No. 797,501. PATENTED AUG. 15, 1905.

P. C. DAHL.

ROTARY ENGINE.

APPLICATION FILED JUNE 27. 1905.

2 SHEETS—SHEET 1.

Fig. 1.

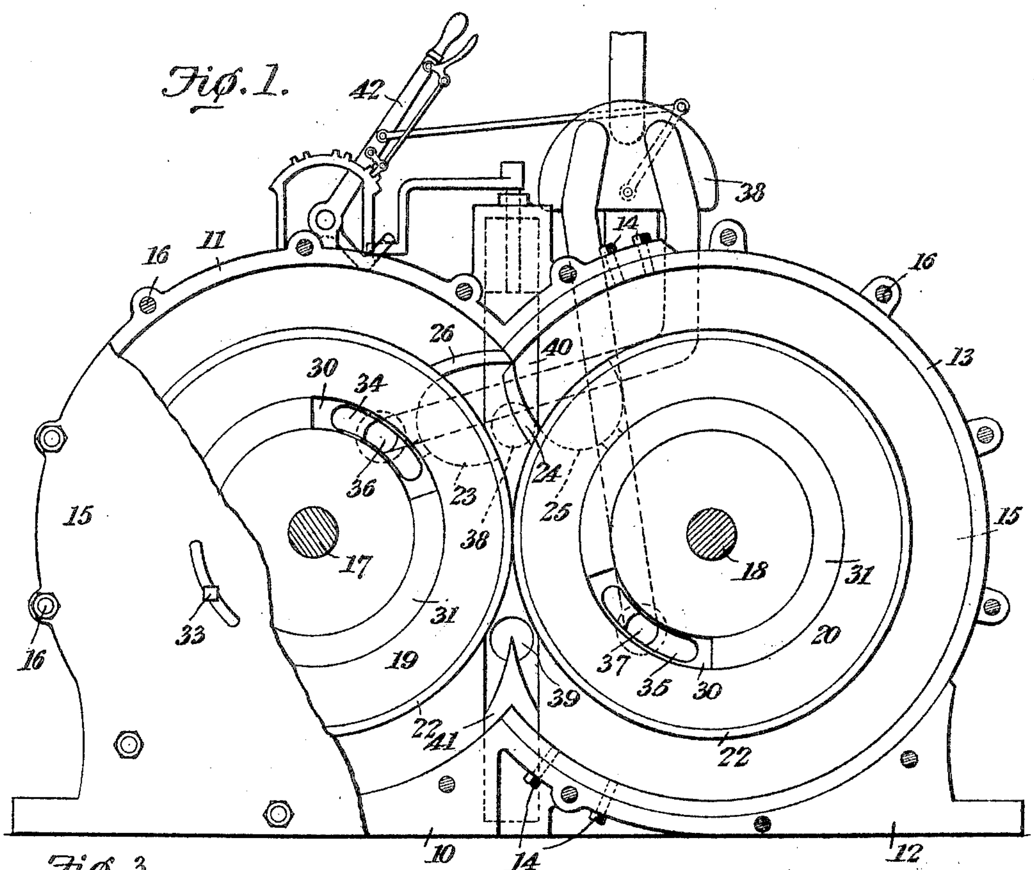
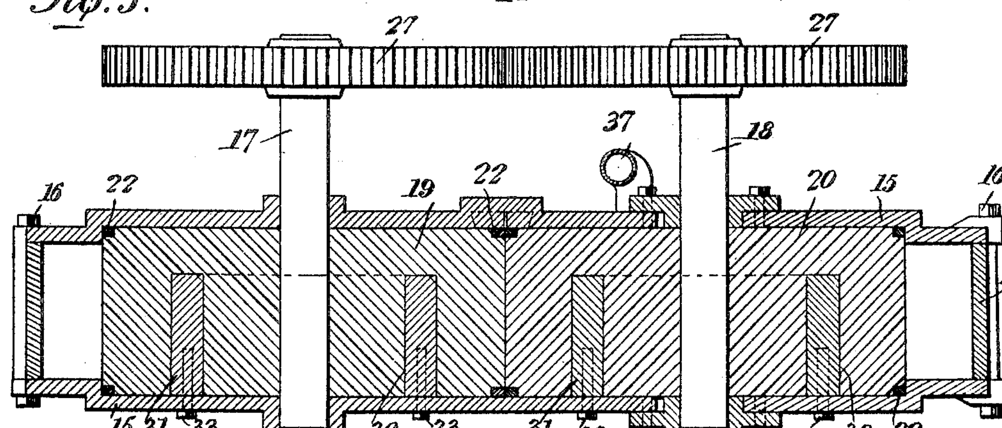


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

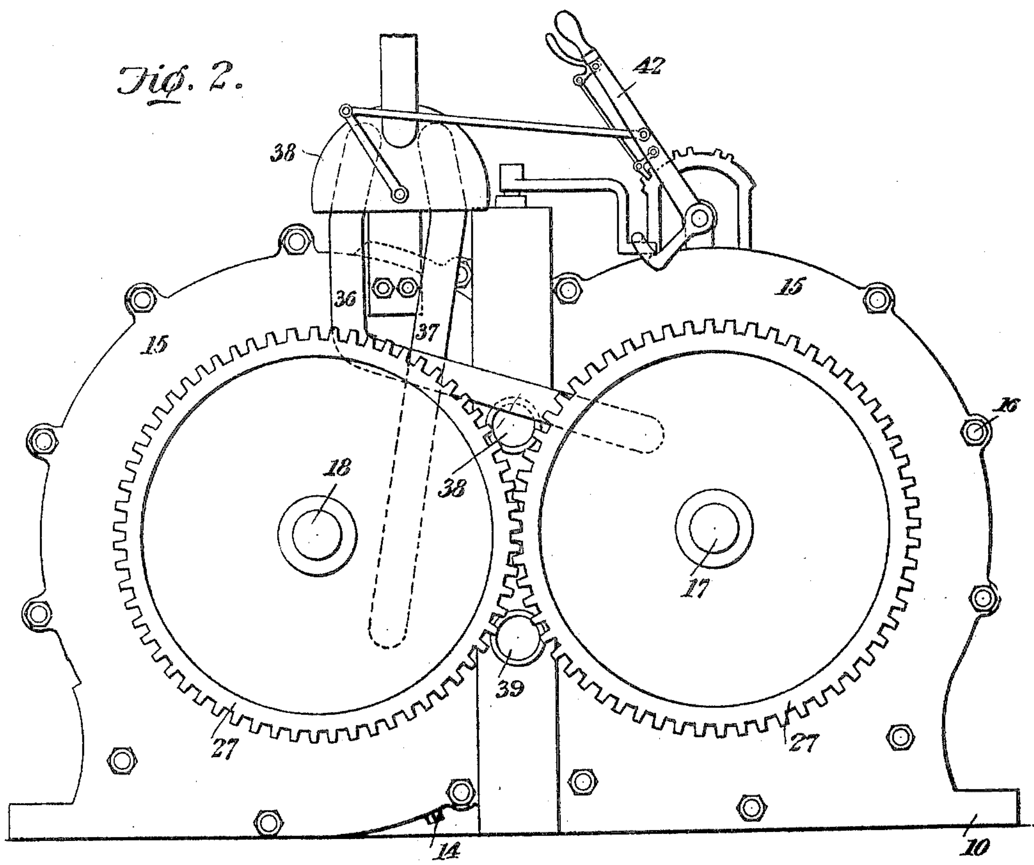


Fig. 4.

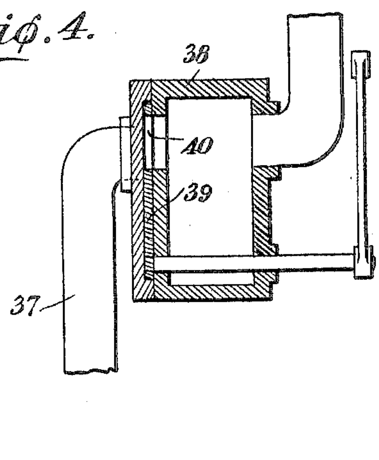
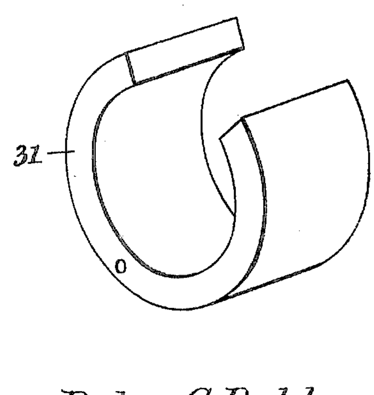


Fig. 5.



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UNITED STATES PATENT OFFICE.

PETER C. DAHL, OF CLARKFIELD, MINNESOTA.

ROTARY ENGINE.

No. 797,501. Specification of Letters Patent. Patented Aug. 15, 1905.

Application filed June 27, 1905. Serial No. 267,273.

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 an engine of simple and economical construction in which the steam or other fluid may be readily cut off after a partial stroke and allowed to act expansively during the remaining portion of the stroke and, further, to so arrange the engine that the point at which steam is admitted may be varied in accordance with the character of the work to be performed.

A further object of the invention is to provide a novel construction of rotary engine in which a pair of revoluble piston-drums are provided with interfitting piston-wings and recesses so arranged that the wings of one will follow closely the contour of the recesses of the other, forming a steam-tight joint throughout and preventing the passage of steam to the exhaust.

A still further object of the invention is to provide an engine that may be readily reversed and will possess the same efficiency in both directions of movement.

A still further object of the invention is to provide a novel form of cylinder which may be adjusted for the purpose of maintaining the piston-drums in close contact with each other and to prevent the leakage of steam.

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 vertical section of a rotary engine constructed in accordance with the invention. Fig. 2 is an elevation of the engine looking from the side opposite that shown in Fig. 1. Fig. 3 is a sectional plan view of the engine. Fig. 4 is a detail sectional view of the reversing-valve. Fig. 5 is a detail perspective view of one of the cut-off valves.

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

The main portion of the cylinder comprises a bed 10 and a cylinder-section 11, from which projects a foot-piece 12, forming a support for an adjustable cylinder 13, which may be adjusted relatively to the cylinder 11 and locked in place by suitable bolts 14. The cylinders are provided with opposite heads 15, that are united by transversely-extending bolts 16, the latter passing through bolting-lugs of the cylinder 11, but clearing the cylinder-section 13 in order to permit adjustment of the latter independent of the cylinder-heads. The two heads are provided with bearings for the reception of parallel shafts 17 and 18, the bearings for the shaft 17 being fixed, while the bearings for the shaft 18 are adjustable.

On shaft 17 is secured a piston-drum 19, and on shaft 18 is a piston-drum 20, these drums being of the same diameter and the opposite edges of each drum being recessed for the reception of annular packing-rings 22. In the periphery of the drum 19 is a recess or pocket 23, adapted for the reception of a piston-wing 24, that projects from the drum 20, and in the drum 20 is a recess or pocket 25 for the reception of a wing 26, carried by the piston-drum 19. The wings and recesses are of such construction that the wing of each will accurately fit against the wall of the recess of the other drum and will prevent the leakage of steam. The wings are held in proper relative position by gears 27, secured to the shafts 17 and 18 and intermeshing with each other.

In one face of each of the drums is formed a deep annular groove 30, which communicates at one point with the wing-receiving pocket of the drum in which it is formed. These grooves receive curved valve members 31 in the form of incomplete rings, the length of the cut-away portion determining the quantity of steam admitted to the engine. These rings are held from rotative movement by suitable lugs or bolts 33, extending inward from one of the cylinder-heads, and these lugs or bolts are preferably made adjustable in order to permit adjustment of the valves.

In one of the cylinder-heads is formed a pair of inlet-ports 34 35, to which steam is supplied through pipes 36 37, leading to a valvechamber 38, in which is a disk valve 39, having a port 40, that may be placed in communication with the pipe 36 when the engine is to rotate in one direction and with the pipe 37 when the engine is to rotate in the opposite direction. The ports 34 and 35 are arranged to communicate with the grooves 30 at points between the ends of the valve members 31, so that the pockets formed between the ends of the valve members will be supplied with steam under pressure, and as the drums rotate the wing-receiving pockets will pass beyond the ends of the valves and steam will flow through the pockets to the rear faces of the piston-wings. The reversing-valve is so adjusted that steam is admitted to but one of the ports at a time, and if steam is now supplied to port 34 and the parts have reached the position shown in Fig. 1 the steam will pass into the pocket 23 to the rear of the blades 24 and 26, causing the latter to move in the direction of the arrow, and the blades will be operated under boiler-pressure until the pocket 23 has passed beyond the opposite end of the valve member, after which the steam will act expansively to complete the stroke. By properly adjusting the valve member steam may be admitted at a point farther along in the revolution, or by lengthening or shortening the valve member the quantity of steam admitted may be governed in accordance with the work which the engine is to perform. In rotating in the opposite direction the port 34 is cut off and steam is admitted to the port 35 and in this case passes through the recess 25 to act on the piston-wings 24 and 26.

In one of the cylinder-heads is arranged a pair of exhaust-ports 38 and 39, said ports being in vertical alinement with each other and under the control of a pair of valves 40 and 41, that slide in dovetailed recesses in the cylinder-head. These valves are operatively connected to the reversing-lever 42, and when the latter is moved in one direction steam will be admitted at the port 34 and will exhaust through the port 39, and movement of the valve in the opposite direction will close these ports and open the steam-inlet port 35 and the exhaust-port 38.

By the employment of adjustable bearings for the shaft 18 and by making the cylinder-section 13 adjustable the piston-drums may be held in close contact with each other and all leakage of the steam or other actuating fluid prevented.

With an engine of this type steam, air, or any other fluid under pressure may be employed for motive power, and the cut-off valve may be so adjusted that the operating fluid will be admitted when the piston-wing is passing through the recess of the piston-drum, thereby materially lessening or doing away with all clearance. The power may be transmitted from one or both shafts, as desired.

Having thus described the invention, what is claimed is—

1. In a rotary engine, a pair of drums provided with interfitting wings and recesses, cylinders in which said drums are disposed, steam and exhaust ports leading to the heads of the cylinders, each of said drums being provided with an annular groove that communicates with the recess of the drum, and a stationary valve member arranged on each annular groove and serving to control the entrance of steam to the cylinders.

2. In a rotary engine, a pair of drums having interfitting wings and recesses, one of said drums having an annular groove that communicates with the drum-recess, a stationary valve arranged within said groove and having a cut-away portion to permit the entrance of steam to the groove, and cylinders in which said drums are arranged.

3. In a rotary engine, a revoluble piston-drum having an annular groove in one face, and a stationary valve member in the form of a partial ring, the space between the two ends of the valve being in constant communication with the steam-supply, there being a passage leading through the drum for communication with the steam-space once during each revolution of said drum.

4. The combination in a rotary engine, of a revoluble piston-drum having in one face an annular groove, a stationary valve in the form of a partial ring fitting within said groove, the space between the two ends of the valve being in constant communication with a source of steam-supply, a piston-wing on the drum, there being a passage leading through the drum from the groove to the rear of the wing, and a cylinder in which said piston-drum is arranged.

5. The combination in a rotary engine, of a pair of drums having interfitting wings and recesses, and each having an annular groove in one face, a valve member arranged in each groove, said valve member being in the form of a partial ring, and the space between its ends constituting a steam-chest, a reversing valve mechanism for directing the flow of steam to one or other of said steam-chests, each of the drums being provided with a passage for placing its groove in communication with the recess, and cylinders having valved exhaust-ports.

6. In a rotary engine, the combination with a pair of piston-drums having interfitting wings and recesses and each provided with an annular groove in one face, a valve extending into each groove, cylinders in which the pistons are arranged, means carried by one of the cylinder-heads for engaging and holding the valves in a fixed position, each of the grooves communicating with the ring-receiving recess of the drum in which it is formed, and a reversing valve mechanism for controlling the

flow of steam to one or other of the annular grooves in accordance with the direction of rotation of the engine.

7. The combination in a rotary engine, of a pair of cylinders including a slotted cylinder-head having exhaust-ports, a pair of exhaust-valves guided in said slots, a pair of piston-drums having interfitting wings and recesses and each provided with an annular groove, a reversing-valve, pipes leading therefrom to the cylinder-walls in alinement with said annular grooves, valves arranged in the grooves, said valves being in the form of partial rings, means for holding the valves stationary, and a controlling-lever connected to both the reversing-valve and the exhaust-valves, substantially as specified.

8. The combination in a rotary engine, of a pair of cylinders, one of which is in the form of a partial ring and the other forming a support for said ring, and locking means for securing the cylinders to each other.

9. The combination in a rotary engine, of a pair of revoluble drums having interfitting wings and recesses, a main cylinder member, a second cylinder member in the form of a partial ring that is adjustable with respect to the main cylinder-ring, cylinder-heads having adjustable bearings, and drum-carrying shafts one of which is mounted in said adjustable bearings.

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:
A. OLIEN,
JOHN LARSON.