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A. M. CLARK.

VALVE.

No. 563,742. Patented July 14, 1896.

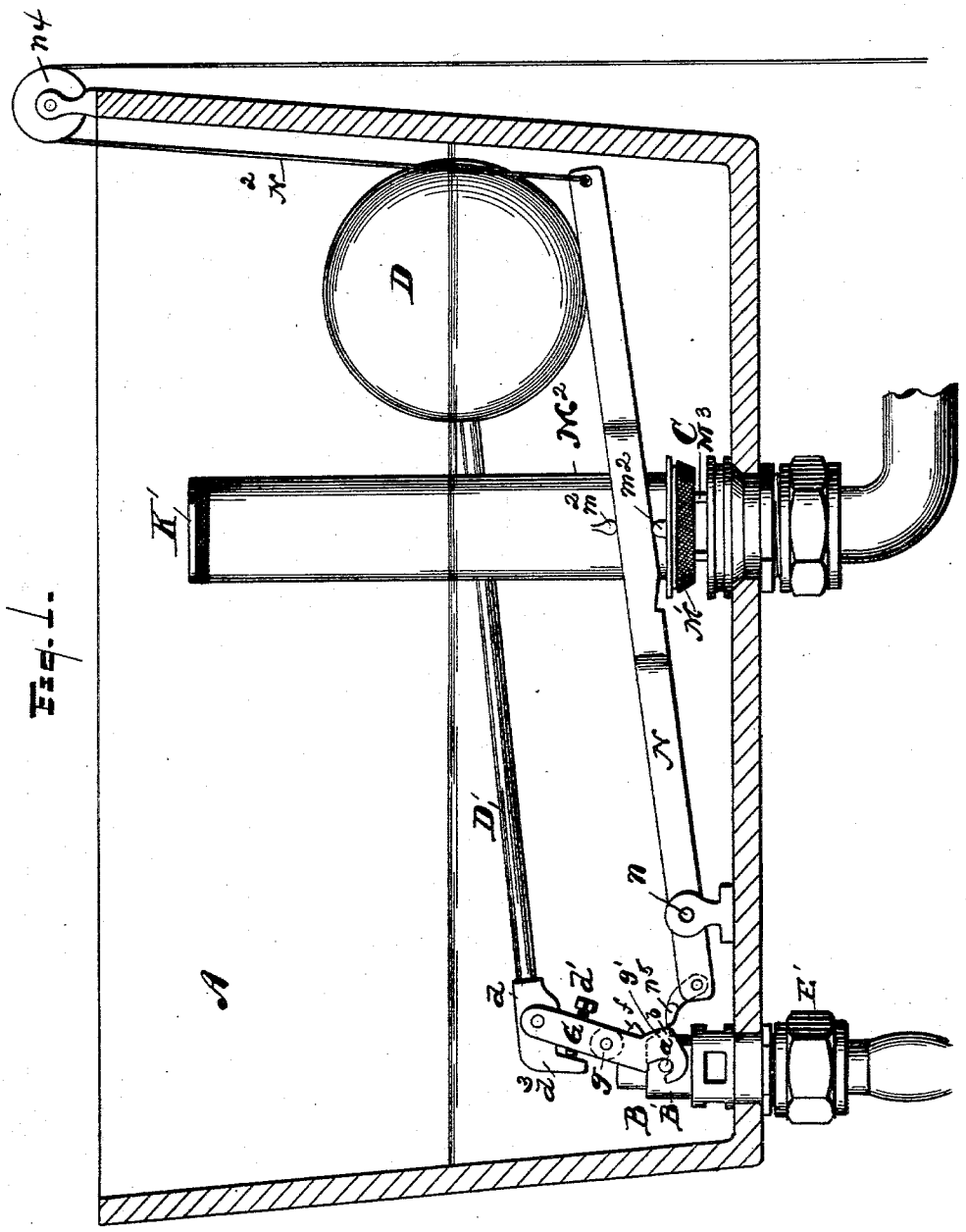

Fig. 1.

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A. M. CLARK.

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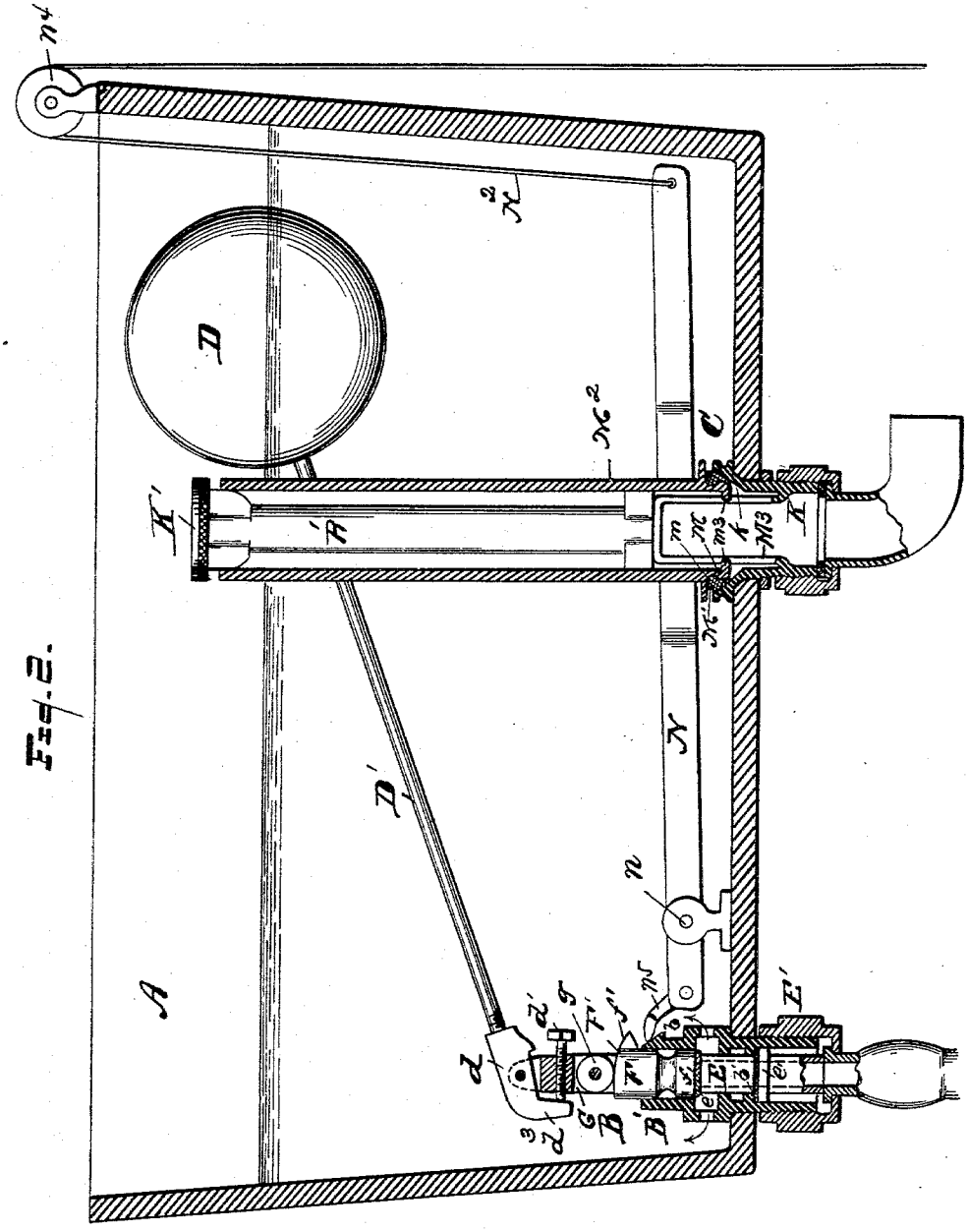

Fig. 2.

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VALVE.

No. 563,742. Patented July 14, 1896.

Fig. 3.

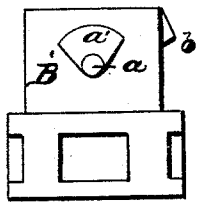
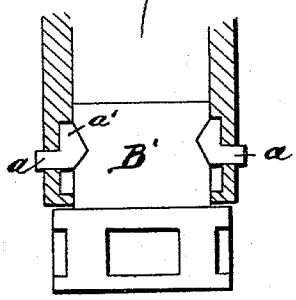


Fig. 4.



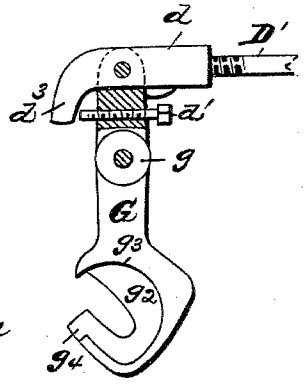


Fig. 5.

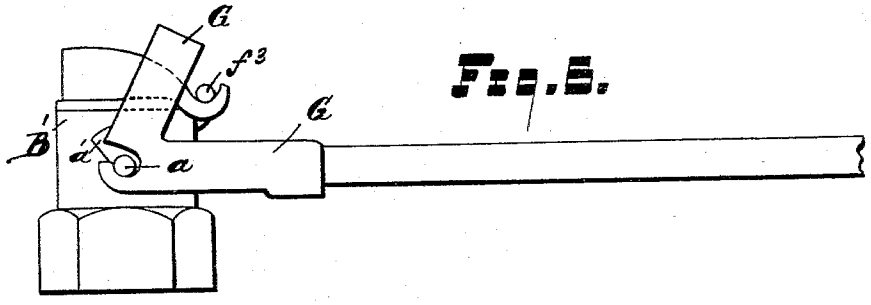
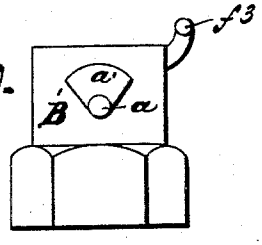


Fig. 6.

Fig. 9.



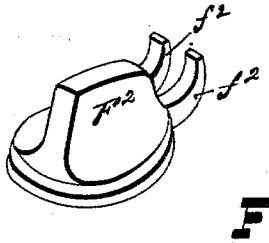


Fig. 8.

Fig. 7.

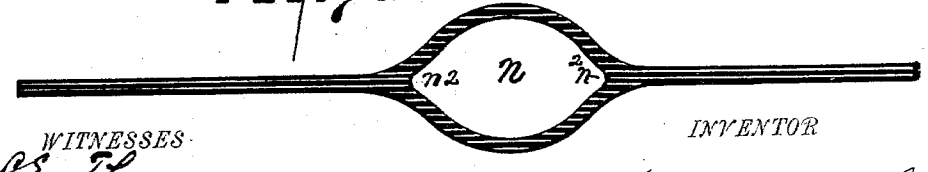


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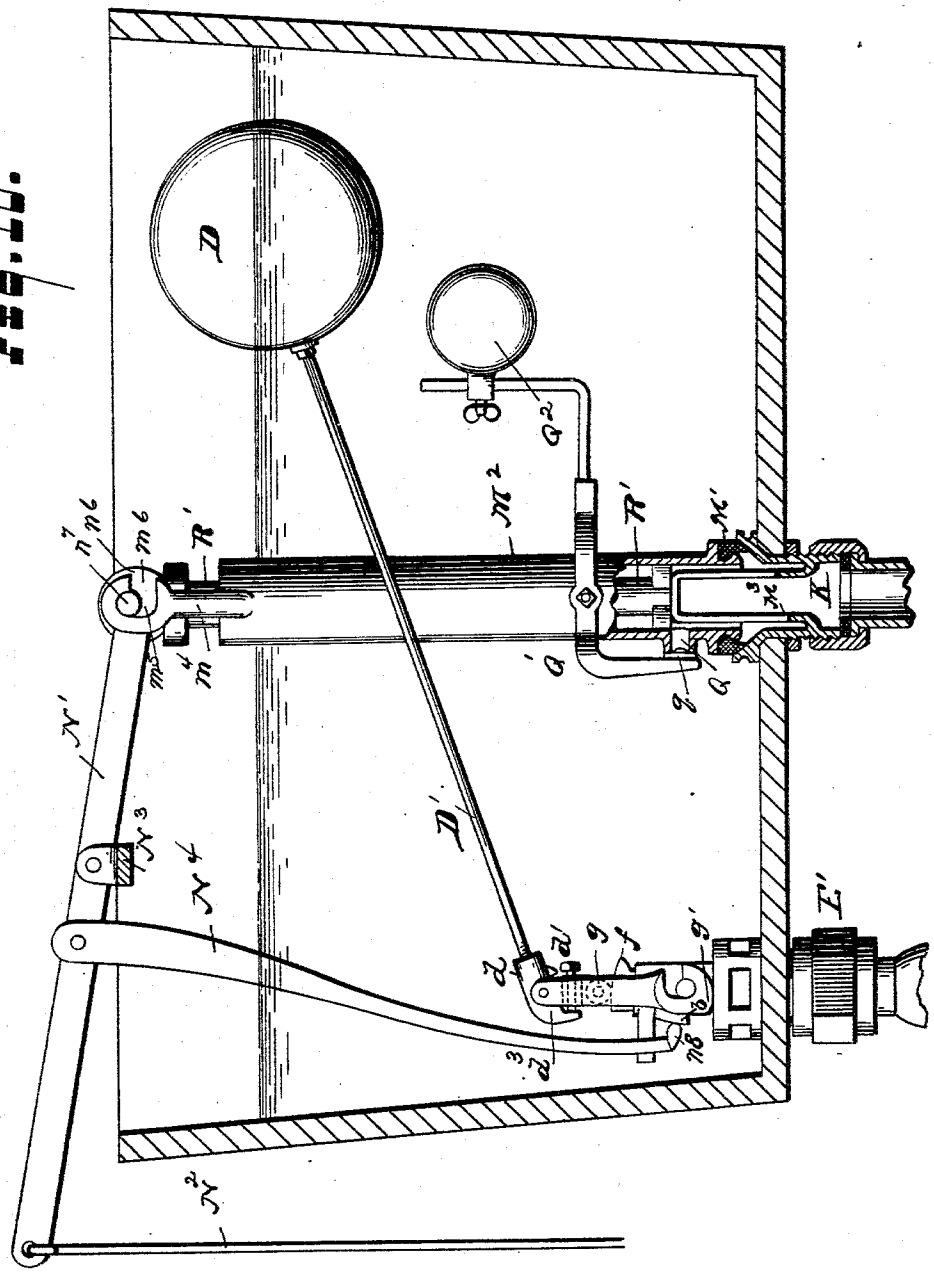
Fig. 10.



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A. M. CLARK.

VALVE.

No. 563,742. Patented July 14, 1896.

Fig. 2.

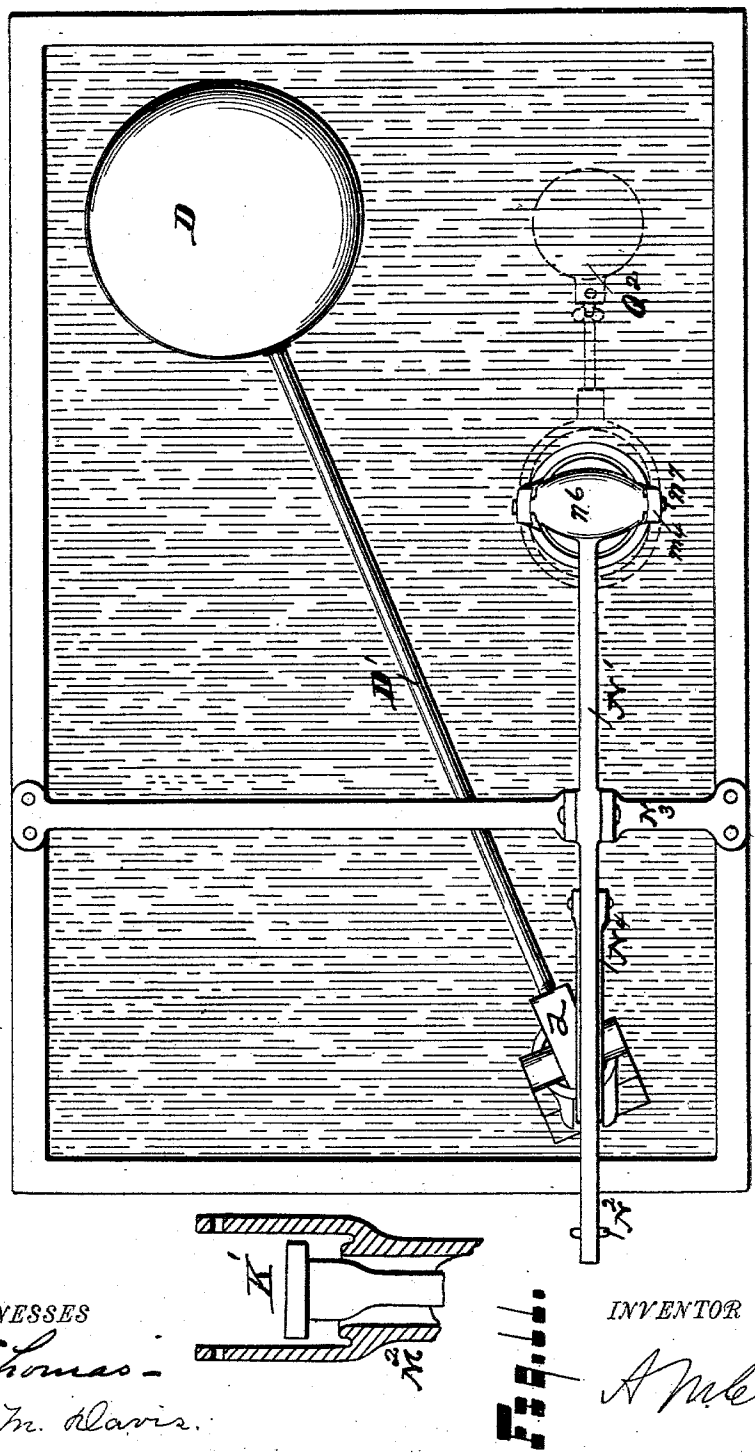

Fig. 1.

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UNITED STATES PATENT OFFICE.

ALBERT M. CLARK, OF ANN ARBOR, MICHIGAN.

VALVE.

SPECIFICATION forming part of Letters Patent No. 563,742, dated July 14, 1896.

Application filed March 16, 1894. Serial No. 503,832. (No model.)

To all whom it may concern:

Be it known that I, ALBERT M. CLARK, a citizen of the United States, residing at Ann Arbor, county of Washtenaw, State of Michigan, have invented a certain new and useful Improvement in Valves; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to devices adapted to automatically control the admission of water into tanks, and particularly to flush-tanks for water-closets. Its object is to provide means for admitting and discharging the water and flushing the bowl.

It consists in a novel inlet-valve and attachments, novel valve for discharging or flushing the water, and means connecting the inlet-valve and the discharge-valve whereby the float operating the inlet-valve unlocks and closes the outlet-valve. Thus my invention, while covering novel valves distinct in themselves, it also includes means whereby they are caused to operate together in complete action of the device.

In the drawings, Figure 1 is a vertical sectional view of a flush-tank. Fig. 2 is a vertical sectional view of inlet and outlet valves of a flush-tank. Fig. 3 is a view showing the case of the inlet-valve with its trunnions. Fig. 4 is a vertical sectional view showing the engagement of the bail with the case and its trunnions. Fig. 5 is a view showing the construction of the bail. Fig. 6 is a view showing a float-rod and a bail formed integral therewith. Fig. 7 is a plan of the flushing-lever. Fig. 8 is a perspective of the valve used in a variation. Fig. 9 is an elevation showing the case of the valve used in the form shown in Fig. 6. Fig. 10 is a view showing the flushing-lever at the top of the tank and an after-fill. Fig. 11 is a sectional view of the top of the valve-stem. Fig. 12 is a plan view of the form shown in Fig. 10.

In the drawings, A is a tank; B, the inlet-valve; C, the outlet-valve; D, the float.

B is the case of the inlet-valve.

E is a removable and reversible seat, the seat proper being the upper end of the stem portion *e*. The seat E is held in the case by the union-nut E', screwed on the bottom of the case. This forces the seat E upward, so that the annular flange *e'*, formed integral with the seat at its center, comes against the shoulder *b'* of the case. The stems of the seat E being of equal length, it can be removed and reversed, and the annular flange will bring it to the same position in each case. The object of making this seat reversible as well as removable is to provide against the expense attending repairs due to the wear of the seat at E'. As the stem F of the valve is usually provided at *f* with a rubber packing, the presence of sand and other grit tends to wear away the end of the seat.

By the use of my construction, all that is necessary to repair the valve the first time is to remove the seat E and invert it. After the first repair the plumber has only to insert a new seat in place of the old one. This change is made by simply unscrewing the union-nut E', inserting the seat, and returning the nut.

The seat E is hollow, and the water-passage through the valve is thus through the seat, and the water-inlet passage is closed by forcing the stem F down on the seat.

The stem F is provided with the head F', formed at the upper edge on a circle at *f'*.

G is a bail pivoted to the trunnions *a* on the case, swinging over the arc of the stem. The bail and the stem are made of such length, and the arc so formed, as to bring the stem downward upon the seat E when the bail is vertical or approximately so, thus locking the stem when the parts are in this position. If desired, the bail may be provided with the roller *g*, or any other suitable anti-friction device.

D' is the float-rod, engaged with the head *d*. To provide for adjustment, I pivot this head to the bail and employ the adjusting-screw *d'*. The head has an overhanging portion d^6, against which the end of the screw acts. The movements of this screw adjust the angle of the float-rod with bail. By means of this adjustment the inlet-valve may be closed with any desired depth of water.

To avoid the expense of constructing my device and convenience in assembling the parts, I arrange to engage the bail G with the

trunnions by slipping it over the trunnions at a position different from that in which it is used when the device is in operation and then swinging it into the operating positions, and so constructing the case, the trunnions, and the bail as to hold the bail on the trunnions throughout its operating positions. Above the trunnions on the case I provide the segment a', and cut away on the inside of each portion of the bail at g^2 to form a shoulder g^3, which shoulder rides on the segment and prevents the disengagement of the bail from the trunnions. The shoulder portion is cut away at g^4 to admit of its passage over the segment.

The outlet-valve consists of the case K with the proper connections below the case. The case is beveled at k to form a seat.

M is the valve, and M′ an annular packing, preferably of rubber, and provided with an interior annular projection m, which fits in an annular groove in the metal portion and holds the packing firmly in position on the valve. The valve-stem consists of the vertical tube M^2. This tube extends nearly to the top of the tank and becomes an overflow-pipe, discharging through the valve. The tube is provided at the top with the hooks m^4, each hook having an oval opening m^5 and an entrance-slot m^6.

N′ is a flushing-lever pivoted on the crossbar N^3. This lever is weighted at n^6. On the weight n^6 are the trunnions n^7. These trunnions engage with the hooks m^4 and enter the hooks through the slot m^6.

N^2 is the chain with which the flushing-lever is operated. By drawing down on the chain the lever raises the tube M^2 and opens the outlet-valve M. To hold the valve open when the water is discharging and flushing, I use the latch N^4, depending from the lever. This latch engages with the catch b on the case of the inlet-valve when the lever is drawn down to open the outlet-valve. This latch holds the lever down and allows the water to discharge until the float lowers sufficiently to swing the bail G until the cams g' g' force the latch from the catch b. This allows the lever to rise and the outlet-valve to close. The latch is provided at the lower end with a T n^8. Thus the cams on opposite sides of the inlet-valve case each act on the latch to disengage it. The amount of water that will be discharged is regulated by the adjustment of the float-stem on the bail.

The construction shown in Fig. 10 for the top of the valve's stem or tube M^2 at the connection with the flushing-lever is designed to be assembled without fitting the castings. When the valve M is closed, the weighted end of the lever N′ rests on the stem R′, and the position of the cap K′ is such as to hold the trunnions in the hooks.

I provide the hollow stem M^2 with means for preventing the gurgling, consisting of the weighted cushion-cap K′. This cap is weighted by and supported on the stem R′, which extends down into the hollow stem of the valve and rests upon the pilot M^3 when the valve is closed, and is of such length as to raise the cap from the top of the stem when the stem is lowered. When the stem is raised and the valve opened, the cap lies on the stem and prevents the passage of air into the stem. It is this passage of air that causes the gurgling.

Q is an after-fill passage into the overflow-tube M^2, and is closed by the valve q. This valve is held to its seat by the lever Q′. This lever is operated by the float Q^2. This float is made adjustable that it may be so set as to prevent waste. It will open the after-fill passage when the tank is flushed and the water in the tank discharged, and hold it open until the tank is partially filled again. The after-fill passage is only large enough to permit a small amount of water to discharge while the tank is filling.

In Figs. 6, 8, and 9 I show an inlet-valve construction, employing the bail G, for use in windmill-tanks and other tanks where the supply of water is to be shut off when it reaches a certain elevation in the tank. The trunnions on the case, with the segment a', are the same as those used in the other construction shown, and the bail G is engaged with the trunnions in the same manner. ^{n3} is a catch, cast integral with the case, having lugs on opposite sides, under which the curved arms f^2 f^2 of the valve engage. Thus the valve is held in position on the seat without drilling or riveting. This valve has a curved top over which the bail swings, and on which it acts to close the valve after the manner before described. This valve and bail is applicable to horizontal as well as vertical inlets. In either case the bail is engaged with the case of the valve without drilling, tapping, or riveting and without machine work.

In Figs. 1 and 2 the flushing-lever is placed within the tank at the bottom instead of at the top, as shown in Fig. 10. Such construction may be used with advantage, and I therefore show and describe the same. N is the flushing-lever in this case and is pivoted at n. It is provided with the oval opening n^4, as shown in Fig. 7. The opening is of sufficient size to permit the stem M^2 to pass up through it. The stem is engaged to the flushing-lever by means of the lugs m^2, one above and one below the lever on each side of the stem. To prevent the valve-stem from rotating, I employ the pilot-loop M^3, rising from the valve-seat. This pilot passes between lugs m^3, cast on the inside of the stem in pairs. In this construction the latch n^5 is pivoted to the end of the flushing-lever and engages with the catch b on the side of the case of the inlet-valve opposite from that shown in the other construction, but is forced from engagement with the catch on the case by the cams g' g' in the manner before described.

The combination of the bail pivoted on the case and the stem or valve having the curved top has the great advantage of securing the maximum resistance against the pressure of the water, as the bail, the valve, and trunnions, when the valve is closed, are all in the same line.

What I claim is—

1. The valve, the head formed with the cam, the bail pivoted to the opposite sides of the case approximately on a line with the center of the valve, whereby the force tending to open the valve is in line with the resistance, and the valve locked by the bail when set to close the valve, substantially as described.

2. The combination of the valve and case, trunnions on the case, the bail slotted to engage the trunnions and provided with recesses g^2, the segmental projections a', which engage with the recesses g^2, whereby the bail is held to the trunnions when in operating position, substantially as described.

3. In a flush-tank for water-closets, inlet and outlet valves, locking bail and float for closing the inlet-valve, and a lever for lifting outlet-valve, in combination with a latch depending from the lifting-lever, and a catch on the case of the inlet-valve, adapted to engage with each other as the lever is operated and means operated by the bail to disengage said latch and catch as the float lowers, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

ALBERT M. CLARK.

Witnesses:
C. H. FISK,
C. C. FISK.