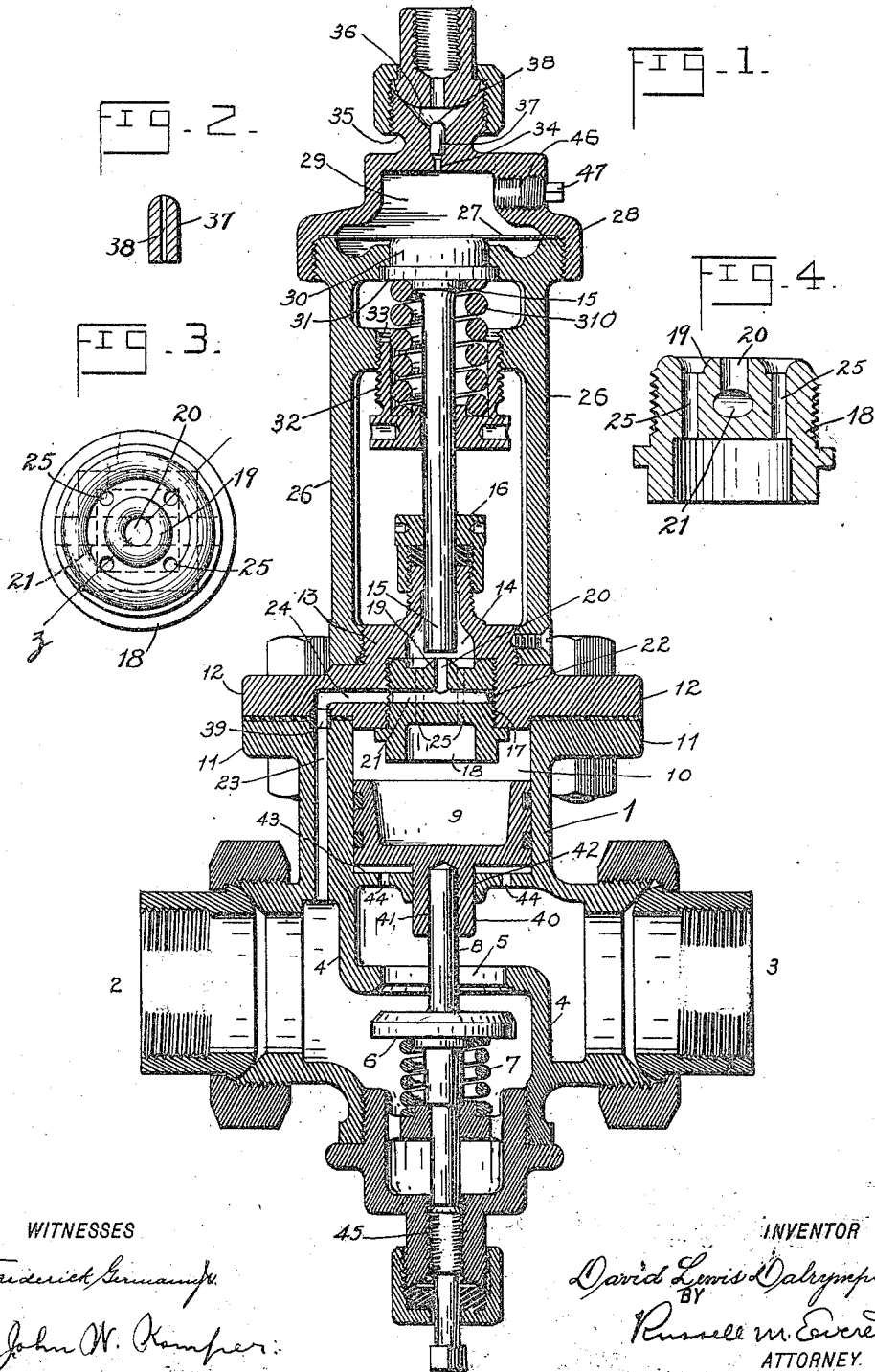


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PRESSURE REGULATING VALVE.
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PRESSURE-REGULATING VALVE.

1,013,645.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID LEWIS DALRYMPLE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain Improvements in Pressure-Regulating Valves, of which the following is a specification.

This invention relates to that class of pressure regulators known as "auxiliary-operated", or in which the opening of the main valve is controlled by an auxiliary or secondary valve.

The objects of the invention are to provide an auxiliary valve plug or seat which is adjustable upon the top of the valve casing with respect to the auxiliary valve; to thus make such adjustment independent of the connection of the said top with the body of the pressure regulator; to thus make the auxiliary valve and main valve separate so that the exact manner of their connection is immaterial; to enable the auxiliary valve plug or seat to be readily and conveniently removed or replaced; to secure a simple and inexpensive construction; to provide an improved construction of spring control for the diaphragm, whereby space is saved at the lower end of such controlling means; to secure improved stop means for limiting the movement of the diaphragm, which shall not obstruct the chamber above the diaphragm; to provide means for preventing the pulsations of a pump affecting the auxiliary valve diaphragm, when the device is employed as a pump governor, and to obtain such other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings in which like numerals of reference indicate the same parts in the several figures, Figure 1 is a central vertical section of a pressure regulating valve of my improved construction; Fig. 2 is a central longitudinal section of a certain reduction bushing for the entrance to the diaphragm chamber; Fig. 3 is a plan of the valve plug or seat, and Fig. 4 is a section of the same on line 2, Fig. 3.

In said drawings, 1 indicates the main

or body portion of the valve casing, provided with an inlet 2 and outlet 3, and intermediate thereof having a partition 4 with an opening 5. This opening, and therefore communication between the inlet and outlet, is controlled by a main valve 6, normally closed by a spring 7 and having at its upper side a stem 8. A piston 9 adapted to work in a cylinder 10 formed in the upper part of the body portion 1, has a neck 40 on its under side which is bored to provide a socket 41 adapted to loosely receive the said stem of the main valve 6. This is not a rigid connection, but one which permits independent motion of the parts in their upward movement. The neck 40 furthermore slides in a way 42 in the bottom 43 of the cylinder, and prevents the piston from tilting or becoming wedged in the cylinder. Holes 44 permit equalization of pressure below the piston 9 in the cylinder and in the outlet end of the valve. Furthermore, a screw 45 is provided in the bottom of the body portion 1 to limit opening of the main valve and thus determine the maximum passage to which it can open. The said cylinder 10 opens out through the top of the body portion 1 and the outer walls of the same are provided thereat with a coupling flange 11 to which a corresponding flange 12 of the top piece 13 is shown bolted in Fig. 1. This top piece provides an interior chamber 14 into which projects the lower end of the auxiliary valve 15, said valve sliding downwardly to close and being surrounded where it enters the top piece with a stuffing-box 16. The said chamber 14 opens out through the bottom of the top piece 13 and has its walls threaded as at 17 so that a valve plug or seat 18 may be screwed therein to provide a seat 19 for the auxiliary valve. The seat 19 is preferably raised, as shown, and through it a passage 20 leads vertically downward into a transverse passage 21, the ends of which transverse passage 21 lie in a groove 22 formed in the outside of the valve plug 18. In the drawings a duct 23 is shown leading from the inlet end of the valve body upward through the same and registering at its upper end

with a similar duct 24 which leads through the top piece 13 and opens against the groove 22 of the valve plug. Other vertical passages 25 are drilled through the valve plug to afford communication from the auxiliary valve chamber to the cylinder 10 above the piston 9.

The construction just described provides in the valve plug 18 a passage 20 which at one end opens through the auxiliary valve seat 19 and at its other end is in communication with the inlet end 2 of the body portion independent of the piston cylinder 10 and auxiliary valve chamber 14. This insures that the inlet pressure is shut off from both the auxiliary valve chamber and piston cylinder when the auxiliary valve is closed, so that there is no chance for leakage or strain upon the joints and packings of said chambers. Only when the auxiliary valve 15 is open does the inlet or high pressure enter the auxiliary valve chamber and so pass into the piston cylinder through the passages 25, and at all other times said inlet or high pressure is cut off from the auxiliary valve chamber and also the piston cylinder.

The ducts 23 and 24 just described, are on opposite sides of the joint between the valve body 1 and its top piece 13, it will be noticed, and a sleeve 39 is let into the enlarged meeting ends of said ducts, as shown, preferably being fast in the body portion 1. This insures that if a soft or very elastic gasket be used in the said joint between the body and top piece, it will not expand to overlap and obstruct the duct, and furthermore the said body and top piece can be put together only one and the right way.

It will be understood that the valve plug 18 is screwed into the top piece 13 and supported entirely thereby, so that the upper and lower parts of the pressure regulator form two valves which can be placed in juxtaposition or separated any desired distance and connected by suitable pipes or other means than those shown in the drawings. Obviously by this construction the relation of the auxiliary valve seat 19 to the auxiliary valve 15 is entirely independent of the connection of the upper and lower parts of the valve which connection as shown in the drawings comprises flanges 11 and 12 bolted together. The kind or thickness of gaskets employed between the said two flanges, it will be noted, has no effect upon the position of the valve plug or operation of the auxiliary valve. Furthermore the construction is extremely simple and inexpensive, and enables the valve plug to be readily removed and replaced as desired.

Upon the top of the top piece 13 is mounted a yoke 26 which provides at its top a seat for a diaphragm 27, the outer edges of said

seat being screw-threaded to receive a cap 28 which clamps the edges of the diaphragm to their seat and provides above said diaphragm a chamber 29. This chamber it will be understood is adapted to receive the governing pressure, and beneath the said diaphragm 27 lies the head 30 of the auxiliary valve 15, said head having a slideway in the top of the yoke 26 and at the under side of said top a radially projecting flange 31 adapted to engage the top and limit upward movement of the auxiliary valve. This prevents undue flexing of the diaphragm 27, and furthermore provides above said diaphragm an unobstructed chamber 29 affording its maximum space for the governing pressure. Also, this flange 31 forms a stop to prevent the auxiliary valve blowing out of its slideway when the diaphragm 27 is removed for any purpose. This enables the said diaphragm to be inspected or repaired without shutting off steam or other pressure from the regulating valve.

Beneath the head 30 of the auxiliary valve a spiral spring 310 is arranged, its lower end being inclosed in a hollow nut 32 exteriorly threaded at its upper part to screw into a correspondingly threaded seat 33 of the yoke 26, and the lower end of said nut being adapted to receive a wrench for turning. By having the nut 32 inclose the spring 31 and threaded at its upper end, sufficient space is provided below the said nut for convenient manipulation of the stuffing-box 16.

Through the top of the cap 28 extends a passage 34 for the governing pressure, said passage being formed in an extension which enables pipe connections to be made and the upper end of the said passage preferably flares as at 36. The upper part of the passage 34 adjacent to its flaring portion is preferably enlarged and a tubular bushing 37 inserted therein which bushing projects at its upper end into the flaring portion 36 and is provided with a bore 38 which is finer than the passage 34. The primary purpose of this bushing is to prevent the pulsations or throbbings of the pump from being transmitted to the diaphragm 27 when the pressure regulator is used as a pump governor, which it does because of its constricted passage. At other times the bushing may be removed if desired, although it is always useful by reason of its upper projecting end which forms a trap at the bottom of the flaring portion 36 to retain any sediment or foreign matter which would otherwise pass to the diaphragm. In the cap 28 is also provided a threaded opening 46, normally closed by a screw plug 47, or other equivalent device enabling the aperture to be opened, and by opening this aperture 46 the auxiliary valve may be rendered idle and

thus the whole regulating valve, as such, thrown out of action, allowing full passage of steam or other fluid through the main valve 6. This occurs because the said opening 46 is larger than the passage 34 (or 38) for the governing pressure, and therefore it can not accumulate in the diaphragm chamber 29. The pressure regulating function of the valve can therefore be thrown out of operation without altering any adjustments of the valve, and there are times when it is very desirable to do this, as for instance when a valve is required to regulate for a portion of the time and the rest of the time allow full pressure to pass. The use of a by-pass for such cases is avoided by my improved device.

Having thus described the invention, what I claim as new is:

1. In an auxiliary operated pressure regulating valve, the combination of a body portion providing inlet and outlet openings and a cylinder, a main valve between said inlet and outlet openings, a piston in said cylinder adapted to impart movement to said main valve, a top piece seated upon said body portion to close the piston cylinder and recessed adjacent thereto to form an auxiliary chamber, an auxiliary valve projecting into said chamber, the said top piece forming around the stem of said valve an impervious wall for the chamber at its side away from the piston cylinder, a removable valve plug dividing said chamber from said piston cylinder and providing a seat for said auxiliary valve, said valve plug having in itself a passage opening at one end through the said auxiliary valve seat, means for conducting pressure from the inlet opening of the valve body portion to the other end of said valve seat passage of the valve plug independent of the auxiliary valve chamber and piston cylinder, and means of communication between the auxiliary valve chamber and piston cylinder.

2. In an auxiliary operated pressure regulating valve, the combination of a body portion providing inlet and outlet openings and a cylinder, a main valve between said inlet and outlet openings, a piston in said cylinder adapted to impart movement to said main valve, a top piece seated upon said body portion to close the piston cylinder and recessed adjacent thereto to form an auxiliary valve chamber, an auxiliary valve projecting into said chamber, the said top piece forming around the stem of said valve an impervious wall for the chamber at its side away from the piston cylinder, a removable valve plug dividing said chamber from said piston cylinder and providing a seat for said auxiliary valve, said valve plug having in itself a passage connecting the piston cylinder and auxiliary valve chamber

and an independent passage opening at one end through the said auxiliary valve seat, and means for conducting pressure from the inlet opening of the valve body portion to the other end of said valve seat passage of the valve plug independent of the auxiliary valve chamber and piston cylinder.

3. In an auxiliary operated pressure regulating valve, the combination of a body portion providing inlet and outlet openings and a cylinder, a main valve between said inlet and outlet openings, a piston in said cylinder adapted to impart movement to said main valve, a top piece seated upon said body portion to close the piston cylinder and recessed adjacent thereto to form an auxiliary valve chamber, an auxiliary valve projecting into said chamber, the said top piece forming around the stem of said valve an impervious wall for the chamber at its side away from the piston cylinder, a valve plug screwed into said recess of the top-piece and forming a valve seat for said auxiliary valve, the said valve plug top piece and body portion being bored to form a duct leading from the inlet of the body portion out through the said auxiliary valve seat of the valve plug independent of the auxiliary valve chamber and piston cylinder, and means of communication between the auxiliary chamber and piston cylinder.

4. In an auxiliary operated pressure regulating valve, the combination of a body portion providing inlet and outlet openings and a cylinder, a main valve between said inlet and outlet openings, a piston in said cylinder adapted to impart movement to said main valve, a top piece on said body portion providing an auxiliary valve chamber, a yoke on said top piece, a cap forming with said yoke a diaphragm chamber, a diaphragm in said chamber, said yoke having an interior stop between the diaphragm and top piece, an auxiliary valve extending from the auxiliary valve chamber into engagement with the diaphragm and having means for engaging said stop on the yoke at its opposite side from the diaphragm and cap, whereby said cap and diaphragm may be removed without the auxiliary valve escaping, and a spring for holding said auxiliary valve against said stop.

5. In an auxiliary operated pressure regulating valve, the combination of a body portion providing inlet and outlet openings and a cylinder, a main valve between said inlet and outlet openings, a piston in said cylinder adapted to impart movement to said main valve, a top piece on said body portion providing an auxiliary valve chamber, a yoke on said top piece, a cap forming with said yoke a diaphragm chamber, a diaphragm in said chamber, said yoke having an interior flange between the diaphragm

and top piece adjacent to the former and constituting a central guideway and a stop, an auxiliary valve extending from the auxiliary valve chamber through said guideway into engagement with the diaphragm and having a lateral shoulder adapted to engage the flange as a stop at its side away from

the diaphragm, and a spring for holding said shoulder against said stop.

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In the presence of—
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