(No Model.)

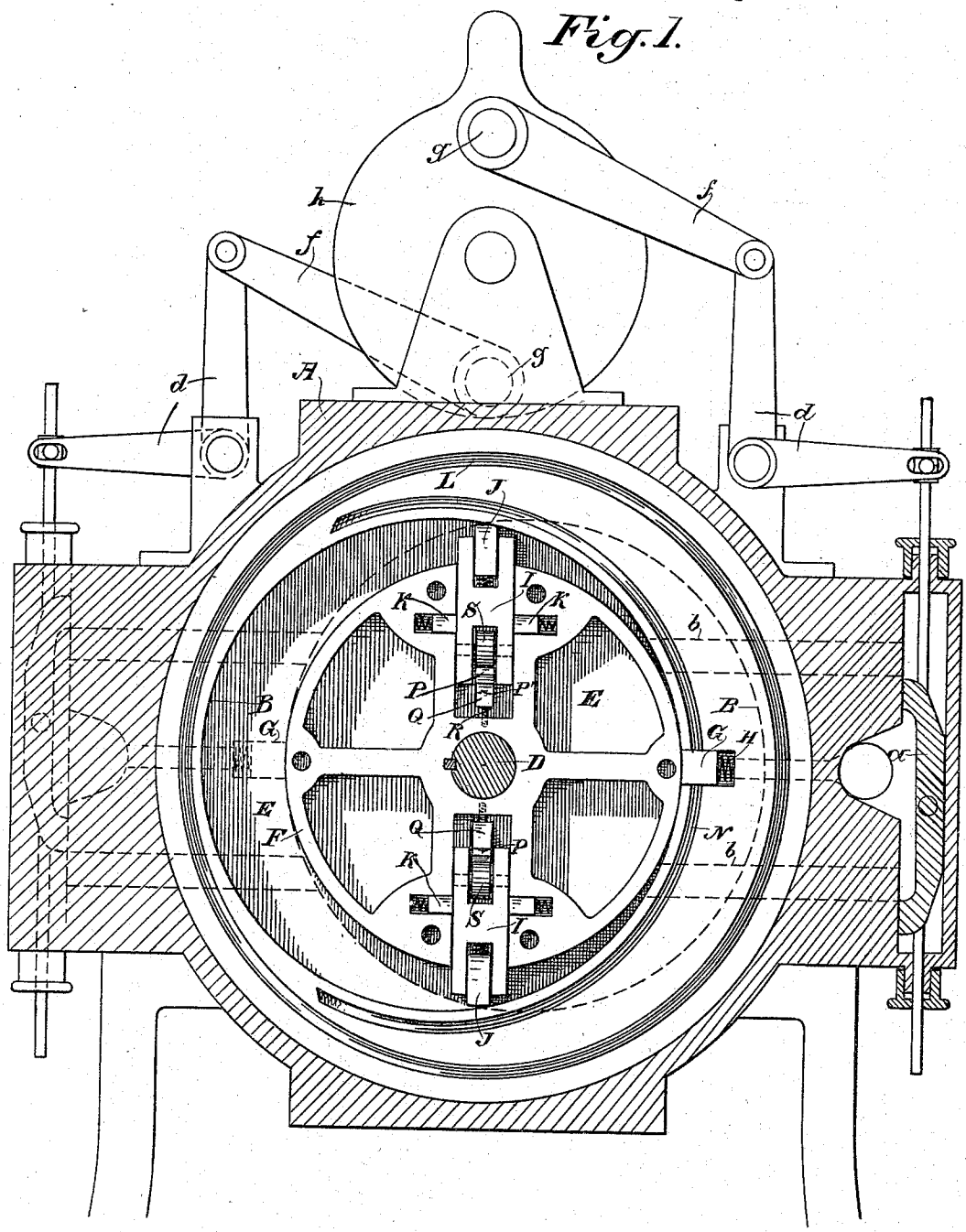
2 Sheets—Sheet 1.

A. W. R. BERR.

ROTARY ENGINE.

No. 558,144. Patented Apr. 14, 1896.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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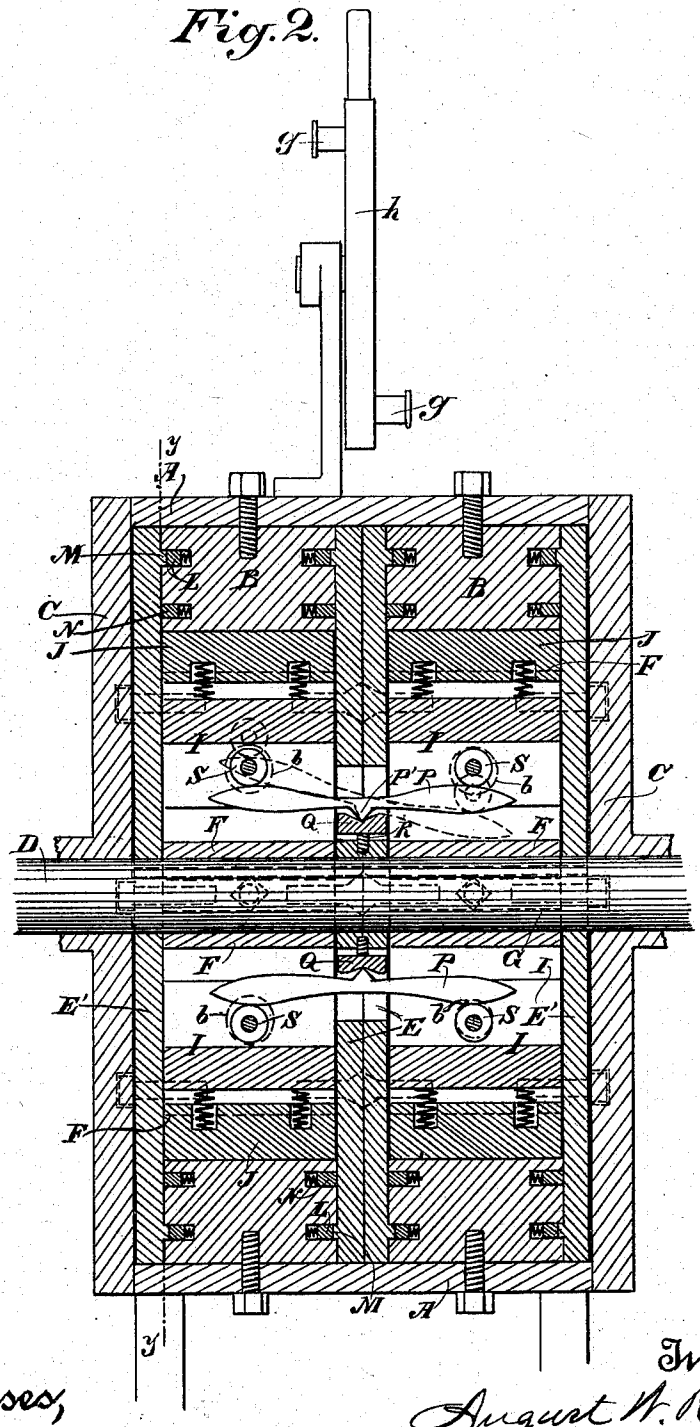
ROTARY ENGINE.

No. 558,144. Patented Apr. 14, 1896.

Fig. 2.



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UNITED STATES PATENT OFFICE.

AUGUST W. R. BERR, OF SAN JOSÉ, CALIFORNIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 558,144, dated April 14, 1896.

Application filed September 11, 1895. Serial No. 562,207. (No model.)

To all whom it may concern:

Be it known that I, AUGUST W. R. BERR, a citizen of the United States, residing in San José, county of Santa Clara, State of California, have invented an Improvement in Rotary Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in rotary engines.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of my engine on line *y y* of Fig. 2. Fig. 2 is a transverse section taken through the plane of the axis of the shaft.

By the word "engine" as used in this specification I intend a mechanical contrivance, employing the word in its broad sense, and the improvements hereinafter set forth may be availed of in the construction of not only rotary engines, in which any medium under pressure is employed to propel the pistons, but also machines to which power is applied to drive the shaft and pistons, so that they may be used as pumps and water-meters and for similar purposes.

The object of my invention is to provide a rotary engine of improved mechanical construction and consisting of independent chambers side by side, so arranged with relation to each other that the pistons in one chamber will receive steam while the others are exhausting, and the engine is thus rendered double-acting.

A is the exterior case of my engine, which is accurately bored and adapted to receive two stationary chambers B, the interiors of which are bored eccentrically to the interior periphery of the case. These chambers are secured to the outer casing with their eccentricities diametrically opposite each other, one of said eccentric-chambers occupying one end of the case and the other the opposite end. The case is provided with heads C, through which the shaft D passes, and upon the portion of the shaft intermediate between the eccentrics is a diaphragm E, preferably composed of two disks bolted together and keyed to the shaft, so as to revolve with it inside of the case A and between the eccentrics B. Exterior to the eccentrics are similar disks E′, fixed to revolve with the shaft and fitting against the outer ends of the eccentric-chambers, which are thus inclosed between the disks.

Fixed upon the shaft D, interior to each of the eccentric-chambers, is a piston-carrying drum F, the diameter of which is such that the periphery of the drum at one side rotates in contact with the interior of the eccentric-chamber, while upon the opposite side the eccentricity of the chamber forms a crescent-shaped space adapted to receive steam or other motive power when the engine is adapted to produce power or to be used as a pumping or measuring chamber when the engine is used as a pump or meter.

In order to form a tight joint between the drum F and the interior of the eccentric-chamber, I have shown a packing bar or plate G, fitting into a transverse slot or channel made in the inner periphery of the eccentric-chamber and having a spring H acting upon its back so as to force it constantly into contact with the rim of the drum. These drums are suitably constructed with one or more radial channels in which pistons I are slidable, these pistons moving out and in in their respective channels as the drum rotates, so that the outer ends of the pistons travel in contact with the interior periphery of the eccentric-chamber. In the outer ends of these pistons are spring-actuated sliding blocks J, extending transversely across the ends and forming constant contact with the interior of the chamber, so as to make steam-tight joints. In the sides of the channels in which these pistons move are other spring-actuated sliding packing-blocks K, which are held by their springs in contact with the sides of the pistons, and thus prevent leakage at this point.

In order to make tight joints between the eccentrics and the disks E and E′, I make grooves or channels around the outer periphery upon opposite sides of the eccentrics B, and within these grooves or channels are fitted spring-actuated packing-rings L, these rings being forced outwardly by their springs. Corresponding with the channels in which these rings are fitted are projecting ribs or flanges M upon the inner faces of the disks

E and E′, which disks are secured to the piston-drums to rotate therewith, so that when these disks are bolted in place these flanges extend into the channels in the outer faces of the eccentrics B and pressing against the rings form tight joints at these points.

Around the inner and thicker portion of the eccentric-rings are segmental channels N, with corresponding spring-actuated rings fitting into them and pressing outwardly against the inner faces of the disks E E′, interior to the flanges M, and these assist in making steam-tight joints between the stationary eccentric-chambers and the movable diaphragms E and E′, which are connected to rotate with the shaft and the piston-carrying drums.

As the eccentric-chambers have their eccentricities diametrically opposite to each other, it will be manifest that when the shaft is rotated and the piston upon one side is moving outwardly to follow the eccentricity of its chamber the corresponding piston upon the opposite side is moving inwardly as the piston approaches the point where the drum forms contact with the interior of the eccentric-chamber, and by a suitable connection the inward movement of one piston caused by its contact with the eccentric curve approaching the periphery of the drum may be utilized to force the corresponding piston outwardly in the other chamber. I effect this by means of a tilting bar P which extends transversely through a slotted opening in the central diaphragm E, and its ends extend into corresponding chambers in the pistons I. This may be fulcrumed in any suitable manner. I have found that a preferable way is to form a V-shaped edge, as shown at P′, which rests in a corresponding socket Q within the diaphragm E. I prefer to make this socket of hardened steel fitting within a chamber in the diaphragm E, and by means of a screw R it is readily adjustable so as to raise the socket and correspondingly move the bar P to compensate for any wear of parts, which is liable to make loose joints.

Within the pistons I are fitted antifriction-rollers S, which are adapted to travel in contact with the ends of the arms P as the latter tilt in unison with the outward and inward movements of the pistons. The surfaces of the arms P are made convex, as shown, with a radius such that as they tilt about their fulcrum the faces or points of contact with the rollers S will be essentially at right angles with the line of motion of the pistons, whatever may be their position, or, in other words, the rollers will rest in contact with the bearing-surfaces of the arms in lines radial to the center about which the curvature is described.

In order to reverse my engine, I have shown a slide-valve *a* movable in a steam-chamber, from which ports *b* lead to the interior of each cylinder for the purpose of supplying the steam thereto. The stems of the valves are connected with bell-crank levers *d*, and these in turn are connected by links *f* with eccentrically-placed pins *g*, fixed in a rotating disk *h*, so that when this disk is turned the valves will be simultaneously moved so as to close one set of inlet-ports and open the others, and correspondingly change the exhaust-ports of the two cylinders.

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

1. In a rotary engine, an exterior case, eccentric-chambers fixed therein side by side with their adjacent sides in proximity, a shaft, disks secured to said shaft and occupying approximately the vertical central line of the case and forming a diaphragm for separating one chamber from the other, other disks exterior to the chambers, drums secured to said disks and shaft, having radial sliding pistons movable inside of the eccentric-chambers and connections whereby the pistons are united to move in pairs.

2. A rotary engine consisting of an exterior case, eccentric-chambers fixed therein side by side, with their eccentricity diametrically opposite, a shaft extending through the heads of the case having a disk fixed thereto intermediate between the eccentric-chambers and other disks exterior to the chambers, and piston-carrying drums fixed to the shaft within the chambers, with radially-sliding pistons connected in pairs in the two chambers, annular grooves in the opposite faces of the eccentrics with spring-actuated rings fitted therein, and corresponding flanges formed upon the central and exterior disks fitting against said rings to form steam-tight joints.

3. In a rotary engine, an exterior case, eccentric-chambers fixed therein side by side with their adjacent sides in proximity, said chambers having their eccentricity diametrically opposite, a shaft, disks secured to said shaft and occupying approximately the vertical central line of the case and forming a diaphragm for separating one chamber from the other, other disks exterior to the chambers, spring-actuated packing-rings forming steam-tight joints between said disks and the faces of the eccentric-chambers, drums secured to said disks and shaft having radial sliding pistons movable inside of the eccentric-chambers, said pistons having spring-actuated packing-blocks upon their outer ends, connections whereby the pistons are united to move in pairs and spring-actuated transverse packing-blocks fixed in the eccentric-chambers at points where the piston-carrying drums contact therewith.

4. In a rotary engine, an exterior case, eccentric-chambers fixed therein side by side with their adjacent sides in proximity, a shaft, disks secured to said shaft and occupying approximately the vertical central line of the case and forming a diaphragm for separating one chamber from the other, other disks exterior to the chambers, spring-actuated packing-rings forming tight joints between the chambers and the disks, piston-carrying

drums fixed to the shaft within the eccentric-chambers, pistons slidable radially in channels in said drums having spring-actuated packing-blocks at the outer ends, channels formed in the drums at right angles with the radial channels in which the pistons move, spring-actuated packing-blocks fitting therein, forming contact with the sides of the pistons, and connections whereby the pistons are united to move in pairs.

5. A rotary engine consisting of an exterior case having eccentric-chambers fixed therein side by side with their eccentricities diametrically opposite, a shaft extending through the heads of the case, disks fixed to the shaft intermediate between the eccentric-chambers and exterior thereto with spring-actuated packing-rings to form joints between the disks and chambers, piston-carrying drums fixed to the shaft within the eccentric-chambers, pistons sliding in radial channels in said drums, and transverse bars fulcrumed in the intermediate disk between the chambers, the ends of said bars engaging with the oppositely-placed pistons whereby the inward movement of one piston is transmitted to produce an outward movement of the corresponding one in the other chamber.

6. In a rotary engine, fixed eccentric-chambers standing side by side having their eccentricity diametrically opposite, pistons sliding radially in drums fixed to a shaft rotating within said chambers, disks fixed to the shaft forming a diaphragm between the two chambers and closing the exterior faces thereof with suitable packing-joints, transverse bars fulcrumed in the central disk having the ends extending into the pistons upon opposite sides thereof, said ends being made convex upon the contact-surfaces, and antifriction-rollers journaled in the pistons and resting upon the ends of said bars.

7. In a rotary engine, fixed eccentric-chambers standing side by side, having their eccentricity diametrically opposite, exterior and intermediate disks closing the ends of the eccentric-chambers, fixed to the shaft and rotating therewith, with suitable packing-joints between the disks and the ends of the chambers, radially-slotted piston-carrying drums fixed to the shaft within the chambers, pistons slidable in said drums to follow the interior peripheries of the eccentric-chambers, tilting arms fulcrumed in the intermediate diaphragm extending into the pistons upon opposite sides thereof with contact-surfaces whereby the inward movement of one piston coincides with the outward movement of its fellow, and a fulcrum-block upon which the tilting arm turns, said fulcrum-block being adjustable to compensate for wear.

In witness whereof I have hereunto set my hand.

AUGUST W. R. BERR.

Witnesses:
S. H. NOURSE,
H. F. ASCHECK.