No. 719,046. PATENTED JAN. 27, 1903.

O. G. RIESKE.

ROTARY ENGINE.

APPLICATION FILED APR. 23, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

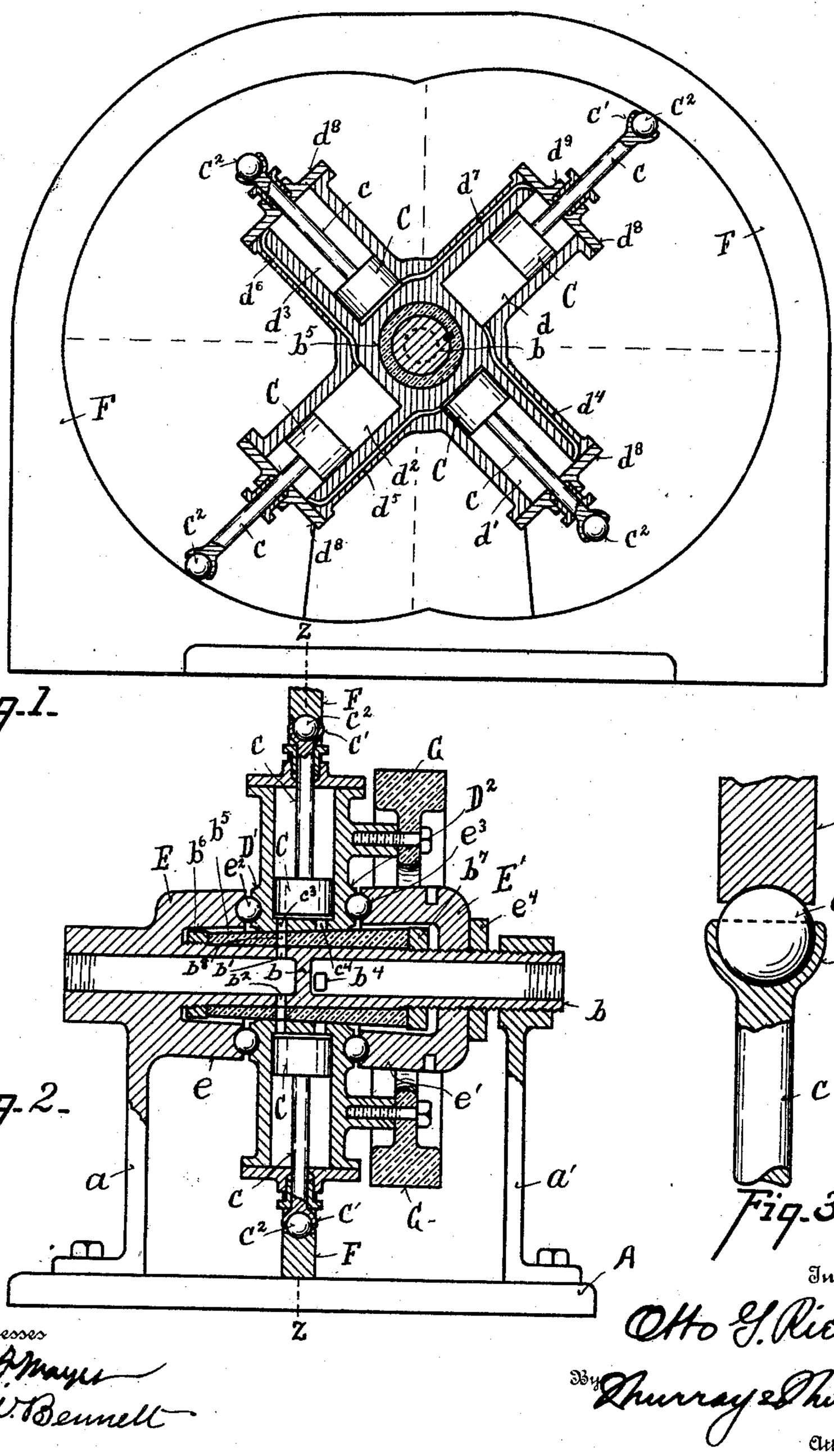

Fig. 1.

Fig. 2.

Fig. 3.

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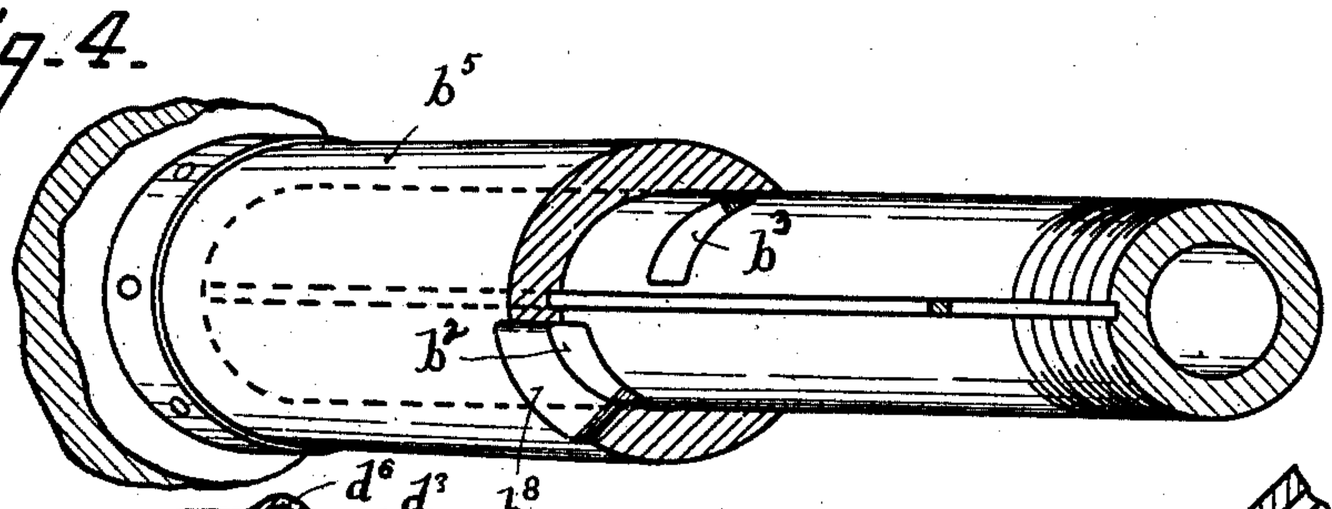
Fig. 4.



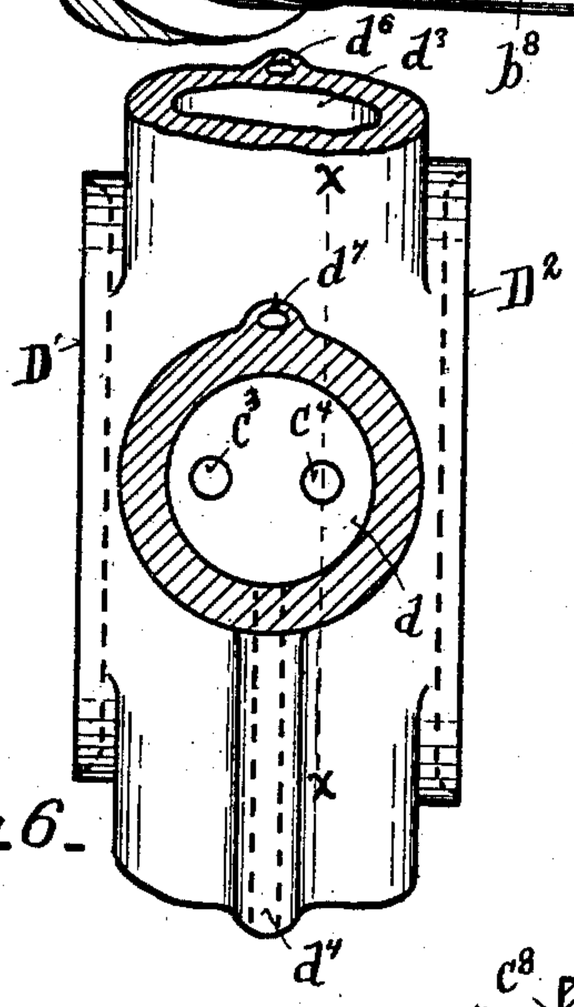


Fig. 6.

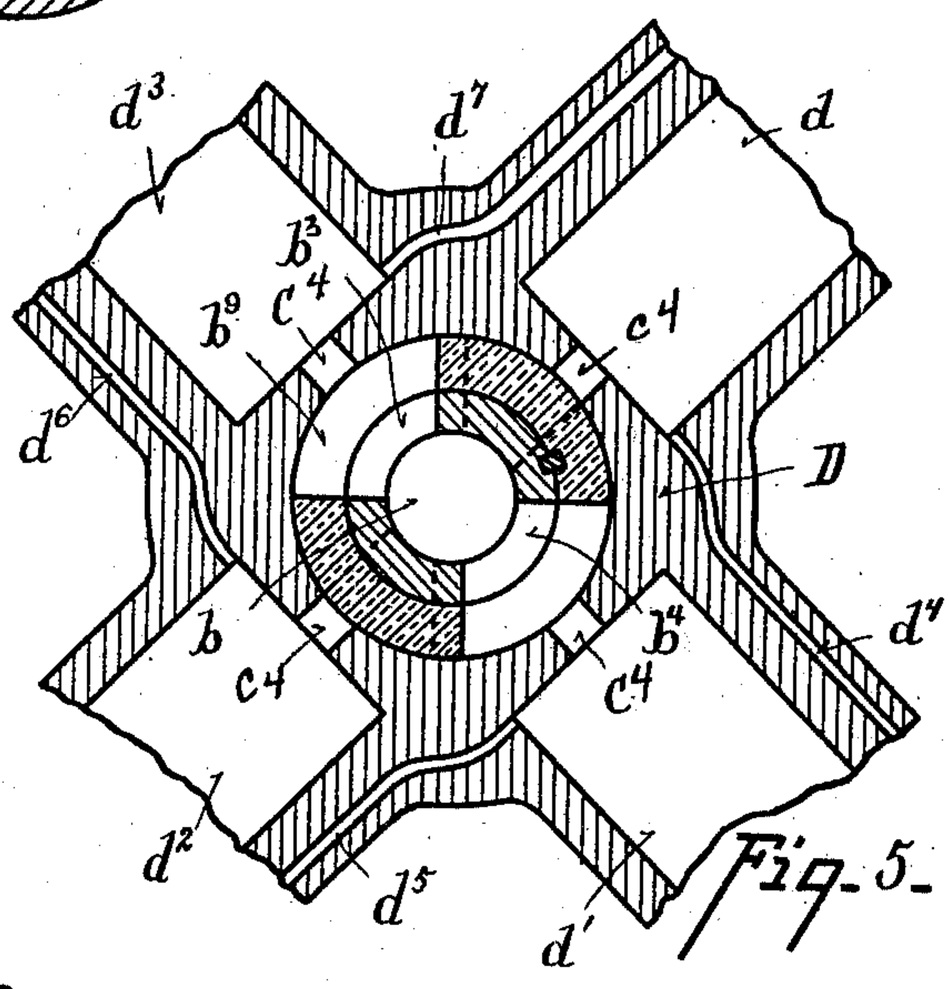


Fig. 5.

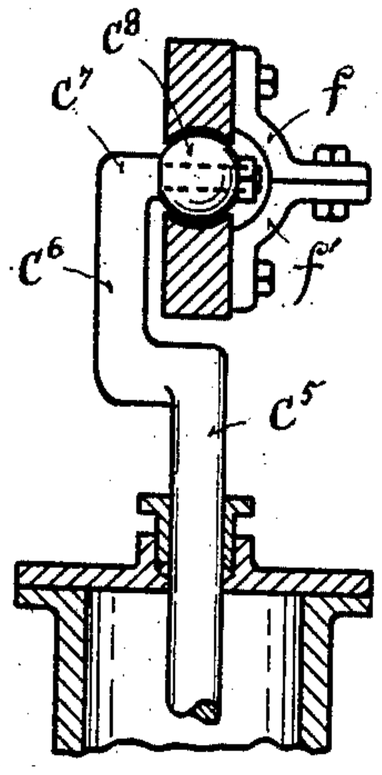


Fig. 7.

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UNITED STATES PATENT OFFICE.

OTTO G. RIESKE, OF DAYTON, KENTUCKY, ASSIGNOR OF TWO-THIRDS TO JAMES J. GROGAN AND JAMES E. O'CONNELL, OF CINCINNATI, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 719,046, dated January 27, 1903.

Application filed April 23, 1902. Serial No. 104,247. (No model.)

To all whom it may concern:

Be it known that I, OTTO G. RIESKE, a citizen of the United States of America, and a resident of Dayton, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

The object of my invention is a rotary engine which is actuated by a fluid under pressure, in which there are no dead-centers, the friction in the moving parts of which is reduced to a minimum, which by reason of the equal distribution of the actuating-power is even in its rotation, and in which compensation for wear in the parts may be made readily.

Referring to the accompanying drawings, in which like parts are indicated by similar reference-letters wherever they occur throughout the various views, Figure 1 is a longitudinal central sectional view of a rotary engine embodying my invention, taken upon line $z\ z$, Fig. 2. Fig. 2 is a central transverse sectional view of the same. Fig. 3 is a detail view of the end of one of the piston-rods which engages the track, upon an enlarged scale. Fig. 4 is a perspective view, upon an enlarged scale, of the shaft and the movable collar thereon, which is used for compensating for wear, the collar being shown partially broken away to expose the shaft. Fig. 5 is a sectional view taken through one set of ports of the hub, the radiating cylinders formed integral therewith, and the shaft, line $x\ x$, Fig. 6. Fig. 6 is a front elevation of Fig. 5. Fig. 7 is a detail sectional view of a modified form of piston-rod and track.

Referring to the parts, a shaft B is secured between standards a a', supported upon a base A. Shaft B is hollow throughout its length except for a central partition b, and upon each side of the partition are formed diametrical admission and exhaust ports b' b^2 and b^3 b^4, respectively, the ports b' b^2 being at right angles to b^3 b^4. Upon shaft B is feathered a collar b^5, which has a slight taper and which may be adjusted upon the shaft by means of jam-nuts b^6 b^7. Collar b^5 has ports b^8, which register with ports b' b^2, and ports b^9, which register with ports b^3 b^4. Mounted upon collar b^5 is a hub D, which is made with a taper corresponding to that of the collar and which is formed integral with its four radiating cylinders d d' d^2 d^3. Hub D has upon each side annular grooved flanges D' D^2. Upon the shaft B are two caps E E', which have inwardly-projecting annular flanges e e', whose inner faces have annular grooves in them to receive ball-bearings e^2 e^3, which engage the annular flanges D' D^2, cap E bearing against or formed integral with standard a and cap E' being adjusted by means of a jam-nut e^4. The bottom of cylinder d communicates with top of cylinder d' through a channel d^4. Similarly d' communicates with the top of d^2 by a channel d^5, and d^2 with d^3 by a channel d^6, and d^3 with d by a channel d^7. The tops of the cylinders are closed by means of perforated caps d^8. Within each cylinder is a cylindrical piston C, which has an outward-projecting piston-rod c, which terminates in a cup c', in which is seated a hard-steel ball-bearing c^2. Caps d^8 have packing-glands d^9 surrounding the stems c.

In the bottom of each cylinder C are two ports c^3 c^4. c^3 registers with the ports b^8 in collar b^5, and ports c^4 register with ports b^9 in the collar. Encircling the cylinders is a track F, against which the balls c^2 bear. Track F is in the form of two intersecting ellipses whose major axes coincide and whose minor axes are placed at a distance apart, the distance depending upon the length of cylinders. At the ends of the major axes the ellipses are cut out for a short distance beyond the end of the axes in the direction in which the cylinders are rotated, and at the points where the ellipses meet the track is carried inward for a short distance, all as indicated by the dotted lines in Fig. 1, which show the major axes and the line at right angles thereto, which connects the meeting-points of the ellipses. The object of thus carrying the track beyond these points is to avoid dead-centers, and the mode in which it does so will be described in detail when pointing out the operation of the engine.

In operation steam or whatever actuating fluid may be used enters the cylinders which

are opposite admission-ports b' b^2 through ports c^3. Ports c^3 register with ports b' b^2 when the cylinders are in the position in which the piston-rods are bearing against the meeting-points of the ellipses, at which time ports c^4 register with exhaust-ports b^3 b^4. The live steam pushes the pistons outward, causing the rods to bear against the track and rotate the cylinders. The steam passes from the inner ends of the cylinders at the same time to the outer end of the adjacent cylinders to draw the pistons therein, which are at the outer end of their strokes inward, the latter pistons at the same time exhausting at their inner ends through ports b^3 b^4. It is of course obvious that channels d^4 d^5 d^6 d^7 may be omitted and that the shape of the track would of itself carry the pistons in to their inward position. The balls c^2, bearing against the track and rotating in their cups, reduce the friction at that point to a minimum, while the ball-bearings e^2 and e^3 reduce the friction at the hub likewise to a minimum. The effect of carrying the curve of the track beyond the major axes and the meeting-point of the ellipses, as aforedescribed, is as follows: When one set of cylinders coincides with the line joining the meeting-point of the ellipses, they are just beginning to take steam. Now if the other set coinciding with the major axes had reached the outer limit of their travel there would be no actuating-power to rotate cylinders except the momentum they had gained. By carrying the curve beyond these points these latter cylinders have still some space left at their ends to allow for further expansion of the steam within them, which carries the cylinders beyond the dead-center, so that the steam has started to actuate the other set of cylinders.

Now as to the feature of compensating for wear, when collar b^5 has been worn by the rotation of the hub thereon it may be readily moved along by adjustment of the jam-nuts b^6 b^7 to bring a new part into operation.

In Fig. 7 the track is formed by a slot F', similar in form to track F, the inner portion being held to the outer by angle-plates f. With this form of track piston-rod c^5 is formed with an angle-arm c^6 at its end, which has an inwardly-projecting arm c^7, upon which is journaled ball c^8, which runs in the slot.

The arrangement of the cylinders in the position such that when one is being actuated by the expanding-steam the other is exhausting causes the machine to run smoothly; but to enhance this effect a fly-wheel G is secured concentrically to hub D.

What I claim is—

1. In a rotary engine the combination of a fixed shaft having therein a channel for live steam and a channel for exhaust-steam, ports in the shaft communicating with the live-steam channel and ports communicating with the exhaust-steam channel the former ports being in different diametrical planes from the latter, a hub having radiating cylinders secured thereto mounted rotatably upon the shaft, the cylinders having at their inner ends a port to register with the live-steam port and a port to register with the exhaust-steam port, an elliptical track encircling cylinders, pistons within the cylinders having outwardly-projecting piston-rods to contact the track, substantially as shown and described.

2. In a rotary engine the combination of a fixed shaft having in it a channel for live steam and a channel for exhaust-steam, ports in the shaft communicating with the live-steam channel and ports communicating with the exhaust-steam channel the former being in different diametrical planes from the latter, a tapering collar feathered upon the shaft and adjustable thereon and having ports therein to register with ports in the shaft, a hub mounted rotatably upon the collar, radiating cylinders secured to the hub and having at their inner ends ports to register with the live-steam ports and ports to register with the exhaust-steam ports, an elliptical track encircling the cylinders, pistons within the cylinders having outwardly-projecting piston-rods to contact the track, substantially as shown and described.

3. In a rotary engine having a rotating hub and cylinders radiating therefrom pistons within the cylinders actuating by an expansive fluid from their inner ends, piston-rods extending outwardly from the pistons and a track encircling the cylinders having the shape of two intersecting ellipses whose major axes coincide, the curve being cut inwardly beyond the point at which the major axes meet the curves, substantially as shown and described.

4. In a rotary engine the combination of a fixed shaft having therein a channel for live steam and a channel for exhaust-steam, ports in the shaft communicating with the live-steam channel and ports communicating with the exhaust-steam channel the former ports being in different diametrical planes from the latter, a hub having radiating cylinders secured thereto, the cylinders having a port in their inner ends to register with the live-steam port and another port to register with the exhaust, caps closing the outer ends of the cylinders channels connecting the inner end of one cylinder with the outer end of the next cylinder, an elliptical track encircling the cylinders, pistons within the cylinders having piston-rods extending outwardly through the caps and contacting the track, substantially as shown and described.

5. In a rotary engine the combination of a fixed shaft having a channel for live steam and another for exhaust-steam, diametrical ports communicating with the live-steam channel and similar ports communicating with the exhaust-steam channel and in a diametrical plane at right angles to that of the former ports, a hub mounted rotatably upon

the shaft four radiating cylinders formed integral with the hub two ports at the inner ends of the cylinders, the one registering with the live-steam port and the other registering with the exhaust-steam port, an elliptical track encircling the cylinders, pistons within the cylinders having outwardly-projecting piston-rods to contact the track, substantially as shown and described.

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