S. O. JOHNS.

FLUSHING VALVE.

APPLICATION FILED FEB. 16, 1917.

1,402,771. Patented Jan. 10, 1922.

2 SHEETS—SHEET 1.

FIG. 1.

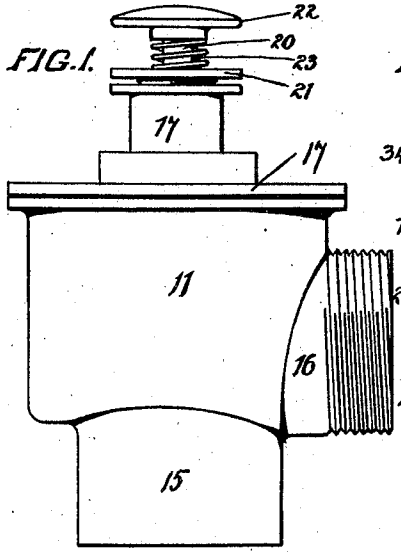


FIG. 2

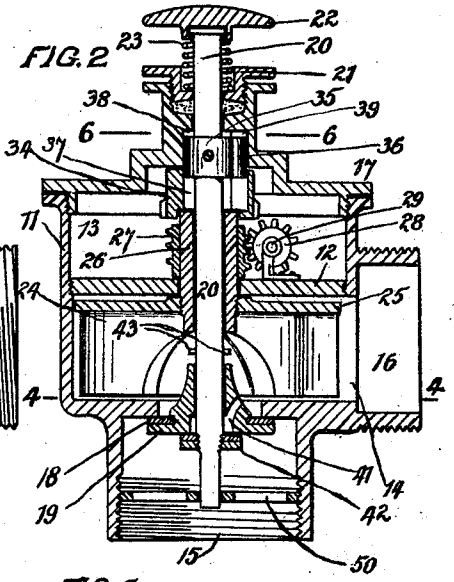


FIG. 3

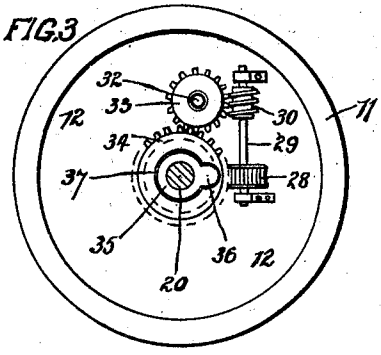


FIG. 4.

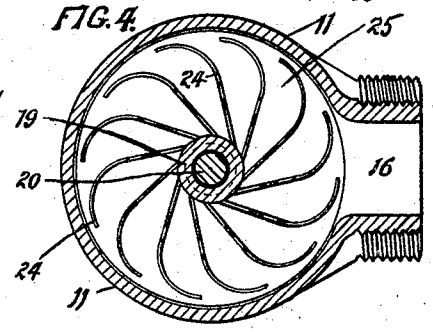


FIG. 5.

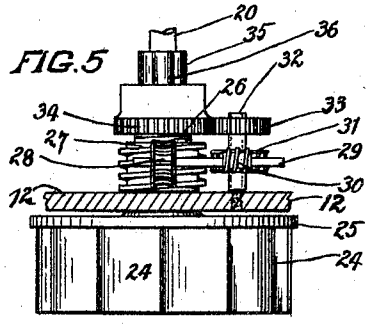


FIG. 6.

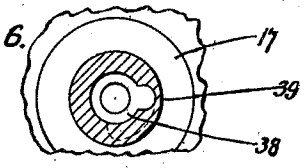
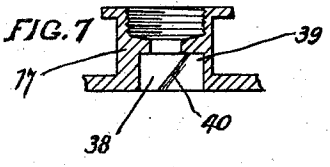


FIG. 7.



INVENTOR:
S. O. JOHNS
BY: Wm. Olsen
ATTORNEY.

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2 SHEETS—SHEET 2.

FIG. 8.

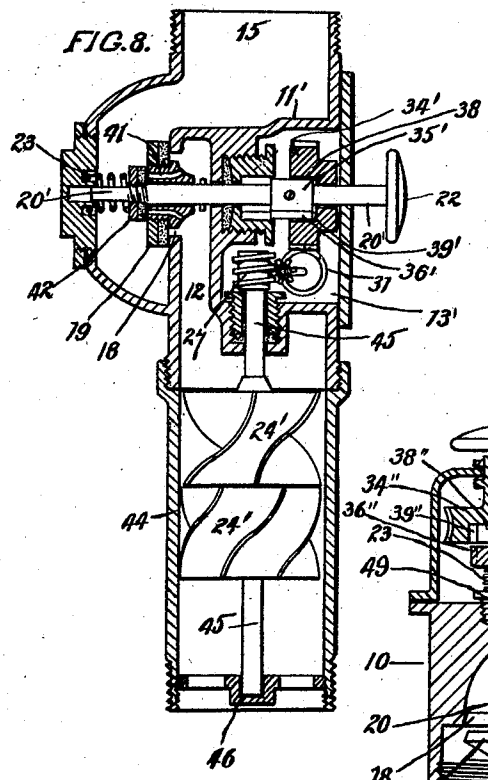


FIG. 9

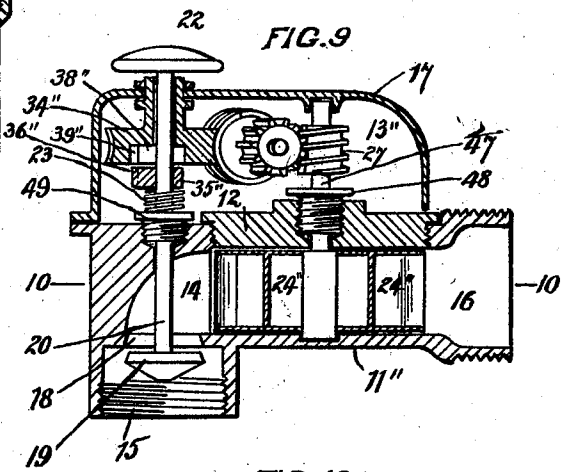
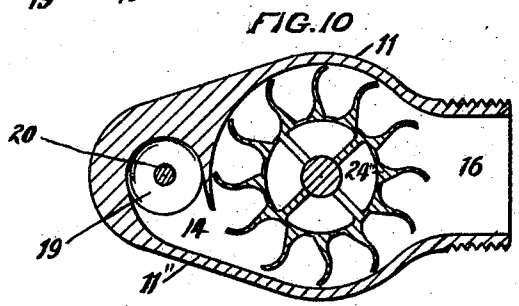


FIG. 10



INVENTOR:
S. O. JOHNS
BY: Wm. Dederick
ATTORNEY.

UNITED STATES PATENT OFFICE.

STUART OTTO JOHNS, OF TAITVILLE, WELLINGTON, NEW ZEALAND.

FLUSHING VALVE.

1,402,771. Specification of Letters Patent. Patented Jan. 10, 1922.

Application filed February 16, 1917. Serial No. 148,985.

To all whom it may concern:

Be it known that I, STUART OTTO JOHNS, subject of the King of Great Britain, residing at Mertoun Terrace, Taitville, Wellington, in the Dominion of New Zealand, have invented new and useful Improvements in Flushing Valves; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention has been devised in order to provide improvements in the valves employed for controlling the flushing operations of water closets, urinals and the like, of that class that are arranged within the water main and are opened to allow the water to flow and then automatically close after a predetermined quantity of water has passed through the valve.

The invention consists in the employment of special and improved means whereby the closing of the valve is effectively performed and whereby the quantity of water passing through at each flush is accurately gauged whether the valve be employed in high or low pressure systems.

The means devised for this purpose consists broadly in the employment of a fan, wheel, or screw that is adapted to be rotated by the passage of the water through the open valve and is geared up with means controlling the valve spindle so as to cause such valve to close after a predetermined number of revolutions of such fan, wheel or screw.

The invention may be carried out in a number of ways in which fans, or water wheels, or screws, of different designs may be employed to actuate the mechanism controlling the valve spindle. The accompanying drawings illustrate some approved forms of mechanism for effecting the desired purpose and in all of which the same principles of operation and of control are embodied.

In such drawings:—

Figure 1 is a side elevation of a form of valve in which the fan is formed and operated upon the centrifugal system.

Figure 2 is a sectional elevation thereof.

Figure 3 is a plan with the cover removed.

Figure 4 is a sectional plan taken on the line 4—4 of Figure 2, but looking upward from such line.

Figure 5 is an elevation of the fan and its gearing connection with the valve spindle.

Figure 6 is a detail section taken on the line 6—6 of Figure 2.

Figure 7 is a sectional elevation of such detail.

Figure 8 is a sectional elevation of an alternative construction in which the operating means consist in a screw or screws arranged in a down pipe.

Figure 9 is a sectional elevation of a further alternative construction in which the operating fan consists in a water wheel of the Pelton type.

Figure 10 is a sectional plan thereof taken on the line 10—10 of Figure 9.

In all the figures, the same references are employed to indicate corresponding parts.

In the construction shown in Figures 1 to 7 the valve casing 11 is divided by means of a plate 12 into an upper chamber 13 and a lower chamber 14 which latter forms the valve chamber and has the inlet 15 leading into its bottom and the outlet 16 away from its side. The inlet and outlet are suitably made for connection respectively with the supply pipe and the discharge of the system. A cover 17 is secured over the top of the upper chamber so as to seal it.

The inlet 15 is formed with a valve seat 18 and underlying such seat is the valve 19 that is mounted upon the valve spindle 20 which extends up through the whole valve casing and out through the cover 17 and through a suitable gland 21 thereon. The top end of the valve spindle is provided with the knob 22, and a spring 23 is arranged between the gland and this knob, to keep the spindle normally drawn up and the valve 19 tight upon its seat 18. Downward pressure upon the knob 22 is adapted to force the valve open to permit of the flow of water.

Within the lower chamber of the valve casing the outflow fan or turbine wheel 24 is arranged. This is constructed in any suitable manner such that the water passing through the valve seat 18 will act upon the blades or vanes of the fan or wheel, as it passes through them to the outlet and cause the fan or wheel to rotate. The wheel shown is formed upon a disc 25 that is made fast upon the lower end of a sleeve 26 loosely surrounding the valve spindle and which sleeve passes up through the divisional plate 12, into the upper chamber 13 of the valve casing. It is thus free to rotate around the spindle and on its upper end is provided with a worm pinion 27 secured to it. This pinion gears with a worm wheel 28 secured upon one end of a horizontal shaft 29 that

is mounted in bearings fixed upon the plate 12. Upon the other end of this shaft a worm pinion 30 is secured which gears with a worm wheel 31 upon the lower end of a vertical shaft 32. A toothed pinion 33 is mounted upon the upper end of this shaft 32 and this gears with the pinion 34 mounted upon the valve spindle 20 above the top of the worm pinion 27. By this gearing the rotation of the wheel 24 is communicated to the pinion 34.

Firmly fixed to the valve spindle 20 is a circular block 35 that is formed with a tooth 36 projecting from one side of its periphery. A recess 37 is formed in the top of the pinion 34 such recess being of corresponding shape to that of the block 35 and its tooth 36. In the normal closed position of the valve the bottom of the block 35 is within the upper end of the recess 37 and such recess is made deep enough to allow for the depression of the valve spindle the necessary amount to fully open the valve. By reason of the tooth 36 and its engagement with the recess 37, the valve spindle is caused to rotate with the pinion 34.

The block 35 when the valve spindle is in the raised position fits within a recess 38 made in the cover 17, and when depressed to open the valve, passes to beneath the bottom of such recess. This recess also is formed with a groove 39 (Figs. 2 and 6) that receives the tooth 36 of the block 35.

Consequently in the operation of the valve, when the valve spindle is depressed to open the valve, the block 35 is lowered to clear the recess 38, the gearing between the fan wheel 24 and the spindle is thus freed to work. The fan wheel is rotated by the passage of the water through the valve, and by its rotation imparts rotation to the valve spindle, so that the tooth 36 on the block 35 leaves the line of the groove 39 and is engaged by the solid edge of the cover 17 around the bottom of the recess 38, and thus the valve is retained in the depressed and open state until the spindle makes a complete revolution, when the tooth 38 coming beneath the groove 39 allows the valve and valve spindle to be raised to close the valve.

The gearing connecting the fan wheel 24 with the valve spindle is so adjusted in its ratio of working that it will impart a complete rotation to the valve spindle on the passage of a fixed quantity of water through the valve, or reversely so that the number of revolutions imparted to the fan wheel 24 by the passage of a predetermined amount of water through the valve, will transmit one complete revolution to the valve spindle. Thus whether this quantity be sent through at high or low pressure, the result will be the same, the valve only closing after the fixed quantity has passed.

If desired, provision may be made for the gradual closing off of the valve, by forming the groove 39 up which the tooth 36 slides, with the side with which the tooth engages as it finishes its revolution, inclined as shown at 40 in Figure 7. The tooth thus as the revolution continues, slides gradually up into the groove.

If desired also, provision may be made for preventing the knocking noise caused by the shutting off of the full pressure of water, by providing for the last portion of the flush being reduced in volume and also to provide for the after flush. This is effected in conjunction with the inclined side of the groove 39 beforementioned allowing the valve spindle to move gradually up. The means for effecting the object consist in mounting the valve 19 loosely on the spindle and in making its boss with a small passage or passages 41 (Fig. 2) passing through it. A small valve 42 is fixed to the spindle beneath the main valve and is adapted when the spindle is raised to cover such passage or passages 41. Projecting from the spindle at a point above the main valve are the pins 43 which, when the spindle is depressed, engage the valve and force it down with it. These pins are so positioned that, when the spindle rises through the first part of its upward movement, the main valve will be free to rise and engage its seat, through the pressure of the water beneath it, leaving the auxiliary valve lowered and the passages 41 open until the spindle has been raised to the full extent of its movement, the force of the water passing through the passages 41 continuing the rotation of the fan wheel 24.

If required, the lower end of the valve spindle may be carried in a guide 50 arranged within the inlet passage 15 which guide serves to keep the spindle and valve from any loose side play.

In the form of valve shown in Figure 8, the casing 11′ forms portion of the down pipe and is formed with a lower section 44 below the valve in which a screw 24′ is arranged upon a spindle 45 extending longitudinally up such section and into the outer chamber 13′ of the valve casing, where it is connected by gearing with the pinion 34′ mounted upon the valve spindle 20′ which in this case extends horizontally through the valve chambers. In this instance the valve spindle does not rotate and is kept from rotation by any suitable means. The toothed block 35′, in the closed state of the valve slides out into a corresponding recess in the pinion 34′, and when the valve spindle is pushed in to open the valve frees such pinion so that it may rotate under the driving action of the screw 24′ until it makes a complete rotation and thereby positions the groove 39′ in its recess opposite the tooth 36′ of the block 35′, when the valve spindle will be free to move out and close the valve.

In this construction also the valve may be formed of the double type illustrated in Figs. 1 to 7 and described in relation thereto.

The screw 24′ may be duplicated by a second screw mounted on the spindle 45 below the first and arranged with its vanes or blades alternating with those of the first screw, as shown in Figure 8.

The spindle 45 is suitably held at its lower end, as for instance by being footstepped in a support 46 screwed into the lower end of the extension 44 and having apertures to permit of the free passage of the flush.

The construction shown in Figures 9 and 10 provides for the actuating wheel 24″ being a wheel of the Pelton type having its blades acted upon by the tangential action of the water in passing from the inlet 15 to the outlet 16 of the casing 11″. In this construction the wheel is mounted upon a spindle 47 that extends in a line parallel with the valve spindle 20 and passes through a gland 48 into the upper division 13″ of the casing. The valve spindle also passes through a gland 49 into such division so that no leakage of water into the chamber can take place.

The spindle 47 is geared by similar gearing to that previously described, with the pinion 34″ that in this case also is mounted to rotate around the valve spindle which is kept from rotation. The recess 38″ with its groove 39″ are formed in the underside of the pinion and the block 35″ secured upon the valve spindle so that when the valve is closed, it will be raised into such recess. When the valve spindle is depressed to open the valve, the block will clear the pinion so that it may rotate until the pinion makes a complete revolution, when the block will rise into the recess under the action of the spring 23 pressing the spindle normally upward.

In the operation of the valve in each of the constructions described and shown, the operator will press upon the knob 22 and hold the valve open for sufficient time to permit the valve spindle, or the pinion as the case may be, to commence its rotation and to alter the coincidence of the tooth 36 with its engaging groove. The knob may then be released the valve remaining open until allowed to close by the tooth being again brought into coincidence with its groove.

I claim:—

1. In a water flushing valve, a valve casing having a recess and also provided with a passage therethrough; rotary means in such casing adapted to be acted upon by the water passing through said casing; a longitudinally slidable spindle in said casing, said rotary means rotatable relatively to said spindle; a valve for the passage controlled by the spindle; a spring controlling that spindle, to keep the valve normally closed; a block slidable with the spindle, and having a tooth which normally engages within the recess of the casing; and gearing, connecting said rotary means with said block, and operating to position the latter relatively to and coincidently with said recess.

2. In a water flushing valve, a valve casing provided with a passage therethrough; a rotary motor in such casing; a longitudinally slidable spindle in said casing, said motor rotatable relatively to said spindle; a valve for the passage and controlled by that spindle, the said valve having an opening; a supplemental valve for the opening in the first-named valve; a spring for controlling both valves; a block slidable with the spindle and disconnectably engaged with the casing; and gearing, connecting said motor with said block, and operating to again connect said block with the casing.

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

STUART OTTO JOHNS.

Witnesses:
W. Alexander,
M. C. Brown.