

C. WAINWRIGHT.
VALVE.
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931,532.

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Fig. 1.

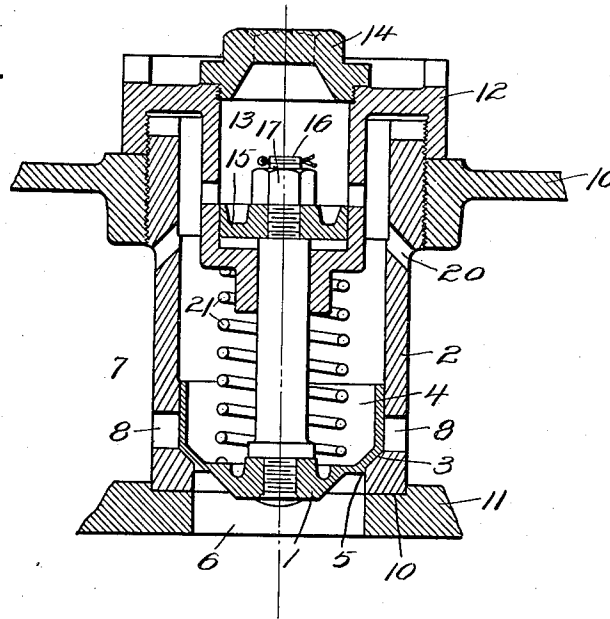
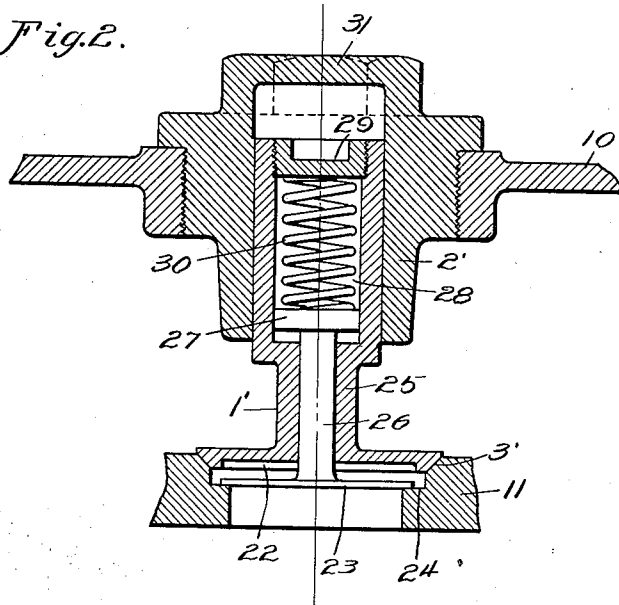


Fig. 2.



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VALVE.

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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 Valves, of which the following is a specification.

This invention relates to valves, the object in view being to produce a discharge valve of the automatic lift type, especially designed for use in connection with air compressors, the said valve being adapted for rapid work and being cushioned in operation so that while a high degree of lift of the valve may be obtained, thus securing the full area of the valve hole, the closure or seating of the valve is cushioned in a manner which will insure overcoming the objectionable dancing and chattering of the valve against the seat and the consequent return or back-flow of the pressure into the compression cylinder. At the same time a practically quiet and noiseless valve is produced.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a sectional view of a valve embodying the present invention, showing the preferred form thereof. Fig. 2 is a similar view showing a modified form of valve involving the same principles.

Referring to the drawings, 1 designates the valve and 2 the valve guide or casing in which the valve moves toward and away from its seat which is indicated at 3, the seat 3 being shown in conical form while the valve which is in the main cylindrical, is provided with a conical seating face for contact with the seat 3, as clearly shown in Fig. 1.

At one side of the conical face of the valve, the valve body is of cylindrical form as shown at 4 so as to fit closely within the guide 2 and be directed toward and away from the valve seat. At the opposite side of the conical face of the valve, there is a shallow or relatively narrow preclosure face 5 which is also cylindrical and of relatively smaller diameter than the main cylindrical body 4 of the valve, the said preclosure face 5 fitting snugly and slidingly in the port 6

which fits from the cylinder in which the air is compressed to the space 7 surrounding the guide 2 into which space 7 the air is taken through openings 8 in the guide after passing by the valve.

The guide 2 is exteriorly threaded as shown at 9 and is screwed through an opening in the walls 10 of the discharge passage 7, which, it will be understood, communicates with the storage tank into which the air is finally compressed. The opposite end of the guide 2 is raised in a recess 10 in the wall 11 of the cylinder in which the air-compressing piston works, the latter not being shown. Upon the outer end of the guide 2 there is screwed a cap 12 the central portion of which is in the form of a hollow cylinder which extends well into the guide 2 as shown in Fig. 1 and forms a cylindrical cushion chamber 12 the outer end of which is closed by means of a plug 14 preferably screwed into the same, as shown.

The valve 1 has connected thereto a stem 13 which works through the inner end of the cushion chamber 13 and has mounted fast thereon a cushion piston 15, the stem 13, for that purpose, having a reduced threaded end portion 16 upon which is placed a nut 17 which holds the cushion piston 15 against a shoulder 18 on the stem 13 formed by the reduced threaded portion 16 of said stem. The piston 15 fits tightly in the cushion chamber 13 and is adapted to move back and forth therein and to trap a certain amount of air between itself and the inner end of the cushion chamber, air being admitted to the cushion chamber 13 through ports 19 and 20 formed respectively in the side walls of the cushion chamber and the guide 2, whereby the compressed air in the passage 7 is admitted to the cushion chamber 13. Interposed between the inner end of the cushion chamber and the valve 1 is a valve closing spring 21 the tension of which is sufficient to press the valve 1 against its seat and prevent the back-flow of the air pressure to the cylinder through the port 6. While the spring 21 acts to return the valve quickly to its seat on the return or inactive stroke of the piston in the compression cylinder, it will be apparent that the preclosure face 5 will fill the port 6 before the working face of the valve strikes against the valve seat 3, which thus acts to cushion the closing of the valve. Furthermore this effect is materially added to by the air c. sh-

ion formed between the cushion piston 15 and the inner wall of the cushion chamber 13. The movement of the valve is thus arrested shortly before the working face of the valve meets the valve seat, thereby avoiding the objectionable pounding or hammering of the valve and the consequent chattering or dancing of the valve which is ordinarily due to a certain proportion of the compressed air temporarily holding the valve off its seat and defeating the instantaneous closing of the same. The preclosure face 5 practically fills the port 6 and shuts off the back-pressure of the air while the cushion feed insures the full return of the valve to its seat in a soft and noiseless manner. It will also be observed that all of the operative parts of the valve are removable with the cap 12 so that by simply unscrewing the cap 12, the valve together with the stem and actuating spring and the cushion piston are removed from the guide 2, the latter being thus left in place in readiness to receive the parts referred to after the necessary repairs or adjustments have been effected.

Under the arrangement shown in Fig. 2, the guide 2' is screwed directly into the opening in the wall 10 and terminates short of the wall 11 of the cylinder. The valve 1' is provided in its outer face with a recess 22 of substantially the same size as an auxiliary valve or preclosure device 23 in the form of a flat disk adapted to be moved into the recess 22. The valve seat in addition to the conical face 3' is provided with a flat face 24 against which the auxiliary valve 23 is pressed and held while the main valve 1' rests against the valve seat 3. The stem 25 of the main valve 1 is centrally bored to receive the stem 26 of the auxiliary valve 23 while the upper end of the stem 26 carries a cushion piston 27 which works in a cushion chamber 28 formed in the upper portion of the valve stem 25 to the upper end of the said cushion chamber being closed by a plug 29. 30 designates a valve-seating spring which is interposed between the plug 29 and the piston 27 said spring acting to press the auxiliary valve 23 against the flat seat 24. The valve guide 2' is provided with a cylindrical bore to receive and admit of the sliding movement of the stem 25 and is closed at its upper end as shown at 31 by a head of nut form adapted to receive a suitable wrench to enable said guide to be removed from and replaced in the opening formed therefor in the wall 10. In the construction shown in Fig. 2 as in the construc-

tion shown in Fig. 1, an air cushion is 60 formed between the cushion piston 27 and the inner end of the engine chamber 28 while the auxiliary valve 23 acts as the preclosure device instead of the preclosure face 5 described in connection with Fig. 1. In 65 the return movement of the valve 1' to its seat, the auxiliary valve or preclosure device 23 is first returned to its seat by the action of the spring 30 after which the main valve 1' is returned to its seat by the action 70 of the air pressure in the passage 7 due to the outer face of the main valve 1' being of greater area than the inner face thereof or that face which is disposed on the auxiliary valve 23. The construction illustrated in 75 Fig. 2 also avoids the noisy chattering and dancing of the hammer of the valve against the valve seat.

I claim:—

1. A cushion valve comprising a cylindrical valve guide embodying a valve seat, a valve movable within said guide, a centrally arranged cushion chamber extending into the valve guide and closed at both ends and having an air inlet port, a piston movable 85 within said cushion chamber, a valve stem connecting the valve with the cushion piston, and a valve seating spring, said valve guide being provided with one or more outlet ports adapted to be closed by a portion of the 90 valve.

2. A cushion valve comprising a cylindrical valve guide embodying a valve seat, a valve movable within said guide and provided with a preclosure face projecting beyond the working face of the valve, a cap fitting over one end of the valve guide and provided with a centrally arranged cushion chamber extending into the valve guide and having an air inlet port, a cushion piston 100 movable within said cushion chamber, a valve stem connecting the valve with said cushion piston, and a valve seating spring disposed around said stem and interposed between the valve and said cushion chamber, 105 said valve guide being provided with one or more outlet ports adapted to be closed by a portion of the valve, a main inlet port controlled by the working face of the valve, and one or more air ports for admitting air 110 to the cushion chamber.

In testimony whereof I affix my signature in presence of two witnesses.

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Witnesses:

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