

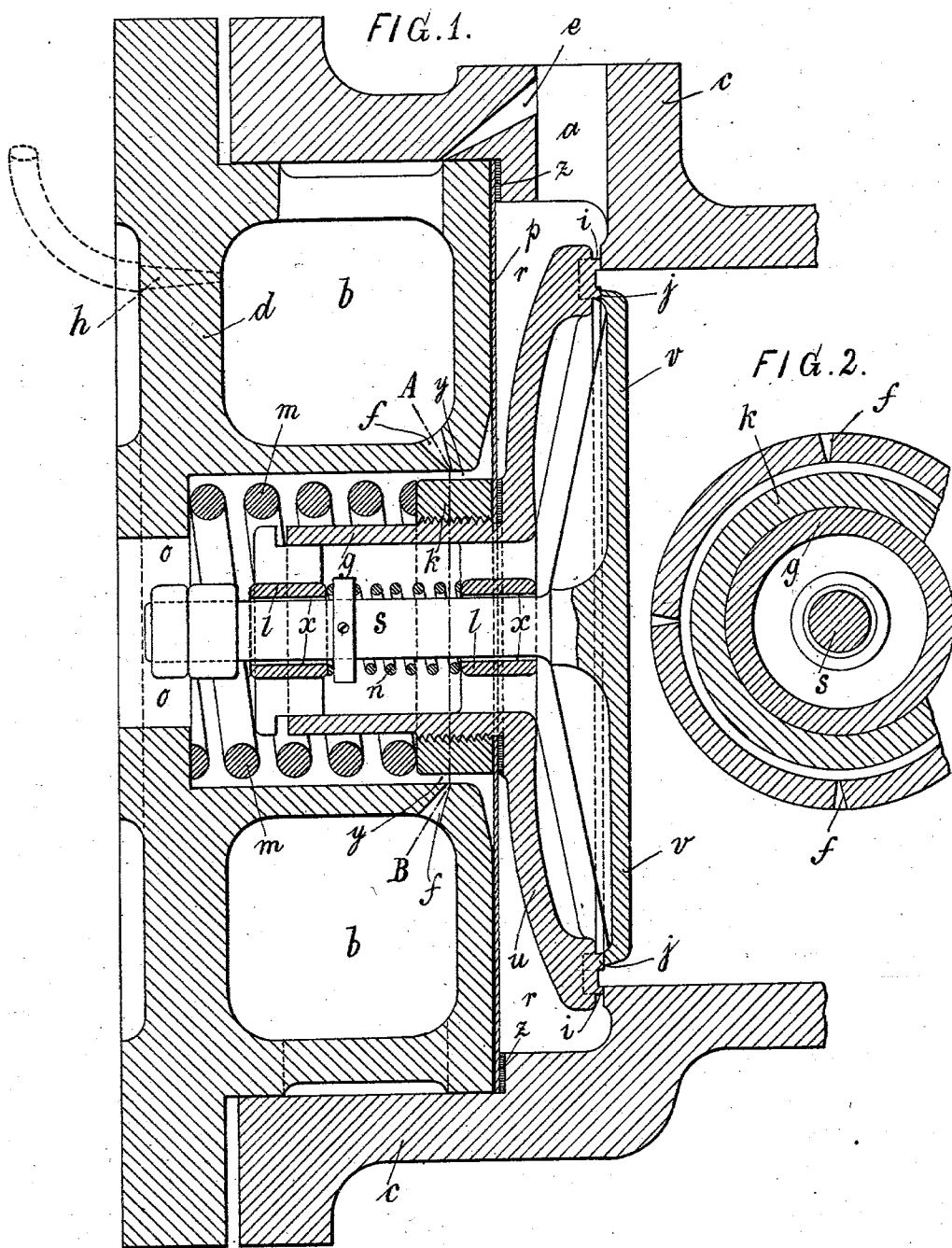
No. 758,183.

PATENTED APR. 26, 1904.

A. KRYSZAT.
CONCENTRIC VALVE FOR COMPRESSOR PUMPS.

APPLICATION FILED OCT. 24, 1902.

NO MODEL.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALBERT KRYSZAT, OF BERLIN, GERMANY.

CONCENTRIC VALVE FOR COMPRESSOR-PUMPS.

SPECIFICATION forming part of Letters Patent No. 758,183, dated April 26, 1904.

Application filed October 24, 1902. Serial No. 128,625. (No model.)

To all whom it may concern:

Be it known that I, ALBERT KRYSZAT, engineer, a subject of the German Emperor, and a resident of No. 28 Levetzowstrasse, Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Concentric Valves for Compressor-Pumps, of which the following is an exact, full, and clear description.

10 This invention relates to an improvement in the valve arrangement of compressor-pumps; and its object is to provide a double-valve device comprising the features hereinafter described and shown in the drawings. While
15 the principal feature consists in the combination of parts constituting the double-valve device, a second feature relates to the arrangement of by-pass jet-holes, whereby the issue of a small part of the compressed fluid
20 is utilized for cooling the valve device. By these cooling means a portion of the compressed fluid is wasted so far as the volumetric efficiency of the pump is concerned; but as it is known that the valves in
25 rapid action of compressors are usually considerably heated the said cooling action enables the compressor to be operated with greater velocity, and therefore the general efficiency is increased.

30 In the accompanying drawings, Figure 1 is a sectional view showing the end of the compressor-cylinder with the valves mounted therein. Fig. 2 is a cross-section through the valve-neck on the line A B of Fig. 1,
35 showing also the by-pass holes of a surrounding wall.

The compressor represented in the drawings is supposed to be an air-compressor.

40 In the drawings, *c* is a part of the cylinder having a head *d* secured thereto in a suitable manner, said head having a central opening *o* serving for the admission of air and in which the stems of the valves, with their operating-springs, extend. The valve *v* is the inlet-
45 valve and the valve *u* the outlet-valve, and as the former is concentrically seated within the latter the stem *s* of the valve *v* loosely

extends through the bearing-eyes *l*, formed in the interior of the sleeve-like stem *g* of the valve *u*.

50 A diaphragm *p* is fixed against the inner side of the head *d*, which is provided with an annular chamber *b*, serving for a purpose to be explained later on, so that the diaphragm shuts off the admission-chamber adjoining the
55 central opening *o* and fits tightly around the neck of the valve *u*. A collar *k*, which screws onto the sleeve-like stem *g*, clamps the said diaphragm against the back of the valve *u*, and the outer rim of the diaphragm is fitted
60 with a suitable packing *z*, so as to form a tight joint. By means of such diaphragm *p* a chamber *r* adjacent to the valve-closed end of the cylinder *c* is formed and separated from the above-mentioned admission-chamber.
65 The chamber *r* is connected to a tank or reservoir (not shown) by passage *a* and owing to its location behind the outlet-valve *u* receives the compressed fluid or air from the pump-cylinder, supplying same through
70 the passage *a* to the reservoir. The outlet-valve *u* is substantially of saucer shape and is supported by the diaphragm *p*, the elasticity of which enables the valve *u* to move to and fro. Between the neck of the valve *u* and
75 the surrounding wall of the admission-chamber is provided ample play at *y*, thus permitting a free valve movement advantageous to a proper seating. The periphery of the valve *u* has a seat-shoulder *i*, adapted to close against
80 the seat at the end of the cylinder *c* and also a seat *j*, with which the inlet-valve *v* coöperates. The latter is of the mushroom type, and the stem *s* thereof, extending through the bearing-eyes *l* *l*, has ample play at *x* for en-
85 abling the free movement or self-adjustment of the valve. A spring *m*, coiled around the sleeve-like stem *g*, tends to keep the valve *u* normally against its seat, and a spring *n* on the stem *s* of the valve *v* performs the same
90 purpose for said valve *v*. By this combination of parts and the valves being held loosely in their concentric position (owing to the play at *x* and *y*) each valve can move easily and in-

dependently and a perfect closure of the valves is insured even when the compressor-pump is operating very rapidly.

For preventing the valves from becoming
 5 unduly heated I have devised a special cooling
 arrangement of by-pass jet-holes which estab-
 lish a communication between the chamber *r*
 and the admission-chamber of the compressor.
 This arrangement is based on the well-known
 10 principle that if a compressed fluid is made to
 expand when issuing at a jet-like orifice a cool-
 ing effect is thereby produced—*i. e.*, the tem-
 perature of the fluid itself is reduced to a cer-
 tain extent.
 15 As already stated, the head *d* is provided
 with a chamber *b*, which may be termed a
 “cooling-chamber.” This chamber commu-
 nicates with the passage *a* of the chamber *r* by
 means of a jet-like port *e*, and its inner wall
 20 is provided with the by-pass jet-holes *f*, which
 are directed, with their contracted openings,
 against the neck of the valve *u* near the col-
 lar *k*. It may be understood that the space
 25 between the said collar and the above-men-
 tioned inner wall forms part of the admission-
 chamber, from which the air (or fluid) is drawn
 into the compressor-cylinder through *g* and
 past the inlet-valve *v*. The effect of the jet-
 like port *e*, having a contracted orifice, and
 30 the by-pass jet-holes *f* is in the operation of
 the compressor-pump as follows: A portion of
 the compressed air (or fluid) instead of being
 delivered with the remaining portion into the
 supply-pipe of the reservoir passes through the
 35 port *e* into the cooling-chamber *b* and thence
 through the by-pass jet-holes *f* into the admis-
 sion-chamber. Thus during the operation of
 the pump a continuous rush of air or fluid in
 a by-pass takes place. The partial expansion
 40 at the contracted orifice *e*, and especially
 the expansion at the by-pass jet-holes *f*, pro-
 duces a distinct cooling effect which, on the
 one hand, lowers the temperature of the cool-
 ing-chamber and its walls, and, on the other
 45 hand, reduces the temperature of the valves
 by the direct impinging action of the issuing
 expanding fluid as well as by the commingling
 (within the admission-chamber) of the cooled
 fluid with the fluid to be sucked in. It is ad-
 50 mitted that the utilization of a portion of the
 compressed air or fluid, according as it is drawn
 into and delivered from the compressor-cyl-
 nder without supplying the reservoir, detracts
 from the volumetric efficiency of the com-
 55 pressor; but by making the by-pass holes very
 small the loss is diminished to a small percent-

age, so that the advantage of the cooling ef-
 fect prevails.

I claim as my invention—

1. In combination with a compressor-pump, 60
 a pair of valves arranged within the end of the
 pump-cylinder partly within the admission-
 chamber, a diaphragm supporting the outlet-
 valve *u*, a sleeve connected to said valve hav-
 ing play (at *y*) inside the surrounding wall of 65
 the admission-chamber, bearing-eyes in the
 sleeve, a stem *s* forming part of the inlet-valve
v, said stem extending through the said bear-
 ing-eyes and having play (at *x*) the valve *v*
 being seated concentrically within the valve *u*. 70

2. In combination with a compressor-pump,
 a pair of concentrically-seated valves arranged
 within the end of the pump-cylinder partly
 within the admission-chamber, a diaphragm
 supporting the outlet-valve *u*, a sleeve con- 75
 nected to said valve having play (at *y*) inside
 the surrounding wall of the admission-cham-
 ber, bearing-eyes in the sleeve, a stem *s* form-
 ing part of the inlet-valve *v*, said stem extend-
 ing through the said bearing-eyes, by-pass jet-
 holes arranged in the wall of the admission- 80
 chamber and opening toward the sleeve of the
 valve *u*, passages establishing communication
 between the said by-pass jet-holes and the
 chamber behind the outlet-valve for the pur- 85
 pose as set forth.

3. In combination with a compressor-pump,
 a pair of concentrically-seated valves arranged
 within the end of the pump-cylinder partly
 within the admission-chamber, a diaphragm 90
 supporting the outlet-valve *u*, a sleeve con-
 nected to said valve having play (at *y*) inside
 the surrounding wall of the admission-cham-
 ber, bearing-eyes in the sleeve, a stem *s* form-
 ing part of the inlet-valve *v*, said stem extend- 95
 ing through the said bearing-eyes, by-pass jet-
 holes arranged in the wall of the admission-
 chamber and opening toward the sleeve of the
 valve *u*, passages establishing communication
 between the said by-pass jet-holes and the 100
 chamber behind the outlet-valve, a port form-
 ing a part of such passages and leading into
 a cooling-chamber, the inner wall of which
 surrounds the admission-chamber and is pro-
 vided with the said by-pass jet-holes substan- 105
 tially as described.

In witness whereof I have hereunto set my
 hand in presence of two witnesses.

ALBERT KRYSZAT.

Witnesses:

WOLDEMAR HAUPT,
 HENRY HASPER.