

J. C. HAMILTON.
Rotary-Engines.

No. 149,116.

Patented March 31, 1874.

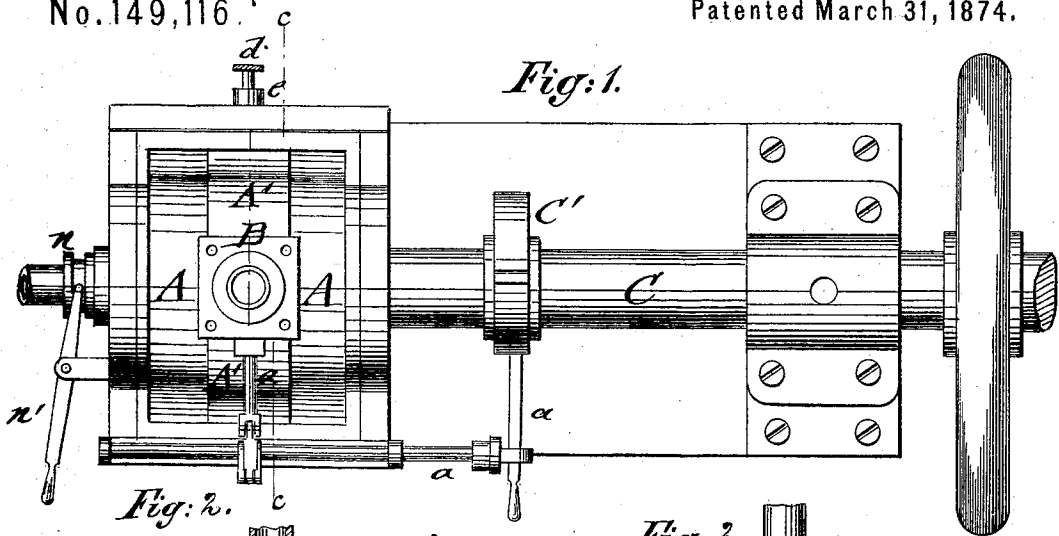


Fig. 1.

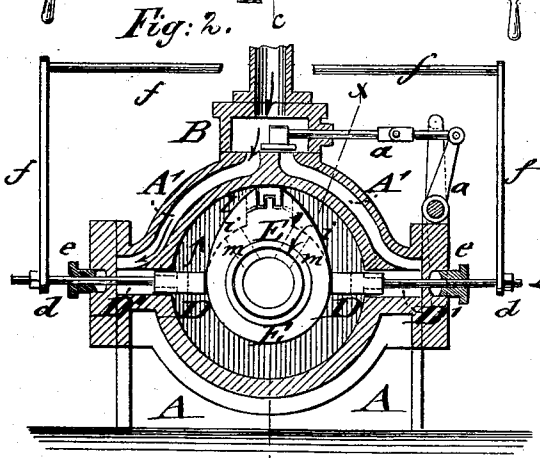


Fig. 2.

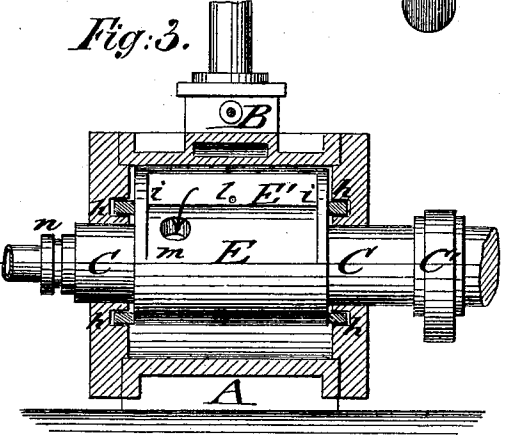


Fig. 3.

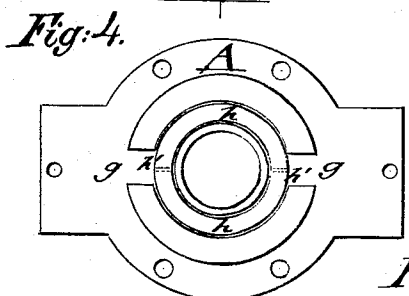


Fig. 4.

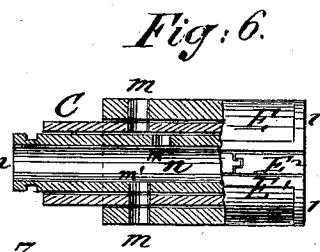


Fig. 6.

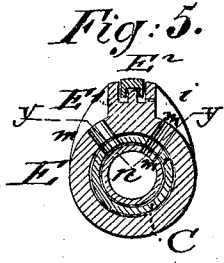


Fig. 5.

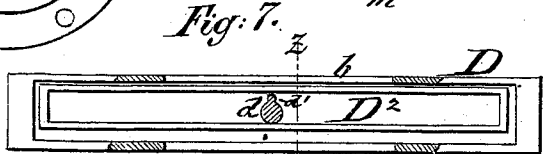


Fig. 7.

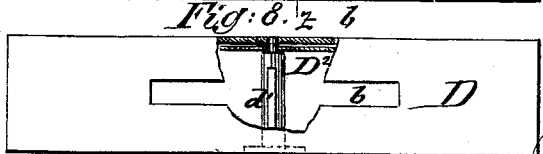


Fig. 8.



Fig. 9.

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UNITED STATES PATENT OFFICE.

JOSIAH C. HAMILTON, OF ASHTABULA, OHIO.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **149,116**, dated March 31, 1874; application filed February 7, 1874.

To all whom it may concern:

Be it known that I, JOSIAH C. HAMILTON, of Ashtabula, in the county of Ashtabula and State of Ohio, have invented a new and Improved Rotary Engine, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a top view of my improved rotary engine; Fig. 2, a vertical transverse section on the line *c c*, Fig. 1; Fig. 3, a vertical longitudinal section on the line *x x*, Fig. 2; Fig. 4, a detail side view of the cylinder-head detached; Fig. 5, a vertical transverse section through hollow shaft and piston, showing exhaust-ports; Fig. 6, a sectional side view of the hollow shaft and piston, taken on the line *y y*, Fig. 5; and Figs. 7, 8, and 9, respectively, are detail end and top views and a vertical transverse section on the line *z z*, Fig. 7, of the sliding abutment-valve for reversing the engine.

Similar letters of reference indicate corresponding parts.

The invention will first be fully described, and then pointed out in the claims.

In the drawing, A represents the cylinder of my rotary engine, which is constructed of semi-circular top and bottom sections, side and head plates, which may be produced in the required finish by the usual machinery employed for such purposes. The sectional parts of the cylinder are bolted together in the most approved manner, steam being admitted by a cut-off valve, B, of the usual construction, worked by an eccentric, C', of the main shaft C, and connecting-levers *a a*. The cut-off valve B serves to admit the steam from the boiler alternately to the entrance-channels A', which are arranged, preferably, along the outer circumference of the top section and conduct the steam to the rear part of the sliding abutment-valves D, which move in pockets D¹ formed symmetrically at both sides of the top and bottom sections. The valves D are fitted exactly into the pockets D¹, and are forced out till their top or bottom slots allow the escape of the steam into the cylinder A, to act on the piston E keyed to shaft C. Valve D is constructed for the purpose of reversing the motion of the engine of hollow rectangular shape, with top and bottom slots *b* for the exit of the steam, and an interior rectangular box, D², which, together with the outer

valve D, is open at the rear end. The front end is provided with packing metal, which may be replaced from time to time, as required. A lever-rod, *d*, passes from the outside of the cylinder through the pockets D¹ into the inner valve-box D², and turns centrally to valve D in the same, and also in stuffing-boxes or bearings *e* of the cylinder. A cam, *d'*, of rod *d* acts either on the top or bottom part of valve-box D², forcing the same up or down and closing thereby either the upper or lower slot of valve D. Lever-rod *d* is attached to suitable lever-gear *f*, by which the valves may be thrown into a position working in exactly opposite direction to their former one, and thereby the reversed action of the valves produced. Instead of the cam *d'*, a cylindrical end of the rod *d*, with spiral guide-groove for a pin of the inner box, or any other equivalent device for reversing the action of the valves may be used. The head-plate of the cylinder A is provided with guide-recesses *g*, Fig. 4, for the ends of valve D, and has a packing-ring, *h*, to the under side of which steam is admitted, by small side apertures *h'*, from the valve-pockets, which causes the tight packing of the head-plates on the sides of rotating piston E, without the use of springs, rubber, or other material. Piston E is of circular shape, with abutting extension or nose part E¹, and nearly oval-shaped end flanges *i*, as shown in Figs. 2, 3, and 5, for the purpose of producing the motion of the valves D in forward and backward direction in a gradual and noiseless manner, and without impeding the rotations of the piston. The extension or nose part E¹ is provided, for the purposes of fitting nicely to the cylinder, with a metallic packing-piece, E², which is of U shape, and placed into a corresponding recess and central rib of nose E¹. Steam is allowed to enter to the under side of packing-piece E² through small holes *l*, so as to carry the same against the inner surface of the cylinder. Packing-piece E² is, preferably, divided and made of two parts, which connect by tongue-and-groove joint, as shown in Fig. 6. The steam enters thereby between the two parts and packs the ends of the same tightly against the cylinder-heads. Piston E is keyed fast to hollow shaft C, the exhaust-ports *m* being arranged at both sides of extension E¹. A tube, *n*, slides inside

of the hollow end of shaft C without turning sidewise therein, being operated by the action of a pivoted lever, *n'*, applied to a collar at the outer end of the tube. Apertures *m'*, of the same size as ports *m*, are arranged below ports *m* in tube *n*, one aperture being nearer to the end of the tube than the other, so that by using one in connection with the exhaust-ports at one side of the piston, the engine will run in one direction, and, by sliding the tube forward and bringing the second aperture under the other exhaust-port, the opposite exhaust-port will be thrown open, and the engine worked in opposite direction, in connection with the reversing of the abutment-valves.

The engine may be run with great rapidity, the steam-packing of the different parts and the small amount of friction producing a slow wearing off of the contact parts. For slow and steady motion the steam may be used expansively, requiring less fuel, and running very cheaply.

Whenever the engine is intended for stationary purposes without reversing-gear, as in planing-mills, grist-mills, machine-shops, &c., the abutment-valves are greatly simplified, requiring only a top or bottom slot, without inside valve-boxes, and operating-levers, also only one exhaust-port, and no sliding tube, allowing thereby the production of the engine at greatly-reduced cost.

The alternating entrance of the steam from the cut-off valve to the sliding abutment-valves, and from them to the piston by the top slot on one side and the bottom slot at the other side,

and vice versa, when reversed, together with the action of the sliding tube, causes the effective rotation of the shaft at any point of the piston, and without dead-points, forming thereby a very compact and effective rotary engine.

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

1. The reversible rotary engine, composed of cylinder A, with channels A' and cut-off valve B, valve-pockets D¹, sliding reversible abutment-valves D, piston E, with extension E¹ and packing E², and shaft C, with exhaust-ports *m* and sliding tube *n*, the whole being arranged, connected and operated in the manner and for the purpose described.

2. The reversible abutment-valve constructed of hollow outer casing D, with top and bottom slots *b*, and adjustable inner valve-box D², as specified.

3. The reversible sliding valves D, in combination with the pockets D¹ of cylinder A, and the lever-gear described for reversing the engine, as set forth.

4. The combination of rotating piston E, keyed to shaft C, having exhaust-ports *m* near hollow end of shaft, in combination with sliding tube *n*, provided with apertures *m'*, to open exhaust-ports at alternate sides of piston, as required by the reversing of the valves, substantially as set forth.

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Witnesses:

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