July 14, 1925. 1,545,990

S. S. WEEKS

FLUID REGULATING DEVICE

Filed July 23, 1923 2 Sheets-Sheet 1

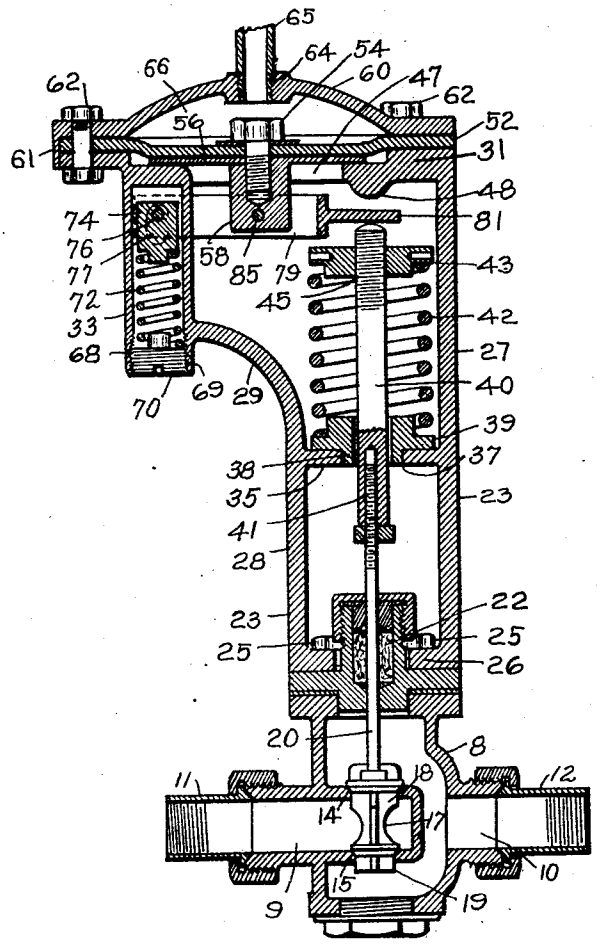


Fig. 1

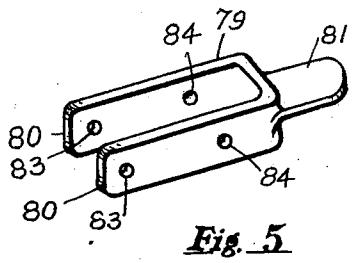


Fig. 5

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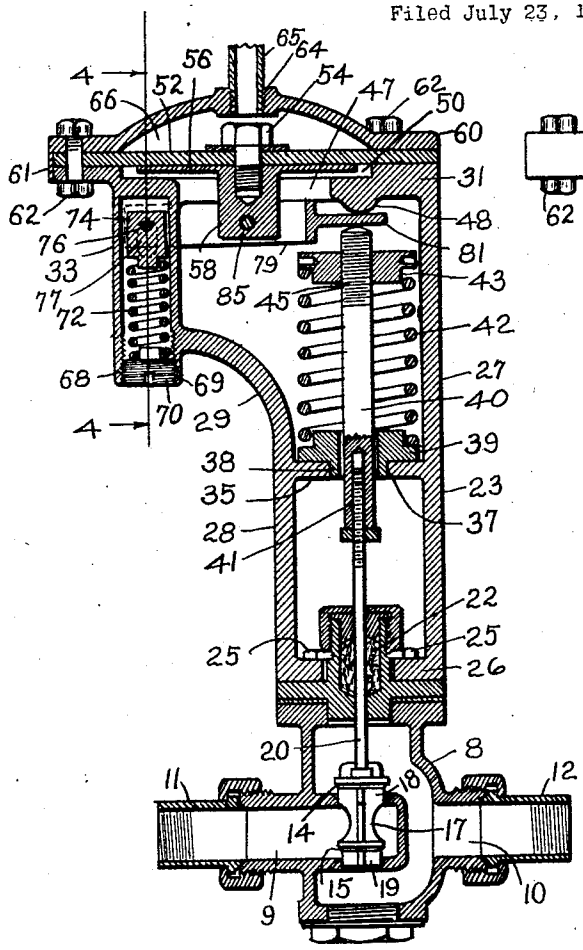


Fig. 2

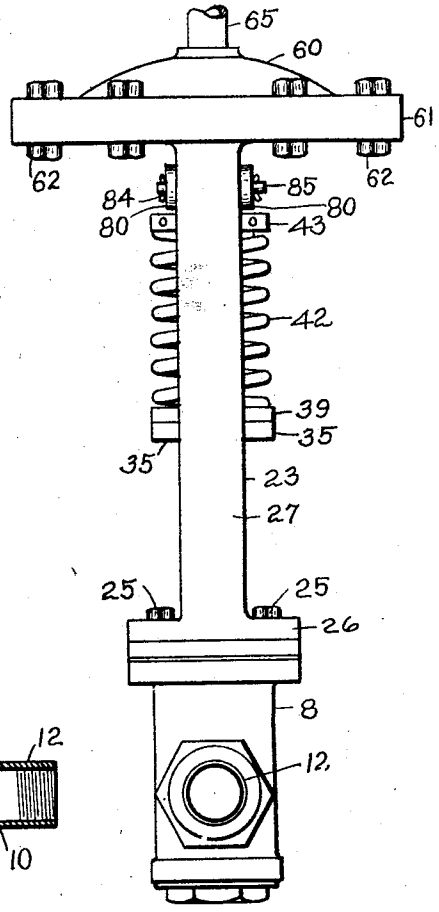


Fig. 3

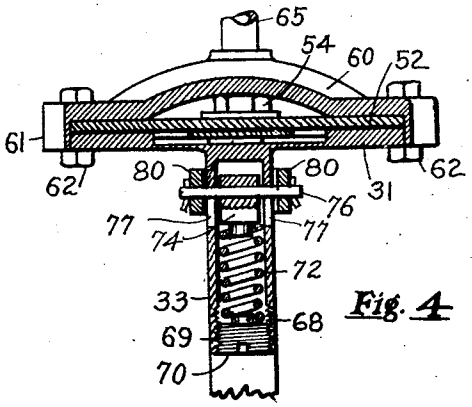


Fig. 4

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UNITED STATES PATENT OFFICE.

SHIRLEY S. WEEKS, OF PROVIDENCE, RHODE ISLAND.

FLUID-REGULATING DEVICE.

Application filed July 23, 1923. Serial No. 653,399.

To all whom it may concern:

Be it known that I, SHIRLEY S. WEEKS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Fluid-Regulating Devices, of which the following is a specification.

My invention relates to fluid regulating devices such as reducing valves, pump governors, burner governors, and vacuum regulators.

The essential objects of my device, in addition to those commonly sought in this class of devices, are to impart an increased movement of the valve stem relatively to the diaphragm, whereby a more sensitive action of the latter operates the valve; to enable the safe employment of a more tenuous valve stem; and to eliminate the possibility of excessive strain upon the valve stem whereby the latter in present construction is caused to buckle, especially when foreign matter accumulates between the valve and valve seat. Other objects and advantages will appear from an inspection of the specification.

To the ends above detailed and suggested my invention consists in such parts and in such combinations of parts as fall within the scope of the appended claims.

In the accompanying drawings which form a part of this specification, and wherein is shown merely the preferred form of my device,

Figures 1 and 2 are vertical central sections of my device, showing the valve in closed and open positions respectively,

Figure 3, a rear elevation of the same,

Figure 4, a transverse section on line 4—4 of Figure 2, and

Figure 5, a detail perspective view of the lever.

Like reference characters indicate like parts throughout the views.

In the embodiment of my invention herein illustrated 8 is a valve casing provided with the inlet and outlet openings 9 and 10 for the stem or other working fluid passing to the pump or compressor through the inlet and outlet pipes 11 and 12 respectively. 14 and 15 are the seats of a balanced valve consisting of the shank 17 and upper and lower valve portions 18 and 19 attached to the valve stem 20. It will be understood that the balance type of valve is not exclusive, as the single type may obviously be substituted therefor. 22 is the usual stuffing box, and 23, a yoke frame connected with the valve casing by bolts 25. In detail the frame comprises a disk shaped base 26, and uprights 27 and 28 rising from diametrically opposite points on the base. The latter upright has an outwardly curved upper portion or arm 29. Integral with the upright is an annular top portion or arm 29. Integral with the upright is an annular top portion or disk 31, integral with whose lower face in its diametrically opposite margin is a depending tubular shell or receptacle 33, which in turn is in one piece with the arm 29. The uprights are connected below the arm portion 29 by a disk or web 35 having a central hole 37 to receive a bushing 38 formed on the bottom of a spring seat 39, and through which slides a rod 40 forming an extension of the stem 20. The latter is threaded into the former as at 41 for the purpose of adjustment. Upon the seat 39 rests the lower end of a helical main spring 42 which supports upon its upper end a nut or spring seat 43 engaging a thread 45 on the rod 40 for adjusting purposes. Adjacent the central opening 47 of the frame portion 31, upon its lower face is a projection 48 in vertical alignment with the rod 40. The upper face of the portion 31 is provided with a circular recess 50 concentric with the opening 47, and resting on said portion is a diaphragm 52 to whose lower face is fastened by a screw 54 a circular plate 56 extending into the recess 50 and provided with a central lug 58 depending through the opening 47. Resting on the diaphragm is a done shaped housing plate 60 provided with a depending peripheral flange 61 embracing the parts 52 and 31 to which the plate 60 is attached by bolts 62. In the center of the plate 60 is a threaded inlet 64 adapted to receive a pipe 65 to induct secondary pressure to the diaphragm chamber 68.

Referring to shell or housing 33, which is located diametrically opposite the projection 48, its lower portion has an internal thread 68 to receive the thread 69 of a screw 70 which closes the housing and forms the support of a helical relief spring 72. Resting on the spring and loose in the housing is a cylindrical block 74 in which is a pintle 76 slidable in vertical slots 77 in the housing, as shown in Figure 4. Pivoted at its rear end on the pintle is a lever 79. In

this instance the lever is bifurcated, comprising parallel side portions or arms 80 and a flat end portion 81. There are perforations 83 in the rear ends of the portions 80 to receive the pintle 76; and perforations 84 intermediate their length to receive a pivot pin 85 in the lug 58 depending between the portions. The portion 81 of the lever rests on the top of the rod 40.

In Figure 2 the valve is shown elevated from its seat. In Figure 1 the valve is shown seated by the action of the fluid which enters the inlet 64 into the chamber 66 and depresses the diaphragm 52 and its plate 56 in the recess 50 to a position nearly or just in contact with the portion 31 of the frame. This depression acts through the lug 58 and lever 79 to depress the valve through the stem sections 40 and 20. If, however, the pressure of the fluid is excessive any undue strain on the stem is relieved by the downward movement of the attached end of the lever 79 which, through the block 74, is met by the yielding pressure of the spring 72. Thus the common buckling or bending of the valve stem is prevented. The extent of downward travel of the plate 56 and lever end 81 is limited at will by the adjustment afforded by the threaded connection 41 of the stem sections. The springs 42 and 72 are adjustable by the nut or spring seat 43 and plug or screw 70 respectively. The spring 72 is more powerful than the spring 42.

It will be noted that the valve stem is out of vertical alignment with the center of the diaphragm, or of the piston, when a piston is substituted for a diaphragm. By virtue of this location and the interposition of the lever 79 any impulse of the diaphragm 52 is lineally multiplied upon the valve stem at the lever extremity 81. The valve action is therefore more extensive and delicate than would otherwise be possible.

The elimination of undue strains is further important because it enables the valve stem to be of reduced dimensions thereby reducing friction through the stuffing box. Furthermore other parts may be of reduced dimensions and therefore less cumbersome and expensive.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:—

1. In a fluid regulating device, a casing, a power inlet and outlet therein, a valve member in the casing, a stem on the valve member, a frame on the casing, a secondary power inlet in the frame, a movable impelling member in the frame vertically eccentric to the valve stem and actuated through the secondary inlet, a lever engaged by the impelling member and engaging the stem and arranged to aid in preventing buckling of the stem, and yielding means for fulcruming the lever.

2. In a fluid regulating device, a casing, a power inlet and outlet therein, a valve member in the casing, a stem on the valve member, a frame on the casing, a secondary power inlet in the frame, a movable impelling member in the frame vertically eccentric to the valve stem and actuated through the secondary inlet, and a lever engaged intermediate its length by the impelling member contracting at one end with the valve stem, and yieldingly fulcrumed at its other end.

3. In a fluid regulating device, a casing, an inlet and outlet therein, a valve member in the casing, a stem on the valve member, a frame on the casing, a spring carried by the stem engaging the casing, a secondary power inlet in the frame, a movable impelling member in the frame offset from the valve, a lever pivotally supported intermediate its length upon the impelling member and engaging the stem at one side of its pivotal point, and a second spring in the frame supporting a portion of the lever at the other side of its pivotal point.

4. In a fluid regulating device, a casing, an inlet and outlet therein, a valve member in the casing, a stem on the valve member, a spring carried by the valve engaging the casing, a secondary power inlet in the frame, a diaphragm in the frame adjacent the secondary inlet and out of alignment with the valve stem and actuated directly by the fluid entering said secondary inlet, a lever pivotally supported intermediate its length by the diaphragm resting at one end on the stem, a block slidably mounted in the frame pivotally connected to the other end of the lever, and a second spring in the frame supporting the block.

5. In a fluid regulating device, a casing, an inlet and outlet therein, a valve member in the casing, a stem on the valve member, a nut on the stem, a spring supported by the frame and bearing against the nut, a tubular housing on the frame parallel with the stem provided with lateral openings, an adjustable plug in the bottom of the housing, a spring in the housing resting on the plug, a block slidably mounted in the housing resting on the spring, a pintle in the plug extending through the openings, a secondary power inlet in the frame, a diaphragm in the frame adjacent the secondary inlet, a disk upon the diaphragm, a lug upon the disk and a lever pivotally mounted on the lug pivoted at one end to the pintle and having its free end resting on the stem said

springs being disposed upon opposite sides of the pivot of said lever.

6. In a fluid regulating device, a casing, an inlet and outlet therein, a valve member in the casing, a stem on the valve member, a frame on the casing, a secondary power inlet in the frame, a movable impelling member in the frame offset from the valve stem, a lever pivotally connected with and engaged intermediate its length by the impelling member and engaging at one end the valve stem, and a spring in the frame supporting the other end of the lever.

7. In a fluid regulating valve, a casing with inlet and outlet, a valve controlling the same, a valve stem therefor, said stem being in adjustable sections, a spring acting on said stem, a diaphragm, a secondary power inlet for actuation of said diaphragm, a lever pendently supported from said diaphragm with one end resting on said stem, and means embodying said lever for preventing buckling of the valve stem.

In testimony whereof I have affixed my signature.

SHIRLEY S. WEEKS.