(No Model.) 2 Sheets—Sheet 1.

J. W. DENMEAD & R. L. McALLISTER.

ROTARY ENGINE.

No. 346,029. Patented July 20, 1886.

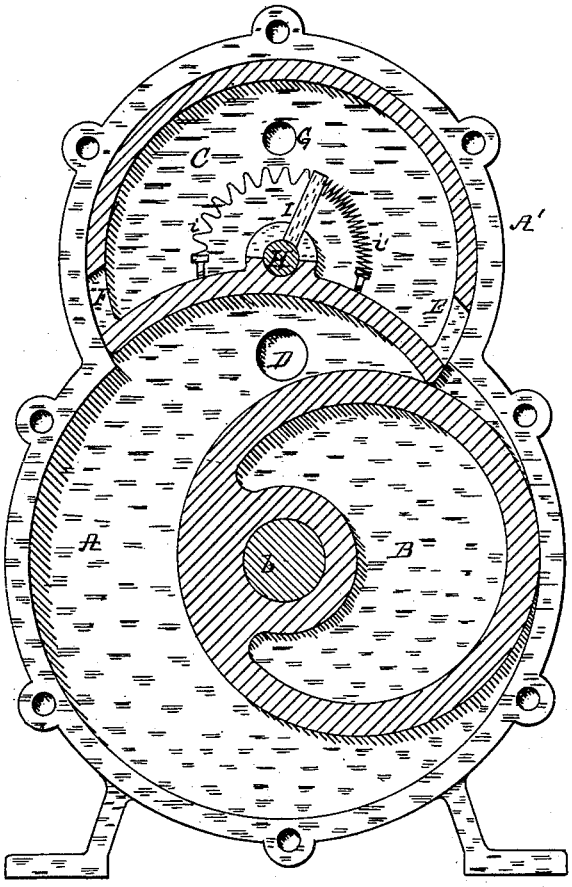

Fig. 2.

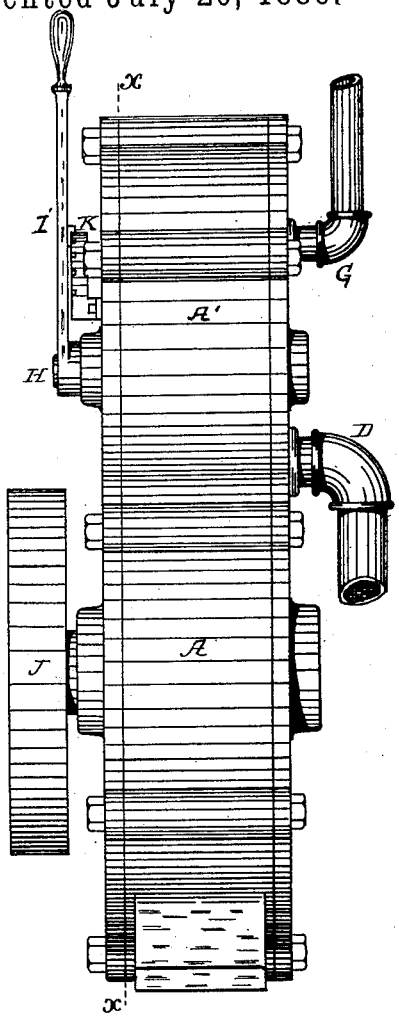

Fig. 1.

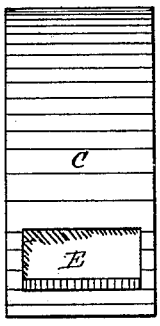

Fig. 3.

Witnesses

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G. H. Simmons

Inventors:

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(No Model.) 2 Sheets—Sheet 2.

J. W. DENMEAD & R. L. McALLISTER.

ROTARY ENGINE.

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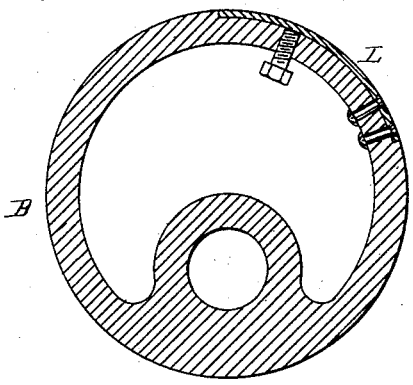

Fig. 4.

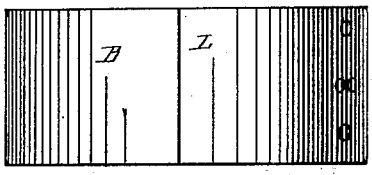

Fig. 5.

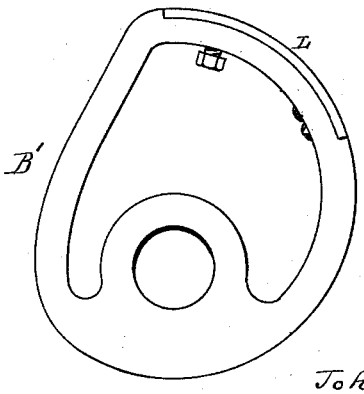

Fig. 6.

Witnesses:

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Atty.

UNITED STATES PATENT OFFICE.

JOHN W. DENMEAD AND RANDALL L. McALLISTER, OF AKRON, OHIO, ASSIGNORS OF ONE-THIRD TO JAMES CHRISTY, JR., OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 346,029, dated July 20, 1886.

Application filed February 12, 1886. Serial No. 191,734. (No model.)

To all whom it may concern:

Be it known that we, JOHN W. DENMEAD and RANDALL L. MCALLISTER, citizens of the United States, and residents of the city of Akron, in the county of Summit and State of Ohio, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

Our invention has relation to that class of rotary engines in which a cylinder, constituting the piston, is mounted eccentrically upon a shaft journaled centrally within a hollow cylinder, and a movable partition follows the face of the piston and closes, between the steam and exhaust ports, the space between the piston and the interior of the steam-cylinder.

The objects of our invention are to avoid friction of the partition, to render it steam-balanced, to facilitate the reversing of the engine, and to provide an automatic packing for the piston.

Our invention consists in the devices illustrated in the accompanying drawings, as hereinafter described, and specifically claimed.

In the accompanying drawings, Figure 1 is a side elevation; Fig. 2, a section of Fig. 1 at line *x x;* Fig. 3, an elevation of the valve; Fig. 4, a transverse section of cylindrical piston, showing automatic packing; Fig. 5, a plan of Fig. 4, and Fig. 6 a side-elevation of another form of piston.

The case consists of a hollow cylinder, A, united with and opening into an intersecting cylinder, A′, the axes of said cylinders being parallel, and their ends closed by suitable heads.

Centrally within the cylinder A is journaled the shaft *b*, upon which is mounted, eccentrically, the piston B, the ends of which meet and form a joint with the heads of the case A, and the face of which farthest from the shaft *b* meets and forms a joint with the inner face of the cylinder A.

Within the cylinder A′ is centrally journaled the shaft H, on which is loosely mounted the valve C, which consists of a semicircular hollow cylinder, which fits within the cylinder A′, the lower side being a segment of a cylinder of like diameter with the cylinder A. In each side of this valve are ports, E F, of like size and relative situation.

Within the valve C is an arm, I, keyed to the shaft H, from either side of which project coiled springs *i i′*, which connect with and press upon the inner face of the lower side of the valve C. This arm I may be rocked in either direction by a lever, I′, attached, outside of the head, to the shaft H, and retained in any position by the notched segment K. A port, G, through the head, permits the entrance of steam within the valve C, and an exhaust-port, D, allows its escape after it has caused a revolution of the piston B.

In operation the arm I, being thrown to one side and held by the lever I′, compresses the spring *i′* in one direction and releases the pressure of the other spring, *i*, thereby forcing the angular edge of the valve on that side against the face of the piston B, forming a joint therewith. Steam is then introduced through the port G into the inside of the valve C, and thence, so soon as the valve rocks far enough to open the port E, enters the cylinder A between the point where the piston touches its internal face and the valve C. A revolution of the piston is thereby caused, the edge of the valve C, following its motion, opens the port E wide, and afterward gradually closes it, while the revolution of the piston opens the port D and allows the steam to escape.

To impart momentum to the piston C for the purpose of carrying it past the dead-center, a pulley, J, is fastened to the shaft *b;* but in use we preferably couple two engines on the same shaft, with their dead-points opposite. The valve C, mounted loosely on the shaft H, rocks freely with slight motion and a minimum of friction, and is perfectly steam-balanced, as the pressure is equal on every part except the port E, which is balanced by the loss of pressure through the port F.

To reverse the engine, the lever I′ is thrown in an opposite direction, thereby forcing down the opposite edge of the valve C against the piston and permitting steam to enter through the port F.

To insure a tight joint between the piston and cylinder, a shallow recess is cut or cast across its face, one end of which is at the point farthest from the shaft *b*, in which recess is attached by one edge a piece of sheet metal, L, Figs. 3, 4, 5, arranged to spring outward by

its own elasticity or be forced out by a screw. This is turned off accurately with the piston, and when in place constantly presses against the inner face of the cylinder A.

To facilitate the operation of engines which run constantly in one direction, either by causing them to cut off earlier or exhaust sooner or relatively more rapidly, the section of the piston may be changed from a circle to other forms, as shown in Fig. 6.

Having thus described our invention, we claim—

1. The combination, in a rotary engine the case whereof consists of two parallel intersecting hollow cylinders, with heads on either end, of a cylindrical piston mounted eccentrically on a shaft journaled centrally in one of said cylinders, with a hollow valve, crescent-shaped in cross-section, resting in the other cylinder loosely mounted on a shaft journaled centrally therein, having like ports on opposite sides through its convex face, and provided with devices, such substantially as shown, by which it is rocked to and retained at either side, substantially as shown, and for the purpose specified.

2. In combination with the cylindrical piston B, mounted eccentrically on the shaft *b* in the cylinder A, the crescent-shaped valve C, surrounding the steam-port G, mounted on the shaft H in the cylinder A′, provided with ports E F, arm I, springs *i i′*, and lever I′, all constructed and arranged substantially as shown, and for the purpose specified.

3. The combination, in a rotary engine with a revolving eccentric piston, of a metallic sheet connected at one edge with the piston and having the other pressed constantly against the inner face of the cylinder in which said piston revolves, substantially as and for the purpose hereinbefore set forth.

In testimony that we claim the foregoing, we have hereunto set our hands, this 23d day of January, A. D. 1886.

JOHN W. DENMEAD.
RANDALL L. McALLISTER.

Witnesses:
C. P. HUMPHREY,
E. W. STUART.