

No. 748,265.

PATENTED DEC. 29, 1903.

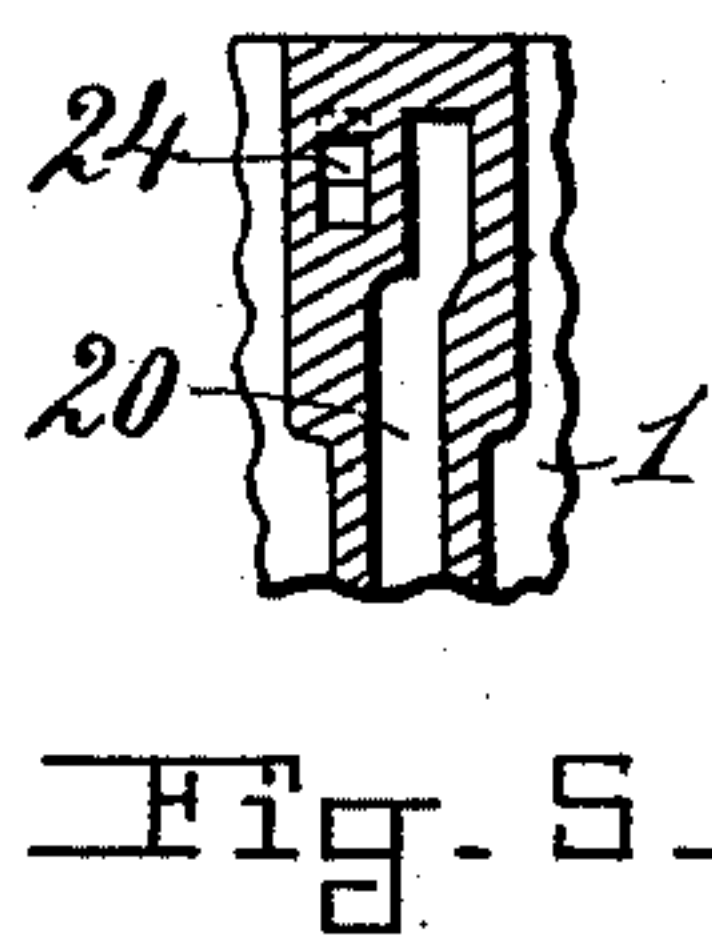
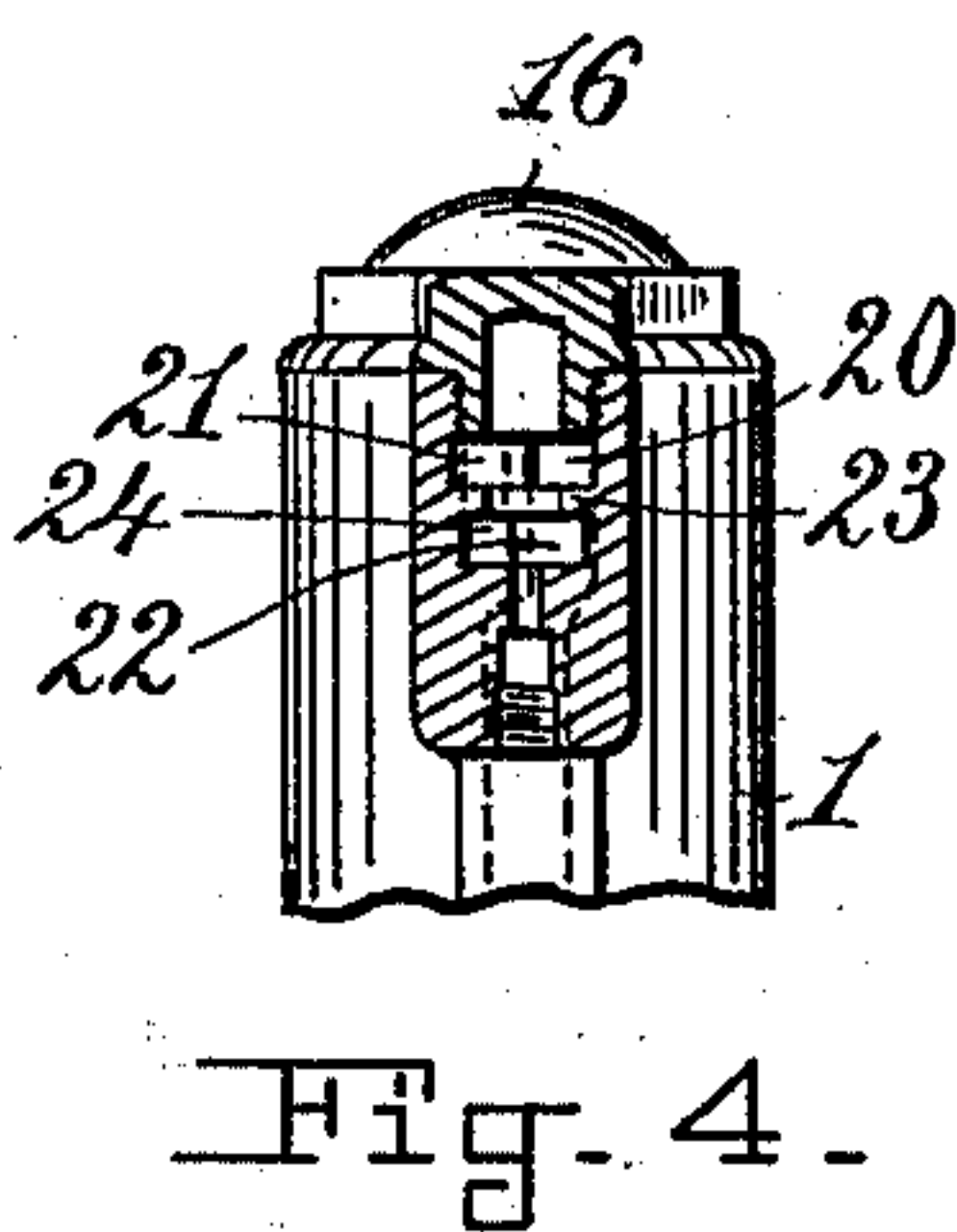
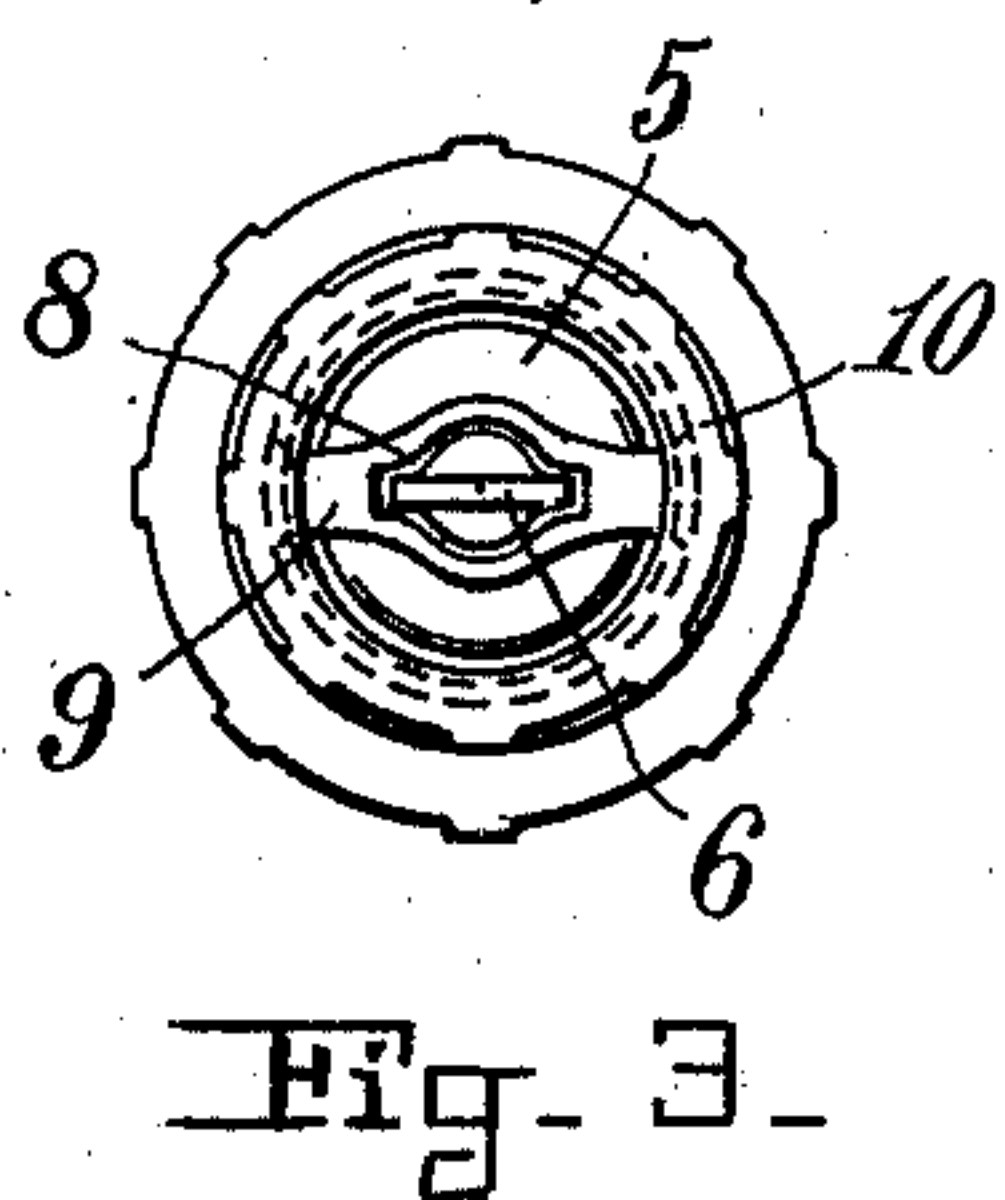
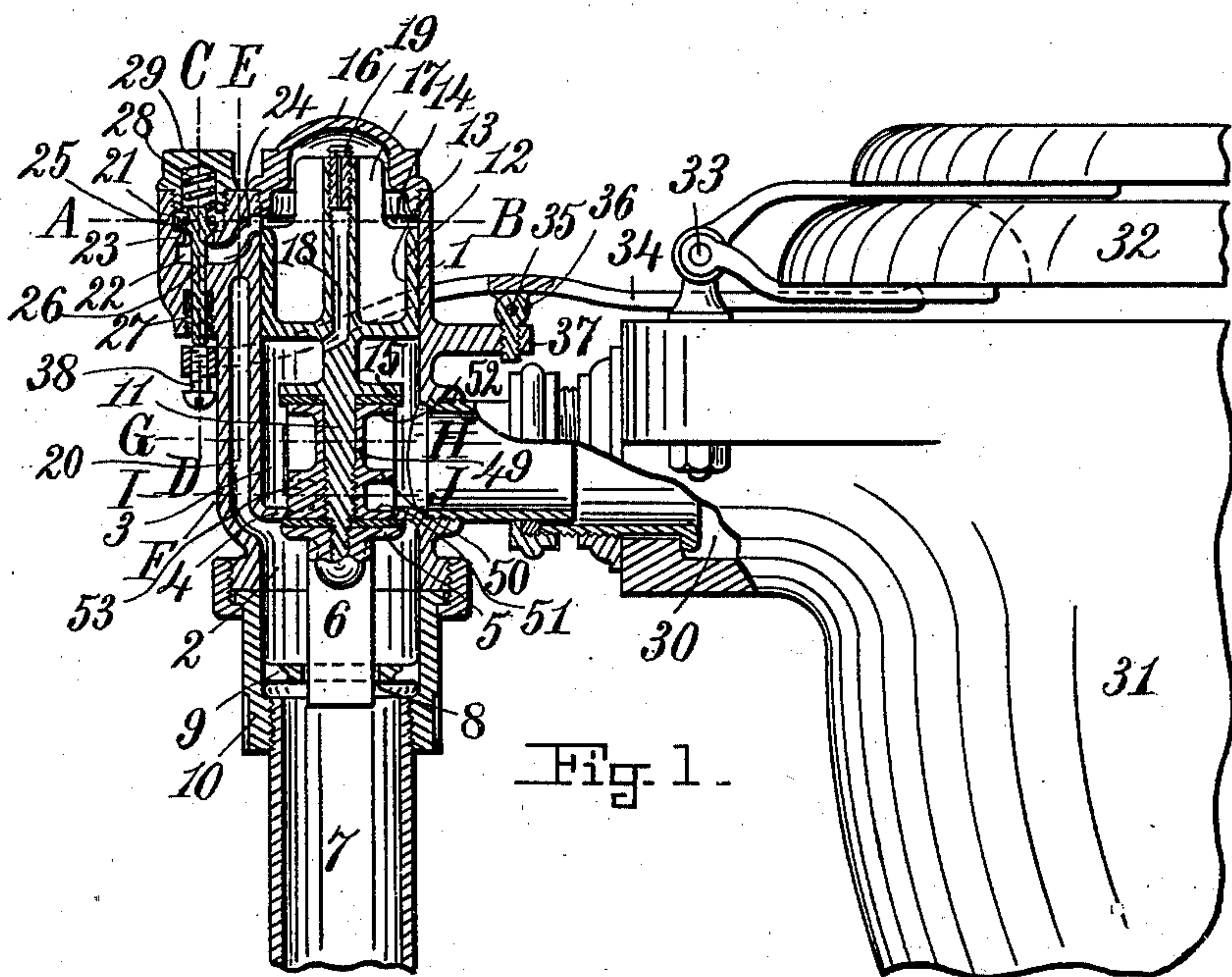
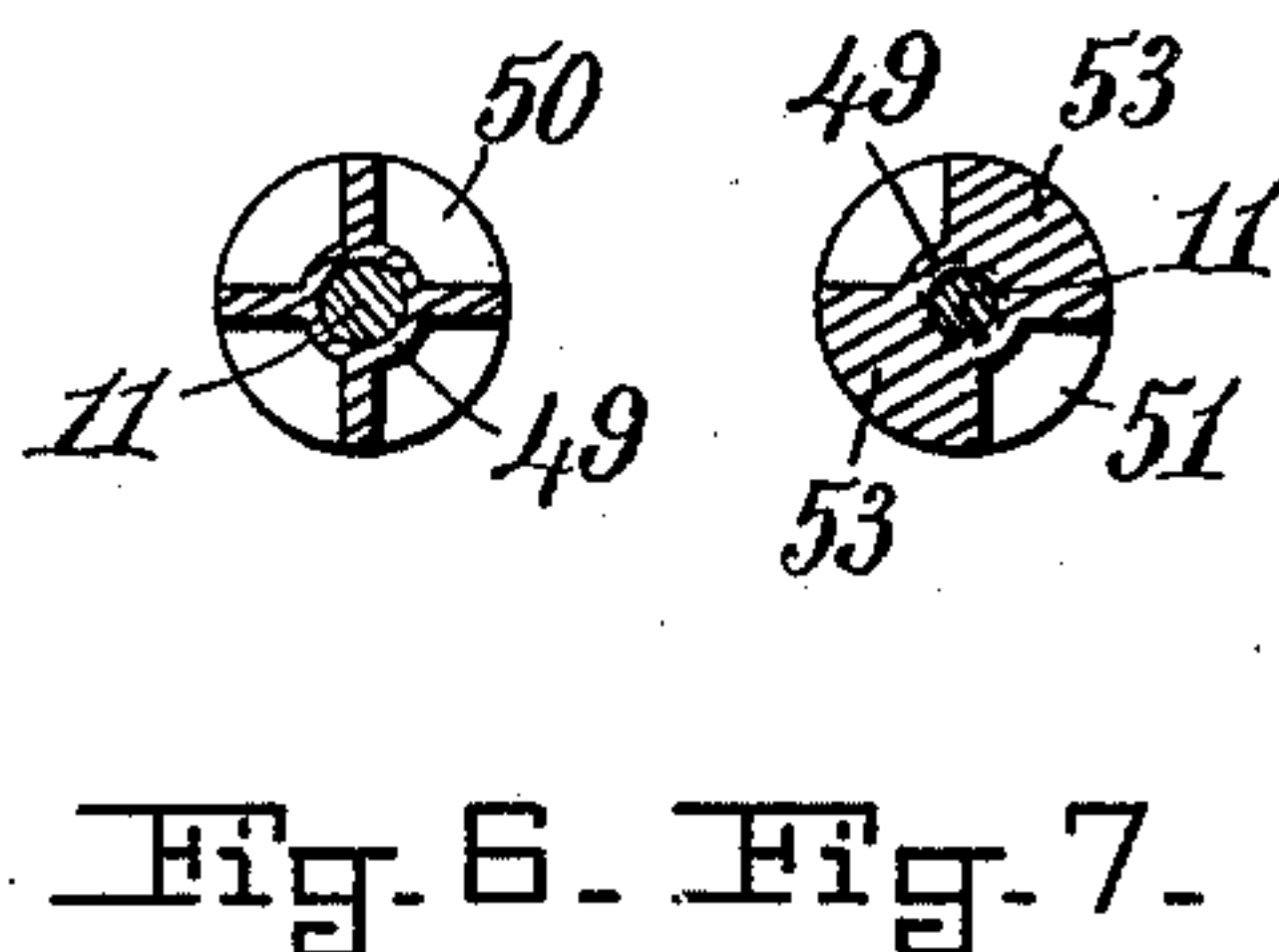
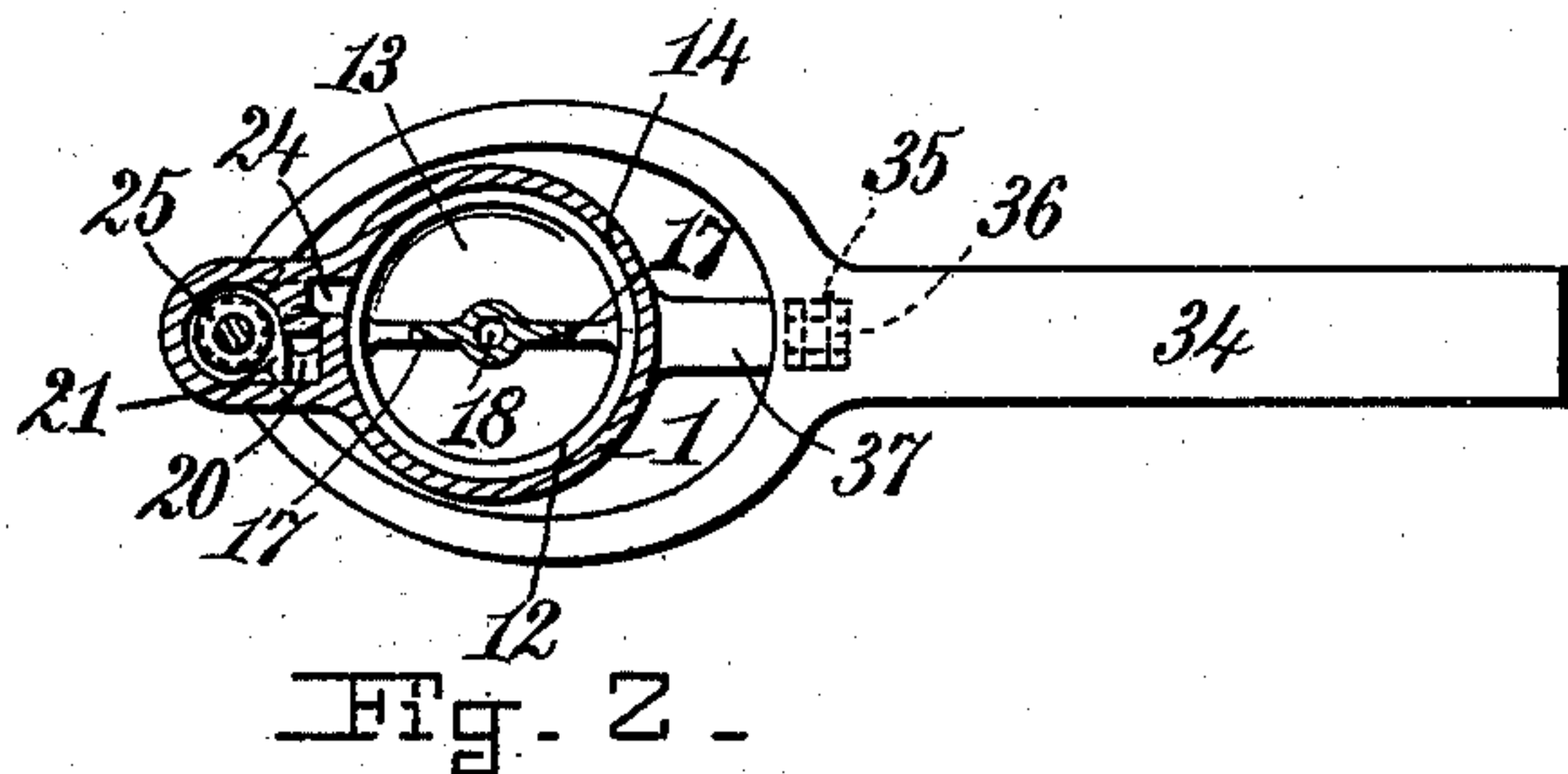
N. CURTIS.

FLUSHING VALVE FOR SANITARY APPARATUS.

APPLICATION FILED MAR. 26, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses—

Cona J. Chadbourn.
Winthrop W. Hick.

Inventor—

Nelson Curtis
Henry Chadbourn
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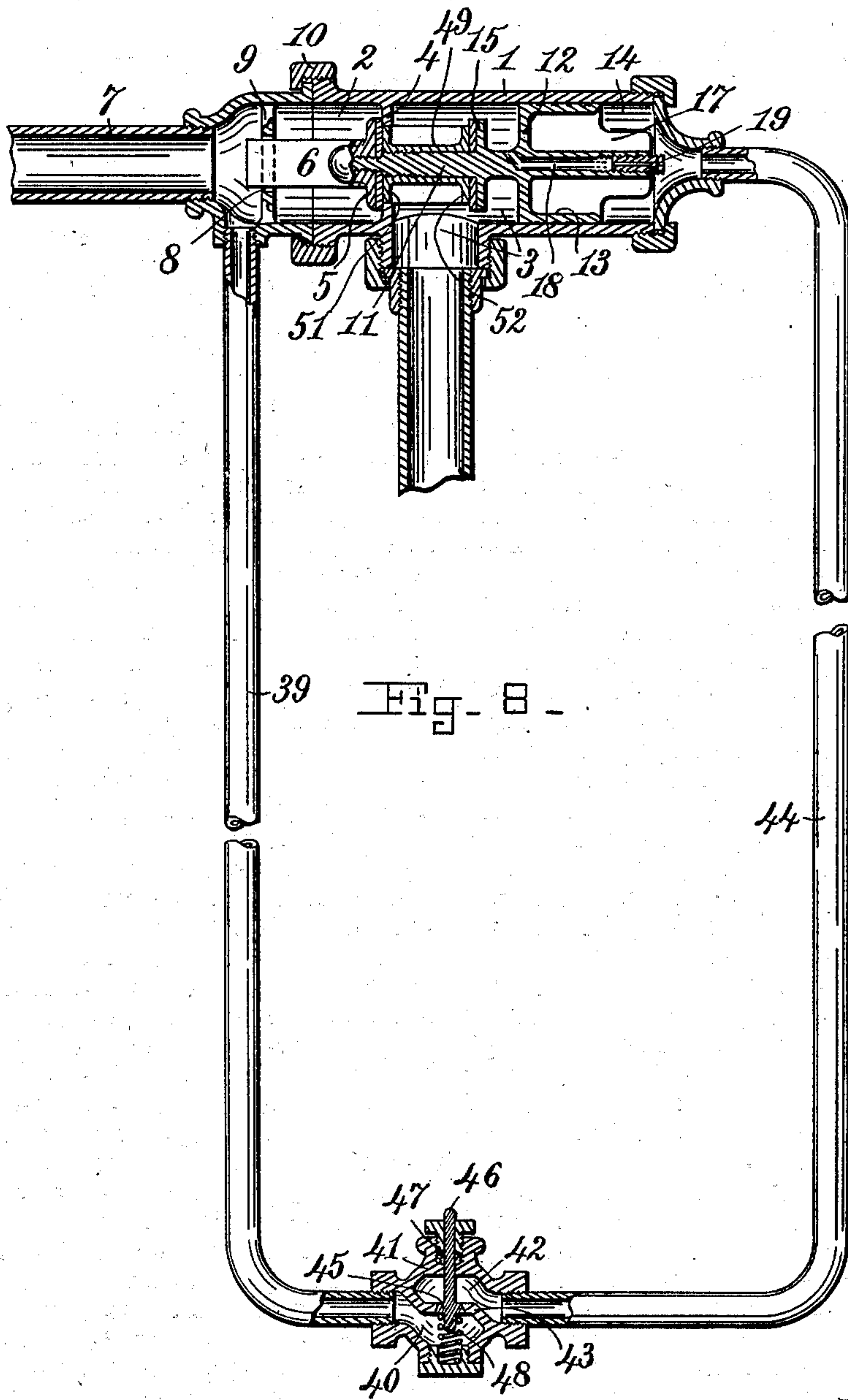
N. CURTIS.

FLUSHING VALVE FOR SANITARY APPARATUS.

APPLICATION FILED MAR. 26, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

Chas. J. Chadbourn.
Winthrop W. Fisk.

Inventor:

Nelson Curtis
by Henry Chadbourn
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UNITED STATES PATENT OFFICE.

NELSON CURTIS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE SUMNER & GOODWIN COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

FLUSHING-VALVE FOR SANITARY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 748,265, dated December 29, 1903.

Application filed March 26, 1902. Serial No. 100,129. (No model.)

To all whom it may concern:

Be it known that I, NELSON CURTIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Flushing-Valves for Sanitary Apparatus, of which the following is a specification.

This invention relates to improvements in flushing-valves for sanitary apparatus, such as water-closets, urinals, and similar apparatus; and it relates more particularly to that class of flushing-valves in which the main valve or valves are moved to open and close the same by the movements of a piston attached to said main valve or valves, the movements of said piston being caused by variations of the pressure in a pressure-chamber bounded in part by said movable piston, and a secondary valve controlling the admission of pressure to the pressure-chamber, and consequently the movements of said piston, said secondary valve being operated by a suitable pull within easy reach of the person using the sanitary apparatus or operated automatically by the weight of the person using said apparatus or operated by any other well-known and suitable means.

The invention consists of certain novel constructions, arrangements, and combinations of parts of the device whereby certain desired results are obtained, as will be fully described, set forth, and claimed hereinafter.

The invention is carried out substantially as illustrated on the accompanying drawings, which form an essential part of this specification, and wherein—

Figure 1 represents a central vertical longitudinal section of a flushing-valve for a water-closet provided with my improvements, showing the valve attached to the bowl of a water-closet and showing the same arranged to be operated automatically by the weight of the person using the closet. Fig. 2 represents a cross-section of the valve on the line A B in Fig. 1. Fig. 3 represents a bottom view of the valve. Fig. 4 represents a vertical longitudinal section on the line C D in Fig. 1, showing the secondary valve as removed from the casing. Fig. 5 represents a

vertical section of the valve-casing on the line E F in Fig. 1, showing a portion of the passage leading to the secondary valve from the inlet-chamber of the valve-casing and also a portion of the passage leading from the secondary valve to the pressure-chamber within the valve-casing. Figs. 6 and 7 represent cross-sections of the valve-stem of the main valve on the respective lines G H and I J in Fig. 1. Fig. 8 represents a longitudinal section of a flushing-valve provided with my improvements, but showing the secondary valve arranged in a casing independent of the casing for the main valve and located at different positions to suit the purpose for which the valve is to be used.

Like characters of reference refer to like parts wherever they occur on the different parts of the drawings.

In flushing-valves of this class it is necessary to properly adjust the freedom of the passage of water through the inlet and the outlet passages into and from the pressure-chamber in relation to the amount of pressure on the supply of water, and thereby to obtain the proper operation of the valve and the desired amount of water at each discharge of the flushing-water. It is also desirable in the flushing-valves of this class that the means whereby the above adjustment is obtained should be covered or concealed, so as not to be accidentally interfered with, but at the same time should be so arranged as to be easy of access even while the water is turned onto the valve from the supply-pipe, and it is also desirable that as much as possible of the interior mechanism of the valve should be free to be inspected, renewed, or cleansed from sediment and other obstructions at any time even when the supply of water is turned on. It is the object of my present invention to so construct the flushing-valve as to obtain these desired results and also to otherwise improve the device, as will appear by the full description thereof herein contained.

The casing 1 of the valve is provided with the inlet-chamber 2, outlet-chamber 3, and perforated partition 4, separating the inlet-chamber from the outlet-chamber. A valve 5,

located within the inlet-chamber, is arranged to engage and disengage a valve-seat on the side of the partition 4 which is toward the inlet-chamber, and thereby to control the flow of water through the perforation in said partition. It will be seen that this valve is normally held upon its seat on the partition 4 by the influence of the inlet-pressure on said valve, and therefore its normal position is such as will prevent the flow of water through the perforation in the partition 4. The valve 5 has a fin or blade 6 projecting from its under side toward the supply-pipe 7 for the supply of water to said valve. This fin or blade passes through a perforation 8 in a cross-bar 9, attached to or made in one piece with some part of the device which is stationary when the valve is attached to the supply-pipe in working position, but is preferably made in one piece with the coupling or union 10 used to connect the valve-casing to the supply-pipe, as shown on the drawings, so as to be able to more easily remove the valve 5 when disconnected from the supply-pipe 7. The cross-sectional form of the fin 6 and the size and shape of the perforation 8 are such that they will prevent the valve 5 from moving or rotating in a plane parallel to its seat on the partition 4, but will allow of a free movement of said valve toward or from its seat on said partition.

A stem or spindle 11 is screwed into a screw-threaded recess in the top surface of the valve 5 from above the partition 4 and through the perforation therein. This stem carries a piston 12, which is preferably chambered out on its upper side, as shown at 13, for a purpose to be described hereinafter, and is preferably made in one piece with said stem. The piston 12 is movable within a cylindrical chamber 14 in the valve-casing toward and from the partition 4, the portion of said chamber above said piston being a pressure-chamber, the pressure in which controls the movements of said piston.

Upon the valve-stem 11, intermediate the valve 5 and the piston 12 on said stem, is a second valve 15, which is located within the outlet-chamber of the valve-casing and is adapted to move toward and from the outlet side of the partition 4 by the movements of the piston 12 and by engaging a seat on the outlet side of said partition to control communication between the inlet and outlet chambers of the valve through the perforation in said partition.

The valves 5 and 15 are preferably each provided with a leather or other yielding gasket, as shown, to insure the perfect closing of communication between the inlet and outlet chambers when either of said valves are seated on their respective seats on opposite sides of the partition 4.

The casing 1 is provided with a removable cap 16, by the removal of which free access is afforded to the pressure-chamber and the piston located within said pressure-chamber,

and an unobstructed path for the removal of said piston is also secured by the removal of said cap 16. The surface of the piston exposed by the removal of the cap 16 is provided with a web or fin 17, by which said piston and its attached valve-stem may be rotated within the casing, and it will be seen that as the valve 5 is prevented from rotation in the casing on account of its attached fin and the perforation 8 any rotation of the piston and valve-stem will tend to unscrew said stem from the screw-threaded recess in the valve 5 or to screw said stem into said recess, according to the direction in which said piston is rotated. The web 17 is preferably of such a size and so arranged in relation to the piston as to be grasped by the thumb and fingers or by a suitable wrench and turned in either direction.

As the valve 5 is normally held upon its seat by the pressure on the water in the inlet-chamber of the valve, it will be seen that the valve-stem may be disconnected from said valve, and the piston, valve-stem, and second valve 15 on the stem may be easily removed from the casing for inspection, renewed, or repaired at any time, even when the water is turned on and is under pressure within the inlet-chamber, without being liable to have water leak through the valve 5 and perforation in the partition 4.

The piston has a passage 18 through it, which passage forms communication between the pressure-chamber and the outlet-chamber in the casing. This passage is continually open; but the freedom of the flow of water through said passage is adjusted by means of a slotted screw-plug 19, adjustable within that end of said passage which is toward the pressure-chamber, and said plug can be adjusted by a screw-driver or other suitable instrument after the cap 16 has been removed from the casing.

The passage 18 forms an exhaust from the pressure-chamber, as will be understood by the complete description of the device. The opening to the passage 18 within the pressure-chamber is preferably arranged at the outer edge of the web 17, and therefore at as high a position within the pressure-chamber as possible, so as to prevent dirt and other sediment collected in the pressure-chamber from entering said passage, which is in some cases a very contracted passage, and thus liable to become stopped by dirt or other sediment carried from the pressure-chamber into said passage unless the entrance to said passage is raised to the highest part of said chamber, as shown and described.

Thus far I have described the construction and arrangement of the parts of my flushing-valve which are common in its application to the different sanitary apparatus; but slight changes in the construction and arrangement of the inlet-passage to the pressure-chamber and the means employed to control said inlet-passage are desirable when said valve is ap-

plied to the different kinds and styles of sanitary apparatus, as will be described hereinafter.

Referring to the application of my flushing-valve as a means to flush a water-closet and as shown in Figs. 1 to 6, inclusive, a passage 20, made in the casing 1, is in open communication at one end with the inlet-chamber 2 and extends to a cavity 21, also formed in said casing. A second cavity 22 in the casing is separated from the cavity 21 by means of the perforated partition 23. This second cavity is in open communication with the pressure-chamber through a passage 24, substantially as shown. It will thus be seen that the passage 20, cavity 21, perforation through the partition 23, cavity 22, and passage 24 form an inlet-passage to the pressure-chamber through which water under pressure is conveyed from the inlet-chamber. This inlet-passage is controlled by means of a secondary valve 25, which is normally held upon its seat by the inlet-pressure in the cavity 21 conveyed thereto through the passage 20. This valve 25 is provided with a valve-stem 26, which passes through a stuffing-box 27 in the casing to some convenient position to be operated to open the valve 25, which is normally closed. In order to insure the closing of the valve 25 and to overcome any friction on its valve-stem which may be caused by the stuffing-box, I introduce a spring 28 between said valve and a removable cap 29 on the casing. It will be seen that the spring in connection with the inlet-pressure on the secondary valve tends to hold said valve upon its seat.

When the flushing-valve is used to flush a water-closet, the outlet of the valve is connected to the flushing-opening 30 of the water-closet bowl 31, substantially as shown in Fig. 1.

On the drawings in Figs. 1 and 2 I have illustrated the valve as being provided with means whereby it is operated automatically by a slight up-and-down movement of the seat 32 of the closet upon its hinges 33. This automatic mechanism consists of a lever 34, fulcrumed at 35 to a stud 36, adjustable up and down within a screw-threaded perforation in a bracket or other projection 37 on the casing 1 of the valve. The forward part of the lever projects forward under the seat of the water-closet, while the rear part of said lever embraces the casing of the valve, and its extreme end is in a position under the projecting end of the valve-stem 26 where it is provided with an adjusting-screw 38, for a purpose to be described hereinafter. When the valve is provided with an automatic operating device, as shown in Figs. 1 and 2, the spring 28 is made sufficiently strong so as to normally hold the lever 34 in the position shown in Fig. 1, and the seat of the closet is preferably provided with a spring or other equivalent and well-known means (not shown on the drawings) which tend to normally hold the seat so that it will exert no pressure on

the lever 34, which would tend to force said lever against the projecting end of the valve-stem 26.

In some cases it is desirable to have the secondary valve, by which the flushing-valve proper is operated, removed from the casing of the flushing-valve in order to be located in a more convenient position than that occupied by the flushing-valve itself. This is especially desirable when the flushing-valve is used in connection with an automatic flushing-urinal, and I have shown such an arrangement of my flushing-valve in Fig. 8 of the drawings, which arrangement is substantially as follows: A pipe or tube 39 is in open communication with the inlet-chamber of the casing 1, which tube extends to the desired location for the secondary valve, where said tube is attached, and in open communication with the inlet-chamber 40 of the secondary-valve casing 41. The casing 41 is provided with an outlet-chamber 42, separated from the inlet-chamber by the perforated partition 43, which outlet-chamber is in open communication with the pressure-chamber 14 in the casing 1 by means of the pipe or tube 44. It will thus be seen that the tube 39, the inlet-chamber 40, perforated partition 43, and outlet-chamber 42 of the casing 41, and the tube 44, form an inlet-passage between the inlet-chamber 2 and pressure-chamber 14 of the flushing-valve casing 1. A secondary valve 45 within the casing 41 controls communication through the perforated partition 43 in said casing and is normally held upon its seat upon said partition by the pressure on the water in the inlet-chamber 40, and consequently said valve controls the inlet-passage to the pressure-chamber in the casing 1. A valve-stem 46 is attached to the valve 45 and projects through a stuffing-box 47 on the valve-casing 41 sufficient to be depressed in order to force the valve 45 from its seat and the partition 43 when desired to establish a free passage from the inlet-chamber 2 to the pressure-chamber 14. The valve 45 is also actuated by a spring 48, which tends to hold the valve upon its seat and to overcome any friction on the valve-stem caused by the stuffing-box, through which it passes.

From the above descriptions of the two arrangements of my improved valve, as shown in Figs. 1 and 8, it will be seen that the inlet-passage to the pressure-chamber in the casing 1 may be made integral with said casing or exterior to said casing, as is the most convenient arrangement for the use desired, and I do not wish to limit myself to either of said arrangements.

In flushing-valves of this class, and more particularly in flushing-valves used for water-closets, it is desirable that a slight or sufficient flushing of the closet to properly lubricate the interior of the bowl should occur before the closet is used, but that the amount of water discharged should not be sufficient to create a siphonic action in the closet. It

is also desirable that the discharge of a quantity of water sufficient to create a siphonic action and properly discharge the contents of the bowl should occur after the closet is used and also that there should be a sufficient pause in the discharge of water from the valve to allow the breaking of this siphonic action, and, further, that a slight and final discharge of water should take place immediately after the breaking of the siphonic action, which discharge should be insufficient to again create a siphonic action, but sufficient to properly fill and seal the trap or traps of the closet. In order to accomplish this result, I construct the main valve-stem 11 between the two valves 5 and 15 in the following manner: Upon the valve-stem 11, between the valves 5 and 15, is placed a sleeve 49, which sleeve is of less diameter than the perforation in the partition 4 and is provided with a collar 50 substantially equal to the diameter of the perforation in said partition, but which will pass through said perforation without friction between said collar and partition. This collar divides the sleeve 49 into two parts, which are preferably of unequal length, that toward the valve 5 being preferably the shorter part for a purpose to be understood by the complete description of the operation of the device herein contained. The ends of the sleeve 49 are also provided with flanges or collars 51 and 52, which rest against the respective valves 5 and 15. The collars or flanges 50, 51, and 52 on the sleeve 49 form a duplex spool-like sleeve on the valve-stem between the two valves thereon. The space between the collars 50 and 51 is filled more or less, as desired, with filling-pieces 53 53, made in one piece with said sleeve or detached therefrom, as desired, so as to reduce the free passage of water through the perforated partition 4 more or less, as desired, while that part of the sleeve is passing through said perforated partition and for a purpose to be understood by the complete description of the operation of the device hereinafter contained.

The operation of the device as shown in Figs. 1 to 7, inclusive, is as follows: The person seats himself upon the seat of the closet and in so doing moves the seat downward until it is stopped by contact with the bowl of the closet or by other means employed to stop its downward movement. This movement of the seat will cause the lever 34 to turn on its fulcrum and the rear end of said lever to engage the projecting end of the secondary valve-stem 26, thus raising the valve 25, which is normally held closed, and establishing a free flow of water under pressure from the inlet-chamber 2 through the inlet-passage to the pressure-chamber 14, where it will exert a pressure on the piston 12 in said pressure-chamber, which pressure will be in opposition to the inlet-pressure on the valve 5. As the area of the piston 12 is in excess of the area of the valve 5, the

pressure on the piston will overcome that on the valve and will force the valve 5 from its seat on the partition 4 and the valve 15 toward its seat on said partition. While the valve 15 is moving toward its seat on the partition and until it reaches its seat water will flow from the inlet-chamber 2 through the space between the sleeve 49 and the wall of the perforation in the partition 4; but as the inlet-passage to the pressure-chamber is comparatively a free passage the movement of the valve 15 to its seat will be comparatively rapid, and consequently there will not be sufficient water discharged from the inlet-chamber 2 through the partition 4, the outlet-chamber 3, flushing-opening 30, to the water-closet 31 to create a siphonic action in said closet, but will simply wet or lubricate the interior of the bowl of the closet. The valve 15 will remain upon its seat and prevent water from flowing through the perforation in the partition 4 during the time that the valve 25 remains open; but during this time a small quantity of water will continually flow through the contracted outlet-passage 18 from the pressure-chamber. As soon as the person leaves the seat of the closet the inlet-pressure and the spring 28, acting on the valve 25, will close said valve, and thus prevent further supply of water under pressure to the pressure-chamber; but the water within said chamber will be free to discharge therefrom through the contracted outlet-passage 18 into the outlet-chamber 3. Pressure having thus been removed from the pressure-chamber will allow the inlet-pressure on the valve 15 to move said valve from its seat and to move the valve 5 toward its seat, the inlet-pressure on the latter valve assisting in this movement. As a certain amount of water was confined within the pressure-chamber by the closing of the valve 25, which water must discharge from said pressure-chamber through the contracted outlet 18, it will be seen that the movement of the valve 5 toward its seat can be made to be more or less rapid by the adjustment of the plug 19, by which the outlet from the pressure-chamber is contracted. Water will discharge from the inlet-chamber through the perforation in the partition 4 and into the water-closet during the time that the valve 5 is moving toward its seat and until it is seated, excepting the time while the collar 50 is passing through the perforation in the partition 4, when the flow of water will be interrupted. The open space between the sleeve 49 and the wall of the perforation in the partition 4 from the time the valve 15 leaves its seat on the partition 4 and until the collar 50 enters said partition is free and such as will allow of the discharge of sufficient water into the water-closet to create a siphonic action therein and cause the discharge of the contents of the bowl of the closet; but this flow of water will be interrupted and the siphonic action broken as soon as the collar 50 enters the perforation in

the partition. The further movement of the valve 5 will cause the portion of the sleeve 49 which is between the collars 50 and 51 to move through the partition, and as this portion of the sleeve is provided with filling-pieces limiting the free space through which water can flow sufficient water will not be discharged to create a siphonic action in the closet, but will fill and seal the trap or traps in the closet.

In some cases it is not necessary to have a number of different amounts and durations of the flushing from the valve, and in such cases it is unnecessary to provide the sleeve 49 with collars 50 and filling-pieces 53, and I have shown such a sleeve in connection with the device, as illustrated in Fig. 8. The operation of the device as shown in Fig. 8 is substantially the same as that above described in relation to Fig. 1, with the exception that both of the respective discharges of the flushing-water while the valves 5 and 15 are moving toward their seats will be uninterrupted.

From the above-described construction of the flushing-valve it will be seen that the plug 19 may be adjusted in the passage 18 to obtain the desired results without having to shut off the supply of water from the valve, that the piston, valve-stem, the upper or second valve attached to said stem, and the sleeve upon the stem between the two valves thereon may be removed when desired and without liability of having water leak through the valve remaining in the casing, that a sleeve 49 with suitable collars and filling-pieces thereon to obtain desired results may be substituted for the one used, and that any desired results may be obtained by the use of the proper sleeve.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In a flushing-valve for sanitary apparatus, a casing having an inlet-chamber, an outlet-chamber, a perforated partition separating said chambers, and a pressure-chamber on the outlet side of said partition, a non-rotatable valve located within the inlet-chamber controlling communication through the perforation in said partition and held upon its seat to close said communication by the inlet-pressure on said valve, a valve-stem detachably attached to said valve, a second valve on the valve-stem located in the outlet-chamber also controlling communication through said perforated partition, a piston on said valve-stem located within said pressure-chamber controlling the movements of said valve, means to control the admission of pressure to the pressure-chamber to operate said piston, and a removable cap to said pressure-chamber, whereby the valve-stem, attached piston, and the valve on the stem which is located in the outlet-chamber, may be disconnected from the valve in the inlet-cham-

ber and removed from said casing while water under pressure is in said inlet-chamber.

2. In a flushing-valve for sanitary apparatus, a casing having an inlet-chamber, an outlet-chamber, a perforated partition separating said chambers, and a pressure-chamber on the outlet side of said partition, a valve located within the inlet-chamber controlling communication through the perforation in said partition and held upon its seat by the inlet-pressure on said valve, a fin on said valve, a guide for said fin attached to said casing and preventing a rotary movement of said valve, but allowing free movement of said valve toward and from its seat, a valve-stem screwed into said valve and extending into the outlet-chamber of the casing, a piston attached to said valve-stem and located in the pressure-chamber controlling the movements of said valve, an inlet-passage to said pressure-chamber, a valve controlling said passage normally closed by inlet-pressure on said valve, a contracted outlet-passage from said pressure-chamber, and a removable cap on said pressure-chamber, whereby said valve-stem and piston may be detached from their attached inlet-valve and removed from said casing while water under pressure is in the inlet-chamber of the casing, and inlet-passage to the pressure-chamber.

3. In a flushing-valve for sanitary apparatus, a casing having an inlet-chamber, an outlet-chamber, a perforated partition separating said chambers, and a pressure-chamber on the outlet side of said partition, a non-rotatable valve located within the inlet-chamber controlling communication through the perforation in said partition and held upon its seat to close said communication by the inlet-pressure on said valve, a valve-stem detachably attached to said valve, a second valve on the valve-stem located within the outlet-chamber and also controlling communication through the perforation in said partition, a piston on said valve-stem located within the pressure-chamber and controlling the movements of said valves, a passage within the wall of the valve-casing forming communication between the inlet-chamber and the pressure-chamber, a valve which is normally held closed controlling this passage, means to operate this latter valve from outside of the casing, and a cap removably secured upon the pressure-chamber, whereby the valve-stem, its attached piston, and the valve located within the outlet-chamber of the valve-casing may be disconnected from the valve in the inlet-chamber and removed from the valve-casing while water under pressure is in the inlet-chamber of the casing.

4. In a flushing-valve for sanitary apparatus, a casing having an inlet-chamber, an outlet-chamber, and a perforated partition separating said chambers, a valve-stem, a valve in said inlet-chamber attached to said valve-stem, a valve in said outlet-chamber also attached to said valve-stem, said valves adapted

to be seated alternately on said partition to control communication between said inlet and outlet chambers, and means to operate said valves, combined with a collar on the valve-stem intermediate the valves thereon dividing the discharge of water at each movement of said valves into two distinct discharges, and a filling-piece intermediate said collar and one of said valves contracting the free passage of water while said filling-piece is passing through said partition, thus varying the amount of water discharged at each of said distinct discharges.

5. In a flushing-valve for sanitary apparatus, a casing having an inlet-chamber, an outlet-chamber, and a perforated partition separating said chambers, a valve-stem, a valve in said inlet-chamber detachably attached to said valve-stem, a valve in said outlet-chamber also attached to said valve-stem, said valves adapted to be seated alternately on said partition to control communication be-

tween said inlet and outlet chambers, and means to operate said valves, combined with a removable sleeve on the valve-stem intermediate the valves thereon, a collar on said sleeve intermediate the ends thereof dividing the discharge of water, at each movement of the valves, into two distinct discharges, and a filling-piece on said sleeve intermediate said collar and one end of said sleeve controlling the free discharge of water while this part of the sleeve is passing through said partition, thus varying the amount of water discharged at each of said distinct discharges and allowing of interchangeable sleeves with various-sized filling-pieces being used.

In testimony whereof I have affixed my signature in presence of two witnesses.

NELSON CURTIS.

Witnesses:

HENRY CHADBURN,
CORA J. CHADBURN.