(No Model.) 2 Sheets—Sheet 1.

S. W. LEWIS.

FLUSH TANK APPARATUS.

No. 496,572. Patented May 2, 1893.

Fig. 5.

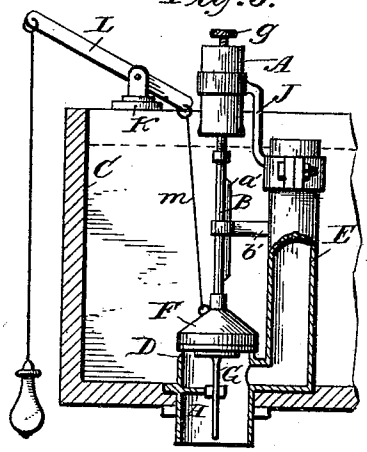


Fig. 1.

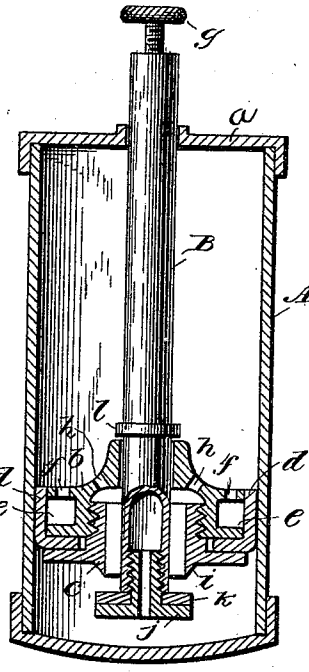


Fig. 2.

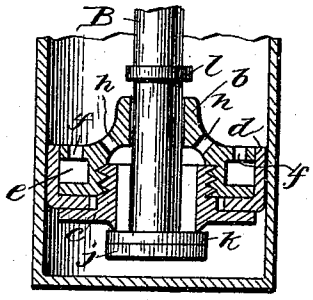


Fig. 8.

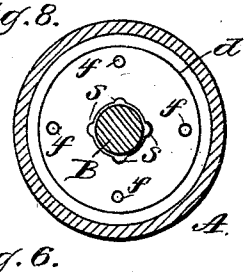


Fig. 4.

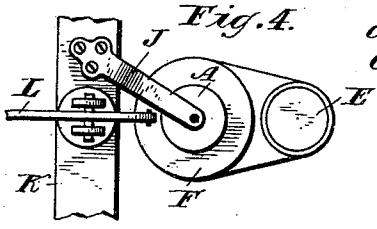


Fig. 6.

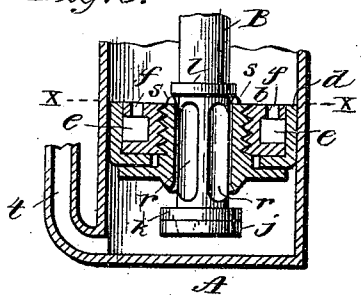


Fig. 3.

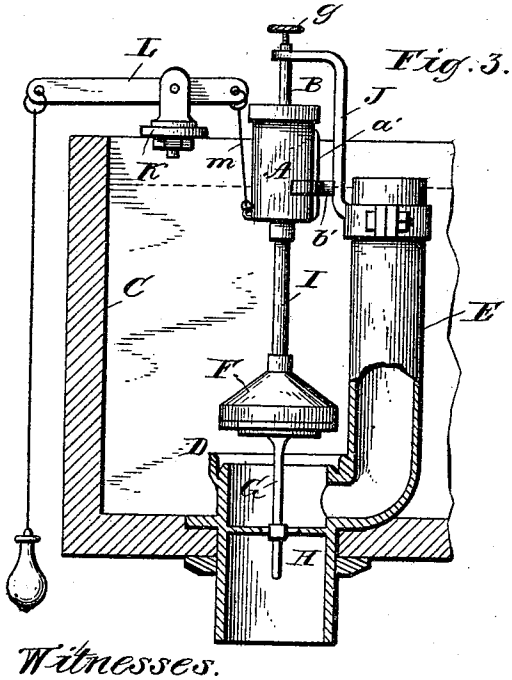
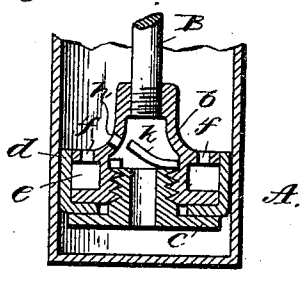


Fig. 7.



Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

S. W. LEWIS.

FLUSH TANK APPARATUS.

No. 496,572. Patented May 2, 1893.

Fig. 10.

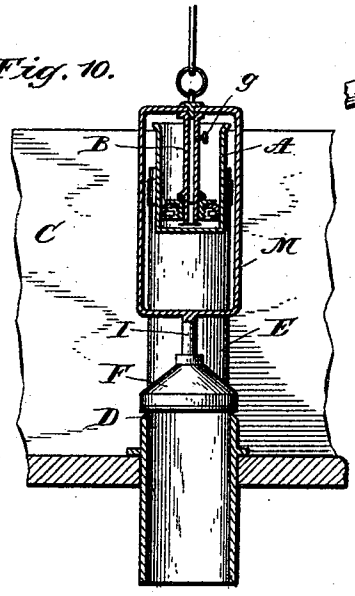


Fig. 9

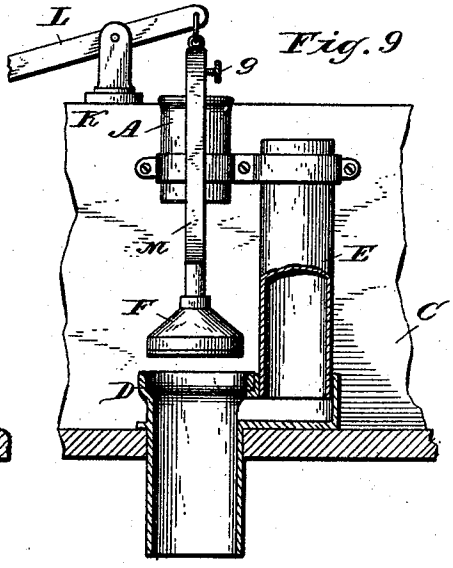


Fig. 11.

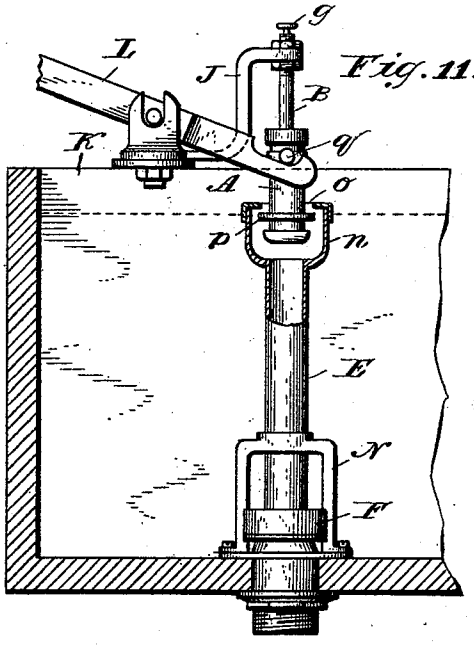
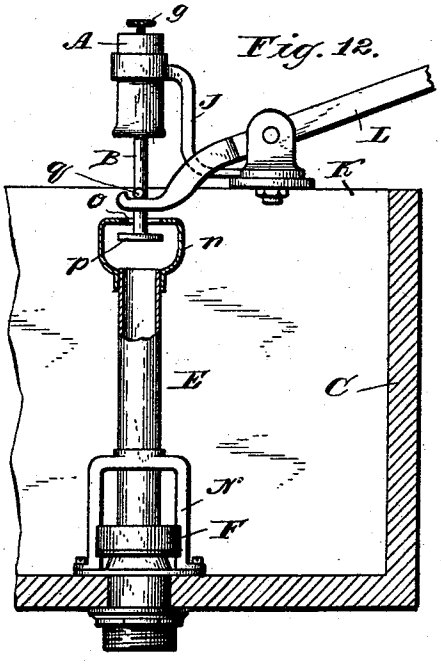


Fig. 12.



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UNITED STATES PATENT OFFICE.

SAMUEL W. LEWIS, OF BROOKLYN, NEW YORK.

FLUSH-TANK APPARATUS.

SPECIFICATION forming part of Letters Patent No. 496,572, dated May 2, 1893.

Application filed August 29, 1891. Serial No. 404,115. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. LEWIS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Flush-Tank Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates principally to flush tanks for water closets and has for its object the production of an air cushioning device for insuring the slow closing of the valve as well as the combination and arrangement of the valve with said air cushioning device.

The novelty of my invention will be herein set forth and specifically pointed out in the claims.

In the accompanying drawings:—Figure 1, Sheet 1, is an enlarged longitudinal central section of the air cushioning device with the valve open. Fig. 2, Sheet 1, is a detail section of the same with the valve closed. Fig. 3, Sheet 1, is a detail section in elevation of a flush tank showing the application of my invention. Fig. 4, Sheet 1, is a plan view of the parts of Fig. 3 but with the support for the piston rod transferred from the overflow pipe to the lever bridge. Fig. 5, Sheet 1, is a view corresponding to Fig. 3 but showing a modification in the arrangement. Figs. 6 and 7, Sheet 1, are sectional details showing modifications in the construction of the piston and valve. Fig. 8, Sheet 1, is a plan view of Fig. 6. Fig. 9, Sheet 2, is a view corresponding to Fig. 3 but showing a further modification in construction. Fig. 10, Sheet 2, is a side elevation of Fig. 9. Figs. 11 and 12, Sheet 2, are corresponding views to Fig. 3, but showing still further modifications to adapt the apparatus to an "after fill."

The same letters of reference are used to indicate identical parts in all the figures.

I will first describe my air cushioning device, illustrated in Figs. 1 and 2 where A is a cylinder tight at one end and with or without a removable guide cap *a* at its opposite end. Within the cylinder is fitted a cup-packed piston composed of the two parts *b* and *c* screwed together and clamping the cup leather packing *d* between them. The part *b* has a peripheral groove *e* behind most of that part of the packing which bears against the inside of the cylinder with openings *f* into said groove so that upon the out stroke of the piston the pressure of the air is exerted behind the packing to force it tightly against the cylinder. It will be observed that the flanged portion of *b* on each side of the peripheral groove bears against the packing to support it and to hold it in constant contact with the cylinder. The piston-rod B is, in this instance, a tube open at its inner end except for a small vent controlled by a screw *g*. It passes and is free to slide through a central opening in the piston, the opening in the part *b* serving as a guide and the opening in the part *c* being enlarged to form an air passage with which openings *h* through the part *b* communicate. The edge of the opening in the piston next to the closed end of the cylinder is beveled as shown at *i* to form a valve seat and a flanged plug *j* screwed in the open end of the piston rod and carrying a leather or other suitable packing *k* constitutes the valve. A collar *l* fast upon the piston rod on the side opposite the valve limits the play of the piston rod through the piston on its in stroke. It results from this construction that the piston carried by the collar *l* can travel freely, and without resistance or material friction, on its in stroke, for the valve is open, as shown in Fig. 1, and the air behind the piston can freely escape through the passage through the piston and the openings *h;* but, at the first outward movement of the piston rod, the valve is closed by the contact of the packing *k* with the seat *i*, as shown in Fig. 2, the packing *d* is forced out tight against the cylinder, and the further outward movement of the piston rod and piston creates a vacuum behind the piston and the entire pressure of the atmosphere is exerted upon the area of the piston, which, with its rod, can only travel outward as fast as air is supplied behind the piston through its rod from the vent *g*. The application of this air cushioning device to a tank valve apparatus will be readily understood by reference to Fig. 3 where C represents the flush tank, D the valve seat near the bottom of the tank and at the upper end of the pipe leading to the closet bowl, E the usual overflow pipe, and F the

valve properly weighted and guided at its lower end, if desired, by a stem G sliding through a perforated bracket or spider H. The cylinder A with its open end above the water line is directly over the valve F and connected thereto by a rod I while the piston rod B is rigidly connected at its outer end to a bracket J secured either to the overflow pipe, or to the tank bridge K as seen in Fig. 4.

L is the usual valve-operating lever pivoted upon the bridge K and having its inner end connected by a chain or wire *m* to the cylinder A, or as seen in Fig. 5 to the valve F. In Fig. 5 the valve F is shown closed and in Fig. 3 open to about half the extent of its upward movement, but the adjustment of the parts is such that when the valve is closed the piston is at the open end of the cylinder.

It will be readily understood from the above arrangement and construction that when the outer end of the lever L is pulled down the valve F and cylinder A will be lifted vertically until the piston is at the closed end of the cylinder. Then upon releasing the lever the valve *k* in the piston will be instantly closed and the valve F with its connected parts will very slowly descend owing to the vacuum and the operation of the parts as before explained, until the valve F is again seated. This slow closing of the tank valve insures a copious and efficient flushing of the closet bowl.

The only difference in the construction of Fig. 5 is that the cylinder A is inverted and made fast to the bracket J and the piston rod B is jointed and sufficiently extended to connect with the valve F. In this latter arrangement the piston rod need not be hollow and the vent *g* is made through the closed end of the cylinder while the latter is entirely above the water line of the tank.

Another method of constructing the parts is shown in Figs. 9 and 10 where the cylinder is shown fast to the overflow pipe and with its open end up. Here the piston rod is connected by a yoke M passing around the cylinder to the valve stem I and the lever L is connected by links to the top of the piston rod.

The construction shown in Figs. 11 and 12 is provided to produce what is known as an "after fill," namely a gentle filling of the bowl after the same has been properly flushed. It consists in attaching the overflow pipe directly to and over the top of the valve F which has an aperture through it and in providing a valve at the upper end of the overflow pipe which is closed by the act of opening the valve F and opened after the seating of the said valve, so that the water held in suspension in the pipe leading from the tank to the bowl can run out and refill the bowl. In this last named construction the upper end of the overflow pipe has an enlarged top *n* with an aperture *o* through the center of its upper wall to form a valve seat on its under side.

In Fig. 11 where the piston rod is fast to the bracket J the lower end of the cylinder A passes through the opening *o* and is provided with a collar *p* which forms the valve to close the top of the overflow when the cylinder A is lifted and by such lifting raises the overflow pipe and valve F. In this case the inner end of the lever L is forked and engages trunnions *q* upon the cylinder A.

In Fig. 12 where the cylinder A is inverted and fast to the bracket J the piston rod passes down through the opening *o* and carries the valve *p* while the trunnions *q* are fast upon the piston rod, as will be readily understood. In both constructions the valve F and overflow pipe are guided by the straddling bracket N. It will be understood from this construction that the valve *p* will be closed before the valve *k* is opened and that it will not open again until after the valve *k* is closed.

In Figs. 6 and 8 I have shown flutes *r* in the solid piston rod to afford the air passages through the piston and I have provided lugs *s* to prevent the collar *l* from acting as a valve. I have also shown a supplemental pipe *t* suitably provided with a vent plug above the water line for supplying air to the closed end of the cylinder.

In Fig. 7 the modification consists in making the piston rod fast to the piston and providing the latter with an ordinary flap valve.

In Figs. 3 and 5 I have shown a rib *a'* acting in connection with a slotted bracket *b'* to prevent the turning of the valve as it moves up and down. In Fig. 3 the rib is upon the cylinder and the slotted bracket arm upon the bracket J, while in Fig. 5 the rib is upon the piston rod and the bracket arm upon the overflow pipe.

The overflow pipes of Figs. 3 and 5 are provided with the usual float covers not shown, to prevent the disagreeable noise occasioned by the sucking of the air when water flows down the flush pipe. The valve seat may be counterbored as seen in Fig. 3 thereby providing a water seal before the valve F is entirely closed.

Having thus fully described my invention, I claim—

1. The combination with a cylinder air-tight at one end, of a piston therefor having a central opening one end of which constitutes a valve seat, a hollow piston rod provided at its outer closed end with a vent, and extending through and having limited play in the central opening of the piston, and a valve carried by said rod to engage said seat upon one stroke, and to be disengaged therefrom upon the opposite stroke, substantially as described.

2. The combination with the cylinder A, of the piston formed of the two pieces *b c*, the former having a central aperture, a peripheral groove *e*, and openings *f h*; the cup-leather *d* clamped by the pieces *b c* and entirely covering the groove *e*, and the hollow piston rod B having the screw vent *g* and provided with the collar *l* and valves *j k*, substantially in the manner and for the purpose specified.

3. In a flush tank apparatus, the combina-

tion with the tank valve and overflow pipe in vertical alignment, the former having a passage way through it, of an air cushioning device in vertical alignment with the overflow pipe, and a second valve connecting said overflow pipe and air cushioning device, whereby upon raising the tank valve the second valve is closed, and whereby upon the reclosing of the tank valve said second valve is opened to cause the after fill, substantially as described.

4. In a flush tank apparatus, the combination with the tank valve and overflow pipe in vertical alignment, the former having a passage way through it, of a cylinder closed at one end and in vertical alignment with the overflow pipe, a piston for said cylinder, a piston rod for said piston, a valve in said piston to be opened upon one stroke of the rod and closed at its opposite stroke, and a third valve interposed between the overflow pipe and the cylinder, substantially as and for the purpose specified.

5. In a flush tank apparatus, the combination of the guided valve F, the cylinder A directly over said valve, the piston rod B carrying the piston within the cylinder, an air valve in said piston to be closed upon one stroke thereof and opened at the opposite stroke, and a vent for the closed end of the cylinder, substantially as described.

6. The combination with the cylinder A in communication with a vent, of a piston having a longitudinal play upon its rod, peripheral groove *e*, openings *f* and cup packing *d* entirely covering said groove, piston rod B provided with a stop at one side of the said piston and with a valve at the other side thereof, the piston being provided with a suitable passage for air into the closed end of the cylinder when the valve is open, substantially in the manner and for the purpose specified.

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Witnesses:
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