

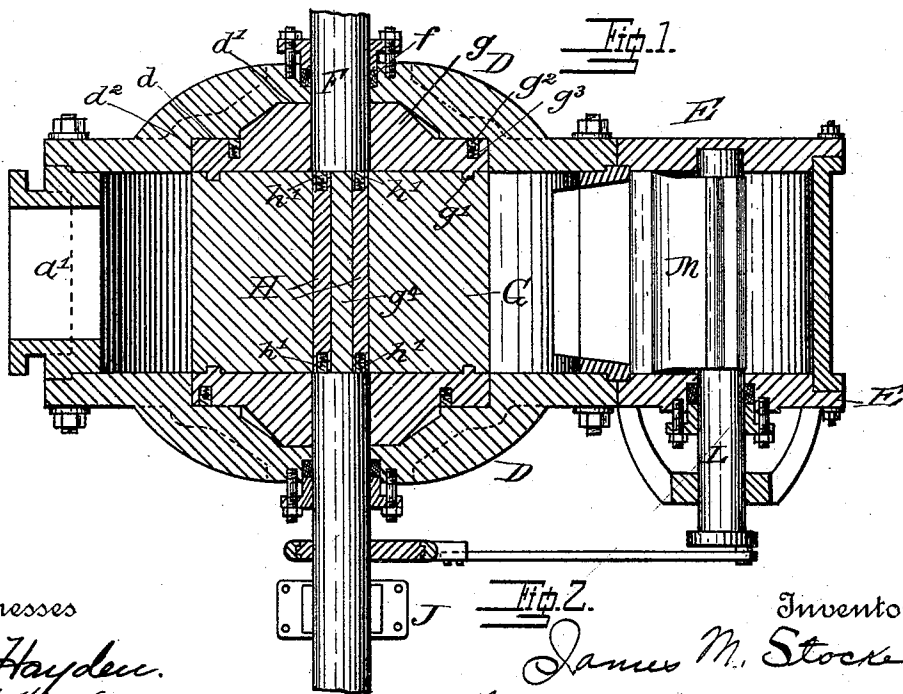
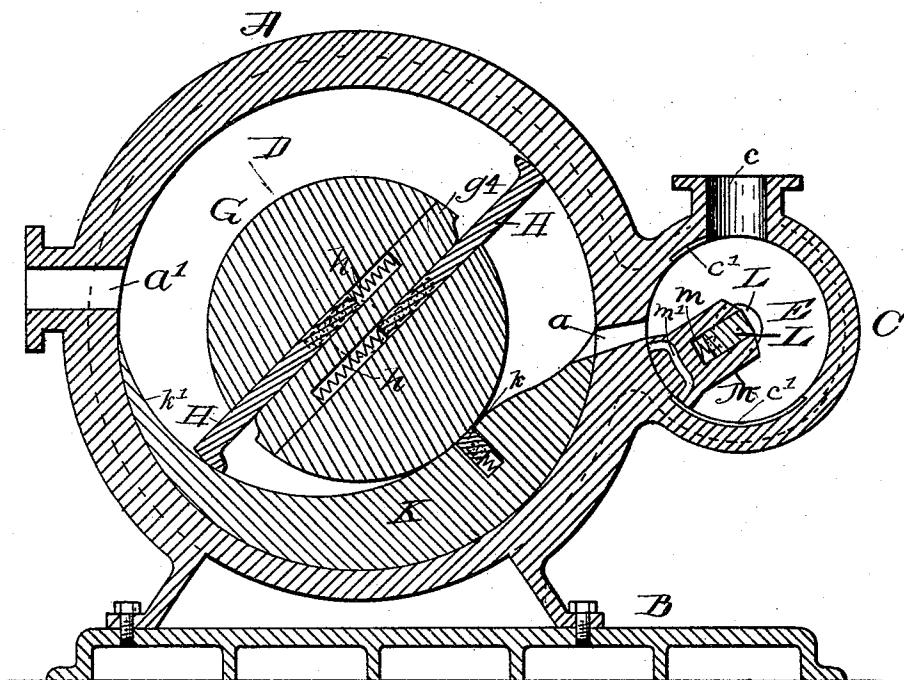
(No Model.)

3 Sheets—Sheet 1.

J. M. STOCKER.
ROTARY ENGINE.

No. 459,381.

Patented Sept. 8, 1891.



2 Witnesses
L. F. Hayden.
S. M. Wood.

Inventor
James M. Stocker
By his Attorneys
A. Woodson

(No Model.)

3 Sheets—Sheet 2.

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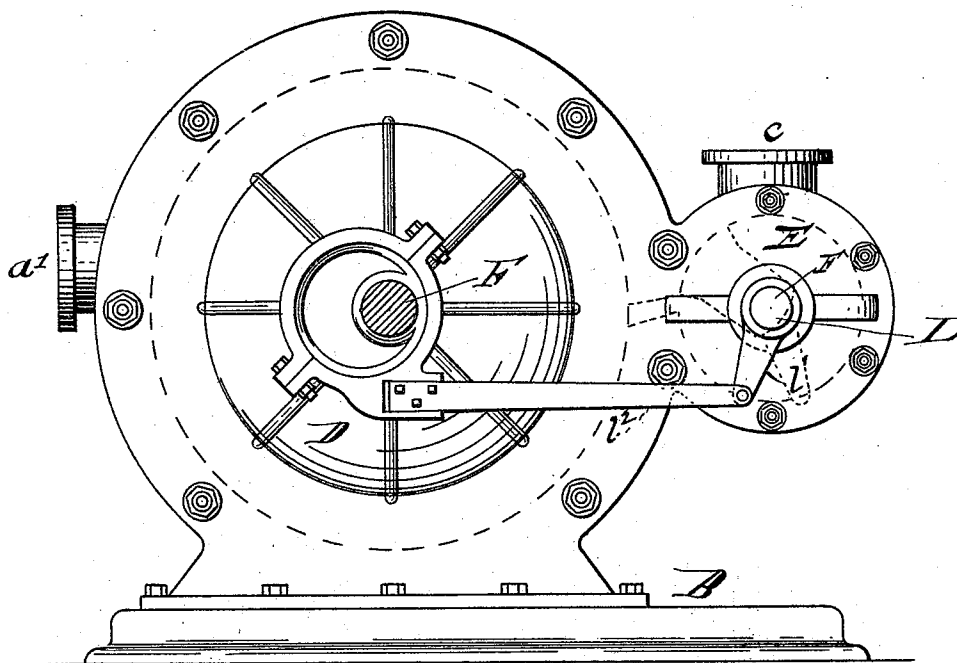


Fig. 3.

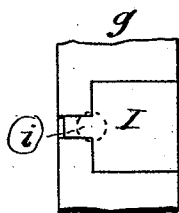


Fig. 4.

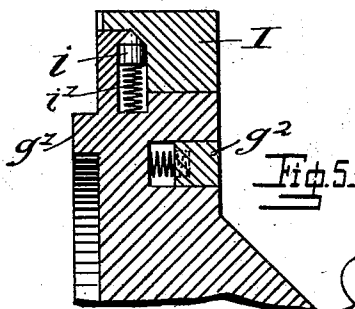


Fig. 5.

Witnesses

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Accompanying

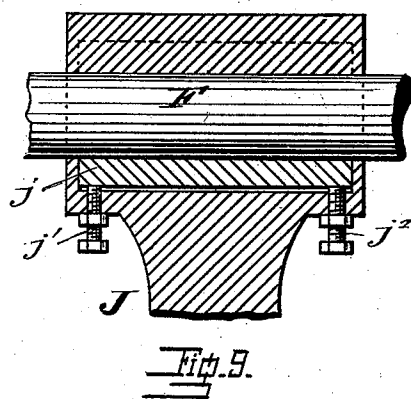
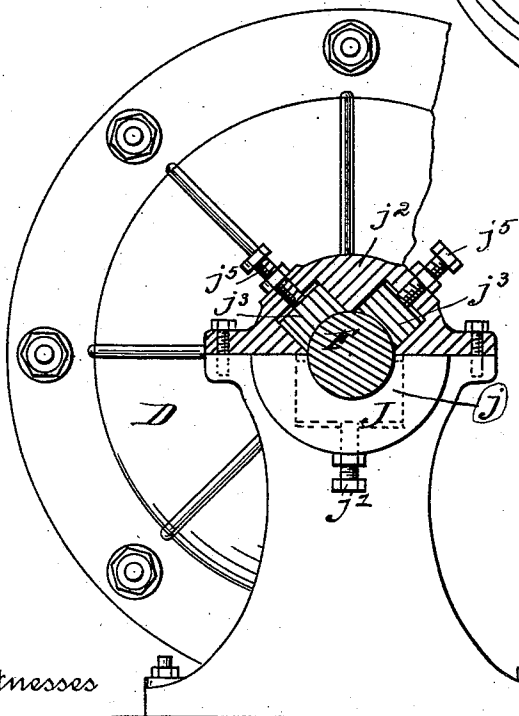
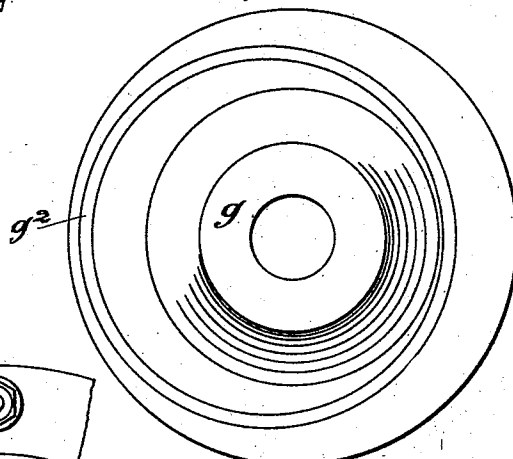
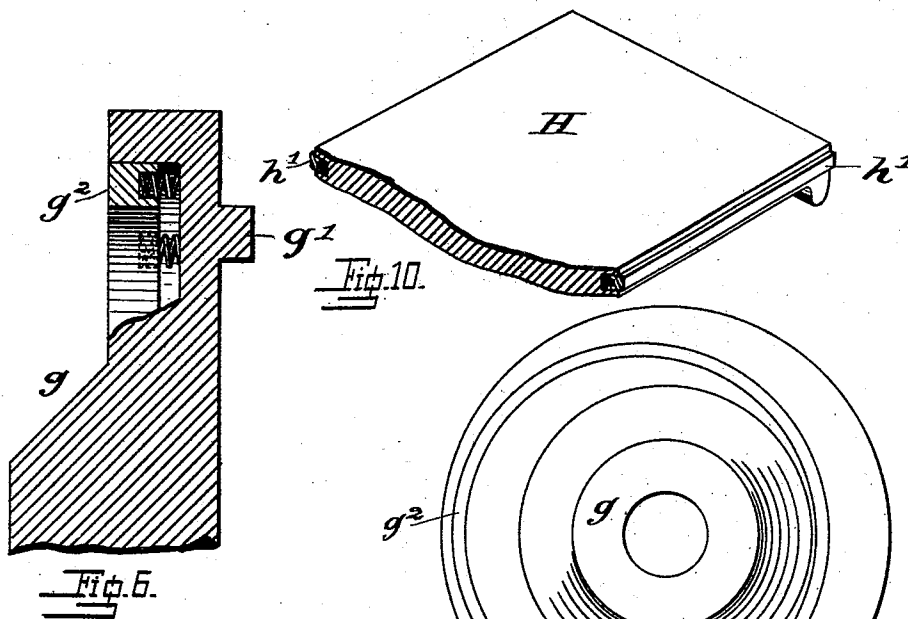
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Witnesses

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Fig. 8.

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UNITED STATES PATENT OFFICE.

JAMES M. STOCKER, OF ATLANTA, GEORGIA, ASSIGNOR OF ONE-THIRD TO
ZIBA O. STOCKER, OF SAN ANTONIO, TEXAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 459,381, dated September 8, 1891.

Application filed April 24, 1891. Serial No. 390,317. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. STOCKER, a citizen of the United States, and a resident of Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 letters of reference marked thereon, which form a part of this specification.

This invention, as stated above, relates to rotary engines, the object being to so improve the art in that class of engines as to obtain in a reliable manner the advantage of the expansion of the steam after admission, and to so construct same as to obtain a minimum of leakage, and to provide an engine which will be capable of long-continued use with a minimum of wear and working friction. The details of construction whereby these ends are accomplished will now be described, as shown in the accompanying drawings, in which—

Figure 1 is a transverse vertical section centrally of the cylinder and valve-chamber, showing same at about quarter-stroke. Fig. 2 is a horizontal section through the center of the piston, further showing the elements shown in Fig. 1, and in addition showing the eccentric and pitman and the construction of the piston and the shaft-packing glands. Fig. 3 is a side elevation of the device from the lower side of Fig. 2. Fig. 4 is a view of one of the packing-blocks, being the plan of the upper end of Fig. 5, which shows the section centrally through the block, and also shows means whereby said block is elastically held, and further showing the end piston-packing. Fig. 6 is a radial section of the piston-head, showing the eccentric end packing-ring and one of the springs, a second spring being also shown by a cross-section of an intervening portion of the head. Fig. 7 is an end view of said piston-head, illustrating the eccentricity of said packing-ring. Fig. 8 is a detail of the pillow-block and wearing-blocks therein and means for lining up the shaft. Fig. 9 is a vertical section centrally of the pillow-block shown in Fig. 8. Fig. 10 is a view in perspective of one of the packing-leaves, show-

ing the edge packing thereof which bears against the ends of the cylinder.

In the figures like reference-marks are employed in the designation of corresponding elements throughout the drawings.

The cylinder A, secured to a suitable base B, is provided with induction and eduction ports *a* and *a'*, respectively, the port *a* opening through said cylinder into the valve-cylinder C, the opening in both cylinders A and C being essentially circular in cross-section. Steam is admitted into the valve-chamber through a port *c*. Heads D are secured to the cylinder A by means of set-screws, as shown, and the cylinder C is provided with heads E, also bolted thereto, any of which said heads D or E may be of any exterior form desired. Each of the heads D are chambered out on their inner sides, said recess extending in cylindrical form for a portion of the way and having a straight shoulder *d* thereon, after which the recess has an extension which is truncate conical in form, and from the center of the bottom of the recess pass bearings or apertures for the shaft F, which are packed to prevent any danger of the exit of steam by a gland *f* in each opening.

G is the piston, which is now to be described. The heads or disks *g* are secured to the inner ends of the shaft F and correspond on their back sides to the shape of the recess in the head D at the points marked *d*, *d'*, and *d²* and contact therewith in revolving. The inner sides of said disks are each provided with an annular projection *g'* for purpose hereinafter described. The surface of the said disk which contacts with the surface *d* is provided with an annular groove eccentric to the axis of said disk a distance equal to the width of said surface, in which is set a ring *g²*, which said ring is pressed outwardly against the surface *d* by means of springs *g³*, set between the bottom of said recess and the back of said ring *g²*. As the disk revolves, it is hence obvious that this eccentric ring will pass across any given point on the surface *d*, and hence said surface will be constantly lubricated, which would not be the case were said ring not eccentric. This ring also forms a packing-strip to prevent the passage of steam. The central section *g⁴* of the piston G is circular in form and has recesses therein ex-

tending the full length thereof, in which are set spring-pressed leaves H, which have motion in a line approximately parallel to the radius, springs h between the bottom of the recesses and said packing-leaves keeping said leaves pressed outwardly in contact with the wall of the cylinder. The preferable form of construction for the part g^4 is that shown in Fig. 1, in which there are two segmental portions flat on their adjacent sides, and the cylinder is completed by a central piece g^4 , offset on its sides, as shown in section of said figure, to receive the packing-leaves H. These three pieces are held together in cylindrical form in the following manner: In each end of the said central section g^4 of the piston is turned or otherwise made an annular groove, into which is set the annular projection g' on each of the disks g , after which the whole piston will be trued up by turning. In this construction it is plain that the two outer parts of the piston may be planed flat on their inner sides, as may also the contacting portion of the central section, and also the offset portions may be planed and a good fit of the packing-leaves insured, which is very desirable. In constructing the piston may, after planing, be clamped together, the annular grooves be turned in its ends, the heads be bolted on with their annular projections inserted in said annular groove, and the whole be then turned, making a truly cylindrical and well-balanced piston with superior wearing qualities in the packing-leaf seats. The repairing of the piston is also greatly facilitated. As shown in Fig. 10, each one of the packing-leaves H is provided with edge packing-strip h' , which is pressed against the inner side of the heads of the cylinder by underlying flat or coiled springs. In order to prevent the steam from passing between the surfaces d and d^2 of the cylinder-head and the disks g contiguous thereto at points near the edges of the packing-leaves H, blocks I, as shown in Figs. 4 and 5, forming segments in said disks, are inserted therein, one near each edge of each of the leaves H. In the joint between the block I and the disk g , being the joint parallel to the face of said disk, is a radial circular recess, half of which is in the disk and half of which is in the block I. The end of said hole farther from the center of the disk is conical or conoidal in form, and a pin l , conical on its end and of a length of about half the length of said hole, is inserted therein, and is pressed outwardly from the center of the disk therein by a spring i' , seated in said hole. It is obvious on account of the conical form of the pin and a portion of the recess that the outward pressure of said pin will cause a movement of the block I in a direction parallel to the stationary side of the conical end of the hole, which will obviously keep the block I pressed against the sides d and d^2 of the head, and so prevent the passage of steam past the disks at that point.

The shaft F is journaled at each end out-

side of the casing upon pillow-blocks J, as best shown in Figs. 8 and 9, said shaft resting upon the bearing j of bearing metal, adjustable vertically by screws j' , and the upper box j^2 , having therein blocks j^3 , concaved on one side to fit the shaft and being movable in the recesses in the box j^3 by means of screws j^5 . It is obvious by the use of which construction the shaft F may be at all times made to run centrally of the cylinder.

The block K, carrying the spring-pressed abutment k in a transverse groove therein, is set in the bottom of the cylinder A, and has an incline k' extending from the exhaust-port to said abutment and being eccentric to the piston in a degree that will cause it to force the packing-leaf H steadily into its recess in the piston from the time it passes the exhaust-port until it reaches said abutment. The said block is inclined from the abutment to the induction-port in about the angle shown, which angle has the advantage of allowing a very quick out-thrust of the leaf H and without coming concussively against any resisting surface, which obviously brings the said leaf quickly into position, wherein the entire superficial area at any time projected is brought quickly into action.

Steam, as before stated, passes from the live-steam pipe c into the cylinder C, and the induction-port a delivers it to the expansion-chamber. Passing longitudinally through the cylinder C and having suitable bearings at each end thereof is a shaft L, the portion of which within the cylinder is made rectangular in form, and over this rectangular portion is fitted the bifurcated backward extension of the slide M, a spring m being interposed between the said shaft and said head, as shown in Fig. 1. The peripheral surface of said slide M is turned to conform to the inner side of the cylinder C, and by the oscillation of the shaft L the said slide will be reciprocated past the induction-port a and admit and cut off steam into and from cylinder A. The shaft L carries on its end a downwardly-projecting lever l' , connected by a pitman l^2 with an eccentric on the shaft of the piston, and obviously the lap and lead or other desired adjustment of the slide M may be made in many ways. Extending from near one edge of the peripheral surface of the slide M, through the body of said slide to near the other edge of said peripheral surface, is a port m' , and the interior wall of the cylinder C is provided with grooves c' , through which steam is admitted into said port m^2 as soon as said port comes opposite the induction-port a , and hence steam is admitted much faster than would otherwise be the case, which is of great advantage in this class of engines, as the "stroke" is so rapid.

In the device it is obvious that the most economical use of steam may be secured, inasmuch as the steam is cut off before the end of the stroke, and this point or cut-off may be adjusted in any desired degree.

I am aware that a patent granted to Thomas on August 7, 1888, under No. 387,606, shows an eccentric-piston carrying a ring therein, the center of revolution of which is eccentric to its contour; but mine is different from it, inasmuch as the entire surface traversed by my ring is at all times covered by the flat end of the piston, which is not the case in Thomas's. Capillary attraction will keep the oil in the joint in mine, whereas in Thomas's the steam will keep all oil cleared from the surface traversed by the said ring, a waste being thus caused and but imperfect lubrication being obtained.

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

1. In a device of the class specified, a piston composed of three parts jointed longitudinally, grooves cut in each end of the composite so formed, and heads, each provided with an annular projection from its face registering with said grooves, and bolts securing said heads to said composite part, substantially as and for the purpose specified.

2. In a device of the class specified, a cyl-

inder, heads thereof having internal flat surfaces, a cylindrical piston journaled concentrically within said cylinder and having correlative flat surfaces in close proximity to the said cylinder-heads, spring-pressed rings set eccentrically in each end of said piston and adapted to bear on and traverse the cylinder-head surface covered by the ends thereof, and suitable packing-leaves carried by said piston, substantially as and for the purpose specified.

3. In a device of the class specified, the cylinder piston-head having a recess therein, and the piston fitting said recess and having packing-leaves, and a block carried by said piston near each packing-leaf and spring-pressed against the side and bottom of said recess by a spring-pressed tapering key having bearing on both said piston and block, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

JAMES M. STOCKER.

Witnesses:

A. P. WOOD,
S. M. WOOD.