

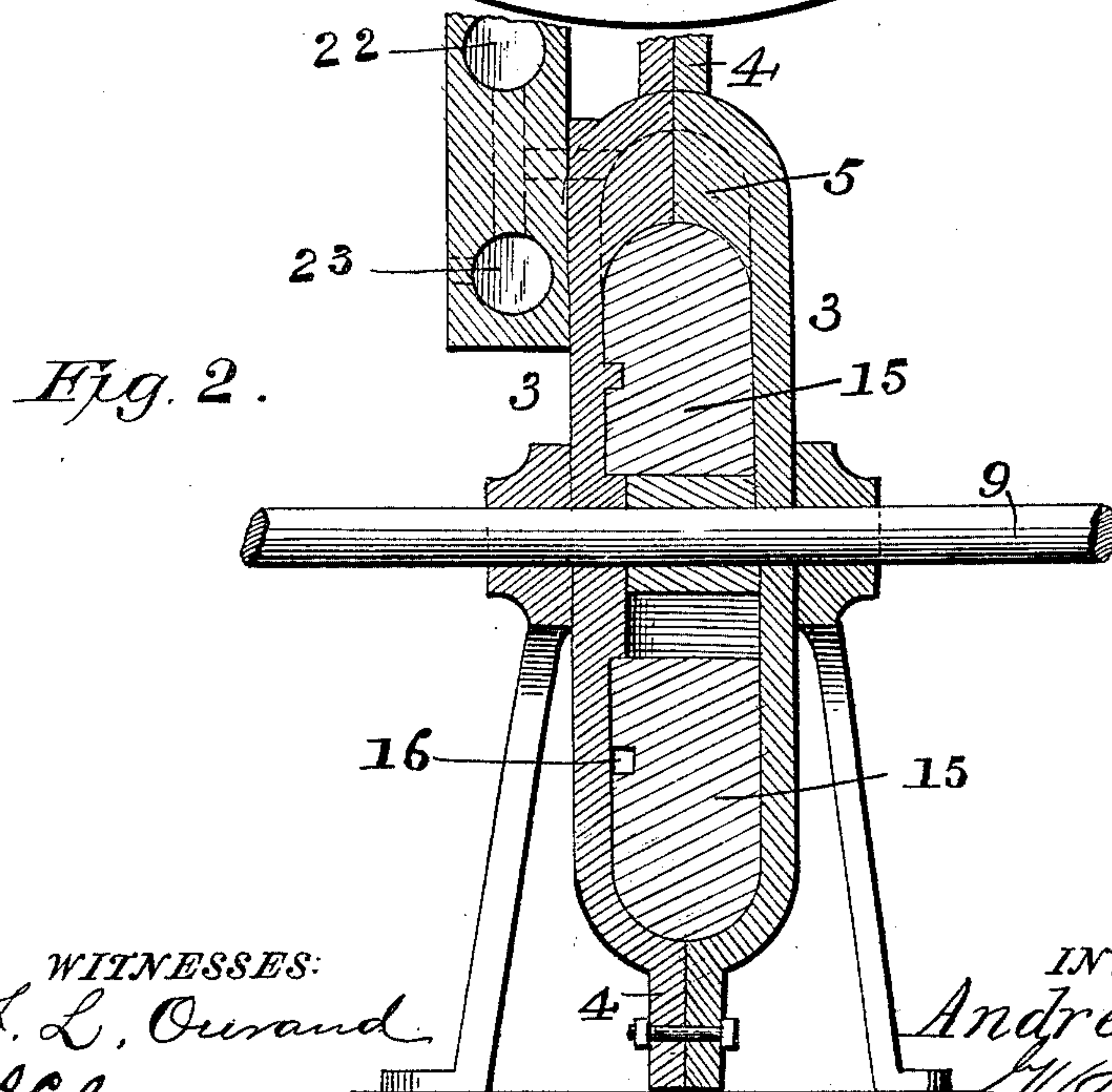
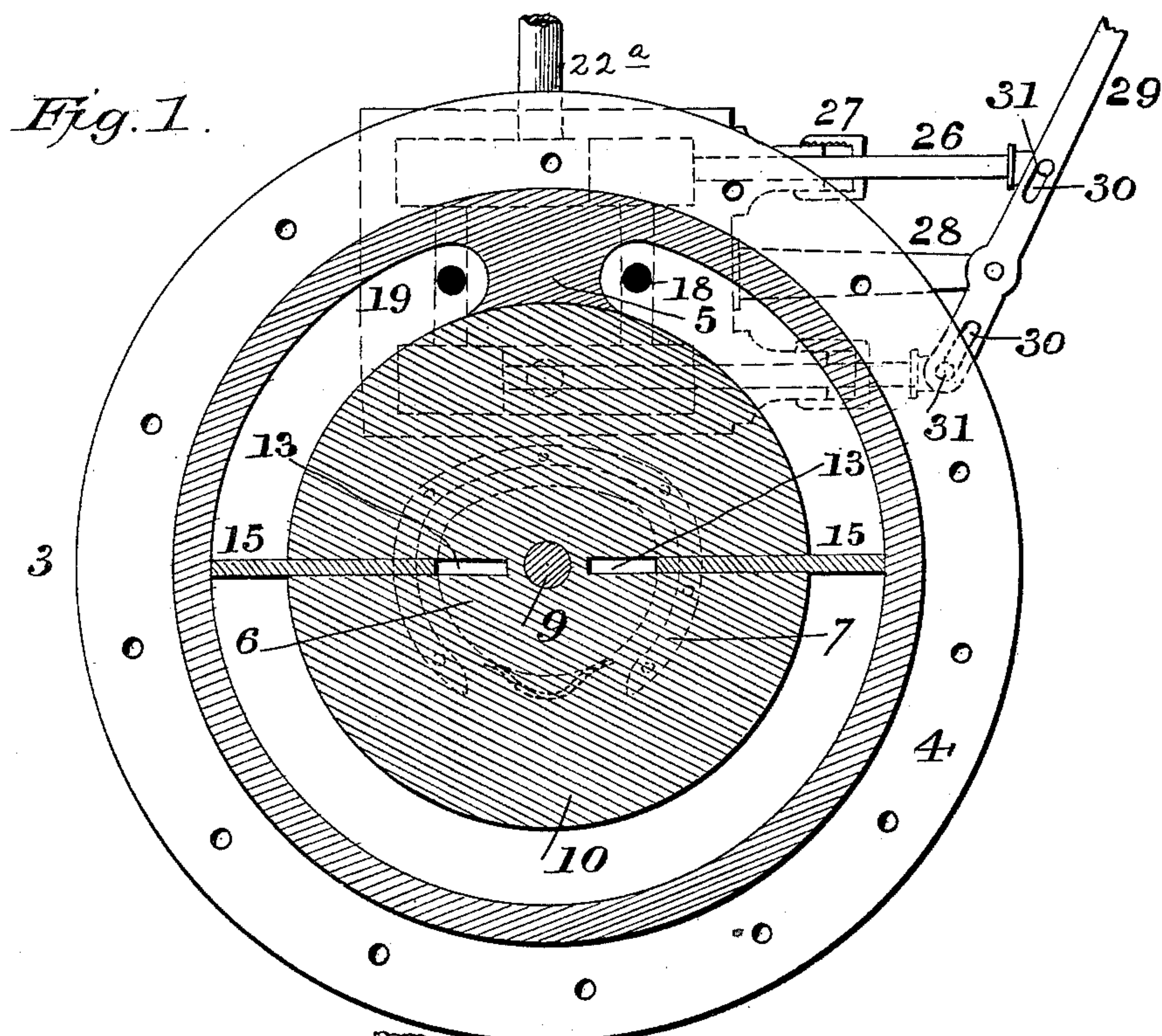
(No Model.)

2 Sheets—Sheet 1.

A. BEARD.  
ROTARY ENGINE.

No. 462,614.

Patented Nov. 3, 1891.



**WITNESSES:**

H. L. Overland  
H. L. Overland

*INVENTOR:*

Andrew Beard,  
Jas Daguerre  
Attorneys.

(No Model.)

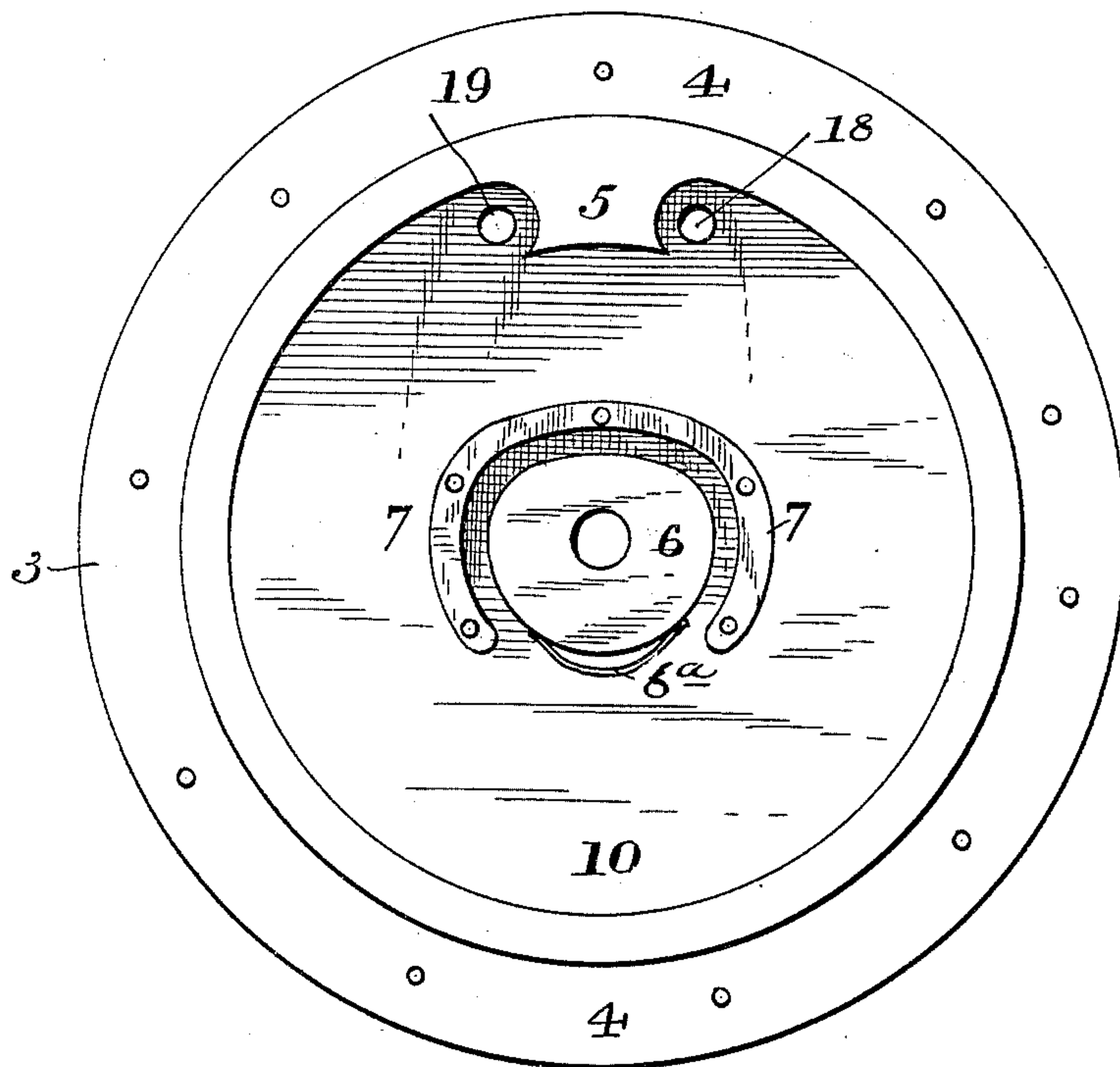
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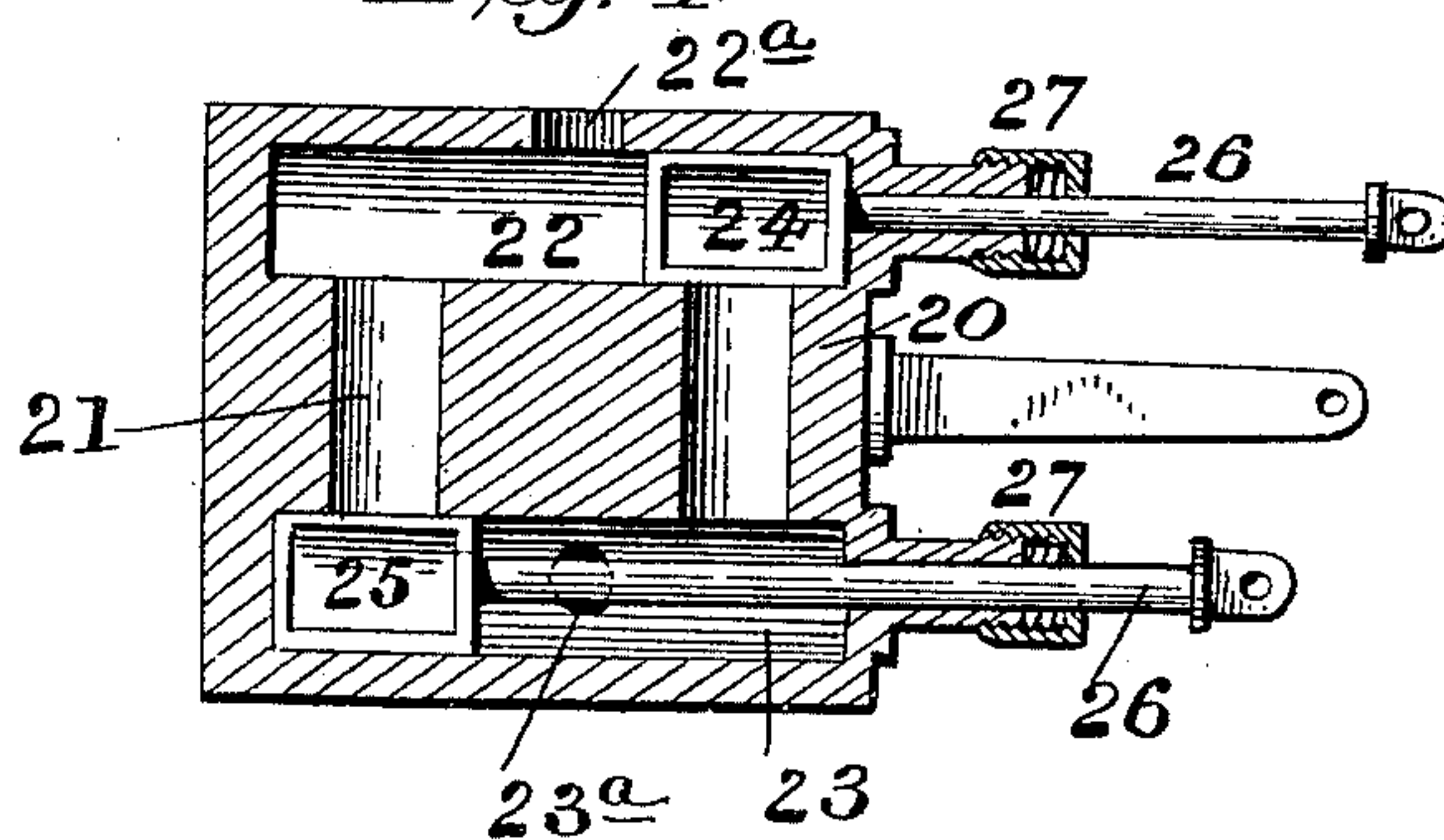
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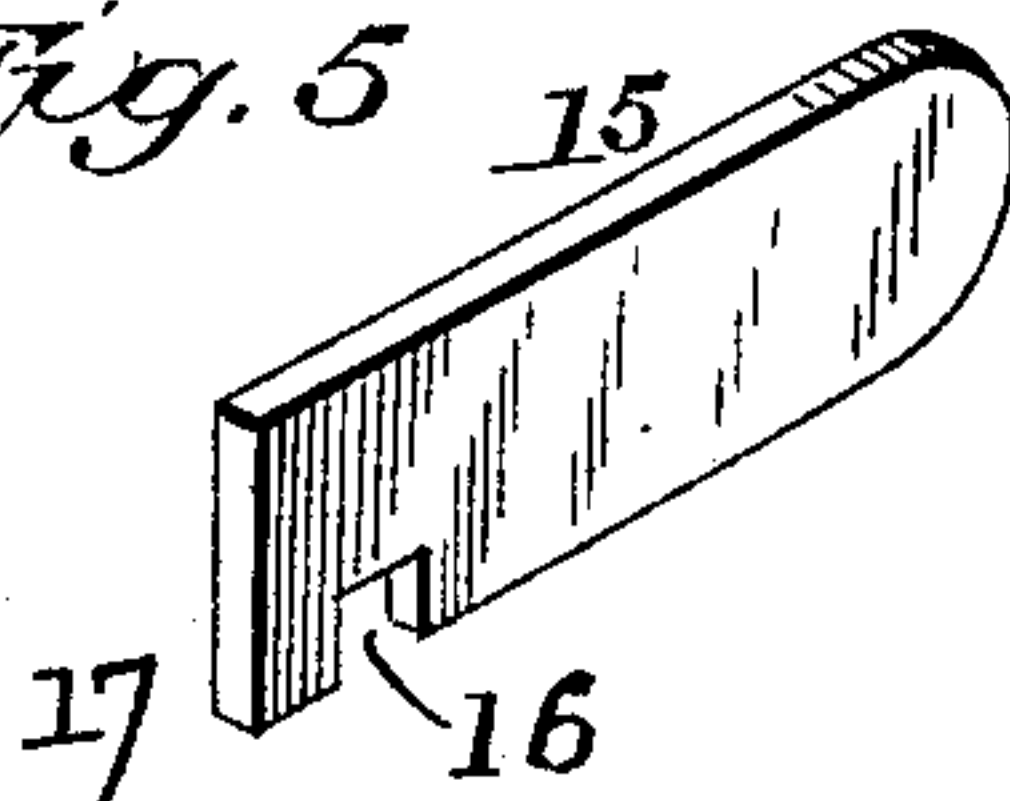
*Fig. 3.*



*Fig. 4.*



*Fig. 5*



WITNESSES:  
*F. L. Curand*  
*J. L. Coombs*

INVENTOR:  
*Andrew Beard,*  
*James P. Rogers & Co.*  
Attorneys



# UNITED STATES PATENT OFFICE.

ANDREW BEARD, OF WOODLAWN, ALABAMA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 462,614, dated November 3, 1891.

Application filed May 8, 1891. Serial No. 392,035. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW BEARD, a citizen of the United States, and a resident of Woodlawn, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in rotary engines of that class in which a piston wheel or hub fixed to a driving-shaft revolves within an annular chamber, said piston-wheel being provided with pistons or gates which reciprocate in radial grooves formed therein.

The object of the invention is to provide a cheap, simple, and efficient engine of the character above named, in which the pistons are actuated so as to bring them into position to be operated upon by the steam by means of cams upon the inner face of one of the walls of the casing, said cams forming a race or way in which works a stud or lug on the inner ends of said pistons.

It is also an object of the invention to provide an improved valve mechanism which shall be simple in construction and efficient in operation and by which the engine may be quickly and readily reversed.

The invention consists in the novel construction and combination of parts hereinafter fully described, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a central longitudinal section of an engine constructed in accordance with my invention. Fig. 2 is central cross-sectional view. Fig. 3 is an inner view of one of the walls of the casing with the hub or piston wheel removed and showing the cam for actuating the pistons. Fig. 4 is a detail view of the steam-chest and valve. Fig. 5 is a detail view of one of the pistons.

In the said drawings, the reference-numeral 1 designates the bed or frame, upon which

the engine is supported by means of the hubs 2 on the casing, which rest on said bed.

The numeral 3 designates the walls of the casing, consisting of two recessed annular disks provided with rims or flanges 4, by which they may be bolted together, a suitable packing being interposed for the purpose of forming a tight joint. When so placed together an annular steam-chamber is formed with an inwardly-extending portion 5, forming an abutment, the inner face of which contacts with the periphery of the hub or piston wheel during the revolution of the latter. Upon the inner face of one of the walls of the casing, at the center thereof, is formed or secured an inwardly-projecting cam 6, resembling in shape a flattened circle, the flattened portion being in juxtaposition to the abutment 5. Concentric with the cam 6 is another cam consisting of the inwardly-projecting flange 7, which, however, only extends part way around cam 6, a space being left, which is aligned with the flattened portion of the cam 6. This under portion of cam 6, or that portion just above said space, is provided with a spring 6<sup>a</sup> to bear against the pistons with an elastic pressure, and the object of this space is to allow the pistons to yield slightly at this point.

Passing centrally through the casing, the cam 6, and the hub 2 is a driving-shaft 9, capable of freely revolving in said hub which forms its bearings. Firmly secured to this shaft, so as to revolve therewith, is the wheel or hub 10, consisting of an annular disk having a series of radial grooves 13, which extend to near the center thereof.

The numeral 15 denotes the pistons, which consist of rectangular metal plates having a notch 16 near their lower ends, forming a projecting lug 17, which runs or works in the race or way formed by cams 6 and 7, the notch 16 engaging with said last-mentioned cam.

Opening into the steam-chamber formed by wheel or hub 10 and the walls of the casing at each side of the abutment 5 are steam-ports 18 and 19, which communicate with vertical passages 20 21 in said chest, and which in turn communicate with horizontal pas-



sages 22 and 23 therein. Passage 22 is provided with an inlet-opening 22<sup>a</sup> and passage 23 with an exhaust-opening 23<sup>a</sup>, which are in line with each other.

5 In the passages 22 and 23 are located the reciprocating slide-valves 24 and 25, provided with stems 26, which pass through stuffing-boxes 27 in the steam-chest. Intermediate of these stuffing-boxes is an outwardly-projecting arm 28, to which is fulcrumed a lever 29. 10 This lever is provided with elongated slots 30 at each side of its fulcrum, with which engage studs or pins 31, connected with the valve-stems 26. These valves are adapted to 15 alternately open and close the passages 22 and 23, according to the position of the lever 29.

The operation is as follows: Supposing the parts to be in the position shown in the drawings, steam will be admitted from the boiler 20 through inlet 22<sup>a</sup> to passages 22 and 21, (passage 20 being closed by valve 24,) from whence it will pass through port 19 to the steam-chamber, and striking against the piston will move 25 the same, causing the driving-shaft and hub to be rotated. As the opposite piston approaches the port 19, it will be gradually drawn inward by means of the cams 6 and 7, so as to pass by the abutment 5. After it passes by the abutment 30 it will be forced outward by said cams, so as to receive the momentum of the steam to rotate the said wheel and driving-shaft. As it continues its movement, the first piston will be drawn inwardly in like manner as it 35 approaches the abutment, allowing the steam to escape through port 18, passage 20, from thence to passage 23, and out through exhaust 23<sup>a</sup>. In this case passages 22 and 21 and port 19 serve for the inlet of steam, while port 18 40 and passages 20 and 23 and opening 23<sup>a</sup> serve as the outlet. By reversing the position of the valves by means of the lever 29 the direction of rotation of the engine will be reversed, in this case passages 22 20 and port 18 being

the inlet and port 19 and passages 21 and 23 45 being the exhaust or outlet, as will be obvious.

Having thus described my invention, what I claim is—

1. In a rotary engine, the combination, with 50 the casing having an inwardly-extending abutment with steam-ports at each side, an inwardly-projecting cam formed with or secured to the inner face of the casing and provided with a spring, and the cam consisting 55 of an inwardly-projecting flange extending partly around said first-mentioned cam, of the driving-shaft passing centrally through the casing, the annular wheel mounted thereon having radial grooves or slots therein and a 60 recess upon one face to receive said cams, and the reciprocating pistons having slots or recesses near their lower ends, forming lugs which work in the race or way formed by said 65 cams, substantially as described.

2. In a rotary engine, the combination, with 65 the casing having the inwardly-extending abutment with ports upon each side thereof, the cams upon the inner face of the casing, the driving-shaft, the wheel or hub secured 70 thereto and having radial grooves or slots, and the pistons located in said grooves and having slots or recesses near their inner ends, of the valve-chest having vertical passages 75 communicating with said ports, horizontal passages connected therewith having inlet and outlet openings, the slide-valves working in said horizontal passages, the pivoted lever, and the valve-stems connected with the valves 80 and with said lever at opposite sides of its fulcrum, substantially as described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

ANDREW BEARD.

Witnesses:

BENNETT S. JONES,  
ARTHUR B. SEIBOLD.