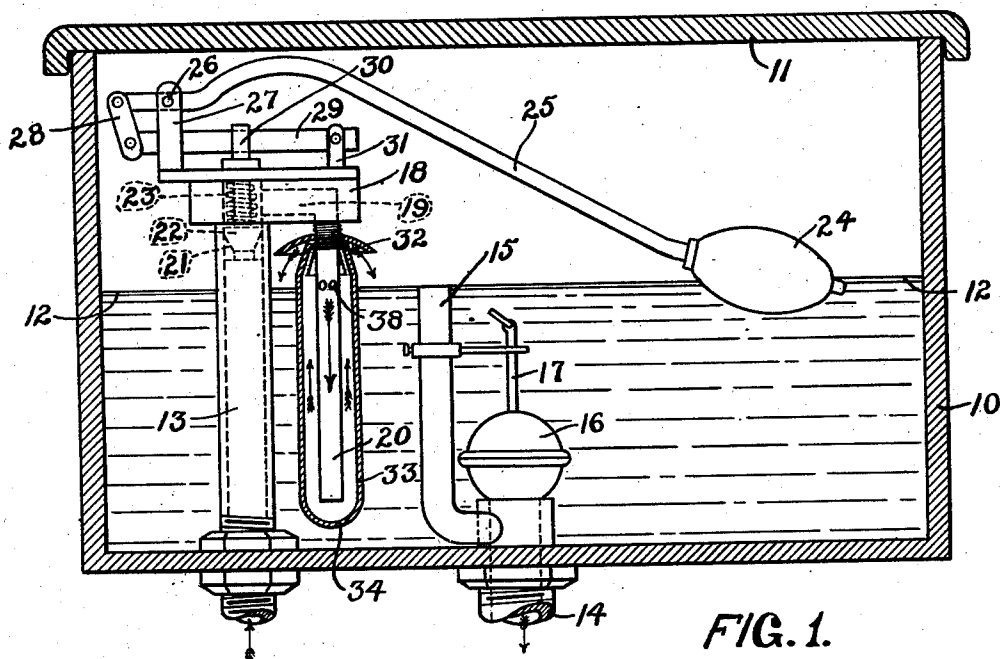
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J. H. COX

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APPARATUS FOR PREVENTING SIPHONIC BACK-FLOW

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INVENTOR
JAMES H. COX
BY *Ramuel E. Foster*
ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR PREVENTING SIPHONIC
BACK FLOW

James H. Cox, Los Angeles, Calif.

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4 Claims. (Cl. 137-21)

This invention relates to a means for preventing siphonic back-flow from a tank of liquid, and is adapted for use in any apparatus and under any conditions where such a back-flow may occur. For purposes of illustration, a standard water control for house toilets is selected; but it will be understood the invention is equally applicable and effective in many other connections.

The invention is, for example, especially suited for use in an apartment house or hotel which has toilets on a number of floors. When, as occurs from time to time, the water pressure is cut off from the main, or weakened from other causes, such as the opening of a hydrant, and a person on a lower floor opens any water tap, the pressure will become reversed and the flushing reservoirs of toilets on a higher level will, under certain conditions, drain part of their contents into the main, thus contaminating the water which is to be used for drinking and cooking purposes. It is the object of this invention to limit any such back-flow to such a minute amount as to render the contamination negligible.

With this and other objects in mind, to appear as the description proceeds, reference is made to the accompanying drawing, in which:

Fig. 1 is a view, partly in vertical section, of the invention as applied to a water toilet;

Fig. 2 is a vertical section on an enlarged scale of the invention itself as shown in Fig. 1; and

Fig. 3 is a sectional view, on a further enlarged scale, taken on line 3-3 of Fig. 2.

Referring more particularly to the drawing, 10 is a tank containing water for the flushing of the toilet proper (not shown). The tank has a cover 11 which may be removed by lifting, and is filled with water to a level 12; the height of the level being predetermined by well known means to be described hereafter. The tank 10 is provided with an intake port or pipe 13, through which the water flows in an upward direction, as shown by the arrow; and an outlet port or pipe 14, through which the water flows downwardly. Pipe 14 leads directly to the toilet to be flushed.

Leading to the pipe 14 is a pipe 15, the open end of which corresponds to the height of the water level 12. That is, when the flow tends to fill the tank above the top of pipe 15, the excess flows down the pipe and into pipe 14, and consequently into the toilet. Closing the open upper end of pipe 14 is a ball 16, of rubber or other suitable material, and attached to the ball is a rod 17 which, in turn, is connected with a hand

lever (not shown) on the outer side of tank 10. When this lever is turned, the ball 16 is lifted from its seat and the water pours out through the pipe 14 to flush the toilet. When the level of the water has sunk near to the pipe 14, the suction produced by the outflowing water draws the ball 16 to thus close the outlet, and the tank begins to refill through mechanism now to be described.

When the ball 16 and other elements of the device are in a position as shown in Fig. 1, there will be no flow of water in any direction, but when the tank has been nearly emptied a valve mechanism acts to open the intake and permit the tank to be immediately refilled. This mechanism, as well as the other elements described above, is so well known to those familiar with the art that it will be described very briefly. It is common to toilet fixtures and is not a part of the invention, but its disclosure is necessary for a clear understanding of the invention.

The intake mechanism consists of the pipe 13, a head member 18 through which is a bore 19, and a pipe 20 extending nearly to the bottom of tank 10. Pipe 13 is provided at its upper end with a valve seat 21, against which a valve 22 is urged by a spring 23. When the valve is raised from its seat, the water flows as shown by the arrows—up pipe 13, through bore 19, down pipe 20, and so (before the attachment of this invention) into the tank 10. The opening and closing of valve 22 is controlled by a float 24, which is attached to an arm 25 pivoted at 26 to a bracket or projection 27 rising from the head member 18. Pivoted to the end of arm 25 is a short link 28 which is also pivoted to a horizontal bar 29. Bar 29 passes through a slotted extension 30, which is integral with valve 22, and is pivoted at its other end to a bracket 31.

In operation, then, the outer lever (not shown) is turned, lifting ball 16 from its seat. The water flows rapidly through pipe 14 to flush the toilet, float 24 drops with the water level and thus opens valve 22. Notwithstanding the inflow, the water level 12 will sink until the tank is nearly empty, at which time the ball 16 settles and shuts off the outflow. At this stage the valve 22 is opened to its maximum and the water pours into the tank until float 24 has risen sufficiently to press valve 22 onto its seat and shut off the inflow.

It is, of course, understood that all of this mechanism is standard and possesses no novelty and is no part, per se, of the invention hereinafter claimed.

Assuming that the apparatus described, with-

out the addition of the invention, is on an upper floor of a building; that the normal water pressure has been temporarily cut off; and that a person on a lower floor has opened a water tap, it will readily be seen what must happen. The water drained away from below cannot be replaced from the main and a partial vacuum results in the system, producing a suction. Then, when any toilet on the upper floors is flushed, the water rushes through pipe 14 to the toilet, but a part of it is also drawn through pipe 20, past the now-open valve 22, and back into the main, thus contaminating the water supply. This action will continue throughout the time that valve 22 is open; and, as will be observed, the valve cannot close until a new supply of water again raises float 24. Therefore, when ball 16 resettles and closes the outlet, all the remaining water in the tank will be drawn into the main until the level reaches the bottom of pipe 20, when the vacuum will commence to draw air rather than water. This highly objectionable feature of toilets as they now function is eliminated by the invention, now to be described and best seen in Figs. 2 and 3.

As shown, the pipe 20 is screw-threaded at its upper end, and preferably screws into corresponding threads in head member 18. A disc 32 is provided centrally with a threaded aperture and is designed for vertical adjustment upon pipe 20. Surrounding pipe 20 is a cylinder 33 having a closed and preferably rounded end 34. At its other end, cylinder 33 is provided with a plurality of integral lugs 35 which converge in a ring 36, leaving between them openings 37. Ring 36 is internally screw-threaded so that it may be screwed upon pipe 20, in the same manner as is disc 32. Pipe 20 is provided, adjacent its upper end, with a plurality of holes 38, and cylinder 33 is adjusted so that the lower edges of openings 37 are slightly above the upper edges of holes 38. Disc 32 is adjusted as desired above the ring 36.

This apparatus operates as follows: As best shown in Fig. 2, the water level 12 is below the lower edges of openings 37, and it is therefore impossible for any water from the tank 10 to get back into cylinder 33 or pipe 20. When the tank is being filled, after flushing, the water flows as shown by the arrows; down pipe 20 and up cylinder 33 around the pipe, out openings 37 against disc 32 from which it is deflected downwardly to the surface of water in the tank. But when the objectionable features described above exist; when there is a suction in pipe 13 rather than a pressure, and the valve 22 is opened following a flushing of the tank, the water will start to flow in a reversed direction—down cylin-

der 33 and up pipe 20. But this will continue only momentarily; for when the level of water in cylinder 33 reaches the holes 38, the siphonic column will be broken and the suction will merely draw air through the holes 38. Thus the maximum of contaminating water which can reach the main is that minute quantity filling cylinder 33 between the bottoms of openings 37 and the tops of holes 38.

It is understood that this invention, while admirably suited to the apparatus shown, is equally valuable in other fields and arts, such as storage and other tanks for oils and gasoline, and it is not intended that the appended claims shall be limited in their interpretation to the specific form illustrated.

Having thus described my invention, I claim:

1. An apparatus comprising a tank for liquids, an intake pipe for the liquid, such pipe being in communication with a main in which the liquid is held under pressure and extending downwardly nearly to the bottom of the tank, the pipe having a hole near its upper end, in combination with means associated with the intake pipe for preventing siphonic back-flow of the liquid when the pressure is reduced in the said main, such means comprising a cylinder surrounding the intake pipe, said cylinder having its lower end closed and being provided with an outlet aperture adjacent its upper end and slightly above the said hole in the intake pipe and above the level of the liquid in the tank.

2. An apparatus as described in claim 1 in which the cylinder is removably adjustable upon the intake pipe.

3. An apparatus as described in claim 1 in which the cylinder is removably adjustable upon the intake pipe, in combination with a disc member removably adjustable on the intake pipe, such disc member being adapted to deflect the liquid downwardly as it flows through the outlet apertures of the cylinder.

4. An apparatus comprising a tank for liquids, an intake pipe for the liquid, said pipe being in communication with a main in which the liquid is held under pressure and extending downwardly nearly to the bottom of the tank, the pipe having a plurality of holes adjacent its upper end, in combination with means associated with the intake pipe for preventing siphonic back-flow of the liquid when the pressure is reduced in the said main, such means comprising a cylinder surrounding the intake pipe, said cylinder having its lower end closed and being provided with a plurality of outlet apertures adjacent its upper end and slightly above the said holes in the intake pipe and above the level of the liquid in the tank.

JAMES H. COX.