(No Model.) 2 Sheets—Sheet 1.

M. HOGAN.

FLUSH TANK AND VALVE FOR WATER CLOSETS.

No. 533,464. Patented Feb. 5, 1895.

Fig. 1.

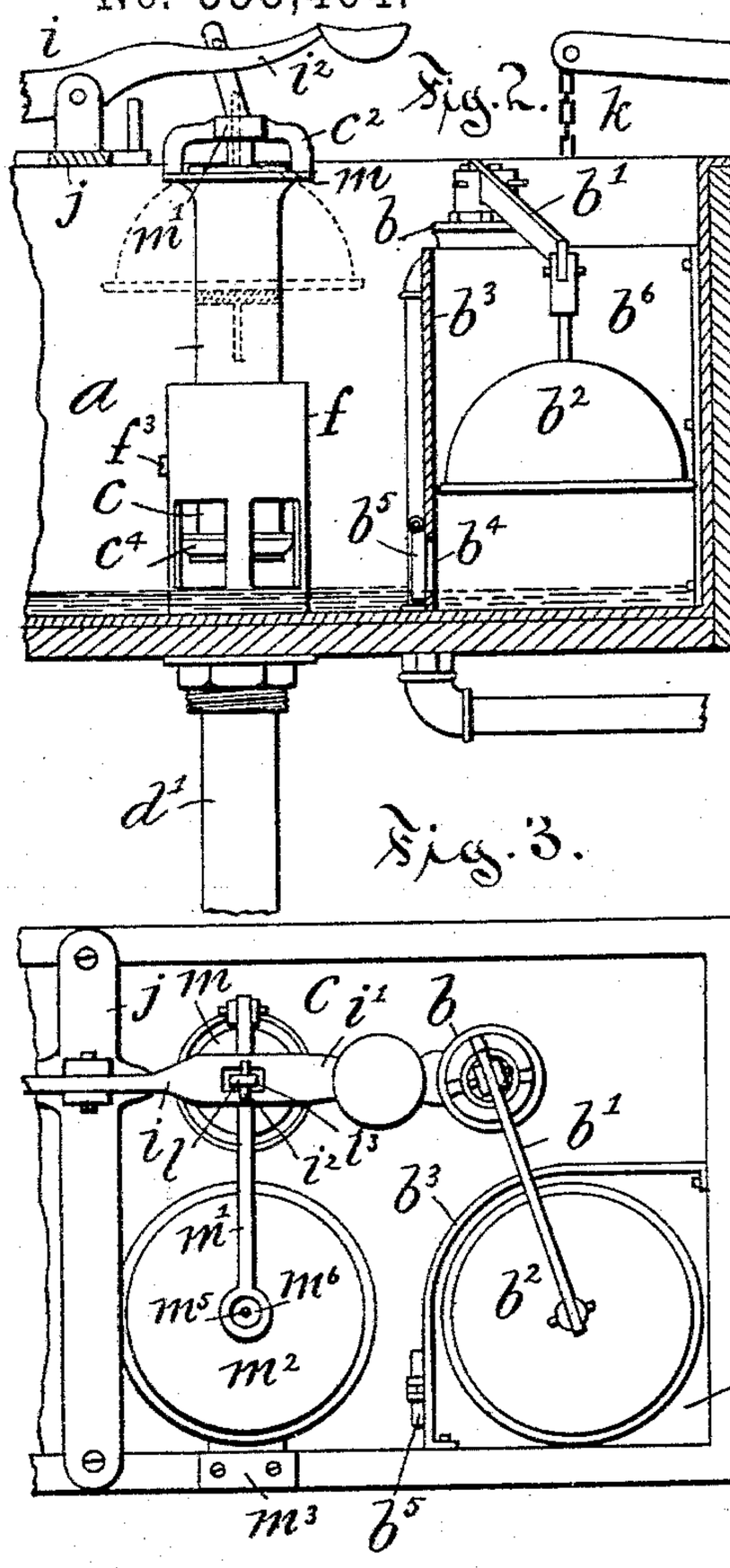

Fig. 2.

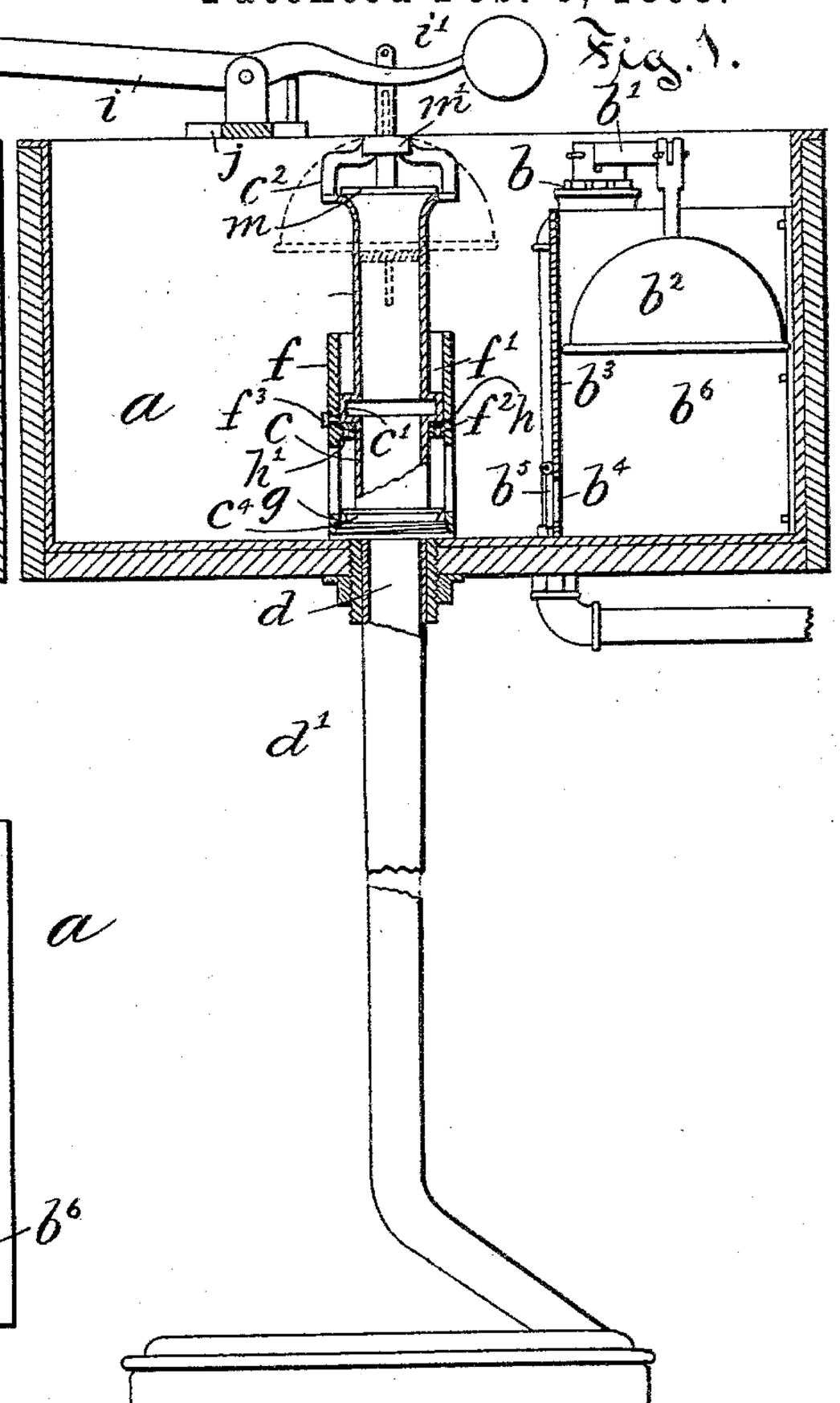

Fig. 3.

Witnesses:
J. A. Cantin
Arthur B. Jenkins.

Inventor:
Matthew Hogan
by Chas. L. Burdett,
Attorney

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

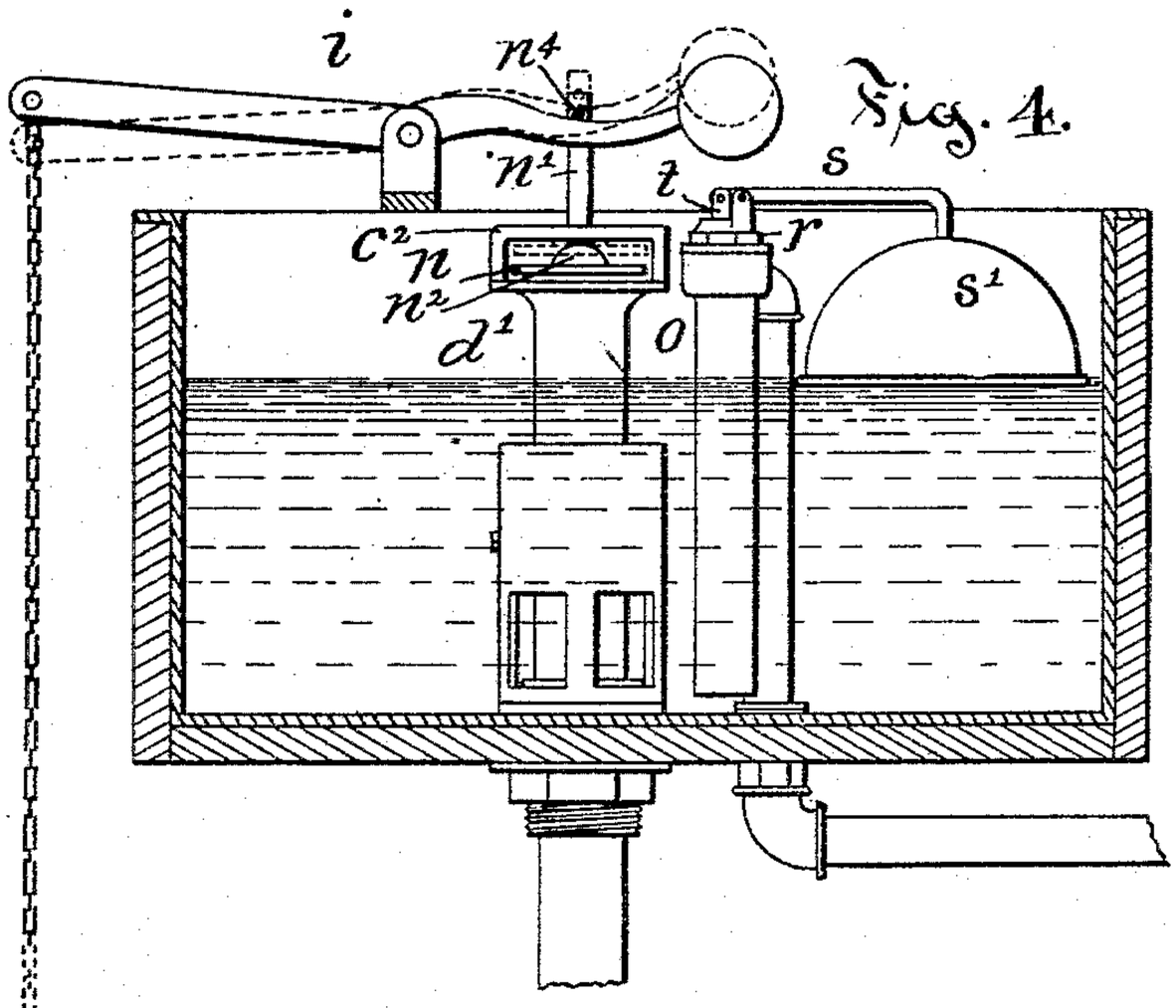

Fig. 6.

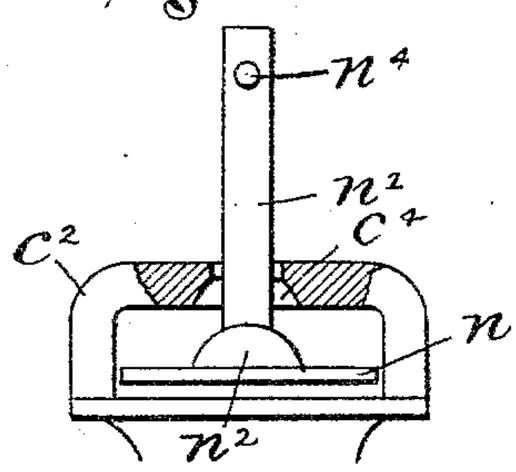

Fig. 5.

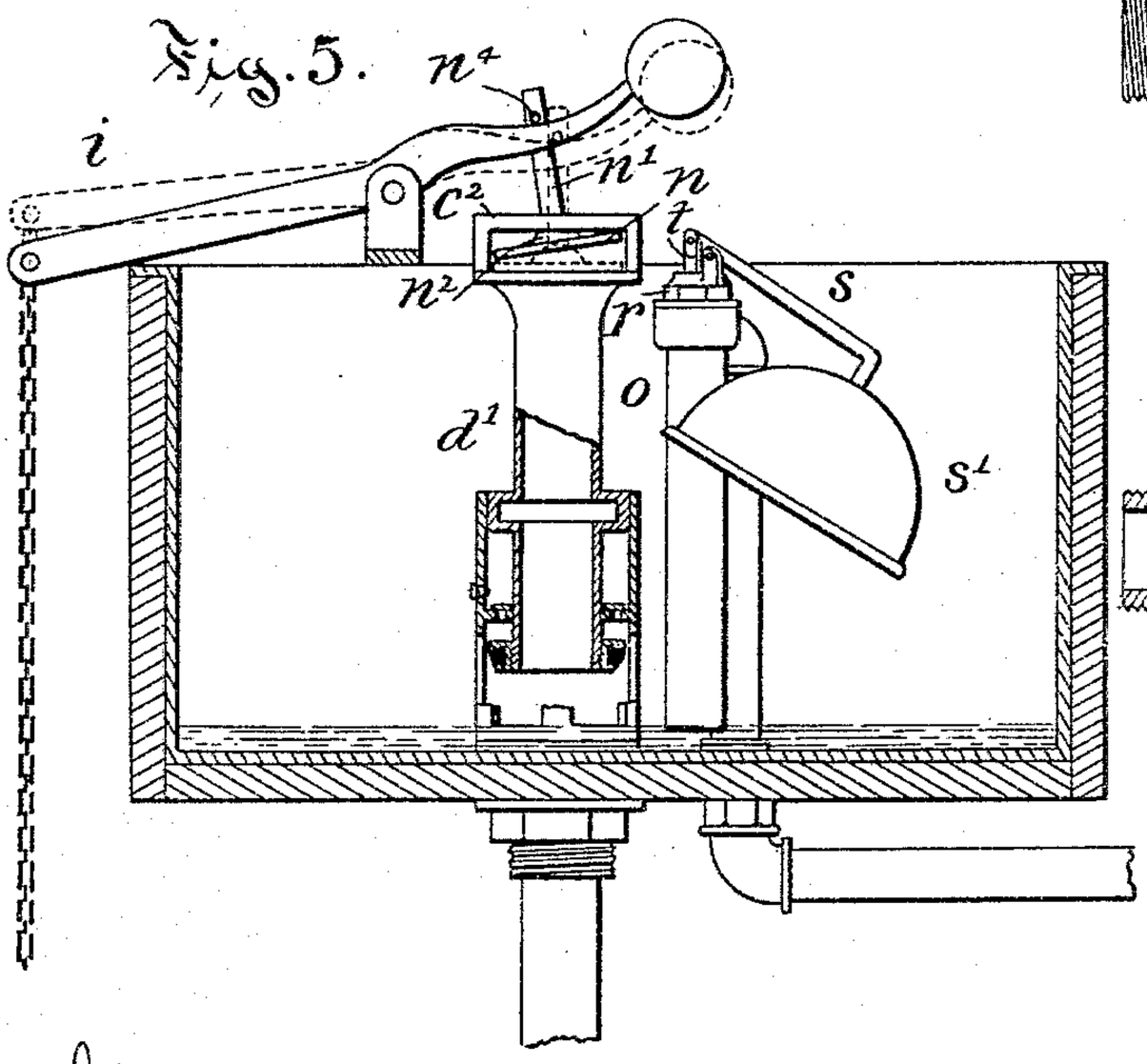

Fig. 7.

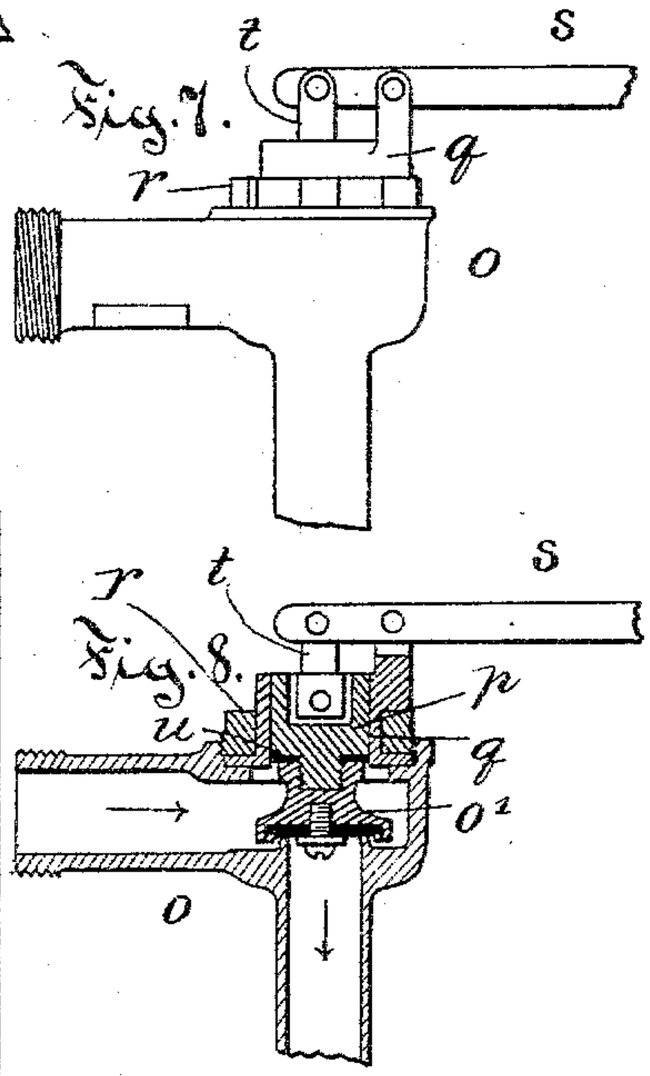

Fig. 8.

Witnesses:
J. A. Cantin
Arthur B. Jenkins.

Inventor:
Matthew Hogan
by Chas. L. Burdett,
Attorney

UNITED STATES PATENT OFFICE.

MATTHEW HOGAN, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE HOGAN MANUFACTURING COMPANY, OF SAME PLACE.

FLUSH-TANK AND VALVE FOR WATER-CLOSETS.

SPECIFICATION forming part of Letters Patent No. 533,464, dated February 5, 1895.

Application filed May 21, 1894. Serial No. 511,888. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW HOGAN, a citizen of the United States, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Flush-Tanks and Valves for Water-Closets, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of devices known as flush tanks used in connection with water closets and like apparatus for the purpose of providing a supply of water, and also to the valves and other operating mechanism by means of which the flow of water is controlled.

The object of my invention is to provide a flush tank and its operating valves which are automatic in providing against any overflow, also to provide a noiseless discharge and supply valve free from chattering and from the sucking sound common to many prior devices of this class.

To this end my invention consists in the details of the several parts making up the tank, the valves, and the valve operating mechanism, and in the combination of such parts as more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a detail view in vertical section of a tank embodying my several improvements. Fig. 2 is a detail sectional view of part of the tank showing the position of floats and valves. Fig. 3 is a detail plan view of part of the tank showing the position of floats and valves. Fig. 4 is a detail view in lengthwise section of a tank showing the discharge valve closed. Fig. 5 is a detail view in cross section of the tank showing the discharge valve open and float dropped. Fig. 6 is a detail view of the top of the discharge valve and connected parts showing ball and socket connection. Fig. 7 is a detail side view of the supply valve. Fig. 8 is a detail view in central vertical section of the supply valve.

In the accompanying drawings the letter *a* denotes a flush tank made of any convenient size and material; *b*, the supply valve through which water is admitted into the tank; *b'*, the supply valve lever; b^2, the supply valve float suspended from the lever and by its weight adapted to open the supply valve.

A discharge valve *c* is arranged in connection with an outlet *d* through the bottom of the tank, a discharge pipe *d'* extending therefrom and communicating with a bowl *e*. A valve body *f* is secured to the frame of the valve seat *g* as by means of screw threads, the lower portion of the valve body being cut away as shown in Fig. 2 of the drawings to provide for the free flow of water into the outlet pipe when the valve is lifted. The valve *c* consists of a tubular stem having a piston *c'* traveling in a chamber *f'* in the upper part of the valve body.

A diaphragm f^2 transversely of the valve body forms the bottom part of a dash pot and it is perforated to enable the valve stem to be readily lifted to open the discharge outlet. When the valve *c* is lifted a partial vacuum is formed below the piston and between it and the diaphragm which causes an annular valve *h* to be lifted by the pressure of the water within the tank which flows into the chamber below the piston. The annular valve *h* is of metal and is narrower than the annular space in which it is located but of sufficient size to at all times cover the ports *h'* formed through the diaphragm.

In the operation of the device when the tubular valve stem is lifted a space is left below the piston and around the tubular stem above the diaphragm f^2. The pressure of water flowing under the diaphragm through the ports *h'* lifts the annular valve *h* and allows water to flow into the chamber. When the valve stem is released it falls by the action of gravity and the rate with which the water in the chamber *f'* is expelled from that chamber, as through an adjustable vent f^3, determines the rapidity with which the valve will be closed. The first inrush of water into the chamber through the ports *h'* lifts the valve *h* but its weight soon returns it to place covering the ports and substantially preventing the outflow of water through them. This provides for the slow closing of the valve in the outlet pipe and permits the tank to be to a degree emptied of water, as illustrated in Fig. 5 of the drawings. As soon as the

water has been expelled from the chamber f' the valve again closes the outlet d and the supply valve having been opened a further supply of water flows into the tank.

In the form of apparatus illustrated herein the valve is opened by lifting the tubular valve stem by means of a lever i pivoted on suitable brackets j and provided at its outer end with a pull wire k which hangs in convenient position for use. The inner end i' of the lever is curved downward and in the recess in the upper surface of this curved part of the lever a pivot pin i^2 is located. The lever is provided with a slot or socket i^3 of a size to permit a free sliding movement of the link l which is pivoted at its lower end to a yoke c^2 which extends across the upper end of the tubular stem c' of the discharge valve c. There is a particular advantage in this described method of connection as it enables a correct reciprocating movement to be imparted to the tubular stem owing to the recess in the lever i in which the pivot pin rests. When the lever is lifted a certain freedom of movement is permitted which prevents any cramping of the tubular valve stem in its socket.

In order to prevent the water in escaping from the tank from making a disagreeable noise the upper end of this tubular stem is covered by a cap m which is pivotally suspended from the overflow lever m'. This lever is pivoted to a bracket on the tubular stem, extends across and over the cap and overlies a float m^2 which is supported on a bracket m^3. The float is provided with the guide rods m^4, m^5, one of which m^4 prevents the float from being removed from the bracket while permitting an up and down movement, while the guide rod m^5 extends through the socket m^6 in the outer end of the overflow lever and allows the lever to be lifted vertically without disturbing the float. This arrangement of the parts enables the valve stem to be raised and lowered in controlling the discharge of a supply of water from the tank without disturbing the position of the cap of the overflow lever or of the float. The function of the lever m' and float m^2 is to provide for the lifting of the cap when the water in the tank shall rise above a certain level. The water in such case lifts the float, with it the overflow lever and cap and permits the water to overflow through the discharge pipe and prevents it from reaching a level which would enable it to overflow from the tank to the damage of whatever might be below it.

The supply valve in the form of device shown in Figs. 1 to 3 of the drawings is controlled by the float b^2 which is suspended in a separate chamber within the tank and separated from the main part of the tank by a division wall b^3. Through the lower part of this wall there is an outlet b^4 closed by a gravity valve b^5 which opens outward from the float chamber b^6. The result of this construction is that as soon as the water flowing out from the main tank reaches a level below that of the water in the float chamber the gravity valve b^5 will be slightly opened and the outflow of water from the float chamber begin. In practice the greater part of the water, however, flows out from the tank before the water flows from the float chamber, the outflow of water from that chamber, however, dropping the float and opening the supply valve, the supply continuing to flow in until the water has filled the tank and then overflowing the upper edge of the wall b^3 fills the float chamber and closes the supply valve b quietly.

By the combination of parts above described a tank is provided having a slow closing valve, its tubular stem forming also the overflow, its cap preventing the making of any disagreeable sucking noise by the discharge of the water, and the overflow device effectually preventing any chance of overflow of the tank.

The discharge valve c is formed on an annular piece screwed onto the lower part of the tubular stem and it has a peculiarly shaped socket c^3 with undercut walls in which is fitted an annular packing c^4. The outer surface of this packing is preferably rounded as shown and the shape of the socket with undercut walls prevents this packing from being accidentally pulled out from the socket. The valve seat g is formed on the upper end of a nipple which is screwed into the lower end of the valve body f and has a shoulder larger than the opening through the bottom of the tank, the nipple being threaded to receive a nut c^5 by means of which the nipple is secured in place in the tank and the valve body f and the operative parts connected with it are supported in place.

A modified form of cap and means for connecting it to the tubular stem is shown in Figs. 4, 5, and 6 of the drawings. The cap n is of a size and shape adapting it to cover the opening in the upper end of the tubular valve stem where it is suspended by its stem n' from the lever i, this stem passing through a hole in the yoke c^2. A spherical piece n^2 at the base of the stem fits a globular recess c^4 in the under side of the yoke so as to permit of a rocking movement of the parts which enables the lever i to lift the valve stem d' without cramping it in the valve body. A pivot pin n^4 extends across the curved upper surface of the lever from which the cap is suspended by its stem, and when the discharge valve is closed the cap is lifted a slight distance above the stem so as to provide an overflow through the tubular stem d' for any surplus supply of water which may accidentally flow into the tank. This construction of the cap and its support removes the need of an overflow lever and special float and the wall which divides the tank in the other construction.

In the modified form of structure when the valve d' is lifted as by means of the lever i and while it is slowly closing the cap n covers

the upper end of the stem, as shown in dotted outline in Fig. 5, and effectually prevents any sucking sound by the discharge of the water through the valve from being made. The supply valve is operated by a float as before described but it is suspended in the main tank.

The supply valve comprises a valve body *o* through which the water flows in the direction indicated by the arrow in Fig. 8 of the drawings. The valve seat is formed in the bottom wall of the valve body, a valve *o'* being arranged within the body so as to be moved toward and from the seat. This valve is secured to the lower end of a plunger *p* which fits snugly in a chamber in the cap *q* which is secured to the valve body by means of a lock nut *r* overlying a flange on the cap and provided with projections or sockets by means of which the annular nut may be turned. A lever *s* is pivoted to the cap and pivotally connected by a link *t* to the plunger, this pivotal connection of the lever to the plunger obviating any cramping of the plunger in the plunger socket and providing for its free vertical movement. The valve has a threaded socket in its upper surface fitting a threaded stem on the lower side of the plunger and between the surface of the plunger and the upper part of the cap a packing *u* is placed the edges of it projecting against the wall of the plunger socket and serving to pack that joint against the outflow of water. This construction provides in a measure a balance valve which is operated by the swinging movement of the lever, the outer end of which supports a float *s'*. The falling of the float opens the valve and allows the water to flow into the tank. By my improved construction the valve is easily operated and all chattering is obviated.

A particular advantage of the described means of securing the cap to the valve body is due to the fact that by loosening the hold of the annular nut upon the cap the latter may be turned in the socket so as to adjust the lever and the float to any desired position within the tank, the nut being then screwed to place and avoiding any cutting, feeding or bending of parts as is required in prior methods of attaching a lever and float to a valve body in flush tank work.

I claim as my invention—

1. In combination with a flush tank, a discharge valve having a reciprocating tubular stem, a dash pot formed between the valve stem and the valve body and providing for the slow closing of the valve, a cap loosely supported on the upper end of the valve stem and adapted to close the opening when the valve stem is moving downward but uncovering the opening in the stem in the normal position of the cap, and the lever connected to the stem of the cap, all substantially as described.

2. In combination with a flush tank, a discharge valve having a reciprocating tubular stem, a yoke secured to the top of the stem and having a globular socket on the under surface of the yoke, a cap adapted to cover the upper end of the tubular valve stem and with its stem extending through an opening in the yoke, the spherical projection on the upper surface of the cap, and the lever loosely connected to the stem of the cap, the said cap when suspended from the lever in its normal position being lifted off the upper end of the tubular stem and providing a waste outlet from the tank, all substantially as described.

3. In combination with a flush tank, a tubular valve body secured to the frame of the valve seat and having openings therethrough, a reciprocating valve having a tubular stem movably supported within the valve body, an annular diaphragm located within the body, a piston on the outer surface of the valve stem, an annular valve overlying ports in the diaphragm, a cap loosely supported on the upper end of the valve stem and operating to close the opening when the valve stem is moving downward but uncovering the opening in the stem when the latter is in its lowermost position, a lever connected to the valve stem, means as described for reciprocating the valve stem and operating the cap, a supply valve having a valve seat in its lower wall, a cap secured to the opposite wall of the valve body and having a plunger socket, an annular nut overlying a flange on the outside of the cap and fitting a threaded socket in the valve body, the reciprocating plunger, a valve removably secured to the plunger with a packing interposed between the plunger and valve, a link pivoted to the plunger and to the inner end of the lever, the valve lever and the float portion on the outer end of the valve lever, all substantially as described.

MATTHEW HOGAN.

Witnesses:
CHAS. L. BURDETT,
AUTHUR B. JENKINS.