(No Model.)

C. HADEN.

ROTARY ENGINE.

No. 388,969. Patented Sept. 4, 1888.

Fig. 1

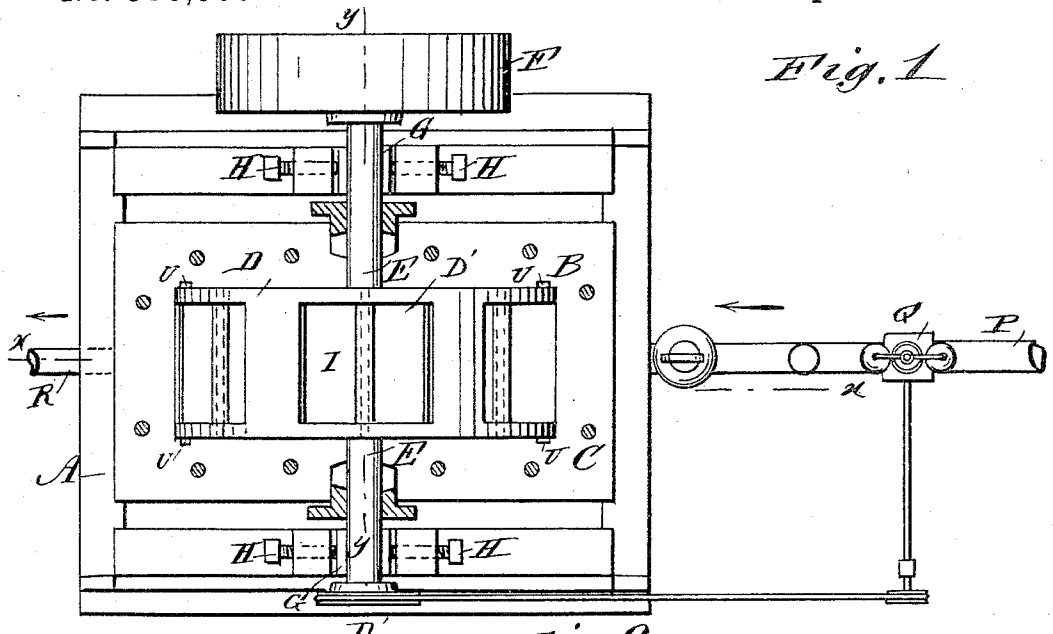


Fig. 2

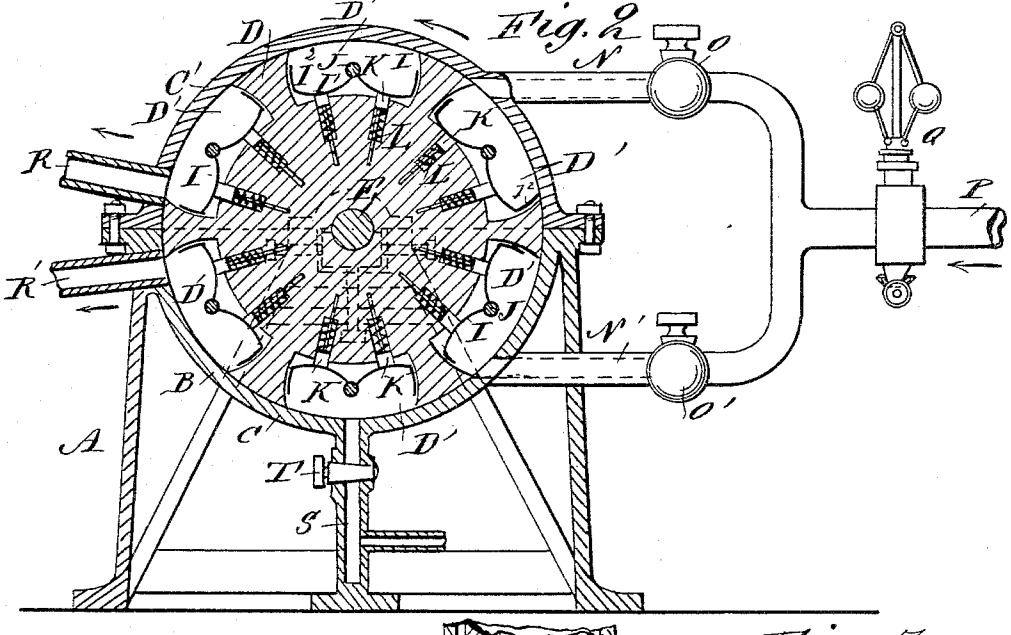
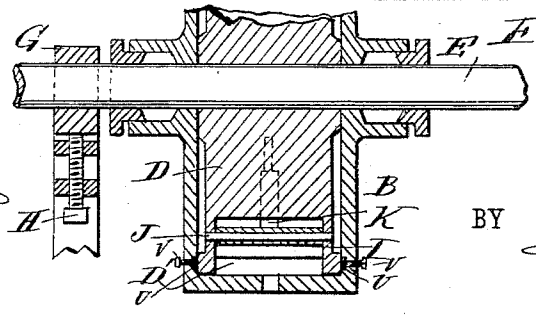


Fig. 3



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CAREY HADEN, OF MONTGOMERY, ALABAMA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 388,969, dated September 4, 1888.

Application filed March 29, 1888. Serial No. 268,786. (No model.)

To all whom it may concern:

Be it known that I, CAREY HADEN, of Montgomery, in the county of Montgomery and State of Alabama, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved rotary steam-engine which is simple in construction, very effective in operation, and adapted to be easily reversed.

The invention consists in the construction and arrangement of various parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improvement with the cover of the cylinder removed and parts in section. Fig. 2 is a sectional side elevation of the same on the line *x x* of Fig. 1, and Fig. 3 is a vertical longitudinal section of the same on the line *y y* of Fig. 1.

A suitably-constructed frame, A, supports the cylinder B, which consists of the lower part, C, formed on said frame A, and of the upper part or cover, C′, bolted or otherwise fastened to said lower part, C. In the cylinder B is mounted to rotate the wheel D, provided in its rim with buckets D′, and said wheel is secured to the main driving-shaft E, carrying on one outer end the driving-pulley F, or other means for transmitting the rotary motion of the main shaft to other machinery. The main driving-shaft E is mounted in bearings G, held in place by set-screws H, screwing in the frame A, and adapted to set the shaft E in an exact position.

In each of the buckets D′ of the wheel D is placed a valve, I, pivoted at its center to a rod, J, mounted transversely in the sides of the wheel D, forming the buckets D′. Each valve I consists of the curved bottom plates, I′, extending equal distances from the rod J, and from the ends of said bottom plates, I′, extend upward the arms I^2, adapted to engage with their upper edges the inside rim of the cylinder B. Against the under sides of the bottom plates, I′, of the valve I presses a plunger, K, held in a radial slot formed in the wheel D, and against said plunger presses a spring, L, so as to hold said plunger K against the under side of the bottom plate, I′, of the valve I.

Into one side of the cover C′ and the lower part, C, of the cylinder B lead the pipes N and N′, respectively, each provided with a valve, O or O′, and both pipes N and N′ uniting in the inlet-pipe P, connected with the boiler and provided with a governor, Q, of any approved construction, and operated from the main shaft E of the engine. On the opposite side from the pipes N and N′ in the cylinder B are arranged the outlet-pipes R and R′, formed in the cover C′ and the lower part, C, in a very close proximity to each other. In the bottom of the lower part, C, of the cylinder B opens the outlet-pipe S, provided with a valve, T, for discharging the water of condensation forming in the cylinder B.

The operation is as follows: When the valve O′ of the pipe N′ is closed and the valve O of the pipe N is open, and steam is admitted into the pipe P, then the steam passes into the cylinder B through the cover C′ and enters one of the buckets D′ of the wheel D. The steam thus entering the respective bucket D′ imparts a rotary motion to the wheel D in the direction of the arrow *a′* by pressing against one end of said bucket, and the steam at the same time presses against one end of the valve I, whereby the respective end of the valve is pressed downward, so that its plunger K is moved inward and its spring is compressed. The other end of the valve rises correspondingly, so that the outer edge of the end plate is in contact with the interior rim of the cylinder B, thus making a steam-tight packing at this one end of the bucket D′ in connection with the interior of the cylinder B. As soon as the respective bucket D′ which has been charged with steam connects with the outlet-pipe R, then the steam escapes through said outlet-pipe and the compressed spring L again forces the valve I to its former normal position, so that the outer edge of the end plate does not touch the interior rim of the cylinder B, as shown in Fig. 2.

It will be seen that the buckets D′ are successively filled with steam, as above described, and in a similar manner permit the steam to escape through the pipe R, so that a continuous rotary motion in the direction of the ar-

row *a'* is imparted to the wheel D, and consequently to the main driving-shaft E.

When it is desired to reverse the motion of the wheel D and the main shaft E, then the valve O of the pipe N is closed and the valve O' of the pipe N' is open, so that the steam entering through the pipe P passes through the pipe N' into the cylinder B at the lower part, C, whereby the steam presses against the opposite end of the respective bucket D', and thereby causes the wheel D to revolve in the inverse direction of the arrow *a'*. The motion of the valve I is similarly reversed to form a steam-packing for the wheel and the cylinder.

In the cylinder B, on each interior side, are held the packing-rings U, pressed against the sides of the wheel D by set-screws V, so as to form a steam-tight packing.

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

1. In a rotary engine, the combination, with a wheel provided with a series of buckets in its rim, of a series of valves centrally pivoted in the said buckets and held by spring pressure in position to be acted upon by the steam, in whichever direction the wheel is turned, substantially as described.

2. In a rotary steam-engine, the combination, with a wheel having a series of buckets in its rim, of a series of valves centrally pivoted in said buckets, and spring-pressed plungers, one upon each side of the pivots of the said valves, substantially as described.

3. In a rotary engine, the combination, with a wheel, D, having a series of buckets, D', in its rim, of the valves I, centrally pivoted in the buckets and having an upwardly-extending arm, I^2, on each side of the pivot, and the spring-pressed plungers K, held in radial slots in the wheel, one on each side of the pivots of the valve, substantially as herein shown and described.

4. In a rotary engine, the combination, with a cylinder provided with two inlet-pipes and two outlet-pipes, of the wheel D, journaled in the said cylinder and having a series of buckets, D', in its rim, the valves I, centrally pivoted in the buckets and provided with an upwardly-extending arm, I^2, and spring-pressed plungers K', arranged in slots in the wheel, one on each side of the pivots of the valves, substantially as herein shown and described.

5. In a rotary steam-engine, the combination, with the cylinder B, made in two parts, C and C', of the wheel D, mounted to rotate in said cylinder and provided in its rim with buckets D', the main shaft E, carrying said wheel D and mounted in adjustable bearings, the valves I, pivotally held in said buckets D' and consisting of the bottom plates, I', and the end plates, I^2, the plungers K, having their bearings in said wheel D, the springs L, pressing against said plungers, the steam-inlet pipes N and N', opening into said cylinder B and provided with the valves O and O', the pipe P, connected with said pipes N and N', and the exhaust-pipes R and R', opening at opposite sides from the pipes N and N' into the cylinder B, substantially as shown and described.

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