(No Model.) 2 Sheets—Sheet 1.

J. B. EWER.

CONCENTRIC ROTARY ENGINE.

No. 311,240. Patented Jan. 27, 1885.

Fig. 1.

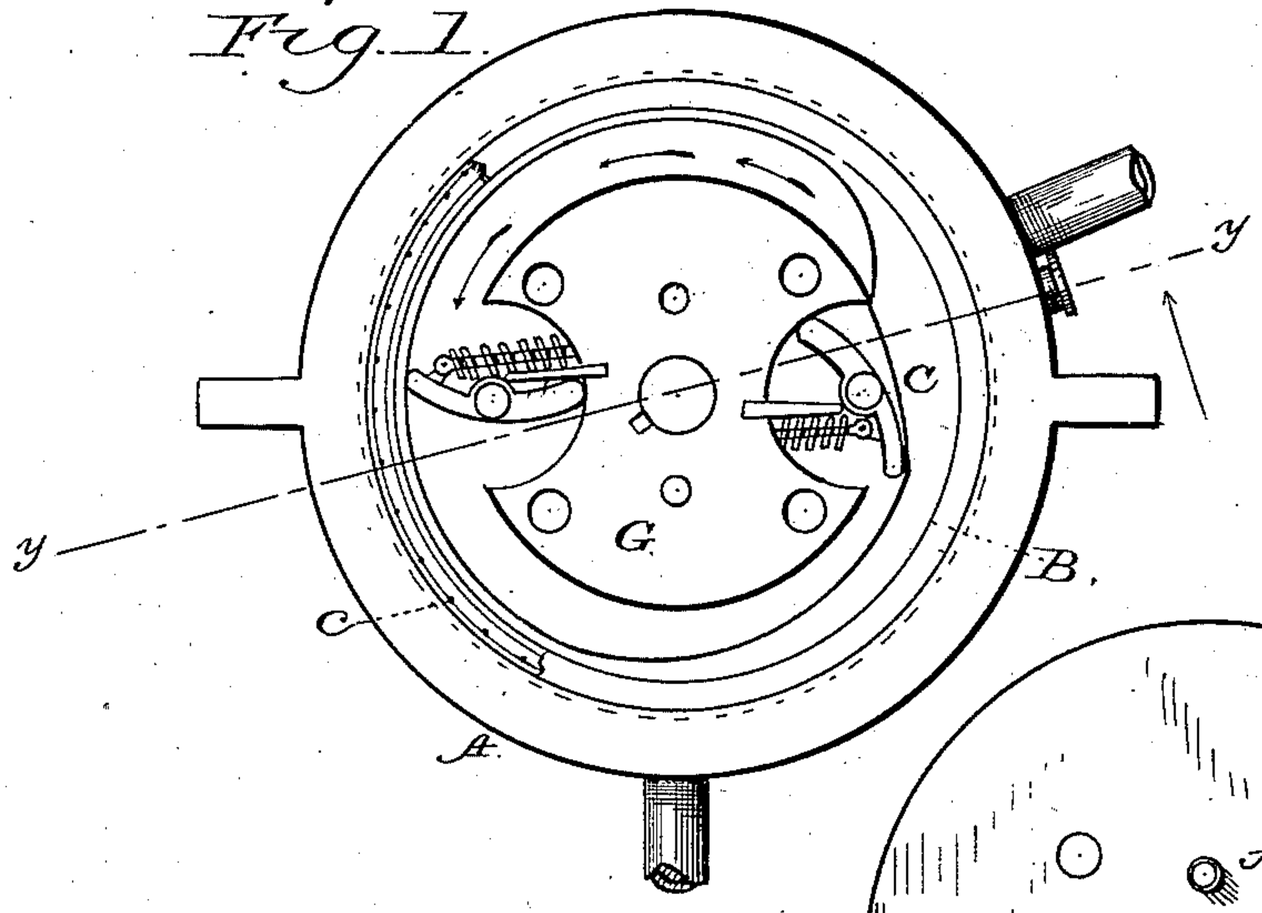


Fig. 2.

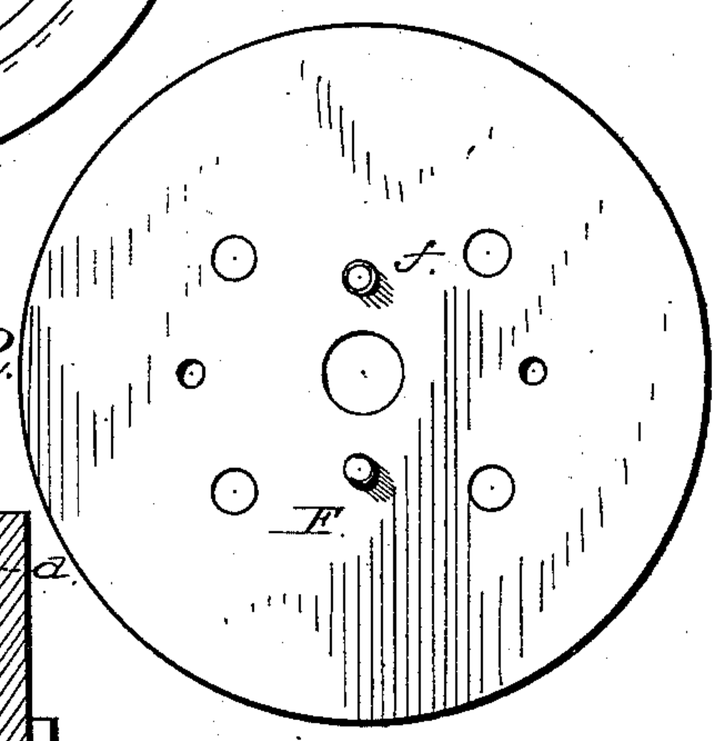


Fig. 3.

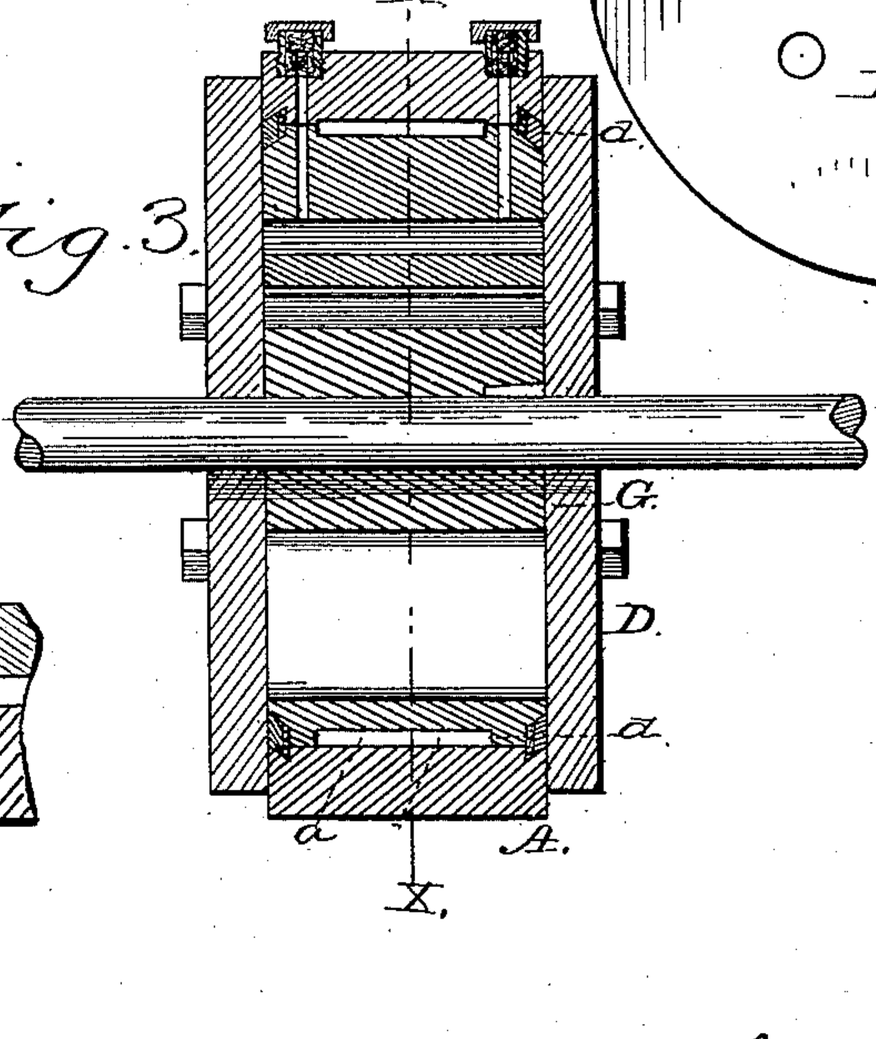


Fig. 8.

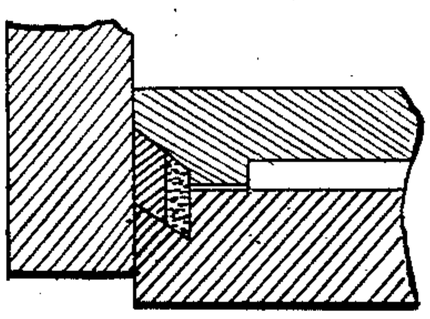
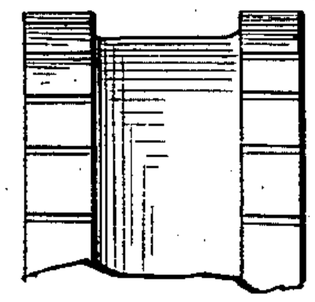


Fig. 9.



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(No Model.) 2 Sheets—Sheet 2.

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CONCENTRIC ROTARY ENGINE.

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Fig. 4.

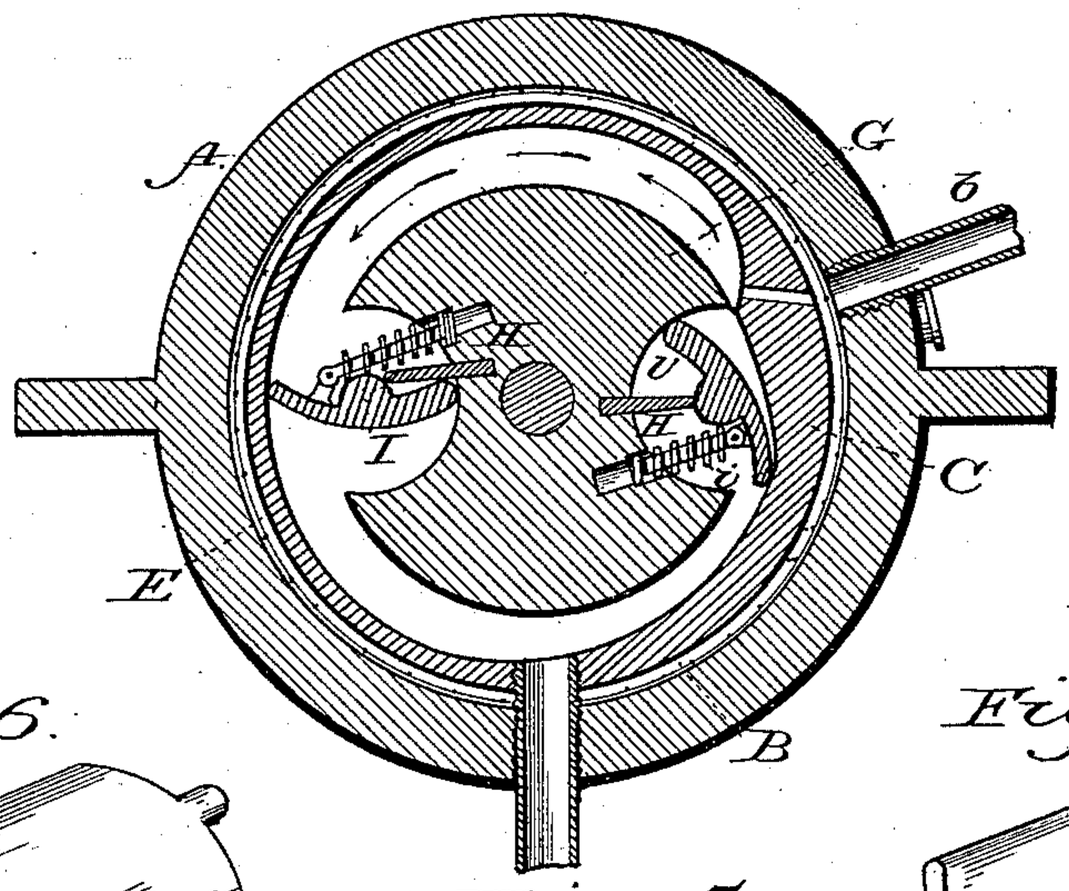


Fig. 6.

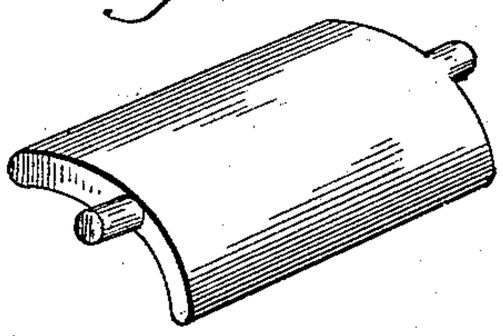


Fig. 5.

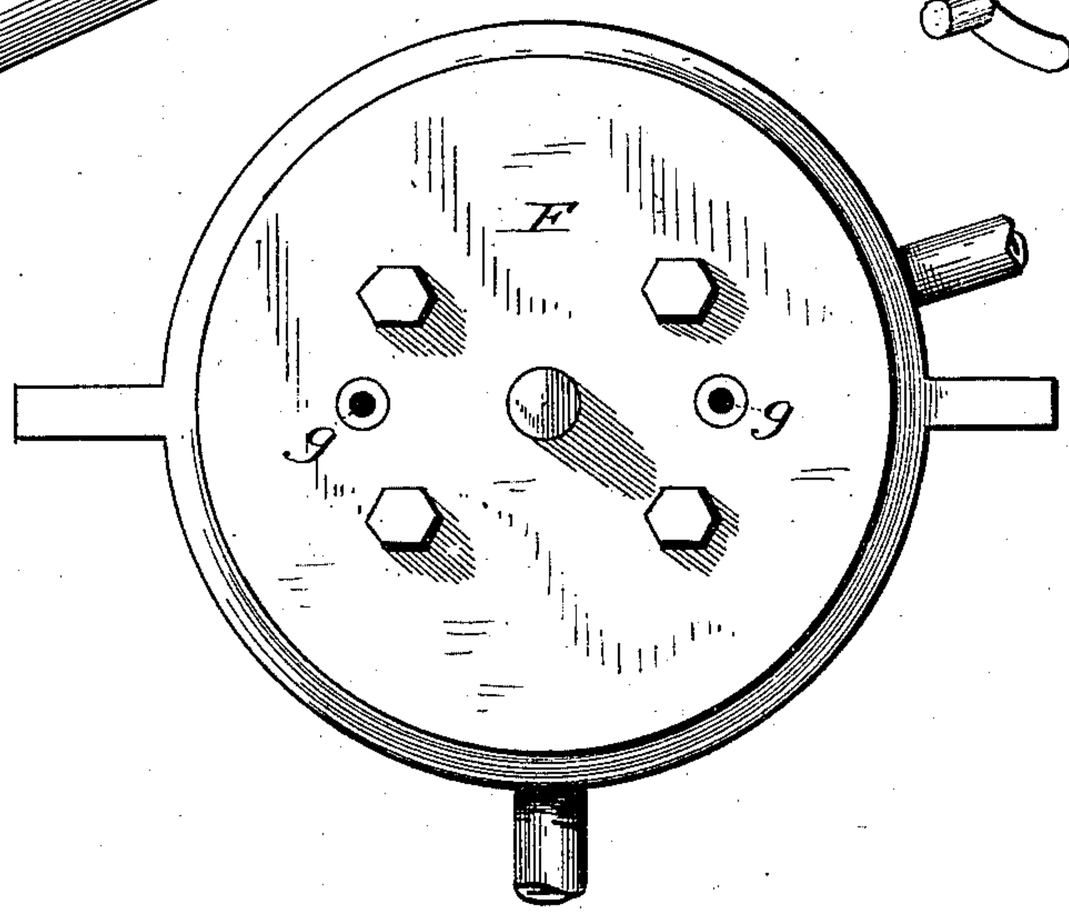
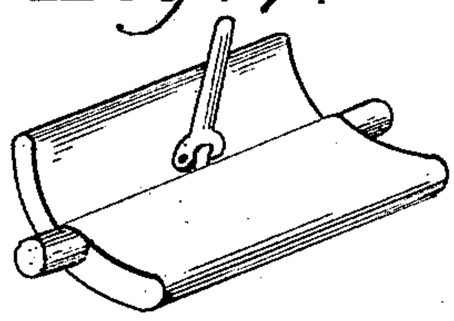


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES B. EWER, OF WELLSVILLE, KANSAS.

CONCENTRIC ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 311,240, dated January 27, 1885.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. EWER, of Wellsville, in the county of Franklin and State of Kansas, have invented certain new and useful Improvements in Concentric Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention relates to the class of engines known as "rotary," and is designed to be single-acting. The greater objection heretofore alleged to exist against the class of rotary engines is that it has been found to be very difficult to pack them and keep them steam-tight without increasing the friction, and thus weaken or lessen the power of the engine. There have been several attempts to overcome these difficulties with more or less success, but with my construction I entirely avoid it.

My improved engine belongs to the subclass known as "concentric engines," in which the pistons are secured to a central hub rigidly secured to the shaft.

The object of my invention is cheapness in first cost, simplicity in construction, combined with durability and economy.

The invention consists in certain novel details of construction, as will be hereinafter more fully described, and pointed out in the claims.

Referring to the drawings hereto annexed, Figure 1 represents a face view of the interior of the engines, with one of its cylinder-heads removed, and also a portion of its packing, clearly showing the small steam-apertures for setting out the said packing; Fig. 2, an inside view of one of the cylinder-heads; Fig. 3, a cross-section of the engine, taken on the line *y y* of Fig. 1. The peculiar conformation of the packing and the mode of setting it out are clearly shown in this figure, as well as the lubricating cups or cells. Fig. 4 shows a vertical cross-section taken on the line *p p*, Fig. 3, clearly showing the annular steam-space between the outer cylinder and inner lining thereof, also, the construction of the piston and the means for carrying the same. Fig. 5 is an end elevation of the engine, showing another means of lubricating from the sides. Fig. 6 is a detail view of one of the pistons, showing one of its sides thicker and therefore heavier than the other, the object of which will be hereinafter more fully set forth. Fig. 7 is a detail view of the other side or front of the piston, with its pivoted spring-guide. Fig. 8 is an enlarged sectional view of the packing. Fig. 9 is a sectional view of a portion of the inner cylinder, looking from the top, when it is removed from the outer cylinder.

A is the cylinder, cast concentrically, and then properly bored out for the reception of the inner lining, which fits tightly therein. B is the inner cylinder or lining, cast with the abutment C thereon, and may also be cast with the external groove, *a*, which surrounds it, although it costs but little to turn the groove in it. The groove *a* encircles the inner cylinder and communicates with the live-steam port *b*, or with the steam in the cylinder. The object of this annular groove *a* is to supply steam to the numerous perforations, *c*, behind the packing for evenly setting it out against the cylinder-heads D. These perforations *c* may not be so numerous as shown, but it is preferred, for the reason that the packing requires an even contact with the cylinder-head, they together forming a ground or steam-tight joint, and, further, the packing *d* is of a compressible nature, and if not evenly set up either by a series of springs at short intervals or steam at short intervals, it would have an irregular bearing and therefore leak. The packing *d* is preferably made of hemp on the inner side and a malleable metal ring on the outside or bearing. This metal may be soft cast-iron. Babbitt metal, brass, or other suitable composition of metals will answer the purpose. This inner lining, B, is constructed and fitted as follows: After it is cast with the groove *a* and the packing-groove E, it is put in a lathe and turned truly on its outside, also, if preferred, truing up the annular groove. The packing-grooves are then turned into the shape shown, beveling the edges downward and outward. The object of

thus beveling the groove in this manner is that when the steam forces the packing outward it becomes more compressed, for the reason that the outer circumference of the groove is much less than the inner; hence the same quantity of packing that would be comparatively loose in the inside of the groove would be tight on the outer edge, and thus it becomes tighter in the groove without pressing or bearing harder on the bearing-joint between the packing and the cylinder-head, and thus a great amount of friction is avoided.

Before inserting the inner lining or cylinder, B, into the outer cylinder, A, I cut across its periphery, on each side of the steam-groove, several serrations, as shown at Fig. 9. These serrations make the perforations *c* (shown on Fig. 1) for setting out the steam-packing, and are preferably cut before the exterior of the inner cylinder is turned, so that the tool will not shiver while at work, and thus a smoother and a more regular surface is produced.

The cylinder-heads F are plain flat disks, particularly on their inner or bearing surfaces. They are turned very truly, so as to make a ground or steam-tight joint, particularly that portion bearing against the edge of the outside cylinder, but more particularly that upon which the packing bears against.

The cylinder-heads F are provided with pins *f*, which guide the heads to their position. The heads are secured rigidly to the hub by suitable bolts tapped into the hub from either side. The cylinder-heads have also journal-bearings for the gudgeons of the pistons to work in, and just outside of these bearings I form oil cups or cells *g*, for oiling the bearings, and on those I place screw-caps, to prevent the leakage of steam. I also provide like oil-cups, *h h*, on the periphery of the outer cylinder, for oiling the body of the pistons.

The hub G is of ordinary construction, except as to the partition and stop H, which extends radially from the hub. For the piston I a longitudinal dovetail slot is cut in the cavity J of the hub, and the partition H, being tapering or wedge shape, is driven into the dovetail slot, where it is held tightly in position.

The object of partition or division plates H is twofold: First, to prevent the steam from striking both sides or wings of the piston, which, if this was the case, would balance it, and the steam striking the central portion would partially lose its force on account of the leverage of the central wing as compared with the outside wing of the piston. The other function of the division-plates H is that the piston is steadied and supported by it, as well as forming a solid stop or abutment for the piston when under steam-pressure. These partitions H are made with one of their wings—the central one—heavier and wider than the other. The object of this is that, should the spring *i* be dispensed with, the preponderating weight of the heavy wing and pressure of steam will cause the piston to turn promptly in the proper direction, it overbalancing the light and narrow side; but to make sure of the piston being in its proper position and to be kept in contact with the lining of the cylinder and the abutment, I prefer to use the spring *i*. This spring works upon and is kept by a jointed spindle which has sufficient play to permit the piston to have a free oscillation.

The various steam-valves, lever-rods, and other steam-engine appliances are not shown, they forming no part of my invention; but any such appliances may be used.

It is evident that my engine may be used as a water-motor with good results.

The operation of my engine is as follows: Steam being admitted at inlet-pipe *b*, a portion of it passes into the annular groove *a*, formed between the inner and outer cylinders. This steam serves to set out the packing, the pressure of which will be equal to the pressure of steam in the cylinder, so that if the pressure is very high the packing is set out accordingly, and if the pressure is low no additional strain or extra pressure is exerted. The larger bulk of the steam of course passes to the cylinder of the engine, the operation of which will be understood from what has been hereinbefore described.

Having thus described my invention, what I claim is—

1. In a rotary engine, an inner revolving hub provided with division-plates H, extending radially from the hub, in combination with oscillating pistons I, substantially as described.

2. In a rotary engine, an inner revolving hub provided with division-plates H, in combination with the oscillating pistons I, having pivoted guide-rods, with or without the springs *i*, substantially as described.

3. In a rotary engine, an inner revolving hub provided with the division-plates H, in combination with the double-winged oscillating pistons I, one of said wings being of greater weight than the other, for the purpose herein set forth.

4. A rotary engine having an inner and outer cylinder, the outer periphery of the inner cylinder or lining being provided with an annular steam-passage and cross-serrations, which form communicating steam-passages with the packing-recess, substantially as described.

5. The combination, in a rotary engine having an inner and outer cylinder rigidly secured to each other, of the downwardly and outwardly beveled packing-recess, provided with suitable packing having corresponding contour to fit said recess, substantially as set forth.

6. In a rotary engine, the combination of the central hub having oscillating pistons, and the cylinder-heads secured to said hub, with the side and top oil or lubricating cups, substantially as set forth.

7. The combination, in a rotary engine, of a concentrically-revolving hub, said hub being

provided with partitions or division plates, with the pivoted pistons having two wings, one of which is of greater area than the other, whereby when steam-pressure is acting on both the wider one will overbalance the narrower and turn the pistons in the proper direction, as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JAMES B. EWER.

Witnesses:
O. E. DUFFY,
F. O. MCCLEARY.