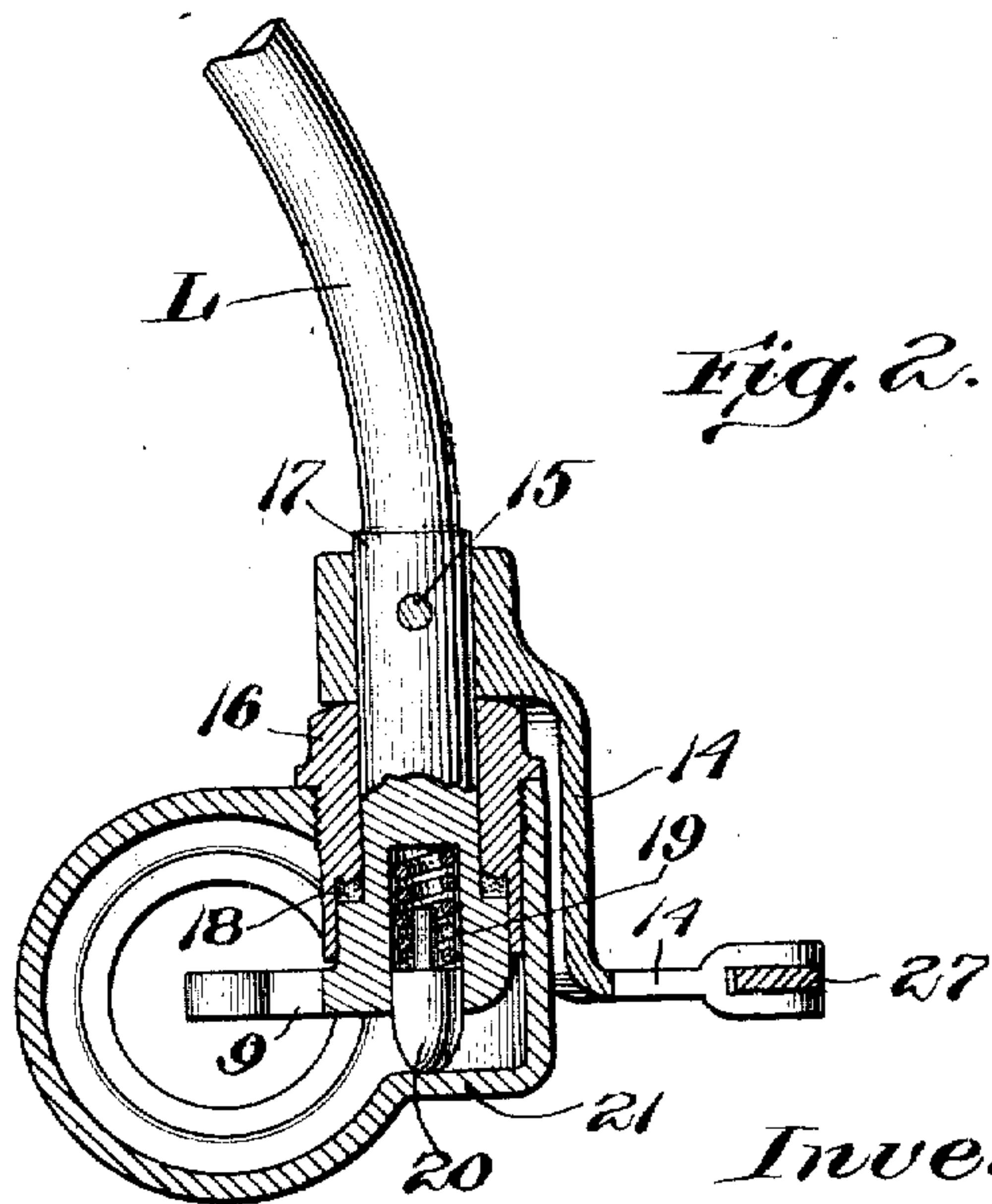
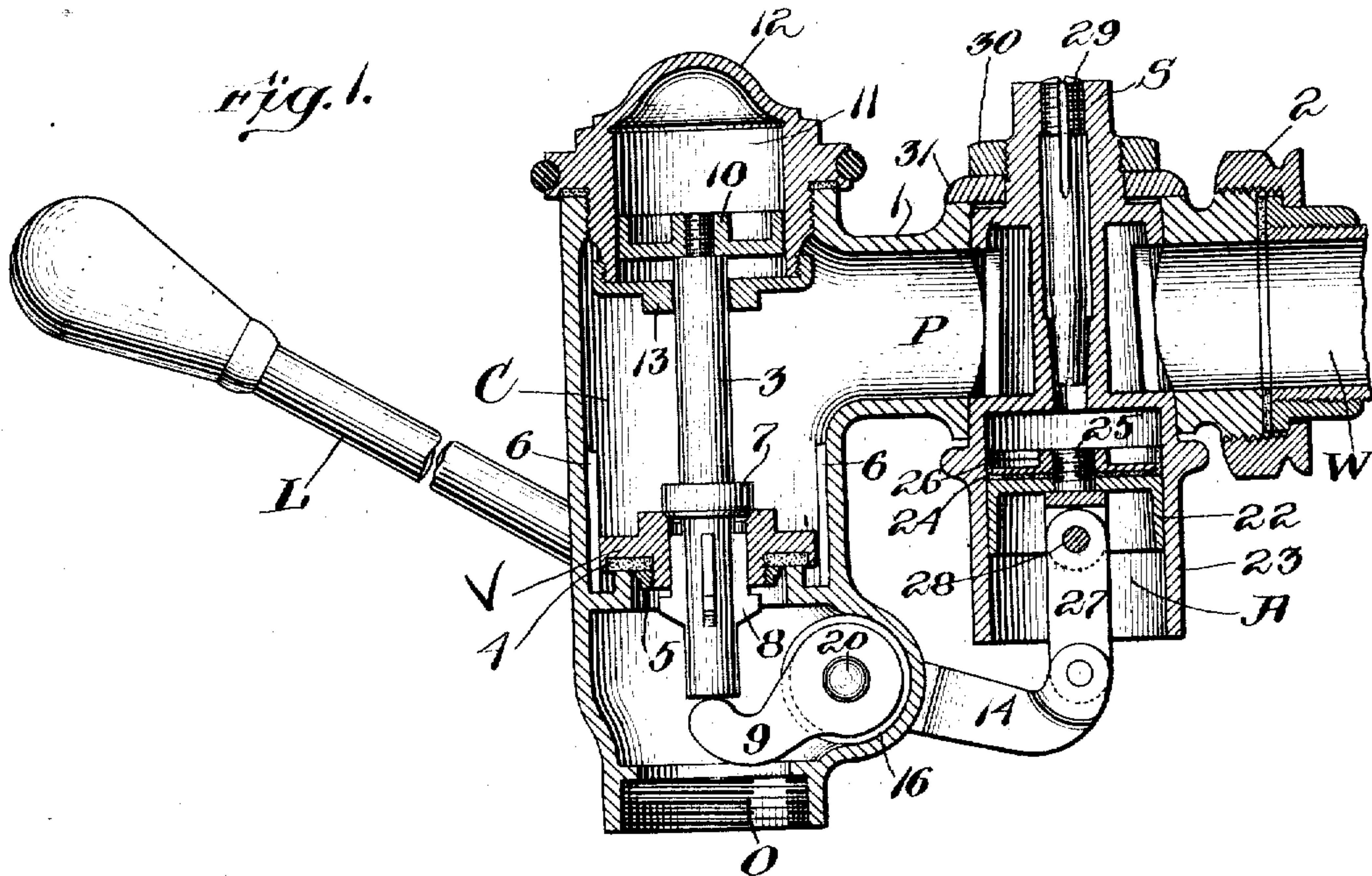


C. H. PHILLIPS.  
 FLUSHING VALVE FOR WATER CLOSETS.  
 APPLICATION FILED OCT. 16, 1905.

Patented July 27, 1909.

929,007.



Witnesses:

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# UNITED STATES PATENT OFFICE.

CHARLES H. PHILLIPS, OF MAPLEWOOD, MASSACHUSETTS, ASSIGNOR TO PHILLIPS FLUSH-  
ING TANK COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

## FLUSHING-VALVE FOR WATER-CLOSETS.

No. 929,007.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed October 16, 1905. Serial No. 282,908.

*To all whom it may concern:*

Be it known that I, CHARLES H. PHILLIPS, a citizen of the United States, residing at Maplewood, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Flushing-Valves for Water-Closets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improvement in flushing valves for water closets.

The object of the invention is to re-organize and improve flushing valves of this type in order to make them more compact and certain in operation and to afford greater facility for dismantling and assembling.

To these ends the present invention consists in the flushing valve hereinafter described and particularly defined in the claims.

In the accompanying drawing illustrating the preferred form of the invention, Figure 1, is a sectional elevation of the valve and Fig. 2 is a transverse section showing the method of packing the operating lever.

The illustrated embodiment of the invention is described as follows:—

The water enters through the service pipe W and passes through the shut off cock S into pipe P which discharges into the valve chamber C from which, when the valve V is open, the water flows to the outlet O. The valve is opened by a hand operating lever L. The valve body 1 consists of an integral casting provided with a valve chamber C which contains the main valve and affords support for the operating lever L and the pipe P which is connected by a union 2 with the service pipe W and contains a shut off cock S. The valve V is mounted upon a valve stem 3 and provided upon its under side with a packing ring 4 which is held in place by a follower 5 screw-threaded on the hub of the valve. The valve V is guided by guides 6 in the interior of the valve chamber. Valve V is provided with a central relief valve 7 which is screwed on the stem 3. The valve stem 3 is permitted to have a limited longitudinal movement through the valve V in order to secure the opening and closing of the relief valve 7. The aperture in the center of the valve V is larger than the valve

stem 3 and the valve stem is provided with a plurality of wings 8 which support the valve thereon. The lower ends of the wings 8 are provided with projections adapted to engage the hub on the under side of the valve V. The external diameter of this hub of the valve V is larger than the external diameter of the circle including the ends of the projections so that the follower 5 may be unscrewed and removed.

The valve operating lever L is provided with an arm 9 integral therewith which extends underneath the bottom of the valve stem 3. When the lever L is raised the arm 9 engages the valve stem and lifts it, thereby opening the relief valve 7 and relieving the pressure on the upper side of the valve V. The further upward movement of the lever L then lifts the main valve V and permits a large stream of water to pass through the valve to the apparatus to be flushed. The upper end of the valve stem is provided with a piston 10 which loosely fits the piston chamber 11 formed in the cap 12 which is screw-threaded into an aperture in the upper end of the valve body. A cylinder head 13 embraces the piston stem below the piston and is screw-threaded upon a reduced portion of the lower end of the cap. The piston 10 does not fit the piston chamber 11, but moves loosely and freely therein excepting so far as the flow of water from the one to the other side of the piston impedes its movements and it may, therefore, properly be termed a water check. When the lever L is permitted to fall, the main valve V being no longer supported by the valve stem 3, falls. Its downward movement under the influence of the pressure of the water thereon would naturally be quite rapid, so rapid in fact, as to cause the valve to strike its seat with a severe blow and the sudden closing of the valve would cause a serious water hammer owing to the sudden checking of the flow of water in the service pipe W. Such rapid movement of the valve V is however, prevented by the piston 10 secured to the upper end of the valve stem 3. The friction incident to the passage of water from one to the other side of the piston 10 impedes the downward movement of the valve and prevents it from closing rapidly. It will be observed, however that the valve V reaches its seat exerting a pull upon the valve stem 3 which is resisted by the piston 10. At the time of closing,



therefore, of the valve V the relief valve is still open and the flow of water into the service pipe is consequently brought to a stop gradually. From the time of closing of the main valve V until the time of closing of the relief valve, the flow of water through the relief valve opening affords refill for the apparatus to be flushed.

The means by which the hand lever L is supported in the valve body and the means for packing the joint comprise a useful feature of the invention. The lever L is provided outside of the casing with an arm 14 secured thereto by means of a pin 15. A bushing 16 is exteriorly screw-threaded and adapted to be screwed into a hole in the side of an extension from the rear lower portion of the valve chamber. The bushing 16 fits the enlarged end 17 of the lever L and affords a pivotal support therefor. The hole in the bushing is enlarged at its inner end to provide a packing space 18. The arm 9 on the end of the lever L is provided with a hub which fits the enlarged opening in the inner end of the bushing 16. Between the hub and the end of the enlarged space in the bushing the packing is received. In order to maintain the lever in the proper position with relation to the bushing so as to compress the packing the end of the lever L is recessed and provided with a spring 19 against which the plunger 20 fitting the spring recess is pressed by engagement with the opposite wall 21 of the extension from the valve body. The lever is removed from the valve body by removing the pin 15 and sliding the arm 14 back on the lever. Then the bushing 16, which is provided with a hexagonal surface, is unscrewed and slid back on the lever L whereupon the lever may be turned so as to remove the arm 9 through the opening in the valve body. In assembling, the reverse operation is had. The spring and plunger 20 being put in place the arm 9 of the lever L is hooked through the opening of the valve body and the lever L is pushed far enough in to cause the plunger 20 to compress the spring 19 somewhat then the bushing 16 is screwed into the valve body where- by the lever L is securely fixed in place, the packing 18 is compressed to prevent the escape of water and the lever L is afforded a good support in the bushing. The arm 14 is then slid into position and pinned fast to the lever by the pin 15.

The gradual closing of the main valve V has been described as being secured by the impediment to its movement imposed by the resistance to movement of the piston 10 in the valve chamber 11. This resistance is however, not the principal resistance to the closing of the valve V but the subordinate or secondary means for this purpose which it has sometimes been found advantageous to employ in valves operating under high water

pressures. The principal means for preventing the sudden closing of the water valve V is the air check A comprising the piston 22 mounted in the air cylinder 23 projected downwardly from and integral with the shut off valve S. The cup leather 24 is secured to the piston 22 by means of the screw 25 which holds the piston 22 and follower 26 together. The head of the screw 25 is provided with two ears and a link 27 is secured thereto by means of a pin 28. The lower end of the link 27 is pinned to the end of the arm 14. An air outlet from this cylinder 23 is provided which extends up through the shut off valve and a regulating screw 29 having a tapered end adapted to be adjusted in the tapered seat in the lower end of the outlet passage affords provision for regulating the rate of outflow of air from the cylinder 23. The screw 29 is grooved at its upper end where it engages the threaded end of the air passage so as to afford provision for egress of air but the regulation of the outflow of air is secured by means of the tapered end of the screw closing more or less the corresponding seat in the air outlet passage. When the lever L is raised the cup leather 24 permits the free movement of the piston 22 downward in the cylinder 23 but when the lever L falls its movement is retarded by the slow escape of air from the air outlet passage in the shut off valve. The lever L is weighted at its end so as to afford means additional to the flow of the water for pressing the piston 22 upward in the cylinder 23. The weight of the lever L together with the friction of the water against the valve V tends to force the air out of the air check. The shut off valve S consists of a perforated tapered plug received in a tapered hole in the pipe P. A nut 30 and washer 31 afford means for securing the shut off valve in position in the pipe P. This valve also obviously affords means for regulating the rate of flow of the water through the apparatus by opening or closing this valve more or less.

When it is desired to dismantle the valve, the plug of the shut off valve S is turned to shut off the supply. It will be observed that this does not affect the air check as it is concentric with the shut off valve. Then the cap 12 is unscrewed and when it is lifted off it carries with it the valve stem and valve. The packing 4 may then be replaced and the parts restored without trouble.

When it is desired to flush the apparatus with which the valve is connected the hand lever is raised and the relief valve is opened first, then the main valve is opened and as this is taking place the piston 22 is pulled down in the cylinder 23 thereby permitting air to pass by the piston 22 into the chamber thereabove. The piston mounted on the valve stem and working in the chamber 11 fits such chambers so loosely that the move-



ment of the piston in the chamber offers no substantial impediment to the opening of the valve. When the valve has been opened to its full extent the lever L may be permitted to drop and the tendency of the water to close the main valve V as well as the weight of the lever will gradually force the main valve down incidentally expelling the air from the space above the piston 22 in the cylinder 23 through the air escape passage of the shut off valve S. The rate of closing of the valve is conveniently regulated by the adjustment of the screw 29. By turning the screw 29 in one or the other direction the duration of the open period of the valve may be regulated with precision to cause the discharge of the proper quantity of water under any given head.

One feature of the invention resides in the combination of the water valve having a relief opening with a separate air check. This is of importance because of the facility of assembling and dismantling. In the present construction it will be observed the water valve may be taken out without disturbing the air valve.

Another feature of the invention resides in providing the shut off valve with the air check cylinder. This feature contributes to compactness and strength.

Another feature of the invention consists in the arrangement of the air check so that the tendency of the water valve to close is resisted by the compression of the air therein. This is of advantage as it secures a construction incapable of adventitious derangement by the user, as the rate of closing of the valve is unchangeable without adjustment of the air escape passage.

Other features of the invention are particularly defined in the claims.

The present invention is not limited to the illustrated embodiment thereof but may be embodied in other forms within the scope of the following claims:—

1. A flushing valve, having, in combination, a single water valve for controlling the flow of water through the apparatus opening by movement against the pressure of the water and provided with a relief valve for relieving the pressure on the valve before opening it, and an independent air check having lever connections with the water valve, the compression of the air in the air check acting to resist the pressure of the water, such pressure being the sole means tending to close the water valve, substantially as described.

2. A flushing valve, having, in combination, a valve body, a supply pipe, a water valve and a combined shut-off valve and air check located in the supply pipe, the air check being connected with and acting to retard the closing of the water valve, substantially as described.

3. A flushing valve, having, in combina-

tion, a water valve opening by movement against and closing with the pressure of the water, an air check connected with the water valve acting to resist the pressure of the water thereon, and a water check connected with the water valve acting to prevent the water valve from chattering, or hammering, substantially as described.

4. A flushing valve, having, in combination, a water valve opening by movement against and closing with the pressure of the water, an air check connected with the water valve acting to resist the pressure of the water thereon, an air valve for regulating the velocity of escape of air from the air check whereby the duration of the flush is determined, and a flow regulator for regulating the rate of flow of water whereby the amount of water used for the flush is determined, the several parts being combined in one fixture, substantially as described.

5. A flushing valve, having, in combination, a valve body, a water valve opening by movement against the flow of water provided with a relief valve, an independent air check, connections between the air check and the water valve, and a water piston connected with the water valve and moving in a piston chamber in a portion of the valve body and comprising a water check, the flow of the water tending to close the water valve being resisted by the compression of air in the air check and the resistance to the passage of the piston through the piston chamber in the valve body, the water check acting to prevent chattering or hammering of the water valve substantially as described.

6. A flushing valve, having, in combination, a water valve opening by movement against the flow of water, a relief valve, a water check connected with the relief valve and acting to resist opening and closing movements thereof, and an air check connected with the water valve, compression of the air in the air check tending to resist the closing of the water valve, the water check acting to prevent chattering or hammering of the water valve substantially as described.

7. A flushing valve, having, in combination, a water valve opening by movement against and closing with the pressure of the water, an air check connected with the water valve acting to resist the pressure of the water thereon, and a loose fitting water check connected with the water valve to prevent the water valve from chattering or hammering during its closing movement, substantially as described.

8. A flushing valve, having, in combination, a single water valve for controlling the flow of water through the apparatus opening by movement against and closing with the pressure of the water and provided with a relief valve, means for opening the water valve, an air check independent of the water valve



for retarding the closing of the water valve, and lever connections between the air check and the water valve, substantially as described.

- 5 9. A flushing valve, having, in combination, a single water valve for controlling the flow of water through the apparatus opening by movement against and closing with the pressure of the water, means for relieving the  
10 pressure thereon, an air check independent of

the water valve for retarding the closing of the water valve, and lever connections between the air check and the water valve, substantially as described.

In testimony whereof I affix my signature, 15  
in presence of two witnesses.

CHARLES H. PHILLIPS.

Witnesses:

HORACE VAN EVEREN,

CHARLES S. HILL.