

(No Model.)

3 Sheets—Sheet 1.

M. C. KESSLER.
ROTARY ENGINE.

No. 602,334.

Patented Apr. 12, 1898.

Fig. 1.

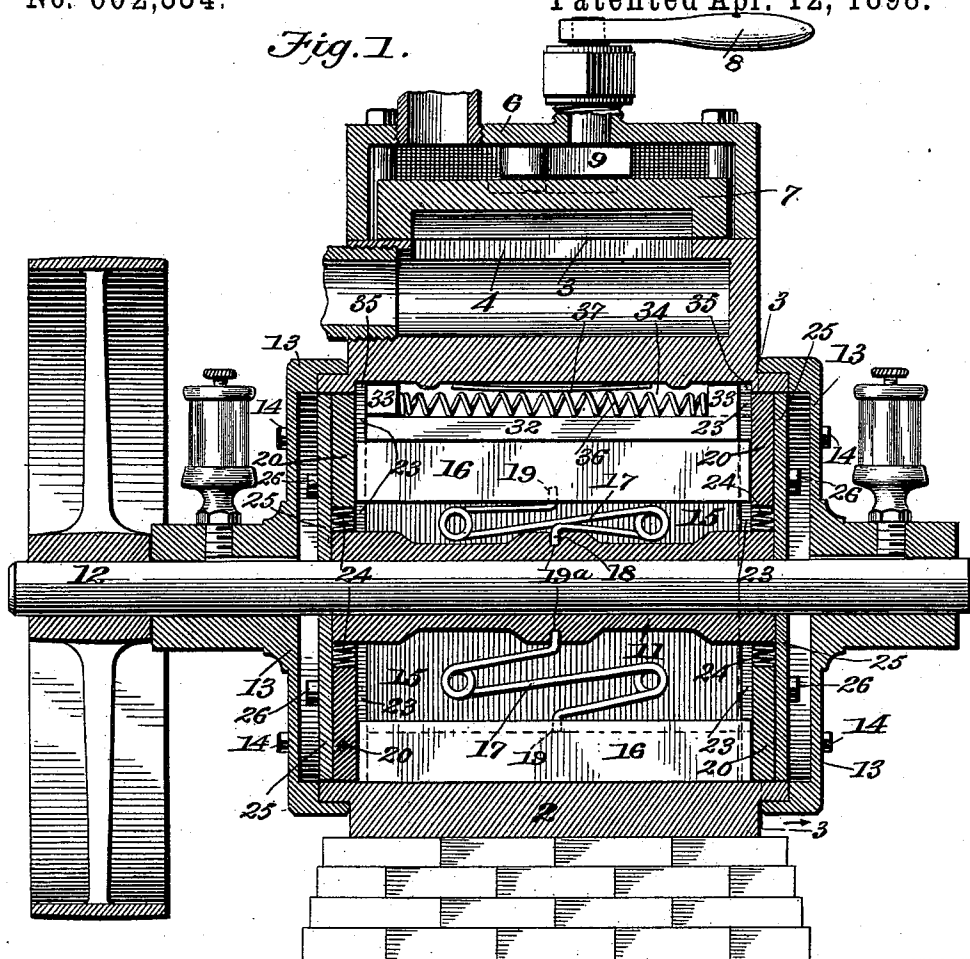
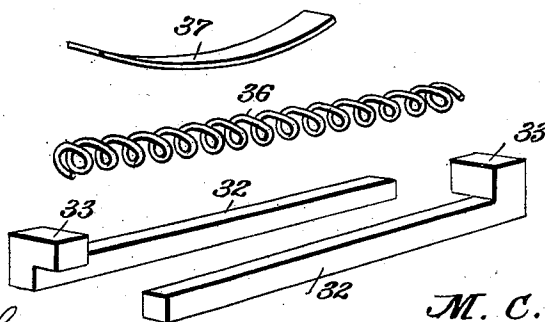


Fig. 7.



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ATTORNEYS.

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3 Sheets—Sheet 2.

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Fig. 2.

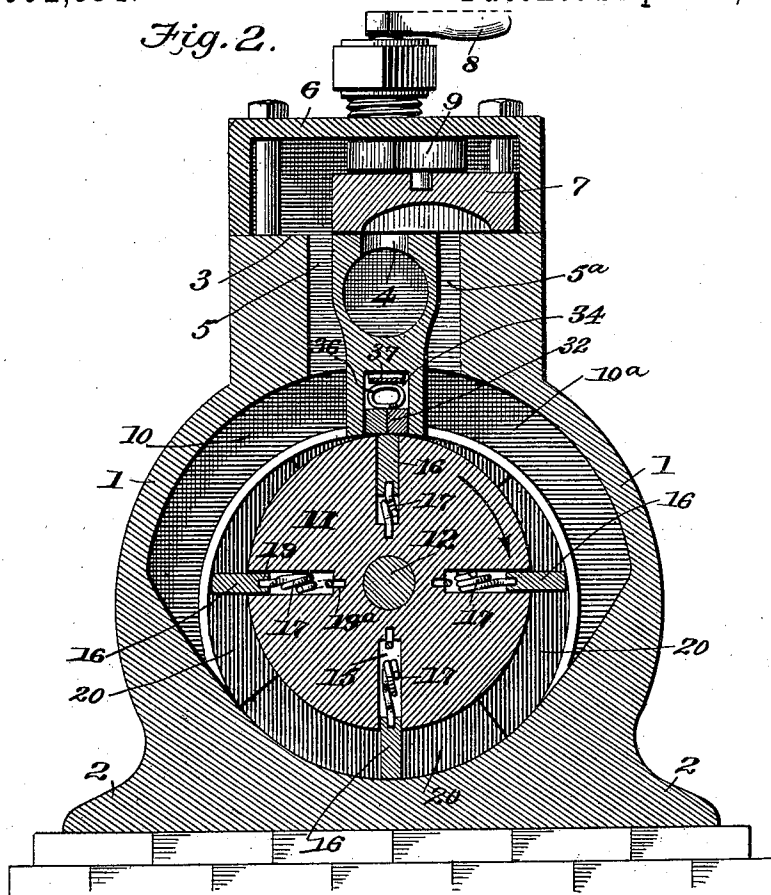
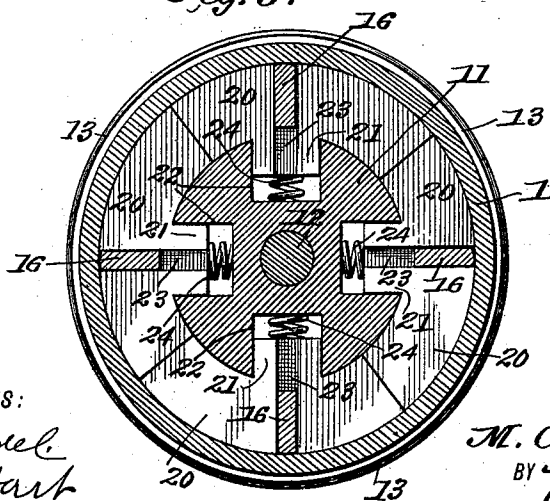


Fig. 3.



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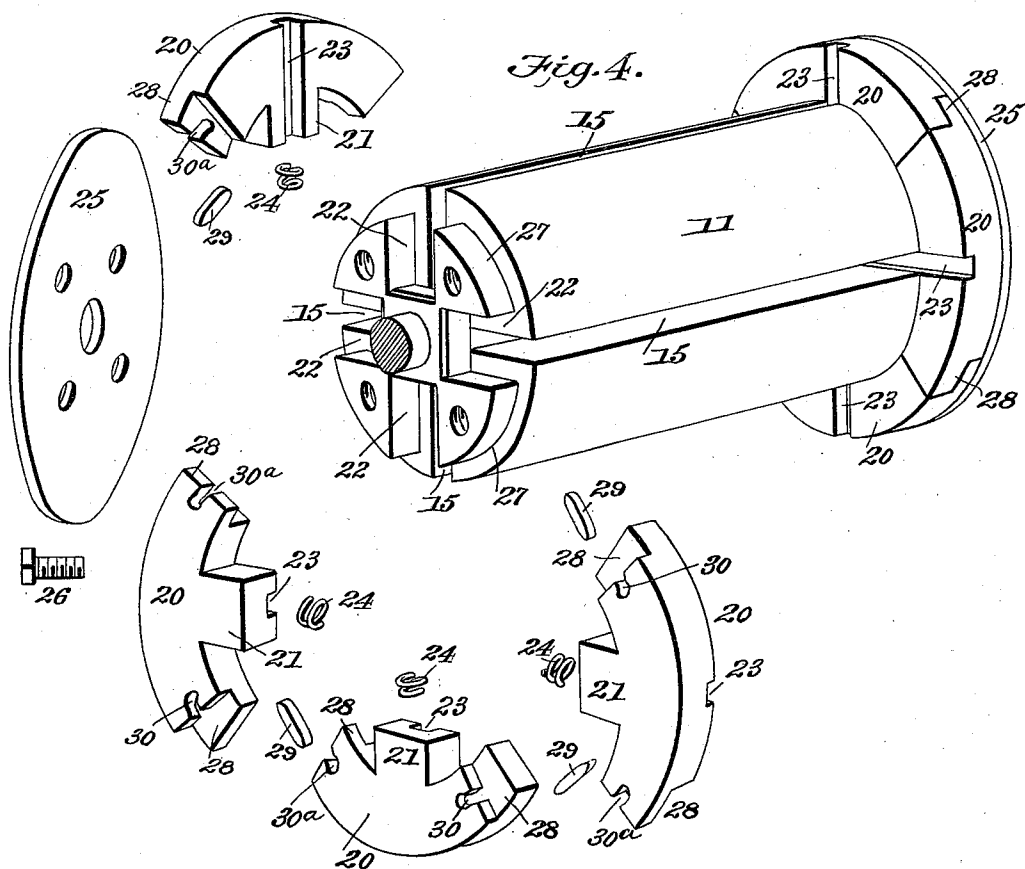


Fig. 5.

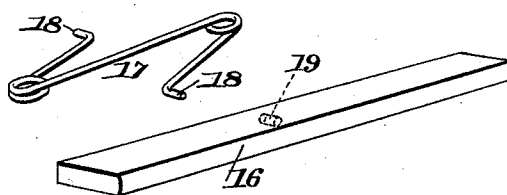
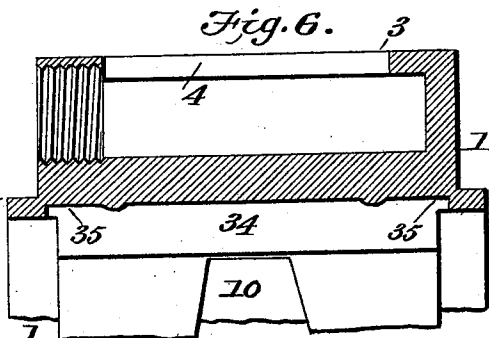


Fig. 6.



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UNITED STATES PATENT OFFICE.

MARTIN C. KESSLER, OF GILEAD, INDIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 602,334, dated April 12, 1898.

Application filed December 3, 1897. Serial No. 660,662. (No model.)

To all whom it may concern:

Be it known that I, MARTIN C. KESSLER, of Gilead, in the county of Miami and State of Indiana, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention is chiefly an improvement in the wear-surfaces and packing of rotary engines, whereby leakage of steam is prevented. The construction, arrangement, and combination of parts are as hereinafter described, reference being had to accompanying drawings, (three sheets,) in which—

Figure 1 is a central vertical longitudinal section of the engine. Fig. 2 is a central vertical cross-section of the same. Fig. 3 is a vertical section on line 3 3 of Fig. 1. Fig. 4 includes perspective views of the rotary piston-hub and its packing-pieces detached from one end thereof. Fig. 5 is a perspective view of one of the pistons and its supporting-spring. Fig. 6 is a longitudinal section of the upper portion of the casing. Fig. 7 is a perspective view of the parts forming a movable abutment.

The cast-metal casing 1 has a large eccentric bore and is provided with a broadened base portion 2 and a flat valve-seat 3, all formed integrally. The valve-seat 3 has three parallel ports 4 5 5^a, the two outer ones 5 5^a being for admission and escape of steam alternately, according to the direction of rotation of the engine-piston, and the central port 4 for exhaust. A valve-chest 6 is detachably secured to the valve-seat 3, and the D-valve 7 therein is shifted by a hand-lever 8 and crank-arm 9, as will be readily understood.

From the side ports 5 5^a passages 10 10^a, Fig. 2, extend down in the side of the casing and open widely on the interior of the same, so that steam admitted through either port and passage has free access to the rotary piston.

The rotatable piston hub or body 11 is cylindrical and keyed on a rotary shaft 12, having its journal-bearings in the central flanged heads 13, which are detachably secured to the ends of casing 1 by means of screw-bolts 14, as shown. The piston-hub 11, Fig. 4, has a series, preferably four, of radial and longitudinal open slots 15, in each of which is arranged a piston proper, 16, the same being a

long rectangular plate or thin bar which is adapted to slide radially, but not longitudinally, in its slot. Beneath each piston 16 is arranged a spring 17 for forcing it outward, so as to insure its working steam-tight with the interior side of the casing 1. Said spring 17, Fig. 5, is formed of a wire having a coil at each end of the straight central portion, while its end portions are bent inward on opposite sides of such central part and again bent outward therefrom to form points 18, adapted to enter central and opposite sockets 19 19^a in the piston proper, 16, and in the slot or groove 15 in the hub. Thus each piston 16 is supported and forced outward by pressure applied at its center only, so that its outer or wearing surface may automatically adjust itself to the contact or friction surface of the casing with the greatest facility and exactness.

At the ends of the pistons 16 are arranged metal pieces 20, that serve as packing. The same are segmental in form save that they have a central interior projection or guiding-tongue 21, that fits slidably in a corresponding open slot 22, Figs. 3 and 4, formed in the end of the piston-hub 11. The ends of the pistons 16 fit and are adapted to slide radially in grooves 23, formed in the inner sides of the segmental packing-pieces 20 and their tongues 21. The latter rests on coiled springs 24, Fig. 1, and thus the several segments 20 are pressed outward similarly to the pistons 16, so as to work steam-tight with the circles of the casing.

A thin metal disk 25 is secured to each end of the piston-hub 11 by means of screws 26, whose heads are between the said disk and the parallel flanged heads 13 of the casing. The ends of the hub 11 being cut away or rabbeted circumferentially, Fig. 4, an annular space is provided between the shoulder 27 thus formed and the adjacent parallel disk 25, in which space the several packing-segments 20 are fitted slidably.

The four packing-segments 20 are so proportioned as to length that they form a divided annulus extending around the hub 11, and their adjacent ends are halved or rabbeted, so as to form lapping portions 28, as shown in Fig. 4. Thus whatever be the radial movement or adjustment of the segments 20

such lapped portions 28 prevent passage of steam laterally outward to the flanged casing-heads 13, and in order to prevent passage of steam radially outward between the shoulders 27 of the contiguous rabbets I employ connecting or bridge pieces 29, Fig. 4, which are held in suitable sockets 30 30^a, formed on the inner side of the segments 20. Such sockets are practically notches in the opposing shoulders of the laps 28. Thus whatever be the radial adjustment and circumferential expansion of the packing-segments 20 the leaking of steam between their abutting ends is effectually prevented.

A fixed abutment, (see Fig. 2,) against which the steam acts on whichever side of the casing-passages 10 or 10^a it may be admitted, is provided in the space between the lateral steam-passages 5 5^a. This abutment is formed of two like straight rectangular bars 32, Fig. 7, which are arranged side by side and each having an enlarged head 33, which is an offset or lateral projection that overlaps the headless end of the adjacent bar. This abutment is arranged in a transverse groove 34, Fig. 6, in the top of the casing-bore, and the heads 33 of bars 32 enter depressions 35 at the end of such groove, as shown in Fig. 1.

A spiral spring 36 is interposed between the heads 33 and obviously tends to press them apart, so that they always work in close contact with the annular shoulder or rabbet of the flanged casing-heads 13. For the purpose of holding the two-bar abutment pressed down upon the periphery of the segment-packing I employ a plate-spring 37, Figs. 1, 2, and 7, which is arranged in the groove 34, as shown.

It will be noted, Fig. 6, that the ends 35 of groove 34 are extended outward beyond the eccentric abutment 38 of the casing bore or chamber, so that the heads 33 of the abutment-bars 32 have free space in which to work outward, and thus always keep in close contact with the disk 25 as the latter wears, so as to prevent leakage of steam past the abutment at that point.

The operation of the engine will be readily understood. The valve 7 being set to cover ports 4 and 5^a, steam is admitted through port 5 and casing-passage 10, and, acting against the abutment 32, the rotary piston is driven in the direction of the arrow or to the right, as shown in Fig. 2, while the exhaust takes place through the passage 10^a and ports 5^a and 4. It is obvious that if the valve 7 be shifted to the alternative position, so as to cover the ports 4 5, steam will be admitted by port 5^a and passage 10^a and the rotation of the piston be reversed.

The operation of the piston is effected with

minimum friction and wear, and leakage and waste of steam are practically prevented.

What I claim is—

1. In a rotary engine, the combination with the casing the rotary piston-hub having radial and lengthwise slots, and pistons proper arranged slidably in such slots, of segmental packing-pieces arranged at the ends of such hub and having radial grooves to receive the ends of said pistons, substantially as shown and described.

2. In a rotary engine, the combination with the casing the piston-hub having pistons proper and provided with notches or slots in its ends, of segmental packing-pieces arranged radially, and having internal tongues that fit and are adapted to slide in such notches or slots, substantially as shown and described.

3. In a rotary engine, the combination with the casing and the piston-hub having radial slots and rabbeted ends, of pistons, and segmental packing-pieces arranged in the slots and rabbets, and guided as they slide radially, springs for projecting said pistons and pieces, and disks applied to the ends of the hub to work in contact with and support the packing-pieces, substantially as shown and described.

4. In a rotary engine, the combination with the casing the piston-hub, and pistons proper, of segmental packing abutting the ends of said hub and pistons, and disks arranged exterior to the latter, substantially as described, for the purpose specified.

5. In a rotary engine, the combination with the casing the rotary slotted piston-hub, pistons arranged in the slots, and a series of segmental packing-pieces arranged at the ends of said hub and pistons, and having lapped end portions, as shown and described.

6. In a rotary engine, the combination with the casing rotary piston-hub, and pistons proper, of segmental packing-pieces arranged at the ends of said hub and pistons, of "bridges," or connecting-pieces, held in sockets formed in adjacent ends of the latter, substantially as shown and described.

7. In a rotary engine, the combination with the casing the rotary piston-hub and pistons, of the segmental packing-pieces arranged at and abutting the ends of said hub and piston, and having lapped ends provided with sockets and connecting-pieces or "bridges" arranged and held in such sockets, substantially as shown and described.

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Witnesses:

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J. H. WAITE.