

(No Model.)

E. W. KÖSTER.  
VALVE FOR AIR PUMPS.

No. 567,600.

Patented Sept. 15, 1896.

Fig. 1.

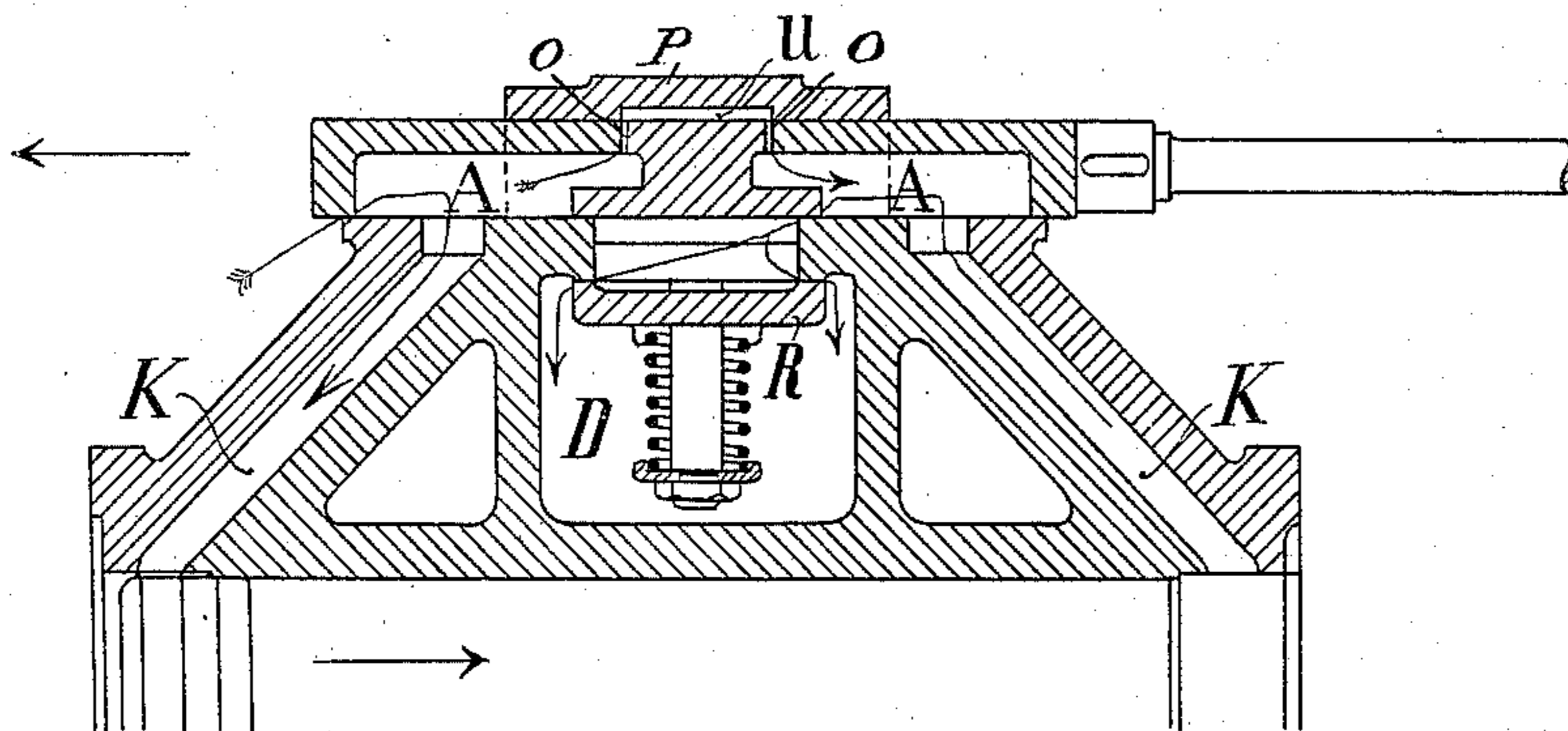


Fig. 2.

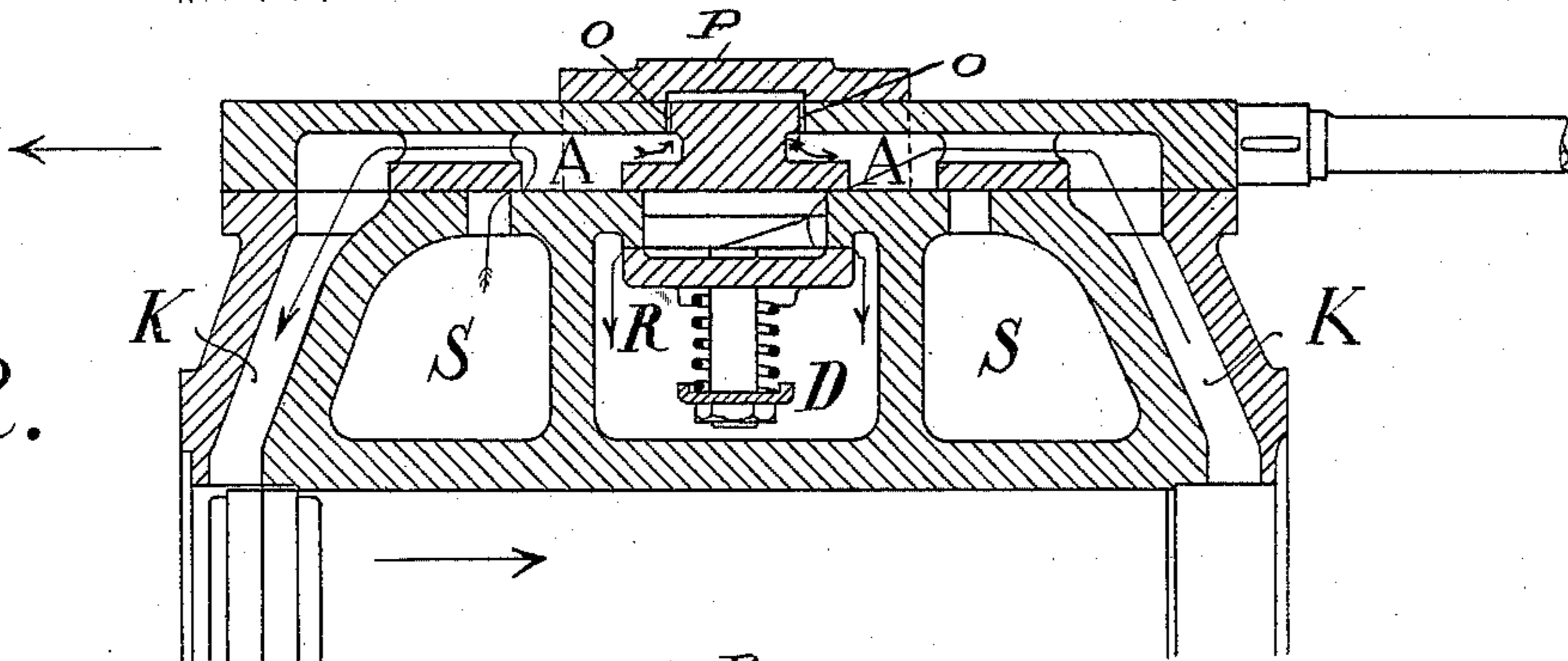


Fig. 3.

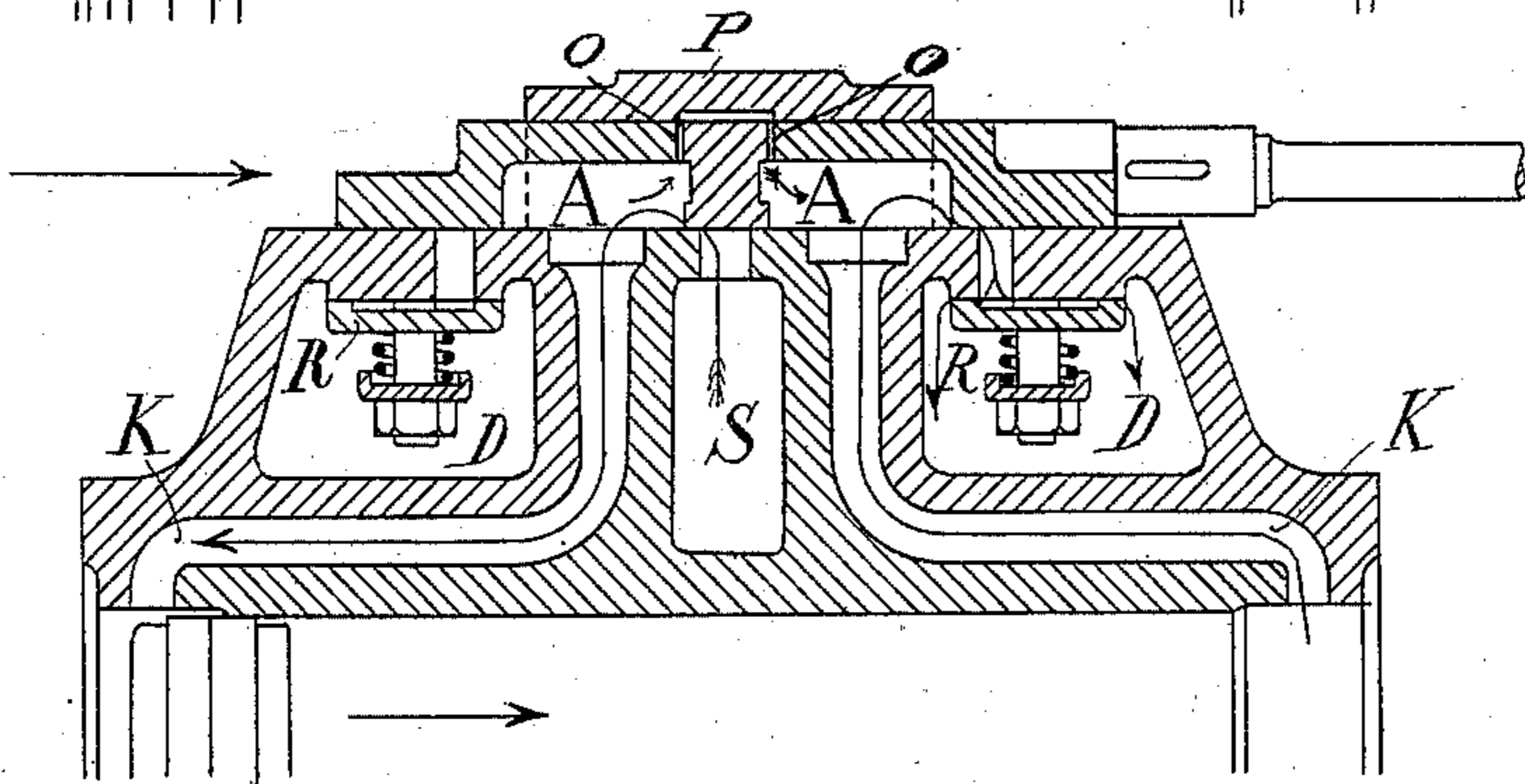
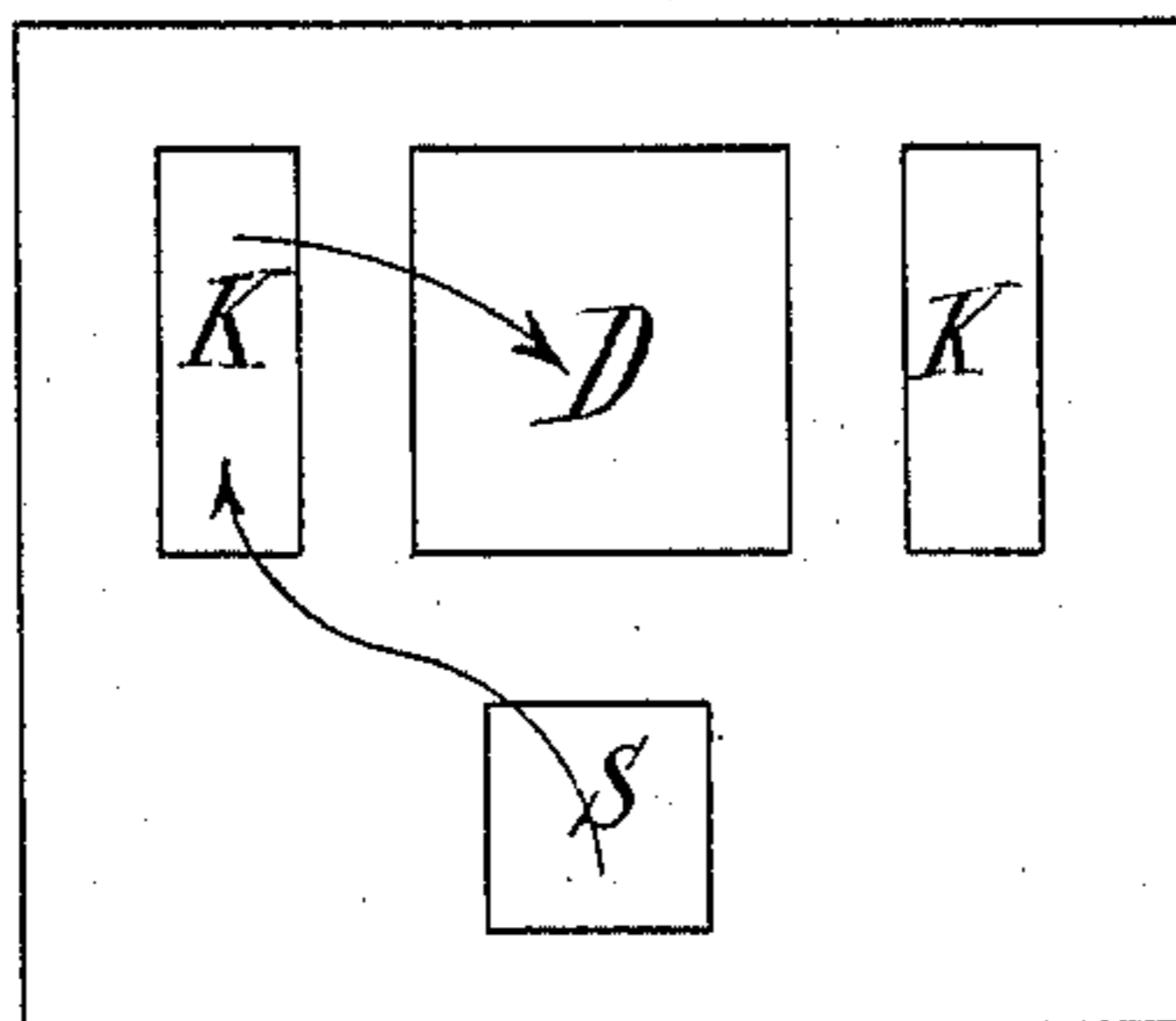


Fig. 4.



Witnesses.

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# UNITED STATES PATENT OFFICE.

ERNEST WILLIAM KÖSTER, OF HÖCHST-ON-THE-MAIN, GERMANY.

## VALVE FOR AIR-PUMPS.

SPECIFICATION forming part of Letters Patent No. 567,600, dated September 15, 1896.

Application filed March 5, 1895. Serial No. 540,620. (No model.) Patented in Germany October 3, 1893, No. 75,230.

*To all whom it may concern:*

Be it known that I, ERNEST WILLIAM KÖSTER, a citizen of Germany, and a resident of Höchst-on-the-Main, Germany, have invented a certain new and useful Improvement in Valve-Motions for Compression and Vacuum Pumps, (for which I have obtained a patent in Germany, No. 75,230, bearing date October 3, 1893,) of which the following is a specification.

The present invention, relating to improvements in compression-pumps and vacuum-pumps, has for its first object to avoid the use of a valve-chest, as the suction-canals, together with the compression-chambers provided with check-valves, are disposed beneath a single E-shaped or double E-shaped slide-valve, and has for its further object to press the aforesaid slide-valve against its seat by means of a simple excavated stationary plate or cover intended for opening communication between the two opposite ends of the cylinder during the period of equalizing of pressure.

Reference is to be had to the accompanying drawings, in which similar letters of reference indicate corresponding parts throughout the several views.

Figure 1 shows a suction-pump provided with the hereinafter-described valve-gear, said pump being intended to force the air aspired from the atmosphere into a compression-chamber provided with a check-valve. Fig. 2 shows a pump where the aforesaid compression-chamber is intermediate of the suction-canals S, said canals being intermediate of the two ports in communication with the cylinder, this disposition of the canals S permitting me to dispense with a valve-chest. Fig. 3 shows a pump where, in contrast with the disposition represented in Fig. 2, the suction-canal is intermediate of the two ports in communication with the cylinder, said ports being intermediate of the two compression-chambers, each of the same being provided with a check-valve, this disposition of the canals permitting me again to dispense with a valve-chest. Fig. 4 shows another disposition of the canals, this view being from above.

In the drawings, S represents the suction canals or canal, this canal not being required in the construction shown in Fig. 1, because

the air is taken from outside, that is, from the atmosphere.

A A represent apertures arranged symmetrically in the slide-valve, said apertures according to the position of the slide-valve opening communication either between S and the ports K in communication with the cylinder or between said ports and the compression chamber or chambers D.

R represents the check valve or valves disposed beneath the slide in the compression chamber or chambers D. The slide-valve, pressed against its seat by means of a motionless [ ]-shaped plate or cover P, is provided on its back with two vertical canals or perforations O. The vertical perforations O in the slide-valve, in combination with the cavity U in the aforesaid [ ]-shaped cover, are intended for opening communication between the two opposite ends of the cylinder during the period of equalizing of pressure, that is, when the slide-valve occupies its central position and the piston approaches the end of its stroke.

In the form shown in Fig. 1 the pump acts as described in the following, the period represented being the beginning of the aspiration part of the stroke for the left side of the piston: The piston goes to the right, the slide to the left. When the latter has moved a short distance, the piston can aspire behind itself air from outside through the port K. On the right side of the piston the air is pressed through K and A into the compression-chamber D, which is closed by means of the check-valve R. The same operation takes place on the other side of the cylinder as the piston goes to the left and the slide to the right. The space between D and K is intended for receiving cooling-water.

The pump shown in Fig. 2 is intended for moving air or fluid from a determined space into another. According to this, this pump has to be provided with openings where the aspired air or fluid goes through. Still, as these openings are disposed beneath the slide-valve at the same place where, in the construction shown in Fig. 1, the cooling-water is contained, I am permitted again to dispense with a valve-chest. The construction of the slide-valve conforms itself to this dis-

position of the canals, and the valve opens communication, according to its position, either between the suction-canals S and the ports K or between the ports K and the compression-chamber D. The period is the same as the one represented in the first drawing, that is, the period of equalizing of pressure. The piston goes to the right, the slide to the left. As shown, the piston aspires, as soon as the slide has gone a little beyond its central position, air or gas from the suction-canal S which lies between the ports K. The aspired air goes, in the direction indicated by the arrows, from S through A and K behind the left side of the piston. The right side of the piston presses at the same time the air through K and A into D, and, as soon as the pressure is sufficient, through the check-valve R. During the motion of the piston to the left and of the valve to the right a similar operation to the one described takes place.

Fig. 3 shows another disposition of pump based on the same principle. The suction-canal S lies in the middle intermediate of the two ports K and of the two compression-canals D, provided with check-valves R. As shown in the drawings, the piston moves now in the same direction as the slide, that is, in the period represented, to the right. The air or fluid is aspired from S through A and K in the direction indicated by the arrows, and at the same time pressed away by the other side of the piston through K, A, and D. In this construction I am permitted again to dispense with a valve-chest.

In Fig. 4 is shown another disposition of the canals, the drawing representing the top view

of the seat of the slide. The piston moves the air or fluid from S into K and presses the same away through D. The opening D contains again the check-valve R beneath the slide-valve.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

The combination with a pump-cylinder without valve-chest, having a valve-seat provided with ports leading to the cylinder, with suction-canals and compression-chambers, the latter being provided with check-valves, of an E-shaped slide-valve provided on its face with excavations corresponding to the above-named canals and ports, said slide-valve, according to its position, to open communication between the suction-canals and one or the other sides of the cylinder respectively, while the opposite side of the cylinder is in communication with the compression-chambers, said slide-valve being provided on its back with two small vertical perforations, of a simple excavated stationary plate fastened to the cylinder and arranged over the slide-valve, said plate to open communication through the aforesaid perforations on the back of the E-shaped slide-valve and through its own excavation, between the two opposite ends of the cylinder, all substantially as described and for the purpose specified.

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

ERNEST WILLIAM KÖSTER.

Witnesses:

ALVESTO S. HOGUE,  
FRANK H. MASON.