(No Model.) 2 Sheets—Sheet 1.

A. HAMPE.

ROTARY ENGINE.

No. 518,812. Patented Apr. 24, 1894.

Fig. 1.

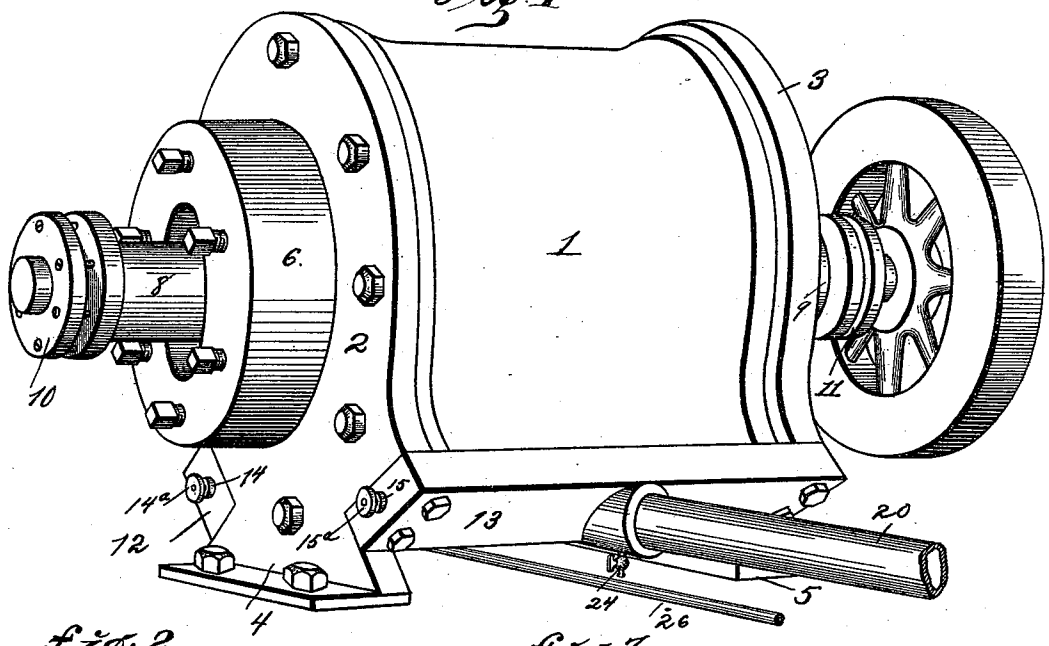


Fig. 2.

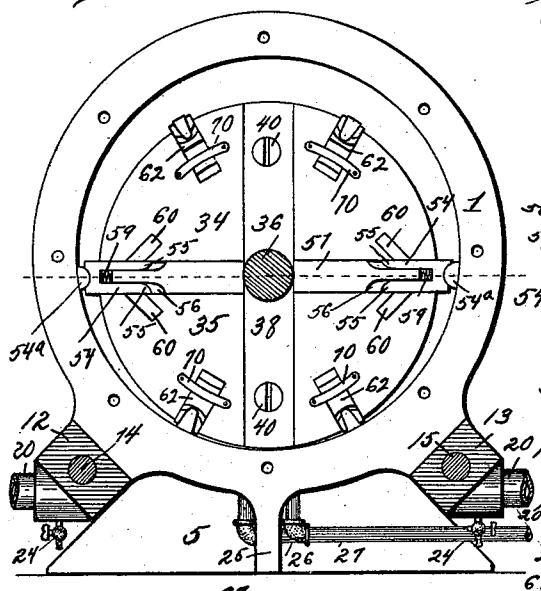


Fig. 3.

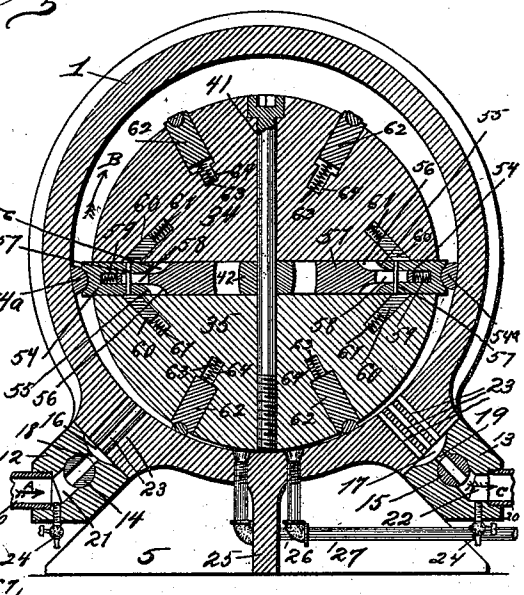


Fig. 11.

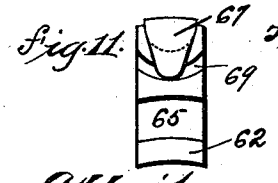
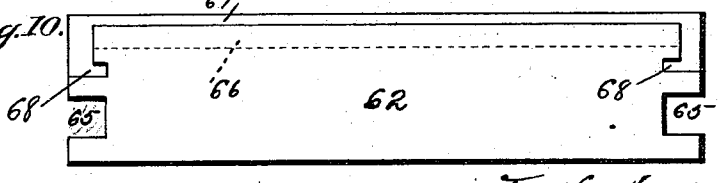


Fig. 10.



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(No Model.) 2 Sheets—Sheet 2.

A. HAMPE.

ROTARY ENGINE.

No. 518,812. Patented Apr. 24, 1894.

Fig. 4.

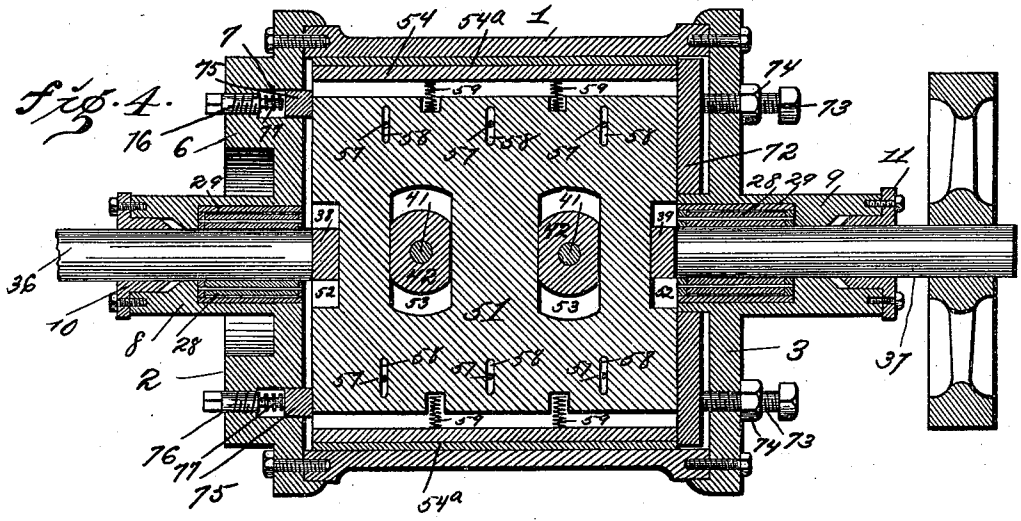


Fig. 5.

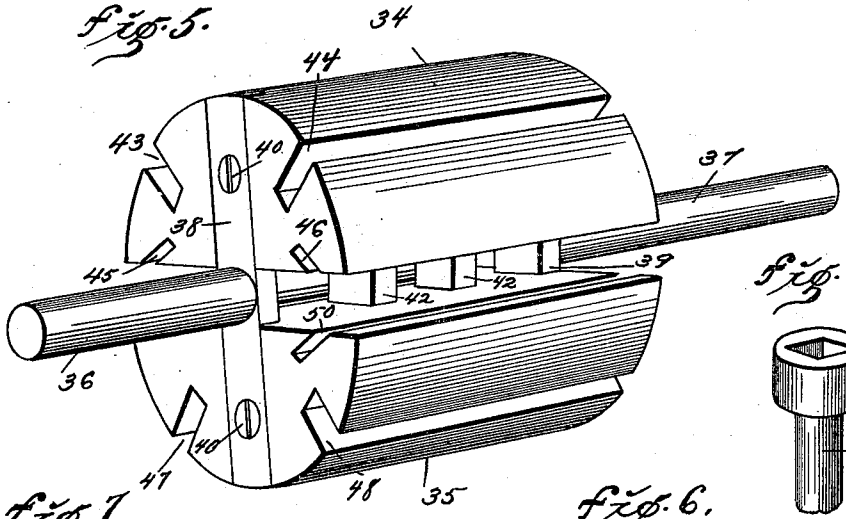


Fig. 9.

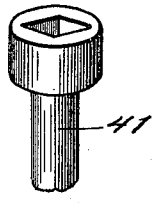


Fig. 7.

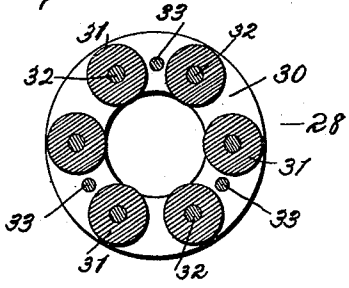


Fig. 6.

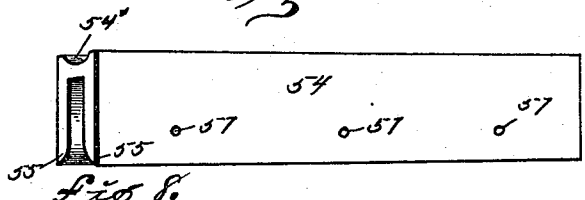
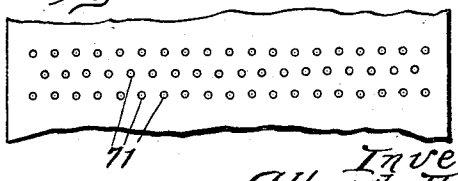


Fig. 8.



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UNITED STATES PATENT OFFICE.

ALBERT HAMPE, OF ST. LOUIS, MISSOURI.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 518,812, dated April 24, 1894.

Application filed January 22, 1894. Serial No. 497,702. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HAMPE, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to that class of rotary engines which employ a revolving piston, carrying a sliding or oscillating piston-plate, said piston and shaft, carrying the same, occupying an eccentric position relative to the engine cylinder.

The object of my invention is to provide a simple and cheaply constructed rotary engine, efficient in operation and easily manipulated.

To the above purposes my invention consists in certain new and novel features of construction that will be more fully hereinafter described and claimed.

In order that my invention may be more fully understood, I will now proceed to describe it, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my complete engine as set up and in practical operation. Fig. 2 is an end view of the engine, with one of the cylinder heads removed. Fig. 3 is a central cross-sectional view of my engine. Fig. 4 is a horizontal longitudinal sectional view of my engine. Fig. 5 is a perspective view of the piston, parts being removed therefrom to more clearly illustrate said piston, and the shafts which carry it. Fig. 6 is a perspective view of one of the parts of the sliding-piston plate, such as used in my engine. Fig. 7 is a cross-sectional view of one of the bearings formed in the cylinder heads of the engine. Fig. 8 is a detail view, showing the induction and eduction steam-ports, such as I use. Fig. 9 is a perspective view of the head of one of the bolts used in holding the piston-sections together. Fig. 10 is a side elevation of one of the auxiliary packings that I use, Fig. 11 being an end view of the same.

Similar figures refer to similar parts throughout the several views.

The numeral 1 designates the cylinder of my engine, which is similar in construction to the ordinary rotary engine, having cylinder-heads 2 and 3 secured thereto in the ordinary manner. The cylinder-heads 2 and 3 have base portions 4 and 5 formed integral therewith, which form the legs or base upon which the engine rests. The cylinder-head 2 has an outwardly extending portion 6, formed integral therewith, and in which is formed an annular groove 7. The heads 2 and 3 have journal bearings 8 and 9 provided with stuffing-boxes 10 and 11 in the ordinary form.

12 and 13 designate two plates or blocks, located immediately above the bases 4 and 5, previously mentioned, and are secured to the cylinder-heads 2 and 3 by bolts, or in any suitable manner. Located in the plates 12 and 13 are cut-off valves 14 and 15, having located on their ends, and on the exterior of the plates 12 and 13, handles 14^a and 15^a for the purpose of manipulating said cut-off valves. On the inner surfaces of these plates are formed grooves 16 and 17, slots 18 and 19 connecting said grooves with the valves. Induction or eduction pipes 20 connect with the central portion of these plates 12 and 13, and bores 21 and 22 connect said pipes with the before mentioned valves 14 and 15. The induction or eduction ports 23 connect the before mentioned grooves 16 and 17 with the interior of the cylinder. Waste-cocks 24 are provided in the plates 12 and 13 and immediately in the rear of the pipes 20, for the purpose of carrying off any condensed steam. A downwardly extending portion 25 of the cylinder 1, centrally located, serves to strengthen said cylinder and form a more substantial base. On either side of this portion 25, and connecting with the interior of the cylinder, are outlet pipes 26 and 27, which serve to carry off condensed steam from the interior of the cylinder. Anti-friction bearings 28 are formed in the bearings 8 and 9, previously referred to, and have a hardened metal covering 29 entirely surrounding them. These anti-friction bearings 28 are composed of two end-plates 30 and a series of hardened metal rollers 31 journaled on the shafts 32, which, in turn, extend from one plate to another, and serve to hold said plates together. Strengthening rods 33 serve to more substantially form these anti-friction bearings.

Referring now to Fig. 5, the piston of my

improved engine is composed of the mating semi-circular parts 34 and 35. These mating portions are held together by two separate shafts 36 and 37 having T-heads 38 and 39 formed integral therewith. These T-heads 38 and 39 lie flush with the ends of the piston, and are secured thereto by bolts or screws 40. To more substantially hold the two mating parts of the piston together, bolts 41 (the head of one of which is shown in Fig. 9) pass completely through the mating portions 34 and 35. These bolts also pass through blocks 42 located in the space between the mating parts 34 and 35. Slots 43 and 44 extend longitudinally of the part 34 for a purpose which will be hereinafter shown. Angular slots 45 and 46 are also formed in this portion 34, and open on the inner face of said portion. These slots are adapted to receive packings hereinafter described. In a like manner the mating portion 35 of the piston is fitted with slots 47 and 48 and angular slots 49 and 50. A sliding or oscillating piston plate 51, rectangular in form, is located in the space between the two mating parts 34 and 35 of the piston. Cut-away portions 52 in the ends of this oscillating plate, and openings 53 in the same, are for the introduction of the T-heads 38 and 39 of the shafts 36 and 37, and also the blocks 42 previously mentioned. The side ends of this oscillating plate 51 are cut away and adapted to receive the piston-packings 54, which are shown in detail in Fig. 6. These piston-packings 54 are slotted their entire length, the ends 55 being rounded or beveled off to fit the rounded or beveled portions 56 of the oscillating plate 51. The outer ends of these piston-packings 54 are grooved their entire length, said groove being numbered 54′. Said groove 54′ is adapted to receive a semi-circular packing-tongue 54^a. Thus it will be seen that this tongue 54^a is capable of a rocking movement, and to conform with the interior wall of the cylinder 1. Pins 57, passing through the walls of the piston-packings 54 and through slots 58 formed in the oscillating plate 51, serve to retain said piston-packings on the piston-plate. Coil springs 59 located between the ends of the oscillating plate 51, and the interior of the piston-packings 54, serve to normally hold said piston-packings 54 in the desired positions. Packings 60 are located in the angular slots 45, 46, 49 and 50, previously mentioned, and bear against the outer surfaces of the piston-packings 54. Coil springs 61 located in the rear of these packings 60, cause said packings to engage against and form a practically steam-tight joint between said packings and the piston-packings. Auxiliary packings 62 are located in the slots 43, 44, 47 and 48, previously mentioned, and are normally held outward by coil springs 63, located in spring-pockets 64 in the base of the slots 43, 44, 47 and 48, said springs bearing against the bases of the packings 62.

Referring now to Figs. 10 and 11, the construction of these auxiliary packings is clearly shown. These packings 62 are rectangular in form, having cut-away portions 65 formed in the ends thereof, and a groove 66 extending longitudinally its entire upper length. The packing-tongue 67, concave on its outer face, lies immediately within this groove 66, and has its ends projecting downwardly and lugs 68 formed integral thereon, extending into segmental slots 69 formed in the ends of the packings 62. By thus forming the packing-tongue 67, it will be seen that said tongue is capable of a rocking movement, thereby always conforming with and bearing against the interior wall of the cylinder. When these auxiliary packings 62 are in position in their respective slots, retaining plates 70, secured to and lying flush with the ends of the mating parts 34 and 35, previously mentioned, occupy the cut-away portions 65 previously mentioned, and serve to retain the movement of and hold in position the packings 62. The inlet eduction ports, previously mentioned, consist of a series of apertures 71 located in and extending through the lower wall of the cylinder 1 and are preferably "staggered," so that the entire surface between the opposite cylinder-heads is perforated in a longitudinal-line at points directly opposite the longitudinal-grooves 16 and 17 and parallel therewith. This arrangement is clearly set forth in Fig. 8. By thus providing a plurality of small ports (instead of large single ports) I may feed or exhaust steam at points near to each head of the cylinder and at points intermediate thereof, and thereby distribute and exhaust the steam more effectually, and also avoid large depressions or openings in the interior of the cylinder, and in this way avoid obstructions in the path of the moving-parts carried by the piston. A packing-ring 72, having a circular opening in its center to fit the bearing 9 previously mentioned, is located immediately between the cylinder-head 3 and the piston. Screw-bolts 73, provided with locking-nuts 74, pass through the cylinder-head 3 and engage against this packing-ring 72. A packing-ring 75, located in the annular opening or groove 7, previously mentioned, bears against the end of the piston, adjacent the cylinder-head 2. Shouldered screw-bolts 76 pass through the portion 6 of the cylinder-head 2, their inner portions being provided with pressure-springs 77 and engage against the packing-ring 75. By these packing-rings 72 and 75 any longitudinal movement of the piston is prevented.

The practical operation of my device is as follows: When the engine is set up and ready for use, we will assume that steam is taken in through the pipe 20, as indicated by the arrow "A," the cut-off valve 14 being open, the steam passes through said valve, through the induction ports 23 located adjacent the slot 16, and into the interior of the cylinder. By reason of the packing-tongue 67 of the packing 66 located in the slot 47

bearing against the interior wall of the cylinder, being in a position adjacent the induction ports 23, the natural tendency of said steam will be to pass upwardly, expand, and press against the oscillating piston-packing 54 and tongue 57, thus causing the entire piston to rotate in the direction of the arrow "B." It will be observed that the packings carried by the opposite edges of the piston-plate, and those arranged at points on the periphery of the piston, are so relatively located that (no matter at what point the piston may be in its rotation) there is always a packing located between the induction-port and the eduction-port, preventing any possible blowing-through of steam and consequent waste thereof. By reason of the movement of the oscillating piston-plate the packing-tongue 57 will always be in engagement with the interior wall of the cylinder. The steam consequently passes around the piston in the rear of the piston-packing 54 and tongue 57, and is discharged through the eduction ports 23, groove 17, slot 19, valve 15 and pipe 20, as indicated by the arrow "C." Thus it will be seen the natural tendency of the steam is always to press against the projecting piston end nearest the induction ports, as the packing prevents it from taking a reverse course. By reason of the number of packings, this operation is always the same. It will also be seen that the piston is capable of movement in either direction, depending only on whichever port is used for induction. Thus it will be seen I have provided a rotary engine with a single oscillating piston-plate, which is simple and complete in operation.

What I claim is—

1. The combination of the cylinder, two separate shafts, a T-head on each shaft, a piston-body comprising two mating semicircular-parts spaced apart by said T-heads, one of which is fixed upon one end of said body and the other fixed on the opposite end of said body, blocks located in the space between said mating-parts, bolts engaging said mating-parts and passing through said blocks, a piston-plate having slots and located also to slide in the said space with said slots engaged by said blocks, packings for said piston-plate, and packings for said piston-body, said T-heads being let into the ends of the latter so as to lie flush therewith, substantially as herein-specified.

2. In a rotary engine, a packing for the piston, composed of a rectangular plate having a groove in its upper edge occupied by a semi-circular packing-tongue, said tongue having downwardly projecting ends provided with lugs engaging in segmental slots, substantially as shown and described.

3. In a piston for rotary engines, the two mating semi-circular parts held together by T-headed shafts, and an oscillating piston-plate having on its ends spring-actuated packings carrying semi-circular packing-tongues, packings spring-actuated and located in angular slots formed in the mating parts of the piston, said packings bearing against the packings of the oscillating piston-plate, and auxiliary packings spring-actuated and carrying rocking packing-tongues, substantially as shown and described.

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

ALBERT HAMPE.

Witnesses:
M. GRIFFIN,
JNO. C. HIGDON.