

No. 640,353.

Patented Jan. 2, 1900.

L. H. ALLEN.
ROTARY ENGINE.

(Application filed Mar. 27, 1899.)

(No Model.)

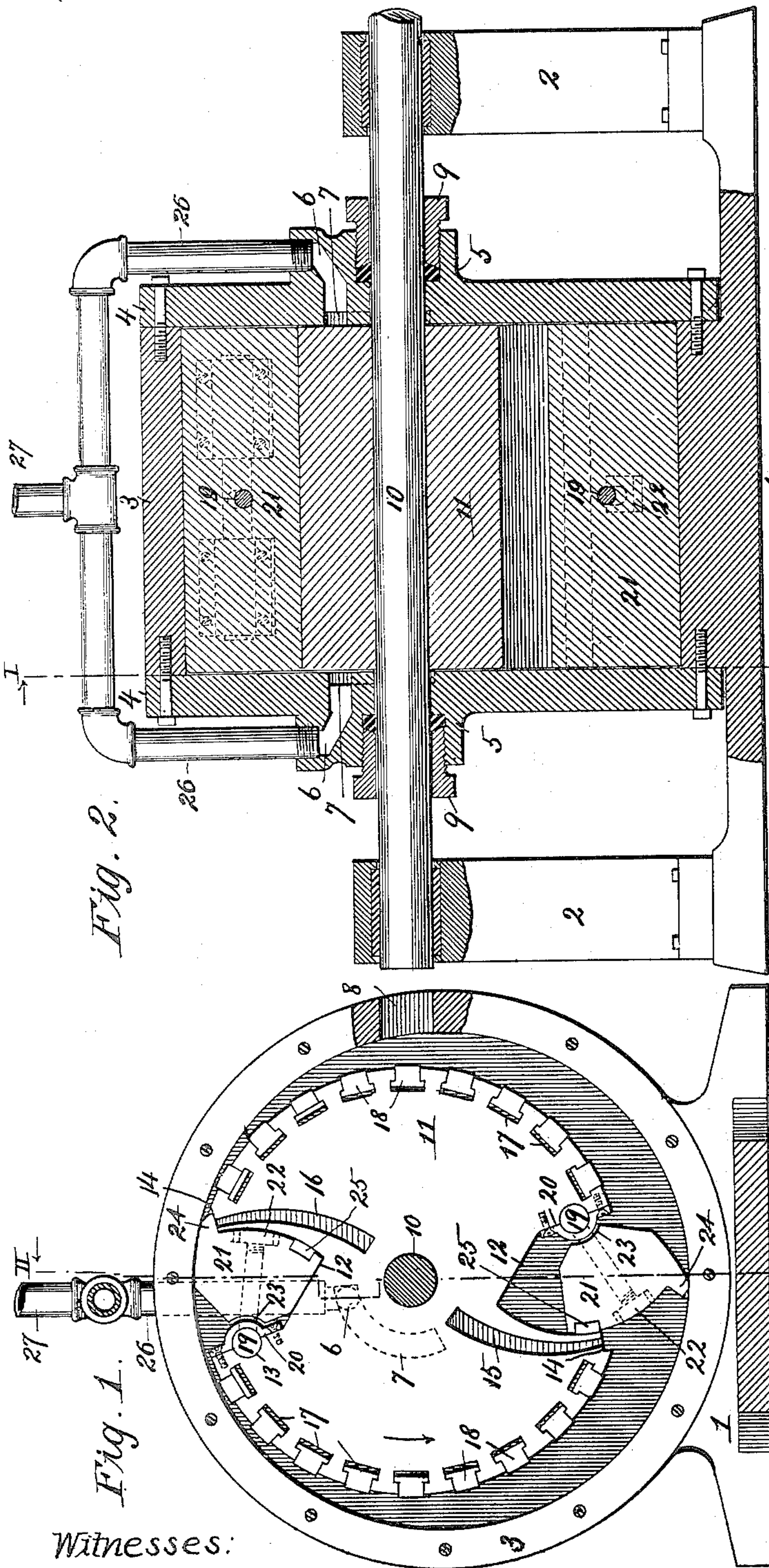


Fig. 2.

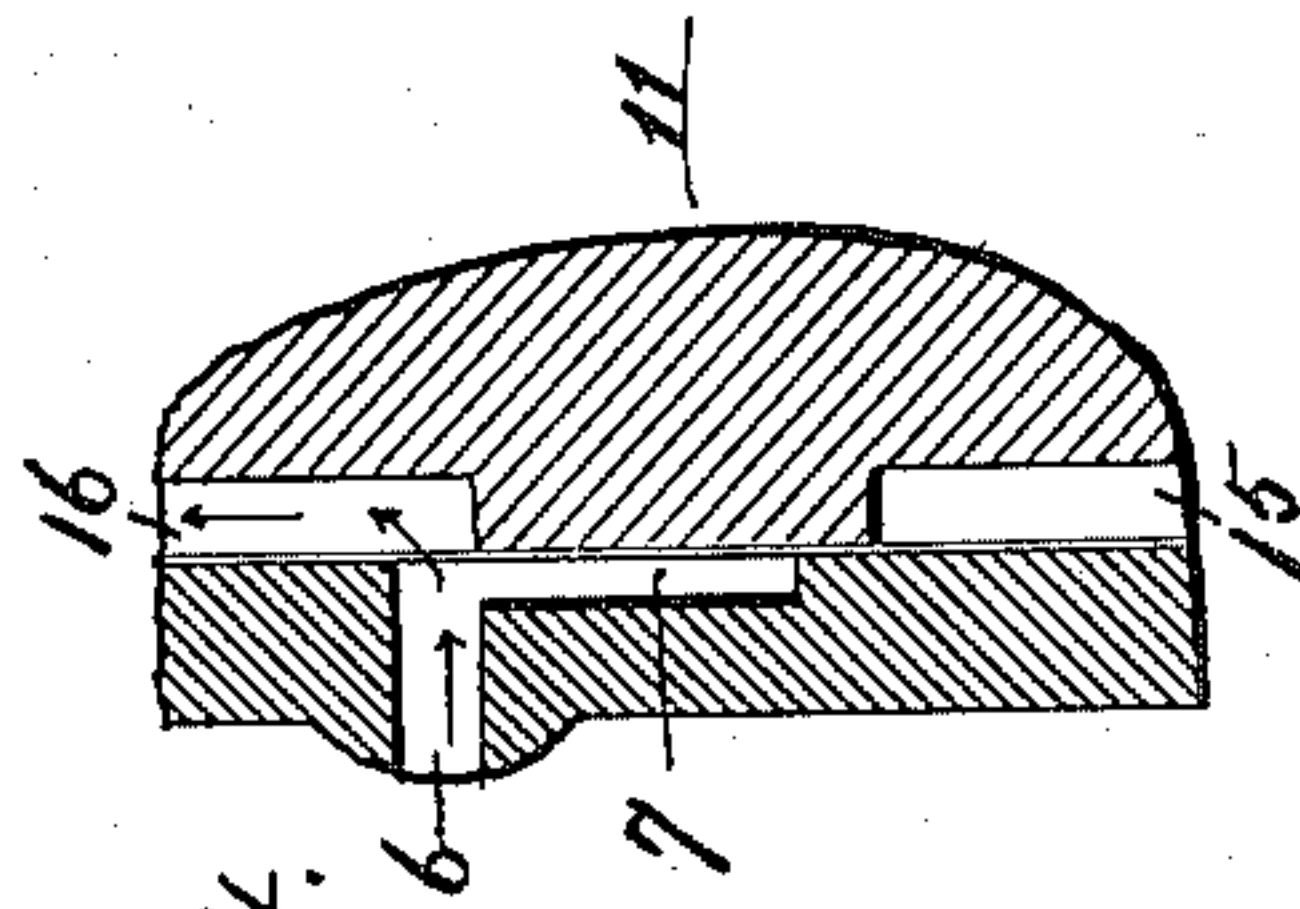


Fig. 4.

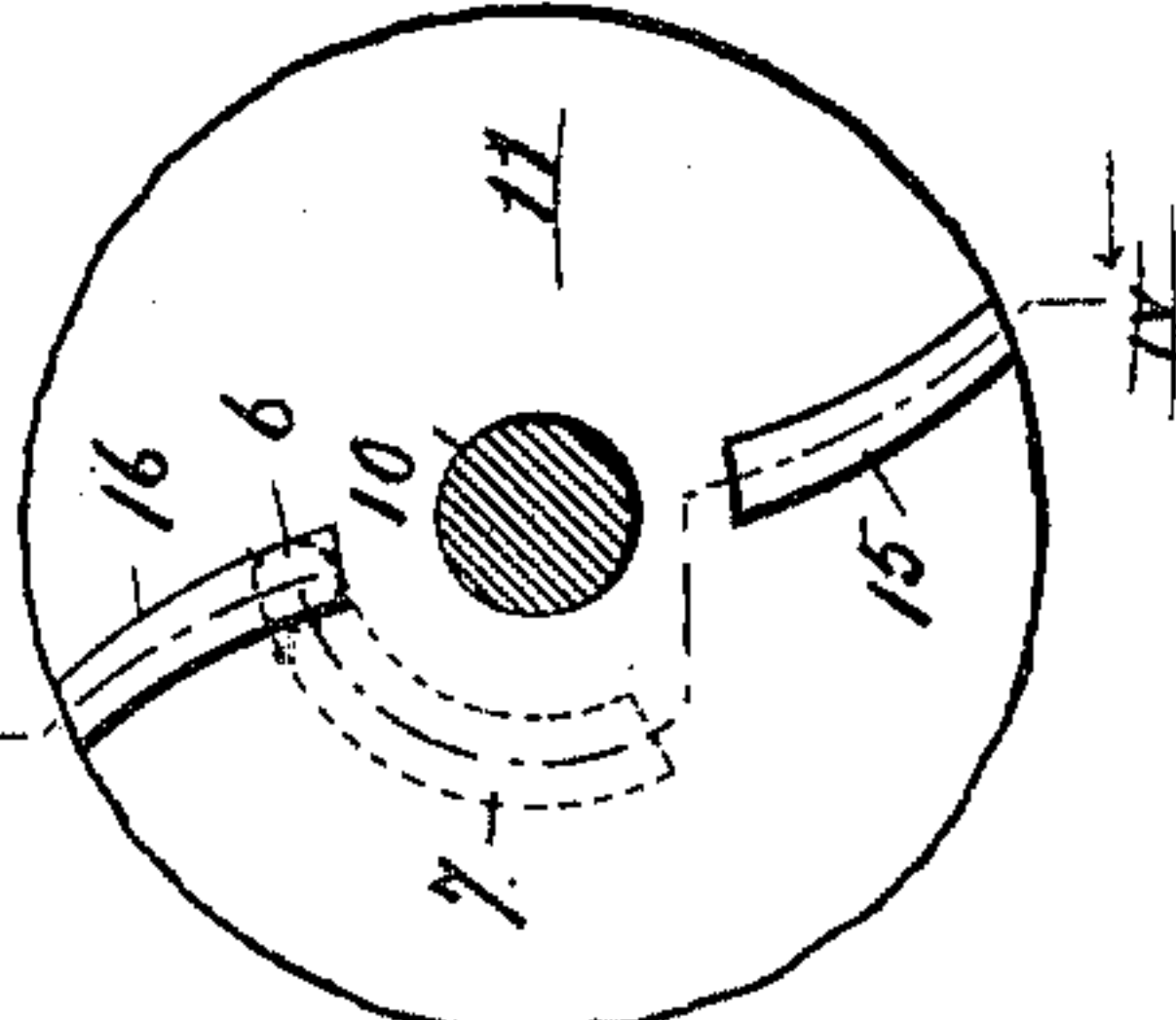


Fig. 3.

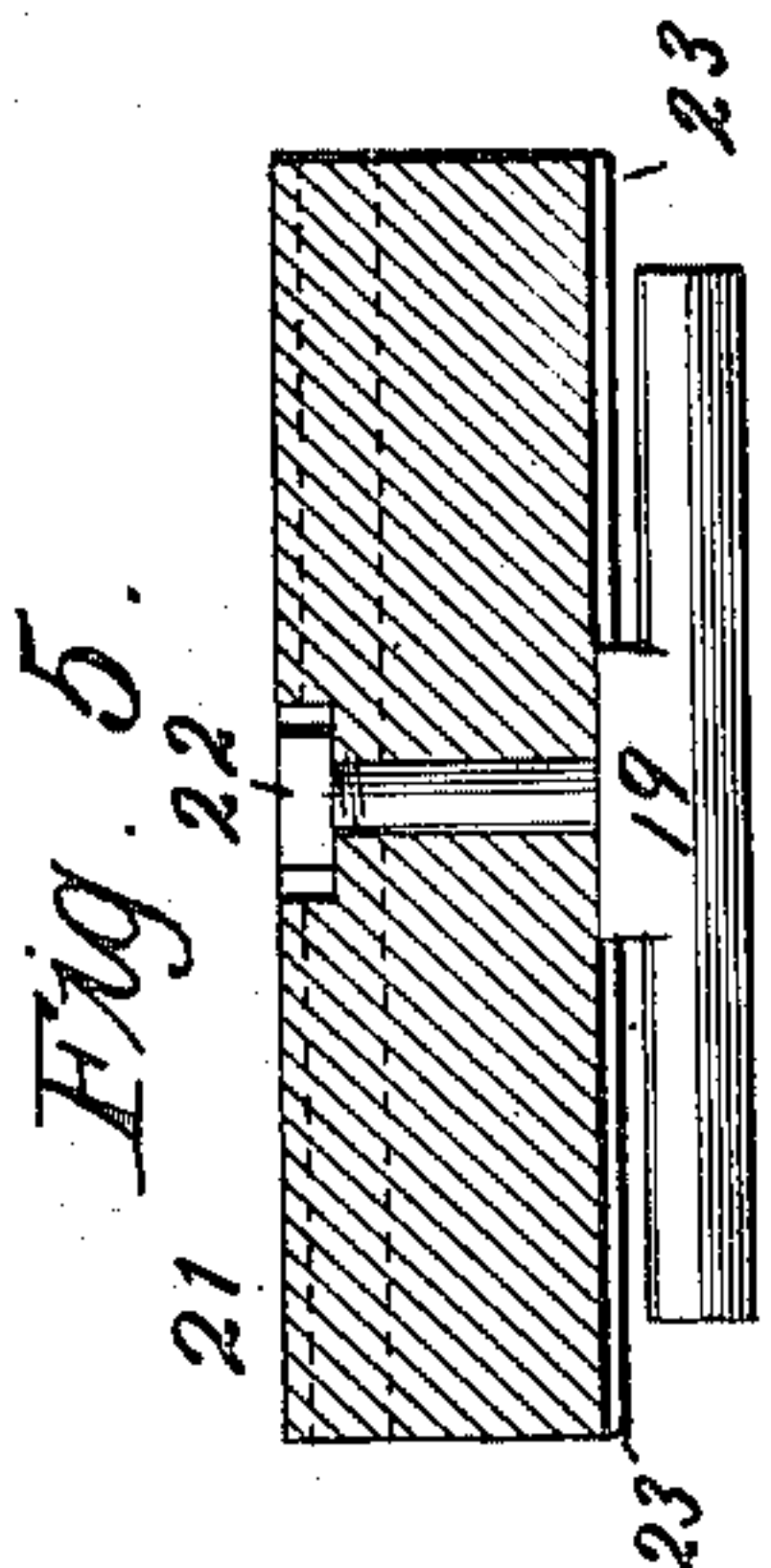


Fig. 5.

Witnesses:

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UNITED STATES PATENT OFFICE.

LIVY H. ALLEN, OF VALLEY FALLS, KANSAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 640,353, dated January 2, 1900.

Application filed March 27, 1899. Serial No. 710,617. (No model.)

To all whom it may concern:

Be it known that I, LIVY H. ALLEN, of Valley Falls, in the county of Jefferson and State of Kansas, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary steam-engines, and more particularly to that type embracing a stationary cylinder or casing, a rotary piston therein and arranged eccentrically of the cylinder, valves which move inward and outward of the piston, so as to present a surface upon which the steam may act, and movable packing-strips carried by the piston, the object in this connection being to produce an engine of this character wherein the customary springs for adjusting the valves and packing-strips are dispensed with and centrifugal force utilized as a substitute for said springs.

A further object of the invention is to produce a rotary steam-engine which is of simple, compact, strong, durable, and inexpensive construction.

With these objects in view the invention consists in certain novel and peculiar features of construction and combinations of parts, as will be hereinafter described and claimed and in order that the invention may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1 is a vertical section taken on the line I I of Fig. 2. Fig. 2 is a vertical section taken on the line II II of Fig. 1. Fig. 3 is a face view of part of the piston, showing the relation between the steam-passages thereof and the inlet-port of the engine. Fig. 4 is a section taken on the line IV IV of Fig. 3. Fig. 5 is a detailed cross-section of one of the piston-valves.

In the said drawings, 1 designates the base-plate, and 2 a pair of vertical bearing-standards at opposite ends of the base-plate.

3 designates a cylinder formed integral, by preference, with the base-plate, and 4 the cylinder-heads bolted to the cylinder, as shown, or otherwise secured in position. Said cylinder-heads are provided with outwardly-projecting flanges 5, having in their upper sides the inlet-ports 6, said ports communicating at their inner ends with curved passages 7, formed in the inner sides of said heads and

extending eccentrically thereof, and at a suitable point the cylinder 3 is formed with an outlet-port 8.

9 designates packing-glands mounted in the flanges 5, such construction constituting stuffing-boxes, and 10 the engine-shaft, which is journaled in said standards and extends through said stuffing-boxes.

11 designates a rotary piston fitting snugly between the cylinder-heads and secured rigidly upon the shaft, and said piston is provided at diametrically opposite points with the deep notches or recesses 12, having semicircular offsetting cavities 13 at one side and shallow offsetting notches 14 at the opposite side, and communicating at their outer ends with the notches 14 are the segmental steam-passages 15 and 16, such passages being formed in both sides of the piston. The piston is also provided with a large number of peripheral grooves 17, which extend from side to side and are of T shape in cross-section, and fitting snugly in said grooves, but adapted to have movement therein radially of the piston, are packing-strips 18 of corresponding form in cross-section to the end that the arms of said T-shaped packing-strips shall limit their outward movement, and thus prevent their total disconnection from the piston.

19 designates a pair of T-shaped bolts, the arms of the same being of cylindrical formation and fitting snugly in the semicircular cavities 13, hereinbefore referred to, and held rotatably in said cavities by means of the bearing-caps 20, secured to the piston. (See Fig. 1.)

The valves 21, of segmental form, fit snugly in the recesses 12 and are balanced to the steam-pressure and clamped firmly on the stems of said T-shaped bolts 19 by means of the nuts 22, and the sides of said valves adjacent to the bearing-caps are concaved, as at 23, so as to fit with comparative snugness against said caps and yet leave room for the passage of steam between them. Supposing the parts to be in the position shown in Fig. 1 and the piston rotating as indicated by the arrow in said figure, it will be apparent that as the passages 15 have just passed out of register with the inlet-ports 7 the piston is rotating under the expansive action of the steam previously introduced, the exhaust-steam in

advance of the lower valve 22 being exhausted through port 8. It is also obvious that this rotation of the piston under the expansive action of the steam will continue until the passages 16 register with the upper ends of the curved passages 7, by which time the valve companion to said passages 16 will have advanced to a point forward of the vertical center of the machine, the joint between the piston and the inner wall of the cylinder being continued steam-tight by the packing-strip 18 immediately following the piston, this packing-strip, and, in fact, all of the packing-strips except the one in engagement with the cylinder repressed by such engagement, being thrown outward by centrifugal power or force, as will be readily understood. At the moment the valve companion to the passage 16 passes the vertical center of the machine—that is, the moment its lip 24 passes the point where the piston and inner wall of the cylinder are nearest—and therefore begins to move outward under the power of the steam admitted through passages 16 the valve companion to passages 15 passes the vertical center of the engine below the shaft or the point where the piston and inner wall of the cylinder are farthest from each other and by reason of the eccentric relation between its axis and that of the cylinder commences to swing inward under the pressure of the cylinder, and during this time any steam which may have got into the recess 12 behind said piston is forced out between the valve and the bearing-caps 20. These valves are of such construction that their outer halves exceed the weight of the inner by just about the weight of the lips 24, which lips when the valves are forced clear into the recesses 12 occupy the offsetting notches 14 and are in position to receive the full benefit and effect of the steam-pressure as it is admitted through passages 15 or 16.

The steam pressing forwardly against the valve and its lip 24 holds the latter so tightly against the wall of the cylinder that a steam-tight joint is formed, and in order to prevent the steam getting in advance of the piston by entering the cavity 12 and then passing out between the valve and the bearing-caps the outer surface of the former is provided with a packing-strip 25, which engages the curved wall of the recess, and thereby prevents steam from entering the recess, as will be readily understood. As the piston revolves a perfect steam-tight joint between the latter and that

portion of the cylinder-wall nearest the axis of the piston is maintained by one of the valves or by the strips 18, the latter being so numerous and arranged so closely together that before one is relieved from frictional engagement with said wall the second one engages it, and thereby prevents any back-leakage of steam, as will be readily understood.

Steam is admitted to the engine by way of the branch pipes 26, leading from the supply-pipe 27.

From the above description it will be apparent that I have produced a rotary engine which embodies the features of advantage enumerated in the statement of invention, and it is to be understood that I reserve the right to make such changes as do not involve a departure from the spirit and scope of the invention.

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

1. A rotary engine, comprising a stationary cylinder having inlet and outlet ports, a shaft journaled in and eccentrically of the cylinder, a piston mounted on the shaft and provided with peripheral packing-strips, cavities 12, and with ports in its side faces, T-bolts pivoted to the piston, valves occupying said cavities 12 and secured to the stems of said T-bolts, said valves having lips to overlap the discharge ends of the piston-ports when the valves are repressed or forced completely in said cavities, substantially as described.

2. A rotary engine, comprising a stationary cylinder having inlet and outlet ports, a shaft journaled in and eccentrically of the cylinder, a piston mounted on the shaft and provided with peripheral packing-strips, cavities 12 having offsetting cavities 13, and with ports in its side faces, T-bolts having their heads of cylindrical formation and journaled in cavities 13, and bearing-caps 20 secured to the piston and holding said bolts pivotally in position, and valves clamped upon the stem of said bolts and concaved as at 23, and having lips to overlap the discharge ends of the piston-ports when the valves are repressed, substantially as described.

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

LIVY H. ALLEN.

Witnesses:

JESSE F. NEWMAN,
EUGENE ALLEN.