Oct. 19, 1937. L. J. VETRANO 2,096,148

WATER CLOSET

Filed May 20, 1935 3 Sheets-Sheet 1

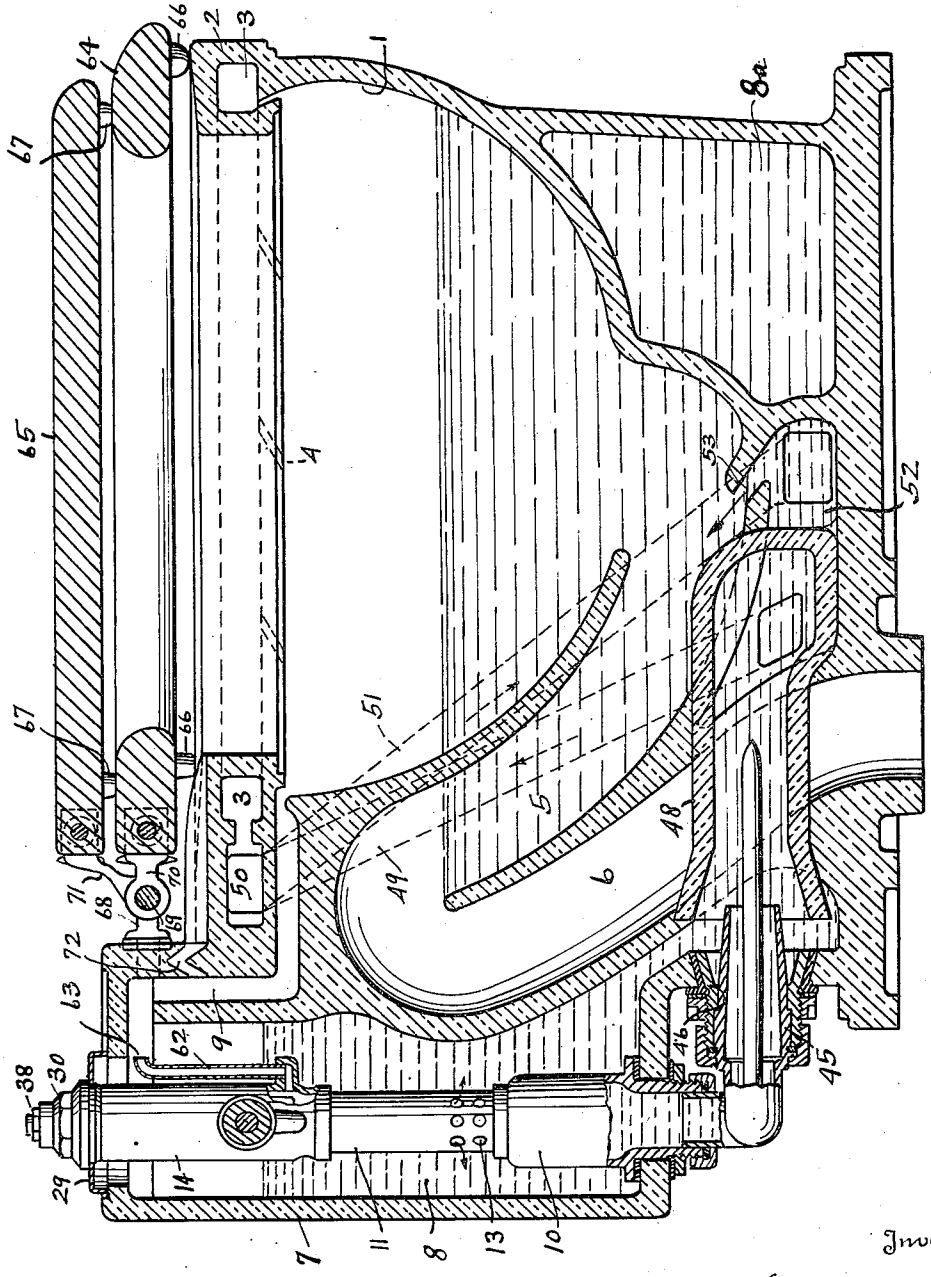



Fig. 1.

Inventor

Leon J. Vetrano

By Hardway & Cathey

Attorneys

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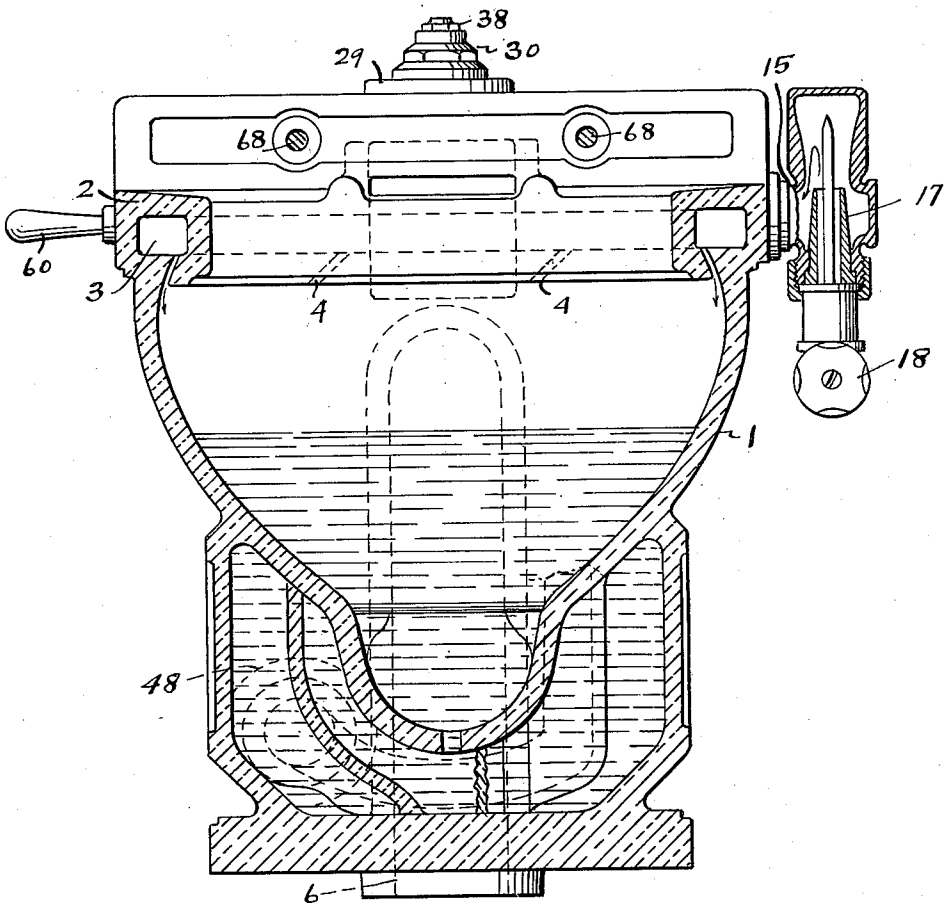



Fig. 2.

Inventor
Leon J. Vetrano

By Hardway & Cathey
Attorneys

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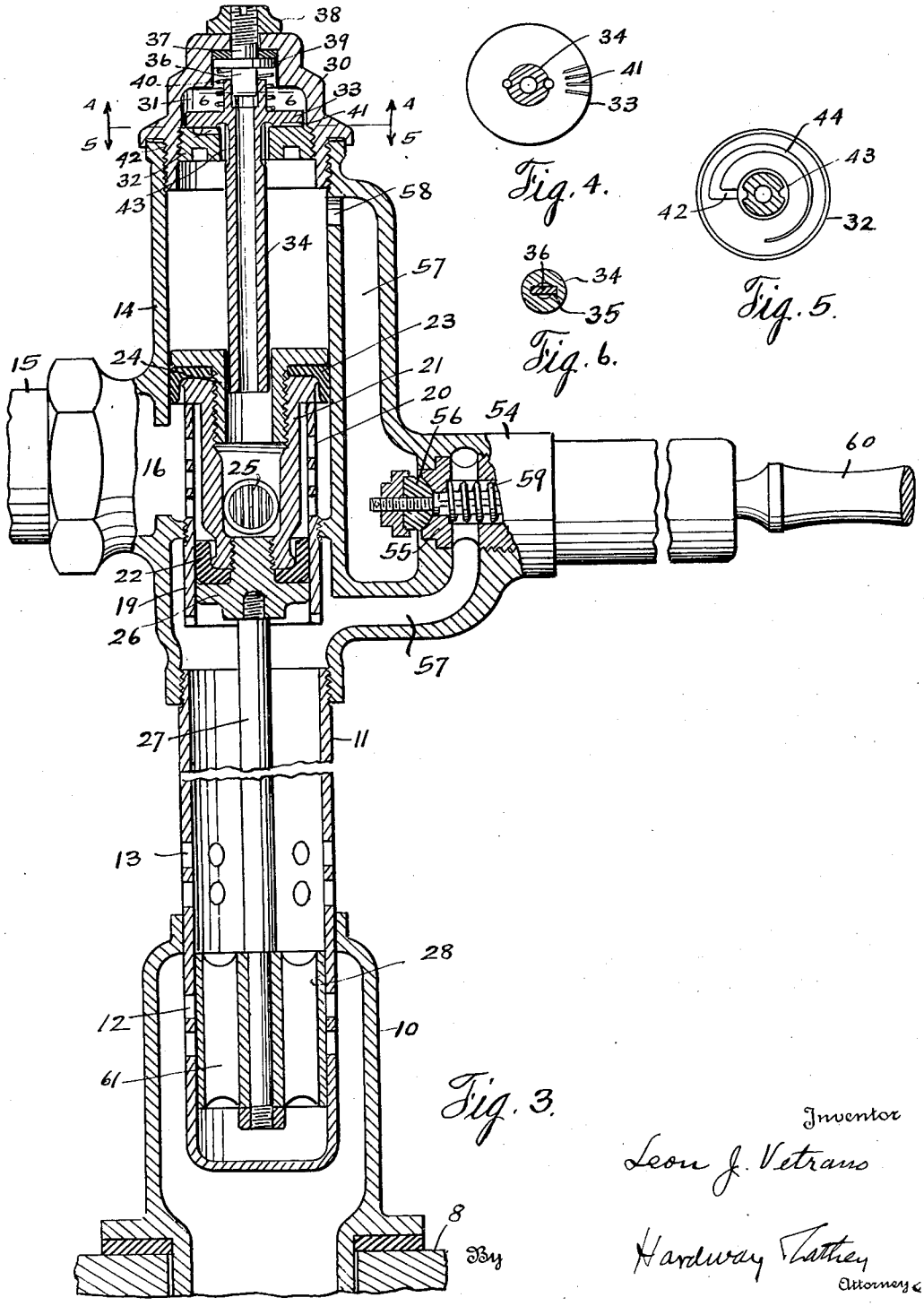



Fig. 3.




Fig. 4.




Fig. 5.




Fig. 6.

Inventor
Leon J. Vetrano

By Hardway & Rathey
Attorneys

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# UNITED STATES PATENT OFFICE

2,096,148

## WATER CLOSET

Leon J. Vetrano, Houston, Tex.

Application May 20, 1935, Serial No. 22,388

10 Claims. (Cl. 4—14)

This invention relates to a water closet.

An object of the invention is to provide a water closet of the character described having a novel type of valve mechanism for flushing the bowl of the closet.

Another object of the invention is to provide, in a water closet, a flushing valve mechanism that may be readily adjusted to regulate the flushing period.

Another object of the invention is to provide, in a water closet, a flushing valve mechanism of such construction that the parts will be readily cleansed of sediment or clogging material.

A further feature resides in the provision of a flushing valve mechanism for a water closet of such construction as to prevent the back-flow of liquid from the bowl into the water supply pipe.

It is another object of the invention to provide a water closet having an auxiliary water reservoir provided to contain an auxiliary supply of water to insure an ample supply for flushing the bowl, either when the supply pipe furnishes a sufficient supply of water, but has low pressure, or in case the supply pipe has adequate pressure, but not sufficient volume. This auxiliary reservoir may be located around the base of the bowl, and in the flushing valve housing formed integrally with the bowl, or may be entirely separate from the closet.

A further feature of the invention resides in the provision of novel means for connecting the closet seat and cover therefor to the anchor post so as to relieve the hinges, for forming the connection, of excessive strain, to the end that the seat bumpers will rest firmly on the top of the bowl and the cover bumpers will rest firmly on the seat.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation, and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Fig. 1 shows a longitudinal, sectional view of the closet.

Figure 2 shows a transverse, vertical sectional view.

Fig. 3 shows a vertical sectional view of the flushing valve mechanism.

Fig. 4 shows a horizontal sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 shows a horizontal sectional view taken on the line 5—5 of Fig. 3, and

Fig. 6 shows a horizontal sectional view taken on the line 6—6 of Fig. 3.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the water closet bowl which is of conventional construction and which is provided with the rim 2 therearound having the channel 3 therein.

Leading downwardly from the channel 3 are the discharge ducts 4 through which flushing water may be discharged against the inside of the bowl at the top, and these ducts, if desired, may be correspondingly inclined, or spiralled to impart a whirling motion to the water as it is discharged into the bowl to flush and cleanse the walls of the bowl and lessen the noise.

The bottom of the bowl is formed with a trap from which leads the discharge siphon having the up-leg 5 and the down-leg 6 for the usual and customary purpose.

At the rear of the bowl and preferably formed integrally therewith, there is the flush-valve housing 7 which contains the flush-valve mechanism, and which also contains a reservoir 8, for an auxiliary supply of flushing water.

Leading from the top of the reservoir 8 into the bowl at the rear, there is a channel 9 for a purpose to be hereinafter stated.

Secured to the bottom wall of the housing 7, there is a tubular anchor 10, and fitted through the upper end of this anchor, and secured thereto, there is a cylinder 11. The cylinder has the outlet ports 12 within the anchor 10, and the outlet ports 13 above said anchor. A valve casing 14 is attached to the top of the cylinder 11.

The water supply pipe 15 is connected into the valve casing 14, and the water may enter said casing through the side port 16 in the casing. This pipe 15 is suitably connected to the supply system, and the supply of water is delivered from the water system to the pipe 15 through the injector 17. The supply of water may be cut off from the bowl for repairs, or the like, through a suitable shut-off valve, as 18. Anchored in the valve casing 14, opposite the inlet opening 16, there is a cylindrical cage 19 whose upper end is provided with the inlet openings 20. There is a plunger having the tubular body 21 whose lower end is reduced in diameter to fit within and clear the cage 19, and whose lower end has the upwardly opening cup-ring 22 which fits closely within the cage. The upper end of the tubular body 21 has a downwardly opening cup-ring 23 clamped thereon by means of the tubular gland

24 which is screwed into the upper end of said body, and the cup-ring 23 fits closely within the valve casing above the cage. The plunger body 21 has one or more inlet openings, preferably covered with a screen, as 25. The lower cup-ring 22 may be clamped in place by the plunger head 26 which is screwed into the body and attached to said head, there is a depending stem 27, to the lower end of which is attached the cylindrical valve 28 which fits closely in the cylinder 11. In one position, the valve 28 closes the outlet ports 12, and in another position, closes the outlet ports 13. The upper end of the valve casing extends up through and above the housing 7 and a closure cap 29 surrounds said extended upper end and forms a close fit with the top of the housing 7 to completely close the space between the said valve casing and said housing.

Screwed into the upper end of the valve casing 14, there is a hood 30 containing a cylinder 31, and screwed into the hood beneath the cylinder, there is an annular valve seat 32. A disk valve 33 rests on said seat and has a tubular stem 34 whose lower end extends down into the passageway through the gland 24, but clears the walls of said gland passageway. The upper end of the tubular stem 34 has a transverse key-way 35 across the same through which the key 36 projects. This key is formed on the lower end of the cylindrical shank 37 which extends up through a central opening in the hood 30 and has the retaining nut 38 threaded thereon. On the shank 37 there is an annular disk 39, and surrounding the upper end of the stem 34, and interposed between the valve 33 and the disk 39, there is a coil spring 40 which normally holds the valve 33 seated against the seat 32. The under side of the valve 33 has the radially extended channels 41 cut therein, and the upper face of the seat 32 has a channel 42 which leads out radially from the central opening 43 thereof. This opening 43 is provided for the stem 34, and the channel 42 continues on around the upper face of the valve 32, but is of a gradually decreasing capacity, as indicated by the numeral 44 in Fig. 5. The margin of the valve 33 clears the walls of the cylinder 31 and the radial channels 41 communicate with the channel 44. The shank 37 may be readily turned by the use of a screw driver so as to turn the valve 33. Accordingly the amount of the water passing from the cylinder 31, above the valve 33, through the channels 41, 44, and 42, and thence through the passageway 43 may be regulated. As said valve 33 is turned to such position that the channels 41 will be out of communication with the channel 44 there will be substantially no leakage past the valve 33, but if said valve 33 is so turned that the channels 41 communicate with the channel 44, the water may pass through the channels from the cylinder 31 through said channels 41, 44, 42, and thence through the opening 43 into the valve casing above the plunger. It is obvious that as the valve 33 is turned to the left, the amount of this leakage will increase in accordance with the increased capacity of the channel 44 and vice versa.

Leading out from the bottom of the anchor 10, and extended inwardly through the rear wall of the closet, there is the injector 45. This injector extends through and is anchored in place by a suitable gland 46 which forms a water-tight joint with the wall to which it is anchored. Within the bottom of the closet there is the receiving tube 48 which, if desired, may be formed integrally with the closet; it is obvious, however, that the injector 45 and the tube 48 may be formed in a separate assembly, and inserted into the bottom of the closet and suitably anchored therein. From the inner end of the tube 48, a channel 49 leads upwardly through the wall of the bowl to the rim thereof and is connected by the cross-channel 50 with the channel 51 which leads downwardly within the wall of the bowl and is preferably on the opposite side of the bowl from the channel 49, and this last-mentioned channel terminates beneath the bottom of the bowl in the chamber 52, and leading upwardly therefrom into the bottom of the bowl 1, are one or more jet openings 53, only one being shown. The cross-channel 50 in the rim of the bowl is connected into the channel 3 which extends around said rim.

Normally the bowl will be filled with water, and the reservoirs 8 and 8*a*, the latter around the bottom of the bowl also will be filled with water, the level of the water in the reservoir 8 rising to the level of the upper end of the channel 51.

Formed integrally with one side of the valve casing 14, there is another valve casing 54 having the seat 55 therein which is normally closed by the inwardly opening valve 56. A relief channel 57 has its upper end connected into the valve casing 14, above the plunger therein through the port 58, and this relief channel leads through the valve seat 55 into the cylinder 11 beneath said plunger, and the channel 57 is normally closed by the valve 56. The valve 56 is normally maintained seated by the coil spring 59, but may be opened by manipulating the handle 60 in the usual way. When the valve 56 is opened, the equalizing pressure against the upper end of the plunger in the casing 14 will be at once relieved and the pressure of the water entering through the opening 16 against the cup-ring 23 will overbalance the pressure against the cup-ring 22, the latter having a smaller area than the former, and said plunger will be forced upwardly in the casing 14. The valve 28 will accordingly move upwardly, also closing the ports 13 and opening the ports 12, and the cup-ring 22 will have passed above the ports 20 of the cylindrical cage 19 so that the water from the supply pipe may pass freely down through the cylinder 11 and through the passageways 61 of the valve 28 and out through the ports 12, and will pass thence through the injector 45 and the tube 48, passing on up through the channel 49 and into the channels 3 and 51. The main volume of water will pass down through the channel 51 and up through the jet opening 53 into the bowl so as to start the siphon action of the water in the bowl; a part of the flushing water, however, passing around the channel 3 and through the jet openings 4 for flushing the walls of the bowl. The siphon action will continue until the supply of flushing fluid contained in the bowl and in the reservoirs 8 and 8*a* has been exhausted. If the pressure and volume of fluid in the supply pipe are adequate, sufficient water will be furnished to flush the bowl without that contained in the reserve reservoirs 8 and 8*a*, but if the pressure is low, or the volume inadequate, the reserve water in said reserve reservoirs will be exhausted, or partially exhausted to give an adequate flush of the bowl.

When the flushing operation is started, the lever 60 is released and the valve 56 immediately closed and water will begin to accumulate in the casing 14 above the plunger and said plunger will begin to descend. Upon descent of the plunger, the ports 13 will be opened by the valve 28, and

the ports 12 closed and the flushing fluid thus cut off from the injector 45. The descent of the valve 28 will be gradual so that some of the openings 13 are uncovered before the cup-ring 23 has passed beneath the lower ports 20 so that the water may continue to flow in through the supply pipe and opening 16, and ports 20, and thence through the cylinder 11 and out through the ports 13 to fill the reserve reservoirs 8 and 8a before the plunger reaches the limit of its downward movement so as to close the ports 12 and to cut off the flow of the inflowing water from the cylinder 11 and the ports 13.

The rapidity with which the water accumulates in the casing 14 above the plunger, and consequently the rapidity of the descent of the plunger, will be controlled by the adjustment of the valve 33. The length of time required for the flushing operation will accordingly be determined by the adjustment of this last-mentioned valve.

As hereinabove indicated, water which accumulates in the casing 14 above the plunger flows in through the screen, or screens, 26, and up around the tubular stem 34, as well as up through it. As the plunger moves up and down, any sediment that might tend to collect between the stem 34 and the plunger will be removed. When the plunger reaches the end of its upward movement, the head 26 will strike the lower end of the stem 34 and suddenly lift the valve 33 permitting the water, under pressure, in the cylinder 31 to flush in between the valve 33, and its seat to keep the same washed clean.

Connected into the valve casing 14, there is an upstanding refill tube 62 whose upper end 63 is overturned and directed toward the upper end of the overflow channel 9. During the flushing operation, with the plunger elevated in the casing 14, the inflowing water may also be discharged through said tube 62 into the overflow channel, thus providing additional flushing water, as well as water to refill the trap at the end of the flushing operation. If, for any reason, the supply of water in the supply system should fail, creating a vacuum in said system, the tube 62 acts as an air-supply tube so as to prevent back-siphonage of the water from the bowl into the supply system, thus avoiding pollution of the water in the supply system.

The numeral 64 designates the closet seat, and the numeral 65 designates the seat cover. The toilet seat is equipped with the legs 66 arranged to rest on the top of the rim 2 and the cover is provided with the legs 67 arranged to rest on the seat 64. Anchored to the forward side of the housing 7 at the top are the anchor posts 68, 68, which support the transverse rod 69. Pivotally mounted on this rod are the links 70, 71, whose forward ends are pivotally connected to the seat and cover respectively. This arrangement provides a flexible connection for the seat and cover so that they will readily assume position to permit the legs 66 to rest firmly on the rim 2, and to permit the leg 67 to rest firmly on the seat 64 without undue strain on the hinged connection between the seat and the cover and anchor post 68.

Leading through the front wall of the housing 7 near the top thereof, there is the duct 72 which is in the form of a trap, that is, it is of an inverted V-shape. In case the bowl should become clogged and the water should rise therein, and overflow, the rim 2, the polluted water from the bowl can not enter the overflow channel 9 and pass thence into the reservoir 8. This trap 72 also provides an air-inlet so that in case the closet is flushed while it is so clogged and overflowing air will be permitted to enter the reserve chamber 8 to prevent the formation of a vacuum therein.

The drawings and description disclose what is now considered to be a preferred form of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A water closet comprising a bowl having a siphon-like trap leading from the bottom thereof, a reserve reservoir for containing a reserve supply of flushing water, an inlet for flushing water, said bowl having a channel through which the water entering through the inlet may be delivered into the bottom of the bowl, injector means communicating with the reservoir through which said entering water and said reserve water may be delivered into said channel.

2. A water closet comprising a bowl, a rim on the bowl provided with a channel having ducts arranged to discharge water onto the inside of the wall of the bowl, injector means for supplying flushing water into the bowl, said bowl having a channel leading from the injector means to said rim channel and continuing as a return channel into the bottom of the bowl, said closet having a reserve chamber for a reserve supply of flushing water, said reserve chamber being connected into the ejector means whereby the reserve supply of water may be utilized to assist in flushing the bowl.

3. A water closet comprising a bowl, a valve housing associated with the bowl and containing a reservoir for a reserve supply of flushing water, valve mechanism in the housing having an inlet leading from a source of supply and also having outlets, one leading into the bowl and the other leading into the reservoir, said valve mechanism also including means operative by the pressure of the water and effective to control said outlets.

4. A water closet comprising a bowl, a valve housing associated with the bowl and containing a reservoir for a reserve supply of flushing water, valve mechanism in the housing having a valve casing provided with an inlet from a source of water supply and also provided with outlets, one leading into the bowl and another leading into the reservoir, means in the casing effective to control said outlets, said controlling means including a plunger normally balanced between static pressure in the casing to maintain the outlet into the bowl closed.

5. A water closet comprising a bowl, a valve housing associated with the bowl and containing a reservoir for a reserve supply of flushing water, valve mechanism in the housing having a valve casing provided with an inlet from a source of water supply, and also provided with outlets, one leading into the bowl and another leading into the reservoir, means in the casing effective to control said outlets, said controlling means including a plunger normally balanced between static pressure in the casing to maintain the outlet into the bowl closed, means for relieving the pressure on one side of the plunger to permit actuation of the controlling means by the inflowing water whereby the outlet into the bowl will be opened and the outlet into the reservoir will be closed.

6. A water closet comprising a bowl, a valve housing associated with the bowl and containing

a reservoir for a reserve supply of flushing water, valve mechanism in the housing having an inlet leading from a source of supply and also having outlets, one leading into the bowl and the other leading into the reservoir, said valve mechanism also including a plunger operative by the pressure of the water and a valve connected to the plunger and effective to control said outlets, said closet having an overflow channel leading from the reservoir into the bowl.

7. A water closet comprising a bowl, a valve housing associated with the bowl and containing water, valve mechanism in the housing having an inlet leading from a source of supply and also having outlets, one leading into the bowl and the other leading into the reservoir, said valve mechanism also including a plunger operative by the pressure of the water and a valve connected to the plunger and effective to control said outlets, said closet having an overflow channel leading from the reservoir into the bowl, said channel having a vent to free atmosphere.

8. A water closet comprising a bowl, a valve housing associated with the bowl and containing a reservoir for a reserve supply of flushing water, valve mechanism in the housing having an inlet leading from a source of supply and also having outlets, one leading into the bowl and the other leading into the reservoir, said valve mechanism also including means operative by the pressure of the water and effective to control said outlets, said closet having an overflow channel leading from the reservoir into the bowl, said channel having a vent forming a trap and leading to free atmosphere.

9. A water closet comprising a bowl, a housing associated therewith and containing a reservoir having an overflow channel leading into the bowl, a valve mechanism in the housing having an inlet for flushing water and having an outlet leading into the bowl, a refill tube connected with the valve mechanism and whose discharge end is directed toward the overflow channel, said valve means including means arranged to be actuated by the pressure of water, inflowing through the inlet, into position to communicate the outlet opening and refill tube with the inlet.

10. A water closet comprising a bowl, a valve housing associated with the bowl and containing a reservoir for a reserve supply of flushing water, valve mechanism in the housing having a valve casing provided with an inlet from a source of water supply and also provided with outlets, one of said outlets leading into the bowl and another leading into the reservoir, means in the casing effective to control said outlets, said controlling means including a plunger normally balanced between static pressure in the casing to maintain the outlet into the bowl closed, means for relieving the pressure on one side of the plunger to permit actuation of the controlling means by the inflowing water whereby the outlet into the bowl will be open and the outlet into the reservoir will be closed and means for controlling the speed of actuation of the controlling means.

LEON J. VETRANO.