(No Model.) 3 Sheets—Sheet 1.

W. M. WHEILDON.

ROTARY ENGINE.

No. 553,086. Patented Jan. 14, 1896.

Fig. 2.

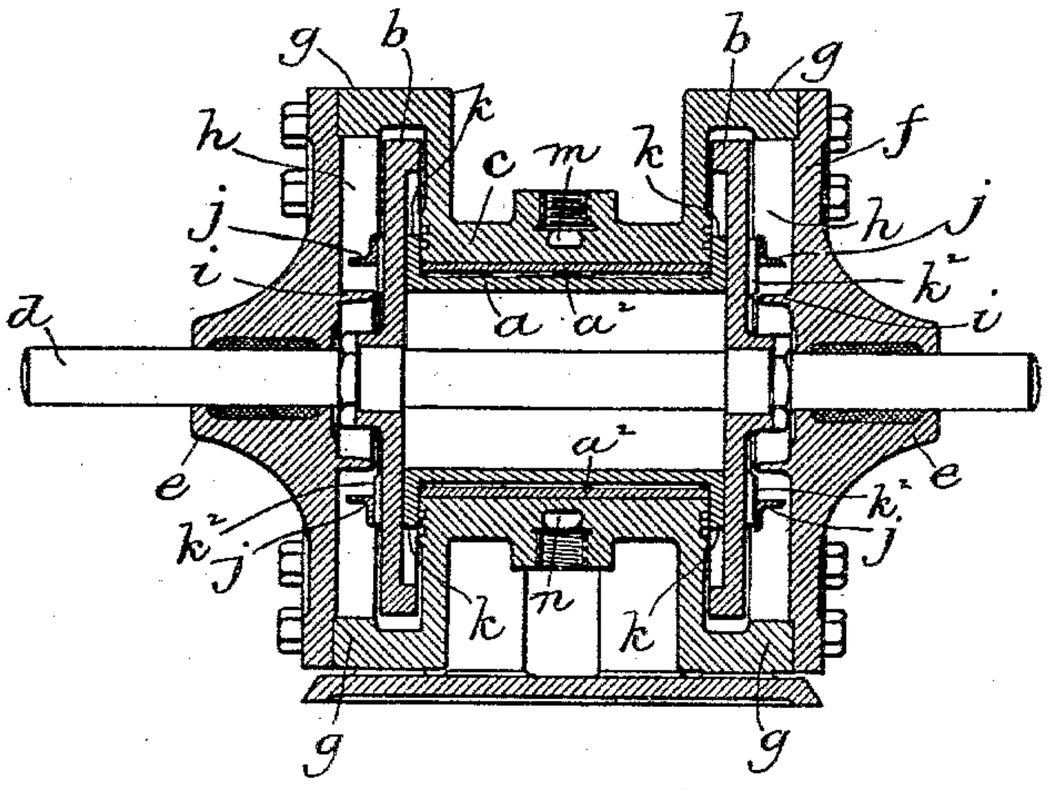

Fig. 1.

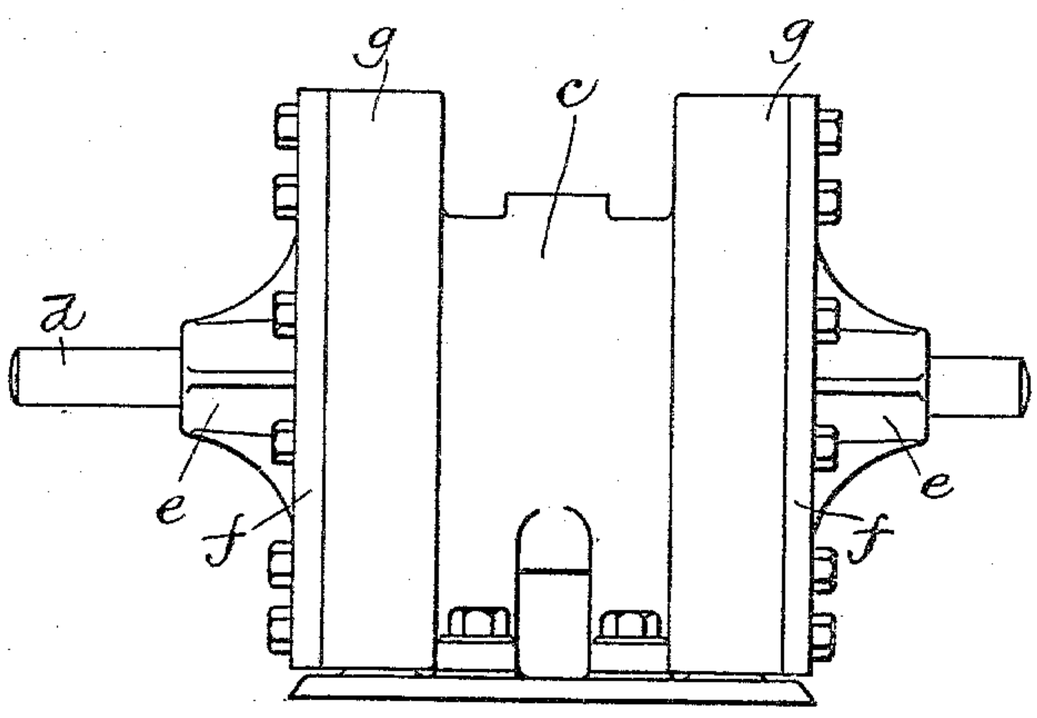

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Fig. 5.

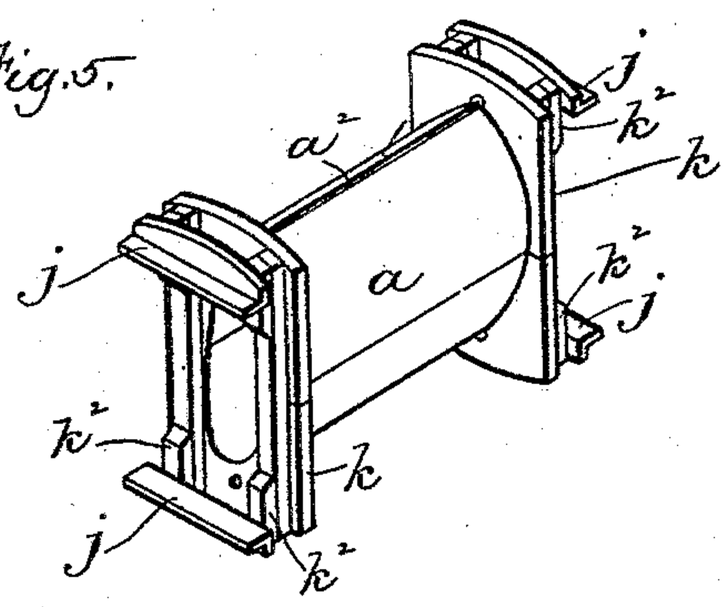

Fig. 6.

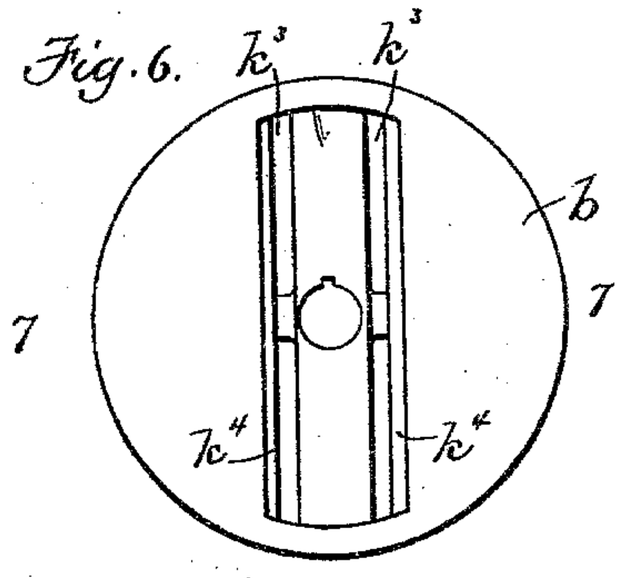

Fig. 7.

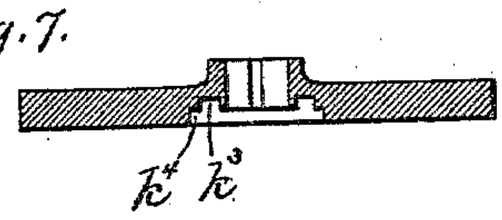

Fig. 3.

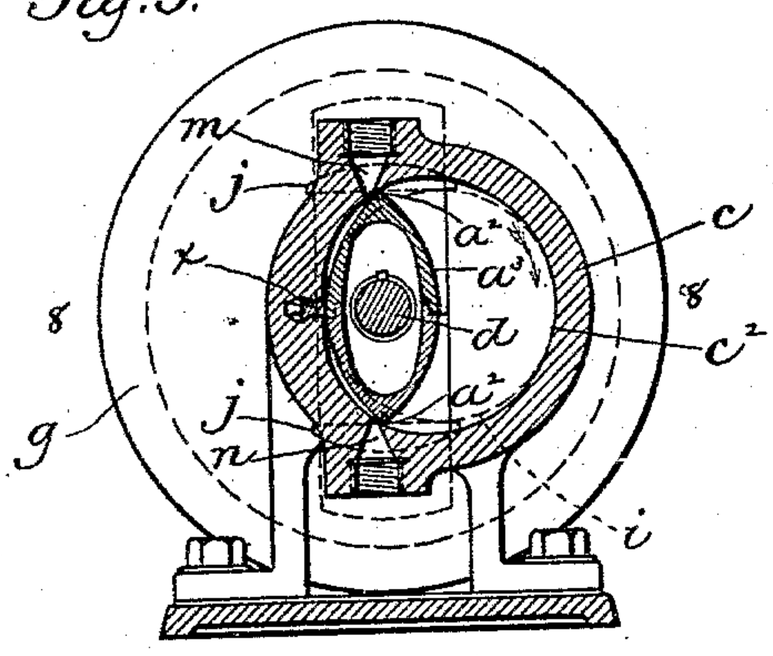

Fig. 4.

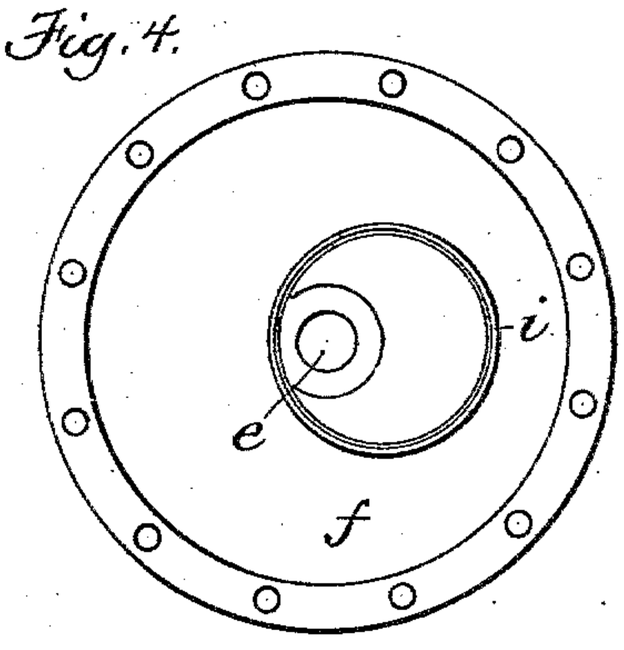

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Fig. 8.

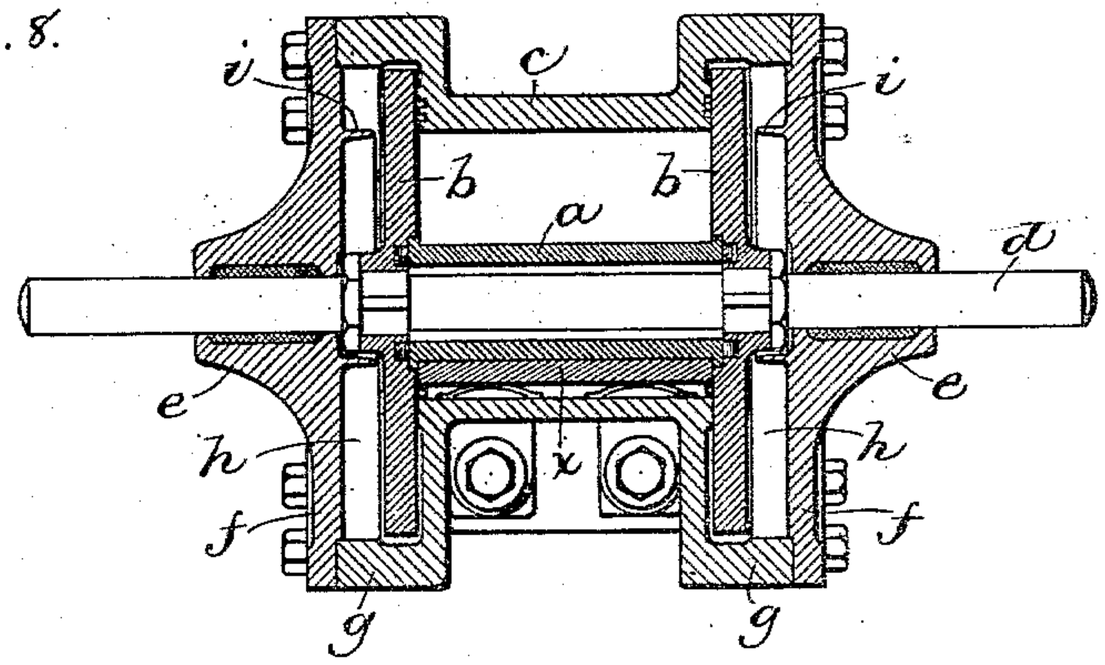
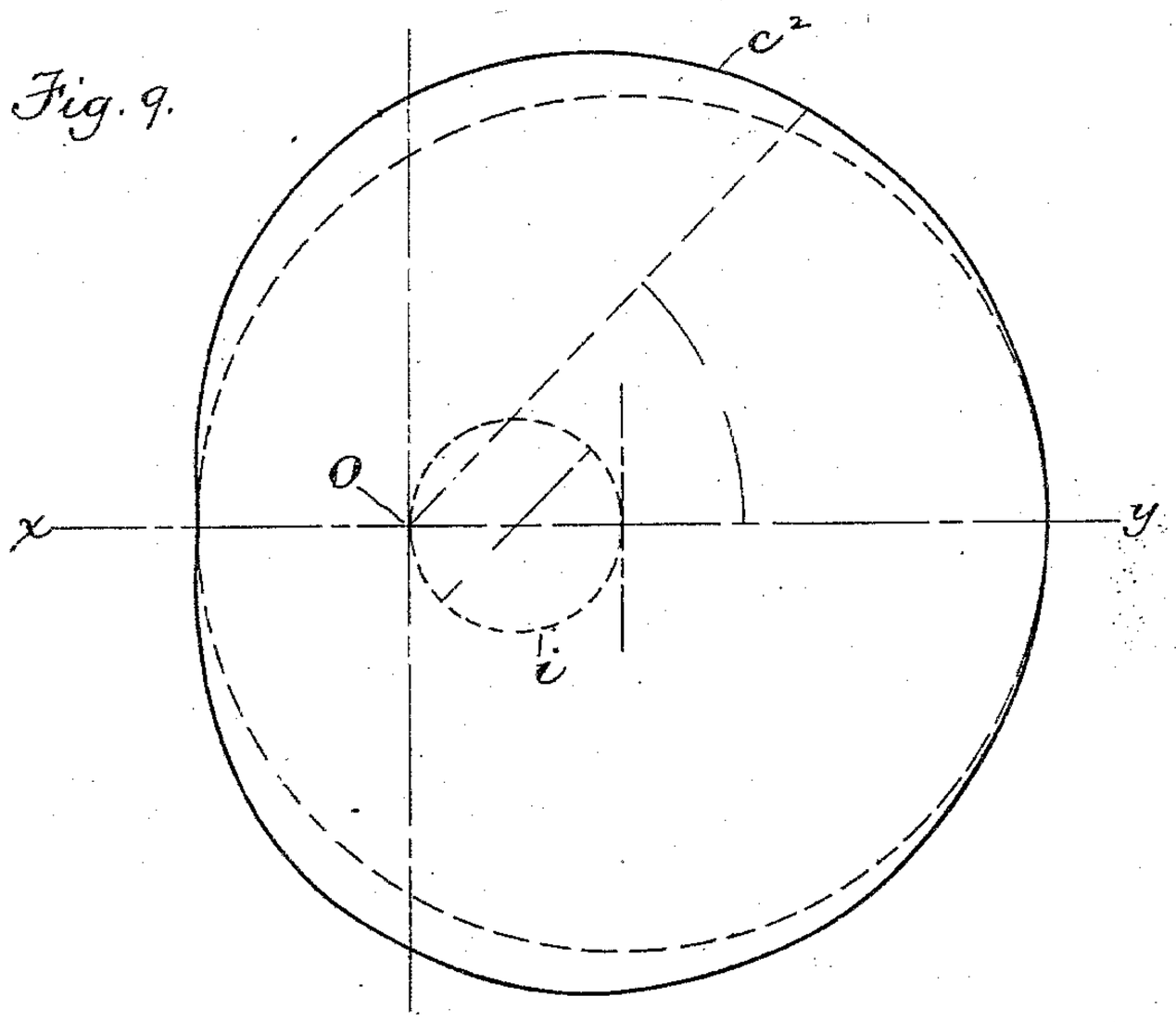


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM MAXWELL WHEILDON, OF BOSTON, MASSACHUSETTS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 553,086, dated January 14, 1896.

Application filed April 12, 1895. Serial No. 545,452. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MAXWELL WHEILDON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to improvements in rotary engines; and it consists in certain improvements hereinafter described, including an improved piston and cylinder, improved means for guiding the piston and driving the shaft, and improved means for lubricating the running parts, the result of these improvements being a reduction of the area of the heat-radiating and frictional surfaces.

Heretofore rotary engines have included a piston hub or drum rotating in a cylinder, the said piston-hub being provided with fixed or movable pistons co-operating with conversely corresponding movable or fixed abutments forming a part of the said cylinder. In either construction the friction of the moving parts was excessive, and the resulting wear very great. Moreover, the space required for the said piston hub or drum at once contracted the steam-space and increased the frictional and heat-radiating surfaces. The object of my invention is to overcome these difficulties, and to provide an engine which is simple, compact and efficient.

Of the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of my improved rotary engine. Fig. 2 is a longitudinal section of the same. Fig. 3 is a transverse section of the same. Fig. 4 is an elevation of the inner side of a cylinder-head. Fig. 5 is a perspective view of the piston and guides. Fig. 6 is an elevation of the inner side of a driving-disk. Fig. 7 is a section on line 7 7 of Fig. 6. Fig. 8 is a section on line 8 8 of Fig. 3. Fig. 9 is a diagram showing the bore of the cylinder.

The same letters of reference indicate the same parts in all the figures.

In my rotary engine no piston hub or drum is used. In place thereof the piston *a* slides in driving-disks *b*, one at each end of the cylinder *c*, said disks being eccentric to the cylinder and revolving in steam-tight contact with the faces or ends thereof, thus serving as heads therefor. The said disks are keyed to a driving-shaft *d*, which is also eccentric to the said cylinder and rotates in suitable bearings *e* supported centrally in external cylinder-heads *f* bolted to eccentric-flanges *g* on the said cylinder. Included between the said external heads and the said eccentric-flanges are annular spaces *h* in which the said driving-disks revolve, and which also serve as reservoirs for lubricating-oil, which is by the action of the revolving disks freely distributed to all frictional surfaces of the engine. Attached to the inner face of the said external heads are circular projecting cams *i* eccentric with the driving-shaft and concentric with the cylinder, and arranged to be engaged with shoes *j* which are attached to the flanged ends *k* of the said piston by connecting-necks k^2, Fig. 5, extending through slots k^3, Figs. 6 and 7, in the said driving-disks. The said flanged ends of the piston are fitted to and slide in recessed guides k^4 in the said driving-disks. The body of the said piston, through which the driving-shaft extends, is hollow, and is of substantially elliptical form in cross-section, as shown in Fig. 3. Packing-strips a^2 a^2 are located on the exterior of the piston, said strips coinciding with the major axis of the ellipse and being preferably pressed outwardly by springs into steam-tight contact with the cylinder. The internal surface or bore of the cylinder has a peculiar form, and is the path of revolution of the portions a^2 a^2 of the piston. This path of revolution is determined by a process equivalent to revolving the driving-shaft *d* and disks *b*, thus causing the fixed cams *i*, by their engagement with the shoes *j* of the piston *a*, to slide said piston to and fro in the said disks and over the said shaft. The portions a^2 of the said piston will be thus caused to describe a path of revolution determined by the relation of the said edges with the said cams. In the present case said path of revolution is that indicated by the solid line c^2 in Fig. 9, said line representing the bore of the cylinder, which is of the same form at each side of a plane *x y* passing coincidently through the center of the said driving-shaft and the said cams, the diameter of the bore at the said plane being equal to the major axis of the elliptical piston.

The broken circle in Fig. 9 represents the

outline of the fixed cams *i*, and O represents the center of the driving-shaft.

The part *x* constitutes the abutment, and is composed of a spring-actuated packing-strip. The contour of the piston is a surface of revolution a^3 generated by the relation of the fixed point *x* with the moving piston, and is such that the said surface is at all times in steam-tight contact with the said packing-strip. The steam ports *m* and *n* are close to the piston-edges a^2 a^2, and are between the said edges and the abutment *x* when the piston is in the position shown in Fig. 3. Either of the said ports may be used as an inlet, the remaining port serving as an exhaust. Hence the engine may be run in either direction and readily reversed.

The operation is as follows: Suppose that the piston is in the position shown in Fig. 3 and that steam is admitted at the port *m* to the space at the left of the piston. As the steam cannot pass the abutment *x*, the pressure acting on one side of the piston tends to turn the piston *a* in the direction of the arrow about the shaft *d*, said pressure being transmitted through the flanges *k* to the driving-disks *b* and shaft *d*, the latter being thus rotated in its bearings. The cams *i*, by engagement with the shoes *j*, constrain the piston to slide in the guides k^4 in the said driving-disks and follow the bore of the said cylinder. When the piston has made half a revolution the other side of the said piston is in turn subjected to the pressure of the steam and advanced thereby, the exhaust escaping by the port *n*. Thus the operation becomes continuous and the rotation of the driving-shaft established and maintained.

I claim—

1. In a rotary engine, the combination with the cylinder and the piston both formed as shown, of the driving and guiding piston disks and the cams external to the said cylinder, arranged to constrain said piston as the latter is revolved in the cylinder.

2. A rotary engine comprising a rotary piston formed as shown and having fixed bearing edges, a^2, a^2, coinciding with the major axis of its cross-section, driving and guiding disks engaging the said piston, fixed cams at the ends of the said piston whereby the piston is constrained, so that the said bearing edges have the described path of revolution, and a cylinder having a bore formed as described to coincide with the said path, said cylinder having also the inlet and outlet ports, and the intermediate fixed abutment relatively arranged as described.

3. A rotary engine comprising the cylinder having a bore or inner surface formed as described, the piston having a substantially elliptical cross-section and bearing edges coinciding with its major axis, the driving-shaft on which the piston is loosely mounted, the driving-disks affixed to said shafts, connections between said disks and the piston whereby the piston is caused to rotate with the disks and is permitted to slide independently, and fixed cams engaged with the piston and controlling its sliding movements.

4. In a rotary engine, the combination of the cylinder having the eccentric flanges *g*, the header, and the fixed cams; the shaft having the driving-disks; the piston formed to cooperate with the bore of the cylinder and the abutment thereof, said piston being provided with flanges engaged with the driving-disks, and shoes affixed to said flanges and engaged with the fixed cams, as set forth.

5. In a rotary engine, the combination of the cylinder having a bore formed as described and having a stationary abutment, a spring-actuated abutment packing-strip, induction and eduction ports, and eccentric flanges; a hollow piston formed as described and having spring-actuated packing-strips, rectangular flanged ends, and shoes bolted thereto; driving-disks rotating in contact with the ends of said cylinder, serving as heads therefor and having recessed guides in which the said piston slides; a driving-shaft affixed to said disks and extending through but not in contact with the piston; external cylinder-heads bolted to the said eccentric flanges inclosing lubricant-containing spaces in which the said driving-disks revolve and provided with central bearings supporting the driving-shaft; and fixed cams engaged with the shoes of the piston.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of April, A. D. 1895.

WM. MAXWELL WHEILDON.

Witnesses:
C. F. BROWN,
A. D. HARRISON.