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AUTOMATIC RELIEF MEANS FOR COMPRESSOR REGULATORS.

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1,366,853. Patented Jan. 25, 1921.

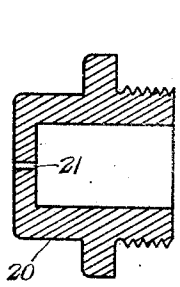


Fig. 3.

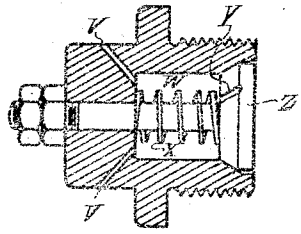
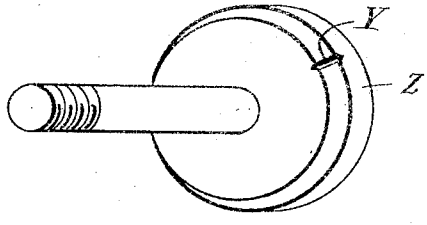


Fig. 2.

Fig. 1.

Fig. 4.



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AUTOMATIC RELIEF MEANS FOR COMPRESSOR-REGULATORS.

1,366,853. Specification of Letters Patent. Patented Jan. 25, 1921.

Application filed October 16, 1918. Serial No. 258,416.

To all whom it may concern:

Be it known that I, CHARLES WAINWRIGHT, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in Automatic Relief Means for Compressor-Regulators, of which the following is a specification.

My present invention has to do with automatic relief means for compressor regulators.

Generally speaking, the object of the invention is the provision of automatic relief means for assuring prompt action of compressor regulators; the said means being characterized by the fact that it remains open until the proper volume of compressed air passes the main valve of the regulator and is then closed by said volume, and also by the fact that it is instantaneously opened at the proper time to afford full and adequate communication to the atmosphere.

To the attainment of the foregoing, the invention consists in the improved relief means and in the combination as hereinafter described and definitely claimed.

In the accompanying drawings, hereby made a part hereof:

Figure 1 is a section showing a compressor regulator embodying the best practical reduction of my invention that I have as yet devised.

Fig. 2 is a detail section showing the relief means *per se*.

Fig. 3 is a detail section showing an old relief device which is not of my invention and which is deficient for reasons hereafter explicitly set forth.

Fig. 4 is a detail perspective showing the vent Y and valve Z.

Referring by numeral and letter to figures 1 and 2 of the drawings:

1 is the body of the governing device and 2 is a casing connected through a union 3 with the body.

A pipe A leads from a compressor and is in communication with a chamber H in the body 1 and a chamber C in the casing 2. The chamber C is connected through an annular valve seat 4 with a lower chamber D, and opposed to the said seat 4 is the valve J of the main piston B of the regulator; the said piston B being backed by a spring I. A piston K is returned to its normal position by a retractile Q; said spring being connected to one arm of a lever 5 that is fulcrumed at 6 and is movable by the piston. The other arm of said lever 5 is opposed to a plunger M having a head N and also having a port N′. A valve seat N^2 is provided in the chamber H, and below the said valve seat N^2 a pipe F is connected; said pipe F being designed to be connected with an apparatus (not shown) that is to be controlled by the regulator. After the air leaves the point F, Fig. 1, it can be used to control anything controllable by the rise and fall of pressure. The apparatus to be controlled is not comprised in my present invention, and I have therefore deemed it unnecessary to illustrate the same. A valve P is opposed to the valve seat N^2 and has its stem extended through the valve seat N^2 and opposed to the upper end of the plunger M. Said valve P is backed by a spring R.

In the general operation of the regulator as thus far described, it will be understood that when a certain predetermined air pressure is collected in the chamber C, said pressure operates to raise the valve or piston B against the action of the spring I and opens the valve J with the result that the compressed air enters the chamber D which is in full communication with the chamber in body 1 in which the piston K is disposed. This compressed air depresses the piston K and forces the plunger M upwardly until the plunger head N brings up against the under side of the body 1, whereby the port N′ is closed to the atmosphere. The upward movement of the plunger M is attended by opening of the valve P against the action of the spring R, and hence compressed air is enabled to pass through the pipe F to the apparatus to be controlled by the regulator. When the predetermined pressure in chamber C falls to a certain extent the valve J closes and the piston K is returned to its normal position by the retraction of the spring Q, and consequently the valve P is returned to and held against its seat. The plunger M also moves downwardly with the result that the compressed air in the pipe F and the apparatus to which it leads is exhausted through a port N′ to the atmosphere.

When a relief device, such as the device 20 shown in Fig. 3 provided with a vent 21 is employed in communication with the chamber D, the condition frequently arises where air pressure in its action upon the piston B will substantially balance or counteract the pressure of the spring I with the result that a small volume of air finds its way past

the valve or valve body J and into the chamber D. In consequence of this, pressure accumulates in the chamber D and moves the piston K against the action of the spring Q. Now, because of the said condition between the piston B, the piston K and the relief device 20, the piston K will be caused to vibrate and this latter will be attended by vibrations of the valve P and the apparatus to which the pipe F is connected and in many cases the said apparatus will be made to hammer to a serious extent.

My present invention as before indicated is intended to preclude the said vibration of the elements in the regulator and in that way eliminate any liability of hammering in the apparatus connected to the pipe F. In the present and preferred embodiment of my invention the relief means is made up of a body T connected to the casing 2 and having a chamber W in communication with the chamber D and also having vents V between said chamber W and the atmosphere, and a valve Z normally held away from its seat Y by a spring X. Across the seating portion of the valve Z is a minute groove Y, Figs. 2 and 4, designed to afford a very small vent from the chamber D to the atmosphere.

When preferred the vent Y may be formed in the valve Z, Fig. 4.

In the operation of the regulator equipped with my novel relief means the valve Z will close immediately upon the passage of the correct valume of air past the valve J and will practically and promptly cut off communication between the chamber D and the atmosphere. Consequently the piston K will be positively and promptly forced downwardly to establish the supply of compressed air to the pipe F. When, on the other hand, the pressure in chamber D drops below the correct amount the valve Z is instantaneously opened by the spring X with the result that all of the compressed air within the chamber D is quickly exhausted to the atmosphere and in consequence the piston K is quickly returned by the spring Q to its normal position whereupon the pipe F will be opened to the atmosphere through the port N′. In this connection it will be understood that there is a vent P^2 in the piston on the lower portion of the stem of the valve P. Manifestly the prompt and positive action of the piston K assures prompt and positive action of the compressor regulator as a whole. It will be noticed in this connection that incidental to the operation of the regulator the valve Z remains open until the correct volume of compressed air passes the valve J and that at said time the valve Z is closed by the pressure in the chamber D, and it will also be noticed that when the valve Z is opened a full and adequate discharge to the atmosphere is afforded which conduces to the advantageous positive and prompt action before alluded to.

In my novel relief means I seek to control the rate of ingress to and egress from chamber D by automatic means. For instance a condition might arise where the pressure in the chambers D and C are balanced and the piston B suspended with resulting fluttering of the piston K. Such a condition would be prevented by the automatic vent, inasmuch as the same would assure prompt action on the piston K.

Having described my invention what I claim and desire to secure by Letters Patent is:

1. A compressor regulator having a chamber adapted for connection with a compressor, a valve to control communication between the compressor and said chamber, and a separate, independently-operable relief valve complementary to said chamber and constructed and arranged to remain open until the first valve has opened a predetermined distance and to then be closed to practically close communication with the atmosphere and also constructed and arranged to remain closed until the pressure is reduced to a predetermined extent and to then promptly open and afford free communication to the atmosphere, whereby positive action of the regulator is insured.

2. A compressor regulator having chambers adapted for communication with a compressor and also having a port for connection to an apparatus to be controlled, a valve controlling communication between one of the chambers and said connection port, a valve for controlling communication between the source of compressed air supply and the other chamber, means for opening the first named valve by pressure from the last named chamber, and a separate, independently-operable relief valve complementary to the last named chamber and constructed and arranged to remain open until the last named valve has opened a correct distance and to then be closed to practically close communication with the atmosphere and also constructed and arranged to remain closed until the pressure is reduced to a certain extent and to then promptly open and afford free communication to the atmosphere.

3. A pressure regulator having chambers adapted for communication with a compressor, and also having a valved port for connection to an apparatus to be controlled; said valved port being adjacent one of the chambers, a valve complementary to the other chamber, means subjected to the pressure in the last named chamber for opening the first named valve; said means including a provision for exhausting air from the connection to the apparatus to be controlled

when the pressure in the regulator is reduced, a separate, independently operable valve complementary to the last named chamber, and a spring for normally opening said valve, the valve being constructed and arranged to be closed after the collection of adequate pressure in the chamber and to then be closed by said pressure, and also constructed and arranged to promptly open and afford free communication to the atmosphere when the pressure is reduced.

In testimony whereof I affix my signature.

CHARLES WAINWRIGHT.