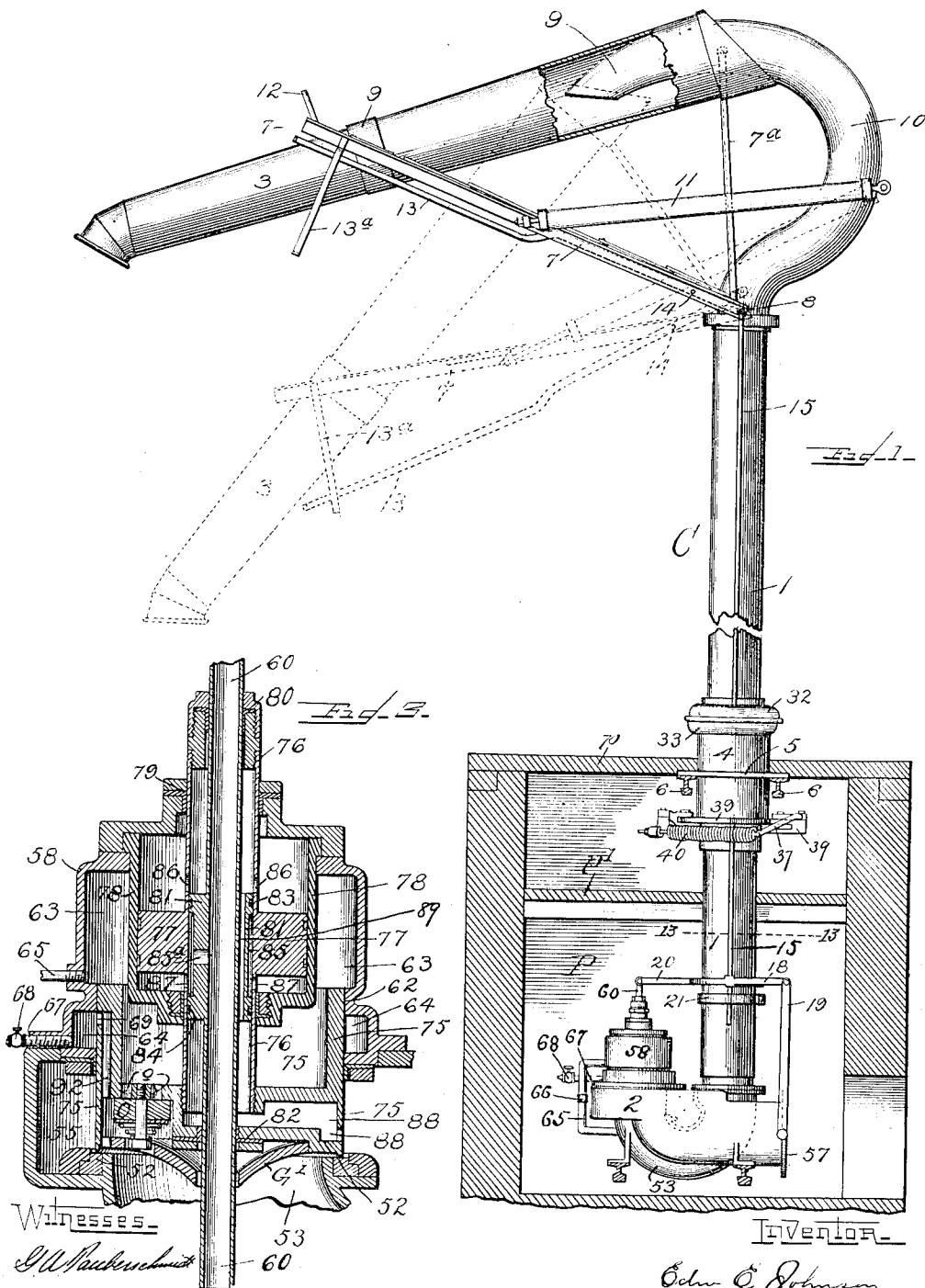


No. 818,968.

PATENTED APR. 24, 1906.

E. E. JOHNSON.
RAILWAY WATER COLUMN.
APPLICATION FILED FEB. 29, 1904.

4 SHEETS—SHEET 1.



Witnesses—

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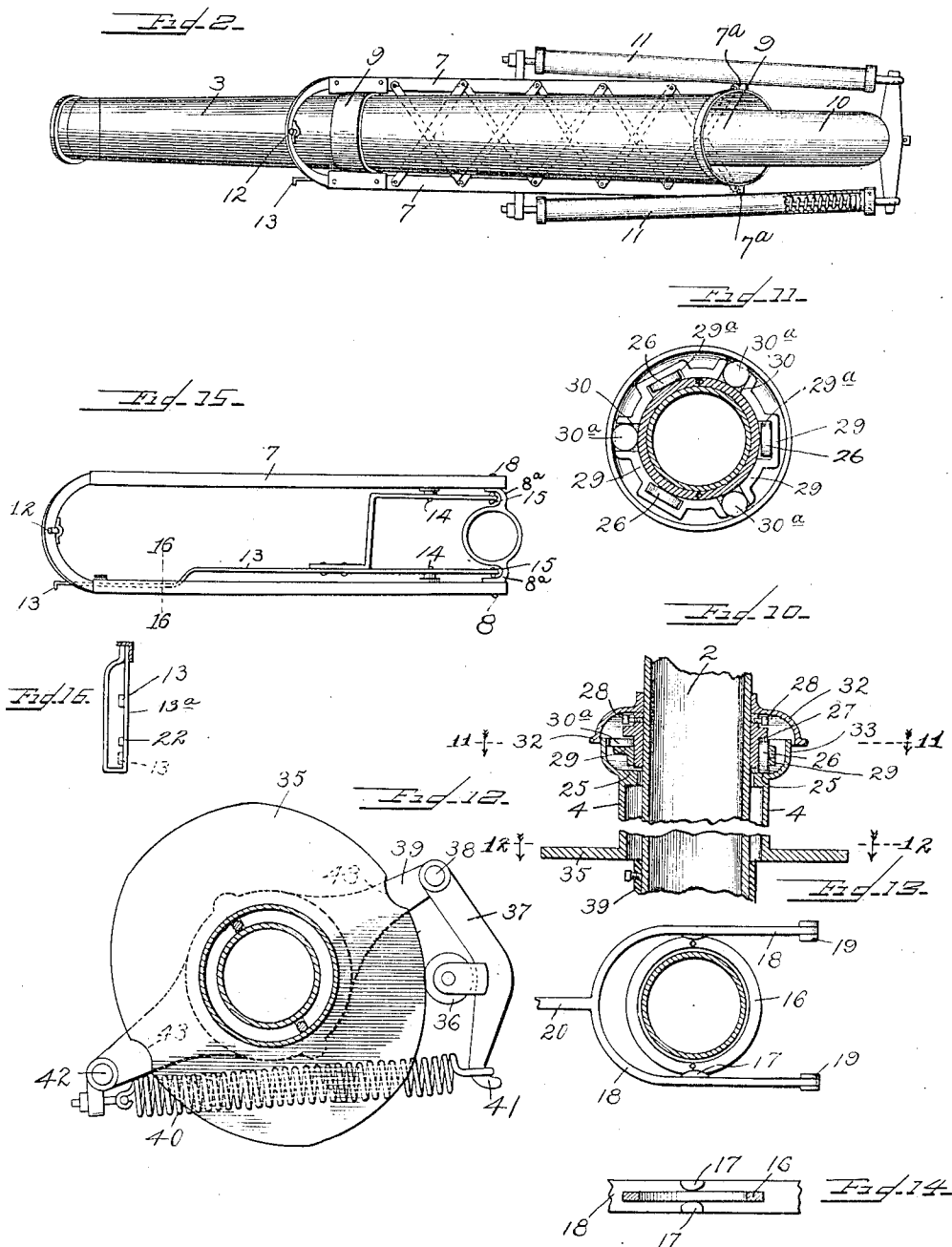
E. E. Johnson
by Henry B. Carter

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4 SHEETS—SHEET 2.



Witnesses.

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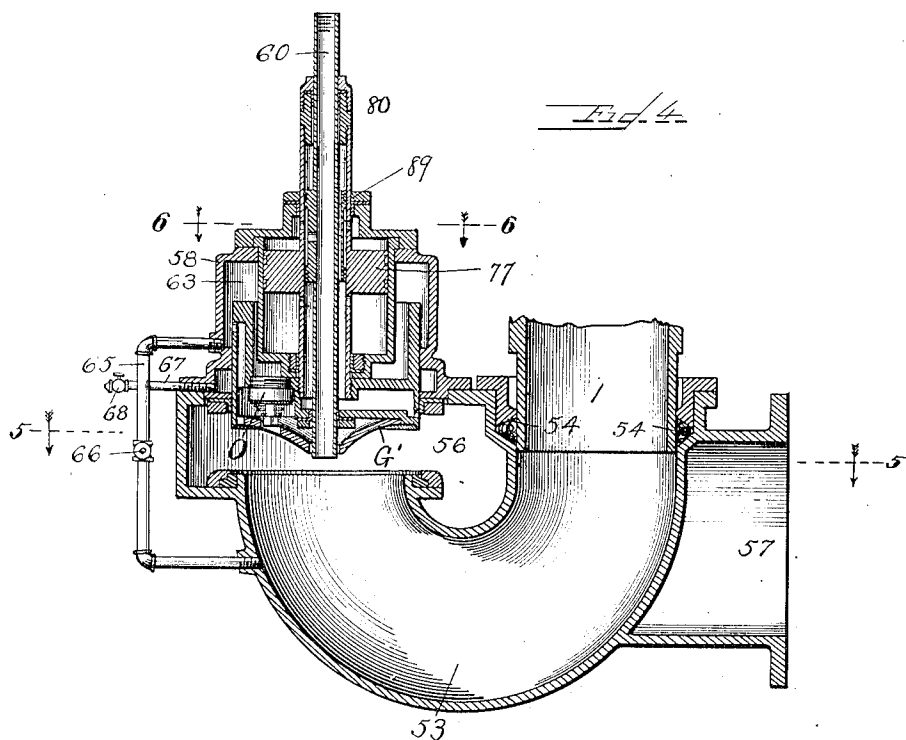
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No. 818,968.

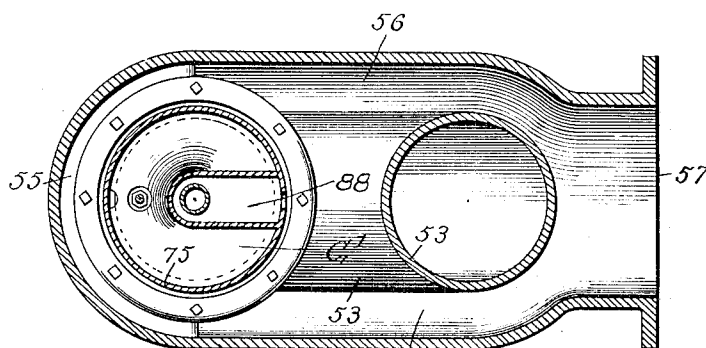
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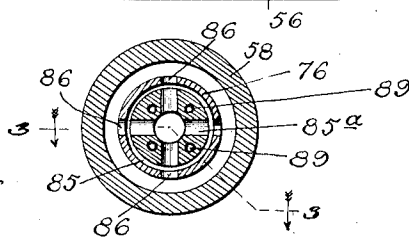
4 SHEETS—SHEET 3.



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Witnesses.

J. A. Paulerschmitt
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Inventor _____

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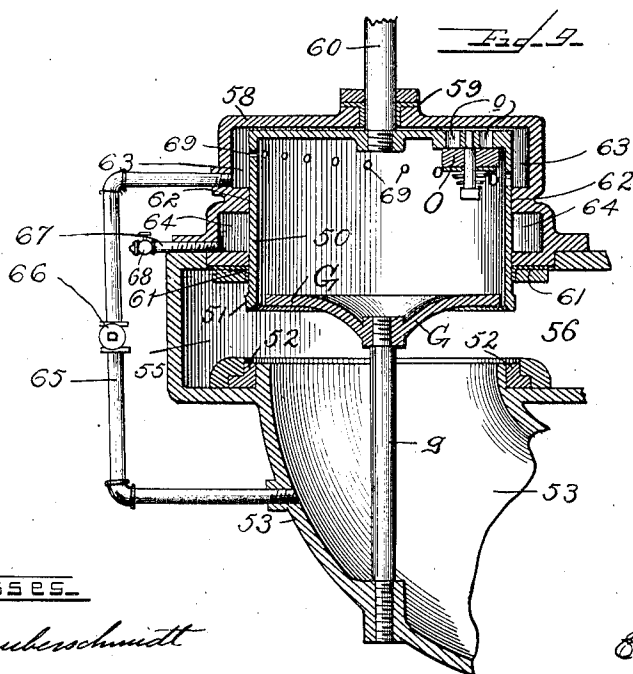
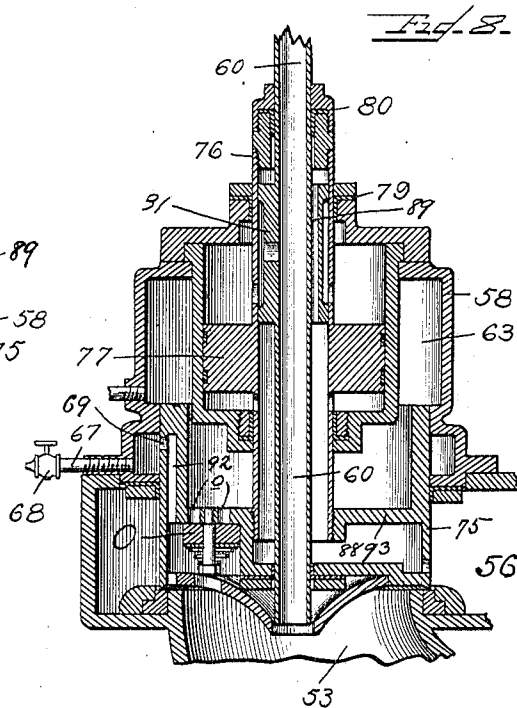
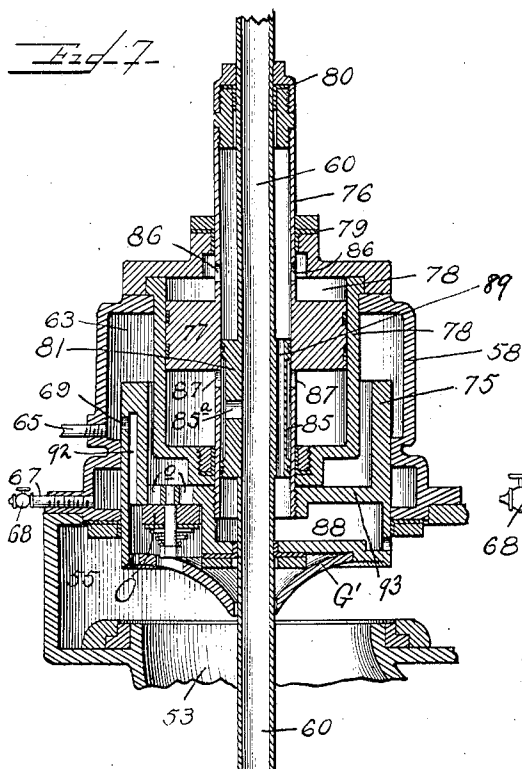
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4 SHEETS—SHEET 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWARD E. JOHNSON, OF ST. PAUL, MINNESOTA.

RAILWAY WATER-COLUMN.

No. 818,968.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed February 29, 1904. Serial No. 195,923.

To all whom it may concern:

Be it known that I, EDWARD E. JOHNSON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Railway Water-Columns, of which the following is a specification.

This invention relates to improvements in railway water-columns or devices of that class which are more particularly intended for supplying water to locomotive-tenders and which comprise a stand-pipe located alongside of a railway-track or between two such tracks, and a laterally-extended spout on the stand-pipe to be turned either at right angles to the tracks to supply water to locomotive-tenders or parallel to the track to avoid the passing trains when not in use and also adapted to be swung vertically throughout a considerable range of movement for the purpose of bringing the mouth of the spout into immediate proximity to the tank-openings of tenders of various heights and of avoiding the coal which is piled on the tenders above the water-tank.

The present improvements have relation particularly to the most desirable type of this class of apparatus—namely, the type in which the spout is pivoted to the stand-pipe at a point below the end thereof and telescopes at its inner end loosely over the downward-turned end or nozzle portion of the stand-pipe.

One of the defects of railway water-columns of this kind, as heretofore constructed, has been that the end of the spout in moving downwardly swings to one side of a vertical line of descent to such an extent as to carry it laterally beyond the tank-opening or water-hole of the tender, either at the upper or lower or at both limits of its movement; and a principal object of the present invention is to avoid this difficulty by mounting the spout in such manner that the arc of movement described by the end of the spout, even when the range of movement provided is unusually great—six feet, or more—will so closely approach a direct vertical line as to keep the spout at all times in proximity to the tank-opening whatever the height of the tender.

A further object of the invention is to provide water-courses free from obstruction and abrupt changes of direction and a spout draining quickly away from the stand-pipe and not liable to be inoperative from freez-

ing; and other objects are to provide an improved mounting for the water-column tending to automatically return the column to its position of parallelism with the tracks when not in use; also, to provide an improved valve mechanism for controlling the flow of water through the column, and to provide various other features of improvement in the column itself.

To these ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, when considered in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a railway water-column constructed in accordance with my invention, the foundation and pit for the base of the column being shown in section. Fig. 2 is a top plan view of the column illustrated in Fig. 1. Fig. 3 is a vertical section of the working parts of the valve shown in Fig. 1, these parts being shown in the position they occupy when the valve is closed. Fig. 4 is a sectional view of the same valve, including its connections with the inlet-pipe and water-column and showing the working parts in the position which they occupy when the valve is open. Fig. 5 is a top plan section taken on line 5 5 of Fig. 4. Fig. 6 is a top plan section taken on line 6 6 of Fig. 4. Figs. 7 and 8 are vertical sections of the valve mechanism, showing the parts in different working positions from those occupied in Figs. 3 and 4. Fig. 9 is a vertical section of a simplified form of the valve mechanism designed to be entirely operated by hand. Fig. 10 is a vertical sectional detail taken through the standard which supports the water-column. Fig. 11 is a top plan section thereof, taken on line 11 11 of Fig. 10. Fig. 12 is a top plan section thereof, taken on line 12 12 of Fig. 10. Fig. 13 is a sectional detail taken on line 13 13 of Fig. 1 and showing the valve-operating connections at the lower end of the stand-pipe. Fig. 14 is a fragmentary detail of a portion of these connections. Fig. 15 is a top plan view of the latticed framework, showing the manner in which the operating-lever is mounted therein. Fig. 16 is a sectional detail taken on line 16 16 of Fig. 15.

As shown in said drawings, the water-column C comprises a vertical stand-pipe 1, to the lower end of which water is admitted through a suitable valve 2 and from the upper end of which water can be discharged through a spout 3. The lower end of the

stand-pipe and its valve 2 are shown as inclosed within a pit P, from which the stand-pipe emerges through a tubular standard 4, within which the stand-pipe 1 is free to swivel upon a vertical axis. For security and permanence of construction the standard 4 is herein shown as cast with a flange 5, which rests upon I-beams 6, that extend across the pit and are buried at their ends in its masonry walls, the standard and column being thus supported independently of the plank top *p* of the pit and not affected by any shrinking or warping of the plank. A frost-floor *p'* is shown as extending across the pit some distance below its top *p*, but above the valve 2 to prevent the latter from freezing up.

As hereinbefore stated, a principal feature of the present construction consists in the peculiar manner of maintaining the spout 3 on the stand-pipe 1 in such way as to permit of the vertical swinging of the spout throughout the desirable arc of movement with but little lateral deflection of its outlet. To this end the spout is shown as carried by a latticed framework 7, which is pivoted at its inner end to oppositely-projecting lugs 8^a to the stand-pipe at a point 8 near the top of the latter, and approximately opposite the middle point of the arc of the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height. The framework carries at its outer end an annular collar or band 9, that encircles the spout and rigidly supports it in the framework. The spout itself is an entirely separate piece from the stand-pipe and, except for the framework 7 and for a brace 7^a between the inner end of the spout and the inner end of the framework, has no permanent connection therewith, the upper end of the spout simply serving to loosely inclose a laterally-extending nozzle 9, in which the upper end of the stand-pipe terminates. This nozzle is herein shown as made in the form of a gooseneck 10, the curved middle portion of which extends a considerable distance back of the column on the opposite side from the spout 3 and tends to balance the weight of the spout and to thus relieve the stand-pipe from sidewise strains, while permitting a sufficient movement of the spout over the mouth of the gooseneck to permit its inlet end to extend to a point back of a vertical line drawn through the pivot 8 when the spout is in its uppermost position and at the same time insure such a position of the spout that it will drain freely away from the stand-pipe.

Suitable means, such as coiled springs inclosed within protecting-tubes 11, are shown as stretched between the frame 7 and the back of the gooseneck 10 to normally maintain the spout in its raised position, these springs being at the same time so applied

that leverage of the spout against them will increase as the spout is depressed, so that when the spout is in its lowermost position its weight will overcome the tension of the springs and prevent their lifting the spout again except by the assistance of the operator.

The latticed framework being stiffened against a horizontal pull and so attached to the stand-pipe as to swing horizontally with it serves the novel purpose of a lever to rotate the water-column, as well as to support the swinging spout. An upwardly-projecting pin 12 is provided on the extreme end of the frame 7 above the spout to serve as a handle by which the spout can be conveniently swung around horizontally with the stand-pipe, which for this purpose is made to swivel within the standard 4, as before stated.

The flow of water through the stand-pipe is controlled by an operating-lever 13, which extends along the inner under side of the framework 7 to within convenient reach of the operator as he stands upon the tender. This lever is pivoted to the frame 7 at 14 and at its inner extremities is pivotally connected with the upper ends of vertical rods 15, the lugs 8^a being laterally curved to permit this connection with rods 15 to be made in vertical alinement with the pivots 8. The rods 15 extend centrally down each side of the stand-pipe to a point on the latter below the frost-floor of the pit. Here the lower ends of the rods are secured to a ring 16, which loosely encircles the stand-pipe and passes between lugs 17 on a forked lever 18, which latter is secured at its forked end to the valve-casing by links 19 and is connected at its other end 20 to the upper end of the stem of the valve 2. The rods 15 are prevented from twisting on the stand-pipe by sliding loosely through guide-holes in a ring 21, that is clamped about the pipe just below the ring 16, Fig. 1. With this construction the swinging up and down of the spout 3 may obviously take place without affecting the valve, while the valve-operating lever may itself be moved upon the frame in any position of the spout to admit water to the stand-pipe or shut it off therefrom, as desired. The outer end of the lever 13 is shown as projecting through and guided by a loop 13^a, which is located on the frame 7 at one side of the spout and is provided with a stop-lug 22, beneath which the end of the lever may be thrust to hold the valve open while the column is delivering water.

The weight of the stand-pipe and spout is herein shown as supported upon an inner annular shoulder 25 of the standard 4 by a number of antifricition-rollers 26, that are inserted between the shoulder 25 and an opposing flange or annular ring 27, which latter encircles the stand-pipe and is rigidly clamped thereto by set-screws 28, Fig. 10. The roll-

ers 26 are shown as loosely mounted within a cage 29, that is recessed at 29^a to receive them and is also recessed at 30 to receive horizontal rolls or disks 30^a, that are inserted between the ring 27 and a flaring or bell-like mouth 33 to the standard 4. This double form of bearing serves to support the stand-pipe with but little friction, notwithstanding the fact that the spout projects laterally to a considerable distance from the pipe and is not wholly counterbalanced by the gooseneck at the upper end of the spout. The bearing when complete is enclosed by a flaring cap 32, Fig. 10, which is lowered over the ring 29 and is large enough to embrace the upper end 33 of the standard, thus largely protecting the bearing from dirt and moisture.

For the purpose of causing a more or less automatic action of the stand-pipe tending to swing the spout back into a position parallel with the tracks after the filling of the locomotive-tank has been completed a cam device is provided, as more particularly shown in Figs. 1 and 12. This device includes a stationary oval cam 35 on the lower end of the standard 4, within the pit and above the frost-floor *p'*, and a cam-roller 36, adapted to travel on the outer periphery of said cam. The roller 36 is herein shown as mounted between the ends of a lever 37, of which one end is pivoted at 38 to a yoke 39, that is clamped rigidly around the stand-pipe. A heavy spring 40 is stretched between the other end 41 of the lever 37 and the opposite end 42 of the yoke 39, and its action serves to force the roller 36 against the periphery of the cam 35 with considerable force. This tends to cause the roller 36 to ride down the cam toward least diameter of the latter and reacts, through the lever 37 and yoke 39, to swing the stand-pipe around parallel to the tracks.

At its points of greatest diameter the cam 35 is provided with concentric portions, so that the stand-pipe will have no tendency to rotate while supplying water to the engine, even though the latter may come to a stop when its water-hole is not exactly opposite the stand-pipe. At its points of least diameter, on the other hand, the cam is provided with recesses 43, which serve to receive the roller 36 and tend to hold the stand-pipe against movement when its spout is swung around between the tracks and parallel to the latter. In the position of the parts shown in Fig. 12 the spout may be regarded as occupying a position of about forty-five degrees from its two extreme positions, the roller 36 being ready at this movement to travel down into the adjacent hollow 43 as the spout swings back parallel with the tracks, or to climb the cam in the opposite direction as the spout assumes a position at right angles to the track, as shown in Fig. 1.

The valve which I have designed for my

improved water-column is a quick-opening and slow-closing valve, so controlled as to prevent any undue shock or water-hammer, and it is furthermore so constructed as to permit the water remaining in the column after the valve is closed to leak away and prevent freezing in the stand-pipe. Such a valve may be operated either by hand or by the hydraulic pressure of the water in the main. In its simpler hand-operated form, such as is shown in Fig. 9, it comprises a cylindrical main valve 50, the lower annular edge 51 of which is adapted for contact with an annular valve-seat 52. This valve-seat is formed at the outer upper end of a U-shaped discharge pipe or section 53 of the valve, the other end of which is formed with a stuffing-box 54, that receives the lower end of the stand-pipe 1.

Surrounding the valve-seat 52 and inclosing the lower end of the main valve is an inlet-chamber 55, having lateral extensions 56, which are continued along and around the U-shaped pipe 53 to a flanged inlet end 57, where connection is made with the main that supplies water to the valve and stand-pipe. In closing the upper part of the main valve 50 is a housing 58, having at the center of its top a stuffing-box 59, through which the operating-stem 60 of the valve is extended to connect with the lever 18. The main valve 50 passes from this housing down into the chamber 55, through a close-fitting opening which will ordinarily be made water-tight by a hydraulic packing 61. Furthermore, the housing is provided at about midway of its height with an inwardly-projecting annular flange 62, which fits closely around the main valve and forms an approximately water-tight connection therewith, although the absolute prevention of leakage at this point is unnecessary and no special packing need be provided. This flange 62 divides the interior of the housing into an upper or cushioning chamber 63 and a lower leakage-chamber 64. Of these the former or cushioning-chamber 63 is connected with the discharge-pipe 53, leading to the stand-pipe by a by-pass 65, the flow through which is controlled by a valve 66. The lower or leakage chamber 64, on the other hand, is provided with an outlet-pipe 67, which may be conveniently controlled by a petcock 68.

In operation the stem 60 of the valve is drawn up when the hand-lever 13 is actuated to lift the rods 15 and lever 18. This drawing up of the stem 60 raises the main valve from its seat and admits water from the inlet-channels 55 and 56 to the U-shaped discharge-pipe 53, and thence through the stand-pipe and spout to the tank of the engine. To permit this opening movement to be very rapid, the water in the upper or cushioning chamber of the housing 58 is allowed to escape freely, while the main valve 50 is

moving up, principally through an outlet-opening *o*, provided in the top of the main valve 50 and normally closed by a spring-pressed valve-plate *O*, (conveniently an ordinary rubber pump-valve.)

The closing of the valve is accomplished by swinging the main lever 13 back to its normal position on the latticed framework 7 and by thus depressing the rods 15 and lever 18 and forcing down the valve-stem 60. During this movement the pump-valve *O* is closed and largely prevents the entrance of water to the cushioning-space above the piston through the opening *o*, and there is a consequent tendency for a vacuum to form in this cushioning-chamber and for the descent of the valve to be thereby retarded. This retardation, however, is modified, as herein shown, by the by-pass 65 and by a series of apertures 69, provided in the cylindric wall of the main valve 50 and through which a limited flow of water may take place during the beginning and greater portion of the valve movement. These apertures are arranged in a row somewhat inclined from the horizontal and are also shown in this instance as made of increasing diameter from the uppermost to the lowermost hole of the series. When the valve is in its uppermost position, the entire series of apertures 69 are located above the flange 62, so that in the initial movement of the valve water can enter the cushioning-chamber through all of them. As the valve moves down, however, the holes 69 are closed off one by one by the flange 62, and as a result there is an increasing tendency for a vacuum to form above the valve and within the cushioning-chamber, with a corresponding increase in retardation until all of the holes 69 are closed off and the by-pass 65 affords the only channel for admitting water behind the main valve. The final closing movement of the valve is then completely controlled by the flow of water through the by-pass, and this may be regulated by adjusting the valve 66. Said by-pass and valve therefore afford an exterior and readily-accessible means of adjusting the valve movement as desired or as may be necessary to prevent undue shock or water-hammer. After the valve has thus closed the water remaining within the stand-pipe gradually leaks away through the outlet-pipe 67 and petcock 68, which latter always will be left at least partially open, this leakage continuing through the apertures 69 and leakage-chamber 64 until the level of the water within the stand-pipe is lowered to the level of the outlet 67, which is a sufficient distance below the frost-floor to obviate all danger of the stand-pipe's freezing up during its periods of operation.

In the more highly developed form of valve (shown in detail in Figs. 3 to 8) the hydraulic pressure of the water from the main is relied upon to operate the valve; but the movement

of the valve is controlled in much the same manner as before. This construction also employs a cylindric main valve 75, the annular lower edge of which is adapted for contact with an annular valve-seat 52, formed and located, as before described, in connection with the hand-operated valve. This main valve 75 is connected by a tubular valve-rod 76 with an actuating-piston 77, which is mounted to reciprocate vertically within a pressure-cylinder 78, conveniently located in the upper part of the valve-housing. At its upper end the tubular piston-rod 76 passes out of the top of the housing through a stuffing-box or hydraulic packing 79 and is itself provided with a stuffing-box or hydraulic packing 80, through which the operating-valve 60 is free to reciprocate. A piston-valve 81 fits within the tubular piston-rod 76 and is secured therein to the valve-stem 60, which latter is also made tubular and closed at its upper end, its lower end being left open and projecting down through a hydraulic packing 82 into the discharge-section 53 of the valve.

The valve 81 is essentially a *D*-valve—*i. e.*, it is provided with upper and lower bearing surfaces or rings 83 and 84, between which is an annular exhaust-passage 85, that communicates with the interior of the valve-stem 60 through one or more ports 85^a. Opening through the tubular piston-rod 76 at points above and below the piston 77 are ports 86 and 87, placed so close together that only one set of said ports at a time can be uncovered by the valve-piston 81. These ports admit water to the cylinder 78 either above or below the piston 77, as may be desired, and according to the position occupied by the valve-stem 60. This water enters from the main through a radial channel 88 in the main valve 75 and passes thence up through the tubular piston-rod 76 and (in order to reach the upper ports 86) through vertical channels 89 in the valve 81.

The position occupied by the parts when the main valve is closed and the apparatus is at rest is indicated in Fig. 3.

In Fig. 8 the valve-stem 60 is shown as drawn up so as to admit water to the lower end of the cylinder 78 through the ports 87, the lifting movement of the main valve 75 being now just about to commence.

In Fig. 4 the upward movement of the main valve has just been completed, the valve-stem 60 and inner valve-piston 81 being still raised.

In Fig. 7 the valve-stem 60 and piston 81 are shown as having been depressed with the intention of closing the main valve, the water being just about to enter the upper end of the chamber 78 to force down the piston 77 and close the valve.

The cushioning action of the valve in this case is much the same as in the case of the

manually-operated valve shown in Fig. 9. The interior of the housing 58 around the main valve 75 is divided by a similar inwardly-projecting flange 62 into an upper cushioning-chamber 63 and a lower leakage-chamber 64, the former being connected with the discharge-pipe 56 of the valve-casing by a by-pass 65, controlled by a valve 66, and the cylindric wall of the valve is provided with a similar inclined row of apertures 69 of varying sizes which open into the cushioning chamber 63 above the valve 62, or into the position occupied by the valve. At their inner ends these apertures 69 in this instance open into a segmental port 92, which is cored in the cylindric wall of the main valve 75 and leads down and out beneath the transverse wall 93 thereof, said apertures and port thus constituting channels of communication between the opposite sides of the main valve. A large outlet through the main valve is also herein shown as provided in an opening *o*, located in the transverse wall 93 of the valve, and controlled by a spring-pressed valve-plate *O*, (also conveniently an ordinary pump-valve,) which permits water to flow out of the cushioning-chamber through the opening *o*, but prevents it from entering the chamber at this point. With this construction when the valve-stem 60 and piston-valve 81 are drawn up water is admitted from the main to the lower end of the cylinder 78 through the radial channel 88, tubular piston-rod 76, and ports 87, Fig. 8. This forces up the piston 77 and causes the main valve to be lifted with the piston, by reason of their being rigidly connected by the tubular piston-rod 76. During this opening movement of the main valve, the water in the cushioning-chamber 63 readily escapes, principally through the outlet-opening *o*, and the valve consequently opens very quickly, and finally assumes the position shown in Fig. 4.

To reverse the operation, the valve-stem 60 and piston 81 are depressed and water is admitted to the upper end of the cylinder 78 through the radial channel 88, tubular piston-rod 76, vertical channels 89, and ports 86, and the piston 77 is forced down, carrying with it the main valve 75. The initial closing movement takes place rapidly and freely, owing to the large area of communication with the cushioning-chamber afforded by the several holes 69, by which water from beneath the valve 75 is permitted to rush into said chamber and relieve the tendency for a vacuum to form behind the valve. This area, however, gradually decreases as the holes 69 are cut off by the flange 62 until just before the valve comes in contact with its seat. The only remaining channel through which water may enter the space behind the valve 75 is the by-pass 65. So that by adjusting the capacity of this by-pass by means of the valve 66 the final closing movement of the main valve 75 may

be controlled to occur as gently as possible and in the same manner as in the case of the hand-operated valve.

In both forms of this improved valve mechanism a curved guide-plate will desirably be provided to direct the water smoothly into the discharge-pipe 53 when the valve is opened, and thus avoid eddies and cross-currents, which might otherwise interfere with the efficient working of the apparatus. In the manually-operated valve shown in Fig. 9 this guide-plate (designated *G*) is a stationary plate which nearly fills the lower end of the piston-valve 50 and is supported therein at a considerable distance above the valve-seat 52 by a standard *g*, the lower end of which is firmly secured by a screw-joint or otherwise in the casting of the discharge-pipe 53 beneath.

In the form of valve shown in Figs. 3 to 8, however, such a guide-plate *G'* is permanently secured to the lower side of the valve 75 and moves with it. A central aperture is also provided in this plate *G'* for the hollow valve-stem 60 to reciprocate freely through and to thereby discharge the water exhausted from the cylinder 78 into the discharge-pipe 53 in either the closing or opening movement of the main valve and its actuating-piston.

I claim as my invention—

1. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a spout swinging loosely over the nozzle and draining away from the stand-pipe, and a support for the spout pivoted to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and below the uppermost level of the outlet of the spout, substantially as described.

2. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle and draining away from the stand-pipe, a support for the spout pivoted to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout describes in descending and ascending forward of the inlet end of the spout in its uppermost position, substantially as described.

3. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, a support for the spout pivoted to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and below the level of the outlet end and forward of the inlet end of the spout when in its uppermost position, substantially as described.

4. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a

spout swinging loosely over the nozzle, and draining away from the stand-pipe, and a support for the spout pivoted to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and below the outlet and forward of the inlet end of the spout in its uppermost position, substantially as described.

5. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, and a support for the spout pivoted to the stand-pipe approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and engaging the spout about midway of the length of the latter, substantially as described.

6. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle and draining away from the stand-pipe, and a support for the spout pivoted at its inner end to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and below the uppermost level of the mouth of the spout and secured at its outer end to the spout about midway of the length of the latter, substantially as described.

7. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a spout swinging loosely over the nozzle and draining away from the stand-pipe, and a support for the spout pivoted at its inner end to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and secured at its outer end to the spout about midway of its length, substantially as described.

8. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout draining away from the stand-pipe in all its positions having a support pivoted to the stand-pipe at a point below the outlet end of the spout and provided with means whereby the stand-pipe may be swung about horizontally, said pivot being located approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height, substantially as described.

9. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, and means for pivotally supporting the spout upon the stand-pipe, comprising a sup-

porting-frame pivoted at its inner end to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and secured at its outer end to the spout about midway of the length of the latter, and a brace extending between the inner end of the supporting-frame and the inlet end of the spout, substantially as described.

10. A water-column comprising a stand-pipe terminating in a nozzle, a spout swinging loosely over the nozzle, means for pivotally supporting the spout upon the stand-pipe comprising a supporting-frame pivoted at its inner end to the stand-pipe at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height and secured at its outer end at about midway of the spout, and a brace between the inner end of the supporting-frame and the inlet end of the spout, and means for rotating the stand-pipe, substantially as described.

11. A water-column, comprising a stand-pipe, terminating at its upper end in a reversely-curved gooseneck, as shown, a swinging spout fitting loosely over the nozzle of the gooseneck, and a support for the spout pivoted to the stand-pipe, substantially as described.

12. A water-column comprising a stand-pipe terminating at its upper end in a reversely-curved gooseneck, as shown, a spout swinging loosely over the nozzle of the gooseneck and a support for the spout pivoted to the stand-pipe at the base of the gooseneck, the curvature of the gooseneck permitting the inlet end of the spout to swing backward past the vertical axis of its supporting-pivot, substantially as described.

13. A water-column, comprising a stand-pipe terminating in a nozzle, a spout swinging loosely over the nozzle, a support for the spout pivoted at its inner end to the stand-pipe and secured at its outer end to the spout about midway the length of the same and counterbalancing devices applied between the stand-pipe and spout-support, these devices being connected to the stand-pipe and the support at points above the pivot substantially as described.

14. A water-column comprising a stand-pipe terminating at its upper end in a nozzle, a spout swinging loosely over the nozzle, a support for the spout pivoted at its inner end to the stand-pipe and secured at its outer end to the spout about midway the length of the same and counterbalancing springs applied between the stand-pipe and spout-support, these devices being connected to the stand-pipe and the support at points above the pivot substantially as described.

15. A water-column, comprising a stand-

pipe terminating at its upper end in a gooseneck, a swinging spout fitting loosely over the nozzle of the gooseneck, a support for the spout pivoted to the stand-pipe at the base of the gooseneck, and counterbalancing devices applied between the support and gooseneck, substantially as described.

16. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, a support for the spout pivoted to the stand-pipe and engaging the spout about midway of the length of the latter, a valve-operating lever pivoted to the spout-support, a valve at the base of the stand-pipe, and connections between said valve and valve-operating lever, substantially as described.

17. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, a support for the spout pivoted to the stand-pipe and engaging the spout about midway of the length of the latter, a valve-operating lever pivoted to the spout-support and extending longitudinally of the latter, a guide for the lever depending from the outer end of said support, a shoulder of said guide beneath which the lever may be caught, a valve at the base of the column, and connections between said valve and lever, substantially as described.

18. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a pair of oppositely-extending curved lugs carried by the standard, a spout having its inlet end telescoping over the nozzle said spout inclining downwardly away from the stand-pipe, a supporting-frame attached to the spout and pivoted at its inner end to said lugs; a valve at the foot of the stand-pipe, valve-operating rods at opposite sides of the stand-pipe and working in line with the pivots of the spout-carrying frame, and means on this frame for reciprocating said rods, for the purposes set forth.

19. A water-column, comprising a stand-pipe terminating at its upper end in a nozzle, a swinging spout fitting loosely over the nozzle, a support for the spout pivoted to the stand-pipe, a valve-operating lever pivoted to said spout-support, a valve at the foot of the stand-pipe, and exterior connections extending down the stand-pipe between the lever and valve, substantially as described.

20. A water-column comprising a stand-pipe terminating in a nozzle, a spout swinging loosely over the nozzle, a spout-support pivoted to the stand-pipe and rigidly secured to the spout, a valve-operating lever pivoted to said spout-support, exterior valve connections between the lever and the valve hinged to said lever so that in the normally closed position of the valve the pivots and hinges lie in a common axis, and a valve at the foot of the stand-pipe, substantially as described.

21. In a water-column, of the character described, the combination with a stand-pipe having an extended discharge-nozzle secured at the head thereof, a discharge-pipe whose inner end telescopes with said discharge-nozzle so as to be moved freely thereon, and which inclines downwardly away from said nozzle in all its positions, a connection uniting said discharge-pipe with the stand-pipe of the water-column and pivoted to said stand-pipe in a horizontal plane below the horizontal plane of the outlet of the discharge-pipe when in its fully-elevated position at a point approximately opposite the middle point of the arc the delivery end of the spout is usually required to describe in being adjusted to tanks of the average height, and means for counterbalancing the discharge-pipe, whereby the range of movement of said outlet is in a substantially vertical plane.

22. A water-column, comprising a stand-pipe terminating at its outer end in a reversely-curved gooseneck-nozzle, a swinging spout fitting loosely at its upper inlet end over said nozzle, and inclining downwardly away from the nozzle in all its positions, a support for the spout pivoted to the stand-pipe at a point below the discharge end of the spout, said reversely-curved gooseneck permitting the inlet end of the spout to swing backward past the vertical plane of the supporting-pivot, substantially as set forth.

23. A water-column, comprising a stand-pipe swiveled in a vertical standard, and a bearing between the stand-pipe and standard comprising a downwardly and an outwardly facing annular bearing-surface on the stand-pipe, an upwardly and an inwardly facing bearing-surface on the standard, a set of horizontal antifriction-rollers inserted between said inwardly and outwardly facing surfaces, a set of vertical rollers between the downwardly and upwardly facing surfaces and an annular cage inclosing the several rollers and holding them between the shoulders and bearing-surfaces, substantially as described.

24. A valve mechanism comprising a hollow cylindric main valve whose interior is in communication with the inlet when the valve is open, a housing into which the valve retreats, a leakage-chamber within said housing, and an opening in the side wall of the main valve through which communication is established between the leakage-chamber and the discharge-pipe leading from the valve when the valve is closed, substantially as described.

25. A valve mechanism comprising a hollow cylindric main valve whose interior is in communication with the inlet when the valve is open, a housing into which the valve retreats, a packing through which the valve works, a leakage-chamber within said housing beyond the packing, and an inclined row of openings in the side wall of the main valve

communicating with the discharge-pipe leading from the valve and arranged to be brought into communication with the leakage-chamber in succession in the closing movement of the valve, substantially as described.

26. A valve mechanism comprising a hollow cylindric main valve whose interior is in communication with the inlet when the valve is open, a housing into which the valve retreats, a packing through which the valve works, a leakage-chamber within said housing beyond the packing, and a series of apertures of graded sizes in the side wall of the main valve communicating with the discharge-pipe leading from the valve and arranged to be brought into communication with the leakage-chamber in succession in the closing movement of the valve, substantially as described.

27. A valve mechanism comprising a cylindric main valve, a housing into which the valve retreats and provided with a packing through which the valve works, and a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, substantially as described.

28. A valve mechanism comprising a cylindric main valve, a housing into which the valve retreats and provided with a packing through which the valve works, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, and means permitting a suitable flow of water into and out of these chambers at appropriate times in the operation of the valve movement, substantially as described.

29. A valve mechanism comprising a cylindric main valve, a housing into which the valve retreats and provided with a packing through which the valve works, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, and an opening through the main valve communicating alternately with the cushioning and leakage chambers as the valve is opened and closed, substantially as described.

30. A valve mechanism comprising a cylindric main valve, a housing into which the valve retreats and provided with a packing through which the valve works, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, and an inclined row of openings in the main valve arranged to be gradually brought into communication with the cushioning-chamber and leakage-chamber in alternation as the valve is opened and closed, substantially as described.

31. A valve mechanism comprising a cylindric main valve, a housing into which the valve retreats and provided with a packing through which the valve works, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, and a series of openings of graded sizes

in the main valve arranged to be gradually brought into communication with the cushioning-chamber and leakage-chamber in alternation as the valve is opened and closed, substantially as described.

32. A valve mechanism comprising a hollow cylindric main valve, a housing into which the valve retreats, a packing for the valve separating the water-inlet from the interior of said housing, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, an opening through the main valve communicating alternately with the cushioning and leakage chambers as the valve is opened and closed, and a by-pass opening out of the cushioning-chamber and into the discharge, substantially as described.

33. A valve mechanism comprising a hollow cylindric main valve, a housing into which the valve retreats, a packing for the valve separating the water-inlet from the interior of said housing, a flange in the housing beyond the packing dividing it into separate cushioning and leakage chambers, an opening through the main valve communicating alternately with the cushioning and leakage chambers as the valve is opened and closed, and an external valved by-pass opening out of the cushioning-chamber and into the discharge to regulate the movement of the main valve, substantially as described.

34. A valve mechanism comprising a cylindric main valve, an annular seat for the valve, a housing into which the valve retreats, a hydraulic cylinder within the housing, and a piston within said cylinder connected with the main valve to open and close the latter, substantially as described.

35. In combination with a casing having an annular valve-seat surrounding the outlet, a housing connected to said casing, a cylindric main valve adapted to seat on said valve-seat and adapted to retreat into said housing when it is open, a hydraulic cylinder extending into said housing, a piston working in said hydraulic cylinder and connected by a hollow piston-rod to said main valve, said hollow piston-rod being in communication at its inner end with the inlet of the casing, and a controlling-valve within the hollow piston-rod, substantially as set forth.

36. A valve mechanism comprising a cylindric main valve, a hydraulic cylinder, a piston within the hydraulic cylinder, a hollow piston-rod communicating with the inlet-pipe and hydraulic cylinder and serving to connect said piston and main valve, a hydraulic valve within the piston-rod for controlling the admission of water to and its escape from said cylinder, and a hollow valve-stem secured to the controlling-valve and affording an exhaust-passage from the hydraulic cylinder to the outlet-pipe, substantially as described.

37. A valve mechanism comprising an inlet-chamber and an outlet-chamber, a ring valve-seat surrounded by the inlet-chamber, a hollow cylindric main valve adapted to seat on said ring and having its interior open to the inlet-chamber when the valve is open, a housing into which the valve retreats separated from the inlet-chamber by a packing, an annular partition for dividing the housing into a leakage-chamber, and a cushioning-chamber, a by-pass connecting the cushioning-chamber with the discharge-chamber, means for operating the valve, said valve being provided with openings in its side wall, adapted to alternately communicate with the cushion-chamber and the leakage-chamber, and a normally closed valve in its head, said valve opening inwardly with respect to the main valve.

38. In a water-column, of the character described, the combination with a stand-pipe

of an extended discharge-nozzle secured at the head thereof, a discharge-pipe whose inner end telescopes with said discharge-nozzle so as to be moved freely thereon, a connection uniting said discharge-pipe with the stand-pipe of the water-column and pivoted to said stand-pipe in a horizontal plane below the horizontal plane of the outlet of the discharge-pipe when in its fully-elevated position, and means for counterbalancing the discharge-pipe, whereby the range of movement of said outlet is in a substantially vertical plane.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 27th day of January, A. D. 1904.

EDWARD E. JOHNSON.

Witnesses:

HENRY M. CURTS,
K. A. COSTELLO.