(No Model.)

J. DE G. BRASSINGTON.

PRESSURE REGULATOR.

No. 533,864. Patented Feb. 12, 1895.

Fig. 1.

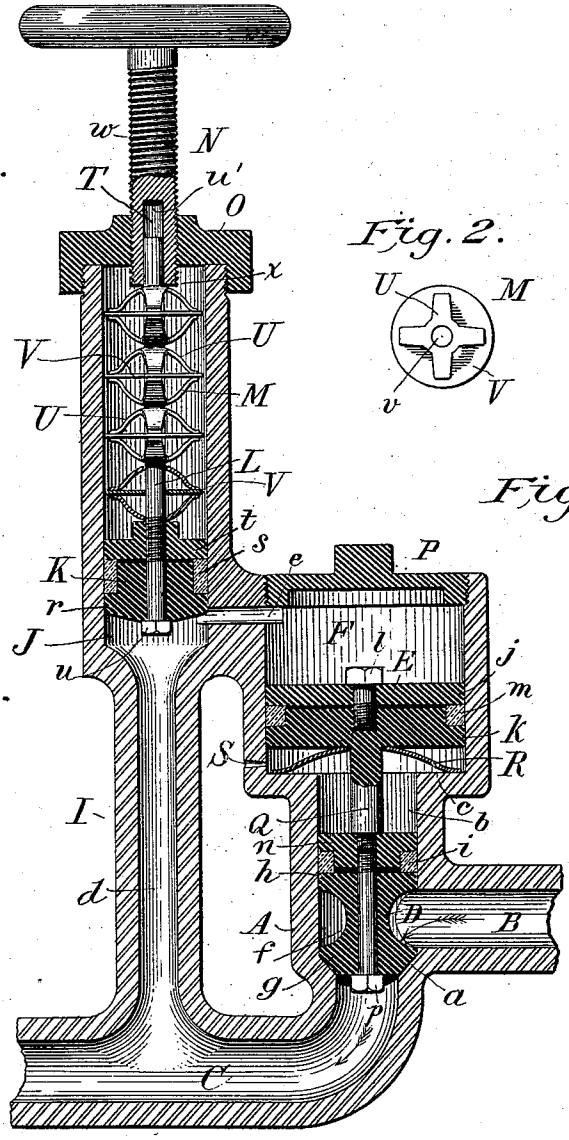
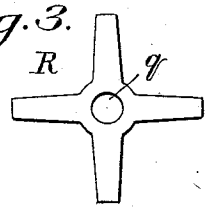


Fig. 2.

Fig. 3.



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JOHN DE GROAT BRASSINGTON, OF PORT RICHMOND, NEW YORK.

PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 533,864, dated February 12, 1895.

Application filed March 25, 1892. Serial No. 426,334. (No model.)

To all whom it may concern:

Be it known that I, JOHN DE GROAT BRASSINGTON, a citizen of the United States, residing in Port Richmond, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is a specification.

This invention relates to pressure regulators of the class having ingress and egress passages and a valve automatically controlling communication between said passages actuated automatically by the pressure at the egress side of the regulator.

My invention aims to provide an improved regulator acting on this principle which will be simple of construction, which will operate freely and with the minimum of frictional retardation, and which can be adjusted to remain entirely open until a maximum egress pressure is reached, and which will not "chatter" in use.

To this end in carrying out my invention I provide certain improvements in the construction and arrangement of such regulators which will be hereinafter fully set forth.

In the accompanying drawings, Figure 1 is an axial section of a pressure regulator constructed according to the preferred form of my invention. Fig. 2 is a separate plan view of the compression spring, and Fig. 3 is a plan view of the spring used for opening the valve in this instance.

Referring to the drawings let A indicate the valve shell; B, the ingress passage thereof; C, the egress passage; D, the valve as a whole; E, the piston; F, the cylinder therefor; I, the conduit between the egress passage and cylinder; J, the auxiliary valve chamber; K, the auxiliary valve therein; L, the stem of the latter; M, its spring; N, its adjusting handle, and O the cap closing the top of chamber J and through which the stem *w* operates.

The shell A may be of any suitable or convenient construction, but I prefer to construct it as shown as a single integral casting. Preferably it is constructed with a projecting valve seat *a*, between the ingress and egress passages, this seat being here shown as tapered, and axially above said seat with a cylindrical guiding chamber *b*, and thereabove with an enlarged cylinder F into which said chamber *b* opens, a shoulder *c* intervening between the cylinder and chamber. The duct I, preferably consists of a vertical conduit *d* rising from the passage C to the auxiliary chamber J, and a horizontal passage *e* communicating between the latter and the cylinder F. The auxiliary chamber J is preferably an enlarged cylindrical extension of the conduit *d*, and is screw threaded at its upper end to permit the coupling of the cap O thereon. Preferably the cylinder F is closed by a screw threaded plug P at its upper end.

The shell A is cast in one integral piece by providing a core corresponding to the interiors of the passages B and C, guiding chamber *b*, cylinder F, ducts *e* and *d*, and valve chamber J. This core can be conveniently formed in one piece, and its ends can project for support in the mold beyond the end of the valve chamber J, cylinder F and passages B and C. By disposing the duct *d* and valve chamber J in the same axial plane, on substantially the same axis, and the cylinder F and guiding chamber *b* on the same axis and parallel with that of the duct and valve chamber, this coring is rendered simple and convenient.

The valve D and the piston E may each be of any desired construction and may be connected together in such manner as convenience dictates. Preferably the valve is substantially balanced, and is constructed with a head *f* having a tapered seating end *g*, fitting the seat *a*, a reduced middle portion within the passage B, and a cylindrical packed portion *h*, fitted to slide in and be guided by the guiding chamber *b*. Preferably the valve is constructed to seat impassably against the seat *a* and to move axially away therefrom in opening. It is packed at its upper end, preferably by a packing ring *i*, with sufficient tightness to prevent leaking at this end, but in such manner as to reduce to the minimum frictional retardation of its movement in the chamber *b*.

The piston E is preferably constructed with a top disk *j*, and a bottom disk *k* clamped together by a bolt *l* and having a peripheral packing ring *m* fitting the cylinder F with sufficient tightness to prevent leakage but sufficiently loose to reduce frictional retardation to the minimum consistent with a tight

joint. Preferably the piston and valve are connected together by a stem Q shown as formed integrally with the disk *k*, depending therefrom into the chamber *b* and having a head *n*, clamped to the valve head *f* by a bolt *p* in such manner as to secure the packing ring *i* between the portion *h* of the valve head and the head *n*.

Any suitable or convenient means may be provided for giving the valve a normal tendency to open. I prefer to employ the leaf spring R, which in the construction shown is a four armed spring, having a central aperture *q*, embracing the stem Q, and bearing at its center against the disk *k*, and at its extremities against the shoulder *c*, the spring acting when expanded to force the piston and valve away from the valve seat.

Preferably an orifice S through the shell A affords communication between the exterior and the interior of the cylinder F below the piston E. This orifice constitutes a duct whereby atmospheric communication is afforded to prevent abnormal pressure beneath the piston as it descends, or vacuum as it rises.

According to the construction described the valve D will normally stand open, permitting flow through ingress passage B to egress passage C, and the pressure in the latter will rise through duct I, and act in cylinder F against piston E, tending to close the valve against the spring R. As the egress pressure increases the valve will be forced toward its seat and at the predetermined limit of egress pressure the valve will be tightly seated against this seat by reason of the pressure against the piston E overcoming the resistance of the spring R. As the pressure falls at the egress side the spring will again open the valve.

I will now describe my improved auxiliary valve. The function of this is to control the operation of the main valve B, to maintain it completely open until the egress pressure arrives at a predetermined limit, and also where the regulator is to be thrown out of operation as such, to cut off communication between the egress passage and the piston, whereupon the valve will be balanced and maintained open by the provision tending normally to open it.

Preferably the auxiliary valve in action operates automatically as heretofore to close communication between the egress passage and the piston until a certain limit of egress pressure is reached, whereupon it automatically opens, and the pressure rushing into the cylinder F acts against the piston E and closes the valve D quickly.

In the construction shown, the auxiliary valve K is a piston valve constructed with a head *r*, surrounded by a packing ring *s* and working vertically in the auxiliary valve chamber J, operating as it passes the duct *e* to close the latter and thereby interrupt communication through the conduit I. Preferably the valve K is constructed with a disk *t* clamped against the head *r* by a bolt *u*, and serving to secure the packing ring *s* in place. Preferably the valve K has a stem L for guiding it, that shown being a cylindrical stem entering a recess T in the handle N, guided thereby, and limited in its outward movement by abutting against the end *u'* of such recess, which thereby serves as a stop.

Preferably the valve K is a spring actuated valve. In the construction shown a spring M mounted above the valve within the chamber J tends to force the valve downward against the egress pressure and thereby to seat it. The construction of spring shown is that I prefer to use. It preferably consists of separate elastic leaf like pieces U U, and interposed inelastic disks V V. The pieces U are shown as constructed with four arms, and these pieces and the pieces V are each provided with central perforations *v*. All the pieces of the spring are separate and independent, whereby it can readily be repaired by substituting a perfect for an imperfect piece and its length can be altered by adding to or removing the requisite number of pieces.

In the construction shown the pieces of the spring M are passed over the stem L of the valve with their central perforations *v* embracing the latter.

The regulating handle N is constructed to be adjustable toward and from the valve to adjust the position of the latter and to control its operating tension. Preferably the stem *w* of the handle is screw threaded, passing through a screw threaded aperture in the cap O and its end *x* bears against the spring M whereby as the handle is adjusted, it compresses or expands the spring to increase or diminish its tension on the valve. When the handle is screwed inwardly its stop *u'* by abutting against the stem L forces the valve closed and prevents its opening until readjusted, thereby entirely disconnecting the cylinder F and piston E from the egress passage, whereupon the regulator ceases to act as such, and even pressure exists in both passages, the valve D remaining open under tension of its spring R.

In operation the handle of the auxiliary valve will be adjusted so that the latter will remain closed until a predetermined limit of egress pressure is reached. Until this time the piston E and valve D will be open and removed from the action of the egress pressure. As soon as the auxiliary valve opens the egress pressure will act against the piston E, to control the valve D, and if stronger than the tension of the spring R will quickly close the latter without intermediate oscillation thereof.

It will be seen that my invention provides an improved pressure regulator which can be readily thrown into or out of action and conveniently controlled, which is simple in construction, and in which there is but two packed surfaces affording frictional retardation to the operation of the valve, and which will not "chatter."

It will be understood that my invention is not limited to the exact adaptation or construction described and shown, and that it may be variously applied and modified as circumstances or the judgment of those skilled in the art may dictate without departing from its essential features.

What I claim is, in pressure-regulators or analogous devices, the following-defined novel features and combinations, substantially as hereinbefore set forth, namely:

1. In a pressure regulator, the integral casing A, having ingress passage B and egress passage C, projecting valve seat *a*, cylindrical guiding chamber *b*, enlarged cylinder F, and ducts *d* and *e* communicating between the egress passage C and the outer end of said cylinder, in combination with valve D fitting said cylindrical guiding chamber, constructed with seating end *g* for engaging said seat, a reduced middle portion above said end and opposite the ingress passage, cylindrical portion *h* above said passage, and the piston E in said cylinder constructed with depending stem Q entering said guiding chamber and carrying at its lower end head *n* clamped to said valve by screw *p*, all substantially as and for the purpose set forth.

2. In a pressure regulator, the combination with the integral shell A having ingress passage B, egress passage C, valve seat *a*, cylinder F, duct *d* communicating with said egress passage, valve chamber J at top of said duct, duct *e* between said valve chamber and said cylinder, and guiding chamber *b* beneath said cylinder, valve D in said guiding chamber for controlling communication through the regulator, piston E in said cylinder for controlling said valve under the egress pressure, valve K in said valve chamber for controlling communication through said ducts to said cylinder, upwardly extending stem L for said valve K, a spring, as M, surrounding said stem, inclosed in said valve chamber and acting to move said valve against the egress pressure, cap O, closing the top of said valve chamber, and handle N for controlling said valve K, constructed with exteriorly screw-threaded stem *w* adjustably traversing said cap O, and acting against said spring to control its tension, and having recess T in its end engaging the end of said valve stem L, all constructed substantially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN DE GROAT BRASSINGTON.

Witnesses:
GEORGE H. FRASER,
CHARLES K. FRASER.