March 1, 1932. D. M. JACKSON 1,847,343

FLUID PRESSURE OPERATED VALVE

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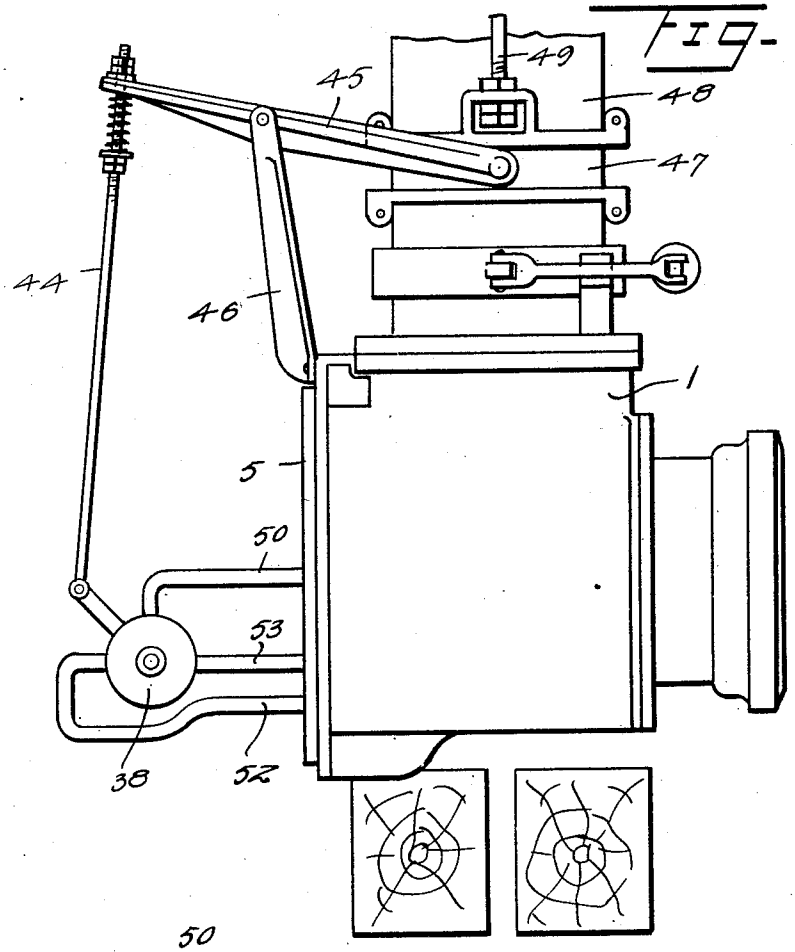
Fig. 1.



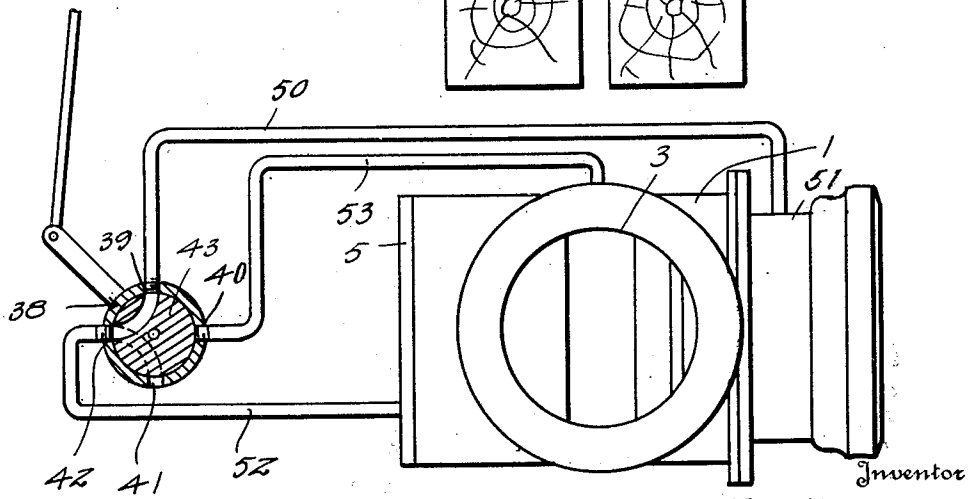




Fig. 3.

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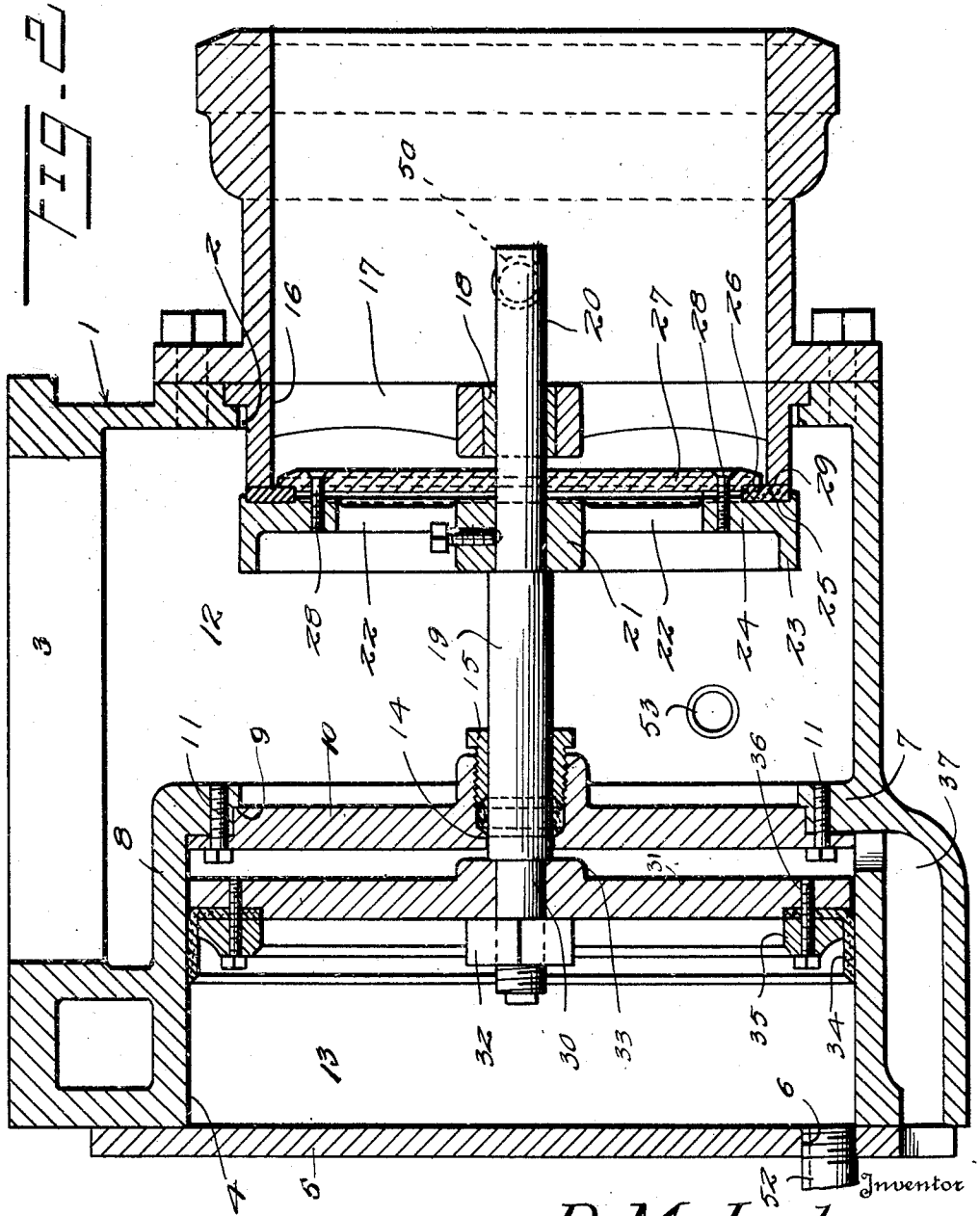
Fig. 2.

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# UNITED STATES PATENT OFFICE

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## FLUID PRESSURE OPERATED VALVE

Application filed November 14, 1929. Serial No. 407,192.

This invention relates to improvements in valves more especially valves designed to be controlled or operated by the pressure of the water in the line in which they are placed both for the performance of the opening and closing movement thereof.

While the valve embodying the present invention may be employed in a variety of capacities it is designed primarily for use in association with a water crane, being adapted to be positioned at the foot of the stand pipe.

The primary object of the present invention is to provide a shut-off valve operated as above stated by the pressure of the water in the supply main for both opening and closing movement, wherein improved means has been devised for passing the water from the supply main to a cylinder having an operating piston therein which operates under the pressure of the water to shut the valve off.

Another object of the invention is to provide a valve structure of the above described character having certain refinements in construction over valves of a similar nature at present in use whereby a more efficient and smoother operation is had and the cost of construction, assembly and upkeep is materially reduced.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:—

Figure 1 is a view in side elevation of a valve constructed in accordance with the present invention showing the application of the same to a feed water stand pipe.

Figure 2 is a longitudinal sectional view through the body of the valve showing the interior construction.

Figure 3 is a view in top plan of the valve structure showing associated therewith and in section the four-way control valve.

Referring more particularly to the drawings wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates generally the body or casing of the present valve which casing is provided with an inlet opening 2, a right angularly directed outlet opening 3 and directly opposite the inlet opening 2 an opening 4 which is normally covered or closed by a plate 5. This plate has a threaded aperture 6 formed therethrough which is disposed at the lowest part of the plate when the valve is in upright position.

Within the casing 1 the wall is provided with an annular flange 7 concentric with the inlet opening 2, a wall 8 continuing the flange across the outlet opening at the top of the valve and closing communication between the side of the flange adjacent the plate 5 and the outlet opening as shown in Figure 2. This flange is provided with a recessed edge forming the shoulder 9 against which positions a plate 10 secured to the flange by the screws 11 and thus dividing the valve casing into the two chambers 12 and 13.

The central portion of the partition plate or wall 10 is provided with an aperture 14 which is enlarged at the end opening into the chamber 12 to receive a packing material and a packing nut 15.

Secured in the inlet opening 2 is an inwardly projecting sleeve 16 the outer portion of which has therein the spider 17 through the central portion of which is formed a supporting bearing or collar for a bushing 18. As shown the diameter of the sleeve 16 is materially less than the diameter of the chamber 13 and the purpose of this will become apparent as the description proceeds.

Slidably extended through the aperture 14 in the plate 10 is a stem 19 which is reduced at its rear end as indicated at 20 and this reduced portion slides through the bushing 18. Secured to the reduced portion of the stem inwardly of the spider and sleeve is a hub 21 from which suitable spokes 22 extend for the support of a packing carrying ring 23, this

ring having the inwardly extending flange 24.

The outer face of the ring 24 is provided with an annular recess 25 in which a packing body 26 positions, this body being held in place by the disk 27 which is centrally traversed by the reduced portion 20 of the pin 19 upon which it is carried while it is secured to the flange 24 adjacent its periphery by the screws 28.

That portion of the face of the disk 27 which comes into position over the packing groove 25 is cut away as indicated at 29 to receive the packing material 26, leaving a portion of the material exposed for contact with the adjacent edge of the sleeve 16.

The forward end of the stem 19 passes into the chamber 13 where it is reduced as indicated at 30 to receive a piston plate 31, this plate being held in place by the nut 32 threaded on the reduced portion 30 of the stem.

The underface of the plate 31 is provided at the central portion thereof with the shoulder 33 which serves to maintain the plate slightly forwardly of the wall plate 10 when the valve packing 26 is seated. The forward face of the piston plate 31 is recessed adjacent the periphery to receive the cup washer 34 which is maintained in position by the ring 35 secured to the piston plate by the screws 36.

In order to prevent the trapping of air or water between the piston plate 31 and the partition plate 10 a vent 37 is provided which opens through the wall of the casing as shown.

Associated with the structure just described, is a four-way valve indicated generally by the numeral 38, the four ports in the casing thereof being indicated by the numerals 39, 40, 41 and 42.

This valve may be mounted at any suitable point so that the plug 43 thereof may be connected with an operating arm or link 44. In the present showing this link is connected with an arm 45 which is pivotally mounted intermediate its ends upon a bracket 46 secured to the casing 1, that end of the arm 45 opposite the one where the rod 44 is connected having connection with a sliding collar 47 surrounding a stand pipe or water crane, the lower end of which opens into the casing 1 through the outlet 3. The elements 44 to 48 inclusive are of usual construction on water cranes, the collar 47 being raised by an engineman adacent the water crane through the medium of the pull rods 49 so as to oscillate the beam 45 and reciprocate the rod 44 as will be readily understood.

The port 39 of the four-way valve is connected by a pipe 50 with the pipe 51 of the water main which connects with the casing 1 at the inlet opening 2 so that water from the main 51 may be passed around the casing 1 to the valve and when the valve 38 is set in the proper position allowed to flow therefrom through the pipe line 52 which is connected at one end with the port 42 to the inlet port 6 opening into the piston chamber 13. When the water is permitted to flow from the main 51 into the chamber 13 as described the pressure exerted upon the piston will force the same to the rear of the chamber and thus firmly apply the valve packing 26 to the inner edge of the ring 16 to close the inlet to the casing. When the rod 44 is actuated to give a quarter turn to the controlling valve plug 43 the water in the piston chamber 13 will flow out through the pipe 52 and be discharged through the drain port 41 of the valve 38.

This will permit the pressure in the main against the disk 27 to unseat the valve packing 26 and allow the water to flow through the casing into the stand pipe 48. By turning the plug 43 back the valve packing ring 26 may be again replaced to close the inlet to the casing 1 in the manner described and by further turning the plug 43 a half turn from this position the contents of the stand pipe may be drained out through the pipe line 53 which connects at one end with the casing 1 where it opens into the chamber 12 and at the other end with the port 41 of the controlling valve in the manner shown.

From the foregoing description it will be readily seen that the water pressure actuated valve structure herein described is of simple construction and of a nature which permits of its being inexpensively manufactured, easily and quickly assembled and devoid of parts which might easily become broken or in any other way out of order. In addition to this the four-way valve governing the water operated valve is so connected with the latter that the control of the same may be easily maintained for the performance of the various functions described.

Having thus described my invention, what I claim is:

1. In a fluid pressure operated valve a casing having an inlet and an outlet opening, a sleeve secured at one end in the inlet opening and extending into the casing, a spider formed in said sleeve, a stem reciprocably supported at one end by said spider and extending into the casing, means for dividing said casing to provide a chamber at the side of the casing opposite said inlet opening, the wall of said chamber adjacent the inlet opening constituting a removable plate having a central passage therethrough for the reception of the inner end of said stem, means for packing the stem in said passage, a piston carried by the stem in said chamber, a valve element comprising a ring carried by the stem adjacent the spider, a plate mounted adjacent the ring and a packing body secured between the plate and ring adapted to position upon the inner edge of said sleeve, a pipe line having communication with the inlet opening of the casing outwardly of the valve element and

opening at its other end into said piston chamber, and a valve in the pipe adapted to pass fluid from the inlet opening into the chamber or cut off fluid from the inlet opening and drain said chamber.

2. In a fluid pressure operated valve, a casing having an inlet and an outlet opening, means providing a valve seat upon the inner side of the inlet opening, a spider in the inlet opening, means to provide a chamber in the casing aligned with and in spaced relation to the inlet opening, said chamber having an inner end removable wall, a stem slidably extended through said wall and through said spider, a valve plate adjustably mounted on said stem to engage said seat, a piston upon the other end of said stem and located in said chamber, a valve controlled pipe line connected at one end with the casing at the inlet side of the valve seat and having its other end discharging into the piston chamber, the valve in said line being designed to cut off the flow of fluid from the inlet opening to the piston chamber and to drain said chamber, and said chamber having a drain passage leading therefrom from behind the piston, said valve being adjustable on the stem to limit the movement of said piston to prevent the latter covering the drain passage.

In testimony whereof I hereunto affix my signature.

DAVID M. JACKSON.