United States Patent [19]

Eastman

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[54] **TOILET WATER TANK WITH LIGHT AND HEAVY FLUSH CONTROL**

[76] Inventor: **Edward A. Eastman,** 9726 E. 26th Ter., Independence, Mo. 64052

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[21] Appl. No.: **249,349**

[52] **U.S. Cl.** ..... **4/67 A,** 4/34, 4/57 P, 4/67 R

[51] **Int. Cl.**..... **E03d 5/10,** E03d 1/22, E03d 1/30 E03d 1/34, E03d/5/02

[58] **Field of Search** .. 4/67 R, 67 A, 57 R, 57 P, 34, 4/37, 40, 41; 220/4 B, 4 R

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Primary Examiner—Henry K. Artis
Attorney, Agent, or Firm—Lowe, Kokjer, Kircher, Wharton & Bowman

[57] **ABSTRACT**

A toilet is provided with light and heavy flush mechanisms to permit conservation of water. Two independent control valves disposed at different water levels within the tank are operable by actuator arms which are coupled with handles disposed externally of the tank in a manner which assures positive operation and economical construction. When the light flush handle is used, only the valve which is disposed higher in the tank is opened and 40 percent of the total water in the tank can be conserved. When the heavy flush handle is used, the lower valve opens draining a larger quantity of water from the tank while simultaneously opening the higher valve to substantially increase the flow rate of water from the tank.

6 Claims, 17 Drawing Figures

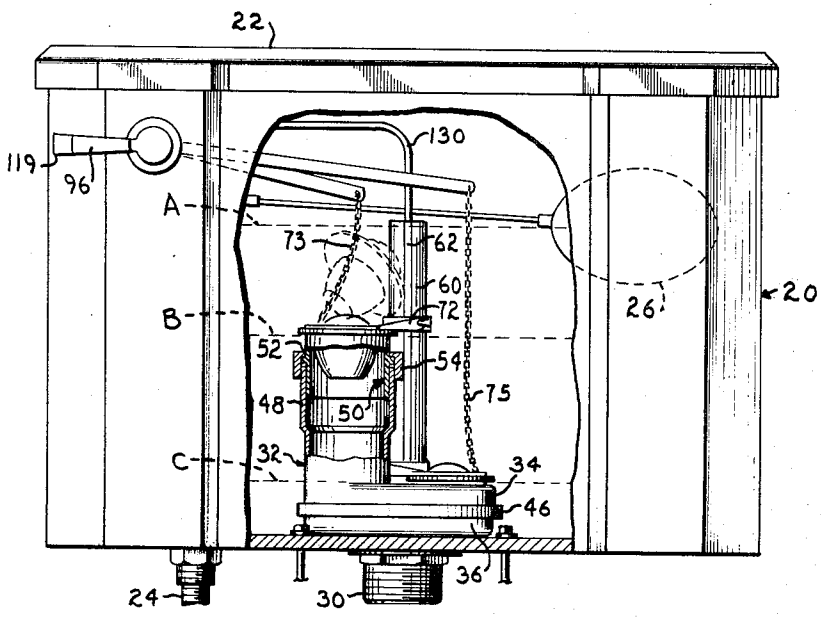


Fig. 1.

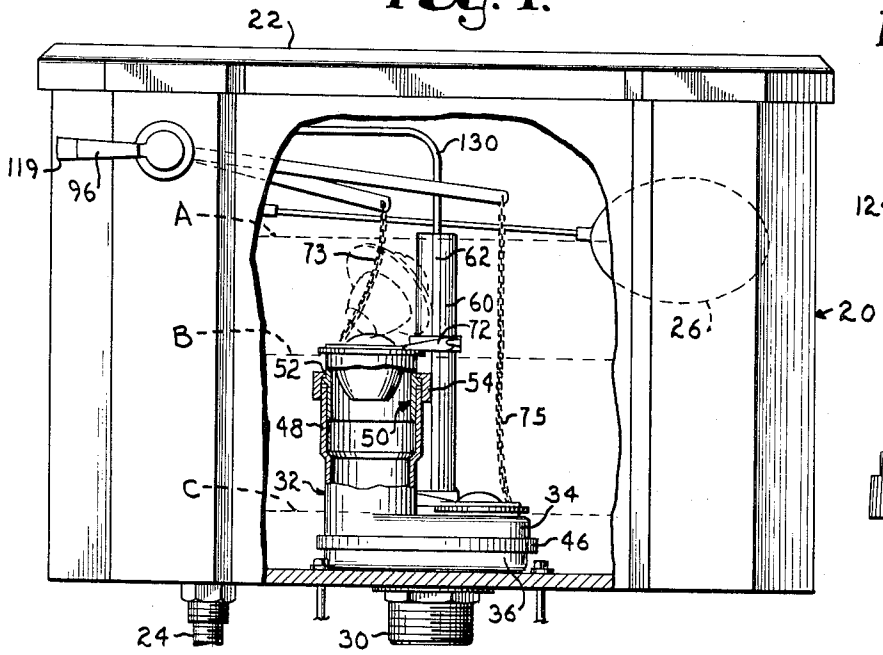


Fig. 16.

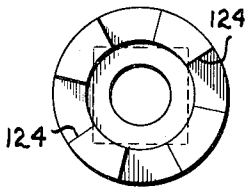


Fig. 17.

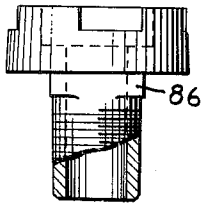


Fig. 15.

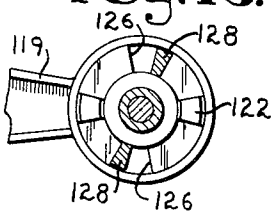


Fig. 2.

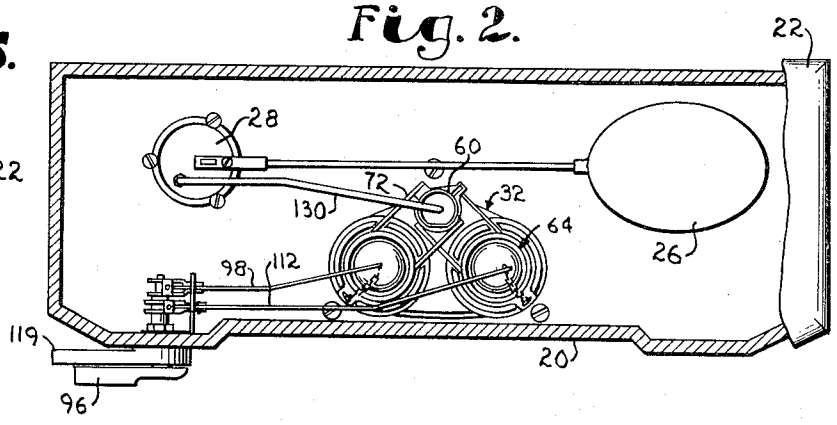


Fig. 12.

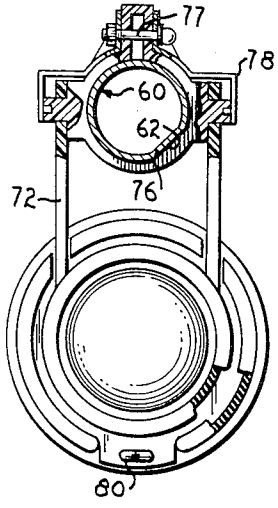


Fig. 11.

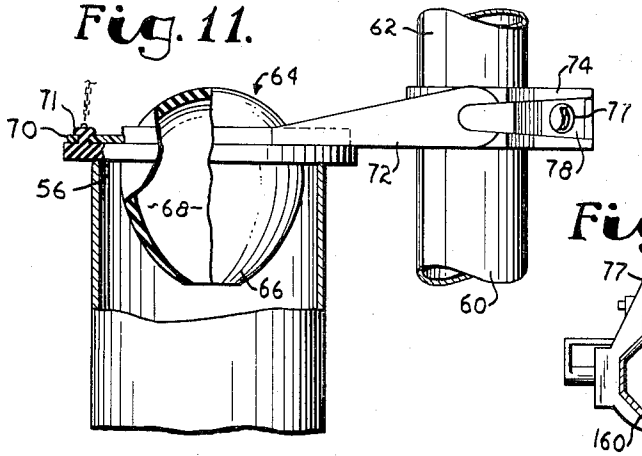


Fig. 13.

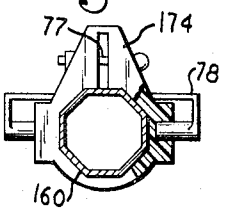


Fig. 3.

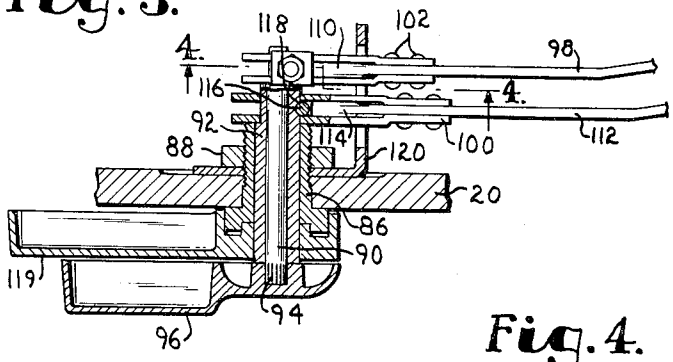


Fig. 14.

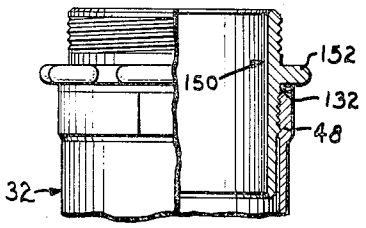


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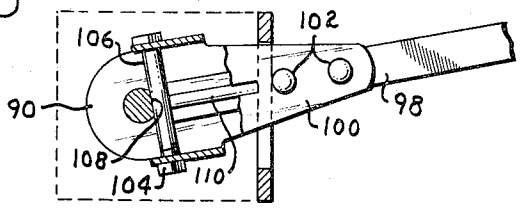


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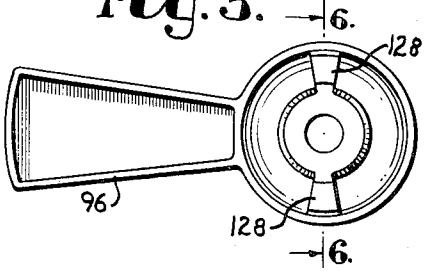


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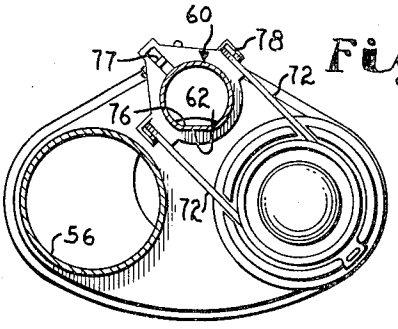


Fig. 10.

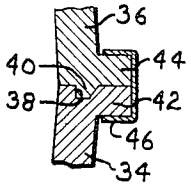
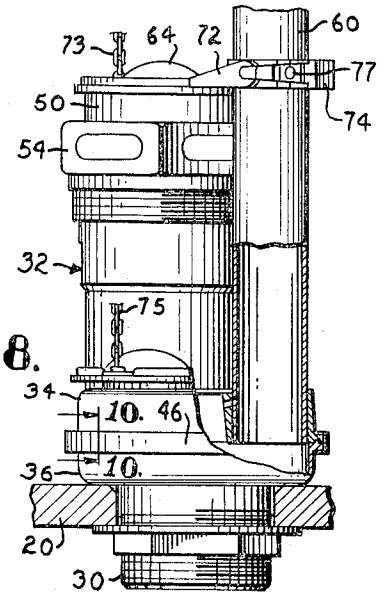


Fig. 7.

Fig. 6.

Fig. 8.



TOILET WATER TANK WITH LIGHT AND HEAVY FLUSH CONTROL

This invention relates to water conservation devices and, more specifically, to a toilet which can be flushed either using a small amount of water or a larger amount.

Conventional toilets offering only one flush using a given quantity of water often use more than is necessary to clean the toilet bowl and therefore waste a considerable quantity of water. Heretofore, attempts to produce a flush toilet having both light and heavy flush valves have been largely unsatisfactory. This has been attributable to their uneconomic construction and the fact that the working mechanism was frequently unreliable.

It is therefore, an object of the present invention to provide a toilet having a flushing mechanism which conserves water by allowing for two different flushes using two different quantities of water and wherein positive operating structure assures that each flush mechanism may work independently of the other in a reliable manner.

Another aim of this invention is to provide flapper valve structure for closing the inlet openings into a common basin which flapper valves are constructed to avoid any problem of the operating mechanism becoming entangled in the valves.

It is also an aim of my invention to provide a toilet flush mechanism as described in the foregoing objects wherein structure is provided to positively align the flapper valves on the inlet openings.

Another one of the objectives of my invention is to provide a flush mechanism for a toilet wherein both light and heavy flushes are possible and wherein the actuating arms which lift the flush valve are so constructed to permit them to be formed by a stamping process rather than a casting process thereby providing much more economical construction.

Still another object of this invention is to provide a flush mechanism for a toilet tank wherein both light and heavy flushes of water from the tank are possible and wherein the quantity of water passing from the tank on the light flush may be selected to release different quantities of water.

In the drawings:

FIG. 1 is a front elevational view of the toilet tank with portions being broken away to reveal the flushing mechanism within the tank;

FIG. 2 is a top plan view of the tank shown in FIG. 1 with the top largely broken away for purposes of illustration;

FIG. 3 is an enlarged fragmentary top plan view of the external handles which are coupled with the actuating arms for the flushing valve;

FIG. 4 is a vertical cross-sectional view taken along ling 4—4 of FIG. 3;

FIG. 5 is an enlarged elevational view of one of the flush handles;

FIG. 6 is a cross-sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is an enlarged elevational view of the flush basin with portions broken away and shown in cross section for purposes of illustration;

FIG. 8 is an elevational view taken from a position 90° removed from the position of FIG. 7 and revealing further details of the flush basin;

FIG. 9 is a top plan view of the flush basin with one of the flapper valves removed for purposes of illustration;

FIG. 10 is an enlarged fragmentary cross-sectional view taken along line 10—10 of FIG. 8.;

FIG. 11 is an enlarged fragmentary side-elevational view of one of the flapper valves illustrating the manner in which it is positioned on one of the inlet openings;

FIG. 12 is a top plan view of the flapper valve shown in FIG. 11;

FIG. 13 is a fragmentary top plan view of an alternative form of the valve mounting and aligning structure;

FIG. 14 is a fragmentary elevational view, with portions broken away and shown in cross section of an alternative form of structure for varying the quantity of water passing through the tank on the light flush;

FIG. 15 is an enlarged fragmentary detail view of the second flush handle;

FIG. 16 is an enlarged elevational view of the head of the mounting nut which receives the actuator shafts; and

FIG. 17 is a side-elevational view of the nut shown in FIG. 16.

Referring initially to FIGS. 1 and 2, a toilet tank is designated generally by the numeral 20 and is closed by a removable top 22. Tank 20 is normally mounted at the rear of and above a toilet bowl (not shown) for the purpose of introducing water into the bowl to flush it out whenever necessary. Water is introduced into tank 20 from a source such as inlet pipe 24 disposed at the bottom of the tank. The quantity of water entering the tank through pipe 24 is controlled by a float 26 which operates valve means of a type well-known to those skilled in the art and shown schematically in FIG. 2 and designated by the numeral 28. While float 26 may be adjusted to a relatively small degree to vary the quantity of water held within tank 20, it is in general intended to provide approximately five gallons of water for flushing purposes. Water empties from tank 20 through an outlet conduit 30 disposed at the bottom of the tank and aligned with a flush basin generally designated by the numeral 32.

Basin 32 comprises upper and lower portions 34 and 36 which are sealingly interconnected as best illustrated in FIG. 10. Upper portion 34 has a groove 38 along its peripheral edge which receives a tongue 40 in the peripheral edge of lower portion 36. Both upper and lower portions 34 and 36 have integral outturned flanges 42 and 44 respectively, which provide a surface for attaching a sealing clamp 46. Clamp 46 is preferably made with one bend preformed in it and with a line of weakness at the point of the second bend to facilitate securing of the clamp on flanges 42 and 44. It will be appreciated that the substantial surface area presented by the tongue-and-groove configuration and the complementally mating flanges 42 and 44 substantially precludes the entrance of any moisture into the interior of basin 32 and thus presents a water-tight seal. Of course, other forms of fastening upper and lower portions 34 and 36 could be utilized including ultra-sonic welding in the case where the portions are constructed from an appropriate plastic material.

Integral with and extending upwardly from portion 34 is an upright stack 48 upon which is seated an elongated nipple member 50. Member 50 is provided with

an externally circumferintially extending shoulder **52** which is disposed on the peripheral edge of stack **48.** A threaded collar **54** mates with complemental threads on the exterior of stack **48** to securely hold member **50** in place. The nipple member **50** presents a first inlet opening **56** communicating with the interior of basin **32.** A second inlet opening **58** which is disposed at a level substantially lower in tank **20** than opening **56** is provided into basin **32.**

A stand pipe **60** which provides an overflow from tank **20** extends upwardly from basin **32** and communicates the interior of the basin with the atmosphere above the highest level of water in tank **20.** Pipe **60** has a flat aligning face **62** along one side for purposes to be made clear hereinafter. Valve means is provided for closing inlet openings **56** and **58** in the form of first and second flapper valves **64.** Since the valves **64** are identical, only one of the same will be described with corresponding reference numerals being used on the two valves to indicate corresponding components. As best illustrated in FIG. **11,** valve **64** has a generally flexible portion **66** which sealingly engages the peripheral edge of inlet opening **56.** Portion **66** is formed to present a hollow enclosure **68** for entrapping air and causing the valve to float when it is lifted from its seat. Lower yieldable portion **66** of valve **64** extends upwardly and grasps an upper portion **70** preferably made of a relatively rigid material, which upper portion presents a framework for supporting portion **66.** A tab projection **71** extends upwardly through the rigid material for securing an actuating link such as chain **73** or **75.** Extending outwardly and away from valve **64** are a pair of integral mounting arms **72** which are pivotally disposed on a mounting collar **74.** Collar **74** is provided with a flat aligning face **76** which is complemental to and mates with aligning face **62** to assure proper positioning of valve **64** over the appropriate inlet opening. Finally, a jaw action clamp **78** securely holds collar **74** on stand pipe **60.** Manifestly, the construction of clamp **78** serves as both a retainer and a shield to keep the chains **73** and **75** from becoming entangled with retaining screws **77.** It will be understood, of course, that flapper valve **64** and its associated mounting arms could be constructed from integral molded plastic as a unit.

The actuating mechanism for operating valves **64** comprises a bolt **86** which passes through the sidewall of tank **20** and is held in place by a nut **88.** Bolt **86** has a through bore for mounting first and second actuating shafts **90** and **92.** First shaft **90** has a knurled end **94** which projects from the tank and mounts a first operating handle **96** disposed at the front of tank **20.** Although shafts **90** and **92** are shown as having rounded outer surfaces, it will be understood that a hexagon configuration could be utilized with a groove in one end and an offset for a rivet in the other end.

A laterally extending actuating arm **98** is disposed at the opposite end of shaft **90** and is mounted on the latter by a bifrocated bracket **100.** A pair of fasteners such as rivets **102** pass through the arm and the bracket. As best illustrated in FIG. **4,** bracket **100** is provided with a pair of integral wings **104** which span the distance between the two spaced elements of bracket **100.** An actuating rod **106** which is generally perpendicular passes through wings **104** and is proximal shaft **90.** Rod **106** may be tightened against wings **104** to effectively clamp shaft **90.** Shaft **90** has a lifting face **108** which engages rod **106** and transmits torque from shaft **90** into a lifting force to raise arm **98** by virtue of the clamping action of wings **104** and rod **106.** It is to be noted that the end of arm **98** presents a corrugated section **110** that serves as a spacer between the elements of bracket **100.** The particular construction of arm **98** is specifically adapted to a stamping operation and is therefore much more economical to construct than conventional arms which must be cast.

A second actuating arm **112** is mounted on shaft **92** by a bracket **100** in the same manner as previously described for arm **98.** Arm **112** also has a corrugated end section **114** which serves as a spacer between the elements of bracket **100.** A second actuating rod **116** passes through the wings **104** of second bracket **100** and engages a lifting face **118** on shaft **92.** A second handle **119** is disposed on the end of shaft **92** opposite lifing face **118,** and between the first handle **96** and tank **20.** An L-shaped stop **120** is secured to tank **20** by nut **88** and arms **98** and **112** are limted in their degree of vertical movement by this stop.

Handle **119** is provided with a pair of finger-like projections **122** (FIG. **15**) which are received within windows **124** on the head of bolt **86** to thereby accommodate a limited degree of movement of the handle. Handle **119** also has a pair of windows **126** which receive projections **128** (FIGS. **5** and **6**) on handle **96.**

In operation, handle **96** may be operated to move arm **98** and open first valve **64** independently of the second valve. As best understood from viewing FIG. **15,** projections **128** on handle **96** may move through an arc of approximately 23° before butting against the opposite end of window **126** on handle **119.** As arm **98** moves upwardly, it will raise valve **64** into the position shown in broken lines in FIG. **1** to allow water to pass through the basin and into the toilet bowl. It is to be noted that with chain **82** disposed immediately above valve **64** and with the valve having a rounded outer periphery it is impossible for the chains to become entangled in the valve. Water in the tank will move from its normal level indicated by the letter "A" in FIG. **1** to the level indicated by the letter "B". This will drain approximately 60% of the total water from the tank to provide a light flush.

When a heavy flush is desired, handle **119** is moved downwardly to rotate shaft **92** and raise arm **112.** Because of the relative positions of windows **126** and projections **128,** handle **96** will also be rotated simultaneously to open the light flush valve at the same time the lower heavy flush valve is opened. This will provide an even more effective flush than would be possible with the heavy flush valve alone. It would, of course, be possible to utilize a pair of chains extending from the heavy flush valve to simultaneously open the light flush valve rather than rotating the light flush actuator shaft and associated arm as is the preferred construction. The heavy flush valve **64** when open will allow the water in tank **20** to empty down to the level indicated by the letter "C" in FIG. **1.** As tank **20** is refilled by water entering the tank through pipe **24,** a small quantity of the water will be diverted through a line **130** to permit filling of the toilet bowl.

An alternative form of construction for stand pipe **60** is illustrated in FIG. **13.** In this instance a stand pipe **160** having an octagonal cross section is provided for proper mounting of valves **64.** As indicated, with the stand pipe **160** a collar **174** having a complemental octagonal configuration is provided for mounting flapper

valves **64.** This assures that the valve **64** will be properly aligned with one of the inlet openings to station **32.**

An alternative construction for nipple member **50** is indicated in FIG. **14** and comprises a member **150** having external threads on opposite ends and a circumscribing peripheral shoulder **152.** Shoulder **152** is provided with a number of wrench flats to allow member **150** to be tightly disposed at the top of stack **48** with a sealing gasket **132** between the shoulder and the peripheral edge of stack **48.** The quantity of water used during the light flush may be varied by simply removing member **150** from stack **48** and threading the opposite end of the member into the stack. With either member **50** or **150,** it may be desirable to chrome plate the member for added wear life.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a toilet having a tank, a source of water into the tank, and means for turning on and off the water from said source, which means is operably controlled by the height of the water in the tank, the improvement comprising:

a basin disposed in said tank,

said basin having first and second intercommunicating inlet openings from said tank with the second opening disposed lower in the tank than the first opening and an outlet opening from said basin intercommunicating with said inlet openings and communicating with an outlet from said tank;

first and second valves for closing said first and second inlet openings respectively,

said valves being movable to open positions to allow the passage of water through said basin and out of said tank;

first and second actuator arms coupled with said first and second valves respectively;

first and second actuator shafts disposed one within the other and being movable independently,

each of said shafts having one end projecting from said tank and a lifting face on one side thereof at the opposite end, said lifting face being generally perpendicular to the longitudinal plane of the shaft,

a lifting rod for each of said arms independent of a respective shaft, disposed in engagement with the said lifting face and coupled with a respective arm,

whereby when a respective shaft is rotated said face transmits the torque from the shaft into a lifting force to lift said rod to thereby move a respective arm and open the valve coupled therewith.

2. The invention of claim **1,** wherein is included a handle member on said one end of each of said shafts; one of the handles being disposed behind the other, said one handle having a window opening therein and the other handle having a finger projection extending into the opening, said opening being of a width greater than the corresponding dimension of said projection whereby said other handle may be operated independently of said one handle and the latter may be utilized to simultaneously operate said other handle.

3. The invention of claim **1,** wherein is included valve anchoring structure for mounting said valves, said structure having means thereon for assuring proper alignment of said valves with said inlet openings.

4. The invention of claim **3,** wherein said structure presents an air passage into said basin.

5. The invention of claim **1,** wherein said basin comprises upper and lower portions presenting peripheral edges disposed in contact with one another, one of said edges presenting a tongue and the other edge presenting a groove for complementally receiving the tongue.

6. The invention of claim **5,** wherein said basin comprises an elongated nipple member presenting said first inlet opening, said nipple member having opposed end sections of different lengths and being movable from a first position disposed on said upper portion wherein one of said sections projects from the upper portion to an inverted position wherein the other of said sections projects from the upper portion to thereby vary the quantity of water disposed above said first inlet opening.

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