

No. 662,417.

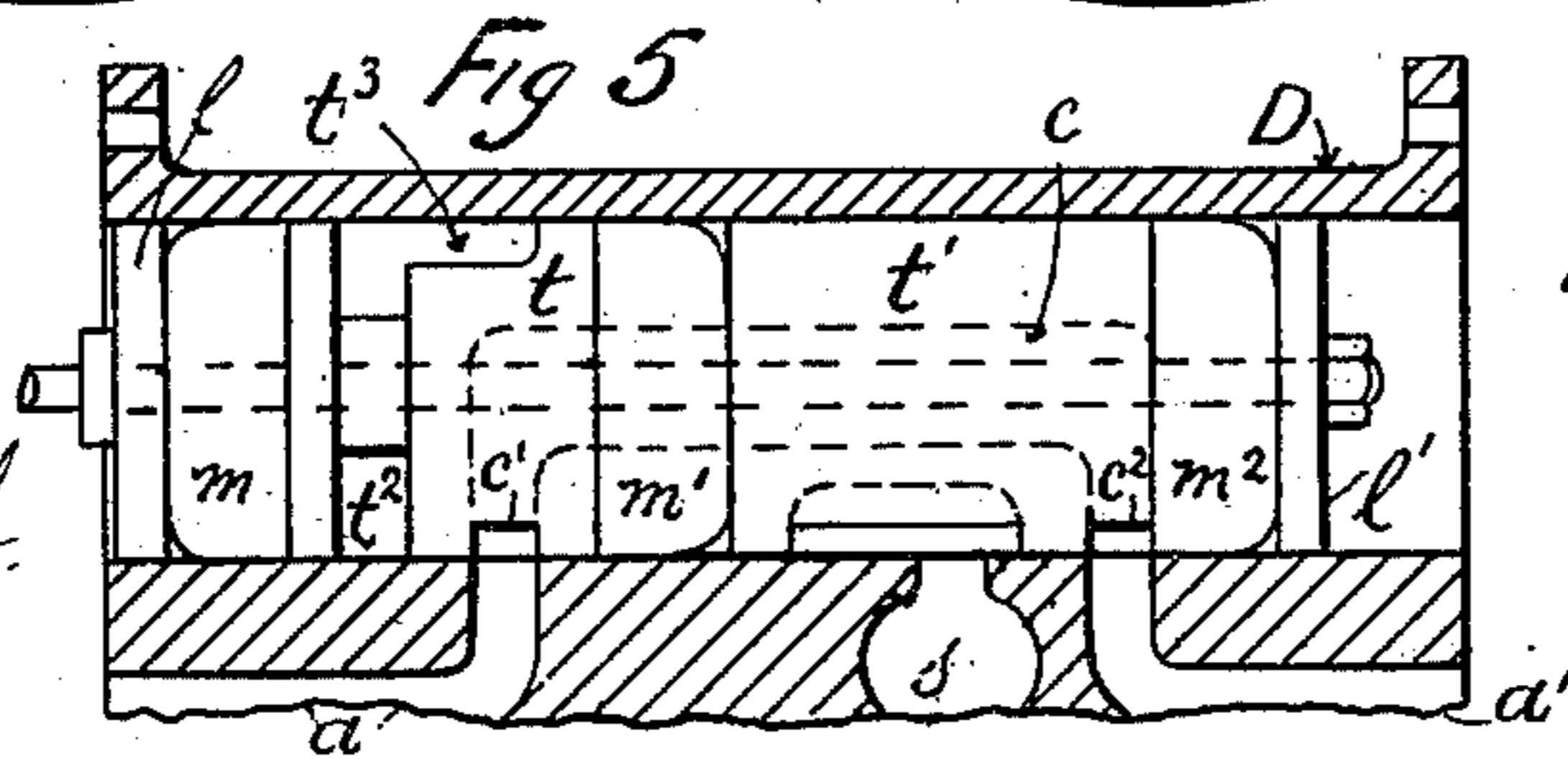
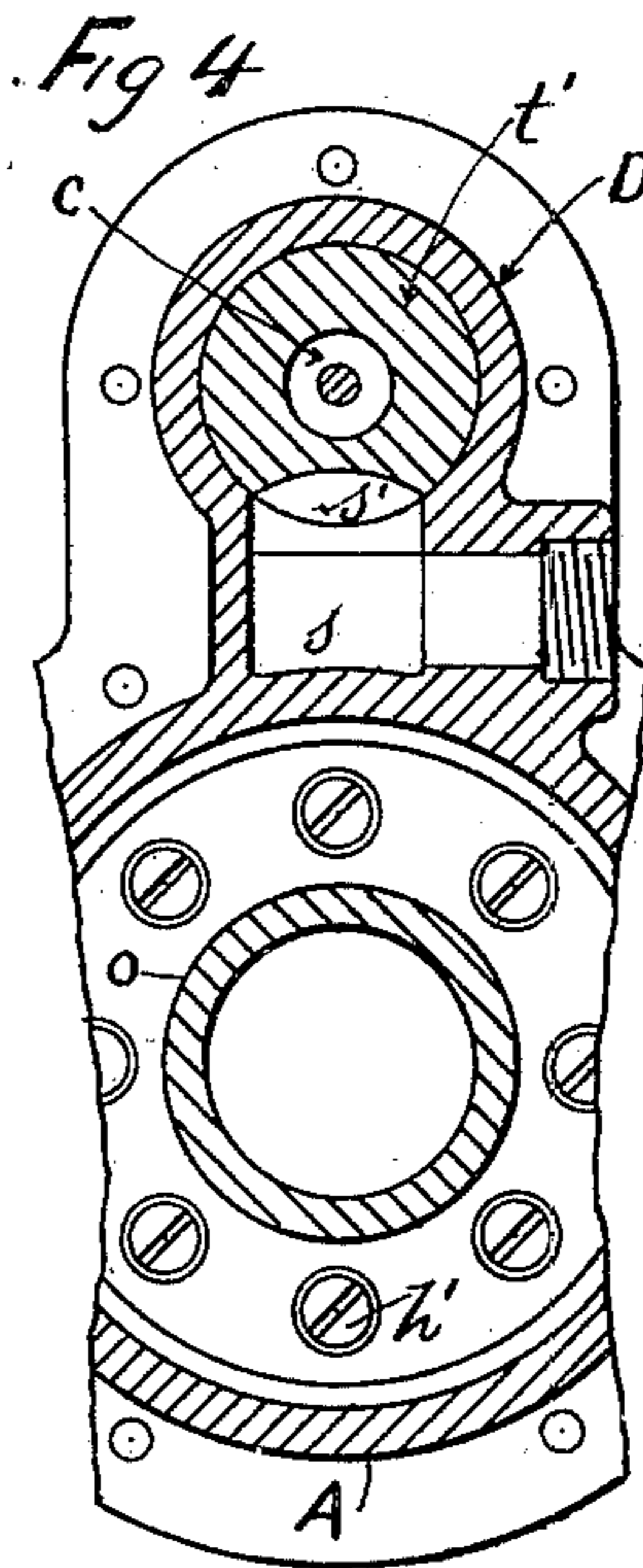
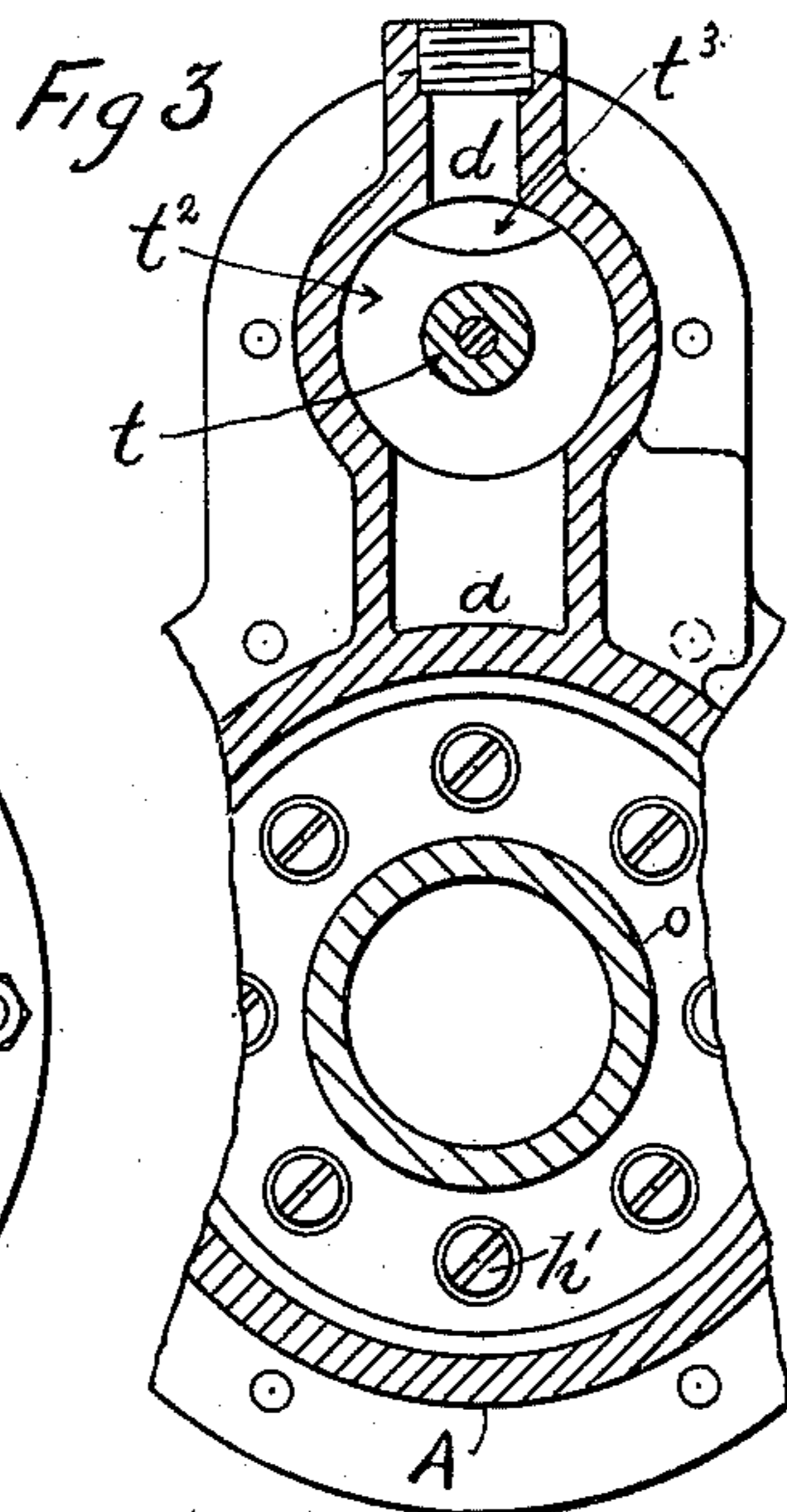
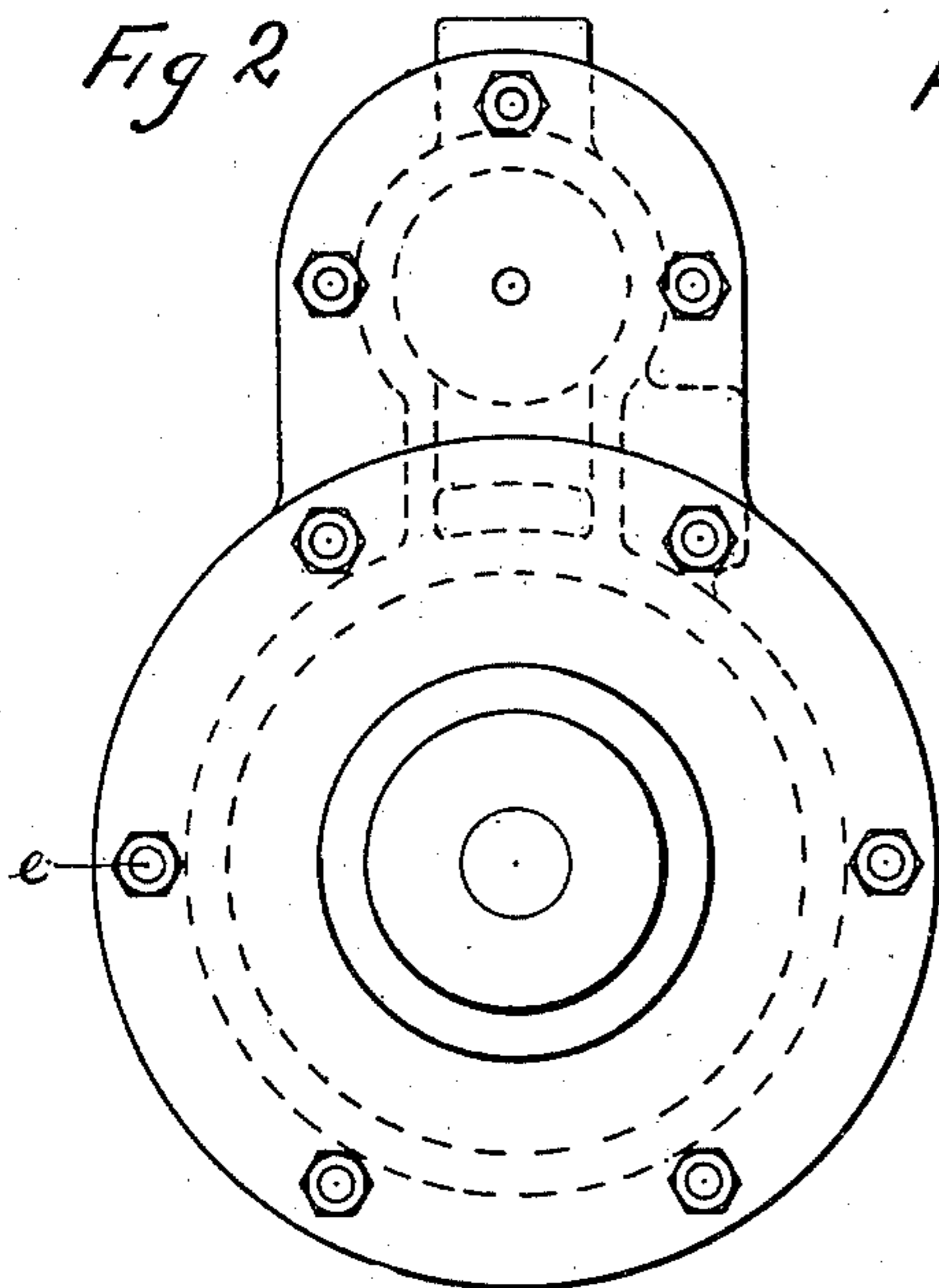
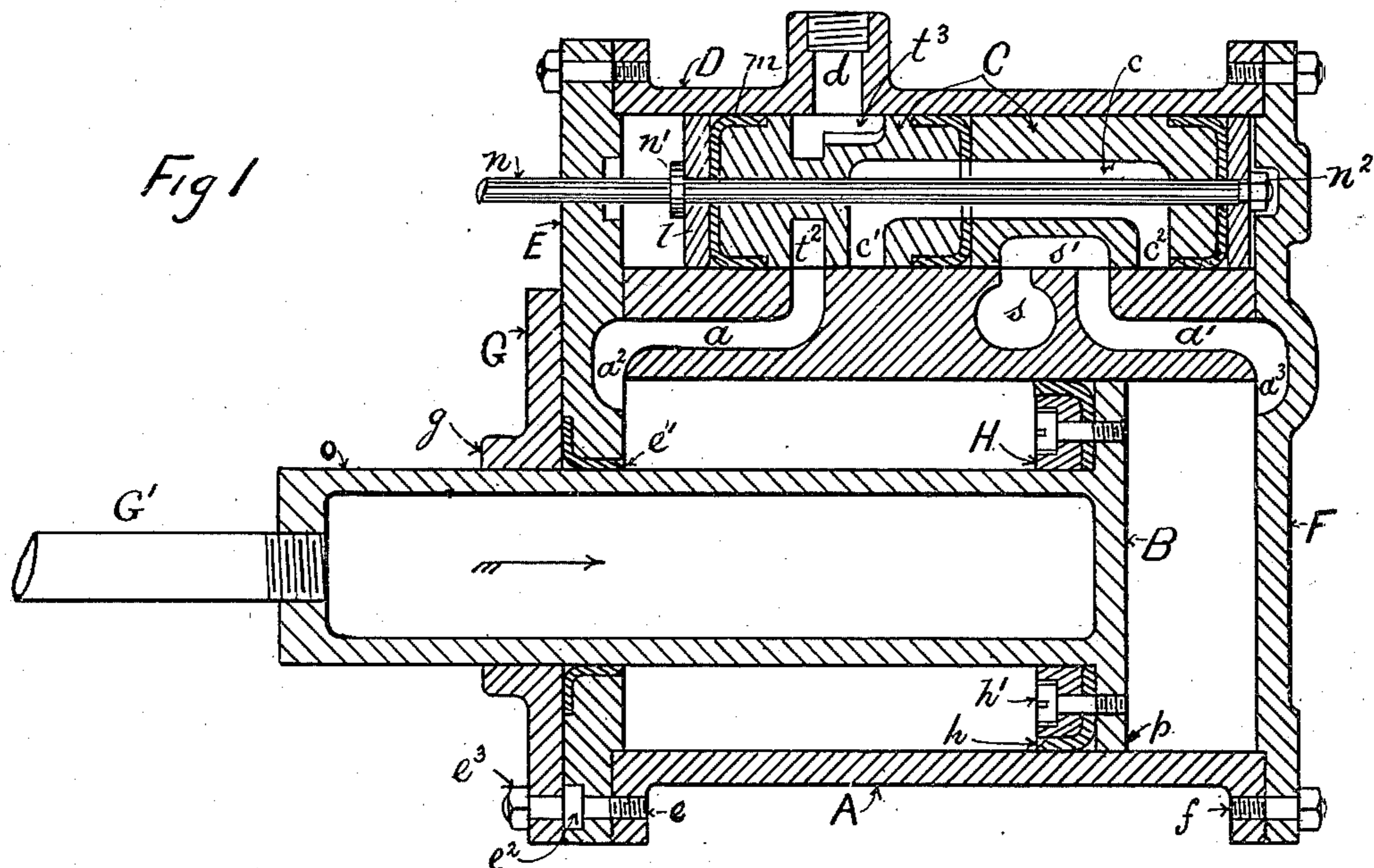
Patented Nov. 27, 1900.

T. GRANT.
SINGLE CYLINDER COMPOUND ENGINE.

(Application filed June 12, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

Charles J. Roe
George A. Wardell

INVENTOR

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BY

A. A. de Romeville

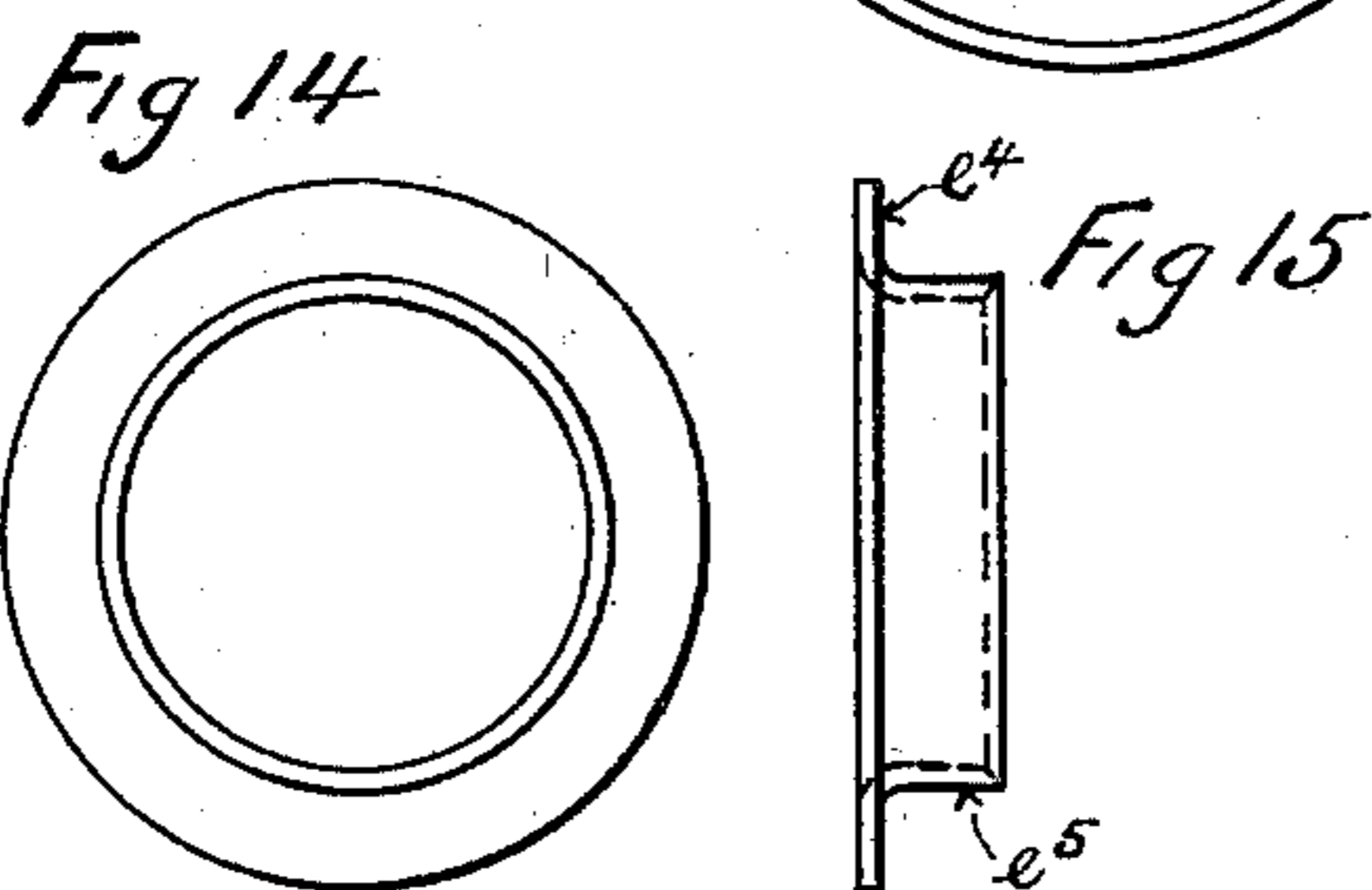
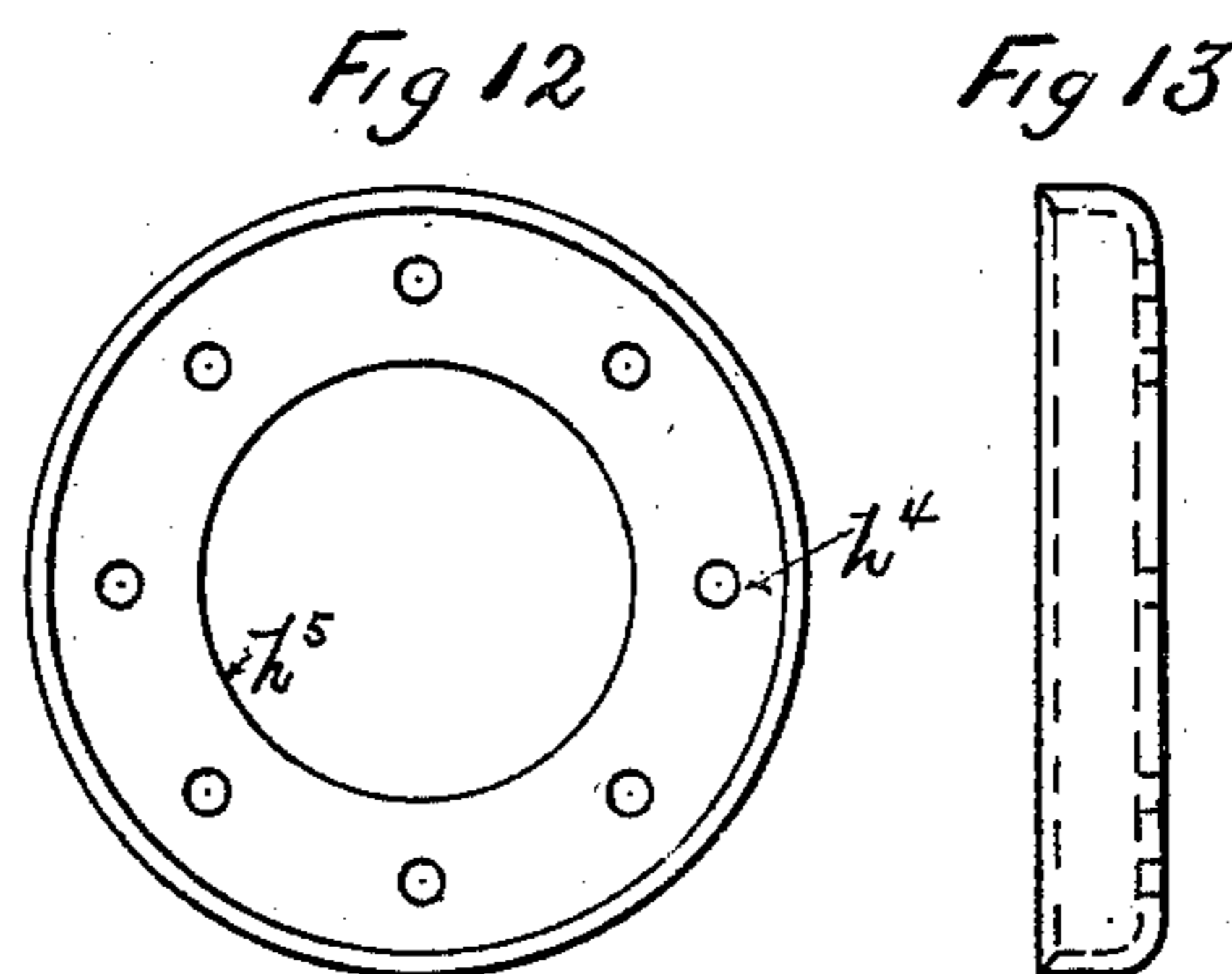
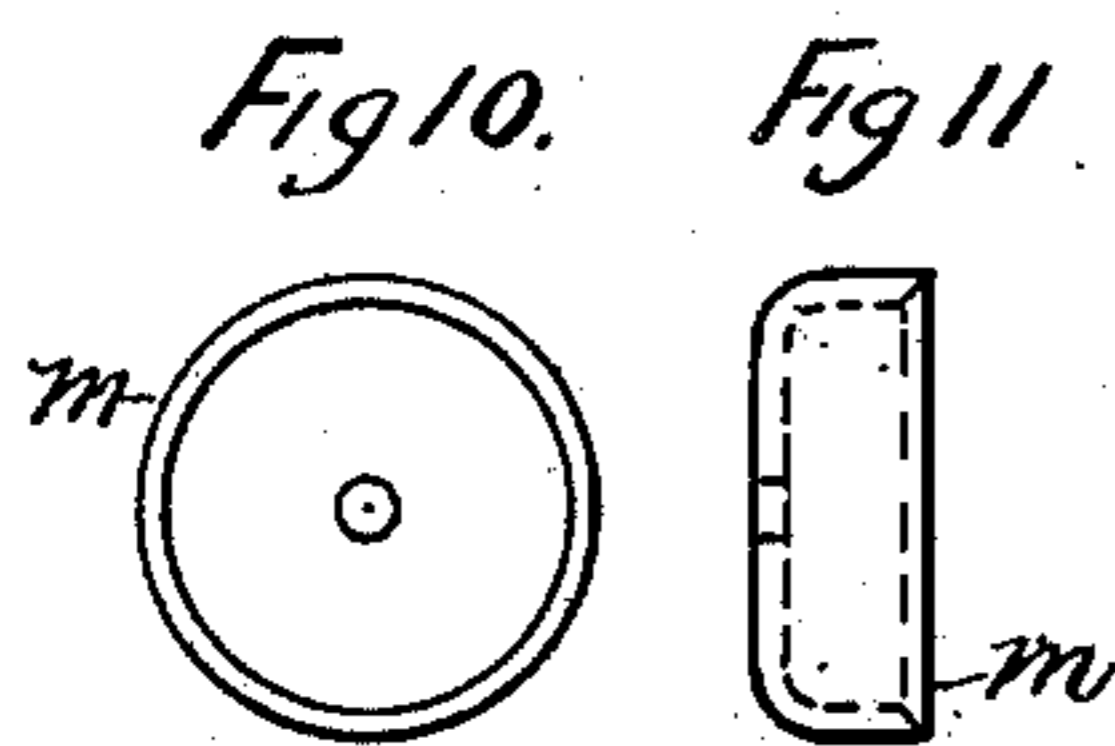
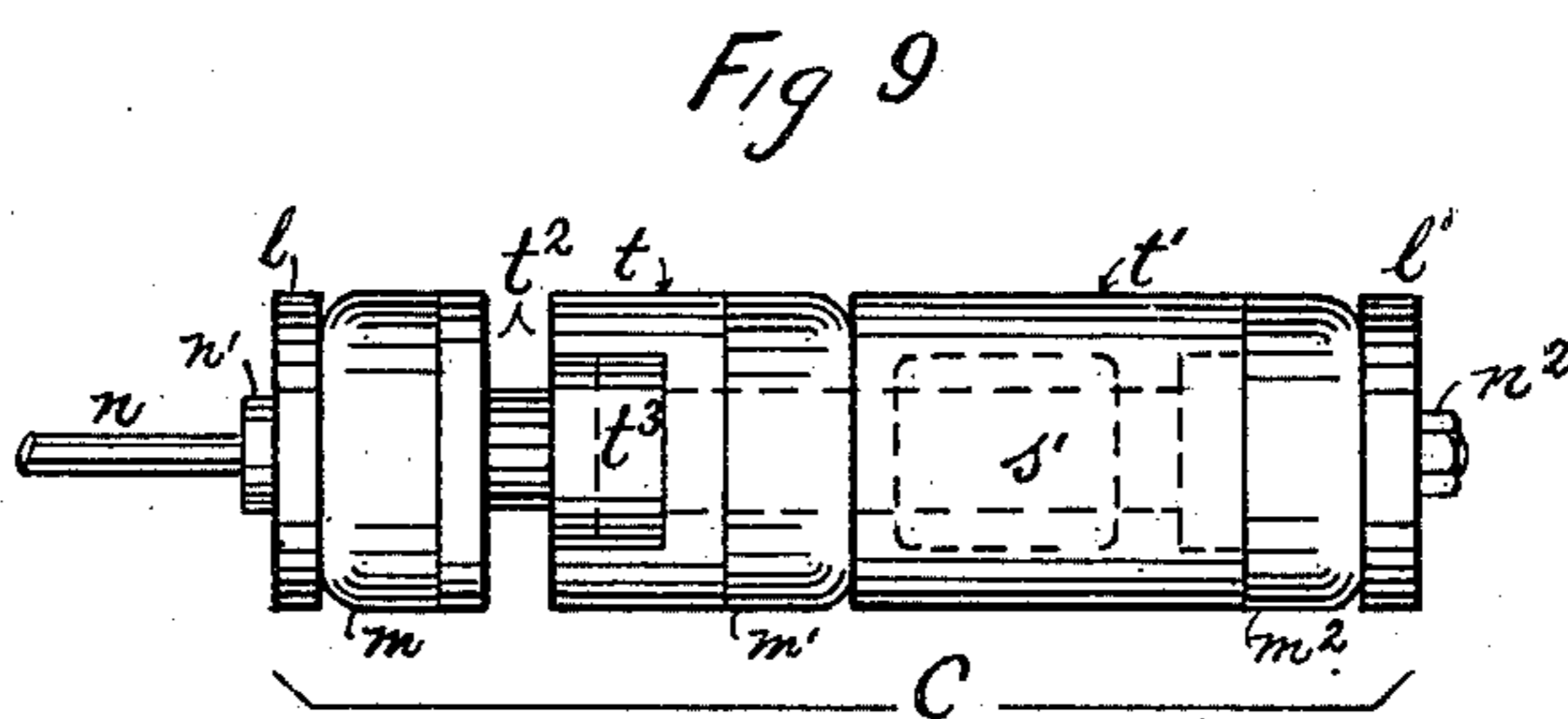
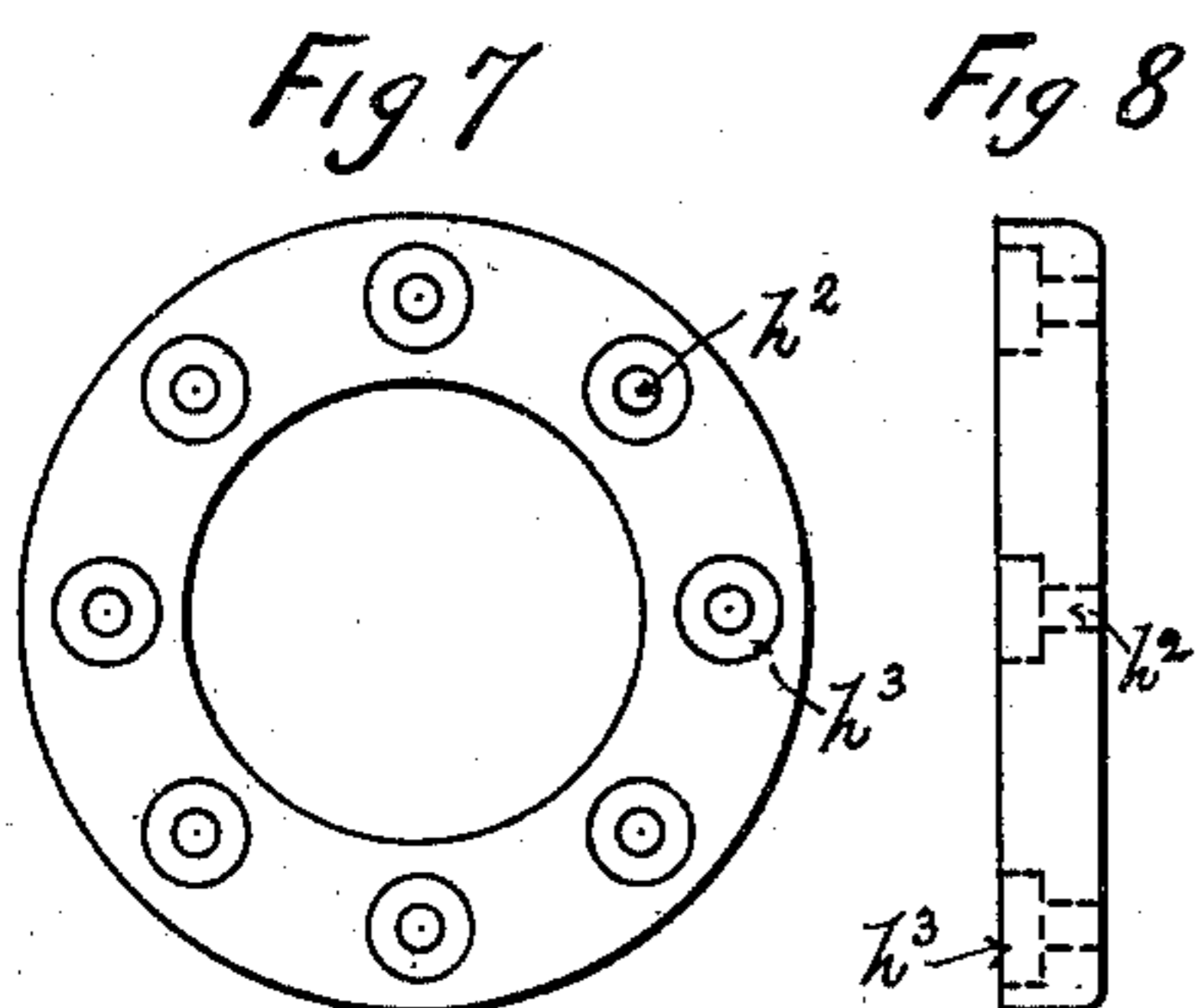
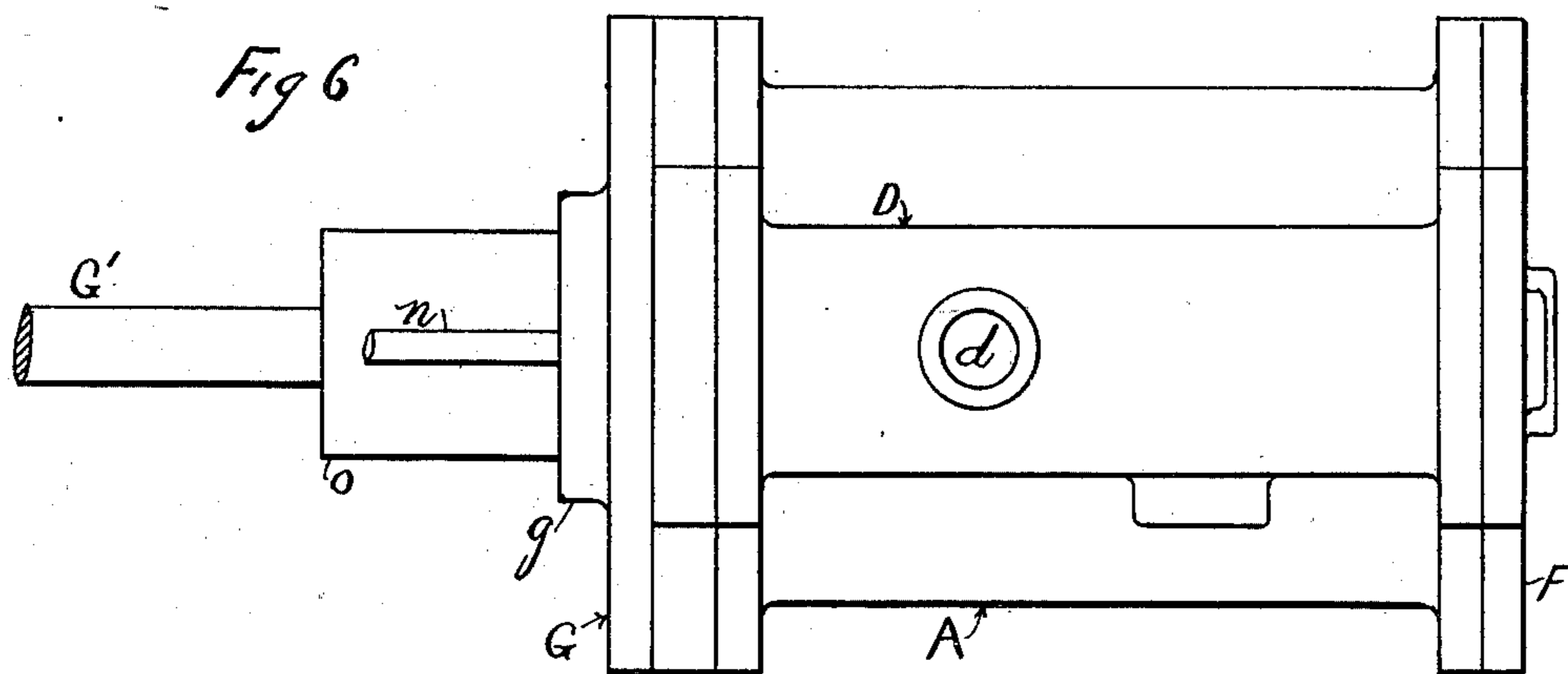
ATTORNEY

T. GRANT.
SINGLE CYLINDER COMPOUND ENGINE.

(Application filed June 12, 1899.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

THOMAS GRANT, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
HARTWIG A. COHEN, OF DALAMAR, NEVADA.

SINGLE-CYLINDER COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 662,417, dated November 27, 1900.

Application filed June 12, 1899. Serial No. 720,311. (No model.)

To all whom it may concern:

Be it known that I, THOMAS GRANT, a citizen of the United States, and a resident of the borough of Richmond, New York city, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Single-Cylinder Compound Engines, of which the following is a specification.

10 The object of this invention is the production of a machine to expand air or other vapors from high to low pressures; and its novel features consist in the simplicity of its construction, eliminating parts heretofore used
15 in machines of this type and securing a compound engine with only one cylinder.

To these ends my invention consists of the device shown in the drawings, described in the specification, and pointed out in the claims
20 herewith.

Figure 1 shows a vertical longitudinal section of my engine, taken through its axis. Fig. 2 is a front end view showing the plunger through the front cylinder-head. Fig. 3
25 is a fragmentary vertical cross-section taken through the inlet opening and port at front end of cylinder. Fig. 4 represents a fragmentary vertical cross-section through the exhaust-cavity of the cylinder. Fig. 5 shows a fragmentary longitudinal vertical section through
30 the axis of the valve-chest, with the valve shown in full. Fig. 6 is a top plan view of the expander. Figs. 7 and 8 show, respectively, an elevation and side view of the follower-ring. Fig. 9 represents a top view of the
35 valve. Figs. 10 and 11 show, respectively, an elevation and side view of cup-shaped valve-packing. Figs. 12 and 13 show, respectively, an elevation and side view of the piston-packing. Figs. 14 and 15 represent an elevation
40 and side view of flanged piston-packing.

The engine consists, essentially, of a cylinder A, a valve-chest D, and a piston B, controlled by a valve C.

45 The cylinder A is cored with the ports a and a' and exhaust-cavity s . The cylinder-heads E and F are secured to the cylinder by the bolts e and f , the bonnet G being also held in place by the bolts e , the collars e^2 on the bolts securing the cylinder-head E, and the nuts e^3 clamp
50 the bonnet G. The front cylinder-head E is

arranged for the flanged packing e' , which is held in place by the bonnet G. A throat g is cast with a bonnet G to maintain the hollow piston B in proper position. The cylinder-head E is cored at a^2 and the cylinder-head F at a^3 to connect the ports a and a' with the inside of the cylinder. 55

The hollow piston B is made of two diameters, as shown at o and p . A follower-ring H clamps the piston-packing h by means of the bolts h' and is always brought tight against the inside surface of the cylinder by the pressure therein on the front side of the piston, which always exceeds the pressure on
60 the opposite side, because the air or vapor is expanded on being transferred from the front to the rear end of the cylinder. The piston-packing, which is separately shown in Figs. 12 and 13, is cup-shaped, preferably made of leather, and punched with holes h^4 for the bolts h' , and contains the internal opening h^5
65 to admit the portion o of the piston. The follower-ring H, which is represented in elevation in Fig. 7 and in side view in Fig. 8, is shown with the holes h^2 and counterbores h^3 for the bolts h' . The flanged packing e' (shown in elevation and side view in Figs. 14 and 15) is formed with a flange e^4 and throat e^5 . 70

The valve C consists of the two main portions t and t' , collars l and l' , and the cup-shaped packings, preferably made of leather, m , m' , and m^2 , all mounted on the valve-spindle n between the collar n' and the nut n^2 . The packings m , m' , m^2 are all of the same cup
80 shape, one of which, m , is shown in elevation and side view in Figs. 10 and 11. The cup-shaped packings m and m' are disposed to be on opposite sides of the inlet opening and port a for any position the valve C may take, thereby securing a tightly-packed valve by means
85 of the pressure of the air or vapor entering or leaving the cylinder through the port a . The circumferential port t^2 of the valve C leads from the cavity t^3 , cut in the top of the same. An exhaust-cavity is cored at s' , and a core c in both portions t and t' of the valve C connects the ports c' and c^2 . 90

The useful effect of the engine consists in avoiding the heat resulting from frictional resistances caused by expanding air or other vapors from high to low pressures when not 100

performing mechanical work, as would result by using an ordinary expansion-valve, while in my device the expansion of the air exerts energy on the piston, and thereby performs useful work.

When the valve C is in the position shown in Fig. 1, the compressed air or vapor enters at the inlet-opening d , passes through the cavity t^3 and port t^2 of the valve C, and enters the cylinder A through the ports $a a^2$, the piston moving in the direction shown by the arrow, and at the same time the air or vapor in the back end of the cylinder is exhausted by passing through the ports $a^3 a'$ and exhaust-cavities s' and s . The air continues to enter the cylinder until the supply is cut off by the valve changing its position, which can be accomplished by any form of valve-gear, and during the remainder of the stroke the air is expanded on the front end of the cylinder. On the return stroke of the piston the valve C assumes the position shown in Fig. 5, the ports $c' c^2$ of the valve connecting with the ports $a a'$ of the cylinder, by means of which the air or vapor between the piston and cylinder-head E is transferred to the space between the piston and cylinder-head F, and a second expansion necessarily takes place, because the volume between the piston and cylinder-head F is greater than the volume between the piston and cylinder-head E by virtue of the space occupied by the portion o of the piston.

It is evident that by the disposition and combination of the parts of my device a compound engine is obtained by the use of only one cylinder with its piston and valve, and an expensive stuffing-box is avoided by the use of the flanged packing e' .

Having described my invention, I desire to secure by United States Letters Patent and claim—

1. A cylindrical slide-valve consisting of the combination of a valve-spindle n , having a collar n' , a collar l , bearing against the collar n' , a cup-shaped packing-ring m , sur-

rounding said spindle and bearing against the collar l , a first portion t , of the valve recessed to receive a portion of the packing m , and turned to a smaller diameter to form a port t^2 , said port being extended laterally by a cavity t^3 , and said portion having another port c' , a packing m' , bearing against said portion t , with its turned-down edge lying in a recess formed in said portion, a second valve portion t' , bearing against the packing m' , and having a port c^2 , communicating with the port c' , a cup-shaped packing m^2 , having its edge lying in a recess formed in the portion t' , a collar l' , bearing against the packing m^2 , and a nut n^2 , screwed upon the said spindle for compressing all of said elements against said collar n' , an exhaust-port s' , formed in the portion t' .

2. A cylindrical slide-valve consisting of the combination of a valve-spindle n , having a collar n' , a collar l , bearing against the collar n' , a cup-shaped packing-ring m , surrounding said spindle and bearing against the collar l , a first portion t , of the valve recessed to receive a portion of the packing m , and turned to a smaller diameter to form a port t^2 , said port being extended laterally by a cavity t^3 , and said portion having another port c' , a packing m' , bearing against said portion t , with its turned-down edge lying in a recess formed in said portion, a second valve portion t' , bearing against the packing m' , and having a port c^2 , communicating with the port c' , a cup-shaped packing m^2 , having its edge lying in a recess formed in the portion t' , a collar l' , bearing against the packing m^2 , and a nut n^2 , screwed upon the said spindle for compressing all of said elements against said collar n' , an exhaust-port s' , formed in the portion t' .

Signed at New York, in the county of New York and State of New York, this 10th day of June, A. D. 1899.

THOMAS GRANT.

Witnesses:

SHERMAN W. FORD,
WILLIAM C. KIDD.