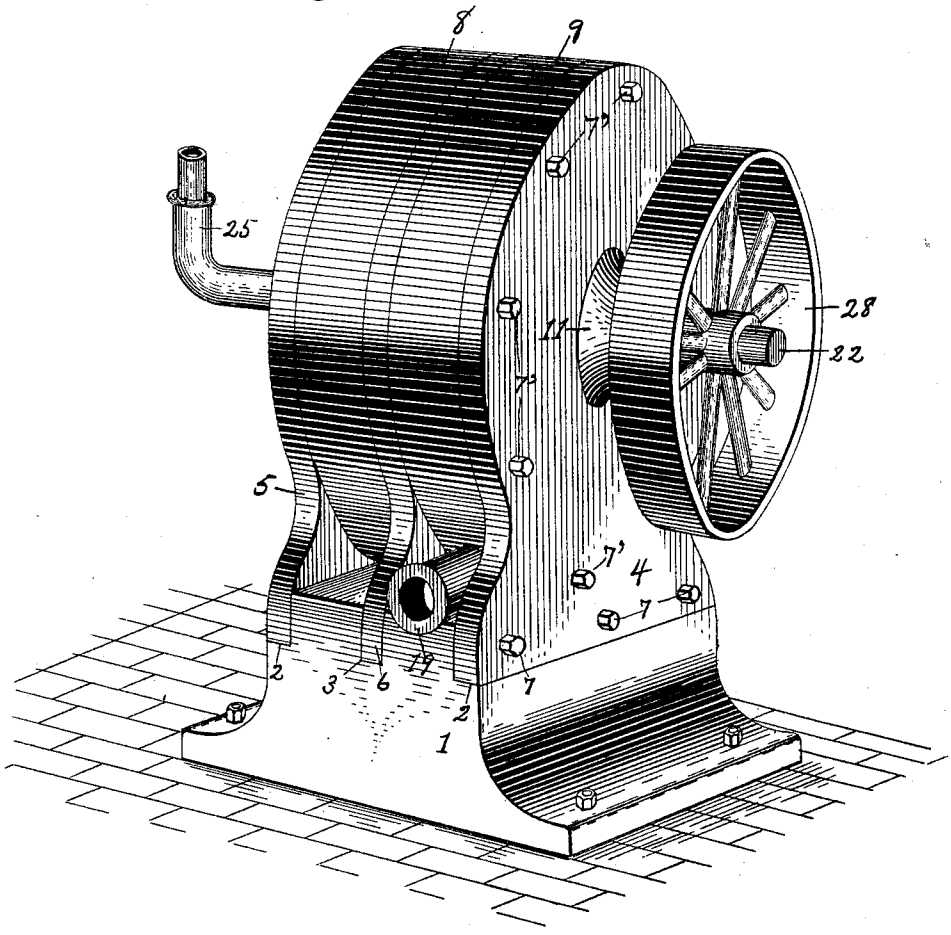
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S. W. COLLINS.

ROTARY ENGINE.

No. 600,343. Patented Mar. 8, 1898.

Fig. 1.



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Fig. 2.

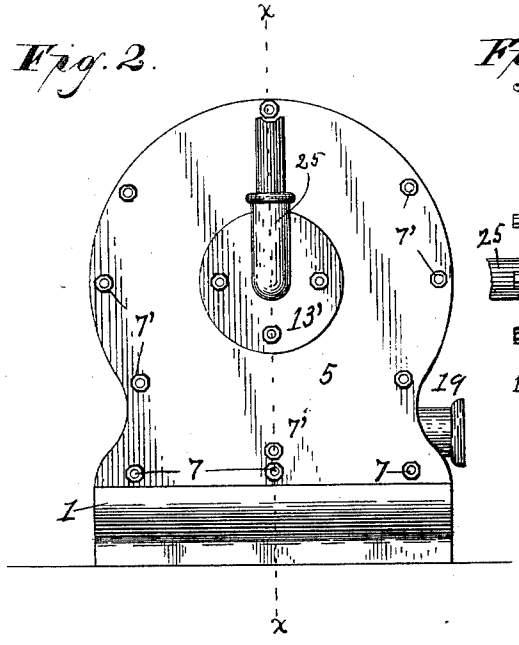


Fig. 3.

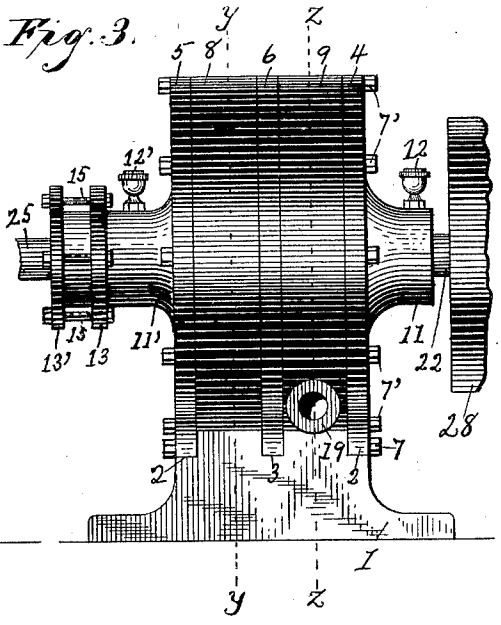


Fig. 4.

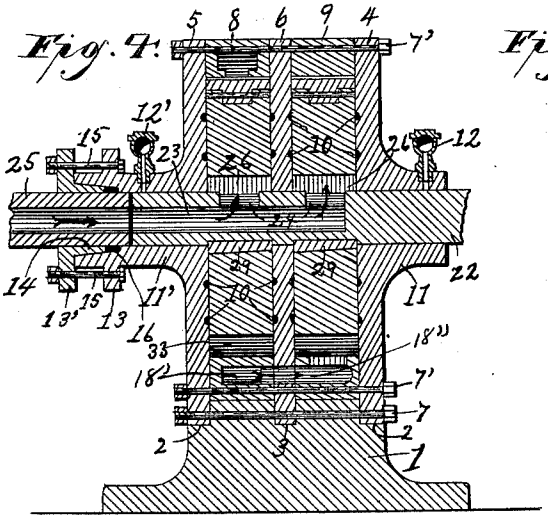
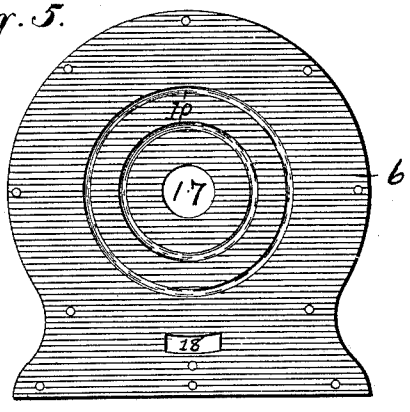


Fig. 5.



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Fig. 6.

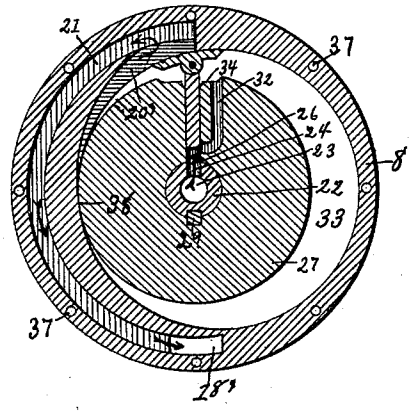


Fig. 7.

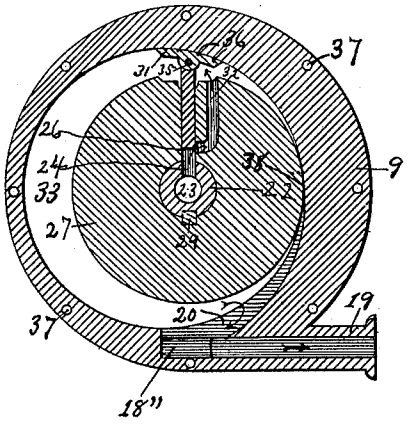


Fig. 8.

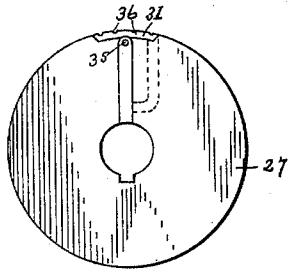


Fig. 9.

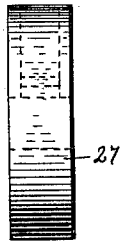
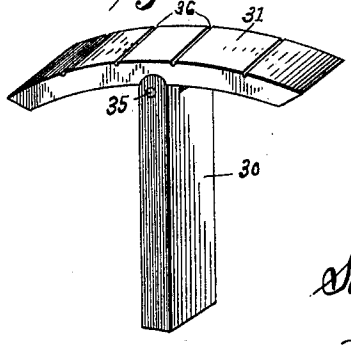


Fig. 10.



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UNITED STATES PATENT OFFICE.

SAMUEL W. COLLINS, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO PARKHURST BROTHERS & CO., OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 600,343, dated March 8, 1898.

Application filed May 14, 1897. Serial No. 636,452. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. COLLINS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Rotary Engines; and I do 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 the figures of reference marked thereon, which form a part of this specification.

My invention relates to motors of that class known as "rotary engines," and to the particular class having circular pistons provided with sliding piston-heads and adapted to be operated either by steam, water, or compressed air.

The objects of my invention are, first, to provide a motor of that class that will be simple in construction; second, that will obtain the maximum expansion of the motive agent by reason of its peculiar construction; third, that has circular pistons provided with a means for introducing the motive agent into the expansion-chambers and carrying self-adjusting heads; fourth, a means for lubricating and packing the piston heads and cylinders; fifth, that has self-adjusting piston-heads adapted to make their own cut-off; sixth, having means for introducing the motive agent through the shaft and pistons to the cylinders, and, seventh, to provide a means for conveying the exhausted motive agent from either of the chambers off through the same exhaust-pipe.

The further objects and novel features of my invention are described in the following specification and shown in the accompanying drawings.

In the drawings, Figure 1 is a perspective view. Fig. 2 is an end elevation. Fig. 3 is a side elevation. Fig. 4 is a vertical sectional view on the line X X of Fig. 2. Fig. 5 is a plan view of the partition-wall between the cylinders. Fig. 6 is a vertical sectional view on the line Y Y of Fig. 3. Fig. 7 is a vertical sectional view on the line Z Z of Fig. 3. Fig. 8 is a side view of one of the pistons. Fig. 9 is an edge view of the same, and Fig. 10 is a perspective view of the piston-head.

The motor rests upon the base 1, which has the shoulders 2 along either end and the groove 3 across its center, which respectively receive end plates 4 and 5 and the partition-plate 6. These plates are secured to the base 1 by means of the bolts 7. The cylinders 8 and 9 are respectively secured between the plates 4, 5, and 6 by means of the bolts 7′, passing through bolt-openings in said base and plates. The plates 4, 5, and 6 are all provided with the semicircular grooves 10, equidistant from their central openings, within which lubricating material is adapted to accumulate. The plate 4 is provided with an extended bearing 11, carrying the oil-cup 12. The plate 5 is also provided with an extended bearing 11′, carrying an oil-cup 12′ and having an annular flange 13 near its outer end and having the diameter of the bearing enlarged at said outer end to receive the packing-collar 14, said collar having an annular flange 13′. The flanges 13 and 13′ are provided with bolt-openings which receive the bolts 15, which secure the packing-collar and thereby hold the packing 16 in place. The plate 6 is provided with the central opening 17, which registers with the bearings of the plates 4 and 5 and has the opening 18 in its base, through which the spent motive agent passes to the exhaust-pipe.

The cylinders 8 and 9 are each provided with the large central circular openings formed out of the center, thereby making the walls thin upon one side and thick upon the other, said openings being formed so that when the cylinders are placed in position the thick and thin sides of each cylinder will be respectively opposite.

The cylinder 9 is provided with the exhaust-pipe 19 at the bottom and has in its wall the groove 20, having its greatest depth at the point where it communicates with the exhaust-pipe, which is at the bottom, and gradually decreasing in depth until it disappears one-fourth the distance around the inner circumference. The cylinder 8 is provided with an exactly similar groove 20′, having its greatest depth where it connects with the upper end of the exhaust-opening 21, which is at the

top of the cylinder. The exhaust 21 extends from the top one-half way round the cylinder through the thick portion and terminates in the side opening 18′, which is coincident with the opening 18″ in the cylinder 9, leading to the exhaust-nozzle 19. A shaft 22, having the central opening 23, extending to a short distance beyond the center and provided with the outlets 24, which admit the motive agent to the pistons, is mounted in the bearings 11 and 11′, said opening 23 coinciding with the opening in the steam-pipe 25, which connects with the steam-boiler or source of the supply of the other motive agent, and the outlets 24 coinciding with the slots 26 in the pistons.

The shaft is provided with the band-wheel 28 on its free or solid end. The pistons 27 are both of the same size and construction and are mounted upon the shaft 22 and held to rotate with said shaft by means of the keys 29, which fit in recesses formed in the shaft and pistons.

Each piston is slotted from the center of its periphery to receive the piston-rod 30, and at the peripheral end of said slot in the piston are recesses 34 to receive the piston-heads 31. Extending from each slot 26 is a port 32, which allows the motive agent to pass into the crescent-shaped chamber 33. The piston-rods 30 are adapted to slide in the slots 26 and are of the same width as the circular pistons 27 and are of such length as to entirely fill said slots when the heads 31 rest in the recesses 34. To the outer ends of the piston-rods 30 are pivotally secured by pins 35 the heads 31, segmental in longitudinal section and of the same width as the rods 30. The arc of the segment is the same as that of the openings in the cylinders 8 and 9. They are adapted to fit against the same perfectly. Across the faces of the heads are semicircular grooves 36, which serve to contain a lubricant, said lubricant acting as a packing for the head.

The cylinders 8 and 9 are provided with the bolt-openings 37, which coincide with the openings in the plates 4, 5, and 6 and receive the bolts 7′. In operation the motive agent enters the hollow shaft 22 from the pipe 25, its direction being indicated in the various views by the darts. After entering the shaft 22 the motive agent passes into the slots 26 through the openings 24 and strikes the inner ends of the piston-rods 30, thereby forcing the heads 31 against the walls of the cylinders until the rod passes the ports 32, which admit the motive agent to the chambers 33 behind the heads 31 and by its expansion holds said heads against the walls of the cylinders and forces the pistons to turn within the cylinders. In Fig. 7 the piston is shown in the position where the rod 30 has been pushed up far enough to begin to admit the motive agent through the port 32 in the small exposed portion of the crescent-shaped chamber 33, and as the piston continues to turn the rod, it will be understood, passes up through the slot 26 until it entirely uncovers the port 32 and rapidly fills the chamber 33. When the head passes the widest part of the crescent, the rod 30 is gradually pressed back into the slot until when it comes opposite the exhaust-opening the inner end of the rod will have entirely cut off the supply of the motive agent through the port 32 and the spent agent in the chamber exhausts through the nozzle 19. Just as the piston in the cylinder 9 is exhausting the piston in the cylinder 8 is beginning to admit the motive agent behind the head 31 in that cylinder. Therefore the power is wholly and constantly maintained. In Fig. 6 the piston-head in the cylinder 8 is just about to pass the exhaust-opening and allow the spent agent to pass through the opening 21, which extends around through the thick wall of said cylinder, and enter the opening 18′, which coincides with the transverse openings 18 and 18″, leading to the exhaust-nozzle.

The purpose of the gradually-decreasing grooves 20 and 20′ is to prevent air or other substance from compacting in front of the heads 31 as they pass to the point 38, where the piston comes in contact with the thick walls of the cylinders. It will be seen that the pistons 27 are smaller in diameter than the openings in the cylinders and, being mounted in the center of the cylinders and the opening in said cylinders being out of the center thereof, that one side of the pistons will be constantly in frictional contact with the thick portions at 38, thereby closing that side of the crescent-shaped cylinders. When the heads 31 pass this point 38, they will be forced into the recesses 34 across the periphery of the pistons. It will be seen that the maximum expansive force of the motive agent is obtained when the head passes the center of the crescent-shaped chamber and begins to slide back into the slot 26, while the motive agent is yet being adjusted in full force, and that it will increase until the rod 30 entirely cuts off the supply through the port 32, at which time the head passes the exhaust-opening and allows the motive agent to escape. The heads 31 being pivotally mounted on the rods 30, they will always adjust themselves to the inner walls of the cylinders 8 and 9.

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

1. A rotary engine, having cylinders mounted on a suitable base, and having suitable partition and end plates, said cylinders provided with large central openings formed out of their centers, thereby leaving one thick and one thin wall, one of the cylinders provided with an exhaust-nozzle at its bottom, and the other having the exhaust-opening extending from the top through the thick portion, to the bottom of the cylinder, and communicating with the exhaust-nozzle by means of openings extending through the intervening partition-walls, and each one of said cylinders having the gradually-decreas-

ing interior grooves beginning at the exhaust-openings and disappearing about one-fourth the distance around the interior walls thereof, and circular pistons mounted within said cylinders upon a hollow shaft, said pistons having the slots to receive the piston-rods carrying adjustable grooved piston-heads, and openings extending from the slots to the recesses formed in the periphery of the pistons to receive the piston-heads, all as set forth.

2. A rotary engine, comprising a base 1, having shoulders 2, and a groove 3, the end plates 4 and 5, having the semicircular grooves 10, the extended bearings 11 and 11′, the bearing 11′ having the annular flange 13, securing the packing-collar 14, the central plate 6, having the semicircular grooves 10, upon each side equidistant from the central opening 17, and the opening 18, through the base, the cylinders 8 and 9, having their respective thick and thin walls, said cylinder 9, having the exhaust-nozzle 19, and the gradually-decreasing groove 20, the cylinder 8, having the curved opening within the thick wall, and the gradually-diminishing groove 20′, the hollow shaft 24, mounted in the bearings 11 and 11′, and carrying the circular pistons 27, said pistons having the slots 24, the recesses 34, and openings 32, extending from said slots to said recesses, piston-rods 30, adapted to slide in said slots 24, and having the self-adjusting grooved heads 31, secured thereto by means of the pins 35, all as shown and described.

3. In combination in a rotary engine, the base 1, having shoulders 2, a groove 3, the end 4, having the bearing 11, and the grooved inner face; the central plate 6, having the grooves 10, on either side, and the opening 18, in the base and the central opening 17; the end plate 5, having semicircular grooves 10, and a bearing 11′, said bearing provided with the annular flange 13; the packing-ring 14, secured against the bearing 11, by means of bolts 15, the plates 4, 5 and 6, secured to the base by bolts 7, and upon the cylinders by the bolts 7′; the hollow shaft 22, having the central opening 23, and having openings 24, leading therefrom; the cylinders 8 and 9, having the thick and thin walls, and the sloping grooves 20 and 20′, said cylinder 8, having the exhaust-nozzle 19, at the bottom, and the cylinder 9, having the opening 21, extending through the thick portion and passing out through the horizontal openings 18, 18′, and 18″, to the exhaust-nozzle 19; and the circular pistons 27, carrying piston-rods 30, in slots 26, said rods having the adjustable segmental heads 31, with grooves across the faces thereof, openings extending from the slots 26, through the piston to the recessed portions 34, which are adapted to receive the heads 31, substantially as set forth.

4. In a rotary engine, the combination of the cylinders 8 and 9, having the large central openings formed out of their centers, thereby leaving the walls upon one side thereof thicker than on the other, and having the gradually-decreasing exhaust-grooves 20 and 20′, formed in their inner faces, one of said cylinders having the exhaust-nozzle extending from the exhaust-groove 20, and the other having the exhaust-opening 21, extending from the exhaust-groove 20′, down through the thick wall of the cylinder to the opening 18′, said opening coinciding with the opening 18, in the dividing-plate 6, and the opening 18″, in the cylinder 9, which communicates with the exhaust-nozzle 19, with the circular pistons 27, mounted upon a hollow shaft 22 within said cylinders, the diameter of said pistons being less than the diameter of the openings in the cylinders, thereby forming within each cylinder a crescent-shaped chamber 33; slots 26, in said pistons to receive piston-rods 30, said slots communicating with openings 24, in the shaft, recesses formed in the pistons at the peripheral ends of the slots, ports 32, in the pistons extending from the slots 26, to the recesses 34, heads 31, pivotally secured upon the piston-rods 30, said heads having grooves 36, across their faces, and adapted to adjust themselves to the outer walls of the chambers 33, and lie within the recesses 34, when passing the thick portions of said walls, as shown and described.

5. In a motor of the class described, the combination with the cylinders having their walls thick upon one side and thin upon the other, and provided with suitable openings and grooves for permitting the escape of the spent motive agent of the circular pistons 27, mounted upon a shaft 22, said shaft having a central opening 23, and side openings 24, the pistons having slots 26, which coincide with openings 24 in the shaft 22, recesses 34 at the outer ends of the slots 26, and openings 32 in the pistons, leading from said slots to said recesses, piston-rods 30, having self-adjusting heads 31, pivotally secured thereto, said rods adapted to slide within said slots 26, and as they alternately slide up and down in said slots to open and close the inner ends of the openings 32, thereby alternately cutting off the supply of the motive agent passing in through the hollow shaft 22, substantially as set forth.

6. In a rotary engine of the class described, the combination of the plates 4, 5 and 6, secured upon the base 1, by the bolts 7, said plate 4, having the extended journal-bearing 11, the plate 5, having the extended journal-bearing 11′ provided with the annular flange 13 near its end, whereby a packing-ring 14, having an annular flange 13′ is adapted to be secured thereto by means of the bolts 15, the plate 6, having the central circular opening 17, and the exhaust-opening 18, all of said plates provided with the semicircular grooves 10, equidistant from the central openings, with the cylinders 8 and 9, secured as shown by the bolts 7′, the circular pistons 27, having the sliding piston-rods 30, and the pivotally-secured heads 31; and the shaft 22, passing through the open-

ings in the plates 4, 5 and 6, and having the central opening 23, the side openings 24, and carrying a fly-wheel 28, upon its projecting solid end, all substantially as shown and described.

7. In a rotary engine, having cylinders in which one wall is of greater thickness than the other, said cylinders provided with gradually-diminishing grooves 20 and 20′, one of said cylinders having an exhaust-nozzle 19, at its bottom and the other having the exhaust-opening 21, extending from the top around through its thick wall to the opening 18′ in the bottom, which communicates with the exhaust-nozzle 19, in the other cylinder, the combination of the movable segmental-shaped heads 31, and the sliding rods 30, said heads pivoted upon the rods and having grooves 36, across their faces to contain a lubricant, and adapted to adjust themselves to the inner walls of the cylinders, said rods adapted to slide in slots 26, within the circular pistons 27, and as they alternately slide up and down in said slots to alternately close the openings 32, through which the motive agent is admitted to the crescent-shaped chambers 33, substantially as set forth.

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

SAMUEL W. COLLINS.

Witnesses:
WM. M. DUNLAP,
L. NATHAN.