No. 816,784. PATENTED APR. 3, 1906.

P. C. DAHL.

ROTARY ENGINE.

APPLICATION FILED JAN. 6, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

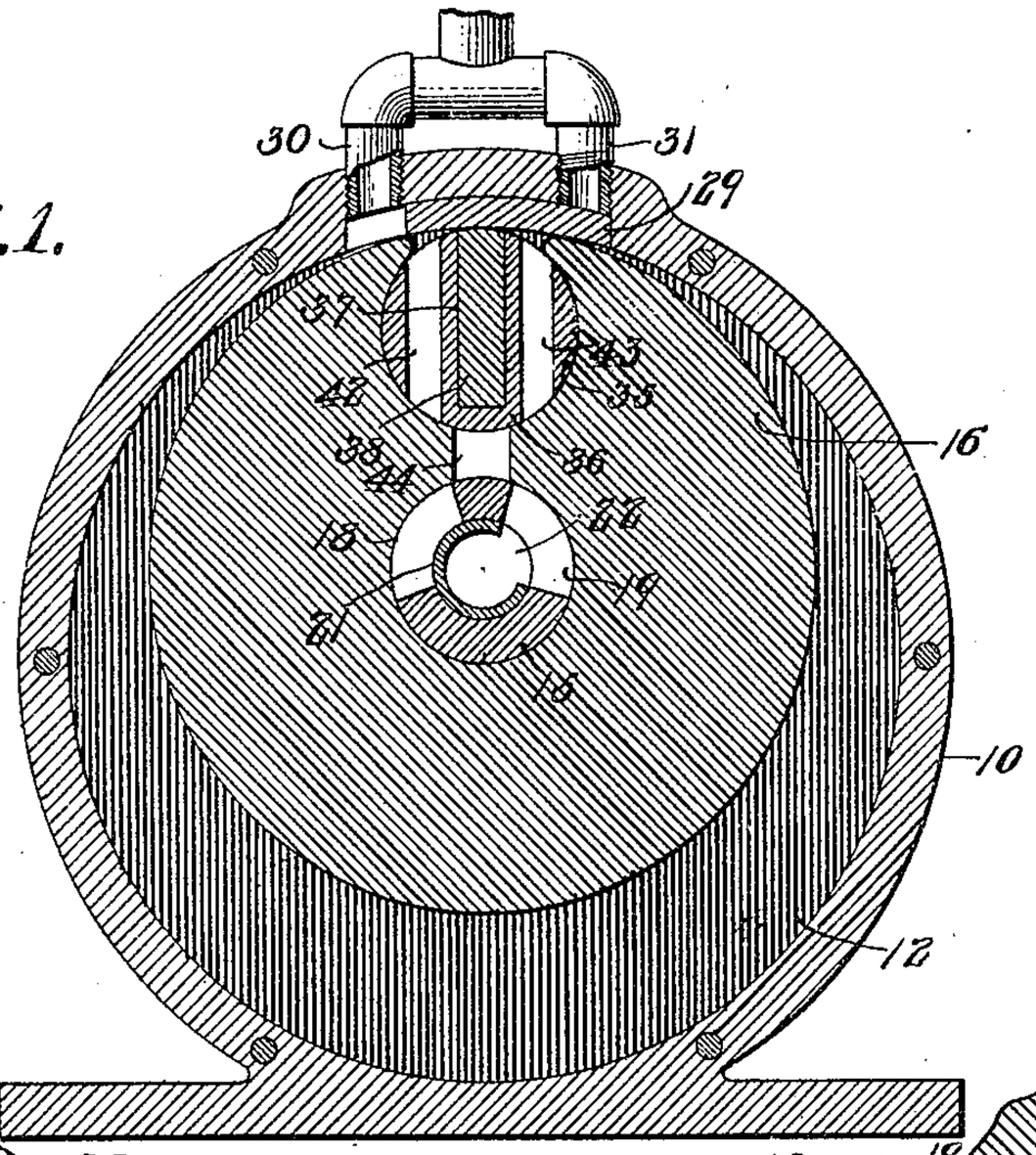


Fig. 2.

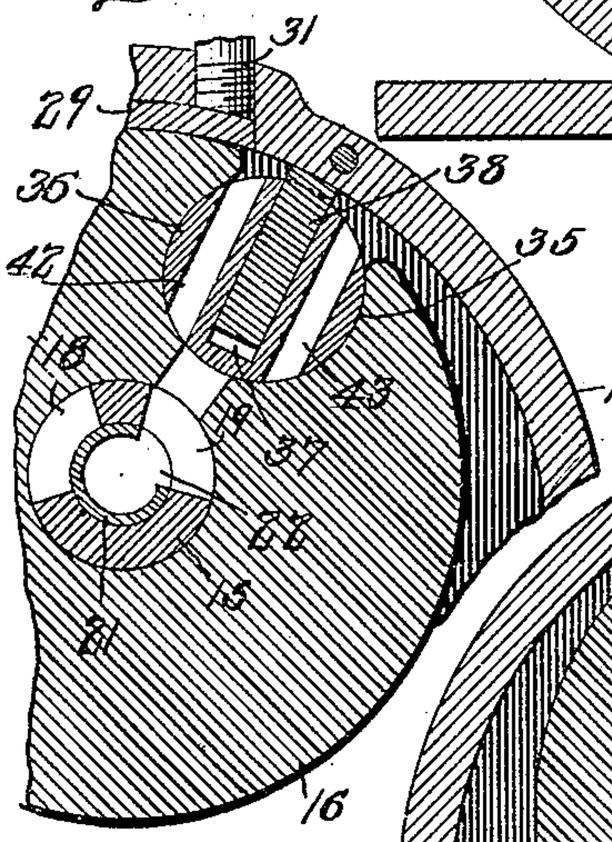


Fig. 3.

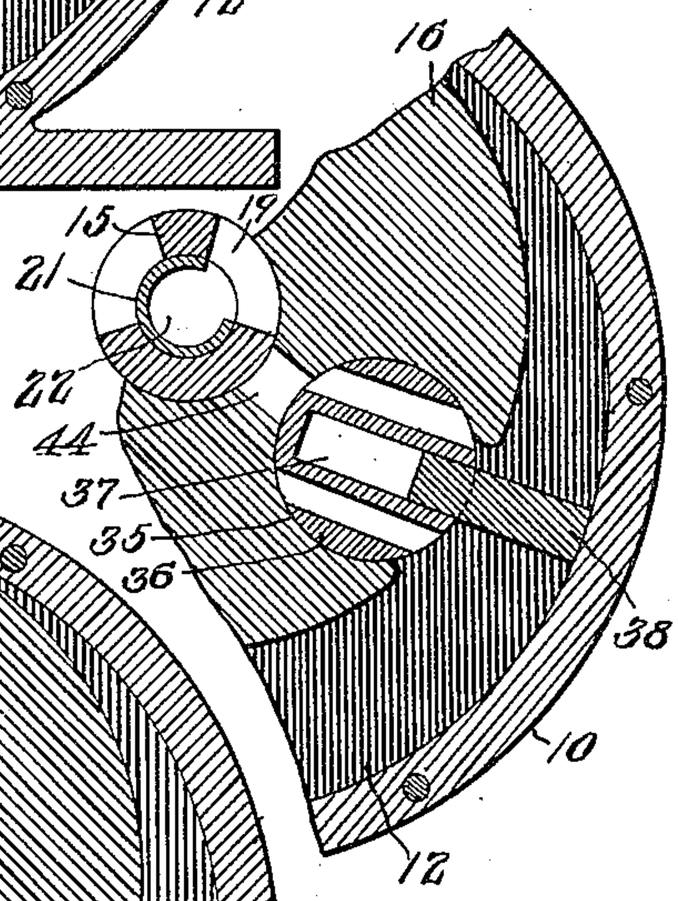
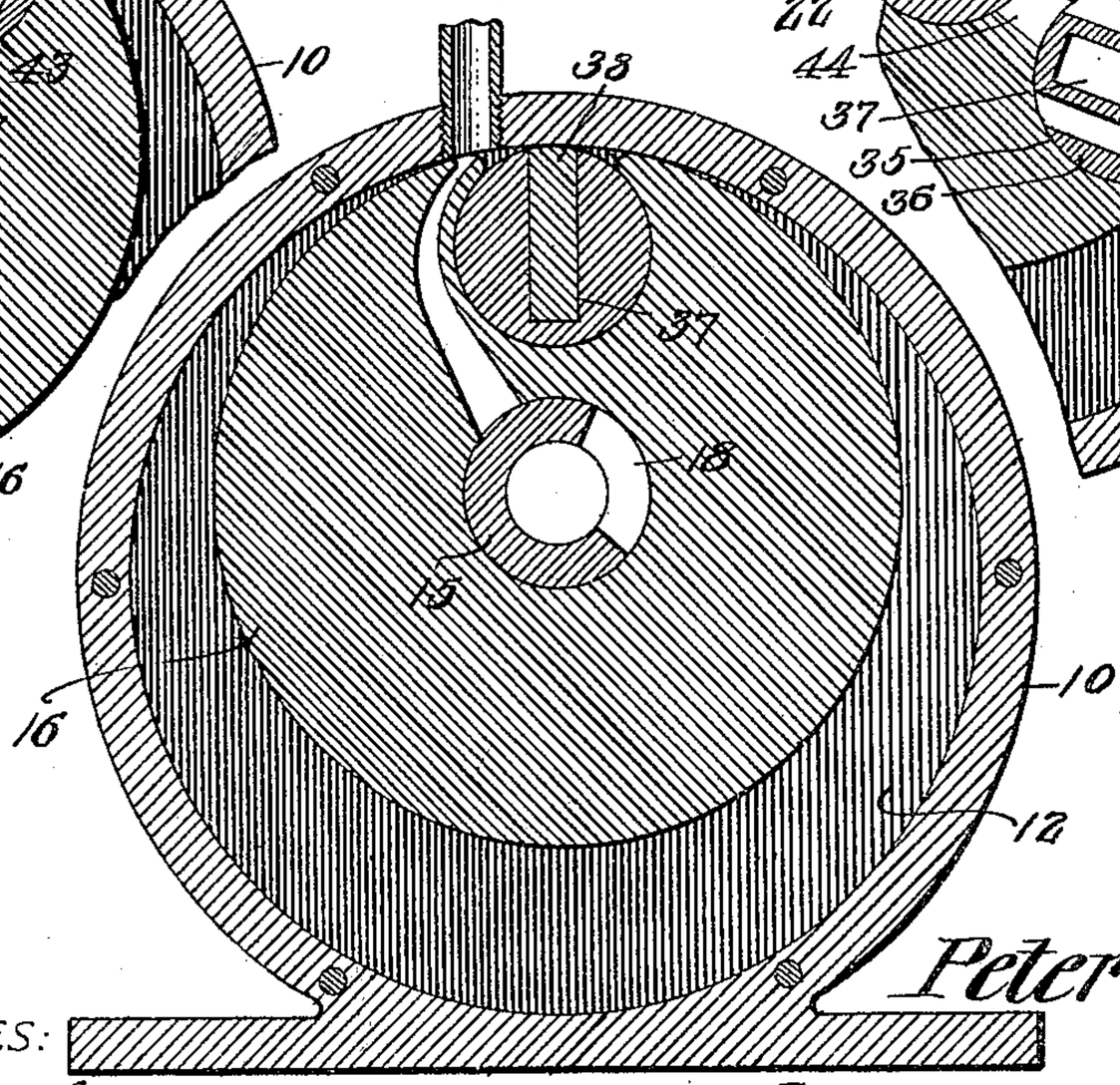


Fig. 6.



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No. 816,784. PATENTED APR. 3, 1906.

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ROTARY ENGINE.

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2 SHEETS—SHEET 2.

Fig. 4.

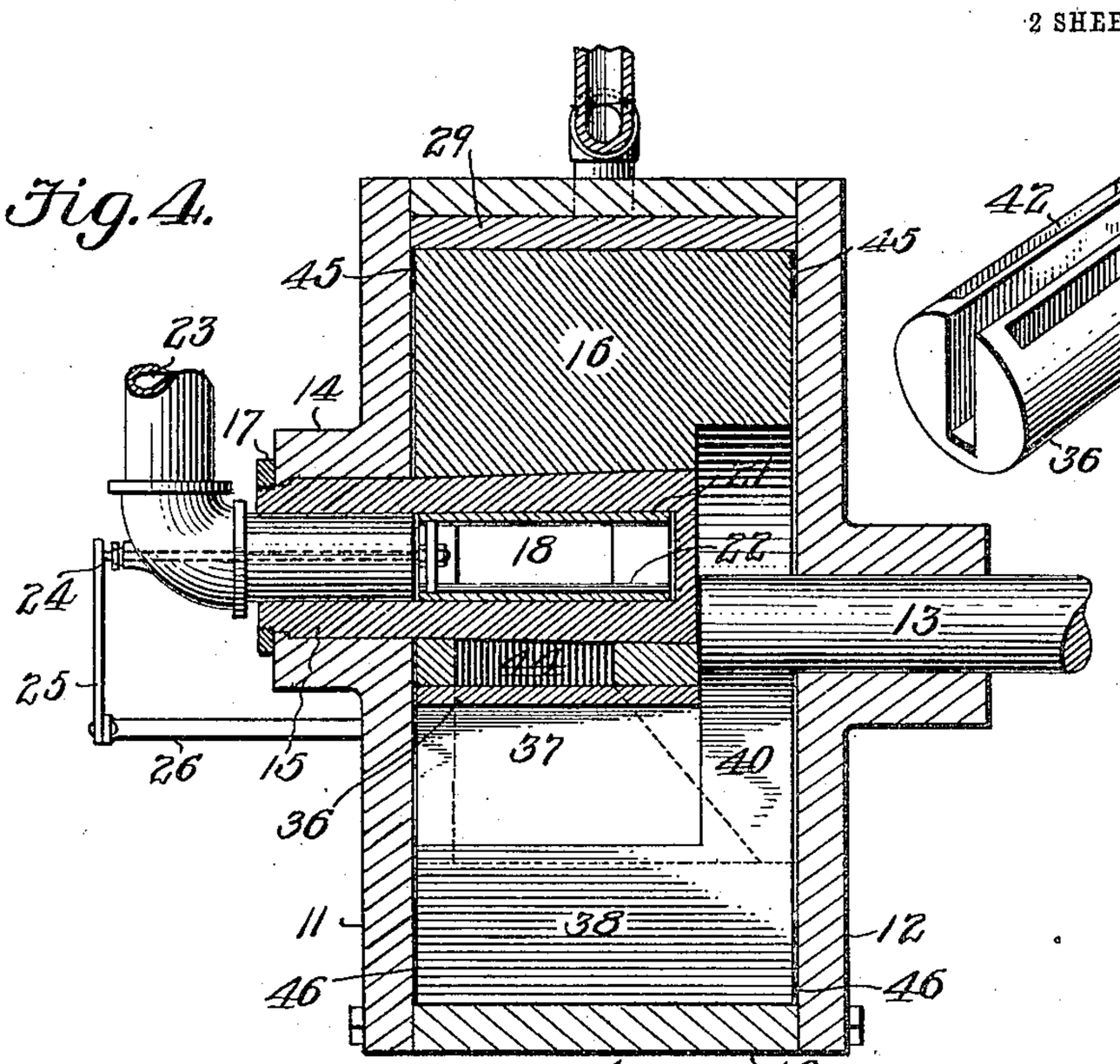

Fig. 5.

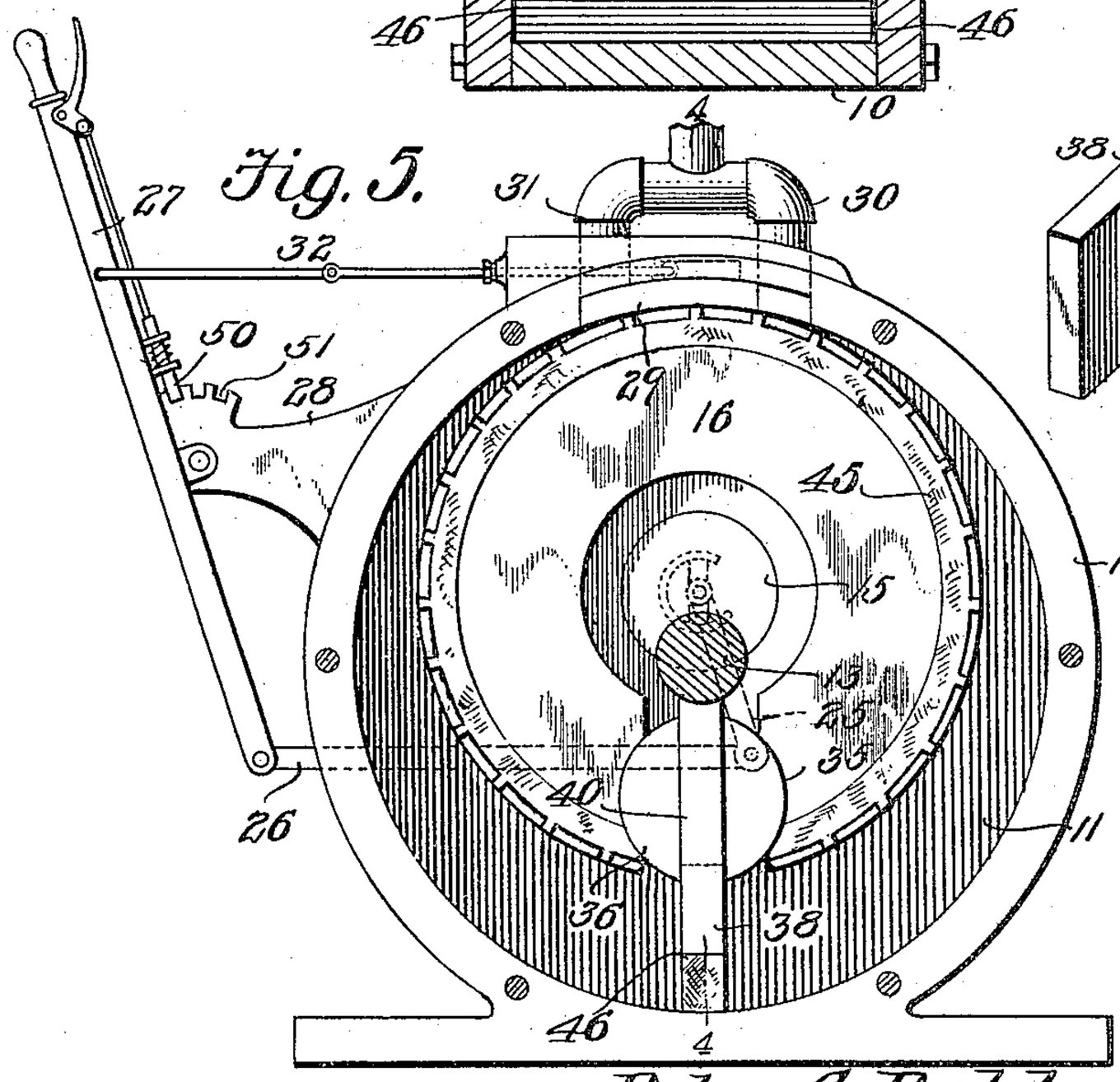

Fig. 7.

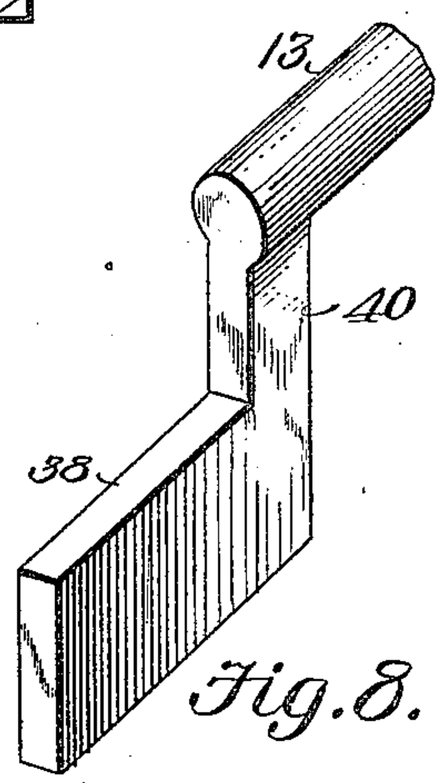

Fig. 8.

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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

No. 816,784. Specification of Letters Patent. Patented April 3, 1906.

Application filed January 6, 1906. Serial No. 294,910.

To all whom it may concern:

Be it known that I, PETER C. DAHL, a citizen of the United States, residing at Clarkfield, in the county of Yellow Medicine and State of Minnesota, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to rotary engines, and has for one of its objects to provide a novel form of valve mechanism for controlling the flow of steam or other fluid, the steam being automatically cut off after movement of the piston through a predetermined arc.

A further object of the invention is to provide an automatic cut-off valve that is carried by the piston; and in this connection a still further object is to provide a valve that is actuated by the piston wing or blade of the engine.

A still further object of the invention is to provide a rotary engine of the eccentric-piston type in which the steam or other fluid is admitted to the center of the piston and from thence passes to the periphery of the piston at one side of the piston wing or blade, provision being made for automatically cutting off the flow of steam at a predetermined point in the revolution of the piston.

A still further object of the invention is to provide an engine that may be quickly reversed and may be stopped at any point.

A still further object of the invention is to provide an engine in which the revoluble piston-drum is supported on a bearing member that is adjustable from the outside of the cylinder in order to compensate for wear.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a rotary engine constructed in accordance with the invention. Figs. 2 and 3 illustrate the piston-wing and cut-off valve in different positions. Fig. 4 is a vertical section of the engine on the line 4 4 of Fig. 5. Fig. 5 is a side elevation of the engine with one of the cylinder-heads removed, the shaft being shown in section. Fig. 6 is a sectional view of the engine, illustrating a slight modification in the arrangement of the steam-port where the engine is of the non-reversible type. Fig. 7 is a detail perspective view of the oscillatory cut-off valve detached. Fig. 8 is a similar view of the piston wing or abutment.

Similar numerals of reference are employed to illustrate corresponding parts throughout the several figures of the drawings.

The cylinder 10 is circular in form and is provided with two removable heads 11 and 12, the head 12 being provided with a bearing-opening the axis of which is coincident with the center of the cylinder and receives a power-shaft 13, through which the movement of the piston may be transmitted to any mechanism to be operated.

The opposite cylinder-head 11 is provided with a bearing 14, the axis of which is eccentric to the axis of the shaft 13, and said bearing 14 receives a hollow stationary shaft 15, that serves as a support for the revoluble piston-drum 16. That portion of the shaft 15 within the cylinder is provided with a conical periphery that fits within a correspondingly-tapered opening formed in the piston-drum 16, while the outer end of the shaft is threaded for the reception of a nut 17, which may be turned for the purpose of effecting endwise adjustment of the shaft, and thus taking up or compensating for any wear between the periphery of the shaft and the tapered opening of the piston.

The shaft 15 is hollow and at a point within the piston-drum is provided with two ports 18 and 19, which are under the control of a ported valve 21, the latter being cylindrical in form and having a single port 22, which may be moved into alinement with the port 18 or the port 19, in accordance with the direction in which the piston is to rotate. The steam or other actuating fluid is supplied through a pipe 23, leading into the end of the stationary shaft 15, and through the steam-pipe leads a valve-stem 24, that is connected by a rocker-arm 25 and link 26 to a reversing-lever 27, that is pivoted on a bracket 28, projecting from the cylinder, said lever serving as a means for shifting the position of the valve in order to bring the port 22 into alinement with the port 18 or the port 19.

The periphery of the piston-drum touches

the inner curved wall of the cylinder at one point only, and at this point is arranged a combined exhaust-valve and abutment 29, that is curved transversely to correspond to the curvature of the cylinder and fits within a correspondingly-shaped recess in the wall of the cylinder. This valve 29 controls the escape of the steam, which may flow through an exhaust 30 or an exhaust 31, in accordance with the position of the valve. The valve is connected by a link 32 to the upper end of the link 27, so that when the lever is moved for the purpose of shifting the inlet-valve the exhaust-valve will also be moved to permit the escape at the proper side of the piston, it being noted that the exhausts are arranged on opposite sides, respectively, of the point of contact of the piston-drum and cylinder.

Extending through the piston-drum from side to side thereof is a circular recess 35, that receives a cylindrical cut-off valve 36, the outer edge of the valve projecting from the peripheral line of the piston-drum. This valve is provided with a longitudinal slot 37, extending from end to end thereof and serving for the reception of the piston wing or blade 38, the latter being arranged to move wholly within the slot when the drum assumes the position shown in Fig. 1. At one end of the piston wing or blade is an arm 40, that forms an integral connection between the blade or wing and the shaft 13, said arm 40 being arranged to slide through a slot extending diametrically of the valve 36.

The valve 36 is provided with two ports 42 and 43, disposed, respectively, on opposite sides of the slot 37 and extending completely through said valve, the outer end of the slots opening on opposite sides of the piston-wing and one serving for the admission of steam when the drum is to rotate in one direction and the other for the admission of steam when the drum is rotated in the opposite direction.

In the piston-drum is a steam-port 44, arranged radially with respect to the axis of the hollow shaft 15 and extending from the tapered bore of the drum to the wall of the valve-recess 35. The opposite ends of the drum are provided with packing-rings 45, and suitable packing-strips 46 are introduced at the opposite sides of the piston wing or blade, packing being also introduced at other points where it may be desired to prevent the leakage of the actuating fluid.

With the parts adjusted to the position shown in Fig. 1 the steam is cut off until as the piston rotates the port 44 is brought into alinement with the port 19, and then movement being transmitted to the piston wing or blade oscillates the automatic cut-off valve 36 until the port 42 is brought into alinement with the port 44, whereupon the steam or other fluid passes through the port 22 of the valved port 19, port 44, and port 42 to the cylinder, the piston-wing being acted upon and forced to travel in the direction indicated by the arrow in Fig. 2 until the parts move to the position shown in Fig. 3, where the valve is so moved that the supply of actuating fluid is cut off, and the movement of the piston is continued through the expansive force of the fluid. The exhaust escapes through the port 30.

When the piston is rotated in the opposite direction, the lever is adjusted until its latch-bolt 50 enters the notch 51. This turns the valve 21 until the port 22 of the valve is in alinement with the port 18, while the exhaust-valve is moved to release the port 30 and open port 31. The fluid then will flow through the port 44 of the valve as the piston rotates in the opposite direction, and the flow of fluid will be cut off in the same manner as previously described after the piston has rotated a predetermined distance.

In the construction shown in Fig. 6 the valve 36 may be omitted and the piston-drum provided with a single port 54, through which the steam is allowed to flow, the piston in this case being arranged for rotation in but one direction.

I claim—

1. In a rotary engine, a cylinder, a revoluble piston-drum arranged therein, a hollow stationary shaft around which the drum revolves, a port leading through the shaft, a cut-off valve carried by the piston, there being a drum-port leading from the shaft to the cut-off valve, and a piston-wing operatively connected to said valve.

2. In a rotary engine, the combination with a cylinder, of a revoluble piston-drum arranged therein, a hollow stationary shaft around which the drum revolves, a port leading through the shaft, a drum-port movable into alinement with the shaft-port as the drum rotates, a cut-off valve having a steam-port movable into alinement with the drum-port, and a piston wing or blade for actuating such valve.

3. The combination in a rotary engine, of a cylinder, a stationary shaft eccentric to said cylinder, a piston-drum mounted on the shaft, a steam-port formed in the shaft, a port formed in the drum and arranged to communicate with the shaft-port as the drum revolves, an oscillatory cut-off valve carried by the drum and having a port movable into alinement with such drum-port, and a piston wing or blade mounted for movement concentric with the cylinder and extending through said valve.

4. In a rotary engine, the combination with a cylinder, of a hollow stationary shaft eccentric to the cylinder and provided with a pair of ports, a valve arranged within the shaft and movable to open one and close the other port in accordance with the direction of rotation of the engine, a piston-drum mount-

ed on the shaft and having a port which passes the shaft-ports as the drum revolves, and an oscillatory cut-off valve having a central slot, a piston wing or blade mounted for movement concentric with the cylinder and extending through the drum and into the slot of the valve, whereby oscillatory movement is imparted to the valve as the drum rotates, and a pair of ports extending through said valve and movable into alinement with the drum-port.

5. The combination in a rotary engine, of a cylinder, a power-shaft extending through one head of the cylinder, the axis of the shaft being coincident with the axis of the cylinder, a hollow stationary shaft carried by the opposite head of the cylinder and forming a steam-inlet, said shaft having a port, a piston-drum mounted on the stationary shaft and having a port, and a piston wing or blade carried by the power-shaft and extending through a slot in the drum.

6. The combination in a rotary engine, of a cylinder having a pair of exhaust-ports, a revoluble piston-drum eccentric to the cylinder and engaging the inner circular wall of the cylinder at a point between the two exhaust-ports, a slidable valve curved to follow the contour of the wall of the cylinder and movable to open one or other of the exhaust-ports, an oscillatory cut-off valve arranged within the drum, a steam-supply leading within the drum, a port for placing the steam-supply in communication with the cut-off valve, and a piston-wing movable with the cut-off valve and mounted for rotative movement concentric with the cylinder.

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

PETER C. DAHL.

Witnesses:

JOHN LARSON,

A. N. KOLSET