

No. 628,566.

Patented July 11, 1899.

M. VAY.
ROTARY ENGINE.

(Application filed Dec. 5, 1898.)

(No Model.)

3 Sheets—Sheet 1.

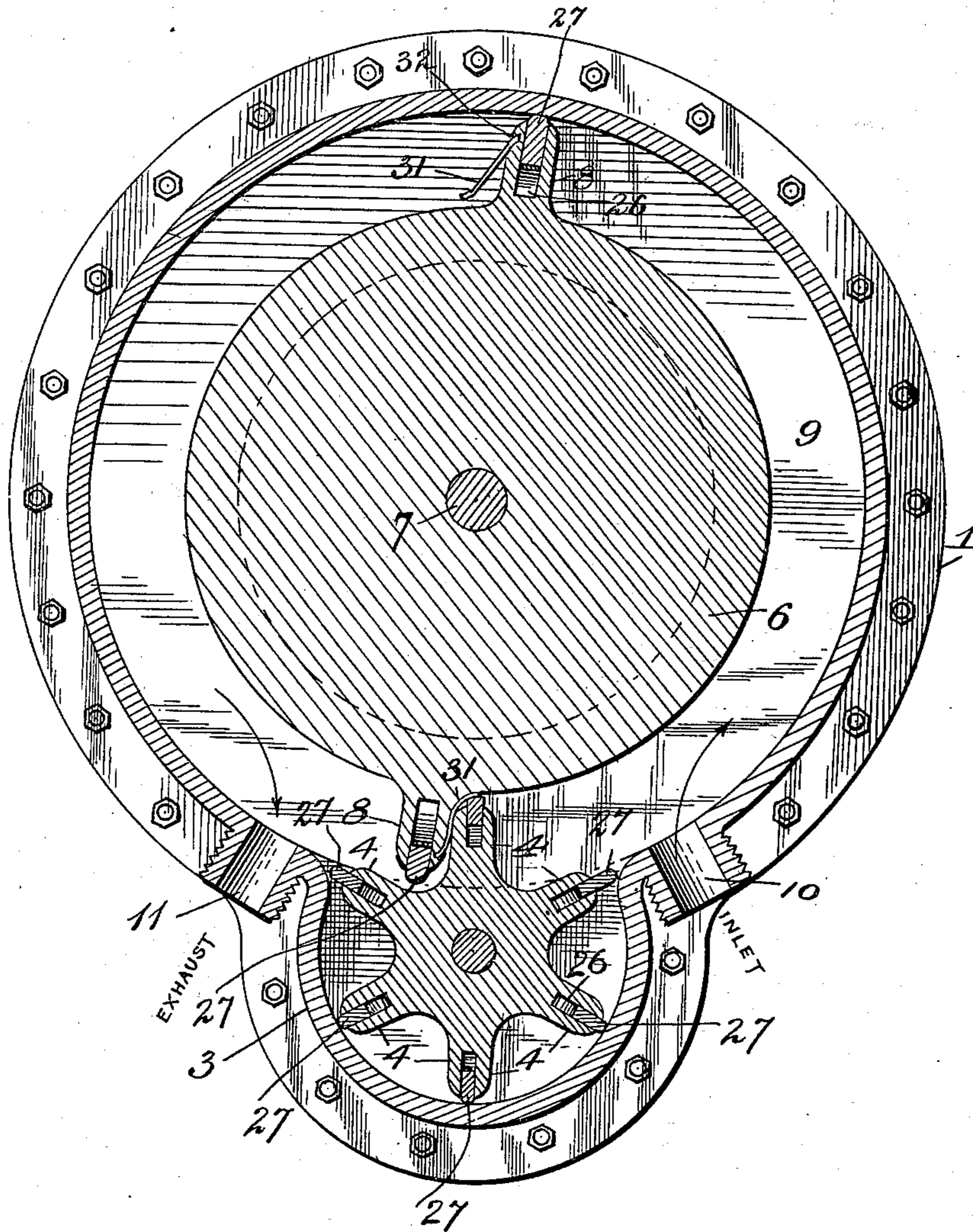


Fig. 1.

Fig. 8.

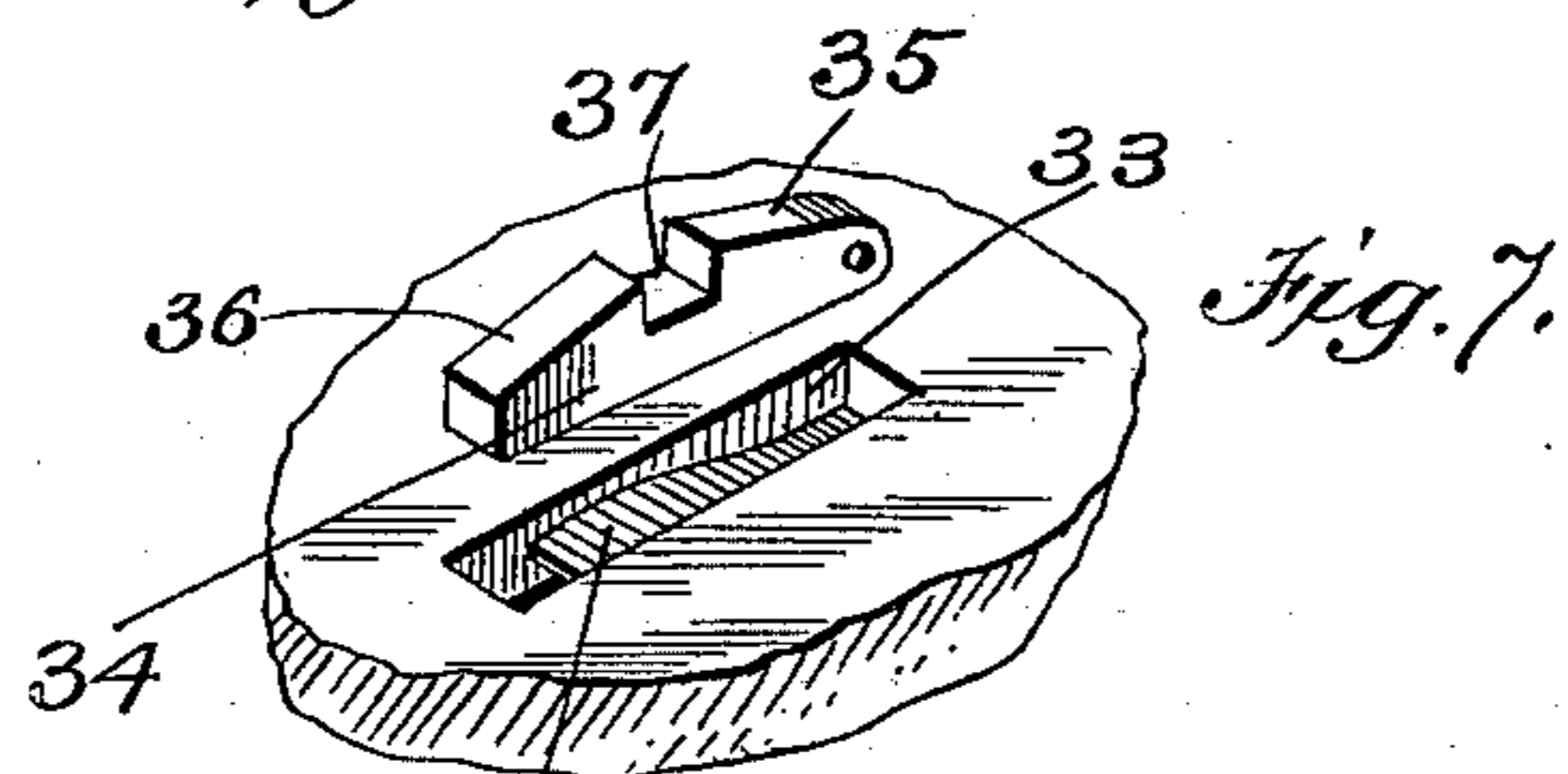
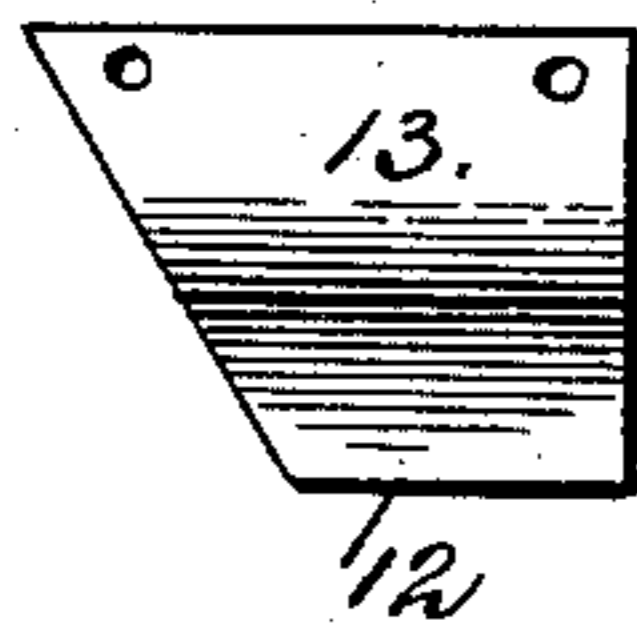


Fig. 7.

Witnesses:
F. L. Ouraud
E. E. Overholt

Inventor:
Martin Vay,
W. J. Fitzgerald & Co.,
By his Attorneys.

No. 628,566.

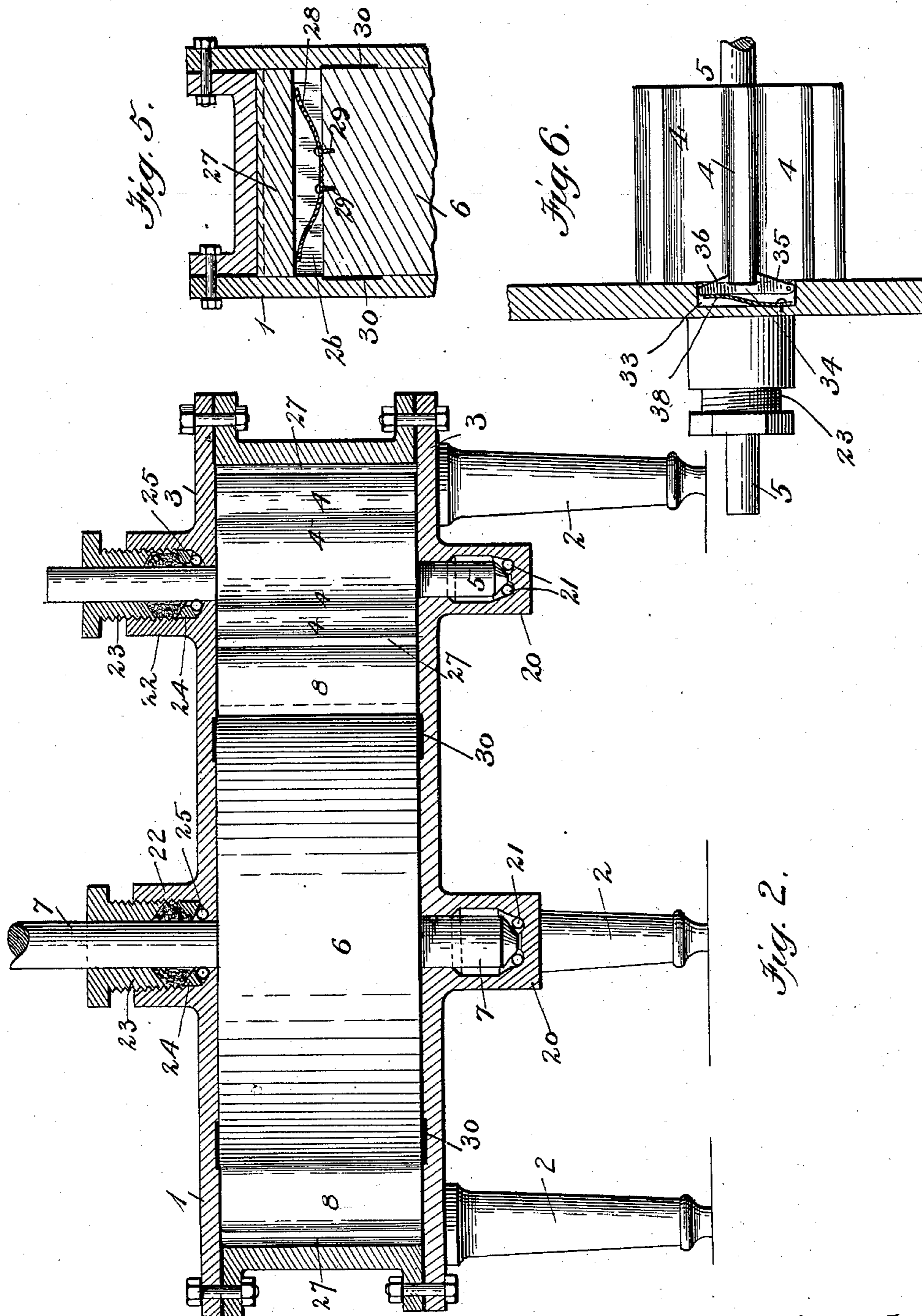
Patented July 11, 1899.

M. VAY.
ROTARY ENGINE.

(Application filed Dec. 5, 1898.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:
F. L. Ourand.
E. E. Overholt

Inventor:
Martin Vay.
By W. T. F. Arnold & Co.
His Attorneys

No. 628,566.

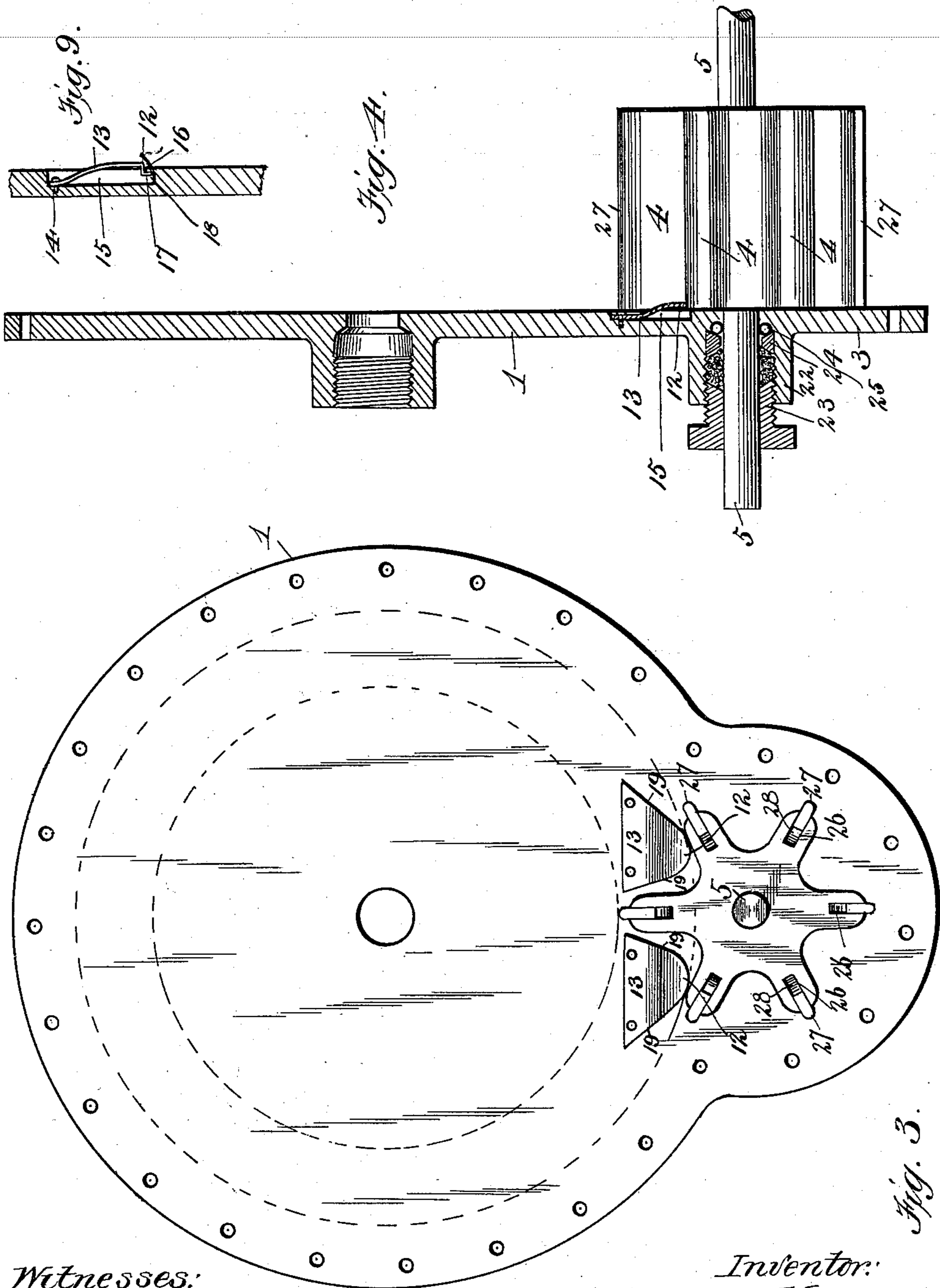
Patented July 11, 1899.

M. VAY.
ROTARY ENGINE.

(Application filed Dec. 5, 1898.)

3 Sheets—Sheet 3.

(No Model.)



Witnesses:
F. L. Ouraud
E. E. Overholt

Inventor:
Martin Vay.
W. J. F. Arnold & Co.,
By his Attorneys.

UNITED STATES PATENT OFFICE.

MARTIN VAY, OF HOISINGTON, KANSAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 628,566, dated July 11, 1899.

Application filed December 5, 1898. Serial No. 698,342. (No model.)

To all whom it may concern:

Be it known that I, MARTIN VAY, a citizen of the United States, residing at Hoisington, in the county of Barton and State of Kansas, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to engines, and more particularly to that variety thereof designated a "rotary" engine, wherein the shaft employed to transmit the power is rotated instead of having a reciprocatory movement imparted thereto.

The object of my invention is to provide a reliably-efficient engine of the characters specified, which upon slight alteration or modification thereof will be found equally efficient and reliable for use as a pumping apparatus.

My invention consists in certain novel combinations and construction of parts, as will be hereinafter fully described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view of my invention, showing the housing or casing in horizontal section. Fig. 2 is a central vertical section of Fig. 1. Fig. 3 is a top plan view of Fig. 1, showing the upper casing and the rotary piston and its shaft removed. Fig. 4 is a side elevation of the controlling-gates and a portion of the upper housing. Fig. 5 is a detail in section, showing the preferred manner of mounting the packing in position in the ends of the blades. Fig. 6 is a detail view of the series of gates, showing a modified construction of the parts designed to hold said gates in an operative position from that shown in Fig. 3 and other views. Fig. 7 is a detail in perspective, showing the locking device illustrated in Fig. 6. Fig. 8 is a plan view of the locking-springs separated from its recess. Fig. 9 illustrates the preferred construction to be employed in forming the locking-spring shown in Fig. 8.

I am aware that a large variety of rotary engines and pumps have been produced wherein it is attempted to provide certain effective combinations of elements having in view a perfect cooperating whole, though, so

so far as I am aware, success has not been reached, mainly owing to the fact that insufficient provision has been made to hold the steam to its work without loss thereof.

The essential feature, therefore, of my invention, it may be briefly stated, consists in means to continuously feed the steam into co-operation with the blades carried by the piston, thereby preventing loss or leakage of the live steam into contact with that side of the piston containing dead or exhaust steam. With this purpose in view I provide a rotary cut-off consisting of a series of gates mounted upon a common center, each gate designed to be successively moved into its operative position and removed therefrom by a blade upon the rotary piston.

For convenience of reference to the several parts of my invention and their necessary accessories said parts will be referred to by numerals.

While I shall confine the following specification to a description of the construction necessary to produce a rotary engine, it will be obvious that by means of slight modifications, as by increasing the length of the piston and the size of the inlet-port, a complete and efficient pump of great capacity will be produced, which may be actuated by any suitable motive power attached to the shaft of the piston, all of which will be apparent by reference to the drawings.

1 indicates the outer casing or housing, supported or held in position in any preferred way, as by the legs 2. Said housing may be disposed horizontally, as shown, or vertically, as preferred, and is provided at one end with the extension 3, designed to hold in its operative position the rotary cut-off, consisting of a series of gates 4, each joined at a common center, said center consisting of the shaft 5, by means of which said gates are held to the performance of their office, which consists in separating the live steam from the exhaust-steam, as will be more specifically pointed out.

Rotatably mounted in the enlarged end of the housing 1 is the rotary piston 6, having the power-transmitting shaft 7 and the oppositely or diametrically disposed blades 8, it being clear that the size of said piston and the length of the blades may be varied as

deemed desirable in order that an annular chamber 9 of proper extent may be left for the reception of the requisite quantity of steam which, as will be seen by reference to Fig. 1, enters said chamber through the port 10, the direction of travel of the steam being indicated by the arrow. In order that the steam may not take the shortest course and pass directly out at the exhaust-port 11, the series of gates 4 are provided, which may consist of any preferred number, though it is thought that best results will follow from the use of six of said gates, inasmuch as the two gates adjacent to the one in contact with the peripheral face of the piston 6 will lie snugly in contact with the raised ends 12 of the locking-springs 13, said springs being properly secured in position, as by the screws or threaded bolts 14. In order that said springs may have their secured ends disposed below the surface of the bottom wall of the housing, thereby permitting the series of gates 4 and the blades 8 to ride unobstructedly over said bolts, I provide the countersink 15, of proper depth to permit the free end 12 of the locking-spring to be forced downward out of the way. In Fig. 9 I have shown the preferred construction for the free end of the spring 13, said end being bent downward to form the depending portion 16 and the extension 17 disposed at right angles to said depending part. In order that the free end of the spring 13 thus constructed may not be forced upward by the action of the gates, I form the undercut or recess 18, designed to engage the extension 17 and hold the same securely in position. By means of this provision the spring 13 may be made of reduced thickness and rigidity without fear that it may be bent or buckled by the action of the gates, thus insuring that a minimum resistance will be offered by it to the movement of the gates and blades as they are moved over it. The preferred shape to be adopted in constructing the springs 13 is that of the outline of a truncated cone, the object being to insure that the inclined edges 19 thereof will present little resistance to the movement of the gates 4 or the blades 8 as they ride over said plates, while the free ends of said springs are of proper extent to rise slightly above the surface of the floor or ceiling of the housing (according to their location) and bear snugly against the approximate face of the gates.

By reference to Fig. 1 it is obvious that the blades 8 will successively move freely over the secured end of the springs 13, and will gradually ride upon the edge 19 thereof until it is squarely on said spring, thus forcing the free end thereof downward until the gate contacting with it is released, said spring being held thus depressed until the blade moves sufficiently to contact with the gate resting against the piston, and as the latter gate is moved it will ride upon the edge 19 of the spring lying in its path and freely pass over it. It is clear that as said gate moves out of the path of the

blade 8 and over the spring in advance of it the succeeding gate will be moved into contact with the periphery of the piston, when the springs will both rise up and prevent further movement of the gates until the operation is repeated by the succeeding blade 8. By this arrangement of the springs 13 one of the gates 4 is always securely locked in contact with the periphery of the piston, thus preventing the live steam from moving the gate toward the exhaust-port 11 and incidentally escaping through said port, the result being that the live steam is always automatically directed into engagement with one of the blades 8. It is therefore apparent that the series of gates 4 and the shaft 5 practically constitute a spur-wheel, and that two of the teeth (gates) thereof are always in contact with the free ends 12 of the springs 13, and it is therefore impossible for said gates to move in either direction until said springs are depressed by the movement of the blades 8.

In order that the shafts 5 and 7 may be rotated in their bearings with the least possible friction, I prefer to construct said bearings substantially as shown in Fig. 2, wherein it will be seen that an extension or seat 20 is provided upon the lower side of the housing for each of said shafts, in which are disposed the antifriction-balls 21, while upon the upper side of the housing I form the flanges 22, by means of which a stuffing-box 23, substantially of the usual construction, is provided, a collar 24 of suitable material being disposed in the bottom of the receptacle formed by the flanges 22, so as to rest upon the antifriction-balls 25, disposed in the bottom of said receptacle. By means of this construction it is clear that the escape of steam will be absolutely prevented, and in order to further confine the steam to its work it will be understood that packing of the usual or any preferred construction may be disposed substantially as I have herein illustrated or otherwise.

By reference to Fig. 1 it will be seen that a longitudinally-disposed slot or recess 26 is formed in the gates 4 and in the blades 8, in which I dispose the loosely-fitting packing-blade 27, the latter being disposed normally outward by the spring 28, which is held in position in the bottom of the recess 26, as by the screws or bolts 29. By means of this construction it is clear that the free ends of the spring 28 will bear against the outer ends of the packing-blade 27, thereby causing said blade to bear snugly against the inner face of the housing and effectually prevent all leakage of steam, it being understood that the packing-blade may be formed of any preferred or suitable material.

In order that the steam may not escape around the upper and lower ends of the piston 6, an annular groove may be formed in the contiguous face of the housing or directly in the ends of the piston itself, in which packing-rings 30 of any preferred variety may be

disposed and thereby insure against the escape of the steam. Inasmuch as the blades 8 will successively strike the series of gates 4 with considerable force I prefer to provide a suitable cushion to be interposed between said gates and blades, which consists, in this instance, of the spring 31, the outer end of which is seated in a suitable recess 32 formed in the blade near the outer end thereof, and it is obvious that the tensile strength of said spring will always be interposed between the contacting faces of the blades and gates, thereby providing a reliable cushion, said spring serving the further purpose of imparting a yielding force to the gate, thereby insuring that said gate will promptly respond without liability to damage at the instant it is released by the action of the blade upon the springs 13.

In Figs. 6 and 7 I have illustrated another means which may be employed to successively hold the gates locked in engagement with the peripheral face of the piston 6, wherein it will be seen that a recess 32 is formed in the bed-plate or floor of the housing in which is pivotally secured at one end the keeper 34, having the inclined faces 35 and 36 and the centrally-disposed notch 37, it being understood that only said inclined faces of said keeper shall appear above the surface of the floor of the housing, said faces being designed to contact with the moving gates and the blades 8. In order to hold the keeper 34 normally upward, I provide the spring 38, suitably disposed in the bottom of said recess, as clearly shown in Figs. 6 and 7.

By reference to Fig. 6 it is clear that one of the blades 8 will ride upon the inclined face 35 of the keeper 34 and force the latter downward against the tension of the spring 38, and thereby release the gate or wing 4 from the notch or recess 37, when the said gate will be forced out of the path of said blade and incidentally cause the succeeding gate to ride into the notch or recess 37, where the operation will be repeated by the following blade.

It will be seen from the foregoing specification, considered in connection with the accompanying drawings, that I have provided a reliable engine of the character specified, the several parts of which may be cheaply constructed of any material deemed suitable for the purpose and readily assembled in their respective operative positions, even by one not skilled in the art, and while I have described the preferred construction to be adopted in the production of the several elements of my invention and the cooperating accessories therefor it will be understood that the substantial equivalent thereof is comprehended by me in this application, and I do not wish, therefore, to be confined strictly to the exact showing herein set forth.

It is thought that the operation of my invention will be fully apparent from the foregoing description thereof, though it may be

briefly stated that suitable connections are made with the inlet and exhaust ports 10 and 11, respectively, and that steam is thereby conveyed from the boiler through the inlet-port 10, and, inasmuch as one of the gates or valves 4 is standing in contact with the peripheral face of the piston 6, the steam cannot pass between said parts and must therefore take the direction indicated by the arrow, thereby bringing its force to bear upon one of the blades 8, which being provided with suitable packing, as indicated by the blade 27, will prevent the escape of the steam between said blade and the inner face of the housing, resulting in forcing said blade to travel in the annular chamber 9, forcing any steam in advance of it out through the exhaust-port 11, which latter may, if desired, be in connection with another engine of similar character in order that the exhaust-steam may not be wholly lost. The blades 8 will thereby be brought successively into engagement with one of the gates as it stands between the locking-springs 13 or in the recess 37, as the case may be, and force said gate out of its path and incidentally bringing the succeeding gate into the same position occupied by its predecessor, and thereby absolutely insure that the steam cannot escape between the peripheral face of the piston and the gate in cooperation therewith.

It is obvious that in case my improved rotary engine is to be used as a pumping apparatus the inlet-port should consist of a vertically-disposed slot which is nearly the full height or extent of the interior of the housing, thereby insuring the free admission of the water to be pumped, when by the application of suitable motive power to the shaft 7 outside of said housing the water in the annular chamber 9 will be acted upon by the blades 8 and forced out through the exhaust-port and thence through suitable pipe connections to the point where it is desired to use the same, the gates or valves 4 acting substantially in the same manner as when steam is used, thereby preventing the water from taking the shortest course to the exhaust-port.

It is obvious that my improved engine may be readily and promptly reversed by means of proper pipe connections and suitable check-valves in connection therewith, said pipes also being provided with suitable throttle or reversing mechanism. By such provision of means it is therefore clear that live steam may be so directed that it will be sent into or through the exhaust-port and will so act upon the blades 8 that the movement of the piston will be reversed, the inlet-port 10 thus becoming the exhaust-port. Inasmuch as said throttle or reversing valve may be of any preferred construction it is deemed unnecessary for the purposes of this application to illustrate the same.

Believing that the construction, operation, and advantages of my improved rotary engine have been made fully apparent, I will

dispense with further reference to the details thereof.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination of a suitable housing; a rotary piston having blades thereon, a series of gates or wings mounted upon a common shaft, each gate being so disposed as to successively contact with said piston; and a triangular spring-plate normally embedded in the floor of said housing and adapted by its free end to successively hold said gates in contact with said piston until released by said blades, as and for the purpose set forth.

2. As an improvement in rotary engines, a housing, a piston rotatably mounted therein and having actuating-blades, an auxiliary shaft having a series of gates or wings, and locking-springs carried by the casing consisting of a thin metallic plate having a tapering end so mounted in the floor of said housing that said tapered end will be normally disposed in the path of the gates whereby said gates will be successively locked in cooperation with said piston, as and for the purpose set forth.

3. In a rotary engine, an outer casing, a piston rotatably mounted therein and having actuating-blades, a rotatably-mounted shaft having a series of gates whereby steam will be directed into contact with said blades and devices for locking said gates in their operative positions until released by the action of said blades, said devices consisting of a triangular plate so mounted in the path of said gates that the pointed end thereof will extend normally upward in contact with the edge of the gate, as and for the purpose set forth.

4. In an attachment for rotary engines, or the like, the combination with a rotary piston having blades and a suitable casing therefor, of a series of gates, a spring having ta-

pering sides and edges, said spring being so formed and mounted in position in the casing that the free end thereof will extend upward; suitable means for securing one of said springs upon each side of the gate in such a manner that the blades upon the piston will ride over said springs and depress the elevated end thereof, as specified and for the purpose set forth.

5. As an attachment for rotary engines, the combination with the rotary piston having blades and a suitable casing therefor, of a series of gates; a spring 13 having suitable apertures for holding the same in place and further provided with the upwardly-extending portion 12; a depending portion and a horizontally-disposed section, and means carried by the casing to limit the upward movement thereof, as and for the purpose set forth.

6. The herein-described rotary engine consisting of an outer casing having an inlet and exhaust port, a piston rotatably mounted in said casing and having actuating-blades; a series of gates mounted on a common center and each adapted to contact the face of said piston; spring-plates having a base and tapered sides so disposed in the path of said gates that one of the gates will be engaged thereby and held in cooperation with the piston, as and for the purpose set forth.

7. As an improvement in rotary engines, a valve or gate holding device consisting of a pair of tapering spring-plates partly embedded in the housing and having their free ends extended upward in the path of said gates whereby said gates will be held in cooperation with the piston and released by the blades on said piston, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN VAY.

Witnesses:

W. T. FITZ GERALD,
EMMA M. GILLET.