No. 859,371. PATENTED JULY 9, 1907.

M. F. COYLE.

SLOW CLOSING VALVE.

APPLICATION FILED JULY 2, 1906.

Fig. 1.

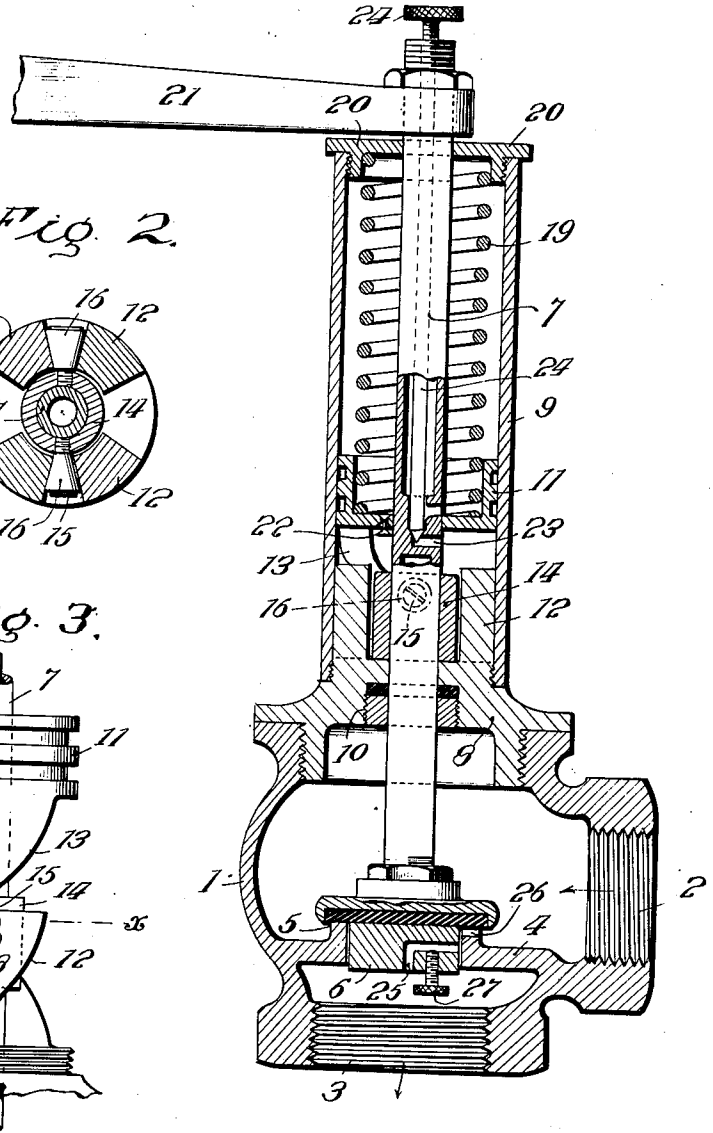


Fig. 2.

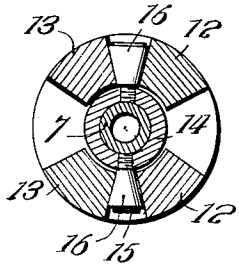
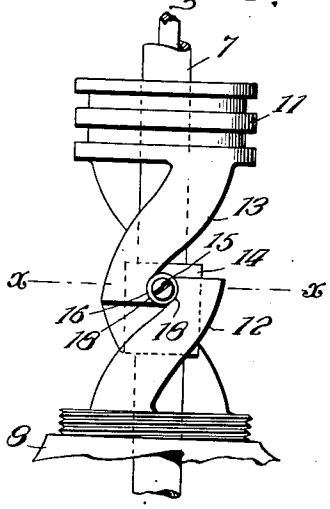


Fig. 3.



Witnesses

Inventor

M. F. Coyle,

By W. B. Lacey. Attorneys

UNITED STATES PATENT OFFICE.

MARK F. COYLE, OF CORRY, PENNSYLVANIA.

SLOW-CLOSING VALVE.

No. 859,371. Specification of Letters Patent. Patented July 9, 1907.

Application filed July 2, 1906. Serial No. 324,489.

To all whom it may concern:

Be it known that I, MARK F. COYLE, a citizen of the United States, residing at Corry, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Slow-Closing Valves, of which the following is a specification.

My invention contemplates certain new and useful improvements in that class of valves for use on drinking fountains lavatories and the like, in which the valve may be readily and expeditiously opened to the full extent, and when released will close automatically after a limited period.

The object of my invention is to provide a slow closing valve of this type, which will be simple and durable in construction and operate with a minimum of friction and in an efficient manner, and in which the actuating parts will be at all times immersed in a body of oil, so that they will not corrode or otherwise deteriorate.

With this and other objects in view as will more fully appear as the description proceeds the invention consists in certain constructions, arrangements, and combinations of the parts hereinafter fully described and pointed out in the appended claims.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a vertical sectional view of my improved valve with parts in side elevation and other parts broken away. Fig. 2 is a horizontal sectional view on the line x—x of Fig. 3. Fig. 3 is an enlarged detail side elevation of the cap piece, the piston, and the two sets of spiral arms carried thereby.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters:

The body 1 of my improved valve is provided with a water inlet 2 and a water outlet 3, separated from each other by a web 4 formed with a raised annular valve seat 5. The valve 6 that is adapted to close on the valve seat 5 may be of any desired material suitably packed and held within a cup or like securing means attached to one end of the valve rod 7. A cap piece 8 is provided with a depending flange formed on its exterior with screw threads by which it is engaged and detachably secured in the valve body 1 in the upper end thereof, and said cap piece is stationary. The cap piece 8 supports an upwardly extending cylinder 9 which is preferably secured thereto by screw threads at its lower end as shown. A stuffing box 10 is secured in the cap piece 8 and the valve stem 7 extends through said stuffing box and up through the cap piece and into the cylinder 9. To the valve stem 7 above the stationary cap piece 8 there is rigidly secured a piston 11 which is suitably packed within the cylinder 9 so as to slide longitudinally therein with the valve stem. The stationary cap piece 8 is provided with upwardly extending spiral arms 12 and the piston 11 is provided with complemental depending arms 13. A sleeve 14 is loosely mounted on the valve-stem 7 between and within the circle of said two sets of spiral arms 12 and 13 and said sleeve carries at diametrically opposite points studs 15 on which rollers 16 are mounted to freely turn. These rollers 16 are interposed between the arms 12 and the arms 13 and are adapted to ride upon said arms so as to raise the piston 11 and the valve stem 7 with the valve 6 whenever said valve stem and piston are turned about their longitudinal axes. The rollers 16 are preferably beveled from their outer edges to their inner edges to overcome the difference in circumference travel, and the said rollers are positively prevented from getting out of alinement by means of the studs which fasten them to the loose sleeve on the valve stem. The length of the sleeve starts them correctly and should they slip at any time in going up the lugs 18 formed at the ends of the spiral arms will compensate for this movement and prevent them from being displaced as well as act as a stop to limit the movement of the rollers.

A spring 19 may be interposed between the piston 11 and the cap 20 on the cylinder 9 so as to assist in the closing movement of the piston and valve stem with its valve, and the valve stem projects through the cap 20 and is provided with an operating handle 21 on its projecting end. The piston 11 is provided with a port extending therethrough and controlled by a downwardly opening check valve 22 and the valve stem 7 is provided with a passage 23 establishing communication between the two portions of the cylinder 9 on opposite sides of the piston 11, said passage being susceptible of regulation by means of a screw or needle valve 24 extending longitudinally into the valve stem from the outer end thereof and intended for manual adjustment.

The cylinder 9 is intended to be filled with fluid, such as oil. In the practical operation of the device, a quarter-turn of the operating handle 21 will turn the valve stem 7, and the rollers 16 will thus ride upwardly in the space between the spiral arms 12 and 13 and cause the piston 11 and valve stem with its valve to move upwardly or outwardly, thereby raising the valve from its seat and allowing the water to pass freely through the web 5 and out through the outlet 3 to the desired point where it is needed. In this action or movement of the piston 11 the check valve 22 will readily open to allow the oil in the cylinder 9 above or beyond the said piston to pass freely through the port controlled by said check valve from the upper part of the cylinder to the lower part. As soon as the operating handle or lever 21 is released, the water pressure (acting upon

the upper surface of the valve itself) assisted to a greater or less extent by the spring 19 if the latter be used, tends to force the piston 11 downwardly or inwardly again against the body of oil which forms a perfect resistance and yields only as the oil is permitted to pass through the channel or passage 23 from the lower side of the piston to the upper or outer side thereof. The closing movement, therefore, will be a slow one as is evident, and the period consumed in closing may be readily regulated by means of the screw or needle valve 24.

If my improved valve be used in any connection in which a refill or seal is desired after the main flow of water has been cut-off, the valve 6 may be provided with a vent 25 establishing communication when the valve is closing, between the water inlet 2 and the water outlet 3 through a groove 26 in the web 4, said vent being regulated by means of a needle valve or similar device 27 as shown.

From the foregoing description in connection with the accompanying drawings, it will be seen that I have provided an improved construction of slow closing valve which will be efficient with a minimum amount of friction, owing to the construction and arrangement of the loose sleeve 14 of the valve stem, in connection with the anti-friction rollers carried by said sleeve, and the spiral arms 12 and 13 between which said anti-friction rollers operate. As the working parts of the device are at all times immersed in oil they will not corrode or otherwise deteriorate and at the same time the oil in the cylinder makes a positive resistance which is a yielding one and adjustable readily to vary the time consumed by the valve in its closing movement. It is to be also noted that a valve constructed in accordance with my invention will not hammer under any pressure but will work independently of the water or pressure of the water and therefore does not require adjusting for varying water pressures. The piston and stuffing box form perfect guides, thus providing a tight and accurately closing valve and preserving the durability of the valve and bib washers. The duration of the flush can be instantly regulated by the needle valve or screw 24 without disturbing the interior of the valve while at the same time all the parts are easily accessible for replacement or repair.

Having thus described the invention what is claimed as new is:

1. The combination with a valve body, its seat, the valve adapted to close on said seat and the valve stem secured to said valve, of stationary spiral arms encircling said stem, a plurality of complemental depending arms movable with said stem, a sleeve mounted to turn and move longitudinally on said stem within the circle of said arms and provided with rollers interposed between said arms and adapted to ride upon the latter, whereby a rotary motion of the valve stem will be accompanied by a longitudinal movement, the said arms being provided at their ends with lugs designed to engage and limit the movement of the rollers.

2. The herein-described valve, comprising a valve body provided with a seat a valve proper adapted to close on said seat, a stem to which said valve is secured, a cylinder mounted upon said body, the valve stem extending into said cylinder, a cap piece supporting said cylinder on the valve body and provided with outwardly extending spiral arms, a piston secured to said valve stem and fitting said cylinder, spiral arms depending from said piston and coacting with the outwardly extending spiral arms, means for turning said valve stem and piston, and anti-friction devices interposed between said two series of spiral arms and adapted to ride upon the same whereby the turning movement of the stem and piston will be accompanied by a longitudinal movement thereof.

3. A device of the character described, comprising a body provided with a valve seat, a valve adapted to close on said seat, a stem secured to said valve, a cap piece mounted on said body and through which the valve stem extends, said cap piece being formed with a series of outwardly extending spiral arms a cylinder supported on said cap piece, a piston fitting said cylinder and movable with the valve stem, said piston being provided with a port, and a check valve controlling said port, the cylinder containing fluid and there being provided a passage independent of said port establishing communication between those portions of the cylinder at opposite sides of the piston, spiral arms depending from said piston and co-acting with the outwardly extending spiral arms, anti-friction devices interposed between said two series of arms and adapted to ride upon the same whereby a turning movement of the valve stem and piston will be accompanied by a longitudinal movement thereof, and means for turning said valve stem.

4. A device of the character described, comprising a body provided with a valve seat, a valve adapted to close on said seat, a stem secured to said valve, a cap piece mounted on said body and through which the valve stem extends, said cap piece being formed with outwardly extending spiral arms, a cylinder supported on said cap piece, a piston fitting said cylinder and movable with the valve stem, said piston being provided with a port, and a check valve controlling said port, the cylinder containing fluid and there being provided a passage independent of said port establishing communication between those portions of the cylinder at opposite sides of the piston, spiral arms depending from said piston and co-acting with the outwardly extending spiral arms, anti-friction devices interposed between said two series of arms and adapted to ride upon the same whereby a turning movement of the valve stem and piston will be accompanied by a longitudinal movement thereof, means for turning said valve stem and means for regulating the passage establishing communication between the portions of the cylinder on opposite sides of the piston.

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

MARK F. COYLE. [L. S.]

Witnesses:
G. T. KINCAID,
LAWRENCE COYLE.