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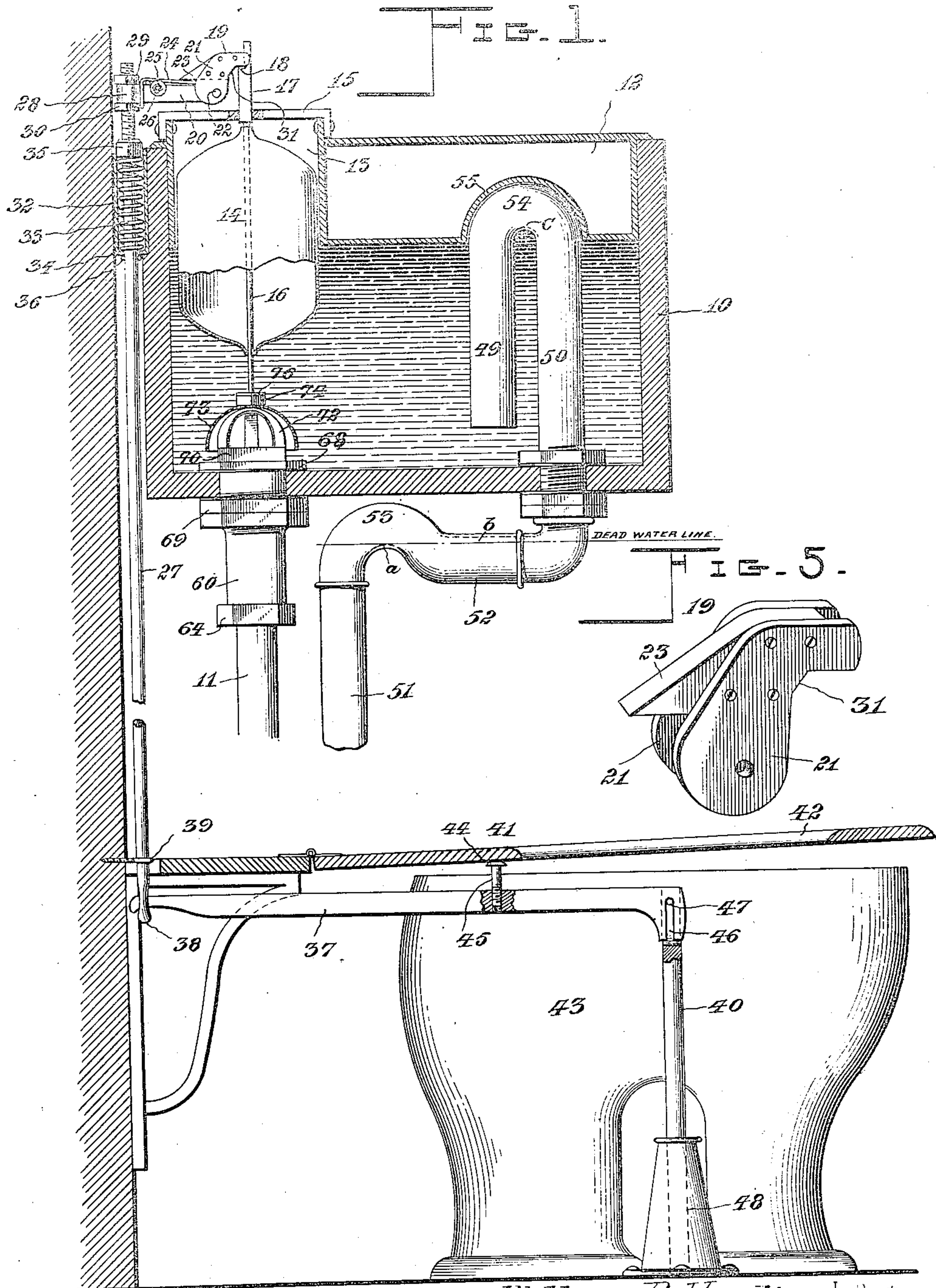
Patented July 3, 1900.

W. P. HASTINGS.
FLUSHING APPARATUS.

(Application filed Dec. 31, 1898.)

2 Sheets—Sheet 1.

(No Model.)



Witnesses

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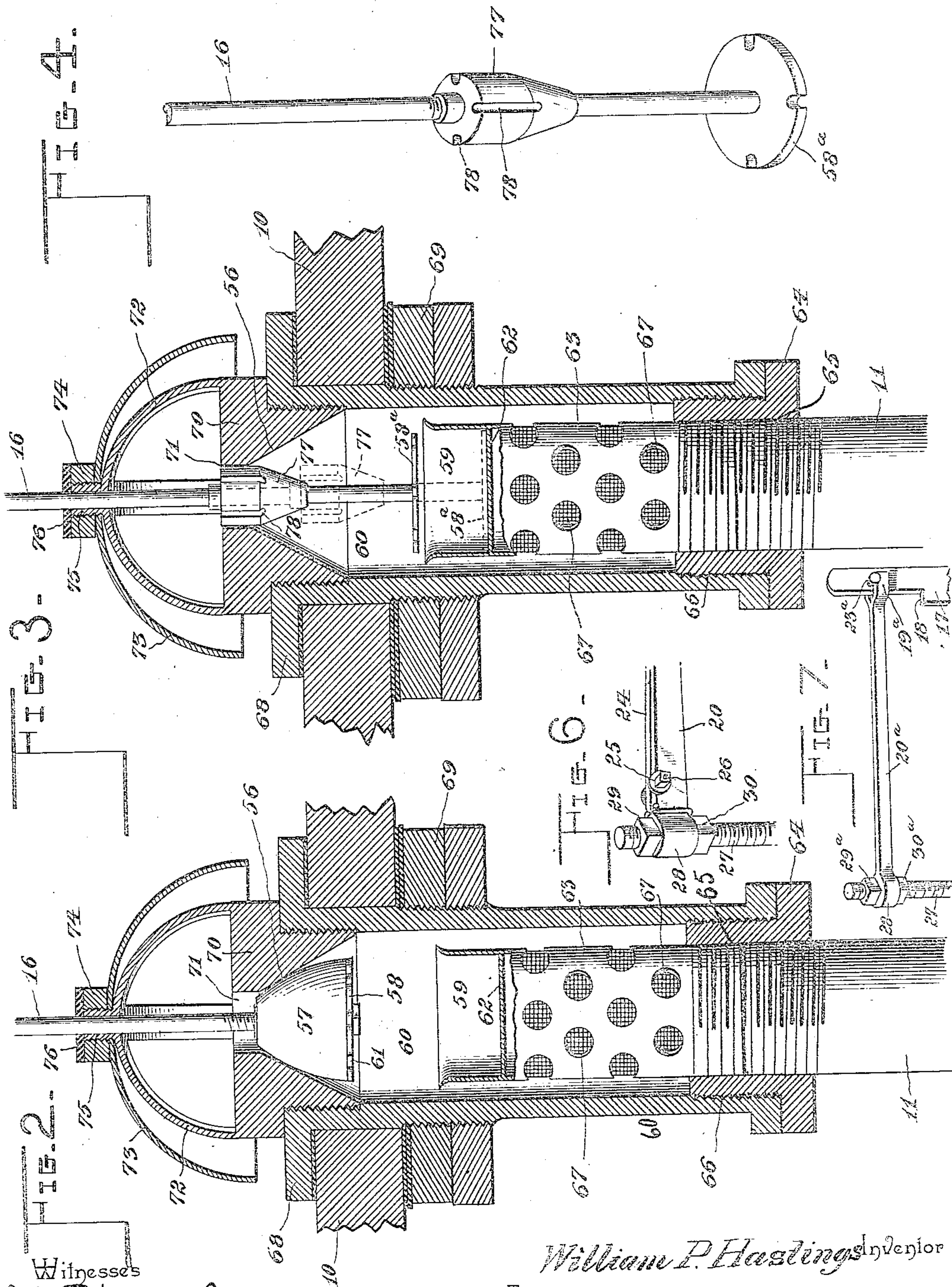
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(No Model.)



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UNITED STATES PATENT OFFICE.

WILLIAM P. HASTINGS, OF NEW YORK, N. Y.

FLUSHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 653,005, dated July 3, 1900.

Application filed December 31, 1898. Serial No. 700,820. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. HASTINGS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Flushing Apparatus, of which the following is a specification.

My invention relates to a flushing apparatus for water-closets, and has for one object to provide a simple, compact, and efficient construction and arrangement of parts whereby the flushing of the bowl may be controlled by the depression of the seat or intermittently during the occupation of the seat or at intervals continuously, according to the adjustment of the parts to suit the conditions under which the apparatus is used.

A particular object of my invention is to provide improved means for making or completing the siphon action whereby the same may be accomplished with certainty and promptness when a certain relation exists between the parts of the mechanism.

A further particular object of my invention is to provide an improved inlet-valve mechanism and restraining devices for the float whereby the efficient siphonic discharge of the contents of the tank or reservoir may be accomplished.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view, partly in section, of a flushing apparatus constructed in accordance with my invention. Fig. 2 is a detail sectional view of the faucet or inlet-valve mechanism, showing the depressed or restrained position of the valve and float-stem. Fig. 3 is a similar view showing the leaking or intermittent valve arranged in operative position. Fig. 4 is a detail view in perspective of the leaking or intermittent valve and the contiguous portion of the stem with the attached restraining disk or piston. Fig. 5 is a detail view of the trip mechanism or clutch connection between the operating-rod and the valve-stem. Fig. 6 is a similar view of the connection between the operating-rod and the cross-head. Fig. 7 is a detail view of a connection between the operat-

ing-rod and the valve-stem adapted for use in connection with the intermittent or leaking valve.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

10 designates a tank, and 11 a supply-pipe for conveying water thereto, said tank being fitted with a depressed cover 12, which is securely, but removably, fastened to the walls of the tank to prevent leakage of water and which is provided in alinement preferably with the supply-pipe with a well 13, forming an upward extension of the interior of the tank for the reception of a float 14, said float fitting loosely in the well (which forms a guide therefor) to allow water which is rising to the plane of the lower side of the cover 12 to pass between the side surfaces of the float and the walls of the well. The upper end of the well 13 is open and is spanned by a cross-bar 15, forming a trip, and the valve-stem 16, to which the float is attached, extends upward through a guide-opening in the center of said cross-bar and is fitted with a catch-block 17. This catch-block is shouldered, as shown at 18, near its upper end for engagement by a latch 19, fulcrumed upon a cross-head 20, said latch having side plates 21, which are pivotally mounted upon opposite sides of the cross-head 20 by means of a screw or bolt 22 and an intermediate core-plate 23, which is adapted at its front end to engage the shoulder 18 of the catch-block, while the extremities of the side plates or cheeks 21 extend forward in advance of said extremity of the core-plate to operate upon opposite sides of the plane of the catch-block. The cross-head 20 also carries a latch-operating spring 24, which bears upward against the tail of the latch, consisting of a rearward extension of the core-plate 23, to yieldingly hold the latch in operative relation with the shoulder of the catch-block, the rear end of said spring being coiled around or otherwise secured to the cross-head and extending forward between lateral guides 25, formed, respectively, by the head of the bolt 26 and a washer secured in place by the nut of said bolt to prevent lateral deflection of the spring.

The cross-head 20 is carried by an operating-rod 27, which extends through the eye 28

of said cross-head, and is threaded for engagement by upper and lower adjusting-nuts 29 and 30, arranged in contact with the upper and lower sides, respectively, of said eye. As the operating-rod descends the latch by contact with the shoulder 18 depresses the valve-stem 16 and the float 14, which is secured thereto, until a cam-face 31 on said latch comes in contact with the trip 15, whereupon the latch is thrown rearward at its free end to release the shoulder 18, and the valve-stem and float are free to rise independently of the latch, and hence of the operating-rod. The return of the operating-rod to its normal or elevated position causes the reengagement of the latch with the shoulder 18 in preparation for a succeeding depression of the valve-stem, as above explained. The operating-rod 27 is preferably arranged in rear of the tank 10 or in any other convenient position with relation to the apparatus and extends at a suitable point through a tubular guide 32, in which is incased a return-spring 33, coiled upon the rod. One end of this spring—namely, the lower end—bears upon the lower partly-closed end of the guide or upon fixed intumed flanges 34, with which the lower end of said guide is provided, and bears at its upper end against an adjustable collar 35, threaded upon the rod, the tension of said spring being adjustable by means of said collar and the exterior diameter of the collar being such as to fit snugly in the bore of the guide 32 to insure the accurate reciprocatory movement of the rod without lateral vibration or displacement. Also to limit the upward movement of the operating-rod under the tension of the return-spring 33 I employ a suitable stop 36, consisting, in the construction illustrated, of a transverse pin fitted in the rod and adapted to come in contact with the lower end of the guide.

Various means may be employed in depressing the operating-rod to actuate the float, as above indicated; but in the construction illustrated these operating means consist of a lever 37, engaged at one extremity with an eye 38 at the lower end of the operating-rod 27, said rod adjacent to the eye 38 extending through a guide-eye 39 and an upright or support 40, upon which the other extremity of said lever is fulcrumed, the lever being provided at an intermediate point with a bearing 41, adapted to receive the downward pressure of the closet-seat 42, said lever being arranged to extend forward at one side of the bowl 43. This bearing in the construction illustrated consists of a head 44, provided with a stem 45, which is threaded or otherwise adjustably mounted upon the lever to provide for varying the position of the bearing with relation to the lever, and hence the stroke of the lever or the amplitude of its movement when actuated by the depression of the seat. Also to facilitate disengagement of the lever from the support or upright 40 the former is provided at its fulcrumed end with a transverse slot 46 to engage a trans-

verse fulcrum pin or bolt 47, arranged in a bifurcation of said upright 40. Also the upright may be suitably braced, as by a truncated conical thimble 48, and may be threaded or otherwise firmly secured at its extremity in the floor.

Communicating with the interior of the tank is a siphon having an inlet or short leg 49, of which the inlet end is located near the floor or bottom of the tank, and an outlet or long leg 50, communicating with a flush-pipe 51, designed to convey the contents of the tank to the interior of the bowl. Interposed, however, between the outlet or long leg of the siphon and the flush-pipe is a trap-arm 52, the body portion of which is located approximately in a horizontal plane and which is provided near its point of connection with the flush-pipe with an upwardly bowed or deflected gooseneck 53, the lower side of this deflected or gooseneck portion being interiorly in the plane, approximately, of the interior of the upper wall of the body portion of the trap-arm. In practice the lower side of the gooseneck portion at the point *a* (or at the most elevated point of said lower side) is arranged slightly below the horizontal plane of the interior of the upper side of the body portion of the trap-arm, as at the point *b*, to allow a channel of small cross-sectional area through which air may escape from the interior of the tank and the legs of the siphon to the flush-pipe during the filling of the tank or during the rise of the water therein, the water-level or dead-water line in the trap-arm being indicated in Fig. 1. Also in practice I prefer to dispose the elbow 54, by which the legs of the siphon are connected, in a cavity 55 in the cap or cover 12 of the tank, whereby the lower side of the interior of said elbow is slightly above the plane of the under surface of said cap or cover. The object of this specific arrangement of parts is to secure a prompt and effectual making or completing of the siphon action when, the tank being full to the plane of the under side of the cap or cover, a comparatively-small additional quantity of water is admitted to the tank. For instance, with the level of the water in the tank in the plane of the inner surface of the cap or cover, and hence filling the short or inlet leg of the siphon almost to the plane of the under side of the elbow 54, as indicated in Fig. 1, the sudden admission into the tank of a comparatively-small additional quantity of water, together with displacement by the depression of the float, will carry the level in the leg 49 over the point *c* and discharge it into the long leg 50 of the siphon, thus closing the small channel or space at the point *b* in the trap-arm and at once making or completing the siphon, whereupon the contents of the tank will be drawn out through the flush-pipe.

The communication of the supply-pipe 11 with the interior of the tank is controlled by a supply-valve carried by the stem 16 and arranged to operate in connection with a valve-

seat 56. In the construction illustrated in Fig. 1 the valve 57 is normally held seated by means of the float 14 when the tank is full, and carried by the valve-stem below the plane of the valve is a restraining disk or piston 58 to fit in a cylindrical receptacle 59 when the valve is unseated or depressed, the function of the cooperating parts 58 and 59 being somewhat similar to that of a dash-pot in that upon the depression of the valve said piston 58 by entering the receptacle 59 opposes the movement of the valve sufficiently to prevent jar, and after the valve is fully depressed the upward movement thereof is resisted by the contents of the valve-chamber 60 and the float is prevented from immediately raising the valve (upon the disengagement of the latch 19 from the catch-block) to reseal the valve. The piston 58 is provided with peripheral relief-notches 61, which allow the depression of the piston into the receptacle 59 and which also allow the withdrawal of said piston therefrom; but owing to the small area of said relief-notches the motion in either direction of the piston is retarded. The dash-pot or receptacle 59 is slightly flared at its upper edge to facilitate the introduction of the piston 58 and is closed at its lower end by a partition 62, which serves to separate the interior of the dash-pot from the inlet-nozzle 63, which is in communication with the supply-pipe 11. A coupling or union 64 is employed to connect the supply-pipe 11 with the nozzle 63 and also secure in place the lower end of the valve-casing 60, said union having an angular exterior wrench-seat and being provided with right and left hand interior and exterior screw-threads 65 and 66 to engage the corresponding threaded portions, respectively, of the supply-pipe 11, the casing 60, and also the lower end of the nozzle 63. This coupling or union may be turned to disengage the supply-pipe from the casing and allow the removal of the nozzle to remove obstructions, as accumulations of dirt, from the straining mediums 67, arranged in outlet-openings formed laterally in the nozzle.

The upper end of the valve-casing 60 is flanged, as shown at 68, to bear upon the inner surface of the floor or bottom of the tank, suitable nuts 69 being threaded exteriorly upon the casing to bear against the outer surface of said bottom, the threaded portion of the casing being enlarged, as shown, to avoid the necessity of threading said nuts throughout the length thereof, and the valve-seat block 70 is threaded into the upper end of the casing and is counterbored in communication with the passage 71 to form the above-described valve-seat 56, which is of trunco-conical construction. The valve 57, which may be of rubber or similar yielding material, is also approximately of trunco-conical construction, but is elliptically rounded at its surface to cause the snug seating thereof without bringing sufficient surface into contact with the valve-seat to cause the sticking thereof, and thus inter-

fere with the prompt unseating of the same when the rod 16 is depressed by the means hereinbefore described. To guide the lower end of the valve-stem 16 adjacent to the plane of the valve, I employ a spider 72, of which the arms may be formed integral with or secured to the valve-seat block 70, said spider being provided at its center with a suitable guide-opening through which the valve-stem 16 extends. Also said spider serves to support an inverted approximately-semispherical deflector 73, held in place by a nut 74, threaded upon the nipple 75, which is arranged at the center of the spider, around the guide-opening therein. Also a cushion 76 is arranged upon said nut in the path of the downward movement of the lower end of the float to prevent jar and injury to the parts when the valve is unseated.

With the parts arranged as described the depression of the closet-seat serves to correspondingly actuate the operating-rod 27 through the medium of the lever 37, which is of the third order, and this downward movement of the operating-rod communicates a corresponding movement to the valve-stem to unseat the valve 57 and depress the float 14. When the parts reach the limit of their downward movement, the piston 58 having entered the dash-pot or receptacle 59 the latch 19 is tripped from the catch-block to release the valve. The immediate return of the float to its elevated position due to the buoyant effect of the water is prevented, however, by the resistance offered to the piston by the contents of the valve-casing. The unseating of the valve is accompanied by an influx into the tank of a quantity of water sufficient to complete the siphon, and hence before the piston 58 can be withdrawn from the dash-pot or receptacle 59 the level of the water in the tank has been lowered by the flow through the siphon sufficiently to prevent the rise of the float to an elevation to seat the valve. Therefore the water flows through the siphon until the tank is empty and the siphon broken, whereupon the filling of the tank by the inflow through the supply-pipe 11 is accomplished as in the ordinary practice. As the level of the water in the tank rises the float is correspondingly moved and finally brings the valve 57 into contact with the seat to cut off further supply.

When an intermittent operation of the flusher is desired during the occupation of the seat, a partial depression of the lever 37 is effected (by the downward adjustment of the bearing-point 41) sufficient to unseat the valve 57 without bringing the latch into engagement with the trip 15 to disengage the float-rod or valve-stem. Hence when the seat is depressed, the tank being full, the operation will be the same as hereinbefore described, with the exception that the float will not be released, and therefore the valve will remain unseated. After the contents of the tank have been discharged through the flush-

pipe and the siphon has been broken the tank will refill through the supply-pipe to again complete the siphon, when without further manipulation of the parts the contents of the tank will again be siphoned out, and so on continuously during the occupation of the closet-seat.

When a continuous intermittent operation of the flusher is desired, whether the seat is occupied or not, I employ an intermittent or leaking valve 77, substituted for the valve 57, having a tapered lower end and peripheral notches, grooves, or ways 78 to allow the gradual or slow filling of the tank. This valve is located normally in the port 71 to allow a slow or gradual admission of water to the tank, and obviously when the tank fills to the proper level to charge the ascending or inlet arm of the siphon, and thus cause an overflow into the descending arm 50, the siphon will be started and the tank emptied, and this operation will be repeated at intervals as long as the leaking valve is in use. When the seat 42 is depressed, to correspondingly depress the operating-rod 27 a downward movement is communicated to the valve-stem 16, thereby depressing the leaking valve 77 to fully open the port 71, and hence during the occupation of the seat the siphon operates intermittently, but at much shorter intervals than when the valve is seated in the port 71. When the valve 77 is depressed, it carries with it the plunger 58^a, at the lower end of the valve-rod, into the dash-pot 59, whereby upon the release of the seat the upward movement of the valve-rod is retarded to allow a gradual seating of the valve 77, and thus avoid jar or hammer in the apparatus.

A form of clutch connection between the operating-rod and the valve-rod in place of that already described, which may be employed in connection with the intermittent valve, is illustrated in Fig. 7, and consists of a cross-arm 20^a, secured at the desired adjustment upon the operating-rod by means of upper and lower nuts 29^a and 30^a, the other end of said arm being bifurcated, as shown at 19^a, to embrace the clutch-block 17, which is provided with a transverse terminally-exposed pin 23^a for engagement by said extremity of the arm. Also the shoulder or stop 18 is arranged in the path of the downward movement of the cross-arm. Hence when the operating-rod is depressed in opposition to its actuating-spring the bifurcated end of the arm 20^a is depressed into contact with the shoulder 18, and thus carries the valve-rod down, with the float, to withdraw the leaking or intermittent valve from its seat in the port 71. Upon the release of the seat the operating-rod rises to bring the bifurcated end of the arm 20 into contact with the pin 23^a, and thus exert an upward strain upon the valve-rod, to reseal the valve 77 in opposition to the resistance offered by the dash-pot.

An important feature of the construction described resides in the fact that the elbow

54, by which the short and long legs of the siphon are connected, is above the normal level of the water in the tank and that the level is raised to complete the siphon action by the sudden influx of water, due to a change of position in the valve. Moreover, the efficient operation of the siphon is due to the use of the trap-arm 52, which is interposed between the long or discharge leg of the siphon and the flush-pipe, wherein a sufficient quantity of dead-water is retained to almost fill the cross-sectional area of the arm, while allowing a free efflux of air from the interior of the tank, but whereby a comparatively-slight discharge of water from the siphon into said arm fills the open space, and thus completes the siphon. This prevents leakage or the repeated partial discharges which would be the result without the use of the trap-arm or an equivalent feature of construction.

The function of the deflector 73, of which the lower edge is permanently below the level of the water in the tank, even when the latter is empty, is to prevent the sound of water entering the tank when the valve 57 is unseated. As the discharge into the tank from the supply-pipe is upward, it is obvious that without a deflector or means for turning the water downward as it leaves the supply-pipe there would be the sound of falling water, due to the upward spouting of the same during the time that the tank is filling; but in addition to this said deflector serves to prevent the upward flow of the water from the supply-pipe from affecting the position of the float. It is obvious that this upward tendency of the water if allowed free access to the lower end of the float would raise the latter prematurely, and thus seat the valve before the water in the tank reaches its normal level at the lower side of the cap or cover 12. It will be seen, furthermore, that in order to prevent the premature seating of the valve 57 it is arranged in a receptacle, which I have termed a "dash-pot," located out of the direct path of the water passing from the supply-pipe to the tank, and this location of the valve, together with the peripherally-notched construction of the piston or plunger 58, serves to restrain the valve and prevent the seating thereof until the water in the tank reaches its normal level.

It will be understood that in practice various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. In a flushing apparatus, the combination with a tank and a discharge-pipe, of a valve-casing having a valve-seat, a dash-pot isolated within the casing, and spaced from said seat, a float-operated valve, and a separate piston carried by the valve-stem, and movable into and entirely out of the dash-pot, said piston being provided with relief-ports, substantially as set forth.

2. In a flushing apparatus, the combination with the tank and a discharge-pipe, of a valve-casing having a valve-seat, a dash-pot isolated within the casing, and spaced from said seat, 5 a float-operated valve working into the valve-seat and provided with a plurality of leak-passages, and a separate piston carried by the valve-stem, and movable into and entirely out of the dash-pot, substantially as set forth.

10 3. In a flushing apparatus, the combination with a tank and a discharge-pipe, of a float-operated supply-valve, a reciprocatory member carrying a pivotal latch having a catch engagement with the valve-stem, and a fixed 15 trip arranged below and in the path of the latch to provide for disengaging the same from the valve-stem by a continued downward movement of the reciprocatory member, substantially as set forth.

20 4. In a flushing apparatus, the combination with a tank, a discharge-siphon, and a float-operated valve, of a reciprocatory operating-rod, a pivotal latch carried by the operating-rod, and adapted to engage with the valve-stem, said latch being provided with a cam-face, and a fixed guide receiving the upper 25 end of the valve-stem, and arranged in the path of the cam-face of the latch to constitute a trip therefor, substantially as set forth.

30 5. In a flushing apparatus, the combination with a tank having a discharge-siphon, and a float-operated supply-valve, of an operating-rod, means for reciprocating the same by the movement of a water-closet seat, a cross- 35 head carried by said rod, a pivotal latch carried by the cross-head for engagement with a catch on the valve-stem, and a fixed trip arranged below and in the path of said latch to provide for disengaging the latter by a continued downward movement of the operating-rod, substantially as specified.

40 6. In a flushing apparatus, the combination with a tank having a discharge-siphon, and a float-operated supply-valve, of an operating-rod, means for reciprocating the same by the movement of a water-closet seat, a cross-head on said operating-rod, a pivotal yielding latch carried by the cross-head, a catch-block 45 connected with the float-operated valve, and a fixed trip arranged below and in the path of the latch to provide for disengaging the latter by the continued downward movement of the operating-rod, substantially as specified.

50 7. In a flushing apparatus, the combination with a tank having a discharge-siphon, and a float-operated supply-valve, of an operating-rod, means for reciprocating the same by the movement of a water-closet seat, a cross-head adjustably mounted upon said 55 operating-rod, a latch carried by the cross-head, a pivotal catch-block operatively connected with the stem of the float-operated valve, and a fixed trip arranged below and in the path of said latch to provide for dis- 60 engaging the latter by the continued downward movement of the operating-rod, substantially as specified.

8. In a flushing apparatus, the combination with a tank having a discharge-siphon, and a float-operated supply-valve, of a lever 70 adapted for actuation by a water-closet seat, a reciprocatory cross-head operatively connected with said lever, a pivotal latch carried by the cross-head, a shouldered catch-block operatively connected with the stem of 75 said float-operated valve, an actuating-spring for said latch, the latter being provided with a cam-face, and a fixed trip arranged below and in the path of said cam-face of the latch to provide for disengaging the latter by the 80 continued downward movement of said cross-head, substantially as specified.

9. In a flushing apparatus, the combination with a tank having a discharge-siphon, and a float-operated supply-valve, of a lever 85 adapted for actuation by a water-closet seat, a cross-head operatively connected with said lever, a pivotal latch carried by the cross-head and provided with a rearwardly-extending tail portion, a spring carried by the 90 cross-head and arranged in operative relation with the tail portion of the latch, guide-ears arranged at opposite sides of the plane of the spring, a catch-block operatively connected with the stem of the float-operated 95 valve, and a fixed trip arranged below and in the path of the latch, substantially as specified.

10. In a flushing apparatus, the combination with a tank, of an upstanding siphon 100 arranged wholly inside of the tank, a flushing-pipe having an approximately-horizontal trap-arm arranged wholly exterior to the tank and in communication with the discharge-leg of the interior siphon, said ap- 105 proximately-horizontal trap-arm being provided with an elevated gooseneck adjacent to its junction with the flushing-pipe, of which elevated gooseneck the lower side is approximately in the plane of the upper side of the 110 body portion of the trap-arm, and a float-operated intermittent valve associated with the water-inlet port for the tank, substantially as set forth.

11. In a flushing apparatus, the combina- 115 tion with a tank and a discharge-pipe, of a valve-casing having a valve-seat, a dash-pot isolated within the casing and spaced from said seat, a float-operated valve, a separate piston carried by the valve-stem and provided 120 with relief-ports, said piston being movable into and entirely out of the dash-pot, a reciprocatory member, means controlled by the closet-seat for actuating said member, and a clutch connection between the reciprocatory 125 member and the stem of the valve.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM P. HASTINGS.

Witnesses:

WILLIAM F. LAWSON,
JOHN RUTZ, Jr.