

No. 721,221.

PATENTED FEB. 24, 1903.

B. V. NORDBERG.
DISCHARGE VALVE FOR COMPRESSORS.

APPLICATION FILED MAR. 8, 1899.

NO MODEL.

Fig. 1.

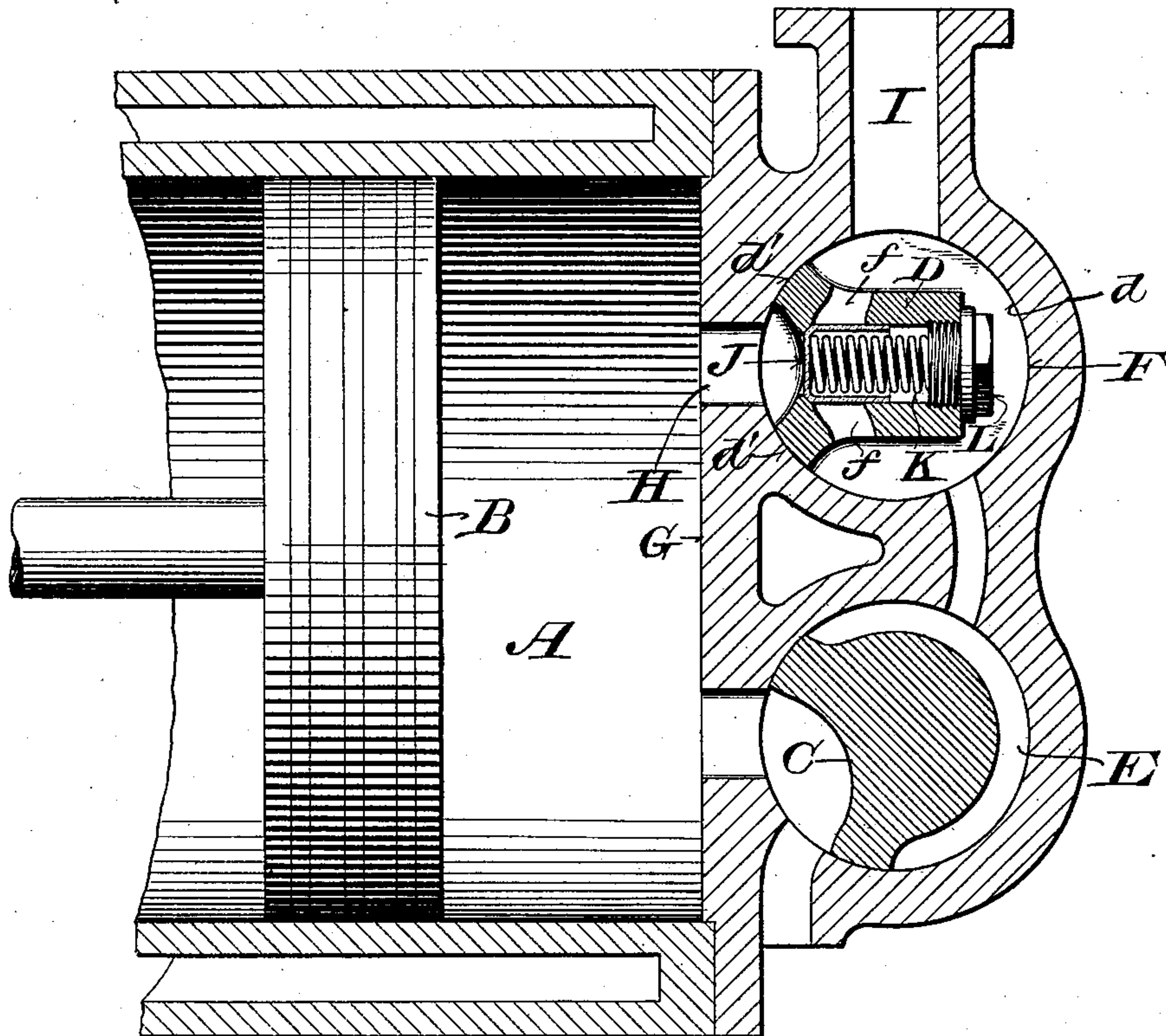
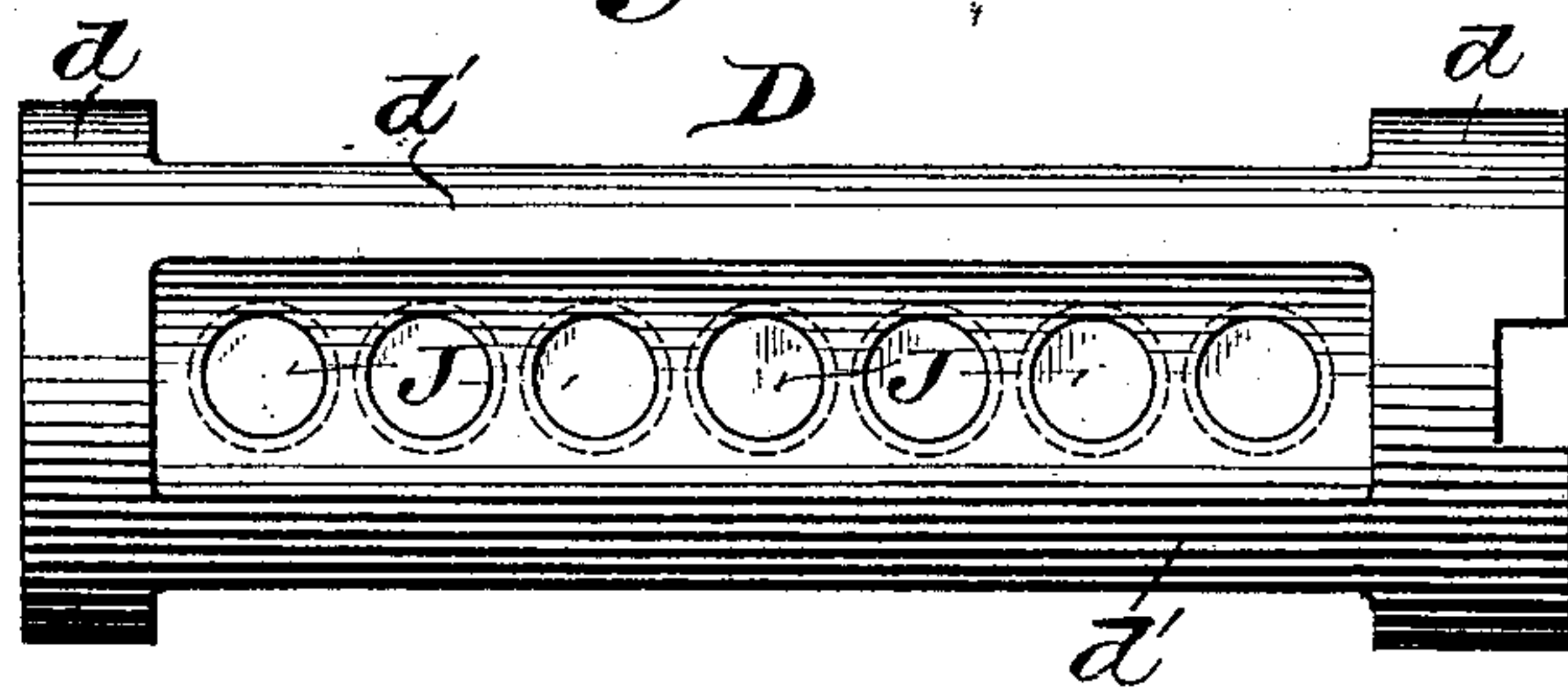


Fig. 2.



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UNITED STATES PATENT OFFICE.

BRUNO V. NORDBERG, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NORDBERG MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

DISCHARGE-VALVE FOR COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 721,221, dated February 24, 1903.

Application filed March 8, 1899. Serial No. 708,236. (No model.)

To all whom it may concern:

Be it known that I, BRUNO V. NORDBERG, a subject of the Emperor of Russia, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Discharge-Valves for Compressors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to pumps or compressors designed to operate upon elastic fluids or gases, such as air, and having positively-actuated discharge-valves set to open at a certain predetermined point with reference to the stroke of the piston or plunger, according to the maximum pressure that is to be produced and maintained.

The main object of the invention is to avoid the necessity of working against the higher pressure which the pump or compressor is designed to produce and maintain when for any cause, as frequently occurs, it is desired to maintain a lower pressure.

It consists generally in features of construction and combination of parts as hereinafter particularly described, and sought to be defined by the claims.

In the accompanying drawings like letters designate the same parts in both figures.

Figure 1 is an axial section of one end of a pump or compressor cylinder and a cross-section of the suction and discharge valves and valve-chambers, and Fig. 2 is an inverted plan view of the discharge-valve as viewed from the left with reference to Fig. 1.

A designates a portion of a pump or compressor cylinder, and B the piston or plunger thereof.

C is the suction-valve, and D the discharge-valve, fitted to turn or oscillate in cylindrical chambers E and F, which for the purpose of illustration are shown as formed in the cylinder-head G. The chamber F communicates with the cylinder A through the discharge-port H thereof and with the discharge-conduit through a port or passage I.

The discharge-valve chamber F is in open communication with the suction-valve chamber E through a passage e, whereby the pressure against which the pump or compressor

works acts to hold the working face of the suction-valve C snugly against its seat.

The discharge-valve D is positively actuated and opened and closed at certain definite times with respect to the stroke of the piston or plunger in the usual way by a suitable valve gear or mechanism, which it is not deemed necessary to illustrate or describe in detail. It is formed in the usual way with cylindrical bearings *d d*, which are fitted in the cylindrical chamber F, and has two accurately-fitted longitudinal working faces *d' d'*, between which it may be recessed. It is cut away outside of these faces between the bearings *d*, leaving a clear space around it in the chamber F. Through this main valve transversely to its axis are formed one or any desired number of auxiliary or relief valve chambers, which are preferably cylindrical in cross-section. They are formed at their inner ends with valve-seats and communicate through lateral passages *ff* with the space outside of said valve. In each of these chambers is fitted an outwardly-opening cup-shaped valve J, which normally closes communication through the main valve between the discharge-port H and the space outside of said valve. Spiral springs K, inserted between the several auxiliary or relief valves J, and screw-caps or plugs threaded in the outer ends of the auxiliary-valve chambers hold said valves normally closed.

Various changes in the construction and arrangement of the discharge-valve and of the parts composing it may be made without materially affecting the operation of the device and without departure from the spirit and intended scope of my invention.

The discharge-valve as herein shown and described as embodying my invention operates as follows: The valve D and the gear or mechanism by which it is operated being constructed and adjusted to positively open and close it at certain definite times with respect to the stroke of the piston or plunger B for producing and maintaining a certain maximum pressure, the auxiliary or relief valves J will be under the usual conditions idle when the pump or compressor is working against such maximum pressure; but if for any reason, as often occurs, it is desired to maintain

a lower pressure than that for which the main valve and its actuating-gear has been constructed and adjusted the auxiliary or relief valves J will be opened by a slight excess of the pressure within the cylinder A over the reduced pressure in the discharge-conduit of the pump or compressor prior to the opening of the main valve. In this way unnecessary expenditure of force, which would otherwise be exerted by the piston or plunger toward the end of its working stroke before the main valve D opens in compressing the fluid to a degree considerably above that desired, is avoided.

I claim—

1. In a pump or compressor the combination with a cylindrical valve-chamber communicating with the pump-chamber through the discharge-port thereof and having an outlet-port, of an oscillatory discharge-valve having cylindrical bearings at the ends fitted in said chamber, and a longitudinal working face spanning the cylinder exhaust-port when the valve is closed, said valve being cut away outside of its working face between its end bearings so as to leave a space between it and the inner wall of the valve-chamber, and formed with passages leading through its working face into said space, and outwardly-opening spring-closed relief-valves seated in said passages, substantially as and for the purposes set forth.

2. In a pump or compressor the combination with a cylindrical valve-chamber communicating with the pump-cylinder through the discharge-port thereof and having an outlet-port, of an oscillatory discharge-valve having cylindrical bearings at the ends fitted in said chamber, and a longitudinally-recessed working face spanning the cylinder exhaust-port when the valve is closed, said valve being cut away outside of its working face between its end bearings to leave a clear space between it and the inner wall of the valve-chamber, and formed with one or more transverse passages leading from the recess in its working face into said space, and an outwardly-opening spring-closed relief-valve seated in each of said passages, substantially as and for the purposes set forth.

3. In a pump or compressor the combination with a cylindrical valve-chamber communicating with the pump-cylinder through the discharge-port thereof and having an outlet-port, of an oscillatory discharge-valve having cylindrical bearings at the ends fitted in said chamber, and a longitudinal working face spanning the cylinder exhaust-port when

the valve is closed, said valve being cut away outside of its working face between its end bearings to leave a clear space between it and the inner wall of the valve-chamber, and formed with one or more transverse passages leading from its working face and opening on both sides of the valve into said space, an outwardly-opening cup-shaped valve seated in each of said passages, a cap or plug closing the outer end of each of said passages, and a spring interposed between each relief-valve and the associated cap or plug, substantially as and for the purposes set forth.

4. In a pump or compressor the combination with a cylindrical valve-chamber communicating with the pump-cylinder through the discharge-port thereof and having an outlet-port, of an oscillatory discharge-valve having cylindrical bearings at the ends fitted in said chamber and a longitudinal recess in its working face spanning the cylinder exhaust-port and extending beyond the edges thereof when the valve is closed, said valve being cut away outside of its working face between its end bearings, leaving a clear space between it and the inner wall of the valve-chamber, and formed with one or more transverse passages leading from said recess into said space, and an outwardly-opening spring-closed relief-valve seated in each of said passages, substantially as and for the purposes set forth.

5. In a pump or compressor the combination of a cylindrical valve-chamber communicating with the pump or compressor cylinder through the discharge-port thereof, a positively-actuated discharge-valve fitted to turn or oscillate in said chamber and formed transversely to its axis with one or more auxiliary-valve chambers which communicate at their inner ends with said discharge-port and through lateral passages with the space outside of said valve, one or more outwardly-opening cup-shaped valves seated in said auxiliary chambers and normally closing communication through the main valve between the discharge-port and the space outside of said valve, one or more caps or plugs closing the outer ends of said auxiliary chambers, and springs interposed between said cup-shaped valves and caps or plugs, substantially as and for the purposes set forth.

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

BRUNO V. NORDBERG.

Witnesses:

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