No. 694,180. Patented Feb. 25, 1902.

D. F. O'BRIEN.

HYDRANT.

(Application filed Apr. 27, 1900. Renewed Aug. 20, 1901.)

(No Model.) 2 Sheets—Sheet 1.

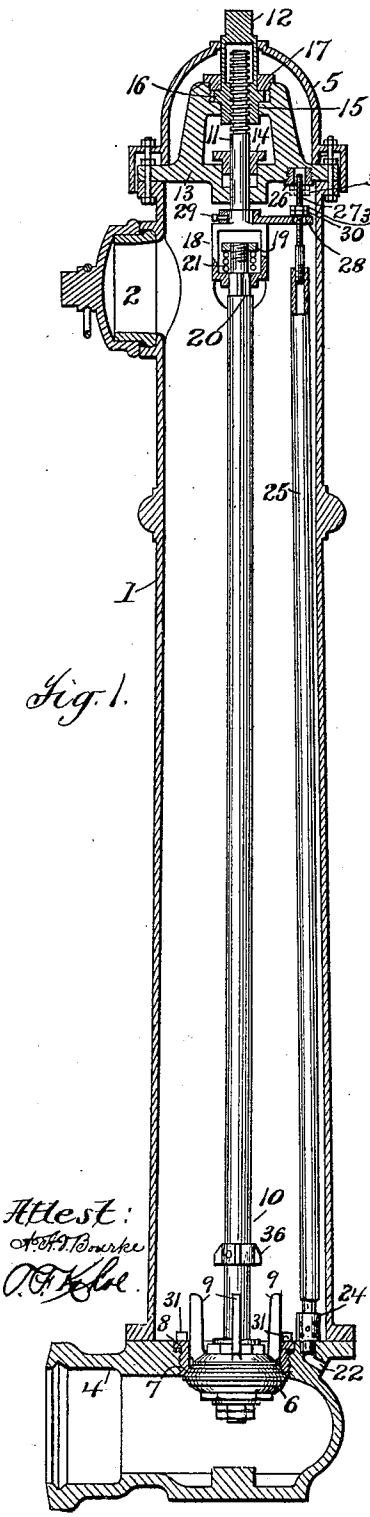


Fig. 1.

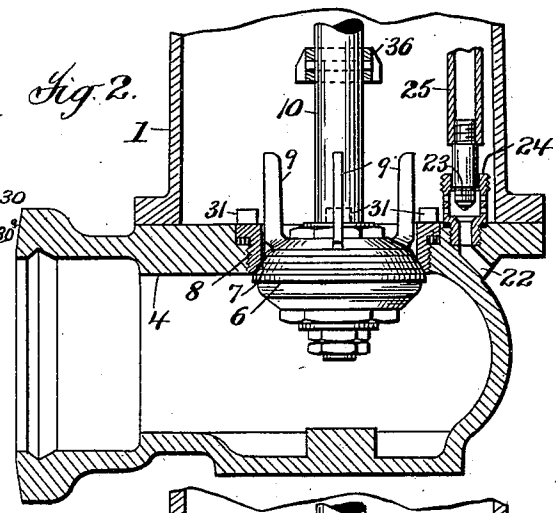


Fig. 2.

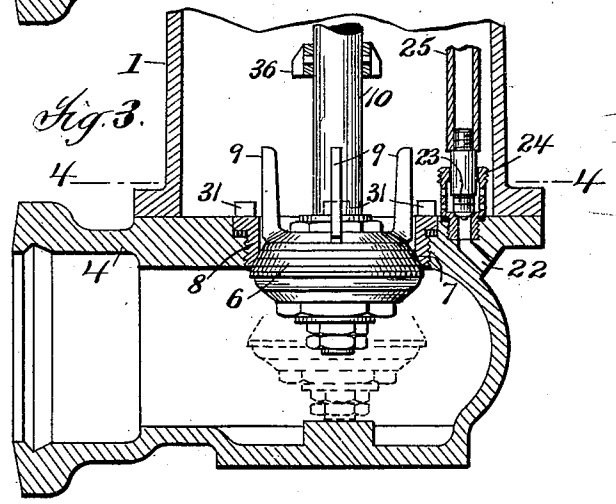


Fig. 3.

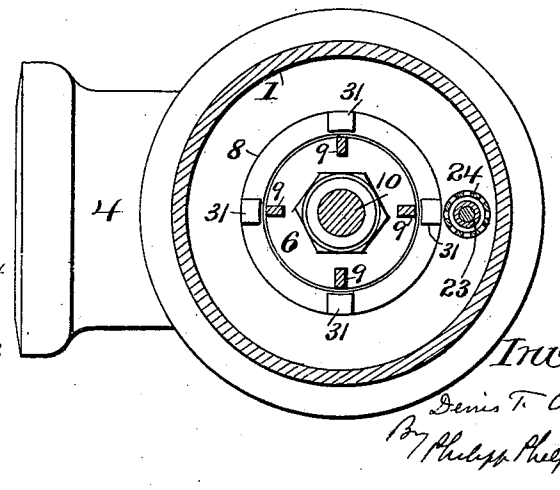


Fig. 4.

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No. 694,180. Patented Feb. 25, 1902.

D. F. O'BRIEN.

HYDRANT.

(Application filed Apr. 27, 1900. Renewed Aug. 20, 1901.)

(No Model.) 2 Sheets—Sheet 2.

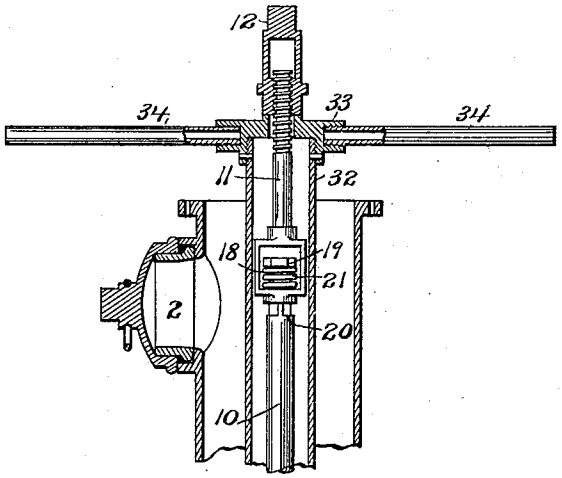
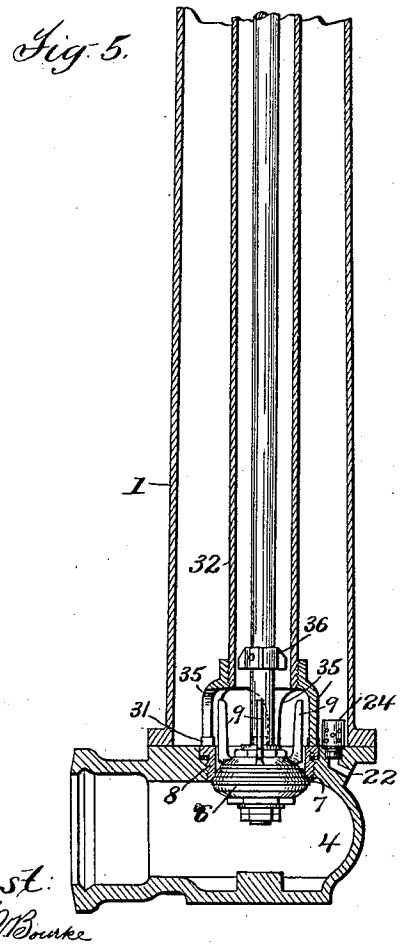


Fig. 5.



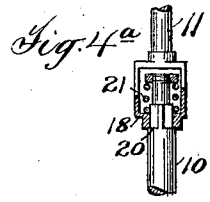


Fig. 4a.

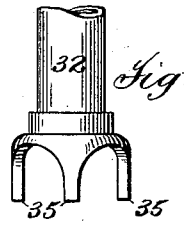


Fig. 6.

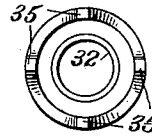


Fig. 7.

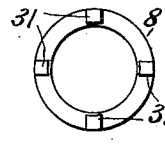


Fig. 8.

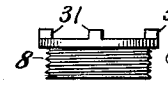


Fig. 9.



Fig. 10.

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UNITED STATES PATENT OFFICE.

DENIS F. O'BRIEN, OF NEWARK, NEW JERSEY.

HYDRANT.

SPECIFICATION forming part of Letters Patent No. 694,180, dated February 25, 1902.

Application filed April 27, 1900. Renewed August 20, 1901. Serial No. 72,645. (No model.)

To all whom it may concern:

Be it known that I, DENIS F. O'BRIEN, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Hydrants, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in hydrants, and particularly to fire-hydrants of that class known as compression-hydrants—that is, hydrants in which the main valve is held to its seat by the pressure of water behind it.

In such hydrants as heretofore constructed a serious difficulty has been met with which it is one of the objects of the present invention to overcome—namely, the liability of waste of water when the hydrant is used, for example, for sprinkling purposes or by builders for mixing mortar, &c., in which cases the full head of water is not desired or employed, the main valve in such cases being therefore only partially opened. Such hydrants are provided with drip-outlets closed by suitable valves for draining the hydrant after the main valve is closed to prevent freezing of the hydrant, and as such hydrants have heretofore been constructed the drip-valves have been moved to closed and open position simultaneously with the movement of the main valve to open and closed position, respectively. As a result of this simultaneous operation of the two valves when the main valve is only partially opened the drip-valve is moved only partially to closing position and not sufficiently to close the drip-outlet, so that the two valves are simultaneously open and water entering the hydrant by the main valve is permitted to escape through the drip-outlet, thus producing great waste.

The invention also consists in certain other features which, with those above stated, will be hereinafter described in detail, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of a hydrant constructed in accordance with the present invention, the main valve being shown as closed and the drip-valve as opened. Fig. 2 is a sectional view, on an enlarged scale, of the lower portion of the hydrant, illustrating particularly the main valve and the drip-valve and drip-outlet, the main valve being shown as closed and the drip-valve as opened. Fig. 3 is a view similar to Fig. 2, illustrating both the main valve and the drip-valve as closed, the drip-valve assuming this position, as will hereinafter appear, just before the opening of the main valve. Fig. 4 is a section on the line 4 4 of Fig. 3. Fig. 4ª is a detail illustrating the relative positions of the main-valve spindle and main-valve-operating mechanism when the main valve is opened or being moved to or from its seat. Fig. 5 is a sectional elevation of the hydrant-casing with the cap thereof removed and the removing and inserting tool inserted in the casing for the withdrawal or insertion of the main valve and its seat. Fig. 6 is an elevation of the lower portion or foot of the valve removing and inserting tool, illustrating particularly the means with which it is provided for engaging with the valve-seat, so as to rotate the latter, and thus remove it and the main valve or secure them in position. Fig. 7 is a bottom plan view of the same. Fig. 8 is a plan view of the valve-seat. Fig. 9 is a side elevation thereof, and Fig. 10 is a section illustrating the lower portion or part of a removing or inserting tool for engaging the drip-valve seat to remove or replace it.

Referring to said drawings, 1 represents the valve-casing, which is provided with the usual hose-nozzles 2 3, 4 the main-valve casing, and 5 the cap of the hydrant-casing.

6 represents the main valve, and 7 its seat, formed in an exteriorly-threaded ring 8, screwed into the main-valve casing, said main valve 6 being also provided with vertical guides 9 for guiding it to and from its seat when the valve is being closed or opened.

The valve mechanism includes a spindle 10, secured to the valve 6, and an actuating-spindle 11, threaded at its upper end and connected with the turning nut 12 and connected at its lower end with the spindle 10 in such way, as will presently more fully appear, as to provide a small amount of lost motion between the two spindles, adapting the spindle 11 to move endwise relatively to the spindle 10 before the main valve 6 is opened and also after it has been closed. The spindle mem-

ber 11, as will be observed, passes through an opening in a bridge 13 and a stuffing-box or gland 14 above the same, and the turning nut 12 is held from endwise movement by a flange 15, engaging the under face of a flange 16 on the nut, and by a retaining-nut 17, engaging the upper face of the flange 16, the nut 12 projecting through the cap 5 and its projecting end being squared for the reception of a monkey-wrench, by which it is turned in either direction. The lower end of the spindle 11 is connected to the spindle 10 by means of a yoke-shaped bracket 18, having a central opening fitting over the upper end of the member 10, the connection being such as to permit of a limited amount of endwise movement of the spindle 11 relatively to the spindle 10. This endwise movement of spindle 11 relatively to spindle 10 is limited in one direction by a stop consisting of a nut 19 on the upper end of the spindle 10 and above the bracket 18 and in the other direction by a second stop, consisting of a shoulder 20 on the spindle 10 beneath the bracket 18. Between the bracket 18 and stop 19 is located a spring 21, coiled about the spindle 10, the tendency of which is to force the two spindles 10 11 together, the function of such spring being to take up the lost motion between the two spindles and cause them to abut and move as one while the main valve is being opened and closed, thus avoiding water hammer and shock and consequent liability of injury to the main valve and parts connected therewith, while permitting further movement upwardly of the spindle 11 relatively to the spindle 10 after the valve has been seated and also downwardly relatively thereto before it is opened. The upper end of the spindle 10 is squared or of other suitable form, and the opening in bracket 18 is of like shape, so as to key the spindle 11 thereto.

The operation of the mechanism thus far described is as follows: Assuming the parts to be in the positions illustrated in Fig. 1, to open the valve 6 the turning nut 12 will be turned in the proper direction to move the spindle 11 downward. During the first part of the downward movement of the spindle 11 it will move relatively to the spindle 10 until the bracket 18 comes in contact with shoulder 20, as shown in Fig. 4ª, the spring 21 during such movement expanding. The movement of spindle 11 being continued beyond this point, the spindle 10 will be moved downwardly by it, thus unseating the valve 6, which then assumes the position shown by dotted lines in Fig. 3. To close the valve, the nut 12 will be turned in the opposite direction, thus moving the spindle 11 upward. During the first part of this upward movement of the spindle 11 the spindle 10 will move therewith, the two spindles being caused to abut by the spring 21 and traveling as one, as shown in Fig. 4ª. The movement together of the two spindles continues until the valve 6 is seated, when the spindle 11 moves upwardly relatively to the spindle 10 against the pressure of the spring 21 into the position shown in Fig. 1. The lost motion between the two spindles, by reason of which the actuating-spindle 11 moves relatively to the valve-spindle 10, is provided for the operation of the drip-valve, which will now be described, such drip-valve being closed during the downward relative movement of the spindle and opened during such relative movement in the opposite direction.

22 represents the drip-orifice formed in the main-valve casing, and 23 the drip-valve. The seat for the drip-valve is formed in a short tube 24, screw-threaded exteriorly at at its upper and lower ends, the screw-threads at the lower end securing it in position in the main-valve casing, while those at the upper end furnish means whereby the tube may be engaged by a removing-tool and removed from or inserted in position, as will hereinafter appear. The tube 24 also acts as a guide for the drip-valve, which is secured to the lower end of a loosely-supported tubular spindle 25, the upper end of which is supported and guided in an opening 26 in the bridge 13, which receives a pin or rod 27, projecting from the spindle 25. The drip-valve 22 seats itself by gravity, aided, if desired, by a spring, (not shown,) its movement in both directions being controlled by the spindle 11 through connections which will now be described. These connections consist of an arm 28, secured to the spindle 11 by a set-screw 29, so that it may be adjusted thereon and removed therefrom when desired, this arm projecting laterally from the spindle 11 and being slotted at its outer end, so as to straddle the rod 27 and engage with a stop 30 thereon to raise the spindle 25 and open the drip-valve. The arm 28 and stop 30 are, as will be observed, so located relatively to each other that during the downward movement of the spindle 11 relatively to spindle 10 and before any movement of the main valve 6 has taken place the spindle 25, following the arm 28, seats the drip-valve 22, as shown in Fig. 2, and during the latter part of the upward movement of the spindle 11—that is, relatively to the spindle 10—and after the main valve 6 is closed the arm 28, engaging the stop 30, raises spindle 25 and opens the drip-valve 22. It will thus be observed that before the main valve 6 can be moved to any extent to open it the drip 22 is fully closed and that the drip-valve is not opened until after the main valve has been fully closed, waste being thus entirely prevented. The stop 30 is in the form of a nut backed up by a lock-nut 30ª, a nut being employed, as it may be adjusted on the threaded rod 27 relatively to the arm 28 to compensate for wear of the main valve 6. The stop 30 is in the form of a nut also for another purpose, which will be hereinafter referred to.

For the purpose of providing for the ready removal or insertion of the main valve without taking apart the hydrant-casing I con-

struct the ring 8, containing the valve-seat 7, with vertical lugs 31, and also provide a tool having a corresponding number of feet adapted to engage said lugs 31 and through them to rotate the ring 8 and screw it into or unscrew it from the main-valve casing. This tool consists of a pipe 32, adapted to be passed over the spindles 10 11 and provided at its upper end with a head 33, bearing handles 34, by which the pipe 32 is rotated, and at its lower end with feet or lugs 35, adapted to engage with the lugs 31 on the ring 8 to rotate the latter and unscrew it from or screw it into position. To insert the tool into the hydrant-casing in engagement with the ring 8, the only parts of the hydrant which it is necessary to remove are the cap 5, turning nut 12, bridge 13, and arm 28, and, if desired, the drip-valve spindle 25, which is loose within the casing. The pipe 32 is then passed over the spindles 10 11 and held in position by the return to the spindle 11 of the turning nut 12, as shown in Fig. 5, said nut also supporting the spindles 10 11 and the main valve 6, and through the latter its seat, so that the main valve and its seat may be properly positioned in the casing or removed together therefrom by the tool. The pipe 32 is maintained in vertical position or centered by means of a guide 36, secured to the spindle 10, aided by the bracket 18.

As before stated, the tube 24, containing the drip-valve seat, is also adapted for removal from the hydrant-casing on the insertion of a suitable tool, so that it may be repaired or cleared of any foreign substance which may lodge therein. The tool for this purpose provided by the present invention consists of a tube 37, interiorly screw-threaded at its lower end for engaging and rotating the tube 24 (see Fig. 10) and removing it from or inserting it in position in the casing.

The tube 24 is, as will be observed, perforated, so as to provide for thorough drainage of the hydrant-casing, the perforations, however, being sufficiently contracted to prevent the entrance into the tube of vegetable or animal matters which may enter the hydrant-casing and which if permitted to enter the tube 24 might choke the drip-outlet. These perforations, as will also be observed, are in close proximity to the bottom of the casing, but sufficiently distant therefrom as to be above the thin film or layer of mineral matter which naturally deposits in such hydrants after the main valve is closed and while the water left in the casing is escaping through the drip-outlet.

Some localities in which hydrants are used of the class to which the present invention particularly relates are so low relatively to rivers and other bodies of water in the neighborhood that the ground in which the hydrant is placed is always saturated with water, and in such localities, if the drip-valve is left open, as it ordinarily is, when the hydrant is not in use the water with which the ground is saturated will find its way into and fill the hydrant-casing and on a lowering of the temperature to freezing-point become frozen, and thus render the hydrant useless until thawed out. To obviate this difficulty, the connections for operating the drip-valve upon the operation of the main valve in the present case comprise a part which may be removed from or adjusted out of operative position, thus rendering such operating connections inoperative, so that the drip-valve will be normally closed instead of open. The part which is thus removable or adjustable is preferably the stop 30, which, as before described, is in the form of a nut and is adjustable on the drip-valve rod, so that, if desired, it may be moved to the position shown by dotted lines in Fig. 1, in which position it will not be engaged by the arm 28 as the latter moves upward with the spindle 11, and as a result the drip-valve 23 will be held by gravity in closed position while the main valve is both open and closed.

The peculiar construction of main valve and drip-valve with tools adapted to engage therewith, whereby said valves may be withdrawn from the hydrant-casing or inserted therein without taking apart the hydrant, as heretofore described, are not claimed herein, as they form the subject-matter of a separate application filed by me December 14, 1900, Serial No. 39,859.

What I claim is—

1. The combination of a main valve, actuating mechanism for opening and closing the valve, a lost-motion connection between the valve and actuating mechanism permitting movement in opposite directions of the latter relatively to the valve before the valve is opened and after it is closed, a drip-valve, connections between the actuating mechanism and drip-valve whereby the latter is operated during the movement of the former relatively to the main valve and a spring for taking up the lost motion between the actuating mechanism and main valve when the latter is open, substantially as described.

2. The combination of a main valve, actuating mechanism for opening and closing the valve, a lost-motion connection between the valve and actuating mechanism permitting movement in opposite directions of the latter relatively to the valve before the valve is opened and after it is closed, a drip-valve, connections between the actuating mechanism and drip-valve whereby the latter is operated during the movement of the former relatively to the main valve and a spring between the actuating mechanism and main valve for taking up the lost motion between them when the valve is open, substantially as described.

3. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement

in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a drip-valve, connections between the actuating-spindle and drip-valve whereby the latter is operated during the movement of the former relatively to the valve-spindle, and a spring for taking up the lost motion between the two spindles when the main valve is open, substantially as described.

4. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a drip-valve, connections between the actuating-spindle and drip-valve whereby the latter is operated during the movement of the former relatively to the valve-spindle, and a spring between the two spindles for taking up the lost motion between them when the main valve is open, substantially as described.

5. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a self-seating drip-valve, and an arm between the actuating and drip-valve spindles, said arm being borne by and movable with one of said spindles and loosely engaging the other whereby upon the movement of the actuating-spindle to open the main valve and before said valve is opened the drip-valve seats itself and upon the movement of the actuating-spindle to close the main valve and after the latter is closed said arm effects the opening of the drip-valve, substantially as described.

6. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a self-seating drip-valve, and an arm between the actuating and drip-valve spindles, said arm being borne by and movable with one of said spindles and loosely engaging the other whereby upon the movement of the actuating-spindle to open the main valve and before said valve is opened the drip-valve seats itself and upon the movement of the actuating-spindle to close the main valve and after the latter is closed said arm effects the opening of the drip-valve, and a spring for taking up the lost motion between the two spindles when the main valve is open, substantially as described.

7. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a self-seating drip-valve, and an arm between the actuating and drip-valve spindles, said arm being borne by and movable with one of said spindles and loosely engaging the other whereby upon the movement of the actuating-spindle to open the main valve and before said valve is opened the drip-valve seats itself and upon the movement of the actuating-spindle to close the main valve and after the latter is closed said arm engages and effects the opening of the drip-valve, and a spring between the two spindles for taking up the lost motion between them when the main valve is open, substantially as described.

8. The combination of main valve 6, spindle 10, actuating-spindle 11 having a limited movement relatively thereto, spring 21 between the spindles, means for moving spindle 11 endwise, self-seating drip-valve and spindles 23, 25, arm 28 borne by spindle 11 and loosely engaging spindle 25, and a stop on spindle 25 on the upper side of arm 28 whereby said spindle and its valve are raised on the upward movement of spindle 11, substantially as described.

9. The combination of main valve 6, spindle 10, actuating-spindle 11 having a limited movement relatively thereto, bracket 18 connecting the spindles, a stop on spindle 10 beneath the bracket for engagement therewith, spring 21 between the spindles, means for moving the spindle 11 endwise, self-seating drip-valve and spindle 23, 25, arm 28 borne by spindle 11 and loosely engaging spindle 25, and a stop on spindle 25 on the upper side of arm 28 whereby said spindle and its valve are raised on the upward movement of spindle 11, substantially as described.

10. The combination of main valve 6, spindle 10, actuating-spindle 11 having a limited movement relatively thereto, spring 21 between the spindles, means for moving spindle 11 endwise, self-seating drip-valve and spindle 23, 25, arm 28 borne by spindle 11 and slotted at its outer end to loosely engage spindle 25, and a stop on spindle 25 on the upper side of arm 28 whereby said spindle and its valve are raised on the upward movement of spindle 11, substantially as described.

11. The combination of a main valve, actuating mechanism for opening and closing the valve, a lost-motion connection between the valve and actuating mechanism permitting movement in opposite directions of the latter relatively to the valve before the valve is opened and after it is closed, a drip-valve, and connections between the actuating mechanism and drip-valve whereby the latter is operated during the movement of the former relatively to the main valve, said connections including a member movable from operative

position to render said connections inoperative, substantially as described.

12. The combination of a main valve, a spindle secured thereto, an actuating-spindle engaging the valve-spindle for opening and closing the valve, a lost-motion connection between the two spindles permitting movement in opposite directions of the actuating-spindle relatively to the valve-spindle before the valve is opened and after it is closed, a drip-valve, and connections between the actuating-spindle and drip-valve whereby the latter is operated during the movement of the former relatively to the valve-spindle, said connections including a member movable from operative position to render said connections inoperative, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DENIS F. O'BRIEN.

Witnesses:
A. A. V. BOURKE,
LEO STEIN.