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J. HENDERSON.

STAND PIPE.

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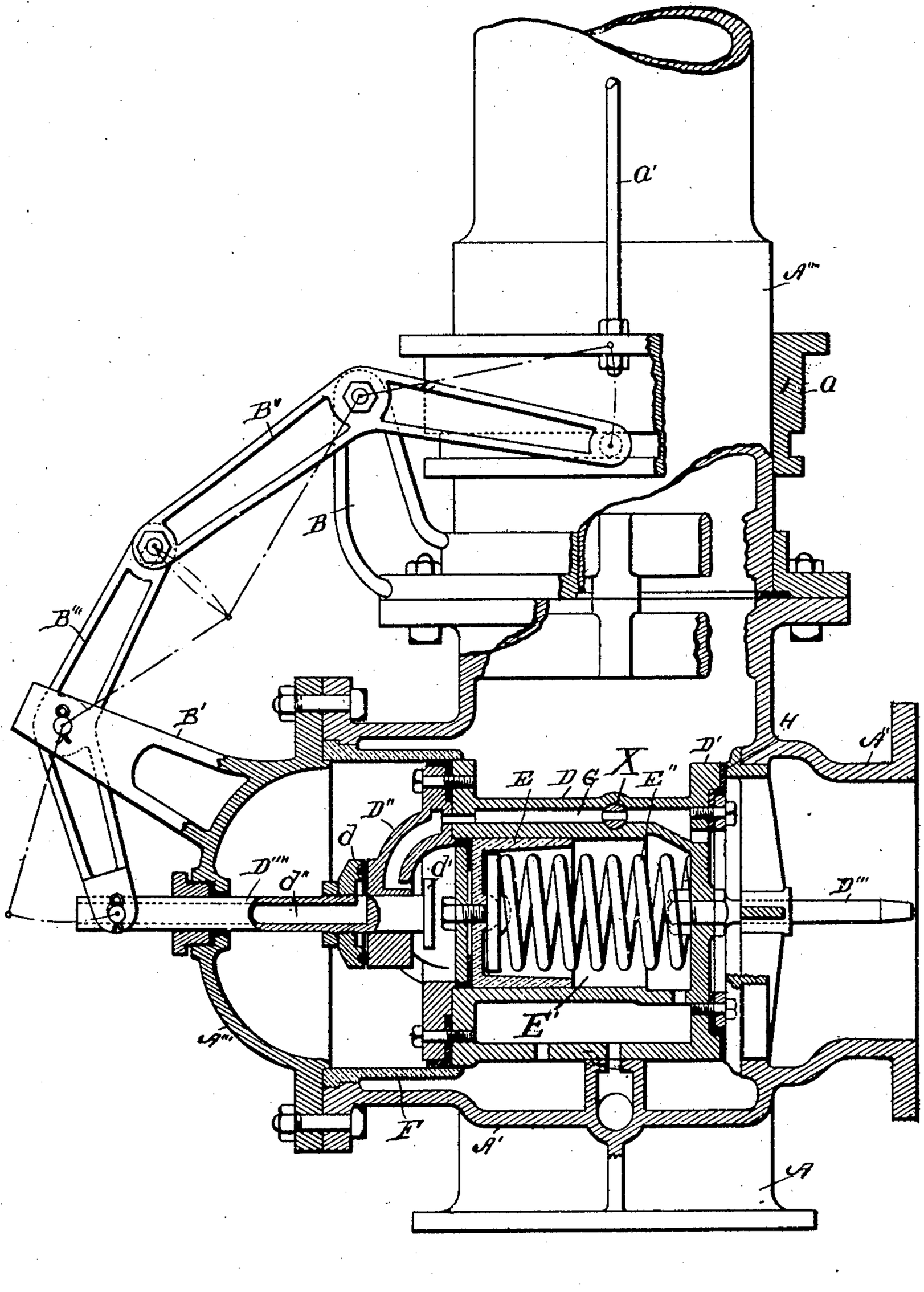

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UNITED STATES PATENT OFFICE.

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STAND-PIPE.

No. 878,462. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed November 12, 1906. Serial No. 343,058.

To all whom it may concern:

Be it known that I, JAMES HENDERSON, a citizen of the United States, residing at the city of Three Rivers, county of St. Joseph, and State of Michigan, have invented certain new and useful Improvements in Stand-Pipes, of which the following is a specification.

This invention relates to an improved hydraulic valve mechanism for controlling the water mains delivering to water cranes or hydrants.

The objects of the invention are, first, to provide an improved construction of valve opening and closing means. Second, to provide in such a valve mechanism an improved cushioning mechanism to take care of the water-hammer which may be occasioned by sudden variation in pressure in the main, as by the quick closing of the valve, or other means.

Objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is fully illustrated in the accompanying drawing, forming a part of this specification, in which, the single figure shows the complete valve mechanism and its actuating means, certain portions being broken away, and other parts being shown in longitudinal section so that the details of the construction may be readily understood.

Referring to the lettered parts of the drawing, the base A supports the remaining part of my improved valve mechanism. The main casing A′ is formed integral therewith. A flange connection A″ is provided to connect to the water main. A dome-shaped head A‴ is secured to the opposite end closing the same. On the top of the casing is provided a flange connection for the support of the vertical pipe of a water crane or hydrant A⁗ which is revolubly supported thereon by a turn-table mechanism consisting of cross arms with a bearing center and surrounding flange bolted to the top flange of the casing A′ with a suitable gasket means underneath.

A pair of connecting levers B″ B‴ are connected for actuating the auxiliary valve mechanism for the control of the main valve. The lever B″ is supported on a bracket B and is bifurcated and engages an annular groove in the collar *a*, which collar surrounds the lower end of the pipe A⁗, and is freely movable thereon, being reciprocated up and down by connections *a*′.

These various parts I have just described do not pertain specially to my invention, except that the levers and connecting means are especially well adapted to my device and can be appropriately claimed in that connection.

Within the main casing is supported the main valve consisting of a body part D and a valve lid D′. The body is provided with a piston head which reciprocates in the cylinder F, which is supported within the main casing.

A stem D‴ serves to guide the valve onto its seat H and supports the piston part thereof in proper alinement with the cylinder F. Within the body part D is a piston E with a suitable packing adapted to reciprocate within a cylinder bore E′ therein. A heavy coiled spring E″ holds this piston normally outward so that it presents a cushion to resist the pressure of a water-hammer against the same. This cylinder bore is vented at the bottom so that only the resistance of the spring is exerted against the piston.

A connecting passage G extends through the body of the cylinder to one side of the piston bore through one of the arms of the spider head D″ which affords the connection for the auxiliary actuating means. This passage G opens inwardly and is controlled by a flat auxiliary valve *d*′ on the end of the tubular rod D⁗. A collar or valve *d* surrounds this tubular rod D⁗ and is provided with a gasket to close against the flat outer surface of the spider D″. An aperture *d*″ is through this rod and opens at a point outside the spider head D″ and at such a point that it is opened and closed by the disk valve *d*. The passage *d*″ delivers to the outside of the valve casing. The capacity of the passage G is controlled by the cock X.

Having described the various parts of my improved valve mechanism, I will now indicate their operation. In the drawing, the valve is shown closed. The piston head of the valve is larger than the valve lid or cover, and the water from the water main connects beyond this piston through the passage G,

so that the pressure in the water main holds the valve closed. This passage G is regulated by the cock X. When it is desired to open the valve, through the proper connections, the ring *a* is raised, which reacts through the levers B'' B''', serves to withdraw the stem D'''' and closes the disk valve *d'* over the discharge opening of the passage G and at the same time lifts the valve *d* away from its seat and opens the passage *d''* to the outside. The pressure in the water main then immediately acts upon the valve, forcing the piston of the valve through the cylinder F, discharging the water therefrom through the passage *d''* which causes the valve to open very easily and very readily by the pressure of the water in the main. The water then passes up to the stand pipe for discharge. On reversing the motion, the valve stem D'''' will be moved inwardly. The valve *d* will close the discharge passage *d''* and will open the passage G so that the water from the water main will then enter back of the piston of the main valve D, and, as the area is larger than that of the valve lid or cover, the valve will be carried over towards the right of the figure and closed, the cylinder head being filled with water entering through the passage G. If the valve closes suddenly, there occurs, of course, what is known as a water-hammer, but the relief piston E, held normally outward by the coiled spring E'', yields and absorbs the force of the blow by permitting the main valve D' to open and remain open slightly until the pressure is equalized at either end of the main valve. The time in which this action takes place is governed by the cock X in the passage G. The spring E'' is sufficiently strong to return the piston against the normal pressure in the pipe so that the device is entirely safe for shutting off the water within the main. The valve itself is operated by the pressure of the water in the main, an auxiliary valve, very easily controlled from the outside, directing the force of the water in that end. In this connection, I desire to remark that the fault with many self-actuating valves is their tendency to make the final closure with a snap due to the rapidly rising pressure acting on the non-elastic piston end of the valve and accelerating the motion of the same in direct proportion to the rapidity of the rise in pressure. I obviate this undesirable feature by providing an elastic piston end that will absorb the effects of rapid rising pressure against the spring, compressing the same until the total force tending to close the valve—in the meantime the main valve remaining stationary—exceeds the force tending to open the same, when the main valve will be gradually moved to the closed position. In practice, there is usually a second or third reaction or water-ram, but it is clear that my improved valve will protect against any injurious shock from this cause by reason of its elastic feature. As the high pressure strikes the face of the closed valve—this pressure being greater than in the piston side—it forces the main valve open, thus discharging a small amount of water. Were it not for the elastic feature on the piston side of this valve, the main valve would not open. The main valve, however, opens and a certain amount of the water in the cylinder F is displaced into the central cylinder forcing in the central piston and compressing the spring to such a point as to equalize the pressure, and when the extra force of the water-hammer recedes, the main valve again moves to the closed position by the action of the spring and the central piston regains its normal position in the cylinder.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination of a main valve casing; a valve body, one end of which is provided with a valve and the opposite end with a piston, the piston being of larger area than the valve; a suitable cylinder within which said piston reciprocates there being a passage through the valve body to a suitable aperture within the cylinder; an auxiliary valve with a tubular stem arranged to open and close the passage to the cylinder; and an auxiliary valve on the same stem for connecting the cylinder to the outside through the hollow valve stem; and a relief piston within the valve held normally in position by a resisting spring, co-acting for the purpose specified.

2. The combination of a main valve casing; a valve body, one end of which is provided with a valve and the opposite end with a piston, the piston being of larger area than the valve; a suitable cylinder within which said piston reciprocates there being a passage through the valve body to a suitable aperture within the cylinder; an auxiliary valve with a tubular stem arranged to open and close the passage to the cylinder; and an auxiliary valve on the same stem for connecting the cylinder to the outside through the tubular valve stem, co-acting for the purpose specified.

3. The combination of a main valve casing; a valve body, one end of which is provided with a valve and the opposite end with a piston, the piston being of larger area than the valve; a suitable cylinder within which said piston reciprocates there being a passage through the valve body to a suitable aperture within the cylinder; an auxiliary valve arranged to open and close the passage to the cylinder; an auxiliary valve for connecting the cylinder to the outside; and a relief piston within the valve held normally in position by a resisting spring, co-acting for the purpose specified.

4. The combination of a main valve casing; a valve body, one end of which is provided with a valve and the opposite end with a piston, the piston being of larger area than the valve; a suitable cylinder within which said piston reciprocates there being a passage through the valve body to a suitable aperture within the cylinder; an auxiliary valve arranged to open and close the passage to the cylinder; a valve stem having a passage therethrough connecting the interior of the cylinder to the outside; and an auxiliary valve for controlling the passage in the valve stem leading to the outside, for the purpose specified.

5. The combination of a main valve casing; a valve body, one end of which is provided with a valve lid and the opposite end with a piston, the piston being of larger area than the valve; a suitable main cylinder within which the piston reciprocates; an auxiliary cylinder within the valve body, the end thereof opening into the main cylinder by suitable passages; an auxiliary piston within said auxiliary cylinder; a spring for holding the said auxiliary piston normally outward; and connections from the water main to the main cylinder, co-acting as specified, whereby the valve and its piston can be moved into the main cylinder and the auxiliary piston into the auxiliary cylinder to cushion the valve and relieve the water-hammer.

6. The combination of a main valve casing; a valve body, one end of which is provided with a valve lid and the opposite end with a piston, the piston being of larger area than the valve; a suitable main cylinder within which the piston reciprocates; an auxiliary cylinder, the end thereof opening into the main cylinder by suitable passages; an auxiliary piston within said auxiliary cylinder; a spring for holding the said auxiliary piston normally outward; and connections from the water main to the main cylinder, co-acting as specified, whereby the valve and its piston can be moved into the main cylinder and the auxiliary piston into the auxiliary cylinder to cushion the valve and relieve the water-hammer.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

JAMES HENDERSON. [L. S.]

Witnesses:
CHAS. E. LANDER,
JOHN T. MCVAY.