

(No Model.)

J. C. GRÄBNER & H. RUPERTI.

STEAM ENGINE.

No. 385,113.

Patented June 26, 1888.

Fig. 1.

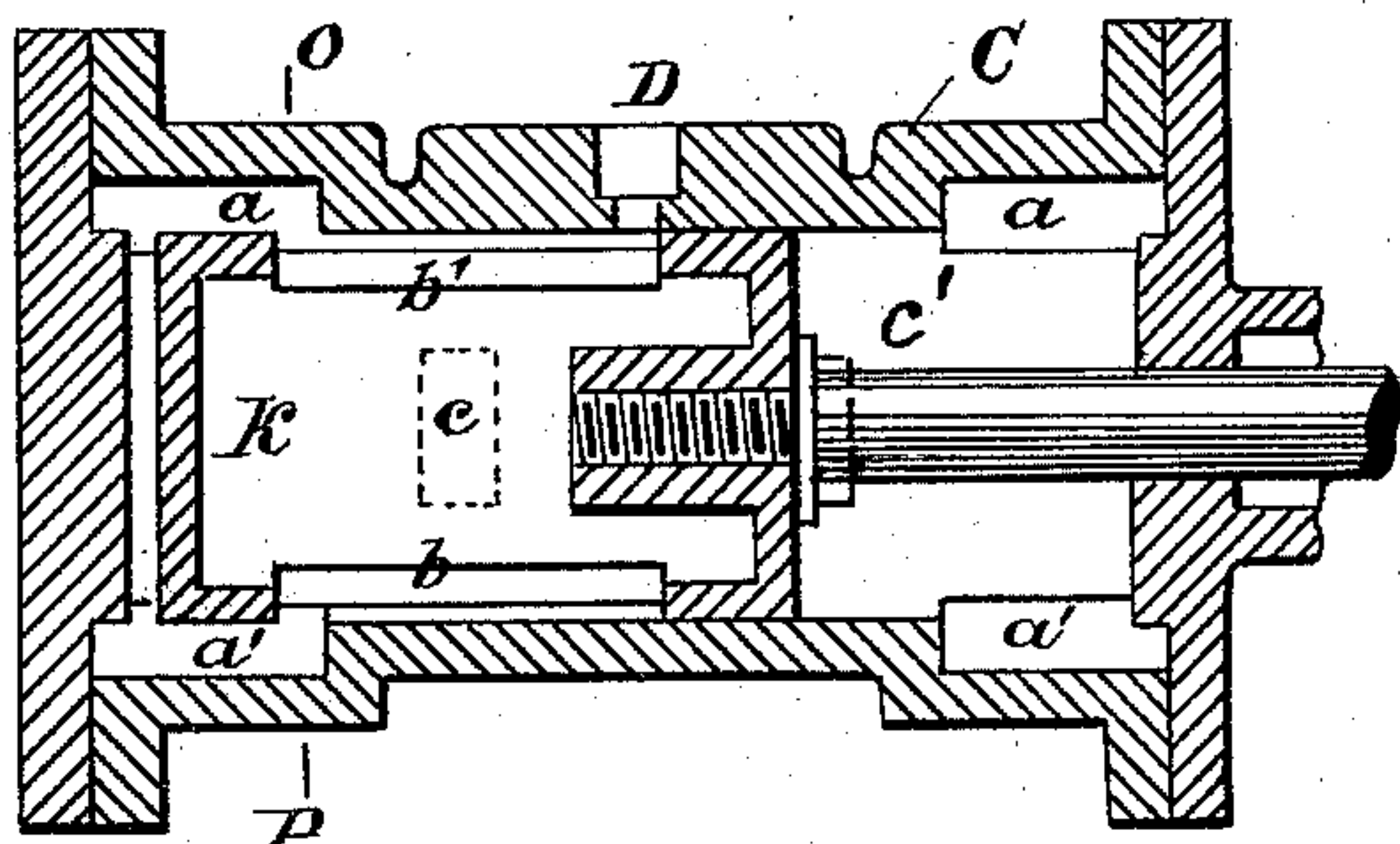


Fig. 2.

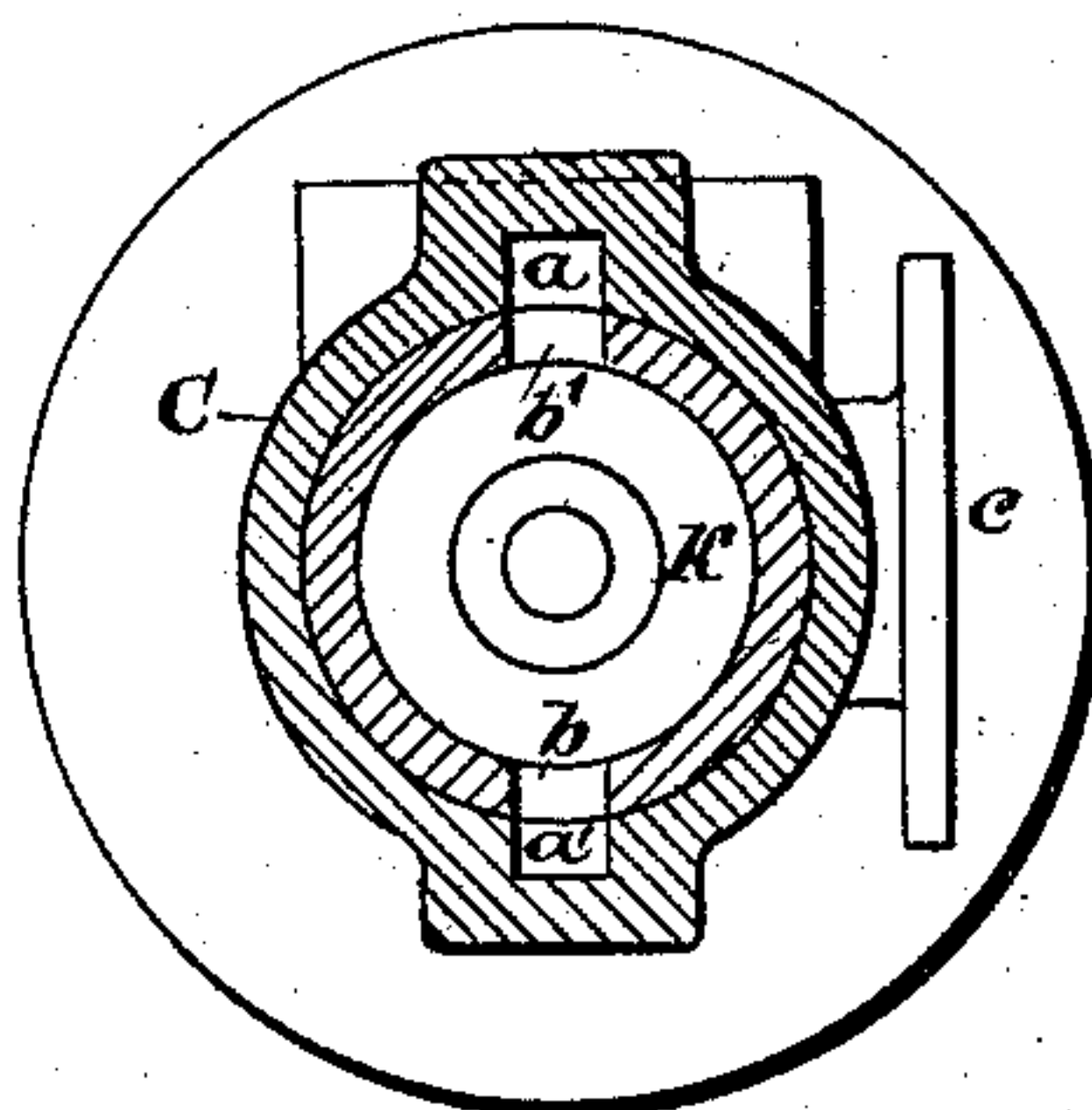


Fig. 3.

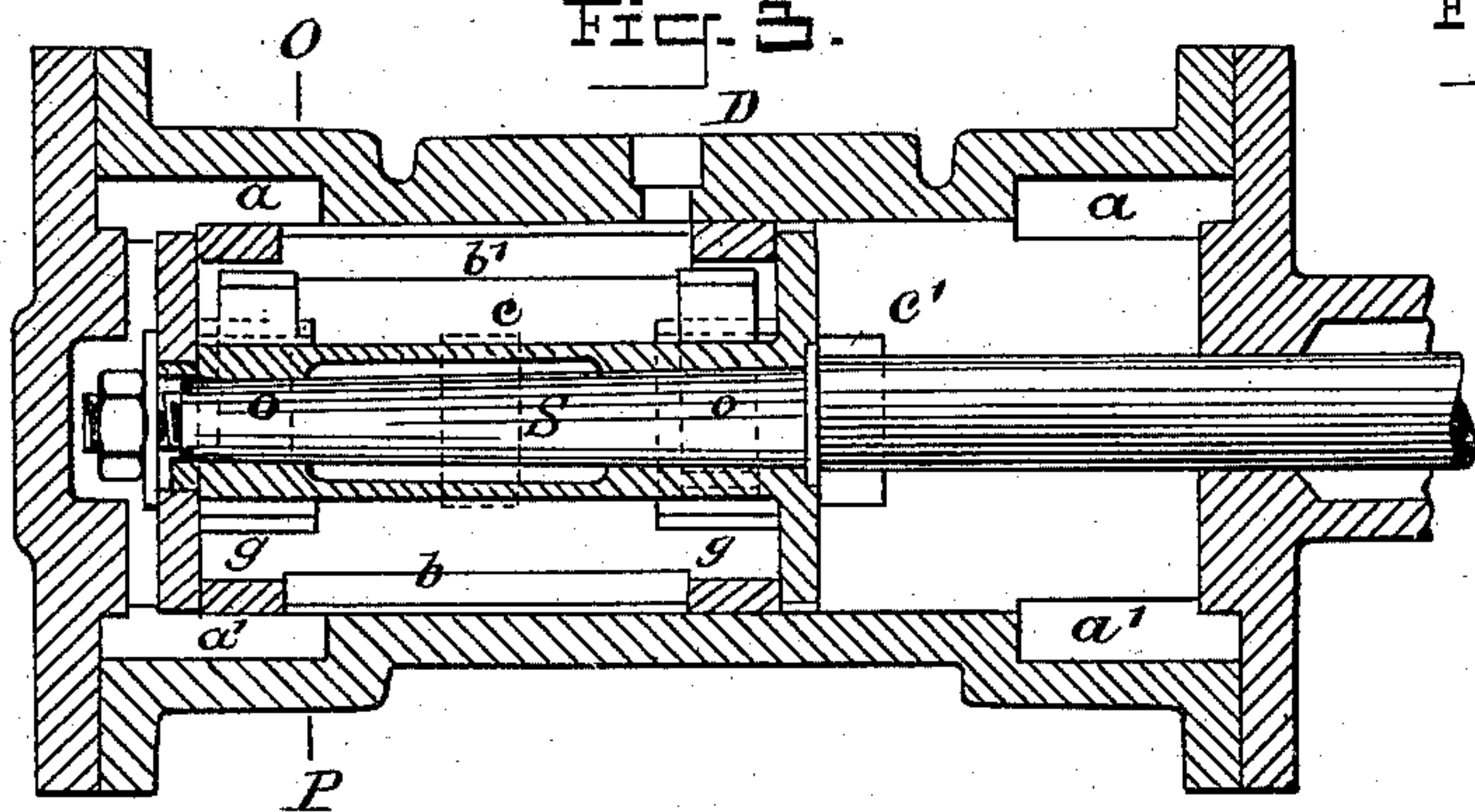
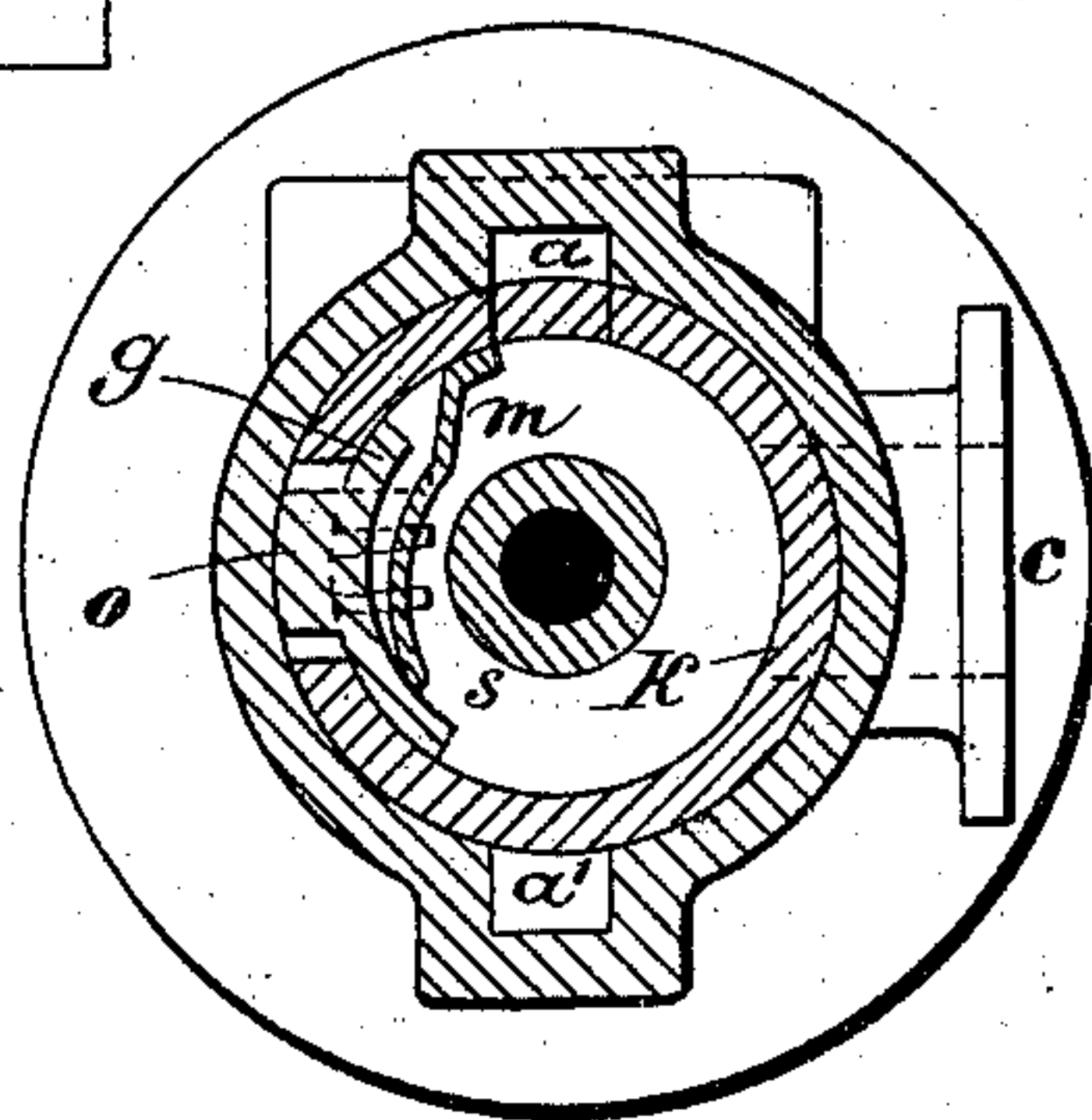


Fig. 4.



WITNESSES:

D. D. Mott.
C. Sedgwick.

INVENTOR:

J. C. Gräbner.
H. Rupert.
Munn & Co.
BY
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHANN CARL GRÄBNER, OF KUPFERHAMMER, AND HENRI RUPERTI, OF BRACKWEDE, ASSIGNORS TO K. & TH. MÖLLER, OF KUPFERHAMMER, PRUSSIA, GERMANY.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 385,113, dated June 26, 1888.

Application filed May 19, 1887. Serial No. 238,788. (No model.)

To all whom it may concern:

Be it known that we, JOHANN CARL GRÄBNER, a subject of the King of Bavaria, residing at Kupferhammer, near Brackwede, and HENRI RUPERTI, a subject of the Grand Duke of Mecklenburg-Schwerin, residing at Brackwede, Prussia, Germany, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates to an improved construction of cylinder and piston motor-engines wherein the distribution of the motor-fluid—such as pressure steam or vapor and gases, explosive mixtures of the same liquids, and the like—alternately to either side of the piston is effected without the use of valves or slides by means of specially-constructed passages and ports in the cylinders and their pistons.

In the drawings, Figure 1 is a longitudinal section of a steam cylinder and piston constructed in accordance with my invention. Fig. 2 is a cross sectional view thereof. Figs. 3 and 4 are similar views of a further modification.

The invention will be readily understood on referring to the accompanying drawings, which show its application, by way of example, to single-cylinder and double-cylinder motor-engines. For more simplicity in the following description steam will be presumed to be the motor-fluid, as this is most frequently used.

Fig. 1 shows a longitudinal section, and Fig. 2 a cross-section, of one arrangement for a single-cylinder engine. C is the steam-cylinder; K, the piston; D, the inlet-port for steam; *e* and *e'*, the exhaust-ports. *a a* and *a'* are grooves or recesses at each end of the cylinder's walls. The piston K is hollow and has slots *b* and *b'*. Steam passes from port D, through slot *b'*, into the interior of the piston K, which is consequently always filled with fresh steam. In the position of the piston shown at Fig. 1 the steam passes behind the piston and drives it forward—that is to say, to the right hand. The steam in front of the piston escapes through the opening *e'*. When the piston has traveled so far that the communication between the slots *b b'* and the grooves *a a'* is intercepted, so that no more steam can

pass behind the piston, the steam previously admitted will expand, causing the piston to complete its stroke. By this motion the front end of the piston is made to close the exhaust-port *e'* before arriving at the end of its stroke, thus forming a steam-cushion in front of the piston. Arrived at the end of its stroke, the piston admits steam in front of it through port D, slots *b'*, and grooves *a a'*, and the piston is made to perform its return-stroke, the steam behind it being made to escape through port *e*, and so on continuously. By admitting steam into the piston K through slots *b b'* the piston is relieved of strain.

Figs. 5 and 6 show, respectively, a longitudinal and transverse section of another modification. The cylindrical part of the piston K is in this case slit along its entire length, so as to have a certain amount of spring when in the cylinder, and at each end of the slit are provided closing-pieces *o*, with cylindrically-shaped stuffing-pieces *g*, ground so as to fit steam-tight against the inner surface of the piston, the end surfaces of the pieces being also ground so as to fit steam-tight against the end plates of the piston. The pieces *o* are kept in position by springs *m*, of any suitable construction. The spring of the piston is regulated by the screw-bolt S, passing through lugs on each side of the slit. *b b'* are opposite slots operating in conjunction with the grooves *a a'*, as previously described with reference to Figs. 1 and 2.

The construction shown in Figs. 1 to 4 may be combined to engines having several cylinders. All these constructions may be provided with the well-known details, such as steam-jacket, grooves or springs in the pistons, cocks, and the like.

Having now fully described the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. The combination, with the cylinder C, having end grooves, *a a'*, steam-inlet D between its ends, and an exhaust, of the hollow or tubular piston K, having closed ends and longitudinal openings *b b'*, communicating with grooves *a a'* when the piston is at the extremes of its movement, the interior of the cylinder always

communicating with the steam-inlet D, the exhaust being closed by the side walls of the piston until the ends of the piston pass thereby in both directions, substantially as set forth.

- 5 2. The combination, with the cylinder C, having end grooves, *a a'*, steam-inlet D between the grooves, and an exhaust, *e e'*, at opposite sides of the inlet D, of the hollow piston K, closed at its ends and having longitudinal
10 openings *b b'*, connecting the interior of the cylinder at all times with the inlet D, and connecting it with the grooves *a a'*, respectively, at the extremes of its movement, both ex-
15 haust-ports being closed by the side wall of the piston and opened successively as the pis-

ton passes them in its two movements, substantially as set forth.

3. The combination, with the cylinder having end grooves and inlet and exhaust ports, 20 of the longitudinally-slitted spring-piston having closing-pieces *o*, stuffing-pieces *g*, and springs *m*, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of 25 two subscribing witnesses.

JOHANN CARL GRÄBNER.

HENRI RUPERTI.

Witnesses:

DAGOBERT SCHÖURY,

CARL KUHN.