Nov. 10, 1970 G. R. WEISZ 3,538,519

ACTUATING MECHANISM FOR TOILET FLUSH TANKS OF THE DUAL-FLUSH TYPE

Filed Oct. 23, 1968 2 Sheets-Sheet 1

FIG. 1

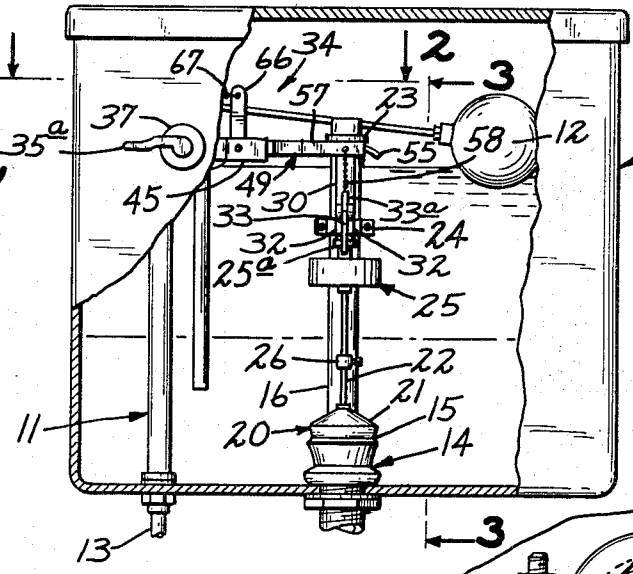


FIG. 2

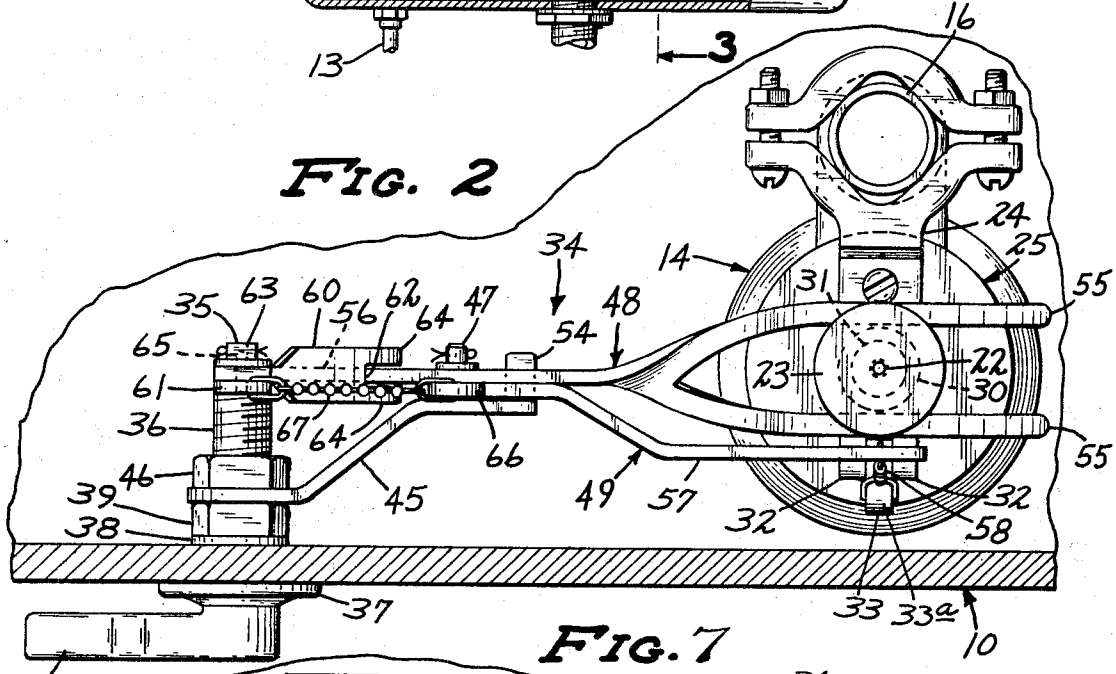
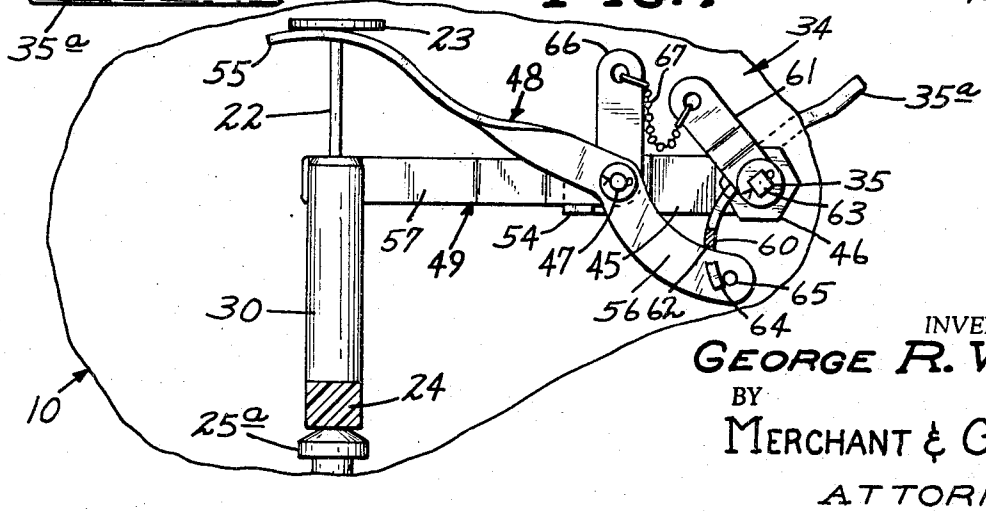


FIG. 7



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FIG. 4

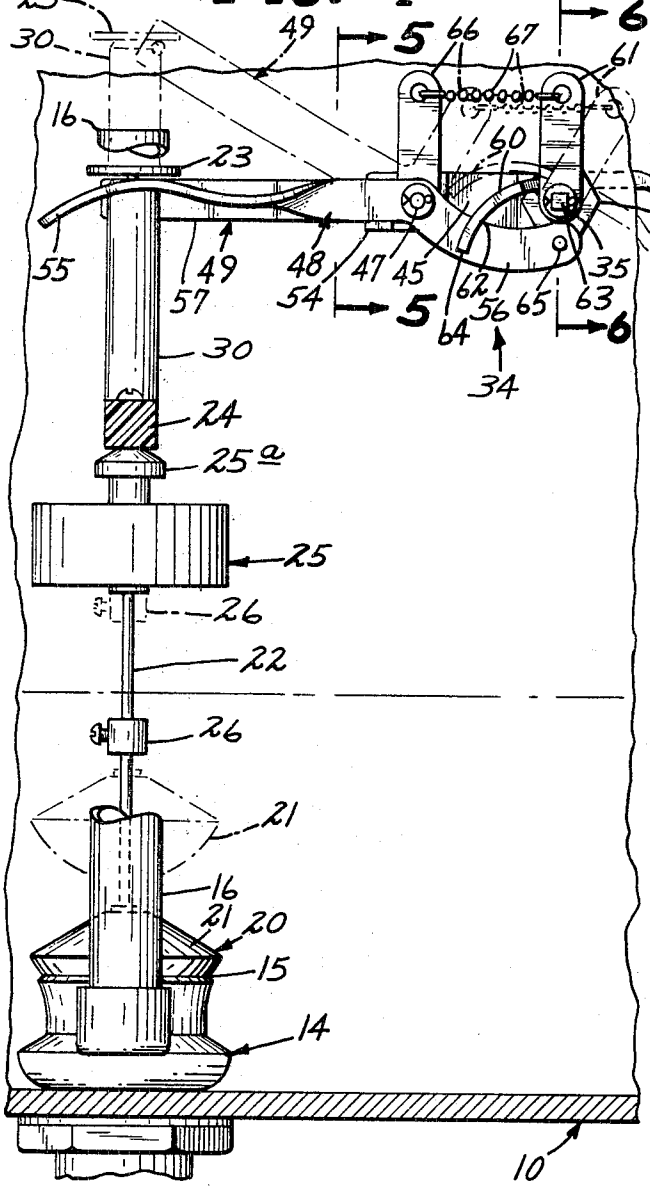


FIG. 3

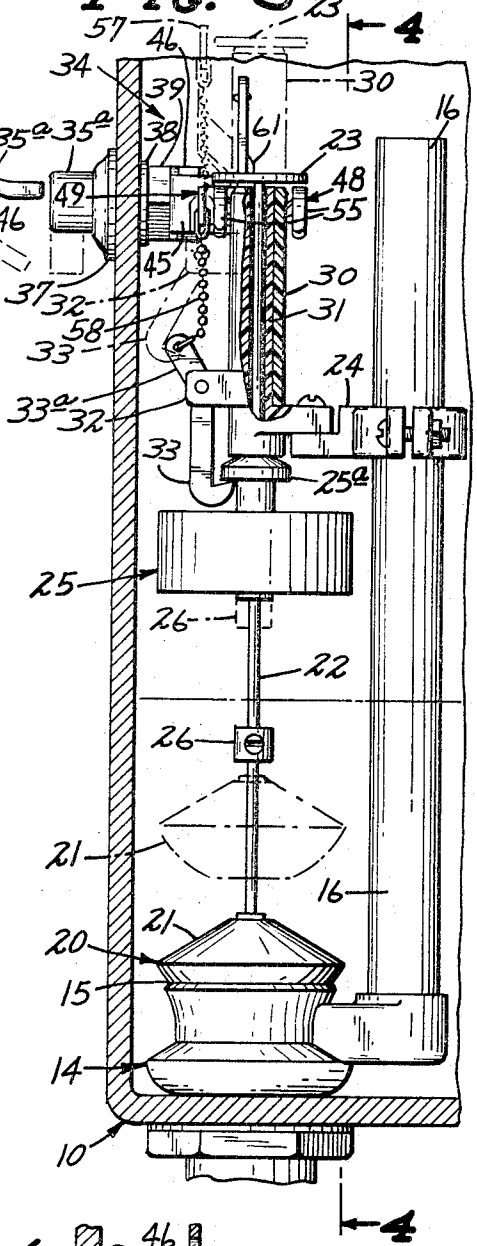


FIG. 5

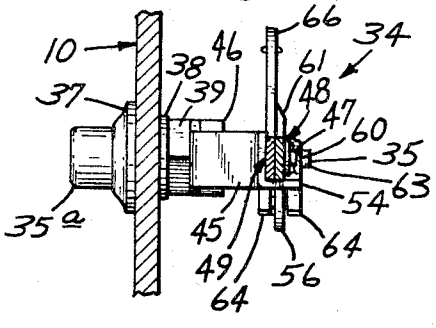
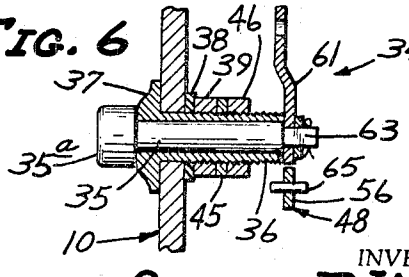


FIG. 6



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ACTUATING MECHANISM FOR TOILET FLUSH TANKS OF THE DUAL-FLUSH TYPE

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Int. Cl. E03d 1/34
U.S. Cl. 4—67 9 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for selectively actuating a dual flush cycle in toilets having a first and second lever means which is mounted on a common pivot for operable engagement with a first and second float means, the first and second float means being mounted in the toilet flush tank to control the flow of fluid therein through the fluid outlet thereof, a handle equipped spindle being mounted in a wall of the toilet flush tank. Means including lost motion mechanism connects the spindle to the first and second lever means whereby movement of the handle in one direction causes a full flush cycle and movement of the handle in an opposite direction causes a partial flush cycle of the toilet.

BACKGROUND OF THE INVENTION

Field of the invention

In circumstances wherein a shortage of water exists or where it is necessary to use a minimum of water during flushing of a toilet, such as when the toilet is connected to a cesspool system of sewerage, it is advantageous to provide dual flushing systems which utilize a full flushing cycle for solid waste products or a partial flushing cycle for liquid waste products.

Description of the prior art

Many prior art devices for causing such dual flushing cycles in toilets have been manufactured and patented. Such devices are often hard to operate due to poor leverage characteristics of the actuating mechanism thereof and multiple exterior actuating handle arrangements. Also such devices often include parts which are arranged in a manner wherein lateral forces are exerted on cooperating parts thereof in a manner to cause poor seating of the float means for stopping the flow of water at the termination of a flushing cycle or binding of the actuating lever during movement thereof. A further problem has been the wear factor between moving parts which result in poor operation and readjustment of the relative positions of the cooperating parts of the flush tank.

Some examples of patented prior art devices are shown in the following patents: 2,532,977; 2,674,744; 2,775,772; and 3,380,077.

SUMMARY OF THE INVENTION

With the above in mind, there is provided an improved actuating mechanism for toilet flush tanks of the dual flush type, having a fluid inlet, with a valve equipped float connected to the inlet to control the level of fluid in the tank, and a fluid outlet means. A first float means, including a vertically extended shaft having a plate on the extended upper end thereof and an adjustable stop element in spaced relation to the float means is operatively connected to the outlet means for movements toward and away from the outlet means to release a predetermined volume of fluid through the outlet means. A second float means is mounted on the vertical shaft above the stop element for movements toward the first float means and stop element to reduce the volume of fluid released by the first float means; and means is provided

for releasably restraining the second float means from movement toward the first float means and stop element to permit selective flushing of the toilet.

The improved actuating mechanism comprises a spindle including a handle and means mounting same in the wall of a toilet flush tank with the handle thereof exteriorly of the tank. A bracket element extends laterally from the spindle mounting means interiorly of the tank and has a pivot pin extending therefrom, at the free end thereof, along an axis generally parallel to the axis of the spindle. First and second generally horizontally disposed lever means are pivotally mounted on the pivot pin and have operative engagement at one end, one to the first float means and the other to both the first and second float means to selectively operate same. Means, including a lost motion mechanism, is carried by the spindle to selectively operate the first and second lever means in a sequence wherein a movement of the spindle handle in one direction causes a predetermined amount of fluid to flow through the outlet means and a movement of the spindle handle in an opposite direction causes a reduced volume of fluid to flow through the fluid outlet means.

The above first lever is bifurcated at one end and has legs, disposed on opposite sides of the vertical shaft of the first float means, which are formed on an arc so as to engage the flat underside of the plate on the upper end of the vertical shaft throughout the pivotal movement of the first lever means. The first lever means also includes a curved portion on the other end thereof which is engageable by an arm carried by the spindle to impart the pivotal movements of the first lever means on a pivot pin journaled in the first lever means intermediate the opposite ends thereof. This structure provides an extremely smooth operating lever arrangement requiring but a minimum of force to operate the spindle handle in one direction. Additionally, a minimum of binding and lateral forces are present during the above movement of the first lever means and actuating of the flushing cycle. The second lever means includes an arm portion extending normal to the longitudinal axis of the second lever means and generally parallel to the longitudinal axis of the second spindle arm. The second lever means and spindle arm are connected together by a lost motion connection in the nature of a flexible tie element. This lever arrangement provides for movement of the spindle handle in an opposite direction with relatively little effort and with a minimum of binding of the moving parts of the toilet flush tank.

It is therefore a principal object of the present invention to provide a device of the class described which is extremely simple and requires but a minimum of force to operate.

It is a further object of the present invention to provide a device of the class described which uses a minimum of fluid during the operation thereof.

It is another object of the present invention to provide a device of the class described which requires but a minimum of adjustment, is durable and inexpensive to produce, and fool-proof in operation.

These and other highly important objects will become apparent to those skilled in the art upon consideration of the following specification, attached drawings, and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings wherein like parts are indicated by like characters throughout the several views:

FIG. 1 is an elevational view of a toilet flush tank of the dual-flush type showing my novel actuating mechanism mounted thereon, portions thereof broken away and shown in section;

FIG. 2 is an enlarged view in horizontal section as

seen from the line 2—2 of FIG. 1, portions thereof being broken away;

FIG. 3 is an enlarged view in vertical section as seen from the line 3—3 of FIG. 1 showing a broken line partial flush position, and portions thereof being broken away;

FIG. 4 is a view in vertical section as seen generally from the line 4—4 of FIG. 3, showing a broken line position of the actuating lever mechanism thereof during a partial flush cycle;

FIG. 5 is a view in vertical section as seen from line 5—5 of FIG. 4;

FIG. 6 is a view in vertical section as seen from the line 6—6 of FIG. 4; and

FIG. 7 is a fragmentary view similar to a portion of FIG. 4 showing the actuating mechanism in a full flush position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, and initially to FIG. 1, there is shown a toilet flush tank indicated generally by the numeral **10**. A fluid inlet **11** extends from the bottom of the tank **10** into the interior thereof and has a valve equipped float **12** connected to the upper end thereof to control the fluid level of the tank **10**. A fluid conduit **13** is connected to the fluid inlet and to a source of fluid under pressure (not shown) to supply the fluid to the tank. Mounted laterally of the fluid inlet **11**, in the bottom of the tank **10**, is a fluid outlet means indicated generally by the numeral **14**. Fluid outlet means **14** provides a connection to a toilet, not shown, and includes a valve seat **15** and a stand pipe **16** which receives the overflow of fluid in the tank **10** should the valve associated with the float **12** fail to close.

First float means **20** including a flexible ball **21**, a shaft **22** extending vertically therefrom, and a disc-like plate **23**, affixed to the upper end of the shaft **22**, is positioned with the flexible ball **21** in engagement with the valve seat **15**. A fixed bracket means **24** is mounted on an intermediate portion of the stand pipe **16** and journals an intermediate portion of the vertical shaft **22** so as to operatively connected the first float means **20** for movements of the flexible ball **21** toward and away from the valve seat **15** to release a predetermined volume of fluid through the outlet means **14**. Second float means **25** is mounted for vertical movements on the shaft **22** between the fixed bracket **24** and an adjustable stop element **26** carried by the shaft **22** in vertically spaced relation to the flexible ball **21**. The second float means **25** engages the stop element **26** and the added weight thereof causes the flexible ball **21** to assume a lower level within the fluid contained within the tank **10** so as to reduce the volume of fluid released by the first float means **20** during a flushing cycle of the tank **10** as will be described in greater detail during the description of the operation hereinafter.

Means for releasably restraining the second float means **25** from movement toward the stop element **25** and flexible ball **21** of the first float means **20**, to permit the aforementioned predetermined volume of fluid to flow through the outlet means **14** during a flushing cycle of the tank **10**, includes a sleeve **30** telescopically received over a vertically projecting boss **31** which is formed as a part of the bracket element **24**. A pair of ears **32** project laterally from the sleeve **30** and serve to pivotally mount a hook-equipped latch element **33** for movements toward and away from a latch detent portion **25***a* carried by the second float means **25**. As shown, particularly in FIGS. 3 and 4, sleeve **30** extends between the fixed bracket **24** to a point closely spaced to the disc-like plate **23**. The slight clearance provided between the sleeve **30** and disc-like plate **23** permits the flexible ball **21** to assume a position on the valve seat **15** and assures that fluid in the tank **10** will not enter the fluid outlet **14** during periods of nonuse.

The improved actuating mechanism of the present invention is indicated generally by the numeral **34**, and

includes a spindle **35** having a handle **35***a* extending radially therefrom along a generally horizontal axis. A sleeve **36**, including an enlarged head **37**, is mounted to extend through the front wall of the tank **10** and journal the spindle **35** for rotation therein with the handle **35***a* thereof exteriorly of the tank **10**. A sealing washer **38** and a nut **39** threadedly engaged on the sleeve **36** fixedly secures the spindle **35** and head **37** with respect to the front wall of the tank **10**. A bracket element **45** is fixedly mounted on the sleeve **36** by means of a second nut **46** having threaded engagement with the sleeve **36**, initeriorly of the tank **10**, in a direction generally toward the plate **23**. A pivot pin **47** extends from the free outer end of the bracket element **45** on an axis generally parallel to the axis of the spindle **35**.

First and second generally horizontally disposed lever means **48**, **49** are mounted on the pivot pin **47** for rotation with respect thereto. Each of the first and second lever means **48**, **49** has operative engagement at one end, one to the first float means **20** and the other to both the first and second float means **20**, **25**, to selectively operate same as will be presently described in greater detail. Stop means **54** carried by the bracket means **45** laterally outwardly of the pivot pin **47** underlies the first and second lever means **48**, **49** and maintains same in the generally horizontal position shown by full lines in FIG. 4.

As shown, particularly in FIGS. 2–4, and 7, the end of the first lever means **48**, having operative engagement with the float means **20** is bifurcated to provide laterally spaced legs **55**. The legs **55** are disposed one each on opposite sides of the vertical shaft **22**, the sleeve **30** and the vertically projecting boss **31** of bracket **24**. Also, each of the legs **55** is formed on an arc whereby the upper surface thereof engages the flat under surface of the plate **23** throughout the pivotal movements of the first lever means **48** on the pivot pin **47**. With this arrangement a minimum of lateral forces are exerted by the first lever means **48** on the first float means **20** during movement thereof by the lever means **48**. Additionally during pivotal movements of the lever **48** on the pivot pin **47** the bifurcated legs **55** never engage the edge of the plate **23**. This prevents any undue wear therebetween during repeated operations thereof. It will be noted by reference to FIGS. 4 and 7 that the bracket means **45** is secured in a position wherein the stop **54** underlines the first and second bracket means **48**, **49** such as to maintain same in a generally horizontal position with the legs **55** of the bifurcated end of the first lever means **48** in a position immediately adjacent to the underside of the disc-like plate **23**. Also, as seen particularly in FIGS. 4 and 7, first lever means **48** is pivotally mounted on the pivot pin **47** intermediate the legs **55** thereof and an arcuately curved portion **56** formed on the other end thereof for a reason to become apparent hereinafter.

The second lever means **49** includes a laterally offset portion **57** having an outer free end which terminates in vertically spaced relation to the hook equipped latch element **33**. Hook equipped latch element **33** includes an angularly disposed arm **33***a* which has operative connection to the free end of the portion **57** of second lever means **49** by means of a flexible tie element **58**. Thus, pivotal movements of the portion **57** of the second lever means **49** about the axis of the pivot pin **47** in a direction vertically away from the second float element **25** causes the hook equipped latched element **33** to become disengaged from the latch detent **25***a*, of the second float element **25**, resulting in the second float element **25** being released from its restrained full line position of FIG. 3. Further pivotal movement of the second lever means **49** causes the sleeve **30** to be moved vertically upwardly with respect to the boss **31**. Upward movement of the sleeve **30** causes engagement of the upper end thereof with the disc-like plate **23** so as to vertically displace the flexible ball **21** from the valve seat **15** of outlet **14**.

Means, including lost motion means, carried by the spindle **35** for selectively operating the first and second

lever means **48**, **49** in a sequence wherein, a movement of the handle **36** in one direction causes the first float means **20** to be vertically displaced from the fluid outlet means **14** and a predetermined volume of fluid to flow through the fluid outlet means **14**, and a movement of the handle **36** in an opposite direction causes the release of the second float means **25** and vertical displacement of the first float means **20** from the fluid outlet **14** to permit a reduced volume of fluid to flow through the fluid outlet means **14**, includes first and second spindle arms **60**, **61**. Arm **61** is mounted on a squared end **63** of spindle **35** so as to project generally vertically therefrom and for common movements therewith. A cotter key serves to retain the arm **61** on the squared end **63** of the spindle **35**. Arm **60** is welded to the arm **61** for common movements therewith and extends therefrom in a direction generally toward the pivot pin **47**. In this manner the end portion **62** of arm **61** engages the curved portion **56** of the first lever means **48** and, upon rotation of the spindle **35** by the handle **35***a*, urges the curved portion **56** downwardly to rotate the first lever means **48** on the axis of the pivot pin **47**. A pair of fingers **64** extending from the end portion **62** of the arm **60** lie on opposite sides of the curved portion **56** so as to guide same during relative movements of the arm **60** and curved portion **56**. A stop pin **65** positioned at the free end of the curved portion **56** is engageable by the fingers **64** of the first spindle arm **60** during movements thereof to prevent disengagement of the first arm **60** from the curved portion **56**.

The second lever means **49** includes an arm portion **66** which extends laterally upwardly therefrom in a direction normal to the longitudinal axis of the lever **49** at a point adjacent the pivotal connection thereof to the pivot pin **47**. Arm **66** of lever means **49** extends generally parallel to second spindle arm **61** and has lost motion means in the nature of a flexible tie element **67** connected to and extending between the upper free ends of the arms **61** and **66**. With this arrangement, it will be seen, by reference to FIG. 7, that upon movement of the first spindle arm **60** along the curved portion **56** of lever means **48** arm **61** is permitted of common movements therewith by the flexible element **67**. Conversely, by reference to FIG. 4, it will be seen that movement of the handle **35***a* in an opposite or downward direction causes the first spindle arm **60** to disengage from the curved portion **56** of lever **48** and arm **61**, together with the tie element **67**, operates to exert a force on the arm **66** so as to rotate the lever **49** on the axis of the pivot pin **47**. It will be noted that when the spindle arm **60** is disengaged from the curved portion **56** of lever means **48** or when flexible tie element **67** is in the relaxed position of FIG. 7 the lever means **48**, **49** are maintained in their generally horizontal full line positions of FIG. 4 by stop **54**.

It has been found that most toilets, before any mineral build-ups or restrictions of the passages thereof, require a lesser amount of fluid than that contained within the tank to cause flushing action of the waste deposits in the toilet whether they be liquid or solids.With this in mind, the actuating mechanism **34** has been arranged so that a normal downward movement of the spindle handle **35***a* causes a partial flushing action of the toilet. That is, downward movement of the handle **35***a* causes the arms **61**, **66** to assume the broken line position of FIG. 4 wherein the free end of the portion **57** of the lever **49** is raised to disengage the hook equipped latch element **33** from the latch detent **25***a* connected to the second float means **25**. During upward movement of the portion **57** of lever means **49** unlatching movements of the hook equipped latch element **33** allows the sleeve **30** to move upwardly in concert with the portion **57** of lever means **49**. Upward movement of the sleeve **30** causes the upper end thereof to engage the disc-like plate **23** and vertically displace the flexible ball **21** from the valve seat **15** of the fluid outlet **14**. Since the second float means **25** has been released from its restrained full line position of FIG. 3 the added weight thereof against the stop element **26** causes the flexible ball **21** to seek a lower level within the fluid of the tank **10**. Consequently, the flexible ball **21** will seat on the valve seat **15** of the fluid outlet **14** before the entire contents of the tank **10** have flowed through the fluid outlet **14**. As the handle **35***a* is released, the sleeve **30** and hook equipped latch element **33** carried thereby return to the full line position of FIG. 3. Fluid entering the tank **10**, through the valve of the float **12**, raises the level of fluid in the tank **10** and second float means **25** is returned to its full line position of FIG. 3 by the rising of the fluid in the tank.

Should the toilet contain a large amount of solid waste material wherein a large amount of fluid would be required to flush same from the toilet, handle **35***a* is moved in an opposite or upward direction to cause spindle arm **60** to engage the curved portion **56** of first lever means **48** and pivot same about the axis of pivot pin **47**. Such pivotal movement causes the upper surface of the curved legs **55** of the bifurcated ends of first lever means **48** to engage the flat under surface of the disc-like plate **23** and, through the medium of the vertical shaft **22**, vertically displace the flexible call **21** from the valve seat **15** of fluid outlet **14**. Since the second float means **25** is restrained in the full line position of FIG. 3, flexible ball **21** moves upwardly a distance allowed by the stop element **26** engaging the second float means **25** and the fluid in the tank **10** is allowed to flow through the outlet **14**. As the fluid level in the tank recedes, the flexible ball **21** seeks a level on the upper surface of the fluid since the second float element **25** is restrained in its full line position of FIG. 3 and cannot provide added weight to the flexible float element **20**. It will be noted that during the pivotal movements of the first lever means **48** that relatively even vertical forces are exerted on the flat underside surface of the disc-like plate **23** by the arcuately formed legs **55**. Such arcuately formed legs **55** preclude any engagement thereof with the peripheral edge portion of the disc like plate **23** so as to prevent undue wear therebetween or binding thereof which could possibly result in lateral displacement of the first float means **20** and subsequent misalignment thereof with the valve seat **15** of outlet **14**. Such misalignment of course would lead to excessive use of fluid or of water and/or possible damage to sewerage systems such as cesspools and septic tanks or the like.

What is claimed is:

1. Improvements in actuating mechanism for toilet flush tanks of the dual flush type having:

(a) a fluid inlet;

(b) a valve equipped float connected to said inlet to control the fluid level of the tank;

(c) a fluid outlet means;

(d) first float means including a vertically extended shaft having a plate on the extended upper end thereof and an adjustable stop element on said shaft in spaced relation to said first float means;

(e) bracket means operatively connecting said first float means for movements toward and away from said outlet means to release a predetermined volume of fluid through said outlet means;

(f) second float means mounted on the vertical shaft of said first float means above the stop element thereof for movements therealong toward the first float means and stop element to reduce the volume of fluid released by the first float means and

(g) means for releasably restraining said second float means from movement toward said stop element and first float means to permit selective flushing of the toilet, the improvement comprising;

(1) a spindle, including a handle extending radially therefrom;

(2) means mounting said spindle for rotary movements in the wall of the flush tank with said handle thereof positioned exterior of the tank;

(3) a bracket element extending laterally from said means mounting said spindle interiorally of the tank;

(4) a pivot pin extending from the free outer end of the bracket means on an axis generally parallel to the axis of said spindle;

(5) first and second generally horizontally disposed lever means pivotally mounted on said pivot pin and having operative engagement at one end, one to the first float means and the other to both said first and sceond float means to selectively operate same; and

(6) means including a lost motion mechanism carried by said spindle for selectively operating said first and second lever means in a sequence wherein a movement of said handle in one direction causes said predetermined amount of fluid to flow through said fluid outlet means and a movement of said handle in an opposite direction causes a reduced volume of fluid to flow through said fluid outlet means.

2. The apparatus of claim **1** in further combination with stop means carried by said bracket means laterally outwardly of said pivot pin and underlying said first and second lever means to maintain same in a generally horizontal position.

3. The apparatus of claim **1** in which said first lever means operates to cause the predetemined flow of fluid through said fluid outlet means and said second lever means operates to cause a reduced volume of fluid to flow through said fluid outlet means.

4. The apparatus of claim **3** in which said first lever means is bifurcated at said one end and in which the legs of said bifurcated end are disposed one each on opposite sides of the vertical shaft of said first float means in underlying relationship to and engageable with the under side of the plate carried by the upper end thereof.

5. The apparatus of claim **4** in which the legs of said bifurcated end of said first lever means are formed on an arc whereby same engages the under surface of the plate of the vertical shaft of the first float means throughout the pivotal movements of said first lever means on said pivot pin.

6. The apparatus of claim **3** in which said first lever means is pivotally mounted intermediate its opposite ends and in which the other end thereof is formed to define an arcuately curved portion.

7. The apparatus of claim **6** in which said means carried by said spindle for operating said first and second lever means includes first and second spindle arms mounted for common movements with said spindle, said first spindle arm engageable with said curved portion of said first lever means to rotate same on said pivot pin responsive to movement of said spindle handle in said one direction.

8. The apparatus of claim **7** in further combination with guide means extending from said first spindle arm on opposite sides of said curved portion and stop means adjacent the free end of said curved portion engageable by said first spindle arm to limit movement thereof toward the free end of said curved portion.

9. The apparatus of claim **7** in which said second lever means includes an arm portion extending laterally in a direction normal to the longitudinal axis of said second lever means and generally parallel to the longitudinal axis of said second spindle arm and in which said lost motion means is a flexible tie element connecting the free ends of said arm portion and said second spindle arm whereby movement of said spindle handle in said opposite direction releases said second float means and raises said first float means to cause a reduced volume of fluid to flow through said outlet valve means due to the weight of said second float means on said first float means.

References Cited

UNITED STATES PATENTS

2,532,977	12/1950	White	4—37 XR
3,026,536	3/1962	Wood	4—57

LAVERNE D. GEIGER, Primary Examiner

R. J. SHER, Assistant Examiner

U.S. Cl. X.R.

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