

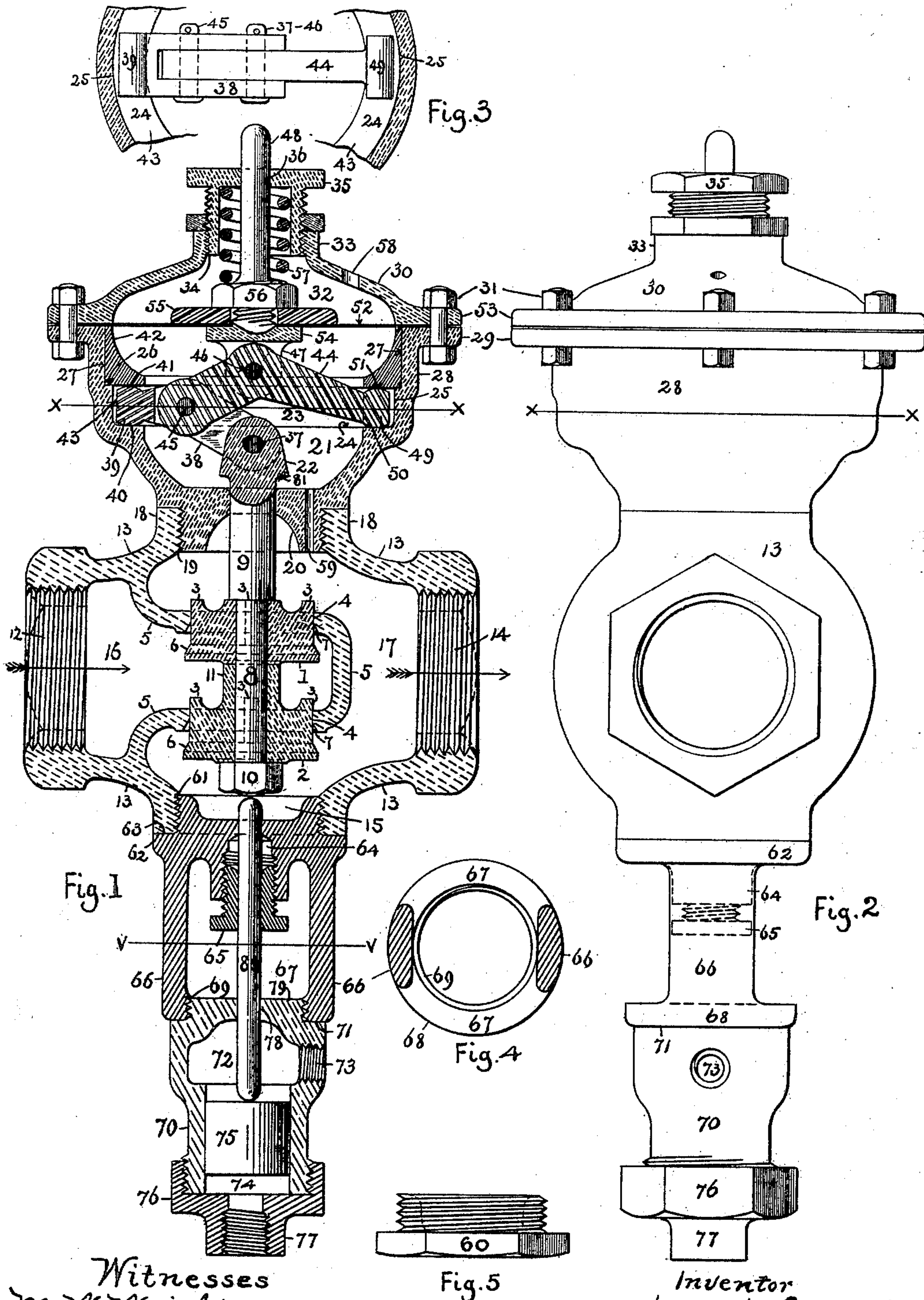
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J. L. CHAPMAN.
REDUCING VALVE AND PUMP GOVERNOR.

(Application filed Apr. 25, 1899.)

(No Model.)



Witnesses
M. W. Wright
H. Watson.

Inventor
JOSEPH L. CHAPMAN
By R. C. Wright
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH L. CHAPMAN, OF HADDONFIELD, NEW JERSEY, ASSIGNOR TO THE
WATSON & McDANIEL COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

REDUCING-VALVE AND PUMP-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 626,594, dated June 6, 1899.

Application filed April 25, 1899. Serial No. 714,350. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. CHAPMAN, a citizen of the United States, residing at Haddonfield, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Reducing-Valves and Pump-Governors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to the class of valves constructed to receive a high pressure and by the mechanism employed in the valve reduce it in its passage through the valve to a lower and predetermined pressure and maintain a constant lower pressure from the delivery side of the valve while receiving a varying pressure, sometimes higher, sometimes lower. I also provide an attachment to govern a pump by the same valve, having means to automatically shut off the fluid-pressure to the pump when the hydraulic pressure becomes excessive beyond a desired limit and again admit the fluid-pressure to the pump when the hydraulic pressure has been reduced to the desired degree.

I attain the objects of my invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is in general a central vertical section. Fig. 2 is an elevation. Fig. 3 is a section on lines *xx*, Figs. 1 and 2. Fig. 4 is a section on line *vv*, Fig. 1. Fig. 5 is a view of the lower cap used when the pump-governor is detached.

Similar figures of reference indicate similar parts in all the views.

I employ two balanced valves 1 2, each having wings 3 fitting within bored openings 4 of the inner casing 5 and having coned seats 6 ground to a fit in coned seats 7 of casing 5, and the valves are placed upon a central stem 8, which is enlarged at 9 above valve 1 and has a nut 10 below valve 2, and as valve 2 has a hub 11 at its upper part to abut valve 1 both valves will be secured together when the

nut 10 is screwed to its seat against valve 2. The inner case 5 surrounds the valves 1 2 opposite the inlet-passage 12 of case 13 and prevents the passage of fluid-pressure when the valves 1 2 are seated. Opposite inlet 12 is outlet 14. Valve 1 is made to be entered through inlet 12 and between upper and lower walls 5 of the inner case, and valve 2 is inserted through the opening 15 in the lower part of case 13. Above case 13, inclosing inlet-chamber 16 and outlet-chamber 17, is a neck 18, having an internal screw-thread 19, into which is screwed neck 20 of an upper chamber 21, the stem 8 9 passing freely through the neck 20 and having an enlarged head 22 above the neck for a purpose to be further described hereinafter.

At some distance above neck 20 the chamber 21 is enlarged and an annular seat 23 is formed, it being composed of a horizontal part 24 and a vertical part 25. Above the vertical part 25 the chamber 21 is again enlarged in diameter and forms a horizontal seat 26 and a vertical wall 27, which reaches up to the top of casing 28 of chamber 21, and thereon is formed a flange 29, to which is bolted cap 30 by bolts 31 and inclosing a top chamber 32. A neck 33 extends above the chamber 32 and has an internal screw-thread 34, into which is screwed a spring-seat and stem-guide 35, which is closed at its top, except at its central part 36, and open at its bottom part. Attached to head 22 of stem 8 9 by pin 37 is a bent and bifurcated lever 38, its outer end 39 being closed and solid and having its lower face 40 and its upper face 41 rounded to bear centrally on seat 24 and be free in its movement, and its upper face 41 is rounded to bear against an annular ring 42, which seats on 26, freely fits into 27, and extends upward to the same distance as the top face of flange 29. It will be noticed that the annular ring 42, together with the seat 24 and vertical wall 25, forms a circular groove or recess 43, extending entirely around the inside of case 28, and its construction is such that it can be quickly and cheaply bored and made true, the ring 42 being inserted after the other work is done, and it is also readily removed whenever the top casing 30 is taken off. Attached to bent lever 38 and embraced by

its bifurcated or inner end is another bent lever 44, the attachment to lever 38 being by pin 45. Thereafter lever 44 is carried upwardly and clear of head 22 to a point exactly vertical above pin 37 of valve-stem 8 9, where it is attached by pin 46 to jaws 47 of diaphragm-stem 48. It is thereafter bent downward and passing outward has an outer end 49, having a lower rounded surface 50 resting on seat 24, and an upper rounded surface 51 coming under annular ring 42. By referring to Fig. 3 it will be seen that the outer ends 39 49 are broadened to form a firm non-tipping base where they rest in circular groove or recess 43, which extends entirely around chamber 21. By reference to Fig. 1 it will be seen that ends 39 49 of levers 38 44 are in the same horizontal plane as pin 45, which attaches them to each other, while pins 37 46, which attach the levers 38 44 to spindles 8 9 and 48, are vertically in the same line and equidistant from pin 45. Resting on flange 29 of case 28 is diaphragm 52, it being held in place between flange 29 of case 28 and flange 53 of upper case 30 and within bolts 31 at its outer edge. The stem 48 has a seat 54 under the diaphragm, and a plate 55 above the diaphragm is forced to it by nut 56 on stem 48. The nut 56 also affords a seat for the lower end of spring 57, which is inserted in and seated under guide and seat 35.

An opening 58 in top case 30 admits atmospheric pressure to chamber 32 and above the diaphragm 52. An opening 59 through neck 20 allows fluid-pressure to pass into chamber 21 and under diaphragm 52. The opening 15, through which valve 2 is inserted, will be closed by cap 60, Fig. 5, when the valve is used simply as a reducing-valve. To allow fluid-pressure to pass valves 1 2 the spring-seat and guide 35 will be screwed down, causing spring 57 to press on nut 56, and thereby diaphragm 52, carrying jaws 47 of stem 36 and pin 46. By this means pin 46 will press down bent lever 44, which is attached by pin 45 to bent lever 38, and owing to the difference in the leverage from end 49, where the lever is supported to pin 46, and end 49 to pin 45 the movement of the diaphragm will be less than the total of the lever in exact ratio to the leverage. The lever 38 also being shorter from its resting end 39 to its point of connection at pin 45 with lever 44, where it receives its movement, than the distance from pin 45 to pin 37, where it delivers the movement to head 22 of stem 8 9 of valves 1 2, it follows that the movement imparted to the diaphragm, owing to my means of compounding by the use of the levers 38 44, will be less than the movement imparted to the valves 1 2 in exact proportion to the differences in leverages which I employ, and thus by my mechanism I am enabled to open the valves to admit a desired pressure and owing to the sensitiveness of my mechanism maintain a constant pressure by a diaphragm, which, while very sensitive,

will, owing to its very slight movement, be very lasting and durable.

My mechanism for a pump-governor is shown in Figs. 1 and 2 and is inserted in opening 15 by means of screw-thread 61, under which a projecting flange 62 is seated against the valve-case at 63. Within flange 62 is a stuffing-box 64, having a follower or gland 65 screwed therein. Projecting downward from flange 62 are two legs 66, which leave two spaces 67 between them, through which to pack stuffing-box 64 and manipulate its gland 65. At the lower end of the legs 66 an annular ring 68 is formed and tapped with screw-thread 69. Into this thread is screwed a cylinder 70, having a seat 71 under ring 68 and an enlarged chamber 72 at its upper part, tapped at 73 to receive a waste-pipe, and at its lower part is the cylinder proper, 74, in which is inserted for close diametral contact, but free perpendicular movement, a piston 75, the lower end of cylinder 70 being closed by a screw-threaded head 76, having a neck 77, tapped to receive an inlet-pipe from the pump. Passing freely through an opening 78 in upper head 79 of cylinder 70 and through gland 65 and stuffing-box 64 is an independent rod 80, which is unattached to piston 75 and valve-stem 8, free to be moved up by piston 75 pressing against its lower end or moved down by the valve-stem pressing against its upper end and by its means enable the piston 75 to close the valves 1 2 when the hydraulic pressure is excessive under piston 75, and so shut off the fluid-pressure to the pump and upon the reduction of the pressure below piston 75 permit valves 1 2 to reopen to produce the normal fluid-pressure in the pump. The rod 80 being free to move, and especially being unattached to any other moving parts, is less liable to friction and therefore more sensitive to act than if rigidly attached and easier and cheaper to produce, as so much attention need not be given to perfect alinement.

Another decided advantage of my arrangement is that by having the stuffing-box 64 no fluid-pressure can escape from the valve-case, and should any leakage pass by piston 75 it can by no means reach the valve-chamber, but will be carried away through overflow-opening 73. When the valve is not required for governing a pump, all of the governor attachments can readily be removed by unscrewing them at thread 61 and cap 60 be substituted, thus enabling a stock of valves to be carried by the manufacturer which may at a moment's notice be sent out as reducing-valves or as reducing-valves and pump-governors.

Another advantage my mechanism has is the easy and quick manner in which the valves may be removed from the case. By removing cap 60 or 62, (whichever may be attached,) together with nut 10 and bolts 31, all parts will readily lift out of case 28 and

the valves 1 2 be free to be removed, saving much time, expense, and annoyance over present constructions. The head 22 of valve-stem 8 9 is enlarged to present shoulders 81 to neck 20 should the attendant force spring 57 too forcibly down on diaphragm 52, thereby tending to damage it.

I claim—

1. In a reducing-valve, a casing having an inlet and an outlet opening thereto, and seated within the casing two valves in manner to open and close the passage from the inlet to the outlet, an upper case attached to the lower case and mounted thereon and secured thereto a flexible diaphragm, a stem for the valves, a stem for the diaphragm, and interposed between the two stems a system of compound levers comprising a bent lever attached at one end to the valve-stem and at the other end resting upon a circumferential seat formed around and within the casing, and a second bent lever attached to the diaphragm-stem and above the valve-stem, having one end attached to the bent lever of the valve-stem and its opposite end resting upon the opposite side of the same circumferential seat as the lever first mentioned, and means above the diaphragm to force the diaphragm down and by means of the compounding by the levers aforesaid move the valves to a greater degree than the diaphragm, substantially as described.

2. In a reducing-valve, an inclosing casing, an opening thereto and therefrom for fluid-pressure flowing, two valves seated therein and controlling the passage therethrough, a stem for the valves, a diaphragm seated on and secured to a chamber above the valve-chamber, a stem for the diaphragm, a spring seated above the diaphragm, bearing thereon and having means for its adjustment, a bent and bifurcated lever attached at one end to the valve-stem and at its other end resting within an annular seat formed within the casing, a bent lever attached at one end between the bifurcations of the valve-lever, and, at a point above the valve-stem, to the diaphragm-stem, and at its outer end resting within the same annular seat as the valve-lever rests in, and removable means within the casing to secure the levers to the seats with freedom for

the movement of the valves and diaphragm connected thereto, substantially as set forth.

3. In a reducing-valve, a casing and means therein to seat two valves to control the flow of fluid-pressure therethrough, a flexible diaphragm seated upon and secured to the casing, means above the diaphragm to force it downward, a stem for the valves, a stem for the diaphragm, in direct alinement, a circular recess formed within the upper casing its lower and outer sides being part of the casing; an annular ring within the upper casing and its lower face forming the upper part of the recess; a bent lever resting within the recess at its outer end, having rolling contact with the top and bottom of the recess, and at its opposite end attached to a bent lever which also rests within the recess at one end and has rolling contact therewith at the top and bottom, and at its inner end is attached to the valve-stem, and means to attach the diaphragm-stem to the first-named lever, between its ends, and above the valve-stem, substantially as described and set forth.

4. In a reducing-valve and pump-governor, a casing having inlet and outlet passages, a diaphragm attached thereto and means to put pressure thereon, valves controlling the inlet and outlet through the casing, means to connect the diaphragm and the valves, a cylinder attached to the lower part of the valve-case, below the valves but not in direct contact with the case, a piston in the cylinder, an inlet below the piston, an overflow above the piston, a stuffing-box at the lower part of the casing, and above the piston, and a rod interposed between the piston and the valve-stem, adapted to reach from the piston to the valve-stem, and to touch the piston and valve-stem by end contact and thereby cause the piston to move the valve and close it when the piston-pressure is excessive, and to recede when the piston-pressure is reduced, and thereby allow the valve to reopen, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH L. CHAPMAN.

Witnesses:

JAMES WATSON,
R. C. WRIGHT.