Feb. 20, 1968 R. J. SARGENT ETAL 3,369,260

FLUSH APPARATUS FOR WATER CLOSETS

Filed Oct. 22, 1965 3 Sheets-Sheet 1

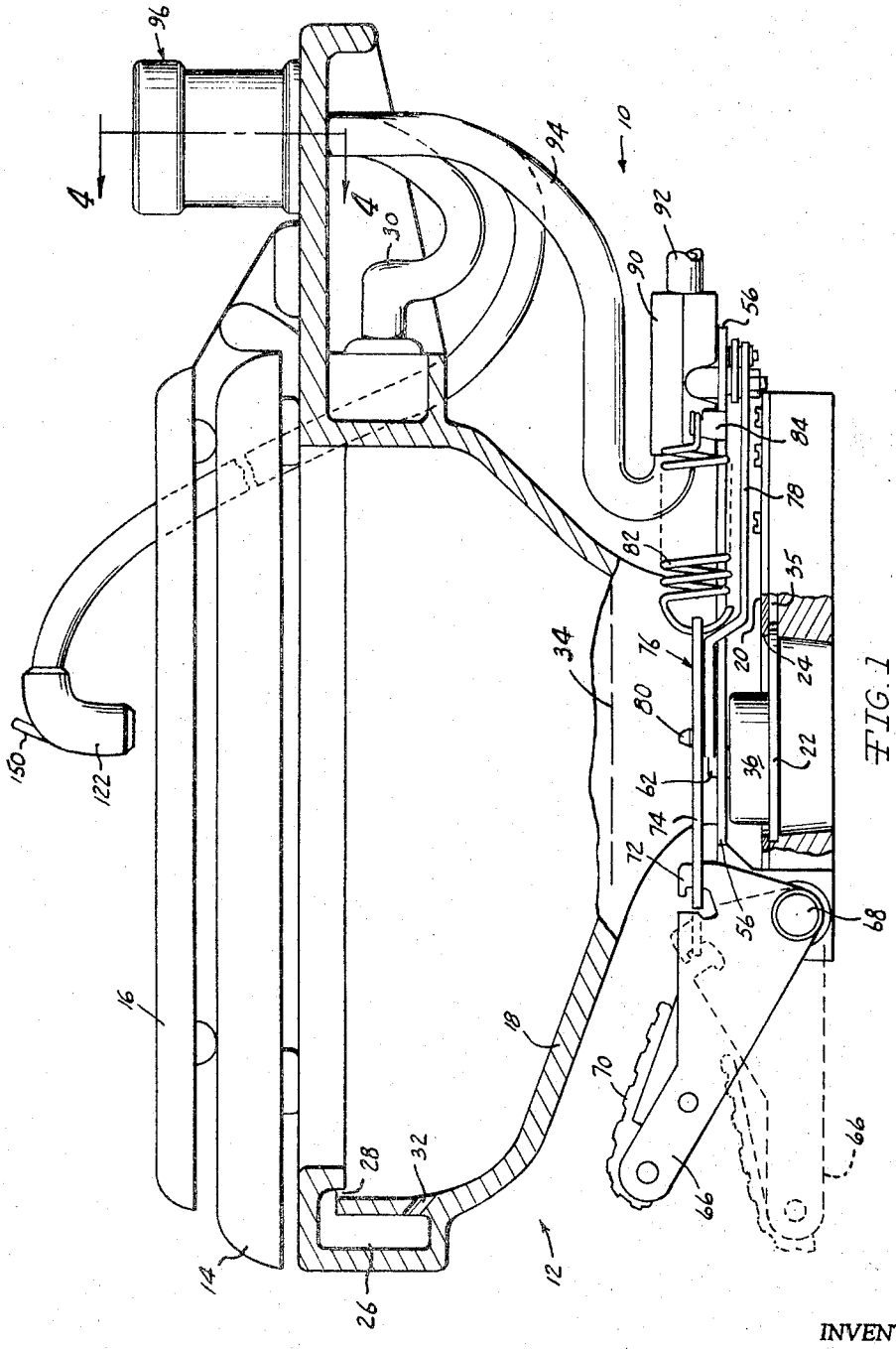


FIG. 1

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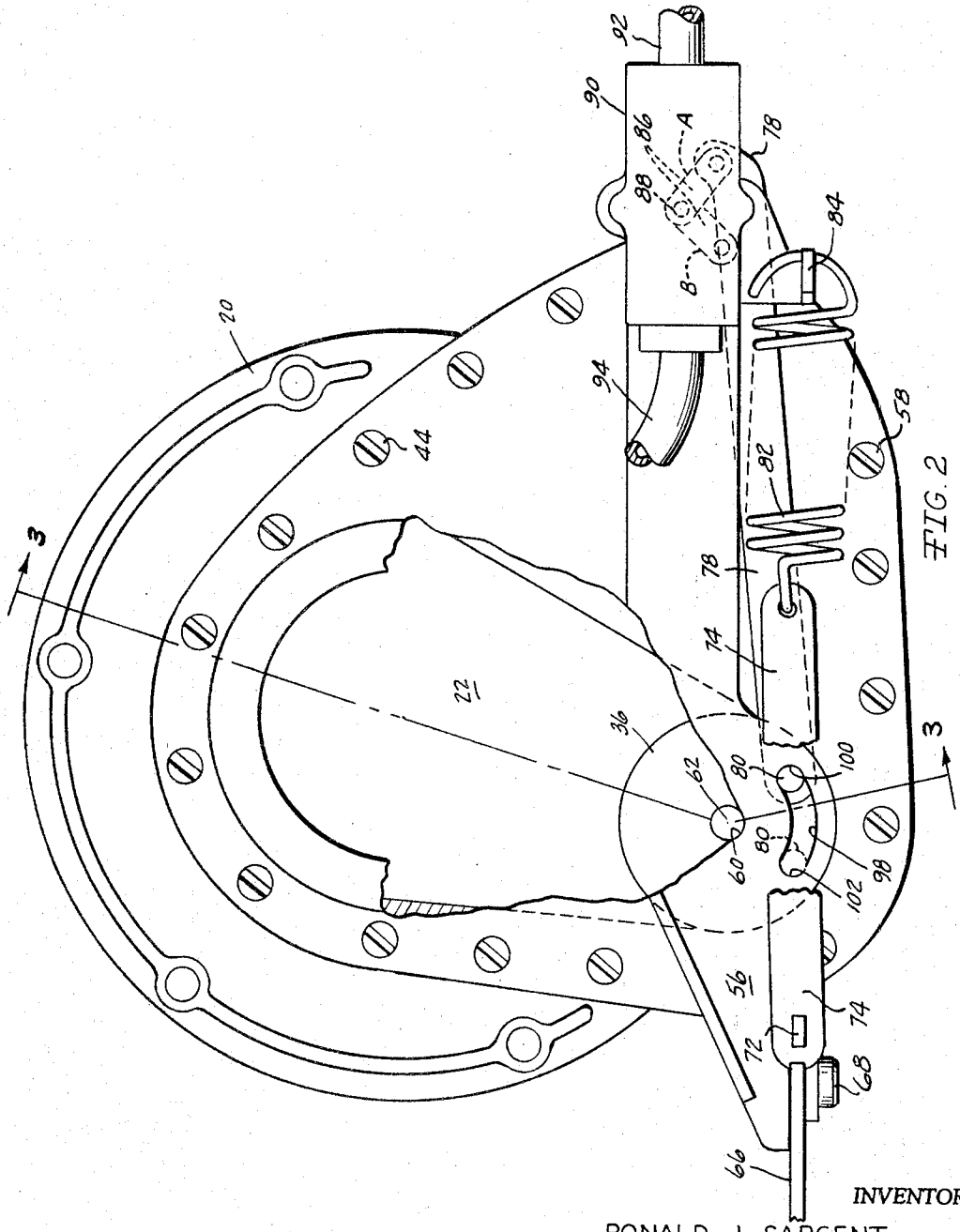


FIG. 2

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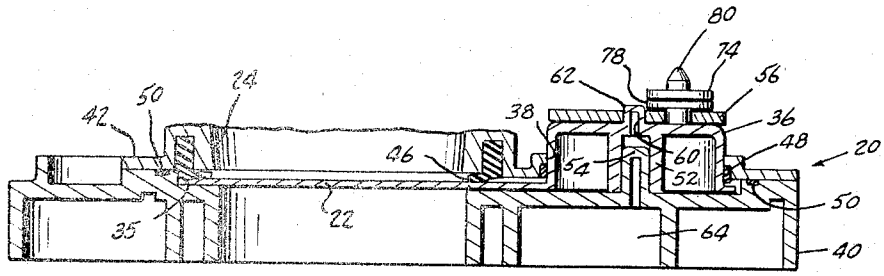


FIG. 3

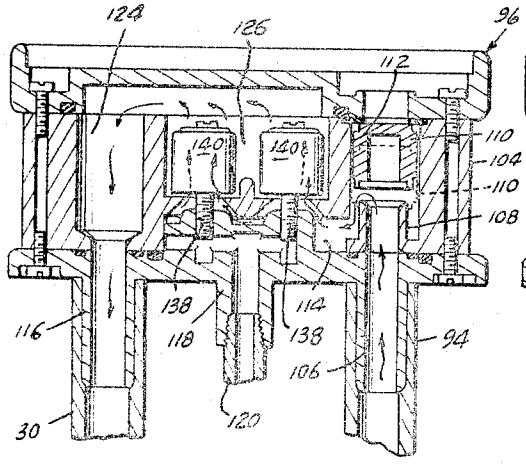


FIG. 4

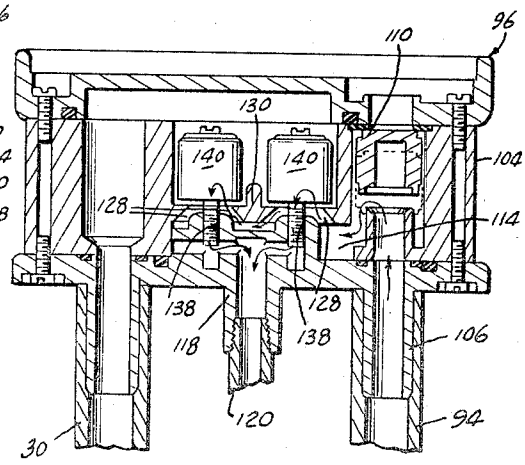


FIG. 5

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United States Patent Office 3,369,260 Patented Feb. 20, 1968

3,369,260

FLUSH APPARATUS FOR WATER CLOSETS

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11 Claims. (Cl. 4—79)

ABSTRACT OF THE DISCLOSURE

Flush apparatus for toilets adapted for use in mobile homes which includes a bowl having an annular chamber around the periphery into which flushing water can be introduced for discharge into said bowl, the latter having a discharge outlet normally closed by a gate valve. A rotary valve is positioned in the conduit for supplying water to said annular chamber, and a foot pedal and linkage is provided for opening and closing said gate valve and said rotary valve substantially simultaneously. A spray nozzle is connected by a flexible conduit to said water supply conduit downstream from said rotary valve, and a diverter is located in the water supply circuit in association with said spray nozzle so that if the spray nozzle is manually opened before said foot pedal is actuated to open the rotary valve, upon such rotary valve being opened the water then flowing in the conduit will be diverted through the spray nozzle rather than to flow into the annular chamber.

This invention relates generally to water closets of the type used in vehicles such as mobile homes, and more particularly to an improved flush apparatus for water closets of this type.

In the use of a vehicle equipped with a water closet it is sometimes necessary to conserve the water supply. Since each normal flushing operation of the water closet consumes a considerable amount of water, an adequate alternative to the normal flushing operation of the water closet is desirable. Furthermore, in water closets of this type it is desirable to provide a flush mechanism in which flushing water flowing through the closet will not leak around the flush mechanism. It is an object of this invention, therefore, to provide improved flushing apparatus for water closets in which a hand operated spray nozzle is associated with the flushing mechanism so that, when desired, the closet can be adequately flushed following use by means of the hand nozzle thereby enabling the user to accomplish an adequate flushing utilizing less than the normal amount of water.

A further object of this invention is to provide improved flushing apparatus for water closets which incorporates improved discharge valve mechanism for the closet which eliminates leakage of water around the operating parts of the flushing mechanism.

Still a further object of this invention is to provide improved flushing apparatus for water closets in which the closet is flushed with the normal and usual amounts of water each time, unless the user elects prior to opening of the discharge valve to the closet to use the hand spray attachment.

Still a further object of this invention is to provide improved flushing apparatus for water closets which is economical to manufacture, easy to install, has a long service life, and is efficient in operation to prevent leakage at the closet discharge valve and provide for flushing with a minimum amount of water when desired.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description, the appended claims, and the accompanying drawing in which:

FIGURE 1 is a side elevational view of a water closet equipped with the flush apparatus of this invention, with some parts broken away and other parts shown in section for the purpose of clarity, and illustrating parts of the apparatus in flushing position in broken lines;

FIGURE 2 is a plan view of the flush apparatus of this invention shown in FIG. 1, with the water closet removed for purposes of clarity;

FIGURE 3 is a transverse sectional view of the flush apparatus looking substantially along the line 3—3 in FIG. 2;

FIGURE 4 is a transverse sectional view of the waterflow control valve assembly in the flush apparatus of this invention, looking substantially along the line 4—4 in FIG. 1, and illustrating the valve assembly in a position in which waterflow is directed to the water closet for normal flushing flow therethrough; and

FIGURE 5 is a sectional view of the waterflow control valve assembly in the flush apparatus of this invention, illustrated similarly to FIG. 4, and showing the valve assembly in a position in which flow of flushing water is directed to a flexible line on which a hand spray nozzle is mounted.

With reference to the drawing, the flush apparatus of this invention, indicated generally at **10**, is illustrated in FIG. 1 in assembly relation with a water closet **12** consisting of an upright bowl **18** on which the usual seat **14** and cover **16** are mounted. The closet **12** is of the type commonly used in mobile homes and is therefore provided at the lower end of the bowl **18** with a valve housing **20** in which a gate valve member **22** is mounted. The gate valve member **22** normally closes an opening **24** (FIGS. 1 and 3) located in the valve housing **20** at the lower end of the bowl **18**. When the water closet **12** is being flushed, the gate valve member **22** is moved to a position to one side of the opening **24**. The upper end of the closet bowl **18** is formed with an encircling water chamber **26** provided with an upper end discharge opening **28** and conected to a water supply passage **30**. A single fill opening **32** communicates the lower end of the chamber **26** with the interior of the bowl **18**.

When the closet **12** is not in use, it is filled with flushing water to approximately the level indicated at **34** in FIG. 1. The closet **12** is normally flushed by actuating the apparatus **10** so as to move the gate valve member **22** to one side of the opening **24** so that the contents of the bowl **18** drop through the opening **24** into a suitable discharge line or receptacle (not shown). In response to actuation of the apparatus **10**, to open the valve member **22**, water from the inlet passage **30** is admitted to the chamber **26** for flow out the top opening **28** and downwardly along the inner side of the bowl **18** so as to flush and clean the bowl. When the apparatus **10** is released, so that the valve member **22** is moved to its closed position illustrated in FIGS. 1 and 3, incoming flow of water through the inlet passage **30** is discontinued, and the water in the chamber **26** leaks through the opening **32** into the bowl **18** so as to fill the bowl **18** to approximately the level indicated at **34** in FIG. 1 for a subsequent flushing operation.

In the flush apparatus **10** of this invention, the gate valve member is in the form of a flat blade of a size to slide horizontally in a cavity **35** formed in the valve housing **20**. One end of the blade **22** is integrally formed with an upright cylindrical boss **36** of a size to extend upwardly through a circular opening **38** in the housing **20**. In the illustrated embodiment of the invention the housing **20** is formed in two parts, namely, a lower part **40** and an upper part **42** secured to the lower part such as by screws **44**. The housing parts **40** and **42** are shaped so that they cooperate to provide the outlet opening **24** for the bowl

18, the circular opening 38 for the boss 36 and the cavity 35 in which the gate valve blade 22 moves which communicates with both the openings 24 and 38. An annular seal 46 carried by the housing 20 engages the blade 22 at a position around the opening 24. A second annular seal 48 carried by the housing 20 engages the periphery of the cylindrical boss 36, and a third annular seal 50 extends between the housing parts 40, 42.

The boss 36 is hollow and is formed with an inner tubular projection 52 which is rotatably supported on a pin shape projection 54 carried by the lower housing part 40. As a result, on rotation of the boss 36 on the projection 54, the gate valve blade 22 is movable from a position closing the opening 24 to a position to one side of the opening 24 and vice versa. During such movement, and at all other times as well, the seals 46, 48 and 50 prevent water from the bowl 18 from leaking around the housing 20.

A bracket 56 (FIGS. 1, 2 and 3), secured to the housing top part 42 by screws 58, is provided with an opening 60 through which an upwardly extending pin shape projection 62 on the boss 36 extends. The bracket 56, which is fixed on the housing 20, thus cooperates with projection 54 to provide for a two point pivot support of the boss 36 permitting rotatable movement of the boss 36 about its axis 64.

A lever 66, pivotally supported for up and down movement on a pin 68 carried by the bracket 56, is preferably provided with a foot pedal 70. The lever 66 is movable between an upper position shown in solid lines and a lower position shown in broken lines and has a leg 72 to which one end of a link 74 in a two-part link assembly 76 is attached. The link assembly 76 includes a second link 78 attached at one end to the link 74 by means of an upright pin 80. The opposite end of the link 74 is connected to one end of a tension spring 82 which is attached at its opposite end to a finger 84 on the bracket 56. The spring 82 thus acts to urge the lever 66 to its upper position, the lever 66 being movable downwardly to its lower position against the pressure of the spring 82.

The opposite end of the link 78 is connected to another link member 86 which is fixed to the actuating pin 88 in a rotary valve assembly 90 which is mounted in a fixed position on the bracket 56. The rotary valve assembly 90 is connected to a water supply line 92 which communicates with any suitable source of water (not shown) and a water inlet hose 94 which conveys the water from the valve assembly 90 to a flow control valve assembly 96 to be hereinafter described. When the link 86 is in the position indicated at A in FIG. 2, the rotary valve 90 is closed so that it prevents flow of water from the inlet line 92 to the hose 94. When the link 86 is moved to the position indicated at B in FIG. 2, the rotary valve assembly 90 is opened to allow water to flow from the supply line 92 into the inlet hose 94 and thence to the valve assembly 96.

As shown in FIGS. 2 and 3, the pin 80, which connects the links 74 and 78, is connected to the boss 36 at a position to one side of the boss axis 64. The pin 80 extends downwardly from the links 74 and 78 through an arcuate slot 98 in the bracket 56, and the spring 82 urges the link assembly 76 to a position in which the pin 80 is urged against one end 100 of the arcuate slot 98. When the lever 66 is moved downwardly to its broken line position shown in FIG. 1, against the pressure of the spring 82, the link mechanism 76 is moved to a limit position in which the pin 80 engages the other end 102 of the slot 98 as shown in broken lines in FIG. 2. When the pin 80 is in this latter position, the boss 36 has been rotated to a position in which the valve blade 22 has been moved to one side of the valve opening 24. Also in this position of the lever 66 the link 78 has been moved to a position in which the link member 86 has been moved to position B to open the rotary valve assembly 90. Thus, in the broken line lower position of the lever 66 illustrated in FIG. 1, the discharge outlet 24 for water closet 12 is open and water flows

through the inlet hose 94 to the valve assembly 96 shown in FIGS. 4 and 5.

The valve assembly 96 includes a valve housing or casing 104 provided with an inlet connection 106 attached to the inlet hose 94. An internal nipple 108 aligned with the fitting 106 is aligned with a backflow preventer body 110 slidably supported in a valve passage 112. In response to flow of water into the housing 104 through the inlet connection 106, the body 110 is moved upwardly to its solid line position shown in FIG. 4 so as to permit flow of water into an internal valve chamber 114. As soon as the flow of water into the casing 104 is shut off, gravity provides for a downward movement of the backflow preventer body 110 onto the upper end of the nipple 108, as shown in broken lines in FIG. 4, so as to prevent any backflow of water into line 94.

The valve casing 104 is provided with a first outlet fitting 116, attached to the inlet passage 30 for the bowl 18, and a second outlet fitting 118 connected to one end of a flexible hose 120 which carries at its opposite end a conventional hand spray nozzle 122. The fitting 116 communicates with the internal valve chamber 114 through an internal passage 124 which communicates with a second internal chamber 126 which in turn communicates with the chamber 114 through passages 128. An internal strut 130 in the valve casing 104 is formed with internally threaded passages 138 which communicate with the outlet fitting 118. A pair of diverter members 140 positioned in the chamber 126 and threaded into the passages 138 communicate internally with the passages 138.

The function of the diverter members 140 is to divert the water flowing from chamber 114 to outlet fitting 116 into outlet fitting 118 when desired. When the hand-operated spray nozzle 122, which is of conventional type having an internal valve which is opened when a lever 150 is depressed, is opened prior to opening of the rotary valve 90, the diverters 140 act, because of pressure conditions in hose 120 and chamber 126, to divert water from chamber 114 into passages 138 and hose 120. The flow of water under such circumstances is illustrated by the flow arrows in FIG. 5. When the hand spray nozzle 122 is not actuated, prior to depression of the lever 66, the pressure conditions in casing 104 are different and the flow of water is as illustrated by the flow arrows in FIG. 4. Commercially obtainable diverters 140 are suitable for this purpose. Examples of such diverters are illustrated in one or more of the following U.S. patents: 2,172,345, 2,314,071 and 2,587,961.

In the operation of the apparatus 10 of this invention, assume that it is desired to conserve the water supply in the vehicle in which the water closet 12 is installed. Prior to depression of the lever 66 so as to move the lever from its upper position to its lower position (FIG. 1), the lever 150 on the hand spray nozzle 122 is depressed so as to open the nozzle, and the nozzle is aimed at the interior of the water closet bowl 18. The operator then steps on the foot pedal 70 so as to move the lever 66 to its broken line position shown in FIG. 1 in which the boss rotating pin 80 is in the broken line position illustrated in FIG. 2 at the end 102 of the arcuate slot 98. This movement of the lever 66 is effective to move the gate valve blade 22 to its open position, allowing the contents of the water closet 12 to be discharged through the outlet opening 24. Movement of the lever 66 to this position is also effective to open the rotary valve 90 so that water flows into the valve assembly 96 through the inlet connection 106. The flow of water in the valve casing 104 is then as illustrated by the arrows in FIG. 5, the diverter members 140 acting to divert the flow of water entering the casing 104 into the outlet connection 118. This water flows through the hose 120 and the nozzle 122.

The operator then manipulates the nozzle 122 so as to adequately flush and clean the interior of the bowl 18. As soon as this flushing operation is completed to the satisfaction of the operator, the lever 66 is released, the

spring 82 returning the lever to its solid line position shown in FIG. 1, and the nozzle 122 is maintained in a position over the bowl 18 until all of the water has run out of the flexible line 120. In the event it is desired to refill the bowl 18 to the water level 34, the operator then briefly moves the lever 66 to its broken line position so as to open the rotary valve 90, leaving the hand spray nozzle closed. By then releasing the lever 66, after the chamber 26 has filled, sufficient water will leak through the opening 32 into the bowl 18 to fill the bowl to about the level indicated at 34. During normal flushing of the water closet 12, the pedal 66 is depressed, with no actuation of the hand spray nozzle 122. The result is waterflow, as indicated in FIG. 4, through the valve assembly 96 into the bowl 18 through the passage 30 and the chamber 26. The pedal 66 is depressed for as long as the flushing operation is desired to continue, with water flowing through rotary valve 90 for as long as lever 66 is held down.

From the above description it is seen that this invention provides improved flush apparatus whereby a vehicle water closet 12 can be flushed with only a necessary amount of water or in the conventional manner, whichever the user elects at the time of flushing. The hand spray nozzle 122 is operable, when it is desirable to conserve the water, to adequately cleanse the bowl 18. By virtue of the apparatus 10, the nozzle 122 is usable or not following each use of the water closet 12, without affecting a subsequent normal operation of apparatus 10 to flush the closet 12. By virtue of the one-piece gate valve 22 and boss 36, the seals 46, 48 and 50 and the particular mechanism utilized for rotating the boss 36, there is no danger of leakage of water from the closet 12 around the lever 66 and the linkage associated therewith.

It will be understood that the flush apparatus for water closets which is herein disclosed and described is presented for purposes of explanation and illustration and is not intended to indicate limits of the invention, the scope of which is defined by the following claims.

What is claimed is:

1. In combination, a water closet provided with a bowl having an outlet, means for opening and closing said outlet, passage means for supplying flushing water to said closet, valve means in said passage means, means for opening said valve means in response to opening of said closet outlet, a spray nozzle, means including a flexible line connecting said spray nozzle and said flushing water supply means downstream from said valve means so that water can flow through said flexible line and spray nozzle only when the outlet means of said bowl is open, and hand operable means for opening and closing said nozzle.

2. In combination, a water closet provided with a bowl having a manually operable discharge valve, supply means for supplying flushing water to said bowl in response to opening of said valve, a spray nozzle, conduit means connecting said nozzle and said flushing water supply means, hand operable means for opening and closing said nozzle, and diverter means positioned in said supply means and operable for diverting said flushing water from said bowl to said spray nozzle on opening of said nozzle prior to opening of said discharge valve.

3. In a water closet provided with an outlet, a gate valve mounted for pivotal movement about an axis located to one side of said outlet, said valve being movable between an open position to one side of said outlet and a closed position closing said outlet, passage means for supplying flushing water to said closet, a rotary valve in said passage, a spray nozzle, means including a flexible line connecting said spray nozzle and said passage means downstream from said rotary valve, hand operable means for opening and closing said nozzle, lever and linkage means connected to said valves for concurrently pivoting said valves to the open positions therefor, and means disposed in said water supply passage between said rotary valve and said flexible line diverting said flushing water in said passage from said closet to said spray nozzle on opening of said nozzle prior to operation of said lever and linkage means to open said valves.

4. In a flush assembly for a water closet having a valve housing at the lower end thereof, a gate valve mounted in said housing and movable to an open position to discharge said closet, means including a water inlet line connected to said closet for supplying flushing water thereto for downward flow through said housing on opening of said gate valve, a shutoff valve in said inlet line movable between open and closed positions, a foot pedal pivotally mounted on said housing for up and down movement, a spray nozzle, a flexible line connecting said nozzle to said inlet line at a position downstream from said shutoff valve, and linkage means connecting said foot pedal and said valves so that on downward movement of said pedal said gate valve is opened to discharge said closet and said shutoff valve is opened to allow water to flow to said closet and said flexible line.

5. A flush valve mechanism for a water closet which includes a valve housing having an opening through which the contents of said closet are discharged, a substantially flat gate valve blade mounted in said housing at a position closing said opening, seal means in said housing extending about said opening and engaged with said valve blade, an upright cylindrical boss formed integral with said valve blade at one side of said opening and pivotally supported on said housing for rotatable movement about the axis of said boss so that when said boss is rotated said valve blade is rotated to position to one side of said opening, bracket means mounted in a fixed position on said housing and extending across the top side of said boss, a lever pivotally mounted on said bracket for up and down movement, link means connected to said lever and extending across the top side of said boss with said bracket between said boss and link means, spring means extending between said bracket and said link means so as to urge said lever to an upper position, pin means extending downwardly between said link means and said boss providing for rotation of said boss in response to movement of said link means, said bracket having an arcuate slot therein concentric with said boss axis and having said pin means extended therethrough, said boss being in a position corresponding to a closed position of said valve blade in said upper position of said lever with said spring urging said pin against one end of said slot, said lever being operable on movement in a downward direction against the pressure of said spring to a lower position in which said pin is in the other end of said slot to move said valve blade to one side of said opening, and means connected to said link means for supplying flushing water to said closet in response to movement of said lever to said lower position.

6. A flush valve mechanism for a water closet which includes a valve housing having an opening through which the contents of said closet are discharged, a gate valve mounted in said housing at a position closing said opening, seal means in said housing extending about said opening and engaged with said valve, an upright boss formed integral with said valve at one side of said opening and pivotally supported on said housing for rotatable movement about an upright axis so that when said boss is rotated said valve is rotated to a position to one side of said opening, a lever pivotally mounted on said housing for up and down movement between upper and lower limit positions, link means connected to said lever, pin means extending downwardly between said link means and said boss at one side of the axis of said boss so that in response to movement of said link means said pin means is moved in an arcuate path about the axis of said boss so as to rotate said boss about said axis, said boss being in a position corresponding to a closed position of said valve in said upper position of said lever, said lever being operable on movement in a downward direction to said lower position to move said valve to one side of said

opening, and means connected to said link means for supplying flushing water to said closet in response to movement of said lever to said lower position.

7. A flush valve mechanism for a water closet which includes a valve housing having an opening through which the contents of said closet are discharged, a substantially flat gate valve blade mounted in said housing at a position closing said opening, seal means in said housing extending about said opening and engaged with said valve blade, an upright cylindrical boss formed integral with said valve blade at one side of said opening and pivotally supported on said housing for rotatable movement about the axis of said boss so that when said boss is rotated said valve blade is rotated to a position to one side of said opening, seal means in said housing extending about and engaged with said boss, lever means pivotally mounted on said housing for up and down movement, means connected to and extending between said boss and said lever means providing for rotation of said boss about the axis thereof on pivotal movement of said lever means, and means connected to said lever means for supplying flushing water to said closet in response to pivotal movement of said lever in one direction to move said valve blade to said position to one side of said opening.

8. A flush valve mechanism for a water closet which includes a housing provided with a discharge opening through which the contents of said closet are discharged, a valve member mounted in said housing at a position closing said opening, seal means carried by said housing and extending about said opening and engaged with said valve member, a cylindrical boss formed integral with said valve member and pivotally supported on said housing to one side of said opening for rotatable movement so that when said boss is rotated said valve member is rotated to a position to one side of said opening, a lever pivotally mounted on said housing, link means connected to said lever, means extending between said link means and said boss providing for rotation of said boss in response to movement of said link means, said boss being in a position corresponding to a closed position of said valve member in said one position of said lever, said lever being operable on movement to a second position to rotate said boss so as to move said valve member to one side of said opening, means including a water inlet line connected to said closet for supplying flushing water thereto for downward flow through said discharge opening, a rotary valve in said inlet line movable between open and closed positions, means connected to said link means for opening said rotary valve on movement of said lever to said second position, a spray nozzle, a flexible line connecting said nozzle to said inlet line at a position downstream from said second valve, and means in said inlet line between said second valve and the connection of said flexible line to said inlet line for diverting flow of water which would otherwise flow to said closet into said flexible line.

9. In a water closet provided with a valve housing having a discharge outlet through which the contents of said closet are discharged, valve means mounted in said housing for opening and closing said outlet, passage means for supplying flushing water to said closet, a valve member in said passage means, a flexible hose, a hand actuatable spray nozzle mounted on said hose, a flow control valve assembly having an inlet connected to said passage means downstream from said valve member, said assembly having a first outlet connected to said closet at a position above said valve housing for supplying flushing water thereto and a second outlet connected to said flexible hose, flow diverter means in said valve assembly between said inlet and said outlets, said diverter means operating to direct waterflow in said valve assembly from said inlet to said second outlet when said spray nozzle is actuated prior to flow of water from said inlet toward said outlets, said diverter means directing said flow to said first outlet in the absence of said prior actuation of said nozzle, and lever means mounted on said valve housing and connected to said valve means and said valve member for concurrently opening and closing said valve means and said valve member.

10. In a flush mechanism for a water closet having a discharge valve, a flexible hose, a hand actuatable spray nozzle mounted on said hose, a flow control valve assembly having an inlet connected to a water supply, said assembly having a first outlet connected to said closet for supplying flushing water thereto and a second outlet connected to said flexible hose, flow diverter means in said valve assembly between said inlet and said outlets, said diverter means operating to direct waterflow in said valve assembly from said inlet to said second outlet when said spray nozzle is actuated prior to flow of water from said inlet toward said outlets, said diverter means directing said flow to said first outlet in the absence of said prior actuation of said nozzle.

11. In a flush mechanism for a water closet having a discharge valve, a flexible hose, a hand actuatable spray nozzle mounted on said hose, a flow control valve assembly having an inlet, a water supply passage connected to said inlet, a shutoff valve in said passage, said assembly having a first outlet connected to said closet for supplying flushing water thereto and a second outlet connected to said flexible hose, flow diverter means in said valve assembly between said inlet and said outlets, said diverter means operating to direct waterflow in said valve assembly from said inlet to said second outlet when said spray nozzle is actuated prior to opening of said shutoff valve to provide for flow of water to said inlet, said diverter means directing said flow to said first outlet in the absence of said prior actuation of said nozzle, and backflow preventing means in said assembly operatively associated with said inlet.

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