

No. 641,564.

Patented Jan. 16, 1900.

W. VIVIAN.  
STEAM ACTUATED VALVE.

(Application filed Sept. 23, 1899.)

(No Model.)

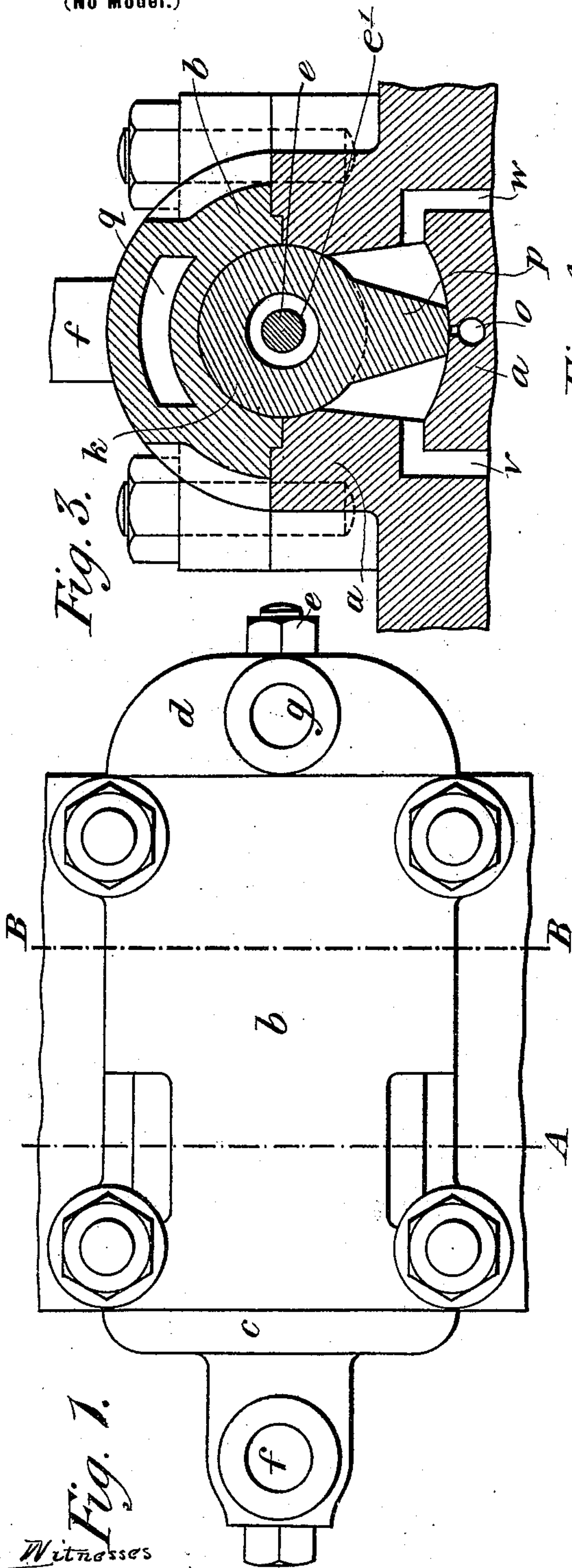


Fig. 1.  
Witnesses  
H. B. Taylor  
Dennis Sumby.

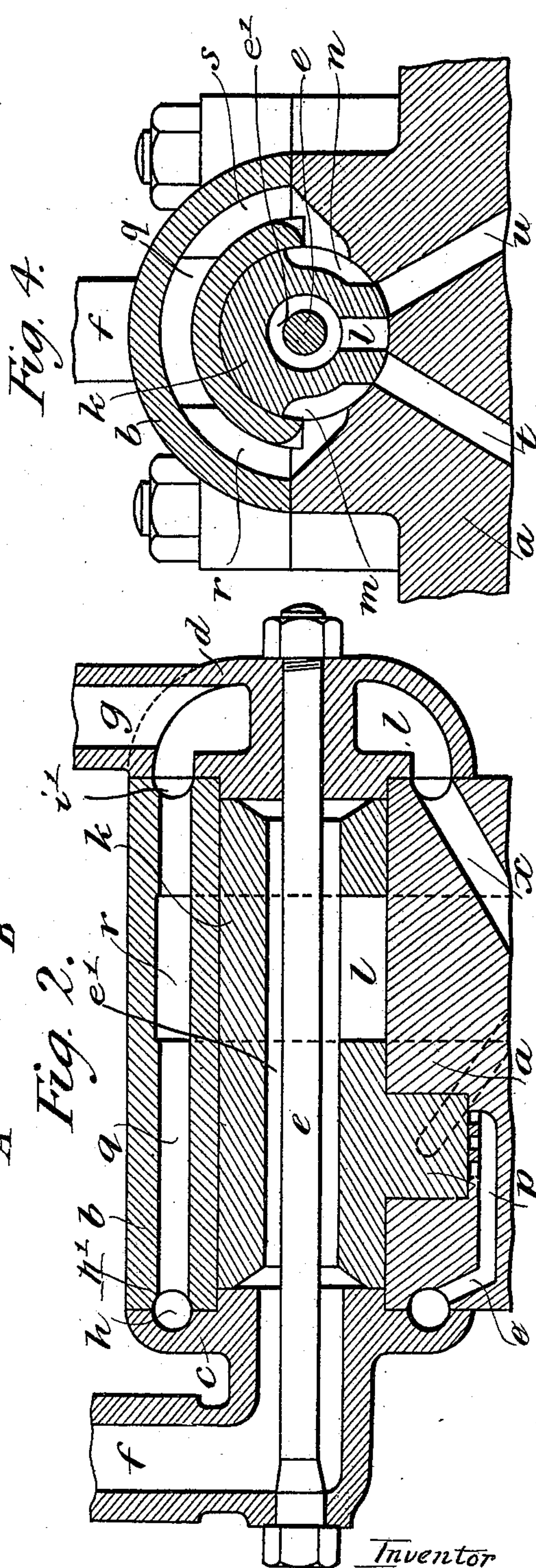


Fig. 2.  
Inventor  
William Vivian  
By James L. Norris.  
attys

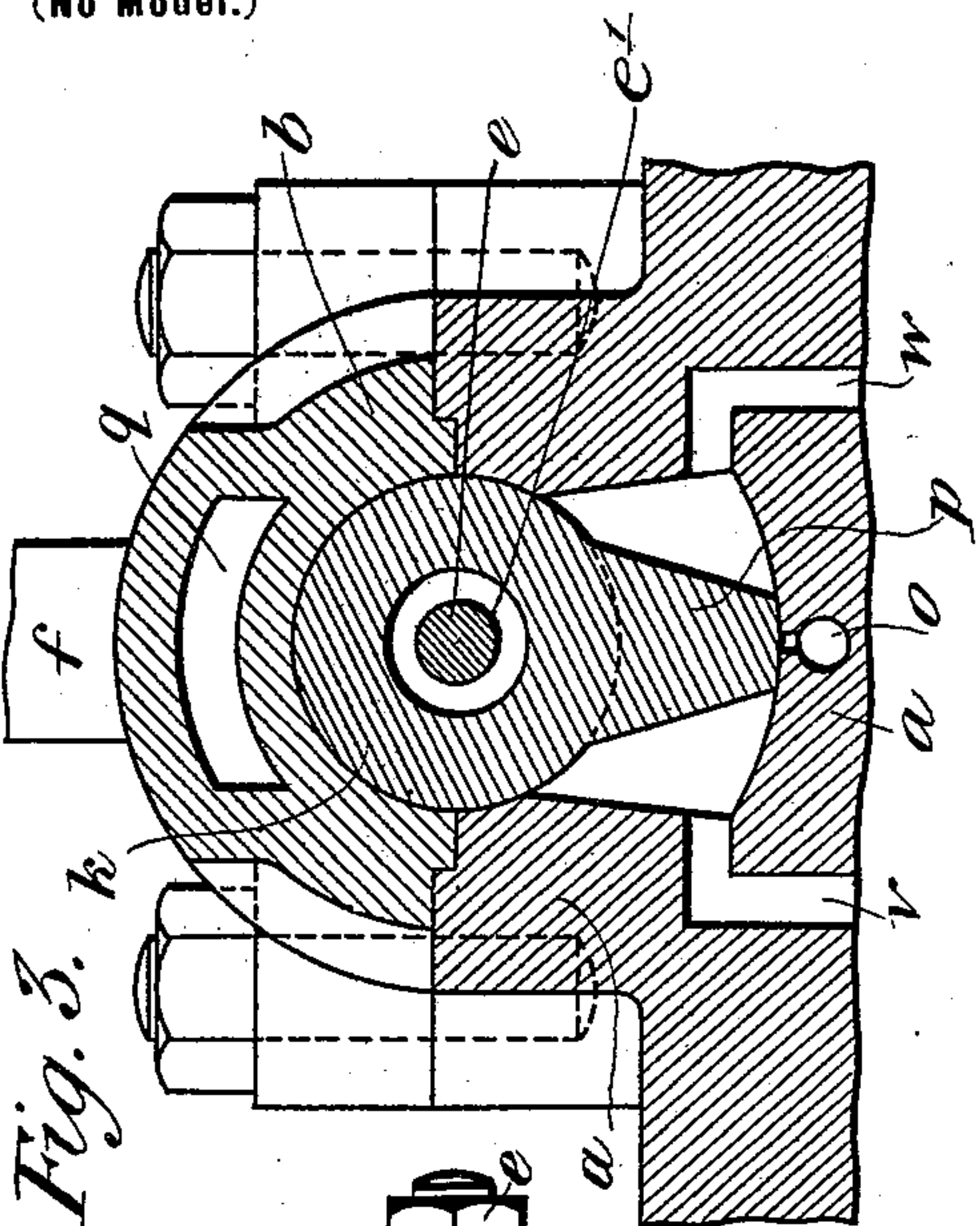
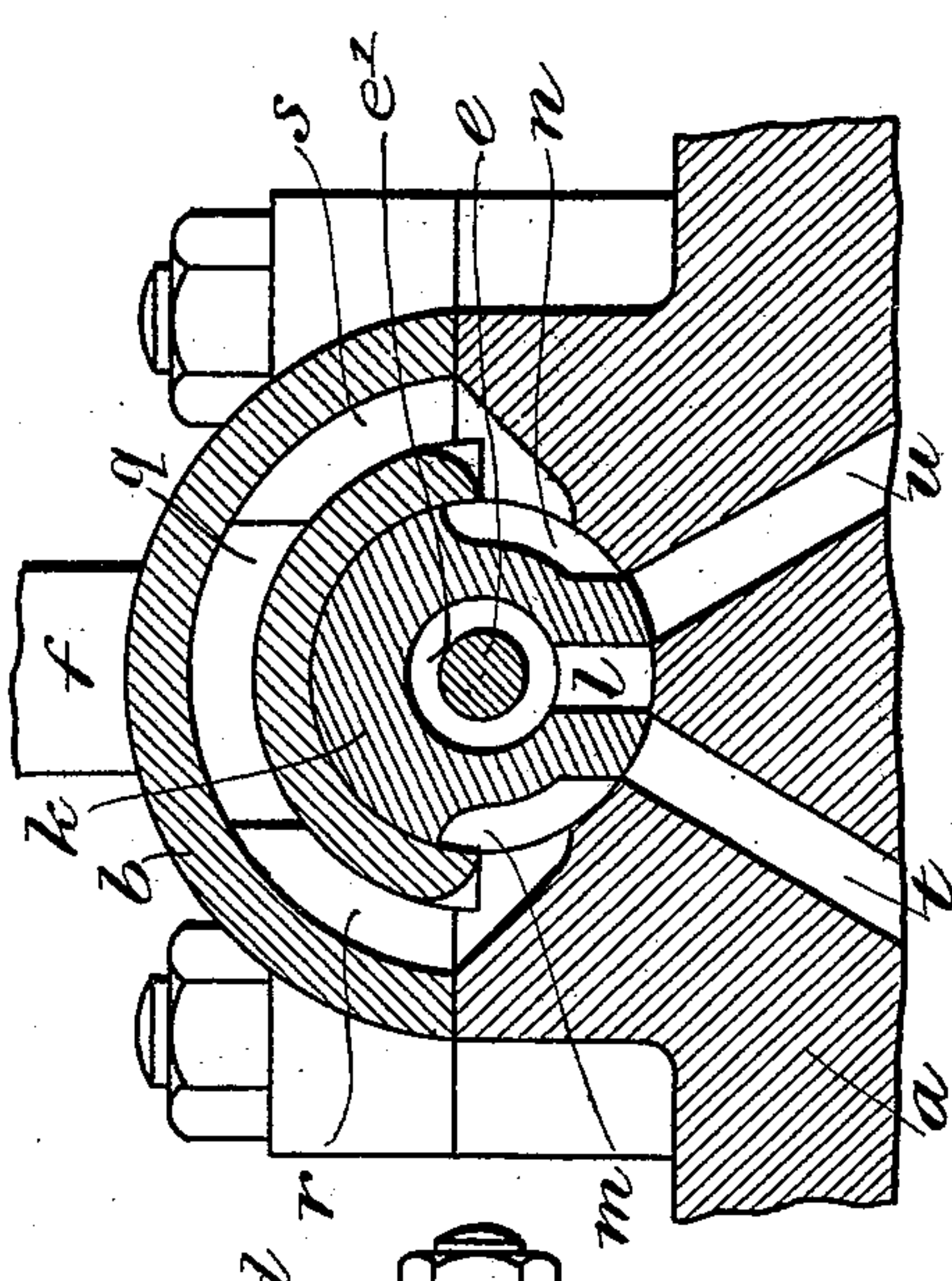


Fig. 3.

Fig. 4.





# UNITED STATES PATENT OFFICE.

WILLIAM VIVIAN, OF CAMBORNE, ENGLAND.

## STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 641,564, dated January 16, 1900.

Application filed September 23, 1899. Serial No. 731,469. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM VIVIAN, a citizen of England, residing at Basset road, Camborne, in the county of Cornwall, England, have invented certain new and useful Improvements in Steam-Actuated Valves for Fluid-Pressure Engines, (for which I have applied for a patent in Great Britain, dated March 8, 1899, No. 5,115,) of which the following is a specification.

In the Patent No. 621,271 is described a partially-rotating valve for governing the supply and exhaust of working fluid for the ends of a rock-drill cylinder.

The present invention relates to improvements in the construction of valves of the kind described in the said specification, which may be applied to fluid-pressure engines, as will now be described with reference to the accompanying drawings.

Figure 1 is a plan of the valve-box. Fig. 2 is a longitudinal section of the box and valve. Fig. 3 is a transverse section on the line A A, and Fig. 4 is a transverse section on the line B B of Fig. 1.

The valve-box consists of a lower part *a*, with an upper part *b* secured on it by four bolts and nuts, and of two end covers *c* and *d*, secured on it by a central through-bolt and nut *e*. The end cover *c* has a pipe connection *f* for admission of the working fluid, and the end cover *d* has a pipe connection *g* for exhaust. In the inner face of the cover *c* there is an annular semicircular groove *h* and in the cover *d* an annular space *i*, the groove and space, respectively, facing semicircular grooves *h'* *i'* in the ends of the valve-box *a b*. The valve *k* is of cylindrical form, fitted to partially rotate within the longitudinal cylindrical bore of the valve-box. It has a central longitudinal bolt hole or passage *e'*, through which passes the through-bolt *e*, there being annular space around the bolt *e* for passage of the working fluid to a lateral port *l*, on each side of which there is a recess *m* and *n*, formed in the valve. From the valve projects down a wing *p*, the end of which fits against a segmental hollow in the lower part of the valve-box. From the middle of this hollow fluid can pass by several small holes and a port *o* to the annular groove *h*, and thence by a channel *q*, formed in the upper

part of the valve-box, to the space *i*. The channel *q* has two lateral communications *r* *s* to ports facing the recesses *m* and *n*.

In the lower part *a* of the valve-box are two ports *t u*, leading to the two ends of the engine-cylinder, and two ports and channels *v w*, leading to lateral ports of the engine-cylinder corresponding with those marked *d'* and *e'* in Fig. 4 of the drawings annexed to the Patent No. 621,271 above referred to, so arranged relatively to a deep piston that when either is uncovered beyond the end of the piston the other is open to a recess in the middle of the piston, which recess communicates by a lateral port marked *f'* in the said figure and a passage *x* with the exhaust-space *i*.

The valve operates as follows: The wing *p* being at the one—say the right—side, next the channel *w*, the port *l* is then in line with the channel *u*, and fluid passes by the port *u* to the right end of the cylinder, while exhaust from the left end passes by the port *t*, recess *m*, and port *r* to *q*, and thence to *g*. At the same time the cavity on the left of *p* communicates by the small holes and *o* with the annular groove *h* and by *q* to the exhaust-pipe *g*. At this time the port *v* is in communication with the space in the cylinder occupied by working fluid, while the port *w* is in communication with the exhaust-recess of the piston. When the piston in the cylinder uncovers the port leading to *w*, the port *v* being then in communication with the exhaust-recess of the piston, then the working fluid, acting on the wing *p*, forces it to the left, so as to put *l* in communication with *t* and *u* in communication with *n* and *s*. The movement of the piston is thus reversed and the port leading to *w* is again covered, that leading to *v* being still in communication with the exhaust-recess of the piston until it is covered by the piston. As the wing *p* is forced in either direction past the small holes leading to *o*, the pressure on it is reduced, owing to escape of some of the fluid acting on it, and thus is avoided the shock which would occur if *p* were driven over it by full pressure acting on it during its whole strokes.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

1. The combination with the valve-box, of



the end covers having, respectively, the annular groove and the space in their inner faces and the inlet and outlet, the partially-rotating valve arranged in the valve-box and  
 5 having a longitudinal bolt-hole, and the bolt passing through said valve and end covers and securing the latter in place, substantially as described.

2. The combination with a valve-box hav-  
 10 ing a longitudinal channel *q*, lateral channels *r*, *s*, leading from the latter and ports *t*, *u*, to lead to the engine-cylinder, of the end covers *c*, *d*, having respectively, the inlet *f*, and outlet *g* and the annular groove *h* and space *i*  
 15 communicating with said longitudinal channel, the partially-rotating valve *k* arranged in the valve-box and having a longitudinal passage *e'*, lateral port *l* leading from the latter and recesses *m*, *n*, communicating with  
 20 said lateral channels, and means for securing said end covers in position, substantially as described.

3. The combination with a valve-box having a longitudinal channel *q*, lateral channels  
 25 *r*, *s*, leading from the latter and ports *t*, *u* to lead to the engine-cylinder, of the end covers *c*, *d*, having, respectively, the inlet *f*, and outlet *g*, and the annular groove *h* and space *i*, communicating with said longitudinal chan-  
 30 nel, the partially-rotating valve *k* having the

longitudinal passage *e'*, lateral port *l* and recesses *m*, *n*, and the bolt *e* passing through said valve and the end covers, substantially as described.

4. The combination with the valve-box hav- 35  
 ing the channel *w*, port *v* and small hole *o*, of the partially-rotating valve *k* having the radial wing *p* located between said channel and port and working over said hole, substantially as described. 40

5. The combination with a valve-box having a longitudinal channel *q*, lateral channels *r*, *s*, leading from the latter, ports *t*, *u*, to lead to the engine-cylinder, the channel *w*, the  
 45 port *v* and the small hole *o*, of the end covers *c*, *d*, having, respectively, the inlet *f*, and the outlet *g* and the annular groove *h* and space *i*, the partially-rotating valve *k* having the radial wing *p*, longitudinal passage *e'* lateral port *l* and recesses *m*, *n*, and means for  
 50 securing the end covers in position, substantially as described.

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

WILLIAM VIVIAN.

Witnesses:

W. H. DANIELL,  
 R. BARCLAY FOX.