C. W. VOLLMANN.

COMPRESSOR VALVE.

APPLICATION FILED JUNE 21, 1916.

1,258,167. Patented Mar. 5, 1918.

Fig. 1.

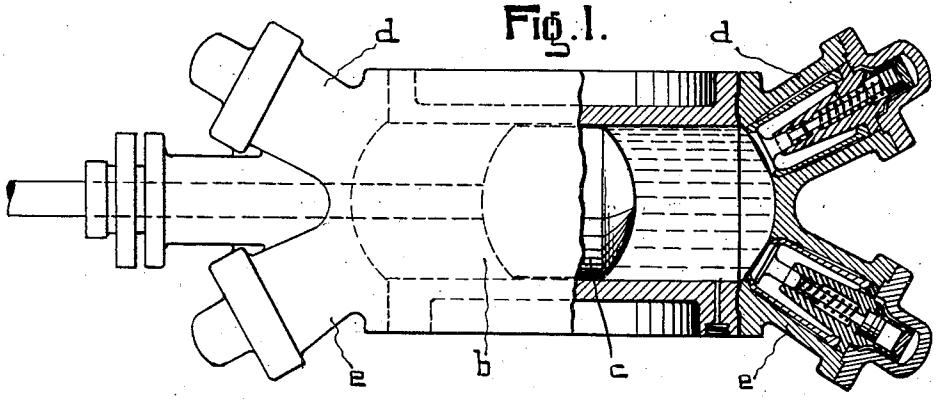


Fig. 2.

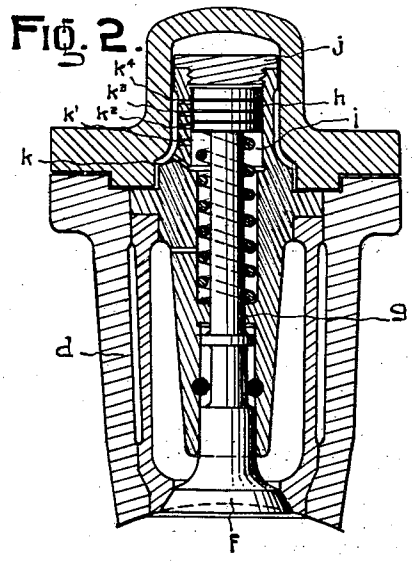


Fig. 3.

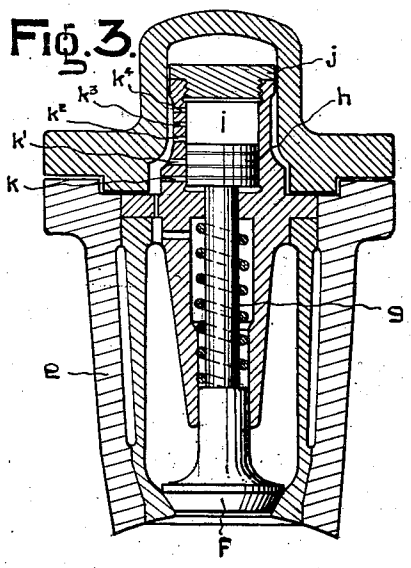
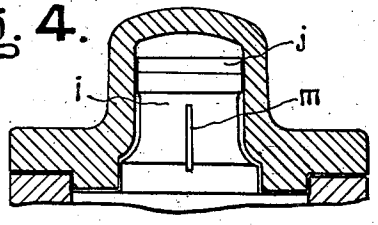


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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COMPRESSOR-VALVE.

1,258,167. Specification of Letters Patent. Patented Mar. 5, 1918.

Application filed June 21, 1916. Serial No. 105,041.

To all whom it may concern:

Be it known that I, CARL W. VOLLMANN, of the city of Montreal, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Compressor-Valves; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates particularly to the suction and delivery or discharge valves of ammonia compressors and has for its object to provide valves of this nature embodying shock-absorbers adapted to offer a gradually increasing resistance as the pistons of the valves reach the ends of their strokes.

The invention may be said briefly to consist of a valve proper the stem of which has at the opposite end to the valve proper a piston the stroke of which is cushioned by a shock absorber consisting of a vent or port in the cylinder for the piston and adapted to effect communication between the space within the cylinder and the surrounding space continuously during the major portion of the stroke, such vent or port being gradually reduced in capacity by the piston thus offering an increasing resistance to the piston as it advances until finally the maximum resistance stops the movement of the piston. The effect is that the first rapid initial movement of the piston is secured which is gradually reduced and the shock completely absorbed without any jar to the valve parts.

For full comprehension, however, of my invention reference must be had to the accompanying drawings forming a part of this specification in which similar reference characters indicate the same parts and wherein:

Figure 1 is an axial vertical sectional view of an ammonia compressor provided with valves constructed according to my invention;

Figs. 2 and 3 are axial sectional views of my improved suction and delivery or discharge valves; and

Fig. 4 is a detail elevation of the shock-absorber end of the delivery or discharge valve, illustrating a modification.

The compressor is of the type comprising cylinder *b*, piston *c*, and the cylinder having a suction and delivery or discharge valve *d* and *e*, respectively, at each end. During operation the stroke of the piston in one direction opens the suction valve and closes the discharge valve behind and opens the delivery or discharge valve and closes the suction valve in advance of it, and as the strokes of the piston are comparatively rapid the movement of the valves are correspondingly rapid and the shocks of their movement are so severe that they would be damaged and eventually destroyed if cushions were not provided.

The cushion I have devised to absorb the shocks comprises a piston formed integrally with the valve stem and reciprocating in a cylinder the interior of which has communication with the exterior, and such communication is reduced by the piston as it advances. The valve proper is indicated at *f*, the valve stem at *g*, the piston at *h* and the cylinder in which the piston travels at *i*, this cylinder being closed by a cylinder head *j*. The vent or port effecting communication between the interior and exterior of this cylinder may consist of either a series of holes k, k', k^2, k^3, k^4 arranged preferably in axial alinement as shown in Figs. 2 and 3, or the communication may be effected by a narrow slit *m* as shown in Fig. 4. This series of holes or the slit preferably extends from within a short distance of one end of the cylinder to within a short distance of the opposite end.

I have described my invention with relation to the delivery or discharge valve although, as illustrated in Fig. 2, it is equally applicable to the suction valve; and the modification may be applied to one as well as the other.

Operation.

I will describe the operation of the delivery or discharge valve.

In the operation of my improved compressor-valve the pressure in advance of the valve-piston through the ports k^2, k^3, and k^4, instantaneously equals the pressure exerted on the valve and as the piston advances it first cuts off the hole k^2, continued advancement cuts off the hole k^3, and finally hole k^4 thus imprisoning a body of gas between the valve-piston and the cylinder head *j* and this gaseous body is compressed until its resistance equals the force of the piston and gradually brings it to a stop. The effect is that the resistance to the opening of the valve is as little as possible thus per-

mitting it to open rapidly then as the holes are cut off the resistance increases until the valve opening has reached its full capacity when the last hole is closed thus causing the resistance to increase sufficiently to bring the valve to a stop without shock. The effect of the series of holes is that the resistance is increased by definite steps whereas the increase of resistance with the slit is uniformly progressive and although I prefer to use a series of holes I wish it to be understood that both specific forms come within the spirit of my invention.

What I claim is as follows:

1. In a compressor valve mechanism, the combination of a cylinder of comparatively small diameter having a longitudinal series of ports therein, a valve-stem, one end of which projects into the cylinder, a piston located in the cylinder and mounted on the end of the valve-stem, said piston being constructed and arranged to simultaneously cover a plurality of said ports; a valve proper located at the opposite end of the valve-stem, and a helical spring encircling the valve-stem and being located between the piston and valve proper and constructed and arranged to yieldingly maintain the valve in closed position.

2. In a compressor valve mechanism, the combination of a casing having an extension of reduced diameter at one end thereof, and an opening in the opposite end thereof, a valve controlling the opening, a cylinder located within said extension, a piston within the cylinder, a longitudinal series of ports in the cylinder constructed and arranged to offer increasing resistance to the movement of the piston therein, a valve-stem located within the casing and having the piston and valve mounted upon its opposite ends respectively, and a helical spring encircling the valve-stem between the piston and valve and constructed and arranged to normally yieldingly maintain the valve in closed position.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

CARL WILHELM VOLLMANN.

Witnesses:
WILLIAM HEWETSON,
GORDON G. COOKE.