No. 638,945. Patented Dec. 12, 1899.

T. TRIPP.

APPARATUS FOR FLUSHING WATER CLOSETS.

(Application filed Feb. 10, 1899.)

(No Model.) 2 Sheets—Sheet 1.

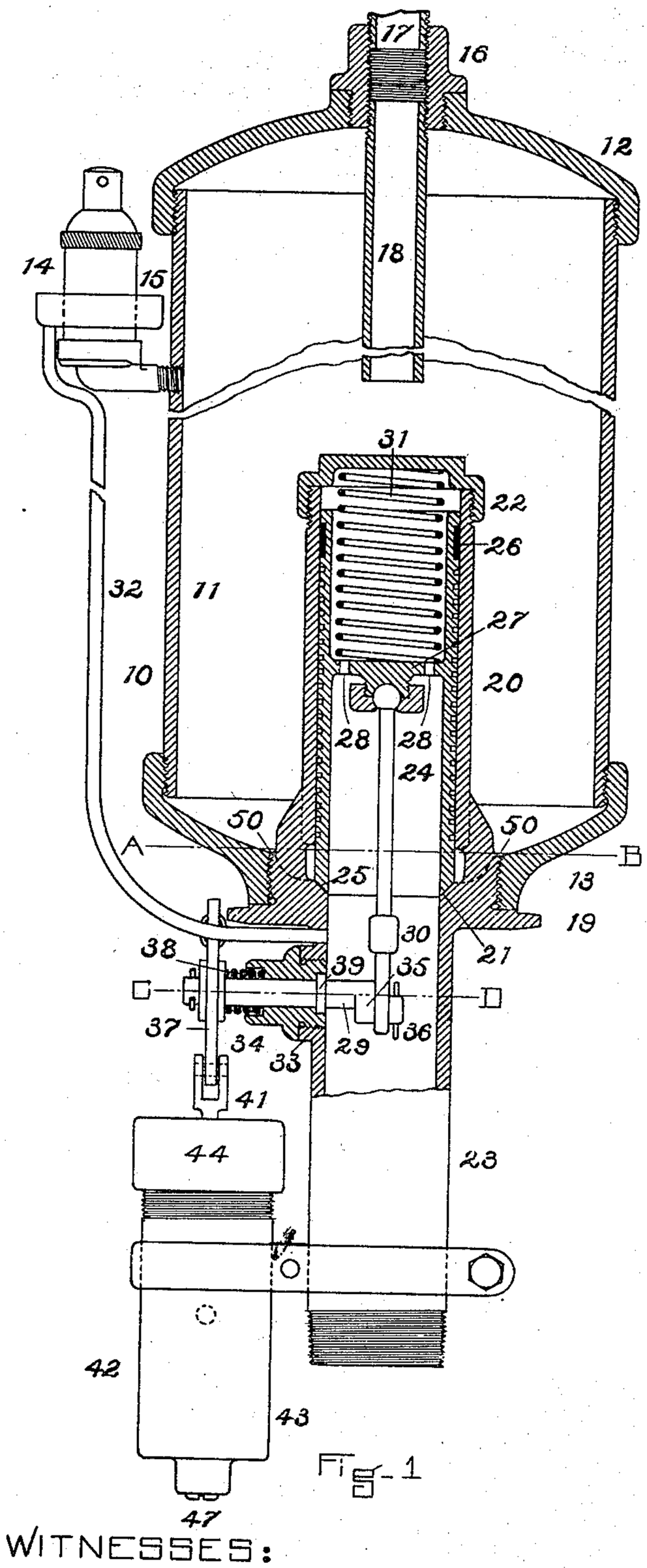

Fig. 1

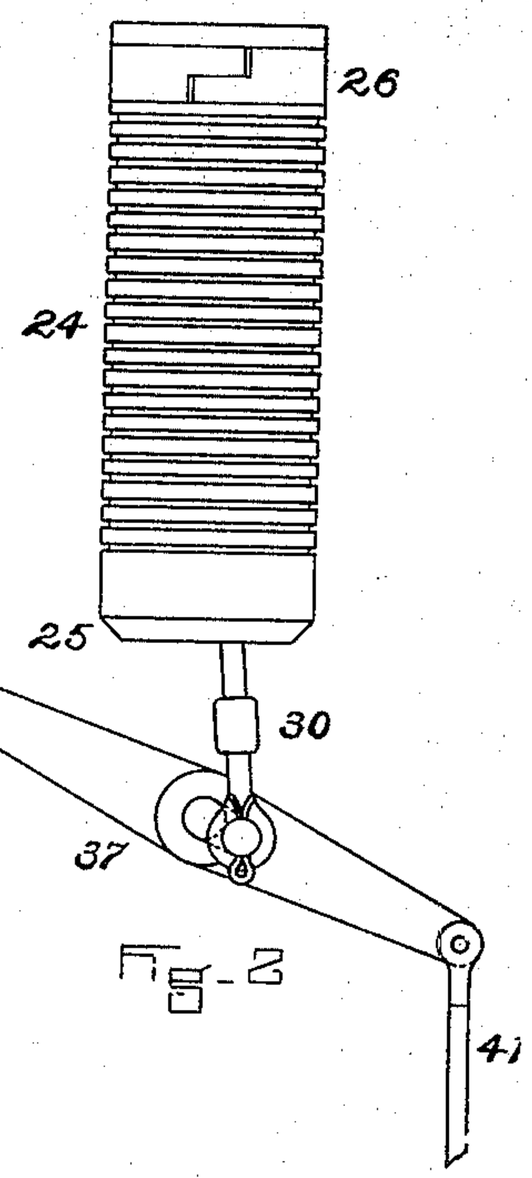

Fig. 2

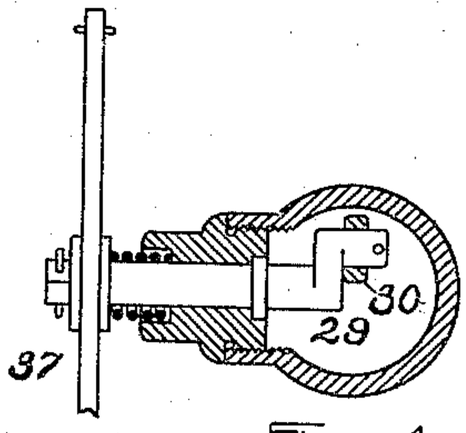

Fig. 4

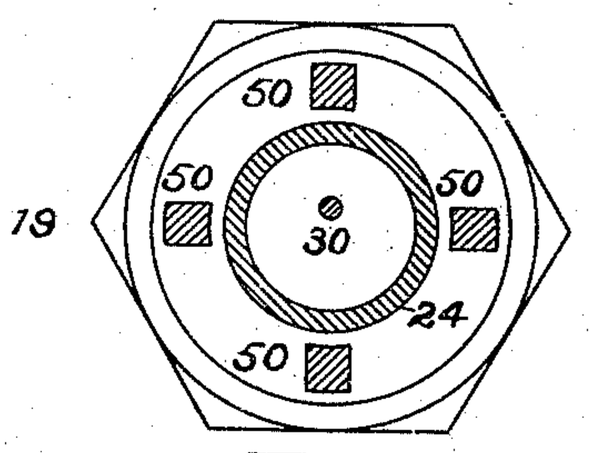

Fig. 5

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(No Model.) 2 Sheets—Sheet 2

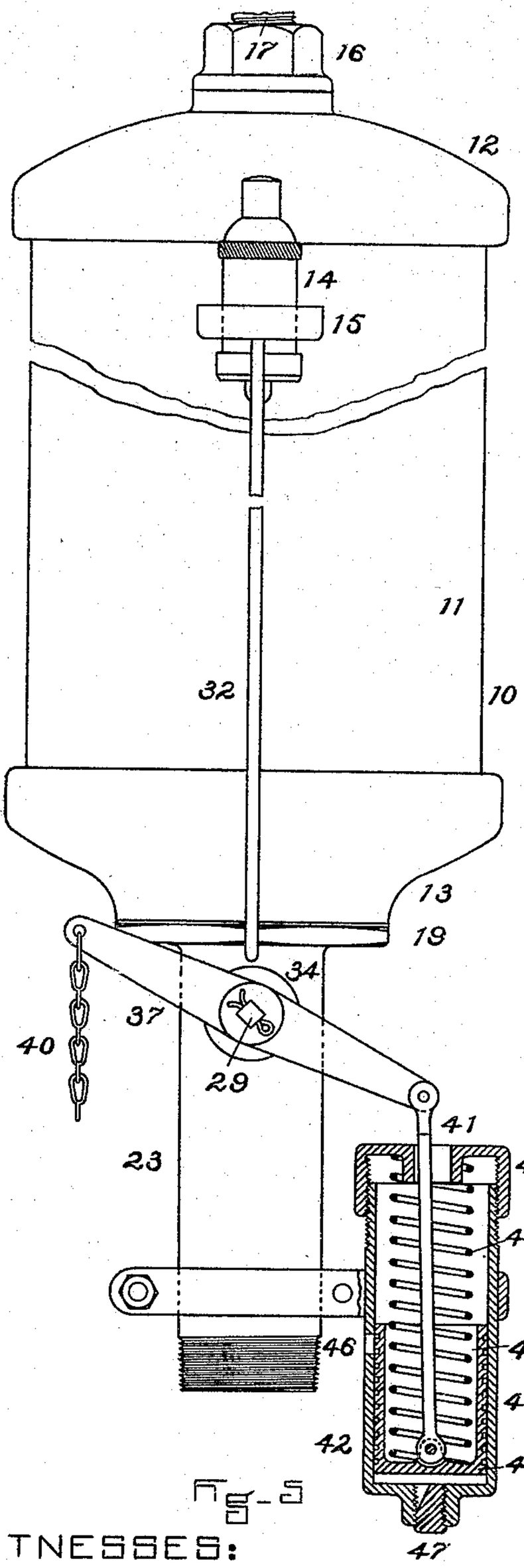

Fig. 5

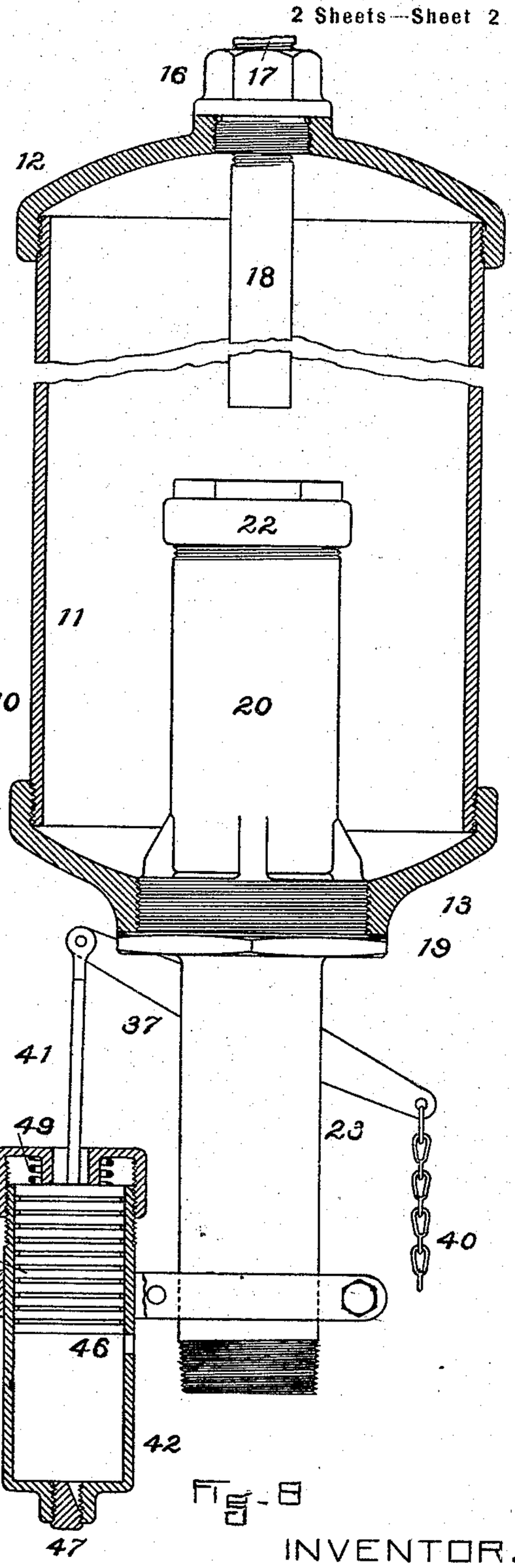

Fig. 6

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THOMAS TRIPP, OF AVON, MASSACHUSETTS.

APPARATUS FOR FLUSHING WATER-CLOSETS.

SPECIFICATION forming part of Letters Patent No. 638,945, dated December 12, 1899.

Application filed February 10, 1899. Serial No. 705,214. (No model.)

To all whom it may concern:

Be it known that I, THOMAS TRIPP, a citizen of the United States of America, residing at Avon, in the county of Norfolk, in the State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Flushing Water-Closets, of which the following is a specification.

My invention relates to apparatus for flushing water-closets, and has for its object the thorough and economical flushing of water-closets in a most efficient manner by means of a closed tank and apparatus which are nearly noiseless in their operation.

Figure 1 of the accompanying drawings represents a vertical sectional view of the apparatus, some of the minor parts being shown in elevation, and the tank and inlet and drip pipes are broken to reduce the height of the drawings. Fig. 2 represents the discharge-valve in elevation. Fig. 3 represents a full cross-sectional view of the valve-chamber and valve on line A B of Fig. 1. Fig. 4 represents a full cross-sectional view of Fig. 1 on line C D, the pull shaft and lever being shown in elevation. Fig. 5 represents in elevation the apparatus shown in Fig. 1, the dash-pot being shown in vertical section. Fig. 6 represents in elevation the discharge-valve, inlet-pipe, and dash-pot valve in elevation, the tank and dash-pot being shown in section.

The same reference-numbers indicate the same parts in all the figures.

The apparatus comprises a closed tank 10, which is preferably constructed of steel, copper, or other sheet metal in the form of a barrel 11, having an upper head 12 and a lower head 13. This tank is provided with an automatic air-valve 14, communicating with the interior of the tank at a point below the top thereof, so as to leave an air-space above said point for the compression of air. This air-valve may be of any suitable construction operated by the rise and fall of the liquid in the tank. This valve opens automatically to permit the inflow of air during the outflow of liquid for the flushing operation and remains open during the inflow of water after the flushing operation to permit the escape of air until the level of the water reaches the point of connection of the air-valve pipe with the tank. The casing of the air-valve 14 is surrounded by a drip-cup 15, which catches any water which may leak around the valve and overflow at the top of the valve-casing when the valve is closed. A pipe 32 connects this drip-cup 15 with the outlet-pipe 23 at a point below the joint 12 and performs the double function of carrying off the leakage or drip water found in said cup and also admits air to the discharge-pipe during the flushing operation, and thereby prevents the gurgling noise which otherwise occurs immediately after the closing of the discharge-valve.

A discharge-valve for the flushing water is preferably located at the bottom of the tank. This valve is preferably carried in a removable plug 19, which is shown as hollow and flanged. This plug is set in a screw-threaded opening in the lower head or bottom 13 of the barrel 11, and the head is preferably conical to effect a free outflow of the contents of the tank or barrel without the deposit of sediment. When constructed as herein shown, this hollow plug 19 has an external downwardly-extending preferably integral tubular projection 23, which constitutes the outlet-pipe, and an inwardly-extending preferably integral tubular extension 20, preferably somewhat larger in diameter than the outlet-pipe 23 and provided at its upper end with a closing-cap 22. This inward extension constitutes the valve-chamber for the outlet or discharge valve. The lower end of the valve-chamber is connected with the inner face of the plug 19 by means of the legs or studs 50, disposed at intervals around the mouth of the inlet-pipe 23 and preferably on a circle of larger diameter than the interior of the valve-chamber. A valve-seat 21 is formed on the inner face of the hollow plug 19 surrounding the mouth of the outlet, and this seat may be conical or of any other suitable shape. A valve 24 is adapted to slide in the valve-chamber 20 and is provided at its lower end with a valve-face 25, which fits against the valve-seat 21 when the valve is closed. This valve 24 is shown in the form of a hollow cylinder provided with a transverse head 27, having drip-holes 28. The outer periphery of the cylindrical valve 24 is preferably provided with circumferential grooves 24′, which will become filled with water under the pressure within the tank when the valve is closed and

serve as a water-packing between the valve and the valve-chamber. The valve is provided at its upper end with a packing 26 of metal or other suitable material. If any water leaks around the valve, it will escape to the discharge-outlet through the drip-holes 28 in the valve-head. The pressure of the water in the tank has no influence on the valve 24 either in its open or closed position.

Any suitable means may be used for opening and closing the valve. The means herein shown for closing the valve and holding it in normally closed position consists of an expansive spring 31, disposed between the cap 22 of the valve-chamber 20 and the partition 27 of the valve 24.

The means shown for opening the valve for the flushing operation comprises a crank-shaft 29, extending laterally through the wall of the outlet-pipe 23 below the bottom of the tank and provided at its inner end within said pipe with a crank 36 and at its outer end with a pull-lever 37. A connecting-rod 30 connects said crank with the head 27 of the valve by means of a ball-and-socket joint or other suitable connection, and a pull-chain 40 is connected to one end of the pull-lever. The crank-shaft 29 is preferably journaled in a screw-plug 34, which screws into a lateral projection 33 of the outlet-pipe 23. The crank-shaft 29 is provided with a collar 39 at the interior of the pipe 23, and a spiral spring 38, disposed between the outer end of the screw-plug 34 and the collar near the outer end of said shaft, has a tendency to give said shaft an outward thrust, and thereby holds the collar 39 against the inner end of the screw-plug to prevent leakage around the shaft. A chain 40 or other pulling or actuating device is connected to one end of the pull-lever 37, while the other end is provided with the dash-pot-connecting rod 41. The dash-pot 42, which is fastened to the discharge-outlet, is provided with the cylinder 43, cylinder-cap 44, and piston 45. The cylinder is provided with the vacuum relief-port 46 and the air-escape-regulating plug 47. The piston is provided with the head 48, which is connected with one end of the pull-lever by means of the dash-pot-connecting rod 41. Between the piston-head and the cap is placed a spring 49.

The operation of the apparatus will now be described. Supposing the tank to be empty and the discharge-valve 24 shut, as represented in Fig. 1, the water-supply valve (not shown in the drawings, but which is usually directly over the tank) is opened and the water flows freely into the tank through the inlet-pipe 17. As the water rises in the tank the air therein escapes into the atmosphere through the automatic air-valve 14. When the water reaches a level in the tank above the inlet of the air-valve 14, the air then remaining in the tank is compressed in the space above the air-valve connection to a pressure equal to that of the water-supply, and the flow of water into the tank is thereby gradually and noiselessly stopped without water-hammering. If the discharge-outlet be connected with a water-closet in the usual manner, then by pulling down the chain the discharge-valve is opened and the water in the tank will be started out of it under a pressure equal to the pressure of the compressed air. The column of water thus started quickly and thoroughly flushes the closet. After this flushing has taken place and the chain-pull is released the discharge-valve is automatically closed by means of the action of the spiral spring 31. If by chance the chain-pull should be released before the main body of the water in the tank is exhausted, a gurgle will ensue, due to the water then remaining in the discharge-outlet and in the pipe connections to the closet, unless means are provided to prevent it. The drip and vacuum relief pipe 32 permits air to enter the discharge-outlet, and thereby breaks the vacuum and effectually prevents the gurgle.

In some makes of closets it is necessary after the main flush has taken place that there should be an automatic after-flush, and to accomplish this result the dash-pot 42 is provided, which operates as follows: When the chain is pulled down, the piston 48 is raised to the position shown in Fig. 6. The piston in rising passes the vacuum relief-port 46 in the side of the dash-pot through which air will enter and fill the cylinder of the dash-pot below the piston. This air will form an air-cushion below the piston when the chain-pull is released and the bottom of the piston closes the vacuum relief-port as it is forced to descend to its lowest position, as shown in Fig. 5, by the action of the spring placed between the piston-head and the cap of the dash-pot. The speed of the descent of the piston is regulated by the manipulation of the air-escape-regulating plug 47 in the common way. This slow closing of the outlet-valve, due to the action of the dash-pot, will accomplish the desired main flushing and automatic after-flushing in the following manner: The body of water held in the tank as the outlet-valve is opened will cause the main flush, and as the outlet-valve closes in a gradual manner, due to the action of the dash-pot, the water flowing into the tank through the inlet-pipe, which is always open, will cause in an automatic manner the desired after-flush. The tension of the dash-pot spring may be regulated by means of the screw-threaded dash-pot cap.

It will be observed that either the valve-spring 31 or the dash-pot spring 49 may be relied on to close the discharge-valve, and either one may be dispensed with; but the spring 31 is preferably retained. The dash-pot may also be dispensed with.

It is obvious that the outlet-valve may be successfully packed in any well-known way

and that the valve face and seat may be constructed after the manner of any style of valve suitable for the purpose.

In a flushing-tank for water-closets the pulling force required to open the discharge-valve should be uniform. This condition does not exist where the valve is influenced by the water-pressure which varies widely from different causes in all water-supply systems. In the apparatus herein described, the discharge-valve being independent of the fluid-pressure of the tank the actuating force required to open it is substantially constant. This feature is of great importance from a practical standpoint.

I claim as my invention—

1. In a flushing apparatus, the combination of a closed tank provided with an inlet for the supply and with an outlet for the flush and with a valve-seat surrounding said outlet, a cylindrical valve-chamber disposed in said tank over said outlet and provided with a closed upper end and with lateral openings at its lower end around said valve-seat, a cylindrical valve, independent of the pressure within the tank, adapted to slide in said valve-chamber and provided with a valve-face adapted to fit said valve-seat, means for closing said valve automatically, and means for opening said valve.

2. In a flushing apparatus, the combination of a closed tank provided with an inlet for the supply and with an outlet for the flush and with a valve-seat surrounding said outlet, a cylindrical valve-chamber disposed in said tank over said outlet and provided with a closed upper end and with lateral openings at its lower end around said valve-seat, a cylindrical valve independent of the pressure within the tank, adapted to slide in said valve-chamber and provided with a valve-face adapted to fit said valve-seat, means for closing said valve automatically, means for opening said valve, and an automatic air-valve which permits the inflow and outflow of air with the outflow and inflow of water.

3. In a flushing apparatus, the combination of a closed tank provided with an inlet-pipe for the supply and with an outlet-pipe for the flush and with a valve-seat surrounding the mouth of said outlet-pipe, a cylindrical valve-chamber of larger diameter than said outlet-pipe disposed within said tank over said pipe and provided with lateral openings around said outlet, a cylindrical valve independent of the pressure within said tank, adapted to slide in said valve-chamber and provided at its lower end with a valve-face adapted to fit said valve-seat, said valve being adapted to close flush with said outlet-pipe, and means for opening and closing said valve.

4. In a flushing apparatus, the combination of a closed tank provided with an inlet for the supply and with an outlet for the flush and with a valve-seat surrounding said outlet, a cylindrical valve-chamber disposed in said tank over said outlet and provided with a closed upper end and with lateral openings at its lower end around said valve-seat, a cylindrical valve, independent of the pressure within the tank, adapted to slide in said valve-chamber and provided with a valve-face adapted to fit said valve-seat, a spring disposed in said valve-chamber over said valve for closing it automatically, and means for opening said valve.

5. In a flushing apparatus, the combination of a closed tank provided with a discharge-opening at its bottom surrounded by a valve-seat, a valve-chamber surrounding said seat and provided with lateral openings, said chamber extending inward and being provided with a closed top, a valve adapted to slide in said valve-chamber provided with a head having perforations for the passage of leakage-water, and with a valve-face at its lower end adapted to fit said valve-seat, a pull-lever-operating mechanism for opening said valve, and means for automatically closing said valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS TRIPP.

Witnesses:
E. FRANK WOODBURY,
JAMES A. WOODBURY.