No. 885,812. PATENTED APR. 28, 1908.

J. E. WARD.

PRESSURE REGULATOR.

APPLICATION FILED DEC. 26, 1907.

Fig. 1.

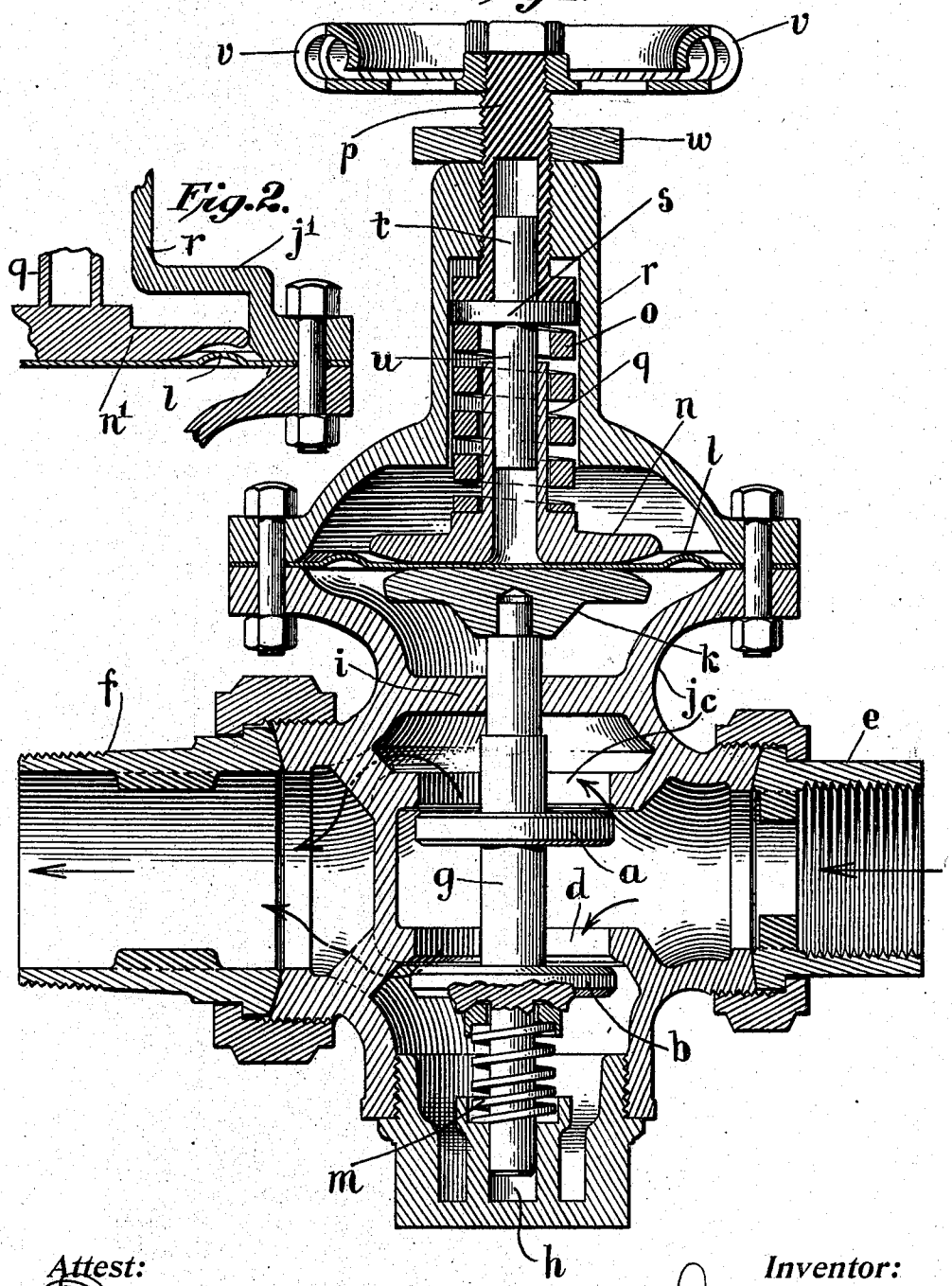


Fig. 2.

Attest:

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JOHN E. WARD, OF NEW YORK, N. Y., ASSIGNOR TO WARD EQUIPMENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRESSURE-REGULATOR.

No. 885,812. Specification of Letters Patent. Patented April 28, 1908.

Application filed December 26, 1907. Serial No. 408,156.

To all whom it may concern:

Be it known that I, JOHN E. WARD, a citizen of the United States, and a resident of the borough of Manhattan, of the city of New York, in the county and State of New York, have made certain new and useful Improvements in Pressure-Regulators, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The main object of the present invention is to provide a pressure regulator of the type or types embodying a diaphragm, in which the head or member bearing upon the side of the diaphragm opposite the valve, shall be maintained at all times in a central position. It is well known that when these regulators are set up in an inclined or horizontal position, as is often the case, this member or head has a tendency to drop more or less from its true position, having, as it does, a fairly loose working fit with its associated parts. When this member thus gets out of its true position, even though slightly, the parts tend to stick and the whole device is apt to work irregularly whereby the desired regulating effect cannot be secured. In the present case this difficulty has been overcome by the provision of an extended portion or shank upon the member in question and through which a working engagement may be had either directly or indirectly with the regulating screw which is preferably made hollow for this purpose. In this way the object of the invention can be realized without providing practically any additional parts; and the spring, through which in some regulators the centering has been effected heretofore, is left free and clear of the adjacent parts and thus performs the regulating functions more evenly and regularly. Moreover, the object of the invention may also be realized by extending the member or head in question so that it will touch the casing of the diaphragm chamber on all sides, and by so forming the diaphragm chamber that as the diaphragm moves, the extended portion or portions of the member or head will travel upon the sides thereof with which there should be a working fit.

In the accompanying drawing, Figure 1 is a view in central section of one embodiment of which the improvements are capable, and Fig. 2 is a sectional detail view on a smaller scale showing another embodiment.

The particular form of valve is of course not essential to the improvements, and neither are the parts directly associated with the valve. In the present case a valve having two plugs *a* and *b* and two coöperating seats *c* and *d* respectively, has been shown for purposes of illustration and explanation, this valve being located in a steam pipe so that the steam enters the valve through the portion of the steam pipe marked *e* and leaves through the portion of the steam pipe marked *f*. The valve plugs *a* and *b* are secured to a valve stem *g* the lower end of which is supported for longitudinal movement in a seat *h* and the upper end of which extends through a partition *i* which separates the diaphragm chamber from the valve chamber and which may be formed integral with the valve casing *j*. The upper end of the stem *g* is provided with a head or enlarged member *k* which is caused to press against the diaphragm *l* by a spring *m* in the lower part of the regulator, the stem having a free working fit in the partition *i* so as to permit it to move longitudinally under the action of the diaphragm and the spring *m*.

Upon the other side of the diaphragm is a head *n*, which, as shown in Fig. 1, is about the same size as the head *k* and which is caused to press against the diaphragm, as usual, by a spring *o* adapted to be placed under tension by means of a regulating screw *p*. This member or head *n* is provided, in accordance with the improvements, with a shank *q* which projects into the dome *r* of the diaphragm casing and coöperates with the screw *p* to center the head *n*, that is to maintain the head *n* always in its proper position, the regulating spring *o* embracing this shank and lying between the stem and the sides of the dome *r* whereby it is perfectly free to act.

Operative connection may be made in different ways between the shank *q* and the screw *p*, for the purpose of maintaining the central position of the head *n*. In the present case a connecting piece is provided which has a flange *s* and two projections *t* and *u* respectively. The projection *t* is extended within the screw *p* which is made hollow or tubular to receive such projections, and the projection *u* which is made preferably longer than the projection *t*, is extended into the shank *q* which is also made tubular and hollow for the same purpose. The flange *s* is

interposed between the screw p and one end of the spring o, thereby serving to maintain the projections t and u in their proper positions and also serving as a washer between the screw p and the end of the spring o. Moreover, this flange may serve to limit positively the upward movement of the diaphragm, as it will be obvious that when the shank q strikes this flange any further upward movement of the diaphragm is impossible. In some cases for the purpose of securing a wide range of regulation, it will be desirable to make the flange q too short to be brought against the washer by the upward movement of the diaphragm, in which case other means may be provided for limiting the movement of the diaphragm, as will be readily understood.

Referring to Fig. 2, which shows another form of pressure regulator embodying the improvements, it will be seen that the head n' is extended so as to meet the sides of the casing of the diaphragm chamber which is so formed that as the diaphragm moves the sides of the head n' will travel up and down the walls of the casing with which the head, of course, should have a free working fit. In this construction, the top of the casing of the diaphragm chamber is preferably formed so as to coöperate with the head n' to limit positively at a certain point the further movement of the diaphragm. This, as will be seen may be conveniently done by forming the chamber with a horizontal portion or portions j' with which the projecting portions of the head will come in contact when the diaphragm has reached its limiting position.

In the operation of the regulator, it will be understood that the requisite compression of the spring o is effected through a hand wheel v, the position of the regulating screw being maintained by a lock-nut w, such operation opening the valve and permitting steam to flow through the valve. When the pressure of the steam has reached the point for which the spring o was set it will act upon the diaphragm and raise the valve so that both of the valve plugs a and b will seat themselves and prevent the further passage of the steam. When, however, the pressure of the steam upon the discharge side of the valve, that is the steam in the pipe f, has dropped below that point for which the valve has been set, the diaphragm, which as will be obvious is always in communication with the pipe f, will again be depressed, thereby moving the valve plugs a and b off from their respective seats and permitting the further ingress of steam until the balance has again been produced.

It will be understood from the foregoing description that the improvements may be embodied in other structures than that shown in the single figure of the drawings or that in other words variations may be made from this structure without avoiding the spirit of the invention.

I claim as my invention:—

1. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member bearing upon the diaphragm and having an extended portion, a spring embracing the extended portion and pressing said member against the diaphragm, a regulating screw and a connecting piece loosely fitted between said screw and the extended portion of said member to maintain said member in a central position.

2. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member having a large head bearing upon the diaphragm and a tubular shank projecting from the head, a spring embracing the shank and pressing the head against the diaphragm, a tubular regulating screw, and a connecting piece extended within both the shank and the regulating screw and against which the spring operates.

3. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member having a large head bearing upon the diaphragm and a tubular shank projecting from the head, a spring embracing the shank and pressing the head against the diaphragm, a tubular regulating screw, and a connecting piece having a flange, one end of said connecting piece being inserted within the regulating screw and the flange of the connecting piece being interposed between the regulating screw and the spring.

4. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member bearing upon the diaphragm having a projecting tubular shank, a spring embracing the shank, a tubular regulating screw for the spring, and a connecting piece having a flange, a projection extending within the regulating screw and a projection extending within the shank.

5. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member bearing upon the diaphragm and having an extended portion, a regulating screw coöperating with the extended portion of said member to center said member, a spring bearing directly upon said member, embracing said extended portion and adapted to be placed under tension by said screw to press said member against the diaphragm and positive means to limit the movement of the diaphragm.

6. In a pressure regulator, the combination of a valve, a diaphragm in operative relation with the valve, a member bearing upon the diaphragm and having a tubular extended portion, a spring embracing the extended portion, a tubular regulating screw for the spring and a connecting piece having a

flange, said flange being interposed between the screw and the spring and also between the screw and the extended portion whereby the spring may be placed under tension through the medium of the flange and whereby the flange serves to check positively the movement of the diaphragm.

This specification signed and witnessed this 7th day of December, A. D., 1907.

JOHN E. WARD.

Signed in the presence of—
WILLIAM S. DENISON,
HENRY J. HORN.