E. E. WALLDREN.

FLUSH VALVE BALL.

APPLICATION FILED JUNE 26, 1909.

1,003,555. Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

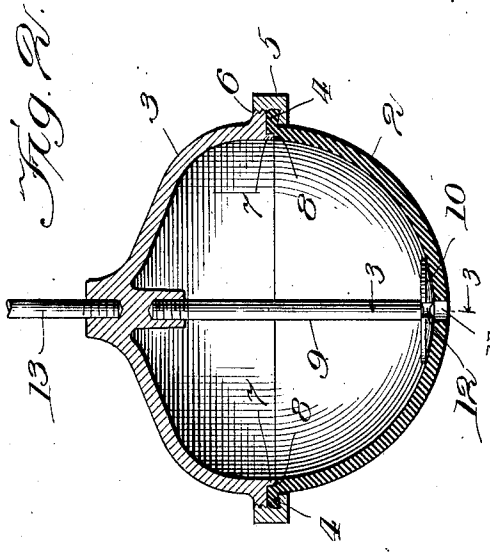


Fig. 3

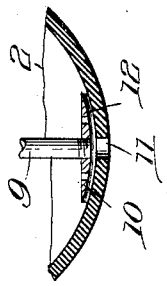


Fig. 7.

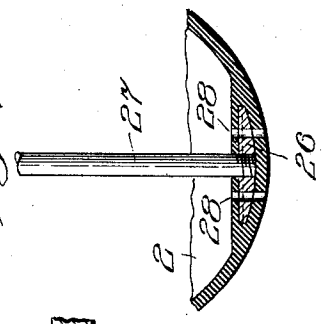
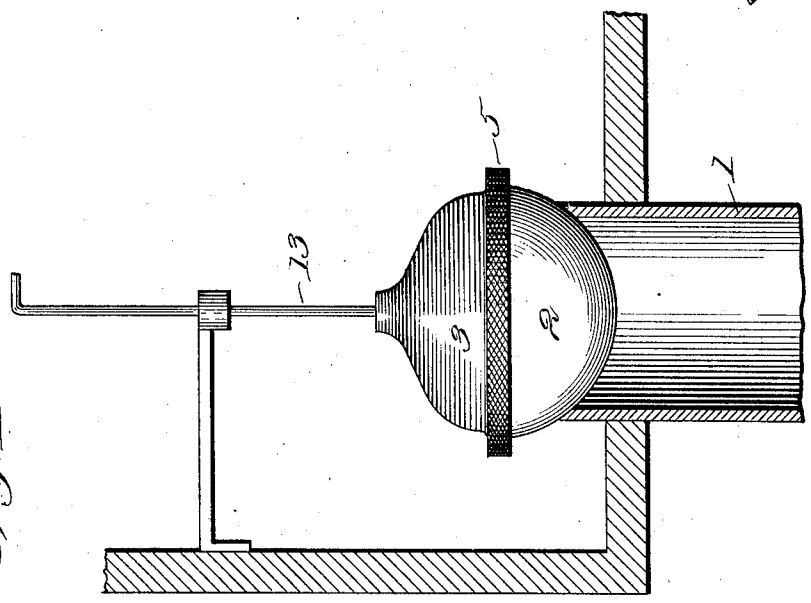


Fig. 1.



Witnesses:

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E. K. Lundy.

Inventor:

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2 SHEETS—SHEET 2.

Fig. 4.

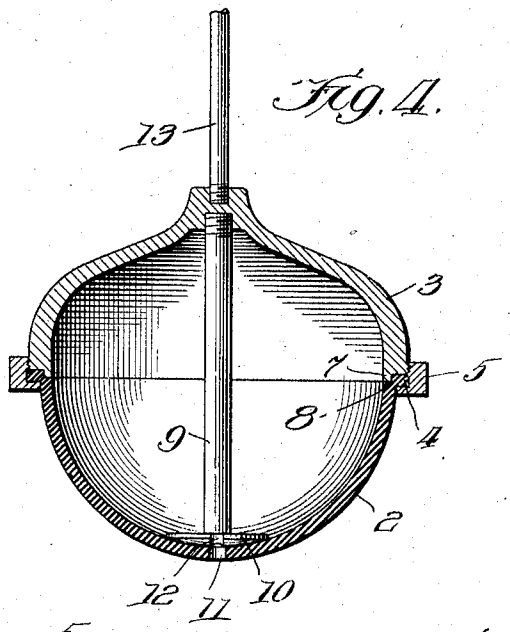


Fig. 5.

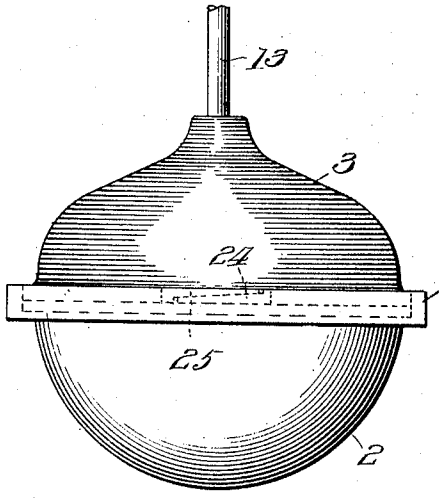
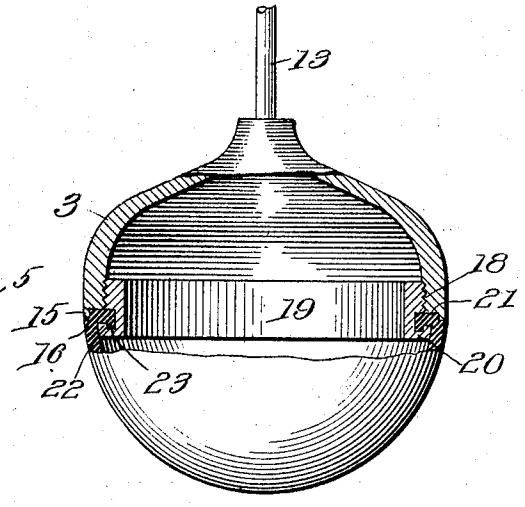


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD E. WALLDREN, OF CHICAGO, ILLINOIS.

FLUSH-VALVE BALL.

1,003,555. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed June 26, 1909. Serial No. 504,470.

To all whom it may concern:

Be it known that I, EDWARD E. WALLDREN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Flush-Valve Balls, of which the following is a full, clear, and exact description.

My invention relates to escape-valves usually employed in connection with flush tanks and its particular object is to provide a valve-ball that is constructed partially of rubber and partially of metal, the latter for the purpose of strength and stability and the former for the purpose of making a positive closure of the valve-seat.

Many escape valves now on the market are made with a hollow rubber ball closure with especially constructed means in the upper portion to which the usual guide-rod is secured. Often these rubber balls collapse owing to the pressure of the water and take a "set" that causes the flush to leak. When this occurs, it is impossible to absolutely close the valve until the ball has been replaced. Another objection has been that the connections between the guide-rod and ball cannot be made tight enough to prevent the slime that usually accumulates in flush-tanks from seeping through said connection and accumulating in the ball thus causing rapid deterioration of the rubber. I overcome these objections by constructing only the lower portion of my valve ball of rubber while the upper portion is formed of metal, and by novel construction I make these two parts water-tight. Also, in order to prevent the collapse of the rubber portion of the ball, I place a rigid column axially within the same and secure it either to the upper or the lower section and independent of the other section. This I accomplish by the means and in the manner hereinafter fully described and as more particularly pointed out in the claims.

In the drawings:—Figure 1 is a side elevation of my improved escape valve ball showing the same seated upon the upper end of a flush-pipe, the latter being shown in section. Fig. 2 is a central vertical section of the valve ball, drawn to an enlarged scale. Fig. 3 is a fragmentary transaxial section taken on dotted line 3, 3, Fig. 2, illustrating the vent duct in the bottom of the ball and lower end of the retaining column. Fig. 4 is a central vertical section of a valve ball showing a slightly modified construction. Fig. 5 is a vertical side elevation of a modified means for locking the two sections of the escape valve ball together. Fig. 6 is a vertical front elevation, partly broken away of still another modified means for securing the sections of the valve ball together. Fig. 7 is a fragmentary central vertical section of the lower portion of a modification of the vent openings and column.

Referring to the drawings 1 represents the end portion of a suitable flush-pipe the upper edge of which extends a slight distance above the bottom of a flush tank, and the upper circumferential edge of which is preferably beveled or countersunk to form a seat for the valve ball. This valve ball preferably comprises two substantially hemispherical sections 2 and 3, the latter of which is rigid and preferably made of metal while the former is flexible and made of soft rubber molded to fit snugly upon its seat on the flush-pipe 1. In order that these two sections of the valve ball may be tightly joined together, the upper circumferential edge of the flexible lower portion is provided with a lateral projection or lip 4 that is adapted to be engaged by and seated upon the inwardly projecting flange of an annulus or ring 5. Said ring is preferably interiorly screw-threaded, and is adapted to be screwed onto the threaded surface of an annular embossment 6 on metal section 3 of the ball, thus clamping the two sections of the ball together. In order to make a water tight connection at this point, I provide the inside engaging edge of one of the sections (preferably the upper) with a rib 7, and the corresponding portion of the opposite section (preferably the lower) I provide with a recess or groove 8 so that when the sections are clamped together by ring 5 the rib and recess will form a seal. Mounted within the ball is a suitable rigid vertical column 9 that depends axially from preferably the upper rigid section 3 and is either separate or formed in one piece therewith. The lower end of this column that is adapted to contact with the interior surface of the flexible section is provided with an enlarged head 10 having a convex exterior surface. It is essential that an air vent 11 should be provided in the lower section of the ball within the radius of the drawn pipe in order to permit of the ingress and egress of air

when the valve is unseated. The head is therefore provided with a suitable transaxial groove 12 cut in its convex surface and in such position as to cross the vent opening 11. Suitable lateral branches of this groove 12 may also be cut through the head so as to give ample vent. Mounted in and extending above the tapered end of the upper section 2 of the ball is a suitable guide-rod 13 that is adapted to slide longitudinally in a vertical bearing in the end of a bracket projecting laterally inward from one of the walls of the tank.

In the modification shown in Fig. 4, I dispense with the annular embossment 6 on the upper section 3 of the ball and in lieu thereof the screw-threads are cut flush with the outer surface of this section. The groove 8 and the rib 7 forming the seal and the annular clamping ring 5, together with the column 9 and the guide rod 13, are of the same construction as in Figs. 1 and 2 of the drawings.

I have shown in Fig. 6 of the drawings a valve ball the construction of the clamping means of which is substantially the reverse of that above described in connection with Fig. 4 in that the clamping ring or annulus is inside the ball. In this modification the lower circumferential edge of the upper section 3 of the ball has screw-threads 18 upon its inner surface and has a downwardly projecting rib 15 on the outer corner thereof, and the clamping ring or annulus 19 is screw-threaded exteriorly. This ring has an outwardly projecting flange 20 on its lower edge over which the inwardly projecting flange 21 of the flexible section 2 of the ball is adapted to be stretched. Said flexible section has a recess 16 on its outer edge to receive the rib 15 while the inner edge of its flange 21 is preferably extended downwardly as shown at 22 to be seated in a groove 23 on the ring. This construction insures the sealing of the connections. Sufficient purchase can be obtained on the ring from the outside to screw the same into place and clamp the flange 21 against the lower edge of the upper rigid portion 3 of the ball.

Fig. 5 shows (in dotted lines) a quick-opening clamp for the ring and ball wherein the screw-threads are omitted from the outstanding embossment of the upper section and the interior of the ring, and in lieu thereof suitable oppositely inclined wedges or cam surfaces 24 and 25, respectively, are provided so that the ring need only be turned a comparatively short distance to lock or unlock the parts of the ball. The other portions of this particular valve ball are identical with the corresponding parts in the preferred form mentioned above.

While I have shown and described the rigid retaining column to be secured to and depending from the upper rigid section 3 of the ball it of course will be understood that the same may be mounted in the lower flexible section 2 as shown in detail in Fig. 7 of the drawings. In this instance the head 26 of said column is molded into the rubber at the lowermost point in the flexible section with its vertical portion 27 projecting axially upward so that its top is adapted to engage the central portion or dome of the rigid section, vent holes 28 are bored through the head and incasing rubber for the purposes hereinbefore mentioned.

What I claim as new is:—

1. An escape valve ball comprising a rigid upper section, a flexible lower section, and a vertical column secured to said rigid section and arranged axially within said ball, and having an enlarged head at its lower end through which a vent opening passes.

2. An escape valve ball comprising a rigid upper section, a flexible lower section, and a vertical column secured to said rigid section and extending axially toward and engaging but disconnected from the opposite section, and having an enlarged head at its lower end, through which a vent opening passes.

In witness whereof I have hereunto set my hand this 19th day of June, 1909.

EDWARD E. WALLDREN.

Witnesses:
THOMAS J. HARPER,
E. K. LUNDY.