

No. 853,693.

PATENTED MAY 14, 1907.

F. F. HEALEY.
PRESSURE REGULATING VALVE.

APPLICATION FILED JUNE 22, 1906.

FIG. 1

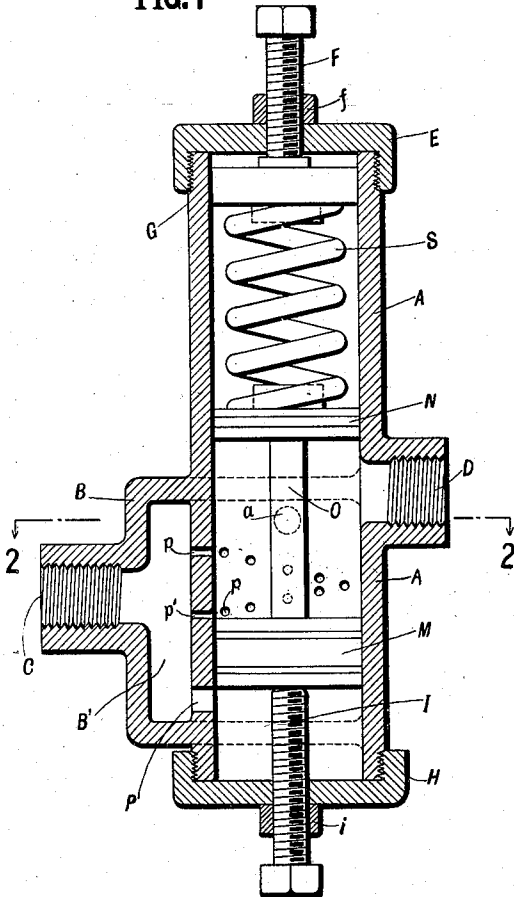


FIG. 2

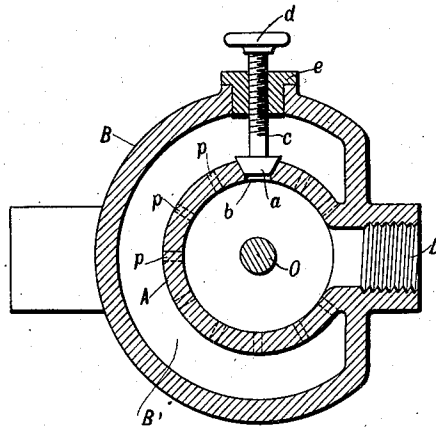
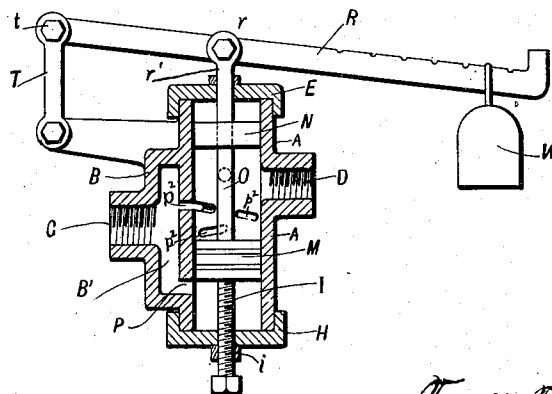


FIG. 3



WITNESSES

Max P. A. Goring.
William Stahl.

INVENTOR

Frank F. Healey
BY *Philip C. Kerk*
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK F. HEALEY, OF NEW YORK, N. Y.

PRESSURE-REGULATING VALVE.

No. 853,693.

Specification of Letters Patent.

Patented May 14, 1907.

Application filed June 22, 1906. Serial No. 322,872.

To all whom it may concern:

Be it known that I, FRANK F. HEALEY, a citizen of the United States, residing in the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Pressure-Regulating Valves, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a vertical, sectional elevation of my improved valve; Fig. 2 is a horizontal, sectional view, taken on the dotted line 2—2 of Fig. 1, looking in the direction of the arrows; Fig. 3 is a vertical, sectional elevation of a modified form of my improved valve.

Similar letters refer to similar parts throughout the several views.

My invention relates, among other things, to improvements in that class of valves, wherein it is designed to regulate and reduce a higher irregular pressure derived from a source of supply, to a constant predetermined lower pressure, and to maintain said lower pressure so that any expanding fluid under pressure, such as steam, may be delivered through the outlet port of my improved valve at a constant pressure, which may be adjusted at will.

Heretofore I have found that it was impossible to employ any form of pressure-regulating valves now procurable in the market, that would be satisfactory and reliable, but I have found that a pressure-regulating valve so constructed as to incorporate within itself the essentials of my improved valve hereinafter described, will adjust and regulate variable higher pressures, coming from a steam boiler for example, into a lower pressure to be employed in performing work, which lower pressure will be constant and may be regulated, by the devices hereinafter described, to a predetermined pressure.

I attain these desired objects by the mechanisms, the description and operation of which I will now set forth.

A is the inner lower pressure chamber of my improved valve, preferably cylindrical in form and having the outer higher pressure chamber B surrounding the chamber A and preferably integral therewith, as shown in Figs. 1 and 2.

C is the inlet port from the source of supply

connected with the higher pressure chamber B.

D is the outlet port connected with the inner lower pressure chamber A as shown in Figs. 1 and 2 and should be connected with the desired machine for performing the work.

E and H are suitable caps or heads screwed on the upper and lower ends respectively of the inner chamber A. The cap E has the regulating pin F journaled in the cap by the ring *f* and threaded therein so as to readily adjust the position of the plate G, which is movable within the chamber A, and so regulate the force of the spring S, the function of which will be hereinafter described.

The lower regulating pin I journaled in the ring *i* and suitably threaded therein, serves to prevent the piston M from descending too far so as to close the port P in the lower end of the higher pressure chamber B when my improved valve is not in use.

Cut in the partition walls between the outer higher pressure chamber B and the inner lower pressure chamber A are a series of small holes or restricted ports *p*, *p*, *p'*, etc. as shown in Figs. 1 and 2, which serve as minute passageways for the expanding fluid under pressure to be conducted with a certain amount of loss of pressure from the higher to the lower pressure chambers. They are arranged on an inclined plane in reference to the longitudinal axis of the two chambers as shown in Fig. 1.

M and N are two pistons in said inner chamber A, rigidly connected with each other by the rod O, and movably operating within said inner chamber A. The thickness of the piston M should be equal to, or greater than the distance between the highest and the lowest of the restricted ports, that is between *p* and *p'* shown in Fig. 1, so that all the restricted ports may be entirely closed if necessary by the cylindrical vertical surface of the piston M.

S is a circular coil spring within the inner chamber A, its upper part fitting snugly against the plate G and its lower part pressing against the upper side of the piston N. The force of the pressure of the spring upon the piston N may be predetermined and adjusted by the regulating pin F in a manner that is well understood.

In Fig. 2 *d* is the regulating pin of a pin-valve *a*, its threaded part being journaled in

the ring *e* fitted rigidly in the shell of the outer chamber B. The opening *b* in the shell of the inner chamber A may be opened or closed by turning the pin *d* by means of the valve *a*, the operation of which will be well understood by those skilled in the art.

Referring to Fig. 3, I have here shown a modified form of my regulating valve, which, in lieu of the spring S, employs a weight which may be regulated upon a lever. The rod *r'* is a continuation of the connecting rod O between the pistons M and N and passes through the cap E and is pivotally connected with the lever arm R at *r*. The lever arm R is fulcrumed at *t* to a rigid support T. At the opposite end of the lever arm is attached a suitable weight W, and the force of this weight at *r* through the rod *r'* upon the piston N may be regulated by shifting the weight W upon the series of notches cut in the lever arm R as shown in the figure and in a manner that is well understood.

In lieu of the restricted ports *p* shown in Figs. 1 and 2, I have, in Fig. 3, constructed my improved valve with a series of narrow slots *p¹, p², p³*, cut in the partition wall between the two chambers A and B and are spirally disposed about the longitudinal axis of the inner chamber A. The function of these narrow slots is the same as that of the restricted ports hereinbefore referred to. Otherwise the construction and operation of the various parts of my improved valve shown in Fig. 3 is the same as that already shown and described in reference to the form of valve set forth in Fig. 1.

The operation of my improved pressure-regulating valve is as follows. The expanding fluid, under a higher pressure than is designed for employment in performing the desired work passes into the chamber B by means of the port C. This fluid, under such higher pressure at once seeks the inner lower pressure chamber A through the restricted ports or slots *p, p', p²*, etc. and at the same time passing through the port P acts on the piston M with a pressure that would move the piston upwardly against the lower pressure of the inner chamber A and the spring S. This upward movement of the piston M serves to close successively the restricted ports or slots and so gradually reduce the area of the passageways of the expanding fluid under pressure from the higher to the lower pressure chambers, thereby reducing the pressure of such expanding fluid within the chamber A to that desired by the apparatus, the force of the spring S or the weight W upon the piston N being regulated so as to serve as a counter balance to the excess of pressure on the lower piston M, derived through the port P from the higher pressure chamber B. The movements of the pistons M and N with their connecting rod O will be automatic and will serve to continuously and

accurately regulate and adjust the higher irregular pressure from the source of supply filling the chamber B, with constant pressure issuing from the port D.

The function of the pin-valve *a* is to enable my improved valve to have an initial movement imparted to the apparatus with the employment of my improved device and it will be noted that I have placed such pin-valve out of the reach of the vertical surface of the piston M.

My improved valve may be employed with steam, gas and air pressures, with equal facility and accuracy, it being evident that one of the important features of my invention is the securing of an automatic regulation of the lower pressure by the co-action of the higher pressure against some constant force that can be regulated as is desired by means of the spring or weight, or other suitable appliance.

I do not wish to limit myself to the precise form of the mechanisms herein shown, for many changes may be made in the means I have illustrated and described, without departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is the following, viz:—

1. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of restricted ports cut in the walls of said inner chamber, and means actuated by variations in pressures between that of the higher pressure chamber and a constant force, for successively opening and closing said restricted ports.

2. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of narrow slots spirally disposed cut in the walls of said inner chamber, and means actuated by variations in pressures between that of the higher pressure chamber and a constant force, for successively lengthening and shortening the openings of said slots.

3. A pressure regulating valve comprising higher and lower pressure chambers having inlet and outlet ports respectively, a plurality of restricted ports cut in the partition walls between said higher and lower pressure chambers, and a piston within said lower pressure chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a constant force, whereby said restricted ports may be opened and closed by the said piston successively under said variations in pressures, substantially as described.

4. A pressure regulating valve comprising

higher and lower pressure chambers having inlet and outlet ports respectively, a plurality of narrow slots spirally disposed cut in the partition walls between said higher and lower pressure chambers, and a piston within said lower pressure chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a constant force, for successively lengthening and shortening the openings of said slots, substantially as described.

5. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of restricted ports cut in the walls of said inner chamber, and a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a constant force, whereby said restricted ports may be opened and closed by said piston successively under said variations in pressures, substantially as described.

6. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of narrow slots spirally disposed cut in the walls of said inner chamber, and a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a constant force, for successively lengthening and shortening the openings of said slots.

7. A pressure regulating valve comprising higher and lower pressure chambers having inlet and outlet ports respectively, a plurality of restricted ports cut in the partition walls between said higher and lower pressure chambers, a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a spring so adjusted as to oppose the force of the higher pressure, whereby said restricted ports may be opened and

closed by said piston successively under said variations in pressures, substantially as described.

8. A pressure regulating valve comprising higher and lower pressure chambers having inlet and outlet ports respectively, a plurality of narrow slots spirally disposed cut in the partition walls between said higher and lower pressure chambers, a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a spring so adjusted as to oppose the force of the higher pressure, for successively lengthening and shortening the openings of said slots, substantially as described.

9. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of restricted ports cut in the walls of said inner chamber, a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a spring so adjusted as to oppose the force of the higher pressure, whereby said restricted ports may be opened and closed by said piston successively under said variations in pressures, substantially as described.

10. A pressure regulating valve comprising an outer higher pressure chamber connected with the inlet port, an inner lower pressure chamber within said outer chamber connected with the outlet port, a plurality of narrow slots spirally disposed cut in the walls of said inner chamber, a piston within said inner chamber, automatically operated by variations in pressures between that of the higher pressure chamber and a spring so adjusted as to oppose the force of the higher pressure, for successively lengthening and shortening the openings of said slots, substantially as described.

FRANK F. HEALEY.

Witnesses:

WILLIAM STAHL,
GEORGE G. MEASURES.