United States Patent [19]

White

[11] **3,869,733**

[45] **Mar. 11, 1975**

[54] **MULTI LEVEL HOLDING TANK DISCHARGE SYSTEM**

[76] Inventor: **Chester A. White,** 813 Ram Trl. S.E., Albuquerque, N. Mex. 87123

[22] Filed: **June 4, 1973**

[21] Appl. No.: **366,267**

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

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

[58] **Field of Search** ..... 4/67 A, 67 R, 57 R, 56, 4/34

[56] **References Cited**

UNITED STATES PATENTS

3,005,206	10/1961	Dollinger	4/67 A UX
3,151,337	10/1964	Deniz	4/67 A UX

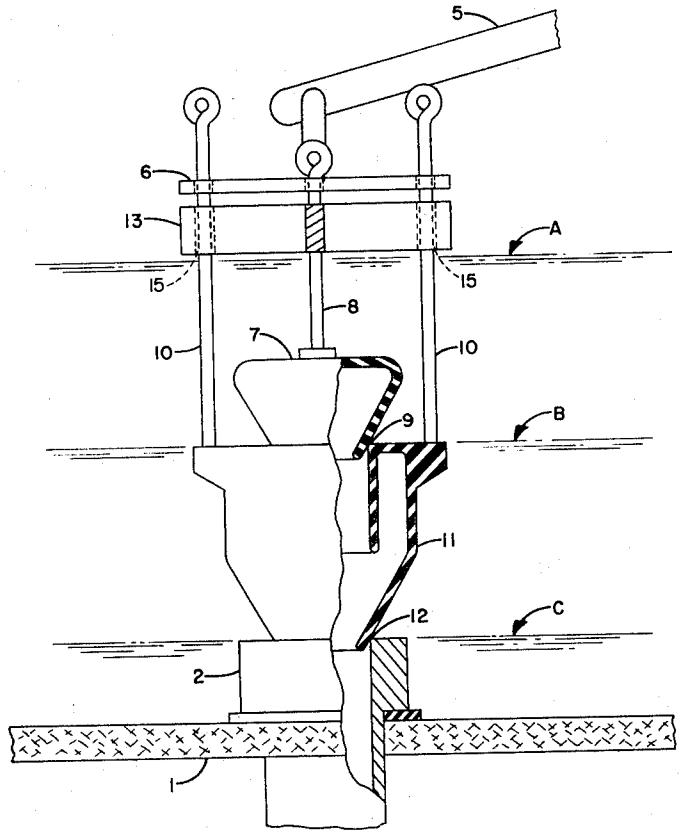
Primary Examiner—Henry K. Artis

Attorney, Agent, or Firm—William C. Bowers

[57] **ABSTRACT**

A mechanism adapted to installation in most standard type holding tanks such are used in water closet type toilet bowl flushing systems, chemical feed tanks, and similar installations, wherein a controlled quantity of any fluid, including but not limited to ordinary tap water, is released by raising a ball check valve from its seat on a discharge fitting and thus causing discharge of the entire contents of the holding tank through the discharge fitting. The addition of one flow through ball check valve seated on the discharge fitting, with the conventional ball check valve seated on an appropriate valve seat on top of the added flow through ball check valve, permits discharge of the volume of fluid above the added flow through ball check valve through a central opening therein, thus limiting the discharge to the volume of fluid above the top of the added flow through ball check valve. Release of the flow through ball check valve from its seat causes discharge of the contents of the holding tank down to the level of the valve seat on which the flow through valve seats. Additional flow through ball check valves, either identical with the first, or of various heights, with proper control means, will permit discharge of any predetermined quantity of fluid up to the maximum content of the holding tank as determined by filling and overflow controls of the system.

2 Claims, 3 Drawing Figures



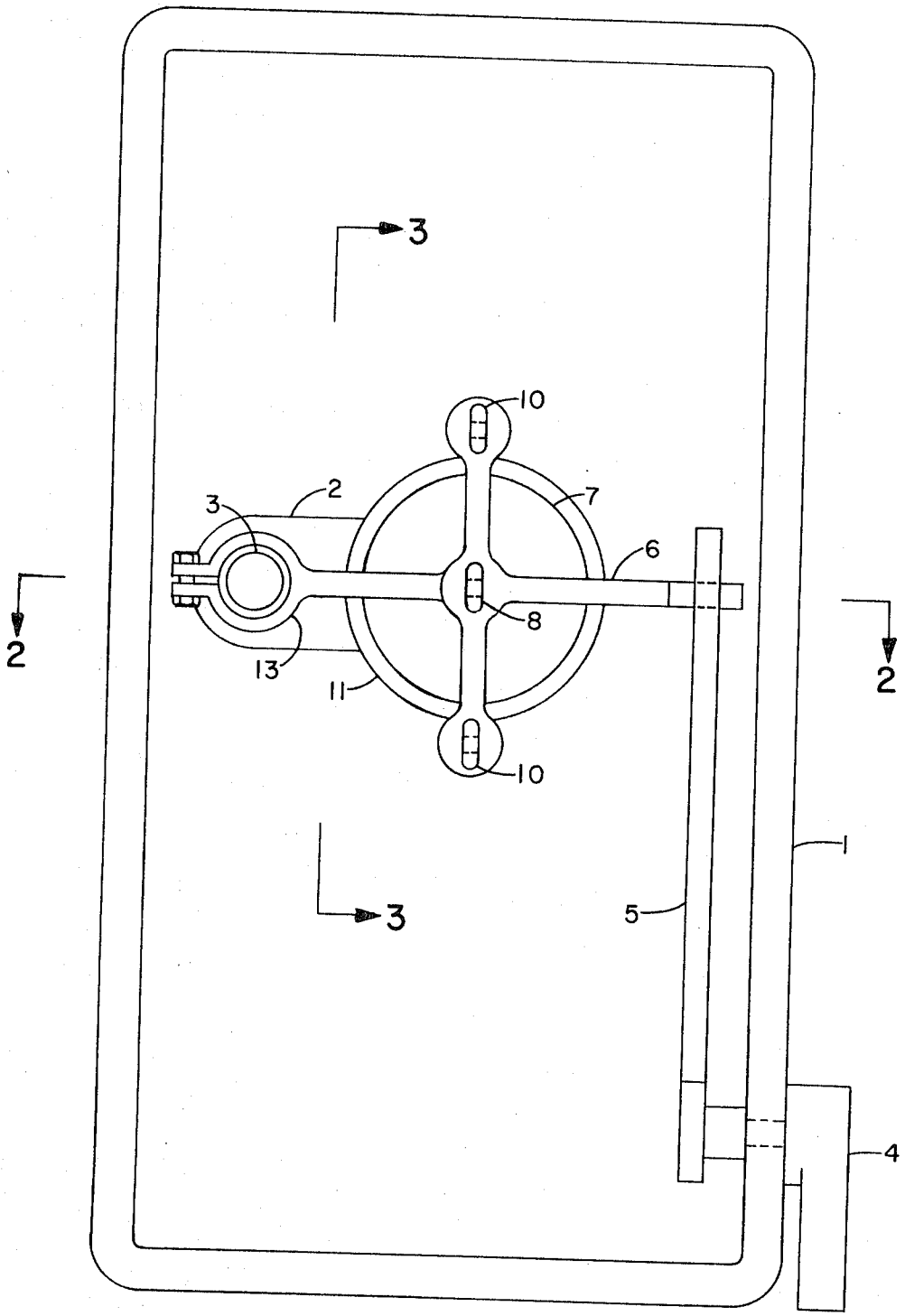


Fig. 1

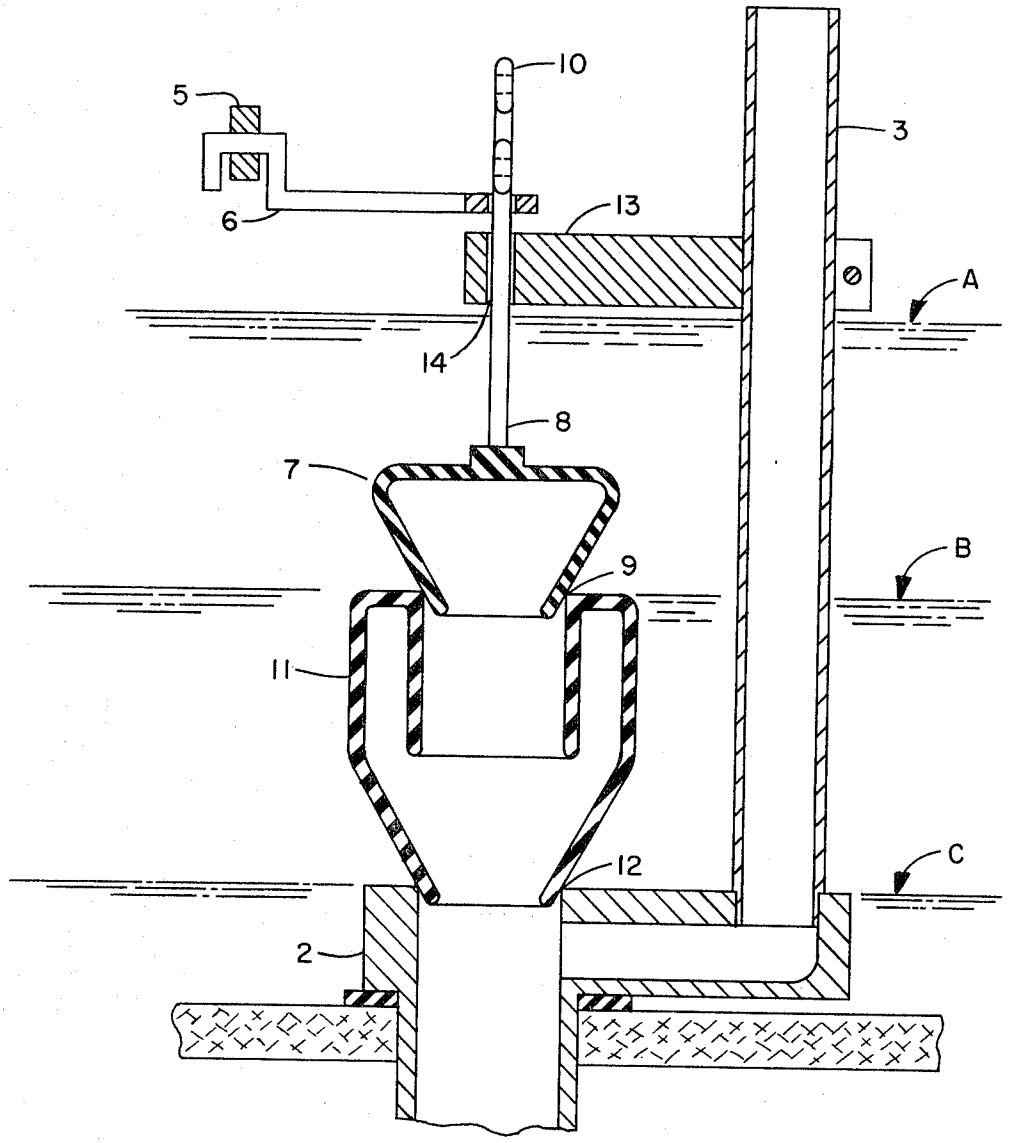


Fig. 2

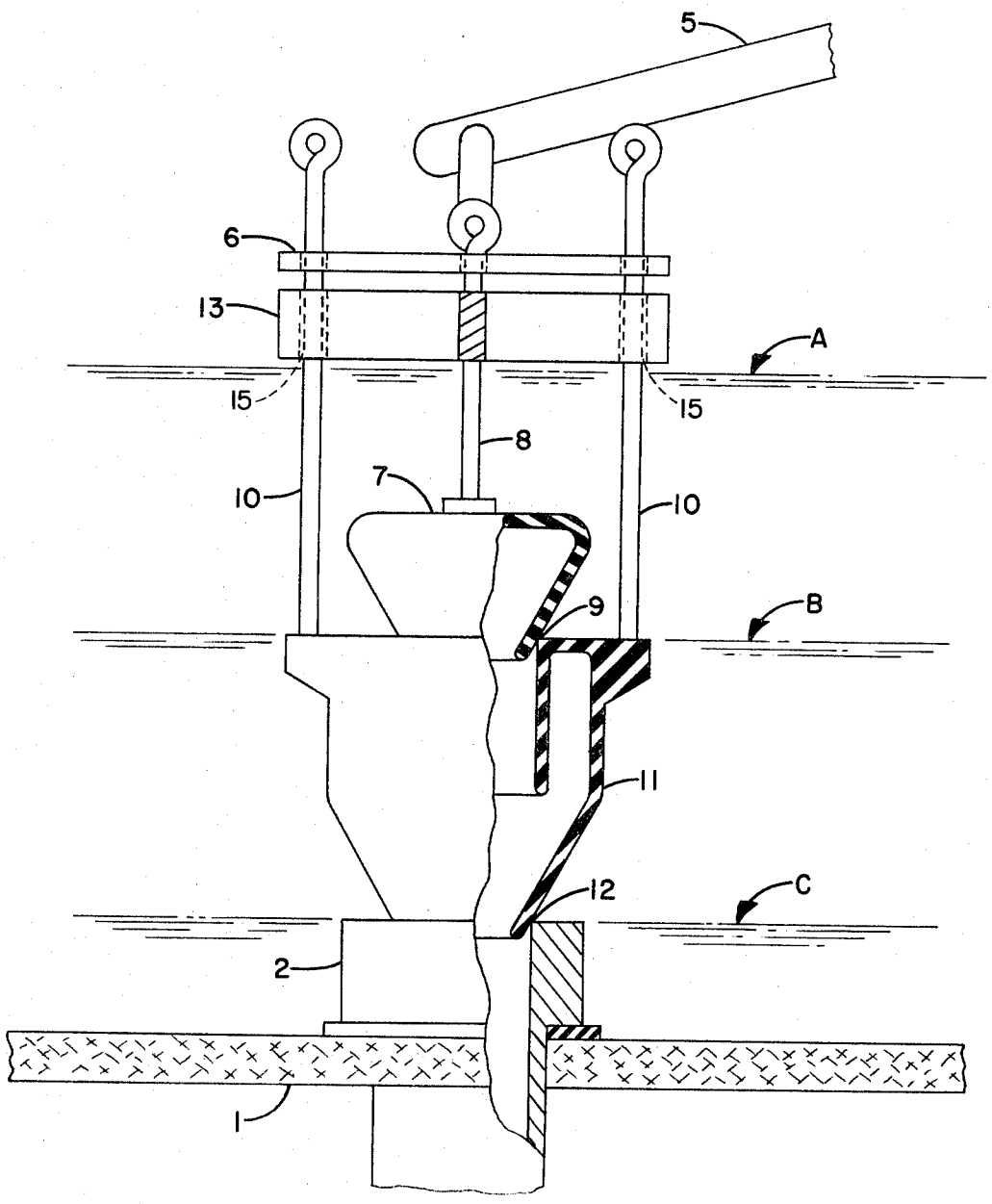


Fig. 3

MULTI LEVEL HOLDING TANK DISCHARGE SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to Class **4**, "bath closets . . .," Subclasses **34** "plural flushers," **37** "plural flushers," and **67A** "alternate flushers." It may also relate to Class **222** "Dispensing," Subclass **42** "selection from plural outlets," but more specifically, it is a "controlled quantity fluid discharge system."

The usual holding tank in chemical procedures and the flush tank or water closet as is used in flushing the common household toilet bowl have the level of fluid available in the holding tank determined by a float controlled shutoff valve connected to the feed pipe. In some chemical installations, electronic, pneumatic, or hydraulic controls are used. We are not here concerned with the method of controlling the maximum fluid level or total quantity of fluid in the holding tank, but only with a method of controlling the discharge of controlled quantities thereof. It is necessary, of course, to control the maximum fluid level in the holding tank to obtain optimum results. Various schemes have been proposed, and patented, to provide discharges of varying volumes of water in flushing the household toilet bowl. All of the schemes uncovered require major modification of the piping or substitute complex control mechanisms; e.g., U.S. Pat. Nos. 2,803,833 (Charest, 1957); 1,963,211 (Patterson, 1934); 1,960,864 (Brown, 1934); and 1,780,810 (Brown, 1930). The invention as conceived has immediate application to the saving of water in the flushing of household toilets as well as other applications previously mentioned. A scheme widely publicized in the media proposes placing of bricks in the water closet or holding tank of the water closet to reduce the amount of water in the tank which is discharged on each flushing of the toilet. This, of course, is only a substitute of properly adjusting the float level control of the maximum fluid level in the holding tank. The solution proposed by this invention, as applied to the toilet bowl, provides two flush quantities. When the toilet is used as a urinal, a minimum flush is required; when fecal matter and relative large quantities of toilet paper must be flushed away, a larger quantity of flush water is required. The invention, while solving the problem of maximum and minimum flushes required in the ordinary household toilet, is also adaptable to chemical processes where variable amounts of solutions or chemicals are required because of procedural requirements.

SUMMARY

A holding tank, multi-level, discharge float valve system; adapted to installation in standard holding tanks such as that of the ordinary water closet toilet bowl, without any major changes in the piping or control systems thereof, operating by the control mechanisms of the original installation with only minor modifications, to discharge the desired volume of fluid through stacked ball check valves, all but the top thereof being of a flow through variety, which is the heart of the invention.

THE DRAWINGS

The drawings omit the filling mechanism and controls which determine the meximum level of fluid in a holding tank; such controls may be float valve control, pneumatic pressure control, electrical, or electronic; it is assumed that the holding tank is fitted with a filling system which controls the maximum fluid level in the tank. It is also assumed that the holding tank is fitted with a usual discharge fitting, valve seat, and associated overflow pipe. Any suitable system may be used. The drawings show the preferred embodiment in a water closet type installation, using a single supplementary flow through ball check valve below a standard ball check valve, thus providing two level fluid discharges or flushes. The Drawings show the invention installed in a holding tank or water closet of a usual household type toilet bowl.

FIG. **1** is a plan view of the usual flush tank located just above and behind the usual toilet bowl with the invention installed therein, and the tank cover removed. The filling pipe and, usually float controlled, filling valve are not shown.

FIG. **2** is a section cut on lines **2—2** on FIG. **1**, and FIG. **3** is a section cut on lines **3—3** of FIG. **1**, also having parts of the ball check valves and discharge fitting cut away to show a partial section thereof.

PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawings in detail, the invention is shown as installed in the flush tank of the usual type connected to a household type toilet bowl with the objective of providing two levels of flush; one where the toilet is used as a urinal and a minor flush is required and, two where considerable amounts of fecal matter and toilet paper must be flushed down the drain by a major flush. The tank **1** is standard. The filling pipe and float controlled valve are not shown. There is the usual discharge fitting **2**, with a connected overflow pipe **3**, a flush handle **4**, a flush actuating lever **5**, an actuating link **6**, a ball check valve **7**, actuated by the ball check valve stem **8**, guided by a guide hole **14** in the stem guide **13**, and seating on the valve seat **9** of the flow through ball check valve **11** which is seated on the valve seat **12** of the discharge fitting **2**. Flow through ball check valve **11** has ball check stems **10** located symetrically about its vertical axis also actuated by actuating link **6** with vertical motion controlled by the movement of all check stems **10** through guide holes **15** in stem guide **13**. Ball check guide **13** is clamped to the usual overflow pipe **3** and has guide holes in such number as required for the guide stems of all ball check valves installed. As shown for a two-level flush system, three (**3**) stem guide holes are required. The maximum total flush, or discharge, is controlled by the size of the holding or flush tank and adjustment of the float (or other) fluid control level in the tank which is not shown. The amount of water saved in a toilet bowl flush is controlled by the height of the flow through check valve **11**. The overall specific gravity of flow through ball check valves such as **11**, including air entrapped therein, is critical in that the release of upper ball check valves such as **7** must not cause the lower flow through ball check valves, such as **11**, to lift from their seats. Flow through ball check valves such as **11**, must, however, float from their seats when released from their seats by operation of the activating mechanism.

As further indicated in the drawings, ball check valve **7** is a conventional hollow ball check valve, has a wall with inner and outer concentric surfaces of revolution about a central vertical axis, has a closed top, and a vertical cross-section tapers inwardly toward an open bot-

tom so the valve conforms to a discharge valve seat. Flow through ball check valve **11** is hollow, has walls with inner and outer concentric surfaces of revolution about a central vertical axis, a cylindrical wall surrounding a central discharge opening having a discharge valve seat at the top, the cylindrical wall is joined to an outer wall, and a vertical cross-section tapers inwardly toward an open bottom so the valve conforms to a discharge valve seat. While all ball check valves may be formed of any material which will provide required flotation characteristics and suitably seat with each other and the discharge valve seat on the discharge fitting, it is preferred that they be manufactured from a suitable rubber-like plastic by injection molding.

In operation, a relatively small movement of the flush handle **4** causes a correspondingly small movement of the flush actuating lever **5** and raises the ball check valve **7** from its valve seat **9** on the flow through ball check **11** by a minor movement of the operating link **6** and upward movement of valve stem **8**, thus causing a minor flush lowering the fluid level from the maximum designated at A to the secondary level B on FIGS. **2** and **3**. This discharge takes place through the center of the flow through check valve **11**. Further actuation of the flush lever **4**, causes further movement of the actuating lever **5**, further movement of the actuating link **6**, thus lifting the flow through ball check valve **11** by raising its ball check stems **10**, raising the flow through ball check valve **11** off its valve seat **12** on discharge fitting **2**, and discharging the entire contents of holding tank **1**, reducing the fluid level in the holding tank to the minimum as indicated by level C on FIGS. **2** and **3**. In FIGS. **2** and **3**, the maximum fluid level is indicated as A, the minor flush level as B, and the minimum level as C.

I claim:

1. A discharge system for a fluid holding tank such as is used on a water closet flushed toilet having a maximum fluid level control such as a float operated valve, a discharge fitting with a float valve seat and an associated vertical overflow pipe a short distance from the center of the discharge valve seat, a flow through ball check valve seating on the discharge fitting valve seat, the flow through ball check valve having a valve seat at the top of the flow through opening designed to accomodate another ball check valve; a conventional ball check valve seated on the valve seat at the top of the flow through ball check valve; the conventional ball check valve having a valve stem extending vertically upward on its axis and passing through a vertical guide hole in a valve stem guide attached as by clamping to the overflow pipe, the guide hole being concentric with the vertical axis of the discharge valve seat, thus controlling the upward and downward movement of that valve to cause it to seat properly when returning to the discharge valve seat; means for selectively raising the top ball check valve from the discharge seat on the top of the flow through ball check valve thus limiting the discharge to the level of the discharge valve seat on the top of the flow through ball check valve; and means for raising the flow through ball check valve and the ball check valve seated on the discharge valve seat on the top thereof, and permitting discharge of the entire contents of the holding tank; wherein the improvement comprises:

means for controlling the upward and downward movement of the flow through ball check valve, so as to cause it to seat properly when returning to its seat, comprising:

the valve stem guide having, spaced symetrically about the axis of the discharge valve seat, a pair of vertical guide holes for valve stems of the flow through ball check valve;

the flow through ball check valve having two valve stems located symetrically about its vertical axis and extending vertically upward through the guide holes provided therefor in the valve stem guide.

2. The discharge system of claim **1**, in which the means for selectively controlling the discharge quantity comprises:

a flush handle;

a flush actuating lever whose upward movement is controlled by the flush handle;

an actuating link, connected to the outward end of the actuating lever which moves upward in response to the movement of that lever, the actuating link having holes so spaced as to receive the ball check valve stem of the top (conventional) ball check valve and the two valve stems of the flow through ball check valve;

both ball check valves having an enlargement at the top of each ball check valve stem so as to cause lifting of the top ball check valve by a minor movement of the flush handle, the flush actuating lever, and the actuating link;

and lifting of both ball check valves as the flush handle is moved through a greater area and lifts the valve stems of the flow through ball check valve.

* * * * *