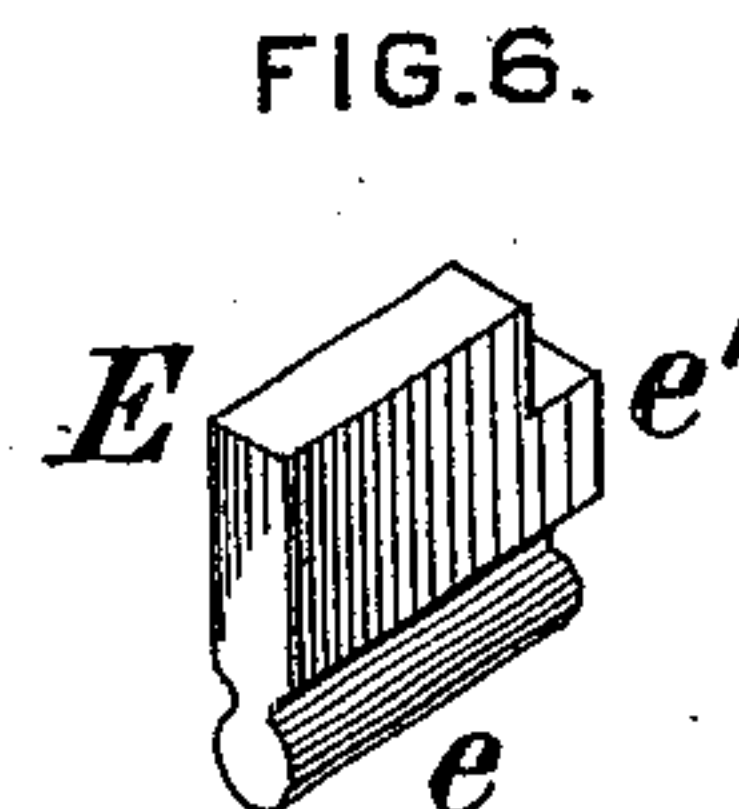
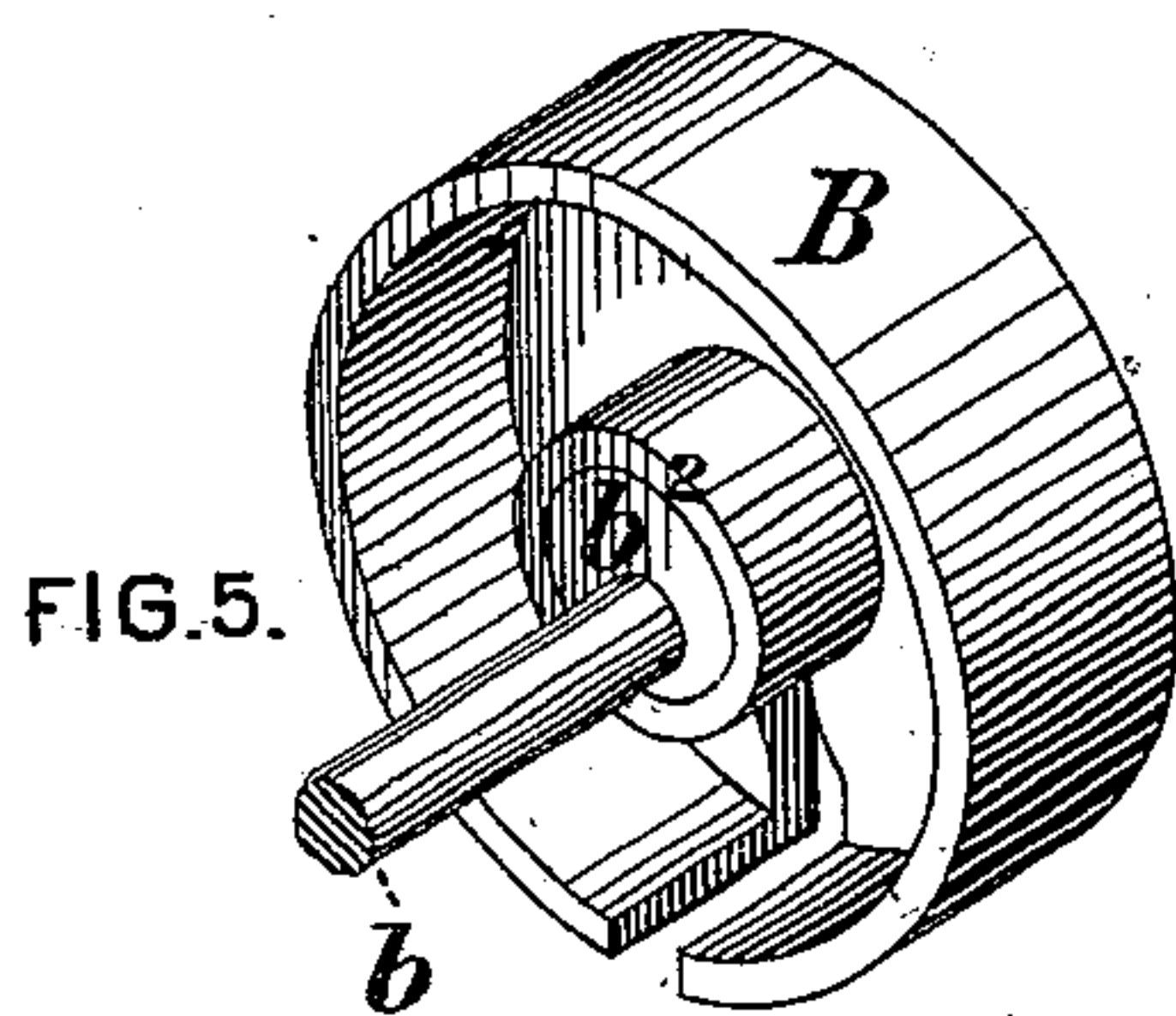
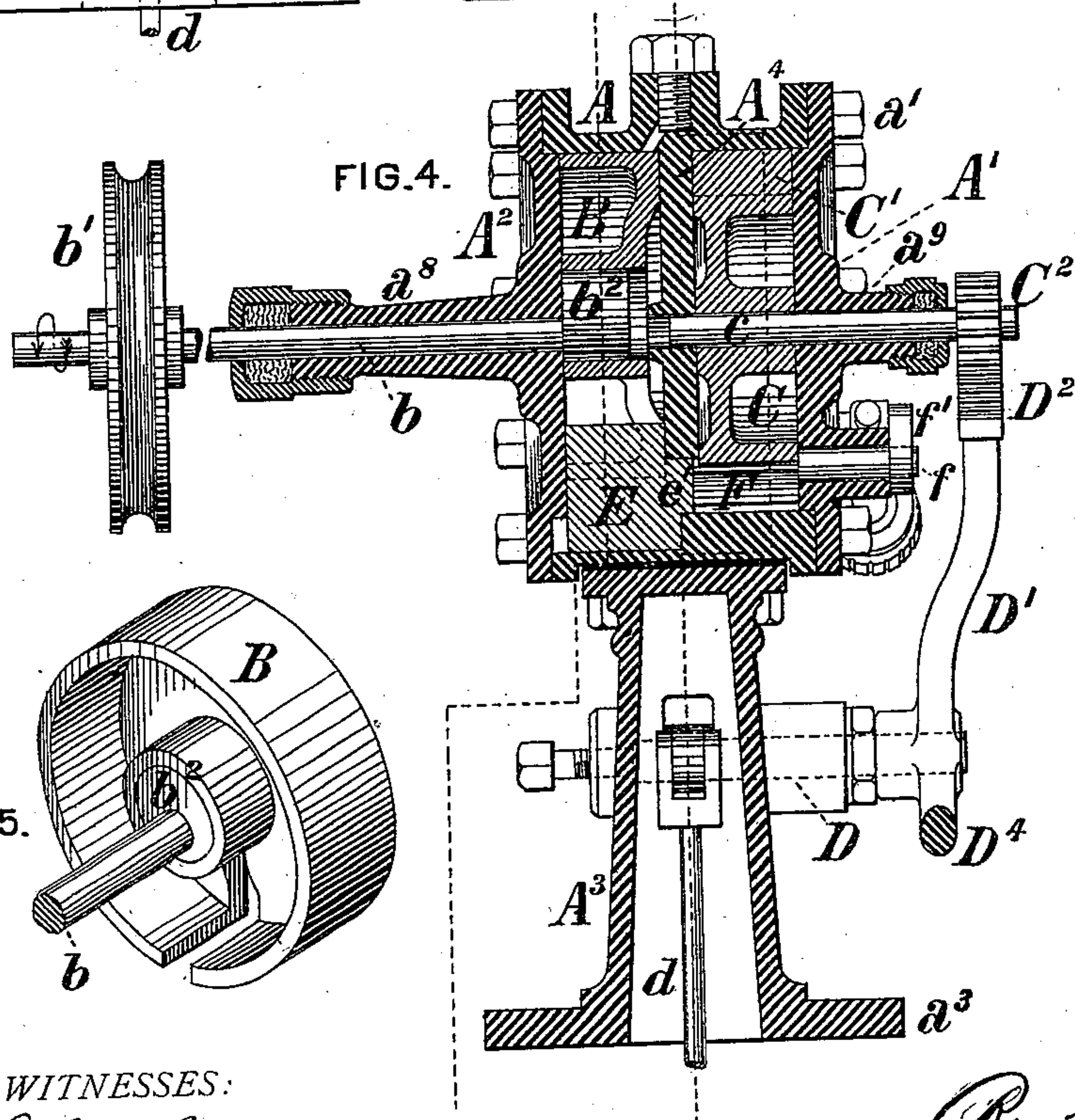
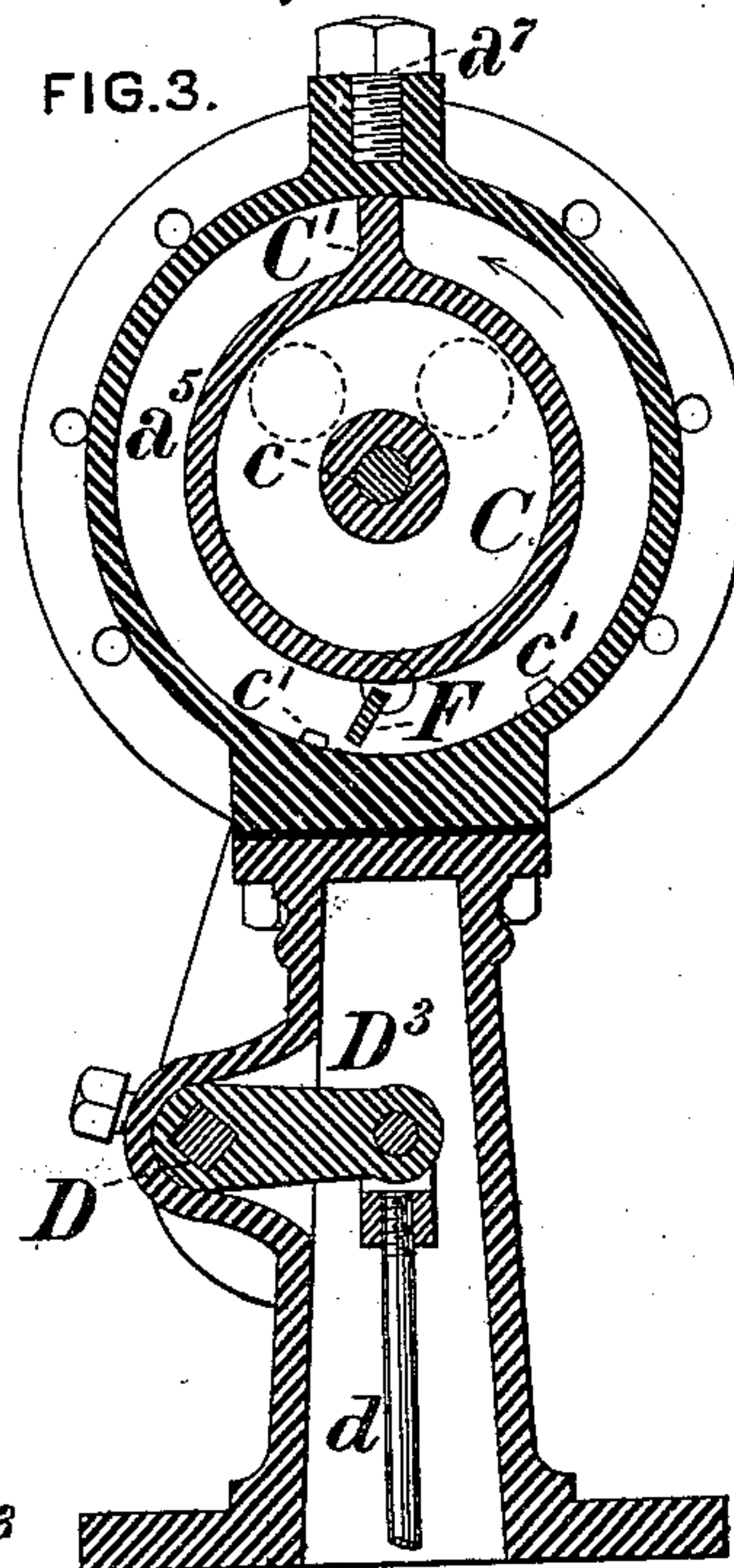
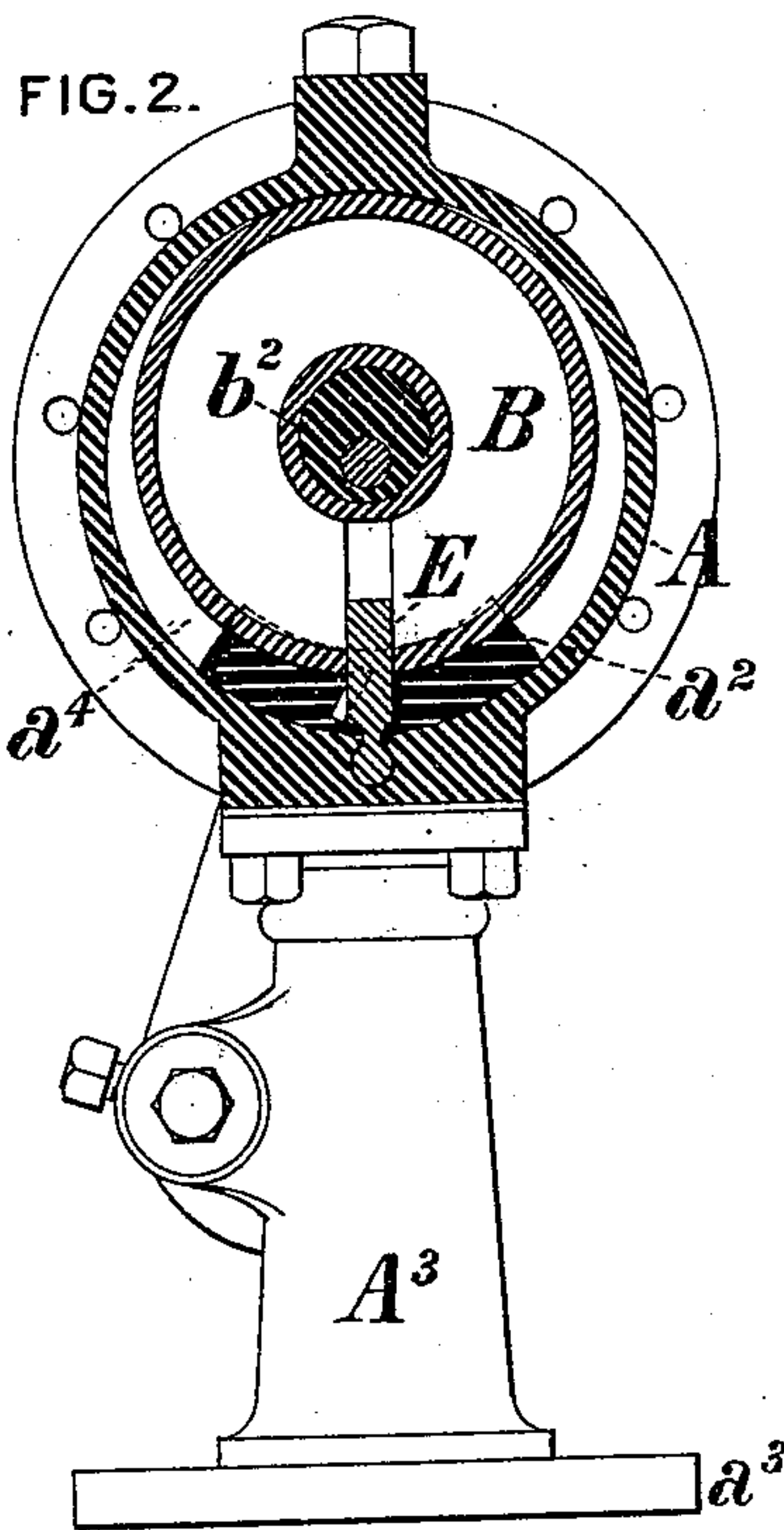
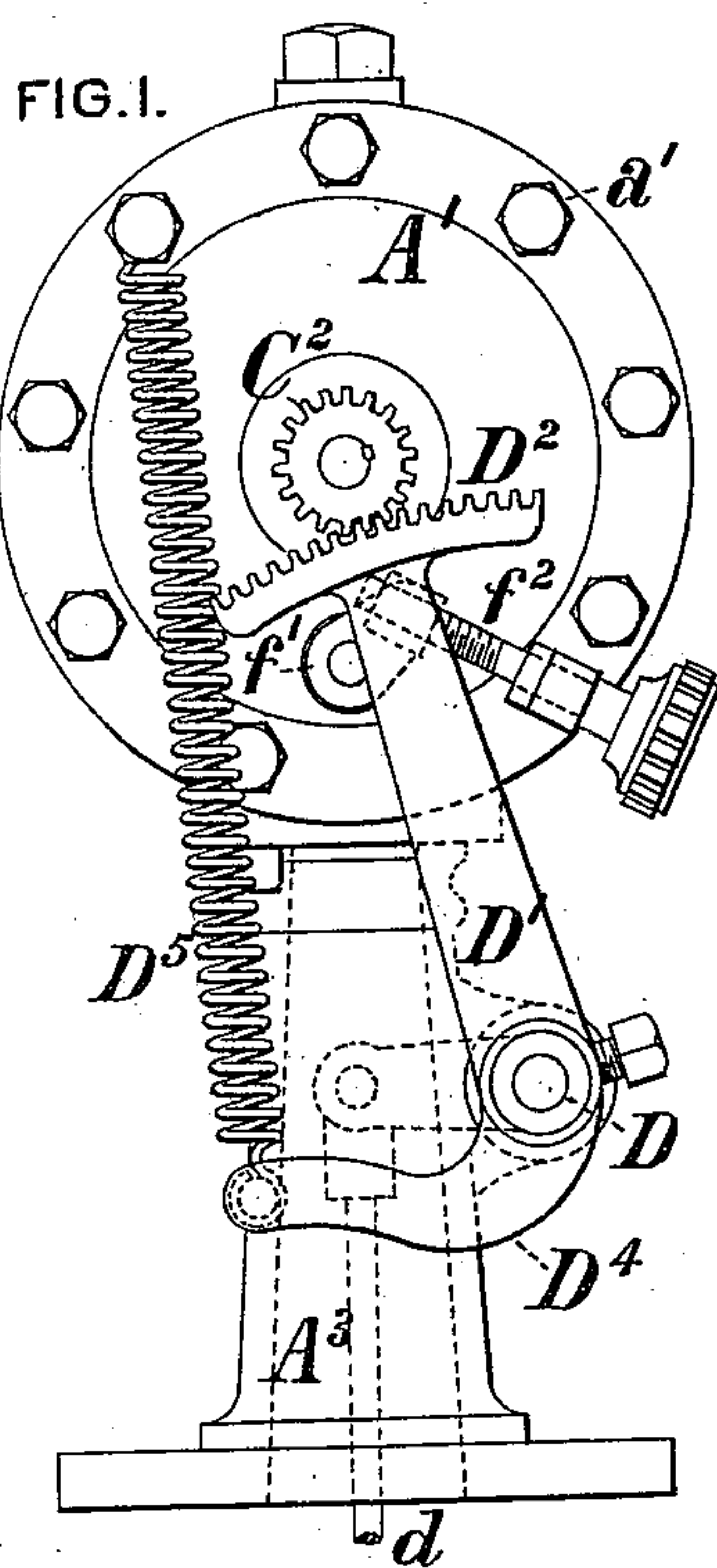


(No Model.)

B. BRAZELLE.  
Governor for Engines.

No. 229,948.

Patented July 13, 1880.



WITNESSES:

Chas V. Morgan.  
Wm E. Morgan.

INVENTOR

Benz<sup>n</sup> Brazelle,  
by Collier & Bell,  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

BENJAMIN BRAZELLE, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BRAZELLE ENGINE COMPANY, OF SAME PLACE.

## GOVERNOR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 229,948, dated July 13, 1880.

Application filed April 29, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN BRAZELLE, of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Governors for Engines, of which improvements the following is a specification.

My invention relates to improvements upon the hydraulic governor for which Letters Patent of the United States No. 208,149 were granted and issued to the Brazelle Engine Company as my assignee under date of September 17, 1878; and its object is to simplify the construction and perfect the operation of the mechanism by which the application and regulation of the pressure of the fluid medium employed is effected.

To this end my improvements consist in a novel construction and combination of the oil-piston and its operating devices, and in a novel combination of the abutment which operates the governor-valve with a pressure-regulating gate, an adjusting-arm, and an adjusting-screw. The improvements claimed are hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a side view, in elevation, of my improved governor; Figs. 2 and 3, vertical longitudinal sections of the same at the lines  $x x$  and  $y y$ , respectively, of Fig. 4; Fig. 4, a vertical transverse central section of the same; Fig. 5, a view, in perspective, of the oil-piston and its operating-eccentric, and Fig. 6 a similar view of the guide or flap of the oil-piston.

The governor-case A is of cylindrical form, having on its ends removable heads or covers  $A'$   $A^2$ , secured by bolts  $a^2$ , and is supported by a tubular standard,  $A^3$ , upon the cap or cover  $a^3$  of the governor-valve chest. The case A is divided by a vertical partition,  $A^4$ , near its center into two chambers or compartments,  $a^4$   $a^5$ , connected at bottom by a segmental channel-way or passage,  $a^2$ . An opening is formed in the top of the chamber  $a^4$  for the introduction of oil or other suitable liquid medium to fill the chambers  $a^4$  and  $a^5$ , and is closed by a screw-plug,  $a^7$ .

A cylindrical piston, B, which is shown as a circular disk or plate of smaller diameter than the chamber  $a^4$ , having upon one of its

sides a central and a circumferential cylindrical flange, the depth of which flange or the thickness of the piston is equal to the width of the chamber  $a^4$ , is mounted so as to move freely upon an eccentric,  $b^2$ , which fits easily within the central cylindrical flange, and is secured upon the inner end of a shaft,  $b$ , journaled in a long bearing,  $a^8$ , formed in the head  $A^2$ , said shaft carrying a pulley,  $b'$ , which is rotated by a belt passing around a pulley on the shaft of the engine. The throw of the eccentric  $b^2$  is equal to the difference of the diameters of the chamber  $a^4$  and the piston B.

A guide or flap, E, having a cylindrical journal,  $e$ , formed upon its lower end and a projection,  $e'$ , upon one of its sides, is fitted into a radial opening or slot in the piston B, with which it corresponds in width. The journal  $e$  of the guide E fits in a corresponding groove in the lower wall of the compartment  $a^4$ , and its projection  $e'$  enters the channel-way  $a^2$ , with which it corresponds in width and height.

A piston or abutment,  $C'$ , is formed upon the periphery of a drum, C, secured upon a shaft,  $c$ , mounted in a bearing,  $a^9$ , in line with the bearing  $a^8$  of the shaft  $b$ , and fitting easily within the compartment  $a^5$ , the outer surface of the abutment conforming to the inner surface of said compartment, and the width of the drum and abutment being equal to the depth thereof.

The area of opening for the passage of oil from the channel-way  $a^2$  against the side of the abutment  $C'$ , inducing pressure in the direction of the arrow, Fig. 3, is varied, as required, by a valve or gate, F, extending across the chamber  $a^5$ , between the periphery of the drum C and the inner surface of the chamber, said gate being secured upon a shaft,  $f$ , fitting a bearing in the head  $A'$ , the center of which bearing is located as nearly as may be in the vertical center line passing through the center of the journal  $e$  of the flap E. An arm,  $f'$ , having a nut formed on its end, is secured upon the outer end of the shaft  $f$ , and an adjusting-screw,  $f^2$ , fitting the nut  $f'$ , is journaled on the head  $A'$ . By the proper movement of the adjusting-screw the position of the valve F may be varied so as to intercept to a greater or less degree the movement of the oil in the compartment  $a^5$  and



correspondingly increase or diminish the pressure upon the abutment C'. The traverse of said abutment in either direction is limited by stops c', secured in the wall of the chamber a<sup>5</sup>, and stops may also be provided for limiting the movement of the valve F.

A spur-pinion, C<sup>2</sup>, is secured upon the outer end of the shaft c, which carries the abutment, and meshes with a segment-gear, D<sup>2</sup>, upon an arm, D', of a horizontal rock-shaft, D, mounted in a bearing in the standard A<sup>3</sup> of the case A. Arms D<sup>3</sup>D<sup>4</sup> are likewise formed upon or secured to the rock-shaft D, one of which arms, D<sup>3</sup>, is connected with the upper end of the stem d of the governor-valve. A helical spring, D<sup>5</sup> is attached at one end to the head A' of the case A and at the other to the arm D<sup>4</sup> of the rock-shaft D.

In the operation of the governor, the case A being filled with oil or other suitable liquid medium, and the shaft b rotated in the direction of the arrow, the eccentric b<sup>2</sup> imparts a vibratory movement to the piston B, due to the rotation of the center of the latter about the center of the former and the connection of the piston B with the flap E, which has the capacity of vibration in its lower bearing. The resultant movement of the piston B is such as to continually maintain a crescent-shaped space between its periphery and the wall of the chamber a<sup>4</sup>, the position of which space is changed progressively around the chamber during each revolution of the shaft b. The relative changes in the area of opening of the channel-way a<sup>2</sup> on each side of the flap E, derived from the movements of the piston B, effect an intermittent pumping action upon the oil in the compartments a<sup>4</sup> and a<sup>5</sup>, which oil is forced by the movements of the piston out of the chamber a<sup>4</sup> against one side of the abutment C', and drawn away from the opposite side thereof, passing through the channel-way a<sup>2</sup> out of and into the chamber a<sup>4</sup>. The induced pressure upon the abutment tends to move it in the direction of the arrow, such movement being transmitted through the gearing and rock-arms to the governor-valve stem, and being resisted by the spring D<sup>5</sup> until equilibrium is estab-

lished, and changes in the normal position of the abutment for an adjusted rate of speed will accompany and compensate for tendency to either increase or decrease the same, and corresponding uniformity in the movement of the engine will be attained. The speed of the engine is conveniently and accurately regulated to a desired normal rate by means of the gate F and its outer arm and adjusting-screw, by which greater or less pressure may be induced upon the abutment C' relatively to the velocity of the piston B, and the power of the governor to overcome weight and friction of parts may likewise be increased, as required, by these devices.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, in an engine-governor, of a double-chambered inclosing-case, a piston moving in one of the chambers of said case and intermittently forcing a liquid medium from one chamber to the other, and a movable abutment located in the opposite chamber and connected with the governor-valve stem, substantially as set forth.

2. The combination, in an engine-governor, of a cylindrical chamber having a channel-way or passage in one of its end walls, a shaft carrying an eccentric and passing centrally through said chamber, a cylindrical piston of less diameter than the chamber and mounted loosely upon said eccentric, and a vibrating flap or guide journaled in the periphery of the chamber and entering a radial slot in the piston, substantially as set forth.

3. The combination, in an engine-governor, of an inclosing-case divided into two chambers or compartments, pumping mechanism located in one of the chambers, a movable abutment located in the other chamber, a gate for governing the pressure of a liquid medium upon the movable abutment, and an external arm and adjusting-screw for regulating the position of said gate, substantially as set forth.

BENJ. BRAZELLE.

Witnesses:

JOSEPH W. BOYER,  
FREDERICK WALTERS.