

No. 867,126.

PATENTED SEPT. 24, 1907.

H. HAAGE.
ROTARY ENGINE.
APPLICATION FILED JUNE 28, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

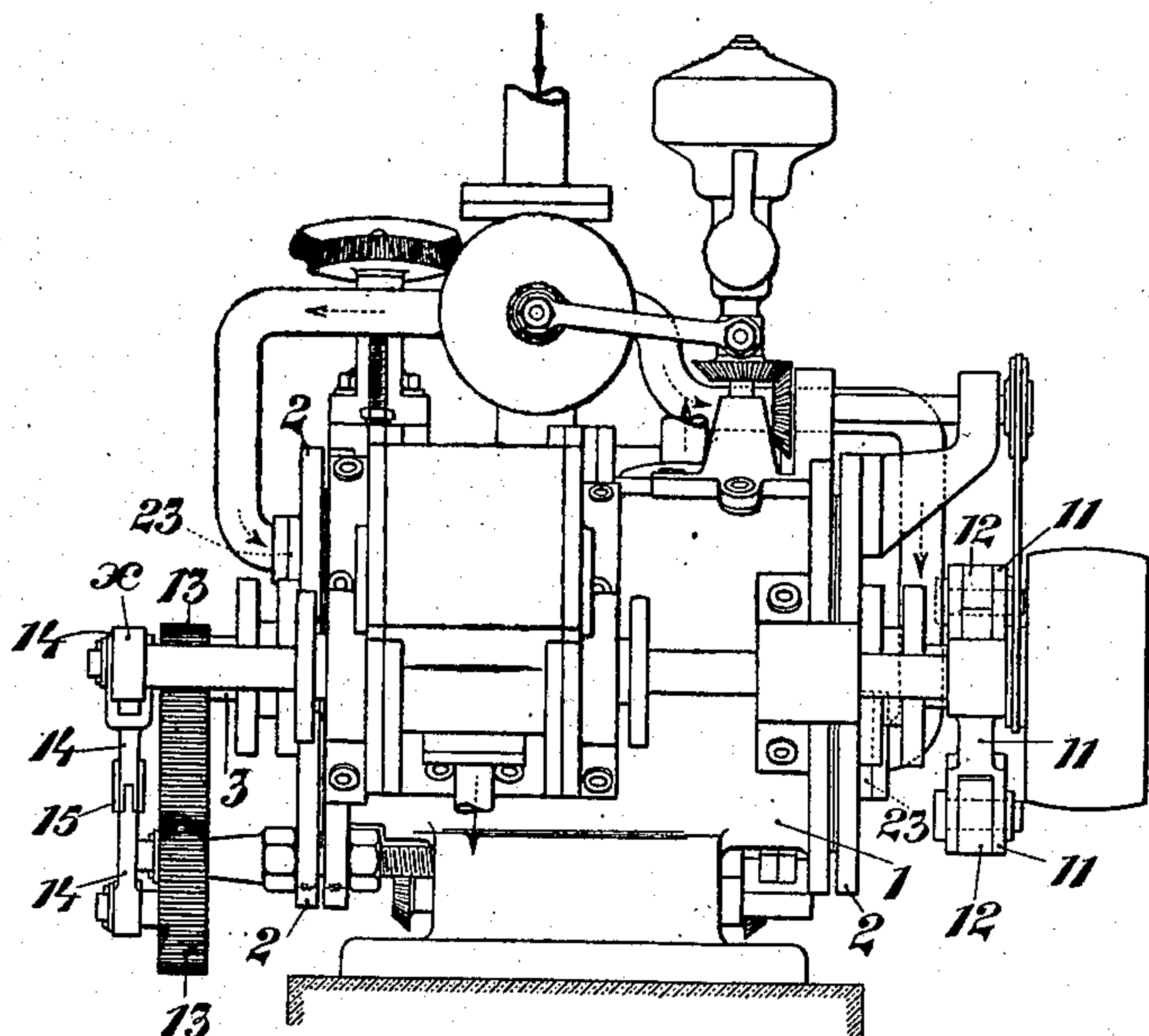
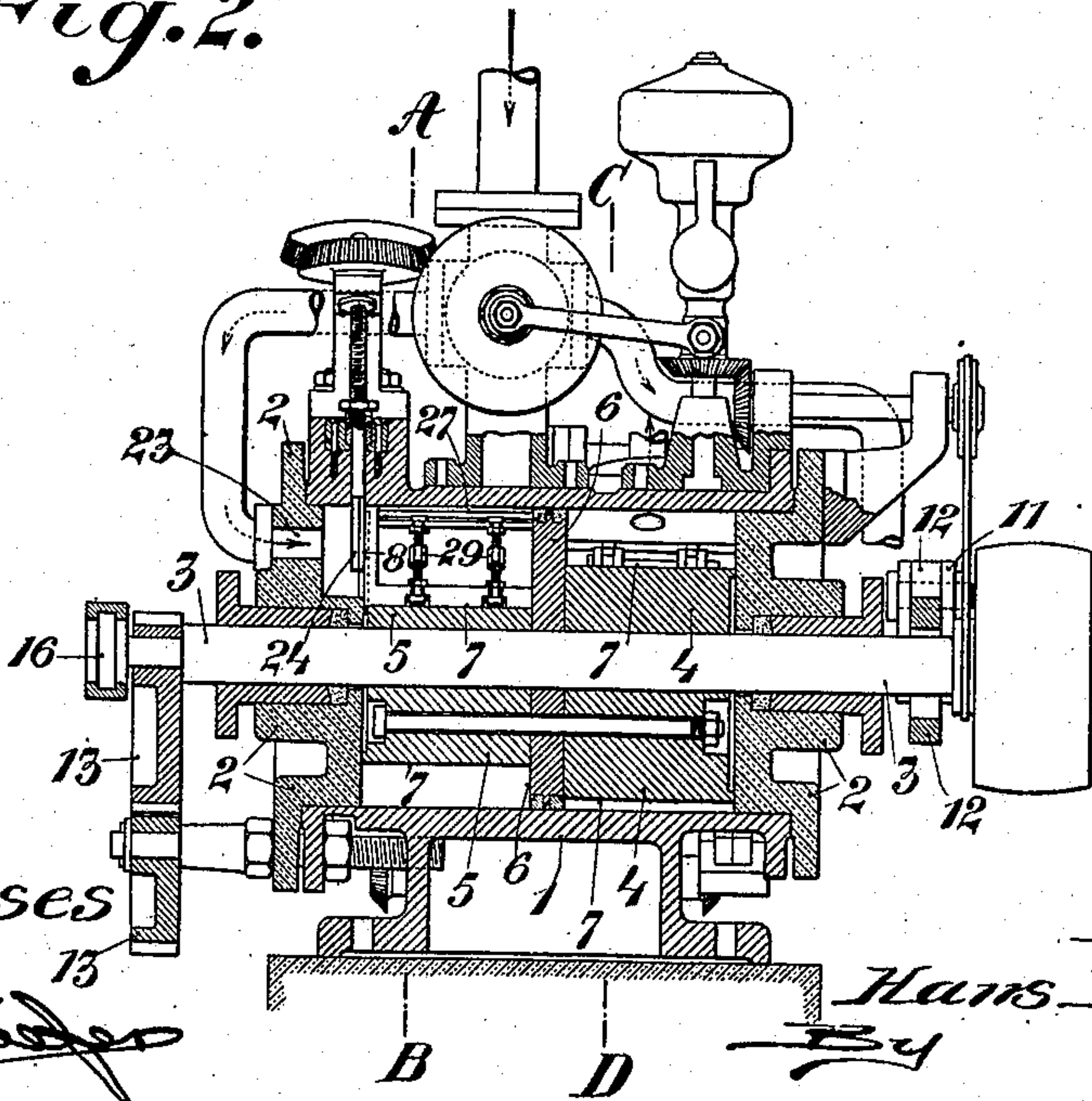


Fig. 2.



Witnesses

W. B. K. G. G.
W. B. K. G. G.

Inventor

Hans Haage

James L. Norris

Atty

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4 SHEETS—SHEET 2.

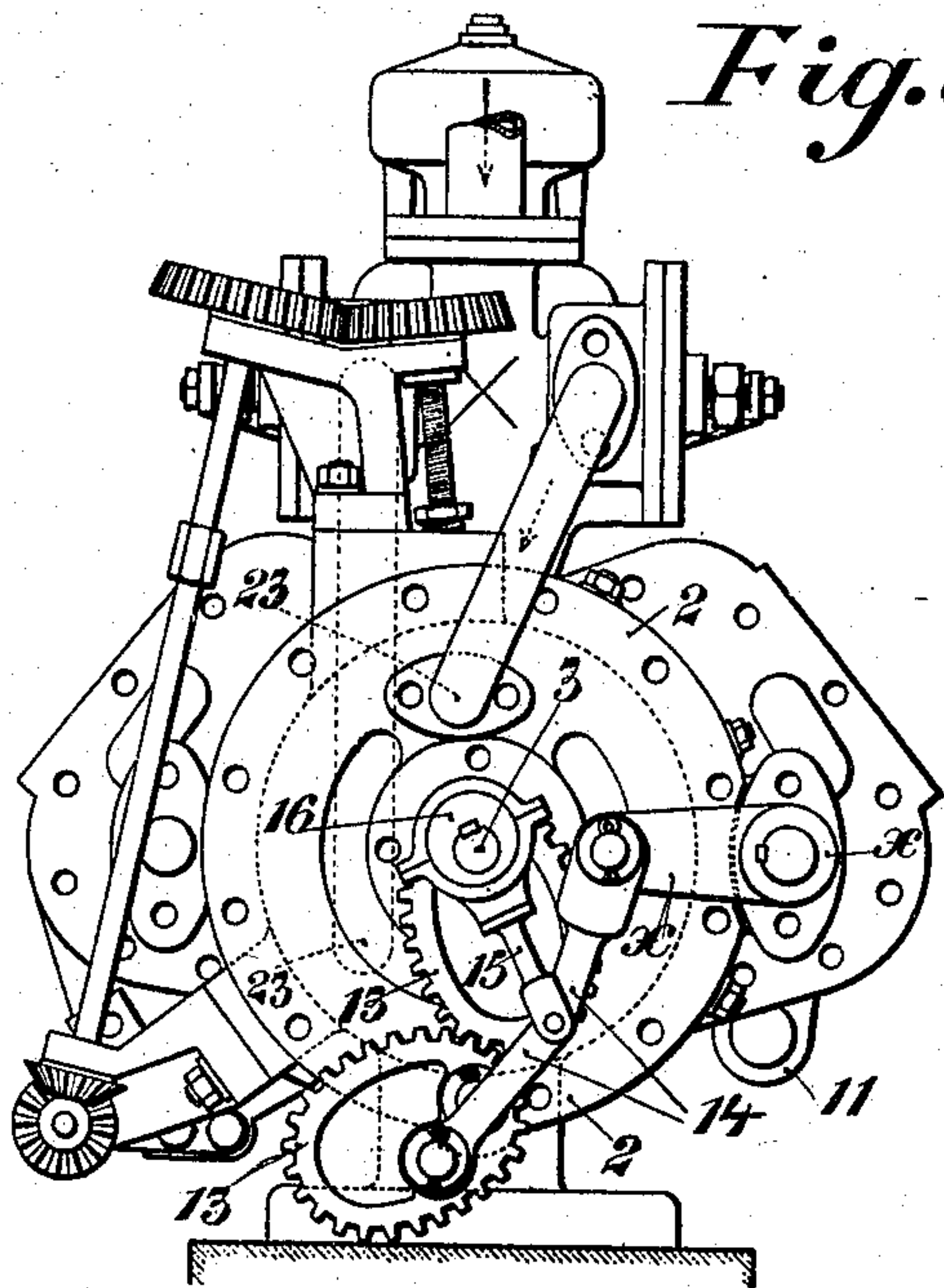


Fig. 3.

Fig. 4.

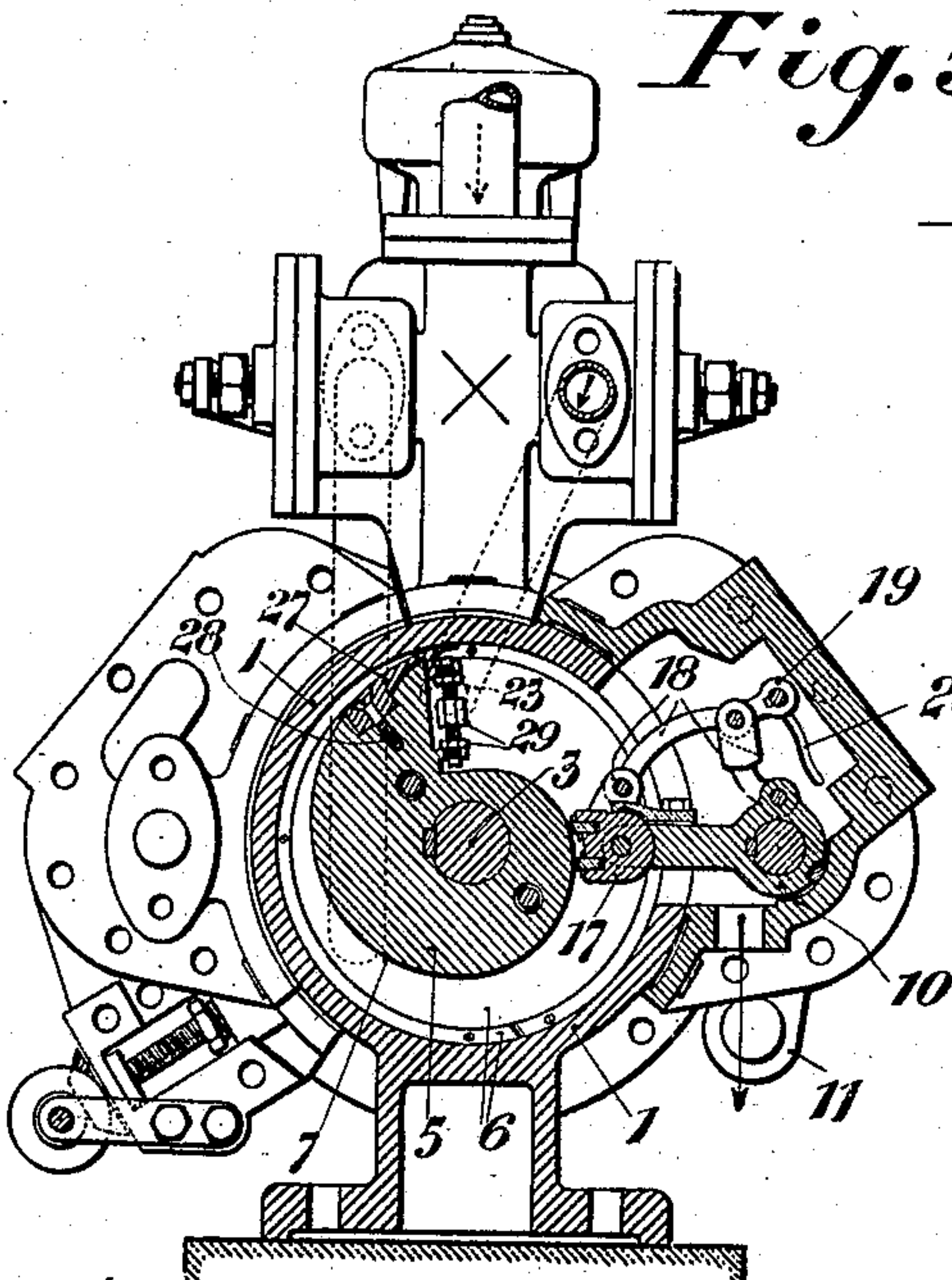
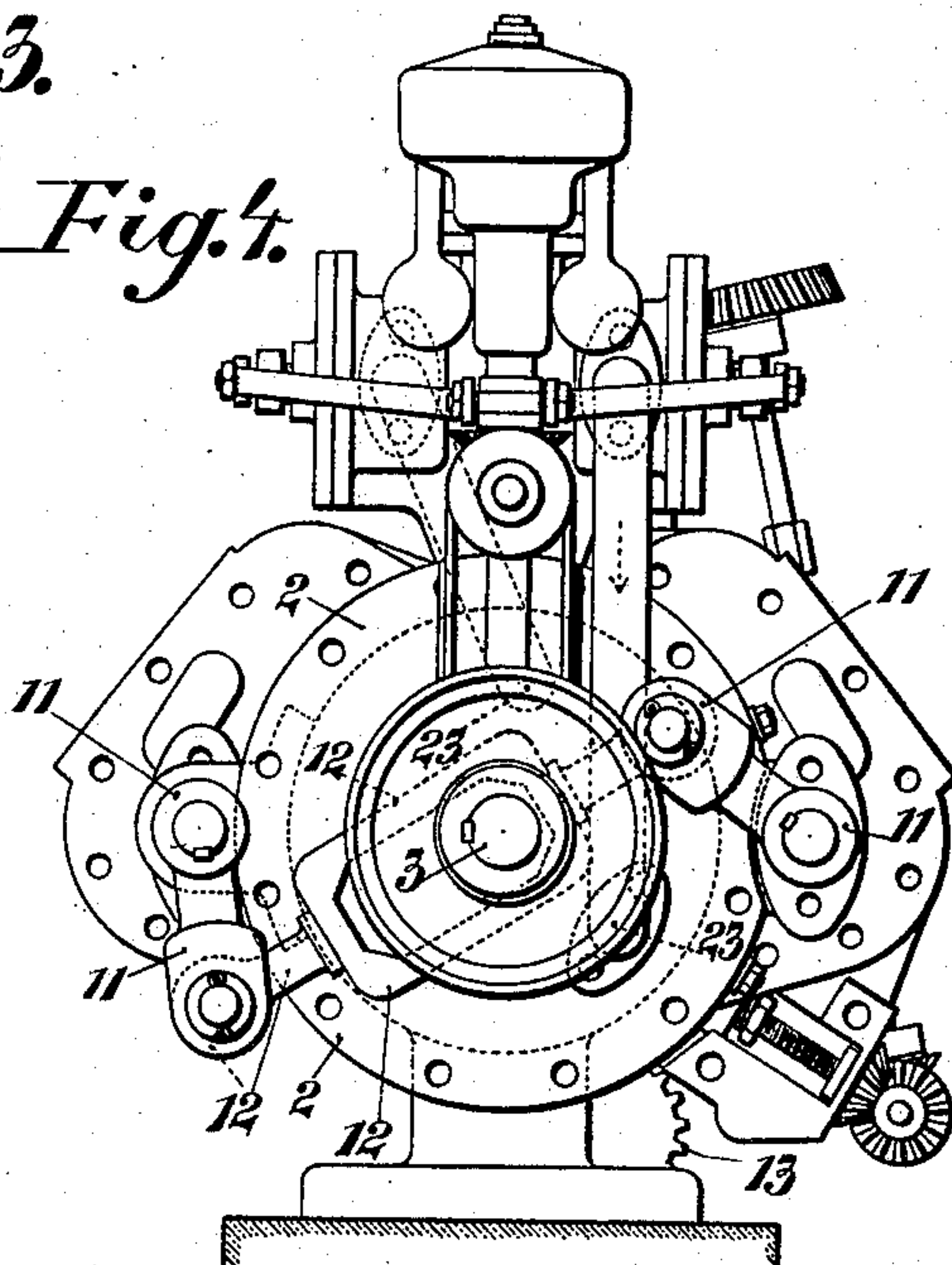
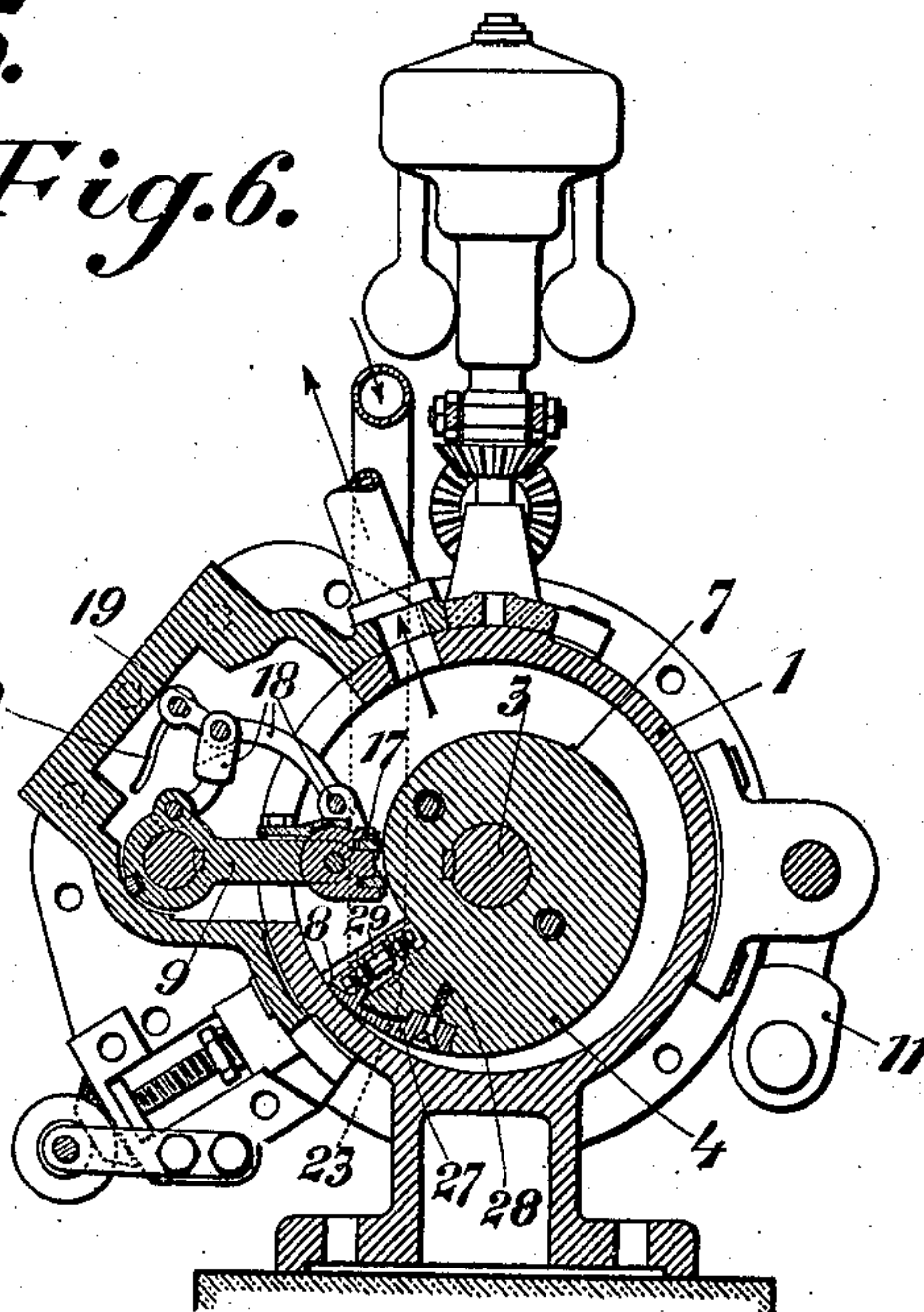


Fig. 5.

Fig. 6.



Witnesses:

J. B. Keeler
C. D. Hester

Inventor

Hans Haage
James L. Norrie

Atty

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4 SHEETS—SHEET 3.

Fig. 7.

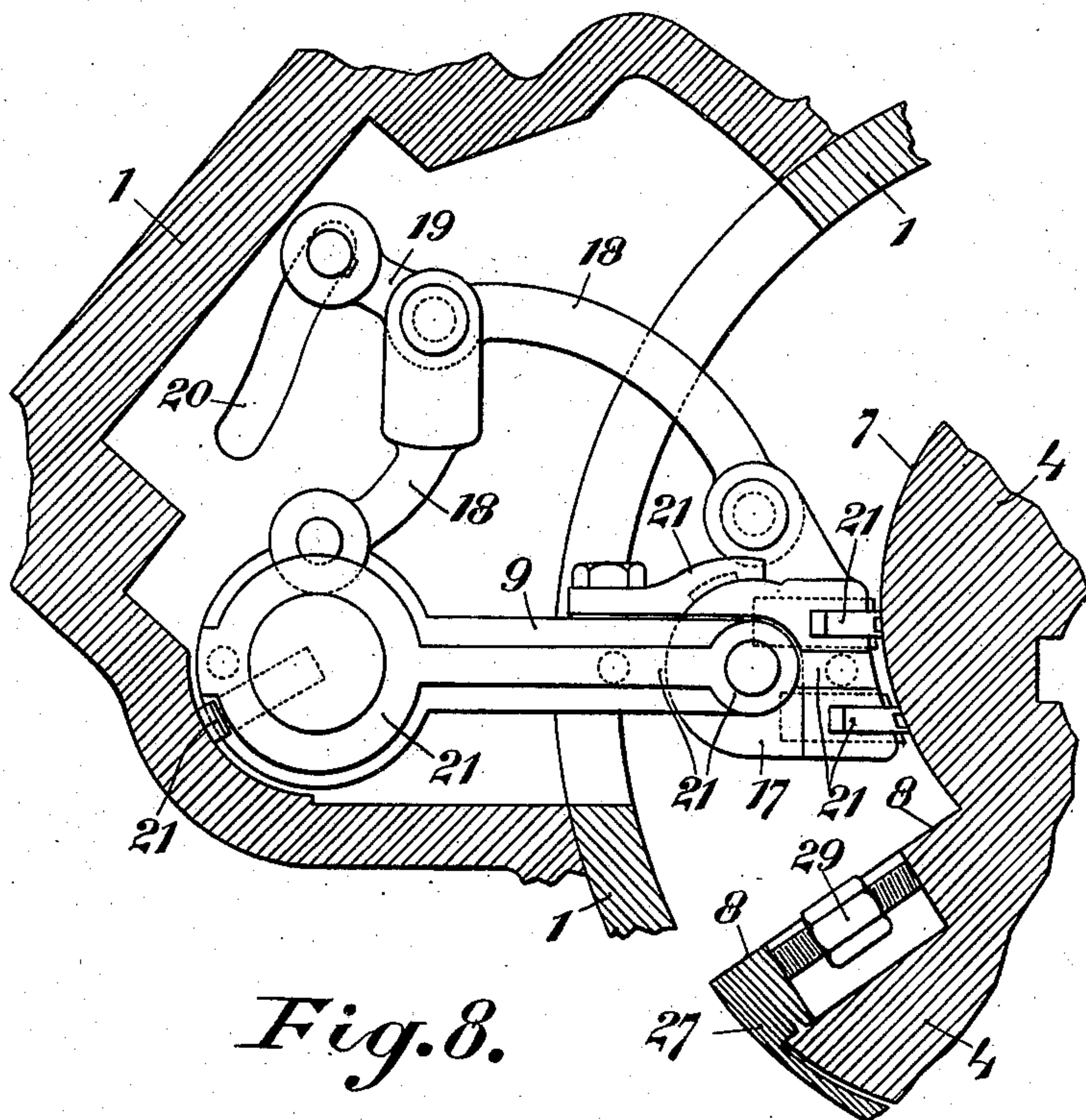
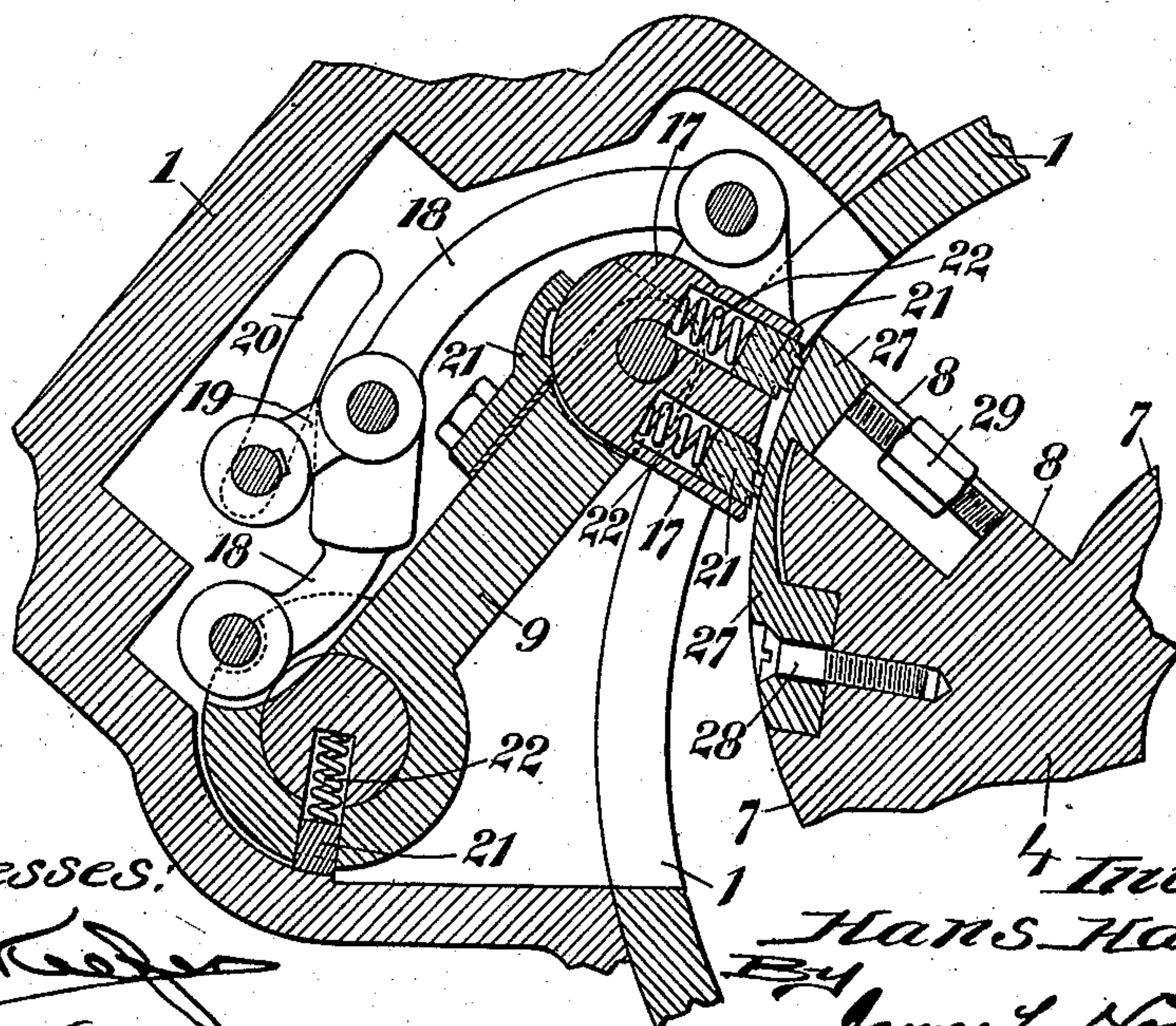


Fig. 8.



Witnesses:
W. B. Kester
Chas. Kester

Inventor
Hans Haage
By *James L. Norris*
att'y

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4 SHEETS—SHEET 4.

Fig. 9.

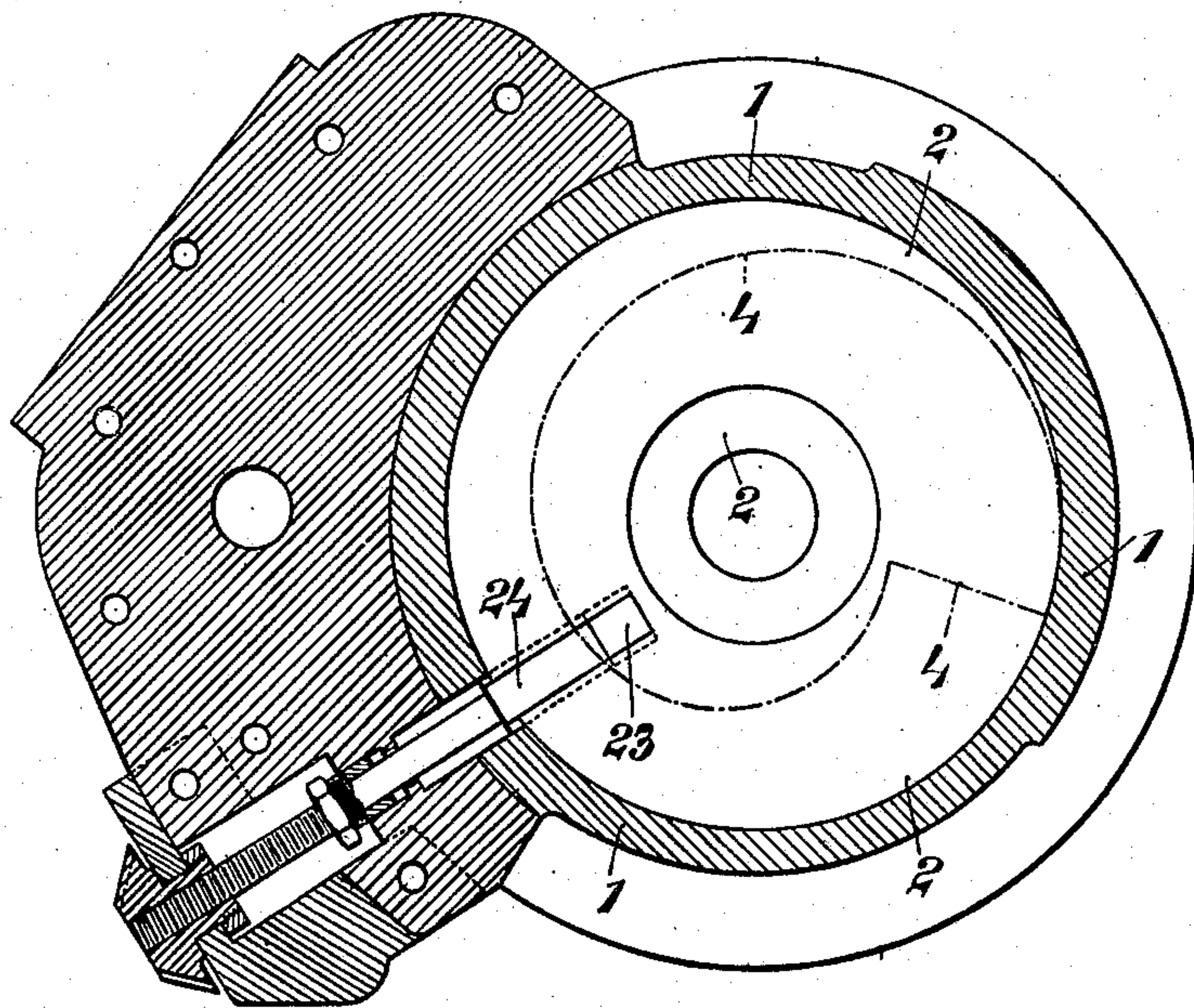
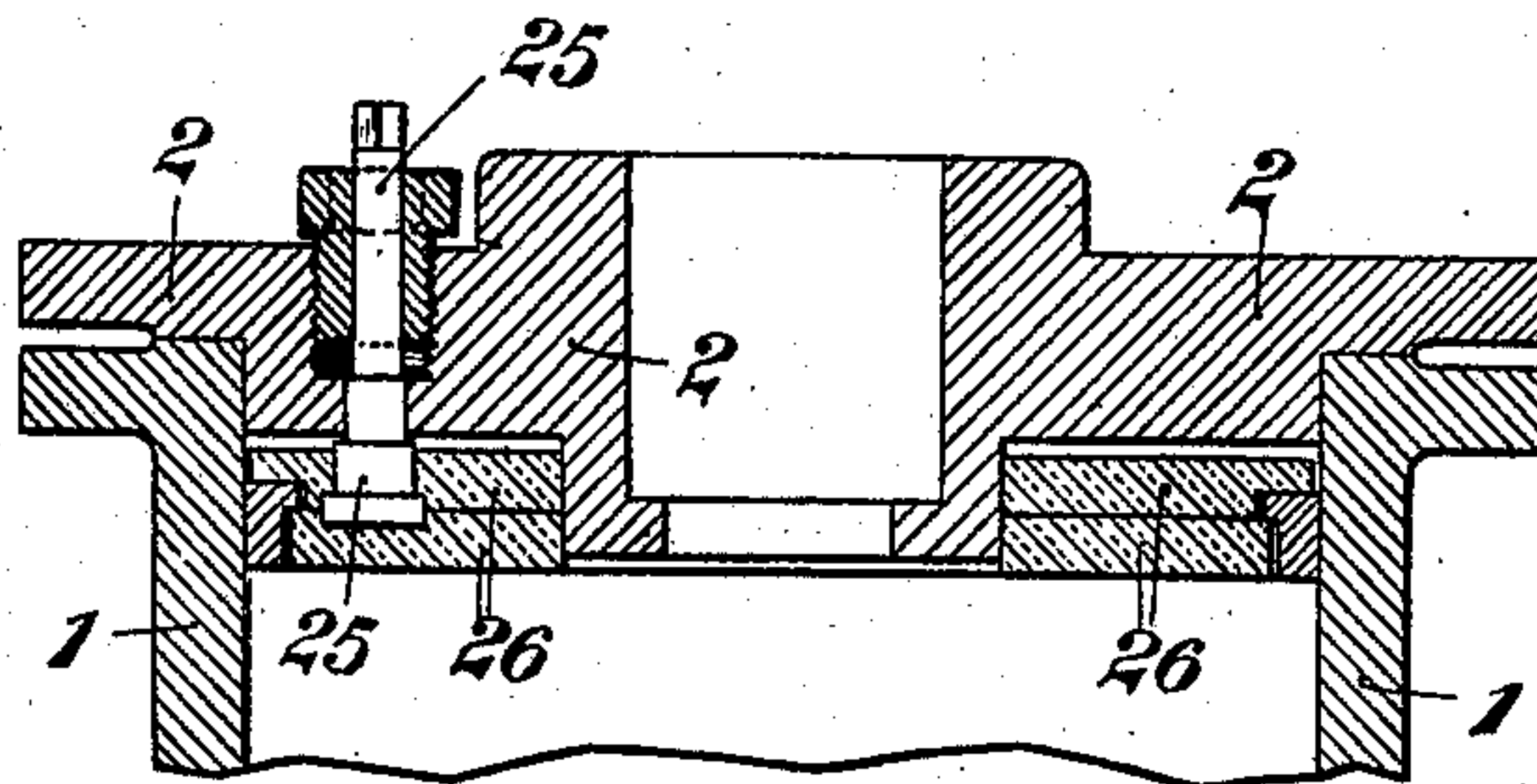


Fig. 10.



Witnesses:

J. B. Greider
Chas. Kessler

Inventor

Hans Haage

James L. Norris

Atty.

UNITED STATES PATENT OFFICE.

HANS HAAGE, OF ERFURT, GERMANY.

ROTARY ENGINE.

No. 867,126.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed June 28, 1907. Serial No. 381,332.

To all whom it may concern:

Be it known that I, HANS HAAGE, engineer, a subject of the King of Prussia, German Emperor, residing at Erfurt, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in or Relating to Rotary Engines, of which the following is a specification.

My invention relates to a motor provided with rotating helicoid double pistons which, on the driving medium being admitted, are caused to rotate the abutment-blades being pivoted to the casing and regulated from the piston shaft. According to this invention the abutment-blades which press upon the working faces of the piston are positively connected together, while their directions of movement are opposite, further that the working faces of the piston are arranged so that, during the working period the pressure is exercised in an opposite direction on each of the abutment blades whereby the pressure of the latter on the working faces of the piston interfering with the movement of the piston is neutralized.

In order to enable the cut-off of the engine to be varied in a simple manner to suit any desired work the steam inlet ports are arranged laterally in the cylinder covers and can be gradually closed in radial direction, from the circumference to the center of the cover, by means of slide valves operated by the governor or by hand, whereby the spiral-shaped lateral face of the piston can close the inlet opening during a longer or shorter portion of the stroke, which corresponds to a change of the cut-off.

For insuring a better joint between the abutment blades and the piston, the end of the blade resting on the piston is pivoted to the other part of the blade. Owing to a system of links which is not only secured to these two parts of the blade, but also guided in guide slots in the casing surrounding the abutment blades, the part of the blade intended to form a tight joint with the piston is moved, at every stage of the movement of the piston, in such manner that two surfaces are always in good contact and packing pieces are also provided.

The forming of a tight joint between the piston and the casing is effected by means of a spring packing part, one end of which is secured to the piston while the other end is forced against the cylinder. Provision is made for the longitudinal expansion difference between the piston and the cylinder by arranging at the inner cylinder cover side a longitudinally adjustable packing disk.

The regulation of the abutment blades can be effected by means of crank and connecting rod, the crank being driven by a pair of elliptical toothed wheels and the connecting rod formed into a bell crank lever on the joint of which acts an eccentric with eccentric rod arranged on the shaft of the piston.

Two constructions of the motor according to this invention are illustrated by way of example in the accompanying drawings.

Figures 1—9 show one, and Fig. 10 the other construction. The first construction is shown in Fig. 1 in side elevation and in Fig. 2 in vertical longitudinal section. Figs. 3 and 4 show the two end elevations of the engine, while Figs. 5 and 6 are cross-sections on line A—B and C—D of Fig. 2. Figs. 7 and 8 show the abutment blade in two different positions in side elevation and section. Fig. 9 is an inner view of the cover. Fig. 10 showing the second construction, is a section through a cover.

The steam cylinder 1 is closed at both ends by covers 2 and through a stuffing box in the centers of which passes a shaft or spindle 3. On the spindle 3 is mounted the double piston, both parts 4 and 5 of which are separated from each other in a perfectly steam-tight manner by means of a disk 6. The circumferential surface of the pistons is constituted by surfaces 7 following spiral-shaped curves, and by radial surfaces 8 on which slide abutment blades 9 10 pivoted to the casing 1 the said blades thus dividing each of the two cylindrical chambers into two parts, the capacities of which vary during the rotation of the piston, alternately between a minimum and a maximum.

The two blades 9 10 are arranged in such manner that steam comes to act on them in opposite directions. They are connected together by means of levers 11 and rod 12 whereby the steam pressure on the blades neutralize each other.

The driving of the blades 9 10 can be effected in any desired manner, for instance, by means of cam disks, grooved disks and the like. In the construction illustrated, there is provided a pair of elliptical toothed wheels 13, one of which is mounted on the spindle 3, while the other is connected to the lever by means of the rod 14. As however, the driving by means of such toothed wheels does not correspond exactly to the blade movements required, the small error is corrected by the following arrangement.

The rod 14 is formed as a bell crank lever with the joint of which engages an eccentric rod 15 driven by an eccentric 16. For the purpose of making a good joint between the blades 9 10 and the pistons 4 5, the ends 17 of the blades are hinged and are moved by means of the lever 18, the free end 19 of which slides in a slot 20, so that the contact between the blades and the piston is always efficient.

A tight joint is maintained by packings 21 and springs 22. For admitting steam, ports 23 are arranged laterally in the covers 2, the radial extension of which ports, for the purpose of altering the cut-off, can be modified from the circumference to the center of the cover by means of slides 24, the spiral-like piston surfaces 7 clos-

ing them sooner or later. The operation of the slides can be effected in any desired manner by hand or still better by the governor or by well known auxiliary means.

- 5 In the second construction shown in Fig. 10, provision is made for the expansion difference between piston and cylindrical casing, by arranging on the inner sides of the covers packing disks 26 adjustable from the outside by means of screws 25. A tight joint between
10 the pistons and the cylinder casing is obtained by means of packing parts 27 secured at 28 to the piston, while their free ends are pressed against the casing of the cylinder by the pressure of steam and the screws 20 with opposite threads.

15 What I claim is:

1. A motor comprising a cylinder, double pistons substantially helicoidal in contour operating in the cylinder, abutment blades adapted to have the motive fluid act thereon in opposite directions, and means whereby the
20 steam pressures on the blades neutralize each other.
2. A motor comprising a cylinder, pistons operating therein and having helicoidal working faces, laterally extending inlet ports in the cylinder heads, and means whereby the inlet ports can be altered in their radial extension
25 from the circumference to the center of the heads, causing thereby the helicoidal working faces of the piston to close the inlet during a longer or shorter position of the stroke in accordance with the position of said means and thus change the cut-off.
- 30 3. A motor comprising a piston, an abutment blade hav-

ing a pivoted end, means for moving said end to make perfect contact with the piston, and a guide for said means.

4. In a motor comprising a cylinder having two air-tight compartments, pistons rotatably mounted in said compartments and having off-set curved working faces, an adjustable packing carried by each of the pistons and adapted to form a close contact with the interior surface of said cylinder, rotary movable abutment blades mounted within the cylinder and having packing elements adapted to contact with the surface of each piston, radially extending means
40 for supplying steam to the cylinder, and mechanism for driving the abutment blades.

5. A motor comprising a piston, abutment blades, a crank and bell crank lever for regulating said blades, an elliptical pair of toothed wheels for actuating the crank, and an
45 eccentric carried by the piston axis and provided with an eccentric rod acting on the joint of the bell crank lever.

6. A motor comprising a spiral-shaped piston, a movable abutment blade adapted to contact with the piston, a bell-crank lever having connection with the abutment blade, a
50 crank having connection with the bell-crank lever, a pair of elliptical tooth-wheels for actuating the crank, an eccentric carried by the piston axis and provided with an eccentric rod operative upon the joint of the bell-crank lever, gear mechanism for actuating said crank, means for supplying a fluid to the motor, and mechanism for regulating
55 the fluid supply.

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

HANS HAAGE.

Witnesses:

PAUL TRICHMANN,
OSKAR HEIMANN.