M. M. MOORE.

VALVE.

APPLICATION FILED MAR. 1, 1913.

1,100,320.

Patented June 16, 1914.

4 SHEETS—SHEET 1.

Fig. 1.

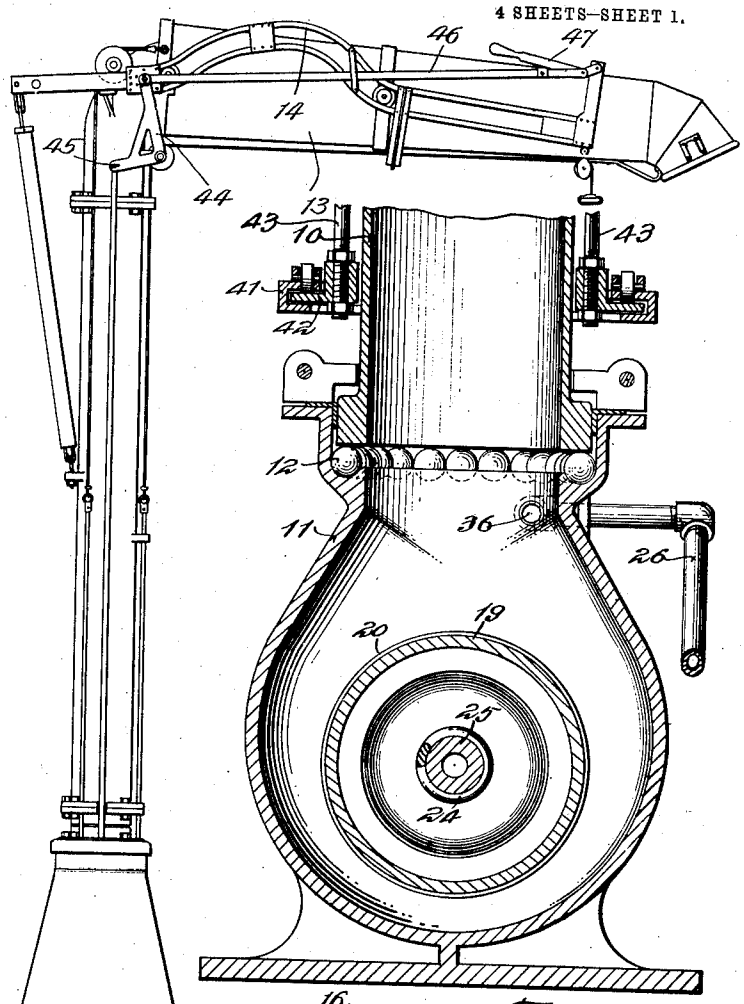
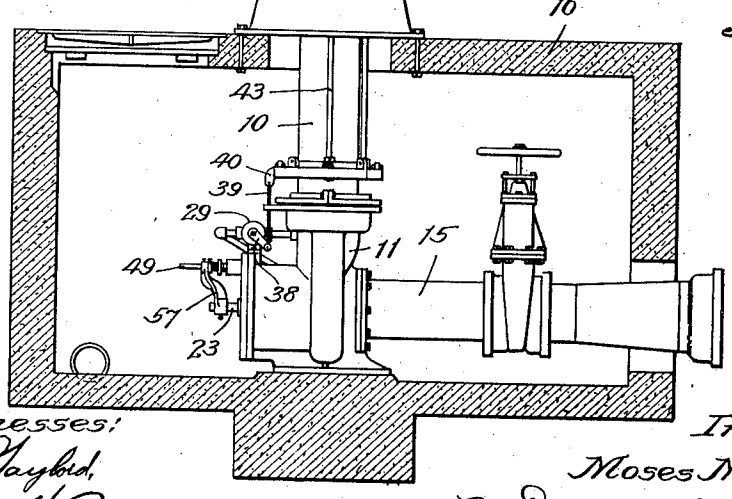


Fig. 4.



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VALVE.

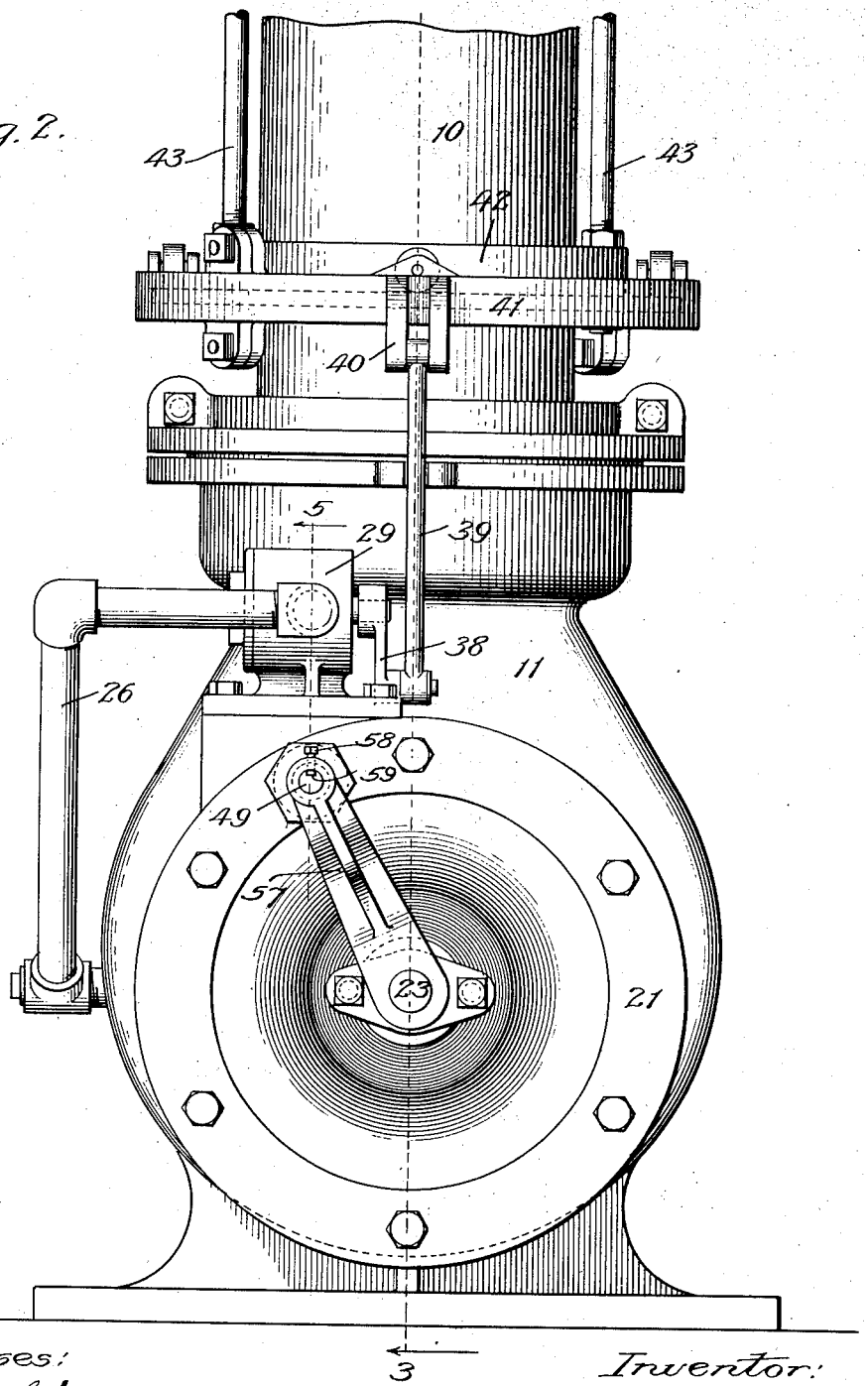
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4 SHEETS—SHEET 2.

Fig. 2.



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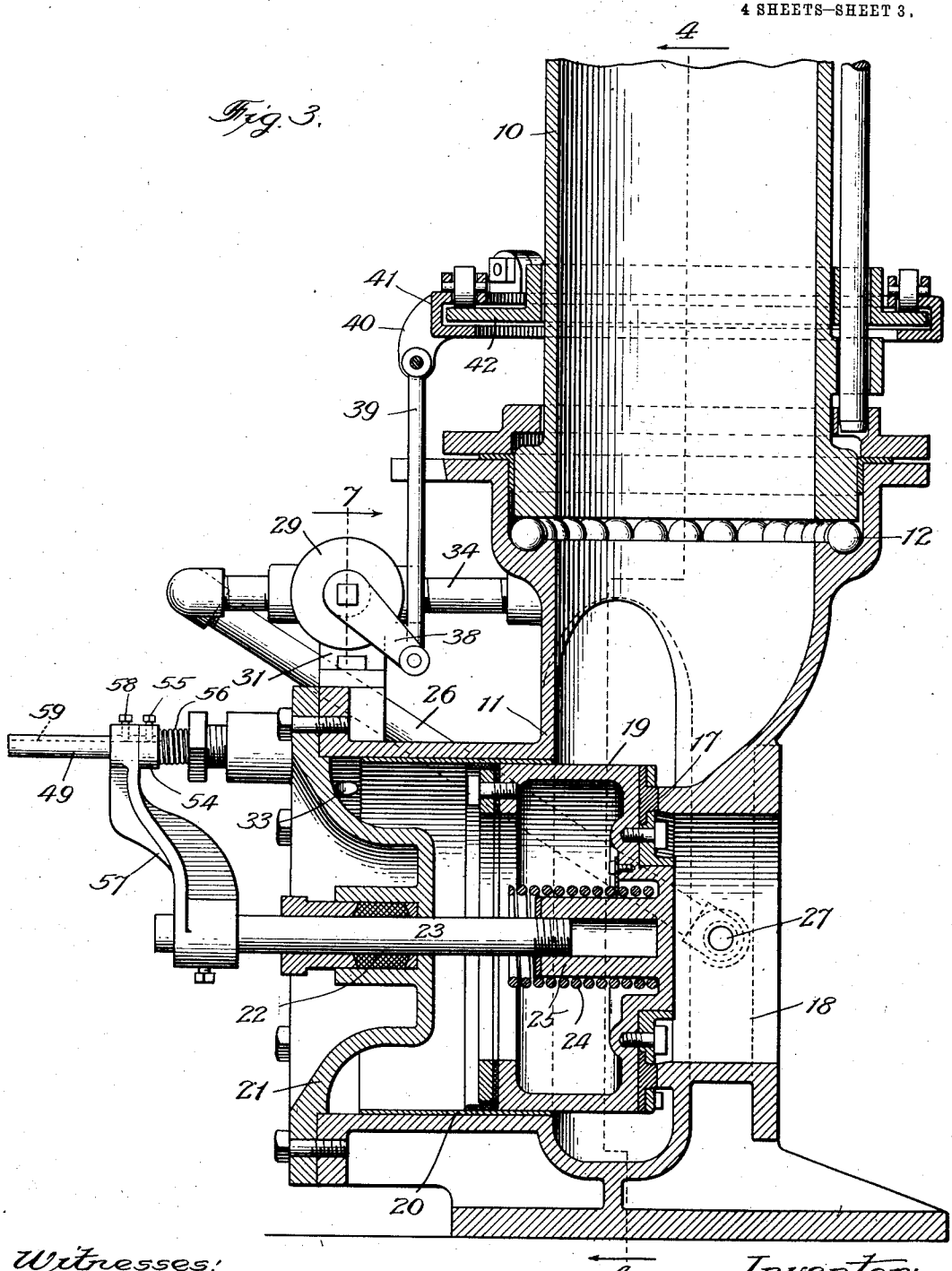
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4 SHEETS—SHEET 3.

Fig. 3.



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APPLICATION FILED MAR. 1, 1913.

1,100,320.

Patented June 16, 1914.

4 SHEETS—SHEET 4.

Fig. 5.

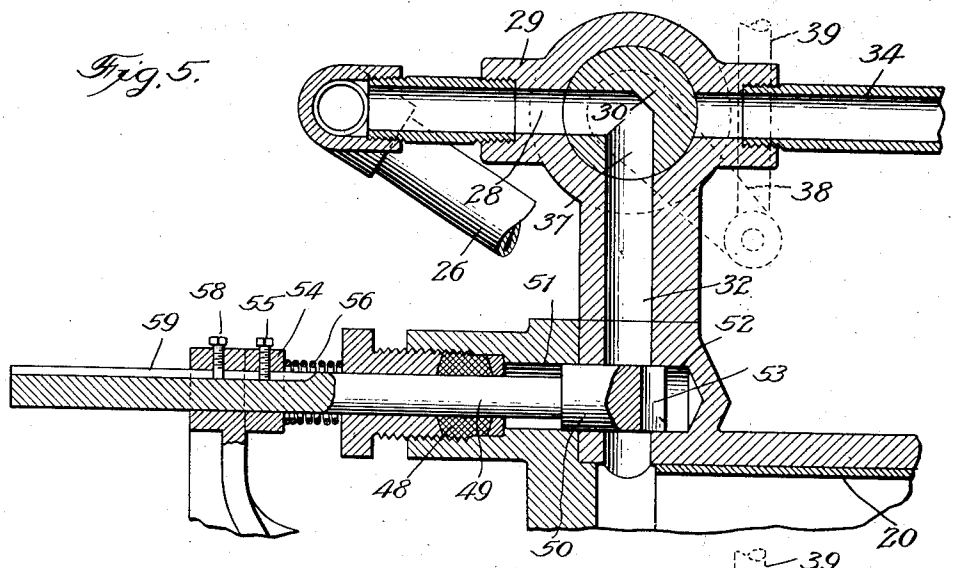


Fig. 6.

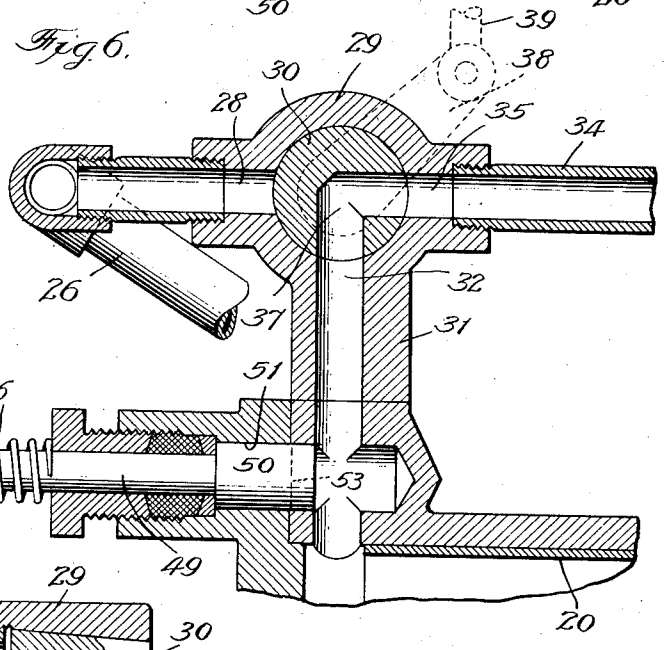


Fig. 8.

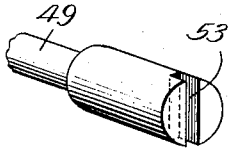
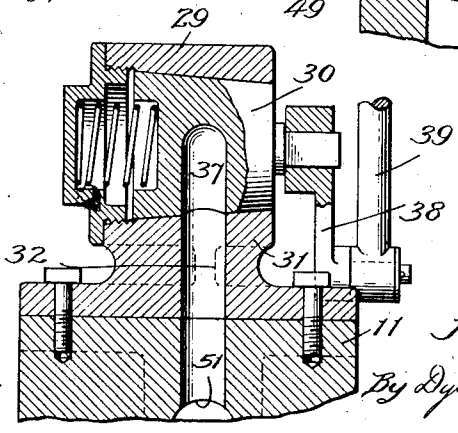


Fig. 7.



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UNITED STATES PATENT OFFICE.

MOSES M. MOORE, OF CHICAGO, ILLINOIS, ASSIGNOR TO T. W. SNOW CONSTRUCTION COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

VALVE.

1,100,320. Specification of Letters Patent. Patented June 16, 1914.

Application filed March 1, 1913. Serial No. 751,445.

To all whom it may concern:

Be it known that I, MOSES M. MOORE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Valves, of which the following is a specification.

My invention relates more particularly to improvement in the valve mechanism of standpipes for controlling the flow of water therethrough and formed, generally stated, of a differential piston-valve coöperating with a seat in the valve-casing and adapted to be closed against the flow of water through the valve, by introducing water into the valve-casing against the rear side of the valve, and unseated by the action of the water against the front side of the valve upon relieving the pressure against the rear side of the valve.

It has been found in practice that where the valve is closed quickly against the incoming pressure, a very undesirable hammer action is produced, which not only impairs the valve structure, but also the pipe lines. It has been found, however, that in valves of this type no appreciable back pressure is produced excepting during the final closing movement of the valve, the point at which appreciable back pressure commences when the valve is closed rapidly, being different in different constructions of valves, but usually such appreciable back pressure takes place during approximately the last one-third part of the movement of the valve in closing.

My object is to provide improvements in devices of the character above referred to, whereby they will be rendered simple of construction, very accessible for making repairs, positive in operation, and whereby the valve will close quickly throughout that portion of its closing movement during which no appreciable back pressure against the valve takes place and as soon as it reaches a point where appreciable back pressure against it begins, will be caused to close comparatively slowly and at gradually decreasing speed until finally closed, whereby back pressure is reduced to the minimum and hammer action likewise minimized.

Referring to the accompanying drawings—Figure 1 is a view in elevation of a standpipe, the upper part of which is of the same general construction illustrated in United States Letters Patent No. 1,000,104, granted to me on the 8th day of August, 1911, the pit in which the valve mechanism for the standpipe is located being shown in section. Fig. 2 is a rear end view of the valve mechanism illustrated in Fig. 1, showing the valve mechanism viewed from the left in Fig. 1. Fig. 3 is a section taken at the line 3 on Fig. 2 and viewed in the direction of the arrow. Fig. 4 is a section taken at the line 4 on Fig. 3 and viewed in the direction of the arrow. Fig. 5 is an enlarged section taken at the line 5 on Fig. 2 and viewed in the direction of the arrow, this view showing the means for regulating the flow of water against the rear side of the valve, in the position it assumes when the valve is closed. Fig. 6 is a view like Fig. 5, showing said regulating means in the position it assumes when the main valve of the standpipe is in open condition. Fig. 7 is an enlarged section taken at the line 7 on Fig. 3 and viewed in the direction of the arrow; and Fig. 8 is a perspective view of the inner end of the valve device constituting a portion of the means for regulating the flow of water against the rear side of the valve for closing it.

The upright water-conducting column of the standpipe is represented at 10, this pipe surmounting a valve-casing 11 and being supported on roller-bearings 12 confined between the casing 11 and the lower end of the column 10. The upper end of the column 10 coöperates with a movable spout-section 13 supported from a pair of spaced levers 14, one only of which is shown, as set forth in the above-referred to patent. One end of the casing 11 connects with a valved service-pipe 15 which, in practice, would lead from the source of water to be supplied to the standpipe, the casing 11 and the lower end of the column 10 and inner end of the pipe 15 being located in a pit 16 in accordance with common practice.

The casing 11 is provided with an annular valve-seat 17 which surrounds a port 18 opening into the service pipe 15 and cooperating with this seat is a piston-valve 19, this valve being slidably confined in the casing 11 and having water-tight sliding fit against the cylindrical wall 20 of the latter. The rear end of the casing 11 is closed by a cover 21 and slidably confined in a stuffing-box 22 in the latter is a rod 23 con-

nected at its forward end with the piston-valve 19, a spring 24 encircling a boss 25 on the valve 19 and serving to cushion the valve by impinging against the cap 21 in the movement of the valve in opening.

The valve 19 is adapted to be moved to closed position and be held therein by introducing pressure fluid into the valve-casing 11 behind the piston 19, and to be opened by the action of the water in flowing through the opening 18 against the front face of the valve, upon venting the casing 11 in the rear of the valve, and as the pressure fluid which I prefer to use for thus seating the valve is the same as that which opens the valve as stated, the parts of the structure are so formed, preferably as illustrated, as to cause less area of the piston to be presented to the water pressure in the port 18, than is presented to the water introduced into the casing 11 in the rear of the piston.

In the arrangement illustrated, the means for supplying the casing 11 with water at the rear side of the piston 19 comprise the following mechanism: A pipe 26 opens at one end, as indicated at 27, into the port 18 and at its opposite end into a port 28 in the casing 29 of a three-way valve, the valve proper of which is represented at 30. A passage 31 connects with a port 32 in the casing 29 and opens into the casing 11 in the rear of the piston 19, as represented at 33; and a pipe 34 leads from a port 35 in the valve-casing 29 and opens into the column 10, as represented at 36, the valve 30 having a port 37 adapted to be moved into registration with the pipe 26 and passage 31 or the passage 31 and pipe 34, respectively. The valve 30 is equipped with an operating crank 38 pivotally connected with the lower end of a link 39, the upper end of which link connects with a lug 40 provided on a channeled member 41. The member 41 loosely straddles a collar 42 which surrounds the column 10 and is connected with the lower ends of rods 43, which latter extend upwardly at opposite sides of the column 10 and connect with means for raising and lowering them to actuate the valve 30. The means, last referred to, in the construction illustrated, comprises bell-cranks 44 pivoted on the column 10 at opposite sides of the latter and each connected at one arm thereof with one of the rods 43, as indicated of the one at 45, and at its other arm with a link 46 which is adapted to be reciprocated back and forth for rocking the bell-cranks 44, through the medium of lever mechanism 47, as explained in the patent hereinabove referred to. The parts of the structure are so arranged that when the mechanism just described is in the position illustrated in Figs. 1 to 5, inclusive, the valve 30 will be in a position wherein its port 37 registers with the ports 28 and 32, and the pipe 26, which, in effect, constitutes a by-pass, is in communication with the interior of the casing 11 in the rear of the valve 19; and when the rods 43 are lifted by swinging the lever 47 upwardly and to the right in Fig. 1, it will cause the valve 30 to be turned from the position illustrated in Fig. 5 to the position illustrated in Fig. 6, wherein its port 37 registers with the ports 32 and 35, thus cutting off communication between the ports 28 and 32 and opening the port 32 to the port 35, whereby the interior of the casing 11 in the rear of the piston 19 is opened to the interior of the column 10.

The description of the operation of the mechanism so far as above described, is as follows: Assuming the valve 19 to be in the position illustrated in Fig. 3, in which it is held against the seat 17, in opposition to the force of the water at the port 18, by the pressure of the water in the casing 11 in the rear of the valve 19, supplied thereto through the pipe 31, the operator to cause water to flow upwardly through the column 10, swings the lever 47 upwardly and to the right in Fig. 1 with the result of turning the valve 30 to the position illustrated in Fig. 6, thus shutting off the flow of water from the pipe 26 into the casing in the rear of the piston-valve 19 and opening the passage 31, and consequently the casing 11 in the rear of the valve 19, to the pipe 34 opening into the standpipe 10. A vent being thus provided for the water in the casing 11 in the rear of the piston 19, the pressure exerted by the water at the port 18 against the face of the valve 19 forces the latter to the left in Fig. 3, thus opening the service pipe 15 to the column 10, the spring 24 serving to cushion the valve in its movement to the left in Fig. 3. To close the valve 19, the operator lowers the rods 43 by swinging the lever 47 in the direction opposite to that just described, thereby turning the valve 30 to the position illustrated in Fig. 5, which causes the pipe 26 to again communicate with the passage 31 and water from the service pipe 15 enters the casing 11 behind the valve 19, and as the area of the valve which is subjected to the water in the rear thereof is larger than the area of the valve subjected to the water in the port 18, the valve 19, upon building up of the water pressure behind it, is caused to bear against the seat 17 and thereby shut off communication between the service-pipe 15 and column 10.

One of the principle features of my invention consists in providing means whereby relatively great flow of water into the casing 11 behind the valve 19 is effected during that part of the movement of the valve 19 to closed position, wherein practically no back pressure is produced, and

decreasing the flow of water into the casing 11 behind the valve 19 for slowing up the movement of this valve while the latter is moving through that portion of its travel wherein the valve is subjected to back pressure, whereby the valve 19, during that portion of its movement wherein it is subjected to practically no back pressure, is given a rapid movement, and while moving through that portion of its path wherein it is subjected to back pressure, is given a comparatively slow movement, a description of the preferred, illustrated, means for this purpose, being as follows: Slidably mounted in a stuffing-box 48 in the cover 21 is a rod 49 having an enlarged end 50, which slides in a bore 51 in the cover 21 and is adapted to be projected across the passage 31, the latter opening into a socket 52 in alinement with the bore 51 for receiving the inner end of the rod 49, which latter is slotted, as indicated at 53, for a purpose hereinafter described. The rod 49 carries a collar 54 clamped thereto, as by a set-screw 55, and between this collar and the end of the stuffing-box 48 and surrounding the rod 49, is a coiled spring 56 which tends to slide the rod 49 to the left in Fig. 5 to the position illustrated in Fig. 6. The rod 49 is connected with the piston-rod 23 through the medium of an arm 57 which is adjustably connected with the rod 23 and is slidingly confined on the rod 49 through the medium of a pin 58 which extends into a longitudinally-extending groove 59 in the rod 49 to prevent turning of the latter.

The parts of the mechanism just described are so arranged that when the valve 19 is closed, the arm 57 in abutting against the collar 54 on the rod 49 will cause the latter to occupy the position illustrated in Fig. 5, namely that wherein the enlarged end 50 of said rod will extend partway into the socket 52, causing a small portion only of the slot 53 to be in communication with the portions of the passage 31 above and below this rod, thus affording a restricted communication between the pipe 26 and the casing 11 behind the piston 19, which is sufficient, however, to maintain the desired pressure in the rear of the valve 19 for holding the latter seated against the pressure exerted against it at the port 18. The valve 19 in moving to the left in Fig. 3 in the valve-opening operation hereinbefore described, permits the spring 56 to shift the rod 49 to the left in Fig. 5 to the position illustrated in Fig. 6 for removing all obstruction in the passage 31, the enlarged end 50 of this rod bearing against the end of the stuffing-box 48. The connection of the arm 57 with the rod 49 being a sliding one as described, the arm 57 will slide along the rod 49 to the left in Fig. 6, leaving the sleeve 54 during the latter part of the movement of the valve 19 to open condition. Thus, when the valve 19 begins its initial closing movement, the arm 57 will slide idly on the rod 49 and will not begin to operate the latter from the position illustrated in Fig. 6 until the valve 19 has closed a predetermined distance, which may be regulated by adjusting the arm 57 on the rod 23 longitudinally of the latter so that the portion 50 of the rod 49 will not begin to be projected across the passage 31 until the valve 19 has reached a point in its closing movement at which it begins to be subjected to appreciable back pressure.

It will be understood from the foregoing that as the valve 19, during the latter portion of its closing movement, approaches closer and closer to the seat 17, the passage 31 will become more and more restricted, by the projection of the portion 50 of the rod 49 across said passage, and, in the particular arrangement illustrated, by the time the valve 19 has completely seated, the portion 50 of the rod 49 will be in such position that a portion only of the slot 53 will be in registration with the portions of the passage 31 above and below said rod, and thus a very restricted opening may be provided between the pipe 26 and the interior of the casing 11 behind the valve 19.

It will be understood from the foregoing that by providing the adjustments between the rods 23 and 49, the movements of the latter may be timed with relation to the valve 19, so that the flow of water into the casing 11 behind the valve 19 will begin to be gradually decreased relative to the movement of the valve 19 in closing, as desired, to suit varying conditions.

It will be noted that by providing for the decreasing of the flow of water into the casing 11 behind the valve 19 during the valve-closing movement, and at a time when the valve begins to be subjected to back pressure, the valve 19 may be moved very rapidly throughout that portion of its movement during which it is immaterial, so far as back pressure is concerned, how fast the valve moves; and moved comparatively slowly during that period of its movement during which, if moved rapidly, undue back pressure would be exerted, and thus I am able to provide a comparatively quick-closing valve without any danger of impairment to the valve structure and joints of the pipes, from hammering action.

While I have illustrated and described a particular embodiment of my invention, I do not wish to be understood as intending to limit it to such embodiment, as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent is:

1. In a standpipe, the combination of a

valve-casing provided with a seat, a piston-valve in said casing coöperating with said seat and seating against the flow of water into said casing, a conduit for conducting water into said casing in the rear of said valve for seating the latter, valve-means in said conduit operating, when actuated, to cause the flow of water into said casing in the rear of said valve to be decreased, and having limited movement relative to said valve, and means actuated by said piston-valve in closing for actuating the valve means in said conduit during the latter part of the valve-closing movement.

2. In a standpipe, the combination of a valve-casing provided with a seat, a piston-valve in said casing coöperating with said seat and seating against the flow of water into said casing, a conduit communicating with the water supply for the standpipe in front of said valve and opening into said casing in the rear of said valve for introducing water into the latter to seat the valve, valve mechanism in said conduit for regulating the flow of water therethrough, and means actuated by said piston valve during its closing movement for operating said valve mechanism to decrease the flow of water through said conduit and into said casing, for the purpose set forth.

3. In a standpipe, the combination of a valve-casing provided with a seat, a piston valve in said casing coöperating with said seat and seating against the flow of water into said casing, a conduit communicating with the water supply for the standpipe in front of said valve and opening into said casing in the rear of said valve for introducing water into the latter to seat the valve, a slide-rod in said conduit for regulating the flow of water therethrough, and means actuated by said valve during its closing movement for operating said slide-rod to decrease the flow of water through said conduit, for the purpose set forth.

4. In a standpipe, the combination of a valve-casing provided with a seat, a piston-valve in said casing coöperating with said seat and seating against the flow of water into said casing, a conduit communicating with the water supply for the standpipe in front of said valve and opening into said casing in the rear of said valve for introducing water into the latter to seat the valve, a slide-rod in said conduit and containing an aperture for registration with the bore of said conduit when said slide-rod is moved to its innermost position and said valve is closed, and means actuated by said valve for actuating said slide-rod, for the purpose set forth.

5. In a standpipe, the combination of a valve-casing provided with a seat, a piston-valve in said casing coöperating with said seat and seating against the flow of water into said casing, a conduit adapted to be connected with a water supply and opening into said casing in the rear of said valve, a valve in said conduit for regulating the flow of water therethrough into said casing, means tending to move said last-named valve to a position in which the opening through said conduit will be unrestricted, and means operated by said piston valve against the action of said first-named means for moving said last-named valve to passage-restricting position.

MOSES M. MOORE.

In presence of—
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O. C. AVISUS.