

No. 725,516.

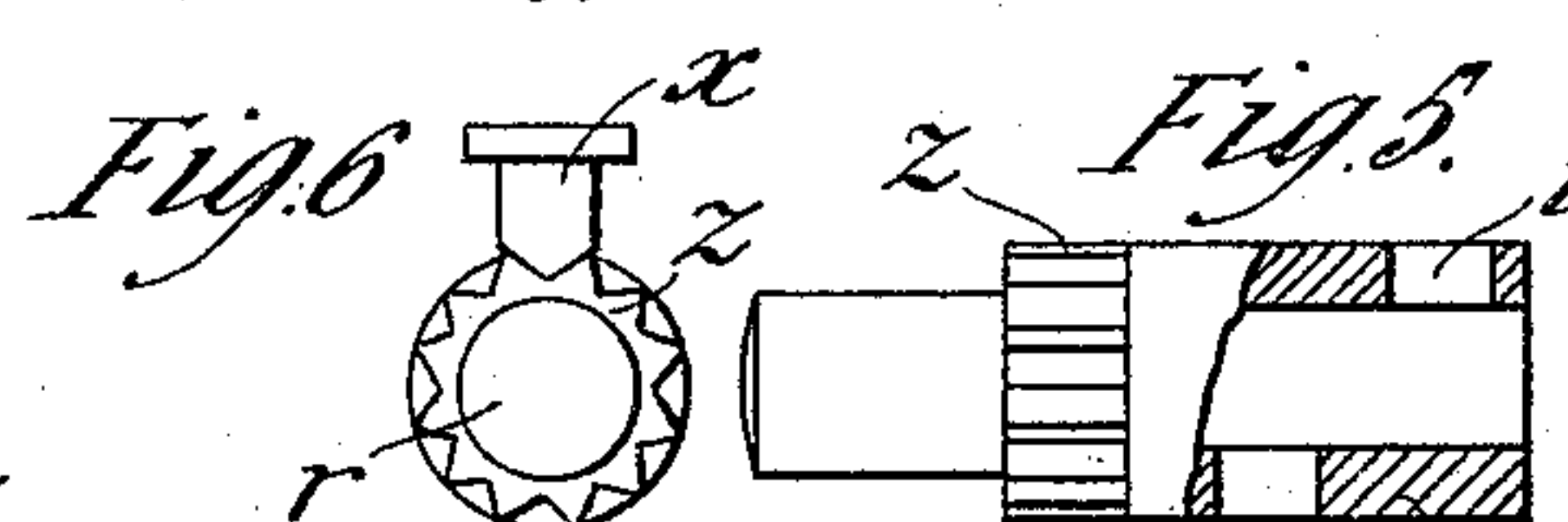
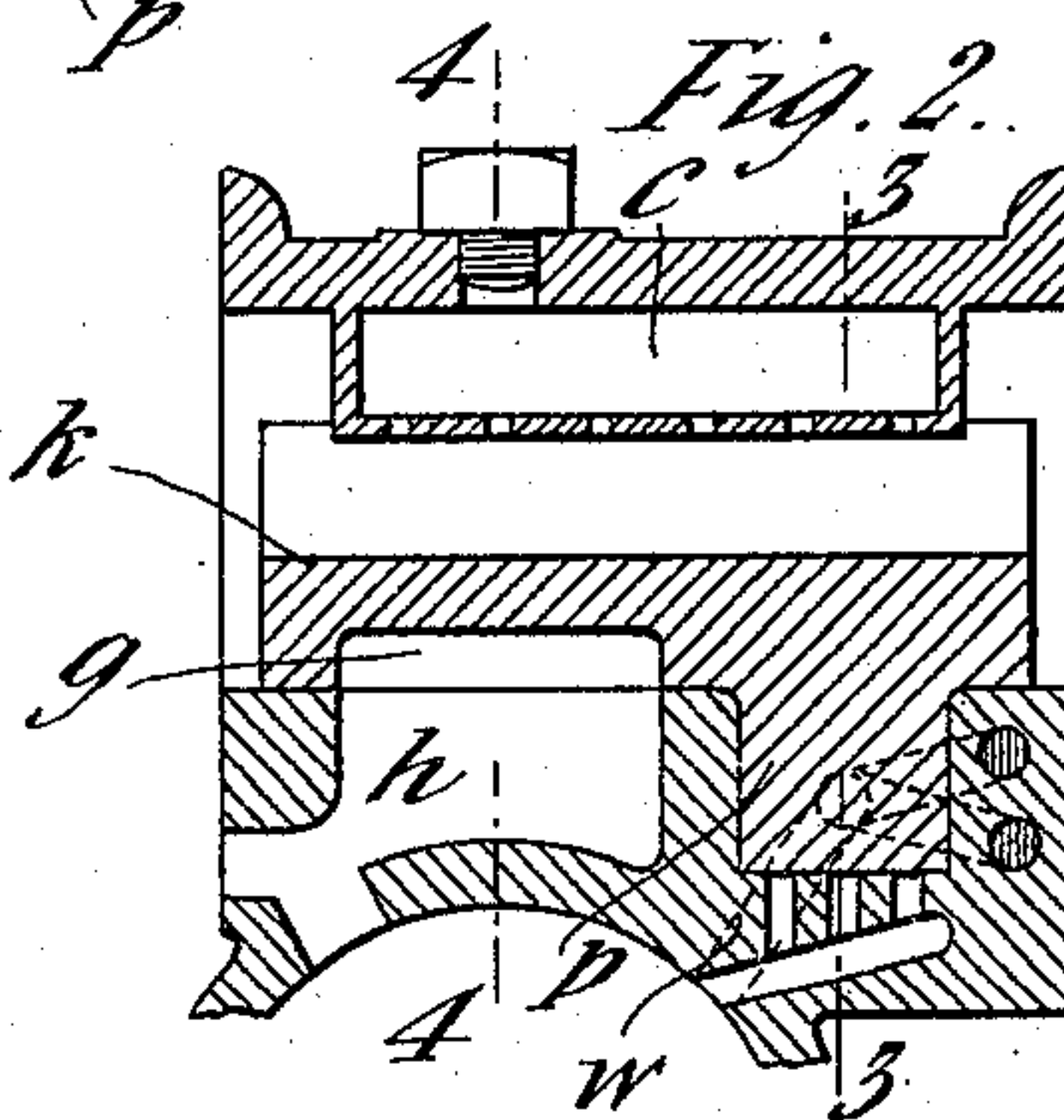
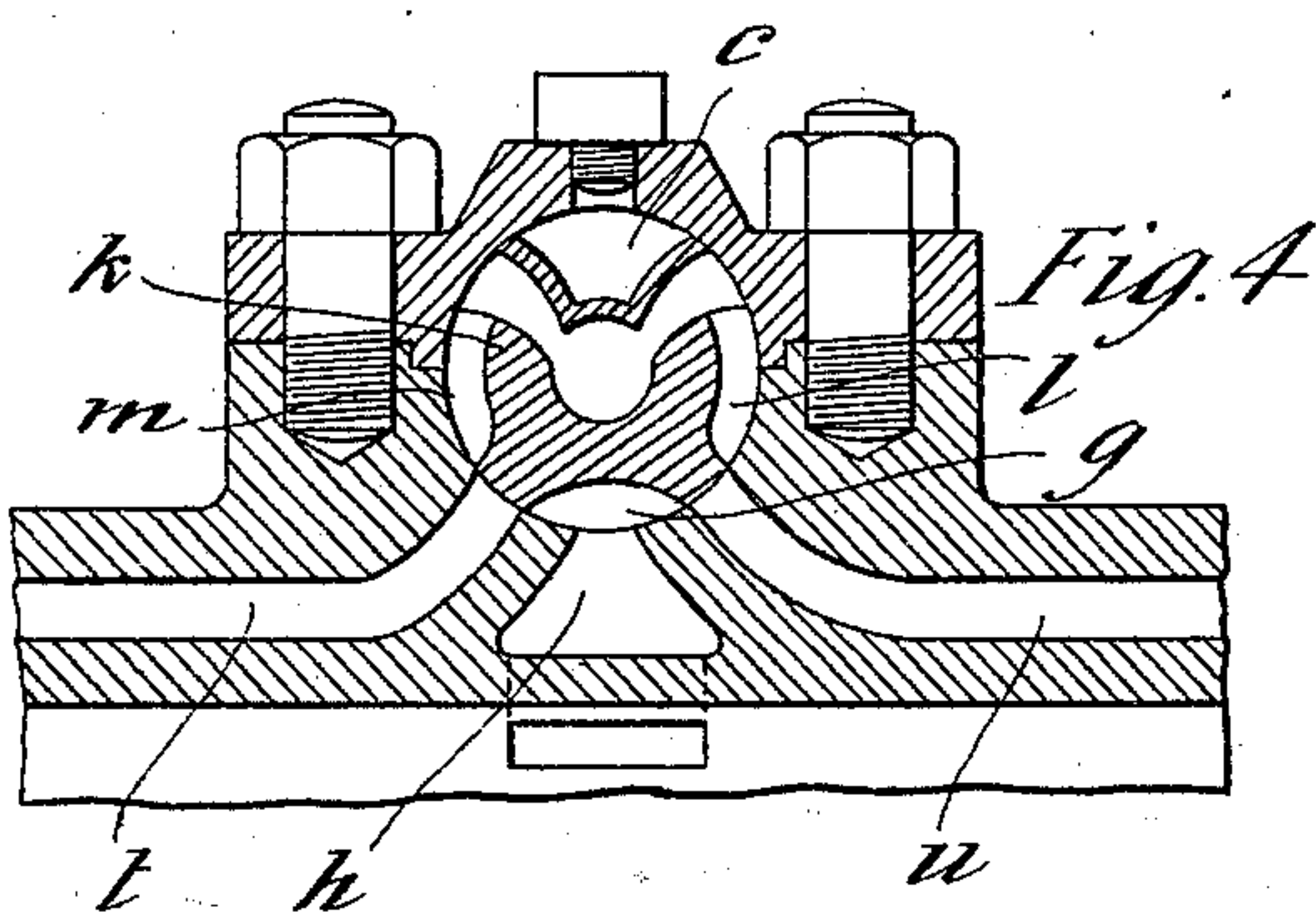
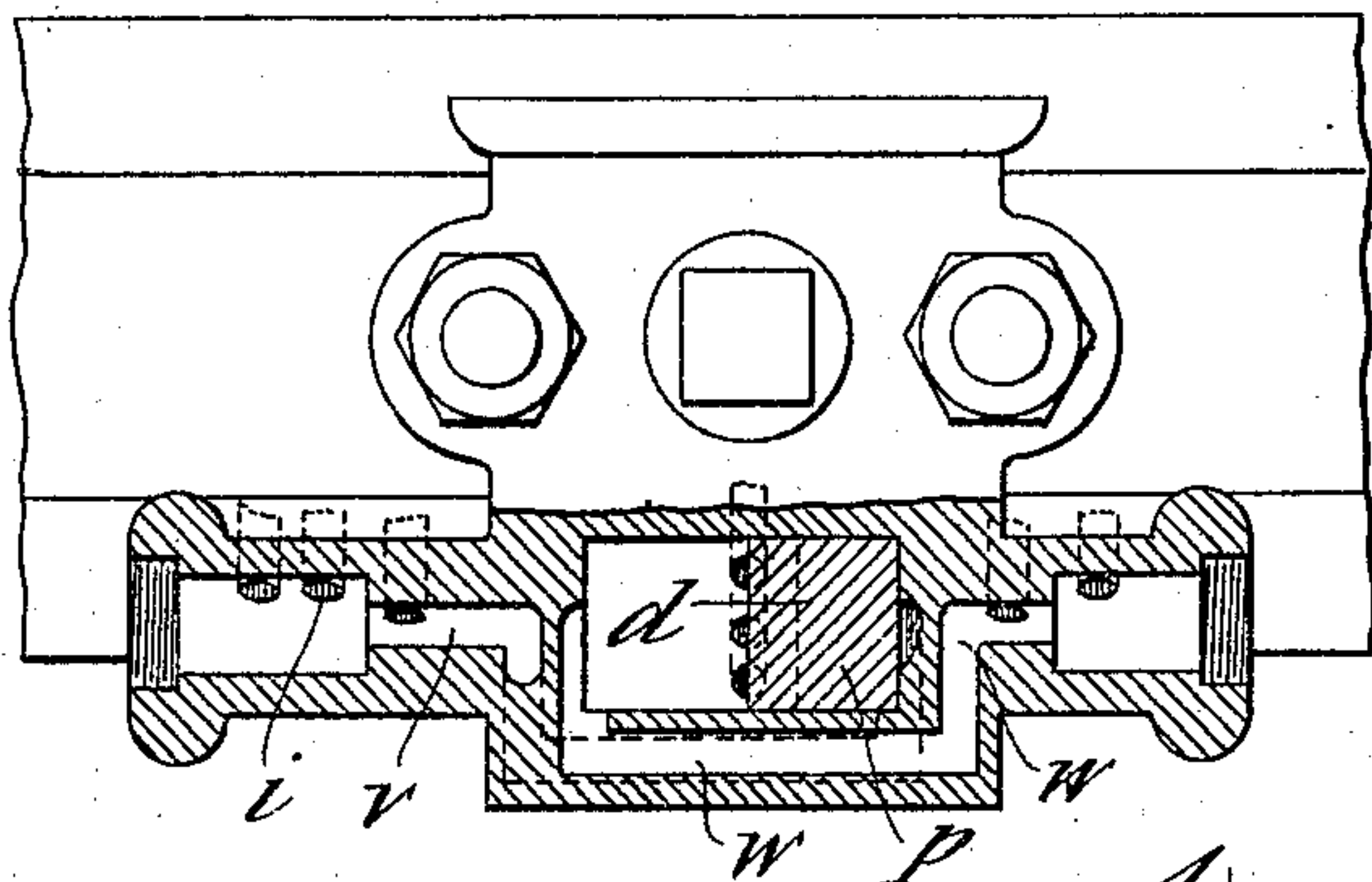
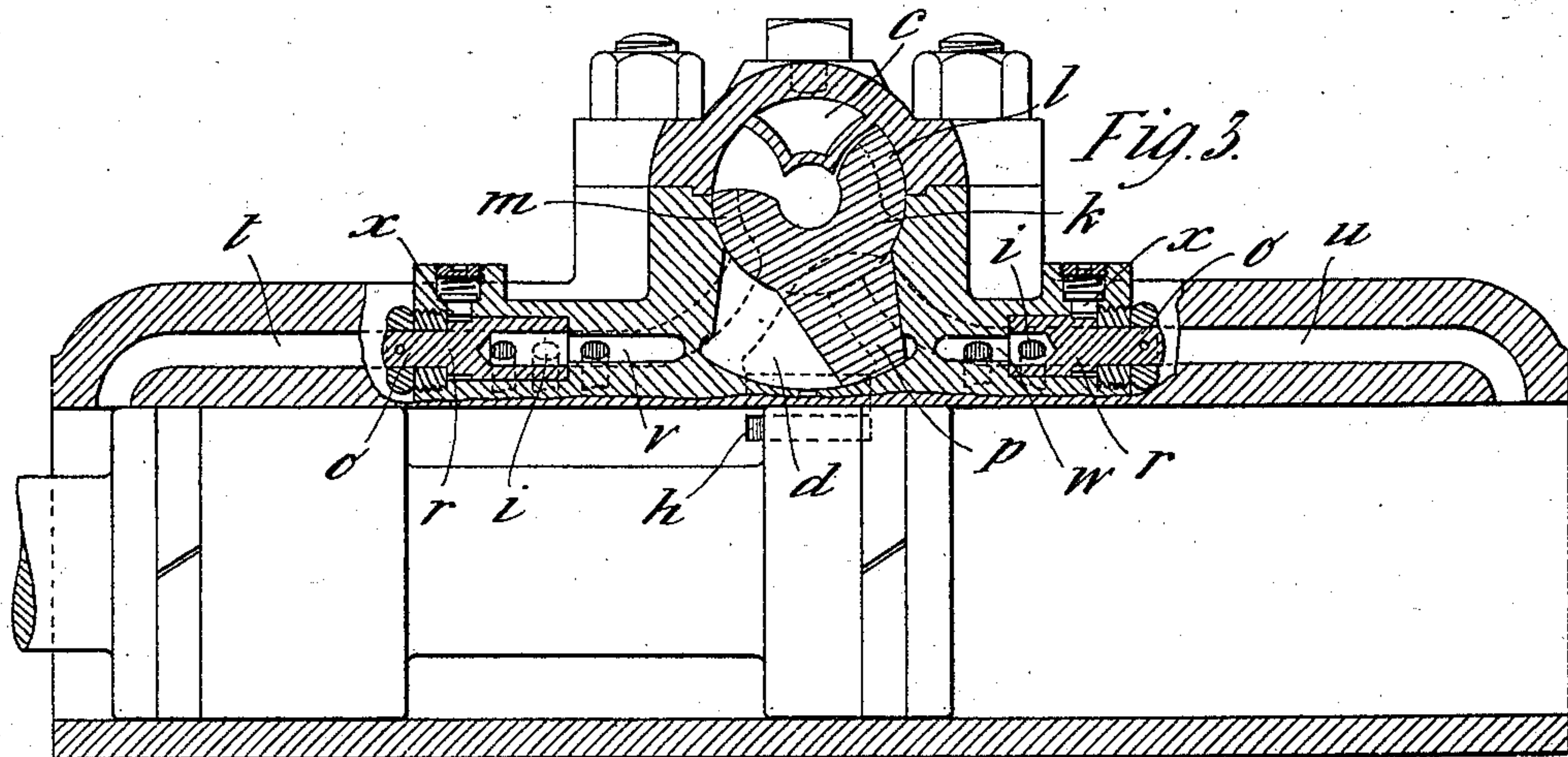
PATENTED APR. 14, 1903.

W. & J. VIVIAN.

ROTATING VALVE FOR FLUID PRESSURE ENGINES.

APPLICATION FILED DEC. 28, 1901.

NO MODEL.



Witnesses:  
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Att'y.



# UNITED STATES PATENT OFFICE.

WILLIAM VIVIAN, OF REDRUTH, AND JAMES VIVIAN, OF CAMBORNE,  
ENGLAND.

## ROTATING VALVE FOR FLUID-PRESSURE ENGINES.

SPECIFICATION forming part of Letters Patent No. 725,516, dated April 14, 1903.

Application filed December 28, 1901. Serial No. 87,628. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM VIVIAN, residing at Fair View, South Downs, Redruth, and JAMES VIVIAN, residing at 2 Dolcoath road, Camborne, in the county of Cornwall, England, citizens of England, have invented certain new and useful Improvements in Partially-Rotating Valves for Fluid-Pressure Engines, (for which we have applied for a patent in Great Britain, dated September 24, 1901, No. 19,041,) of which the following is a specification.

This invention relates to modifications of a partially-rotating valve of the kind described in Patent No. 641,564, January 16, 1900, the object which we have in view being to improve and control the operation of such valve. For this purpose we construct and arrange the valve as we shall describe, referring to the accompanying drawings.

Figure 1 is a plan, partly in section, of the valve-casing. Fig. 2 is a longitudinal section of the valve, showing part of the cylinder in transverse section. Fig. 3 is a transverse section of the valve, partly on the line 3 3 of Fig. 2, with the cylinder in longitudinal section; and Fig. 4 is a transverse section on the line 4 4 of Fig. 2. Fig. 5 is an elevation, partly sectional; and Fig. 6 is an end view of the adjusting-plug.

The partially-rotating valve *k* has ports *l m* in its upper part and along its two sides, which are in communication with the supply of working fluid, and has in its lower part a segmental recess *g*, somewhat like that of a D-slide. The slide-case has in its lower part an exhaust-port *h*, facing this recess when the valve is in middle position, and has on each side of this part ports *t u*, leading to the ends of the cylinder. When the valve *k* is partially rotated to either hand, one of the upper side ports *l m* of the valve is put in communication with one of the cylinder-ports *t* or *u*, while the other cylinder-port is in communication, through the recess *g* of the valve, with the exhaust-port *h* in the valve-case.

*c* is a cavity in the valve-case holding lubricant.

The valve *k* has a wing *p*, working in a segmental chamber *d* at one end of the valve-

case, this wing being forced alternately to the one side and the other by the pressure of the working fluid led by suitable channels *v w* to the two sides of the segmental chamber. These channels *v w*—the one above and crossing over the other, as shown in Fig. 2—operate in connection with the piston, which is elongated and has in it a middle space, the cylinders having lateral ports leading to the channels *v w*, and these are by the motions of the piston put alternately in communication with the ends of the cylinder and with a middle exhaust-port. The arrangement of the ports above referred to is such that as the piston is at or near the end of its stroke in either direction some of the working fluid under pressure is admitted to act on the one side of the valve-wing *p*, which fluid can escape from the space on the other side of the wing to the exhaust. The pressure on the wing causes the valve to turn from its one position to the other, thereby altering the admission to and exhaust from the cylinder ends and so reversing the motion of the piston. When the valve is on a rock-boring drill, we prefer to throttle more or less the ports *v w*, which conduct the fluid to act on the wing *p*, so as to regulate the strokes of the drill to suit various characters of rock and various sizes and depth of the holes drilled. For this purpose instead of employing a single port for each side of the wing-chamber we divide the passage into several parallel, all of which pass through holes *i*, bored at different angles transversely through a plug *r*, like that of a stop-cock. By turning this plug partly around we can throttle more or less or entirely close some of these subdivided ports, and thus more or less retard the action of the fluid on the wing, and consequently the reversal of the valve and of the piston.

In order to prevent the plug from becoming shifted by the vibration of the rock-drill, we form on it a collar *z*, which is toothed and engaged by the  $\Lambda$  end of a spring-pin *x*, which can hold the plug in position notwithstanding vibration, but gives way, allowing the plug to be turned by force applied to its spindle *o*.

Having thus described the nature of our said invention and the best means we know



of carrying the same into practical effect, what we claim is—

1. The combination with a cylinder and a valve-casing provided with a chamber, of a suitable valve arranged in the casing and provided with a wing operating in said chamber, passages crossing each other and leading from said cylinder to opposite sides of said chamber, separate ports provided in the said passages, and means for adjusting the area of said ports.

2. The combination with a cylinder and a valve-casing provided with a chamber, of a valve arranged in said casing and constructed with two supply-ports in its upper part, an exhaust-port in its lower part and a wing operating in said chamber, and passages leading from the cylinder to opposite sides of said chamber and crossing each other.

3. The combination with a cylinder provided with ports leading to each end thereof and a valve-casing having a suitable chamber, of a valve arranged in the casing and constructed with two supply-ports in its up-

per part and an exhaust-port in its lower part, a wing carried by the valve and operating in said chamber, and passages leading from said cylinder to opposite sides of said chamber.

4. The combination with a cylinder provided with ports leading to each end thereof and a valve-casing having a suitable chamber, of a valve arranged in the casing and constructed with two supply-ports in its upper part and an exhaust-port in its lower part, a wing carried by the valve and operating in said chamber, passages leading from said cylinder to opposite sides of said chamber, separate ports provided in the said passages, and means for adjusting the area of said ports.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WILLIAM VIVIAN.  
JAMES VIVIAN.

Witnesses:

FRANK ASHLEY WRIGHT,  
GEORGE HENRY HALL.