No. 813,024. PATENTED FEB. 20, 1906.

J. H. RENNER.

ROTARY ENGINE.

APPLICATION FILED FEB. 23, 1905.

Fig. 1.

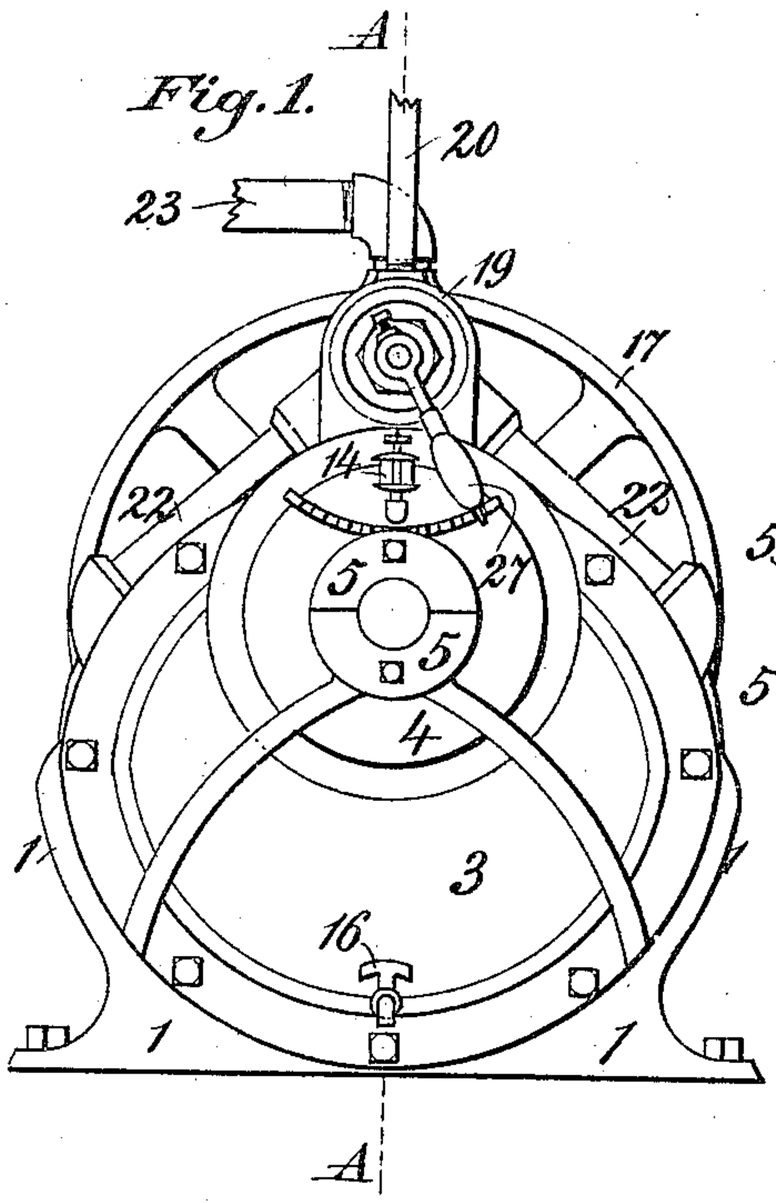


Fig. 2.

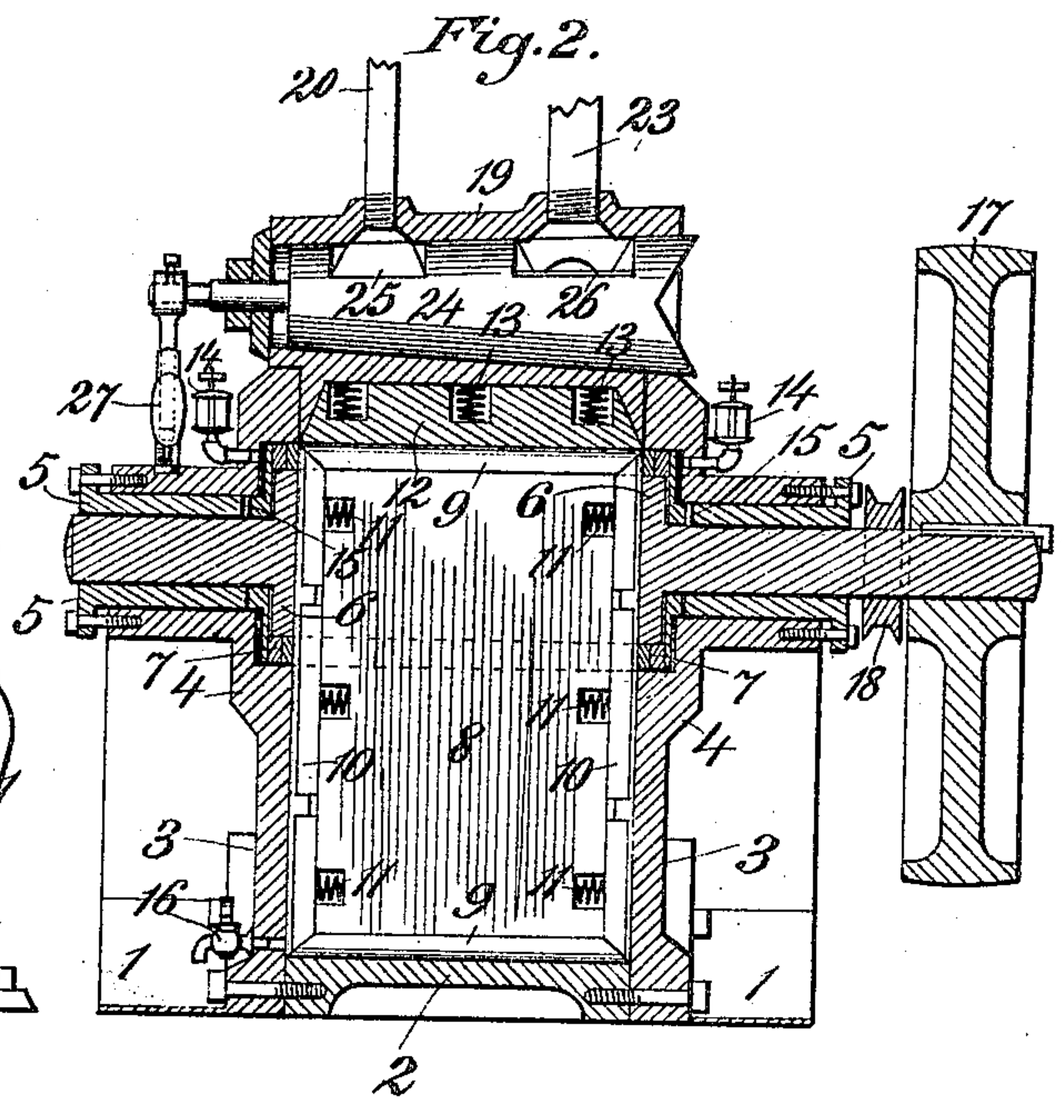


Fig. 3.

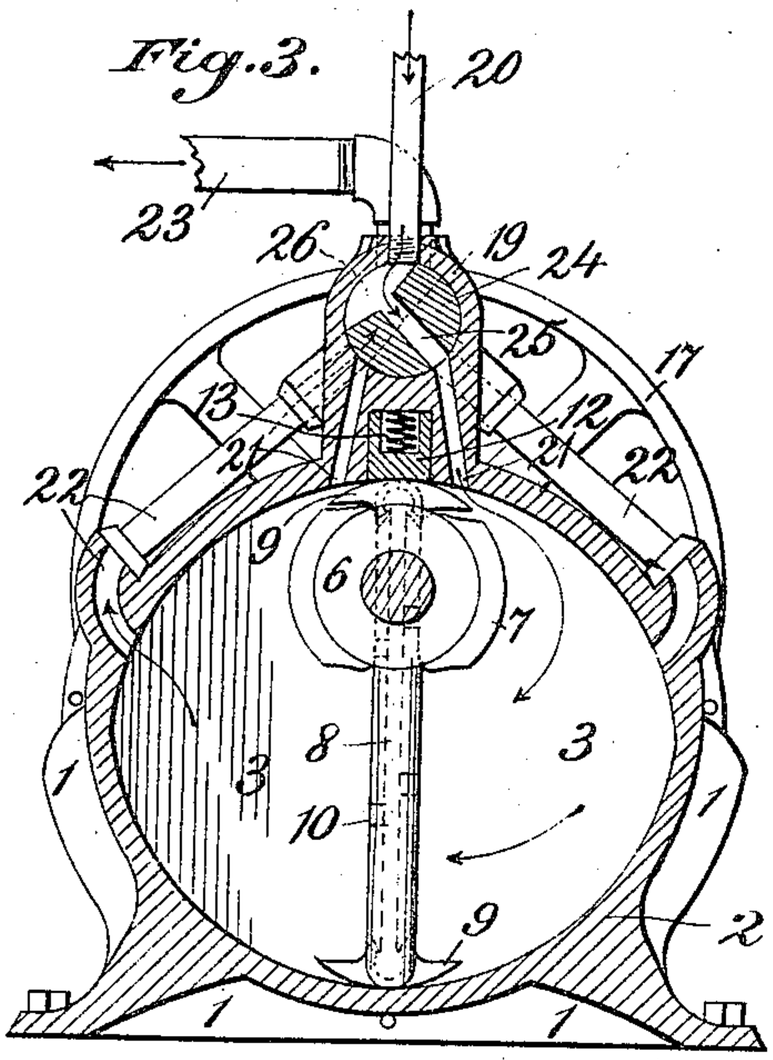
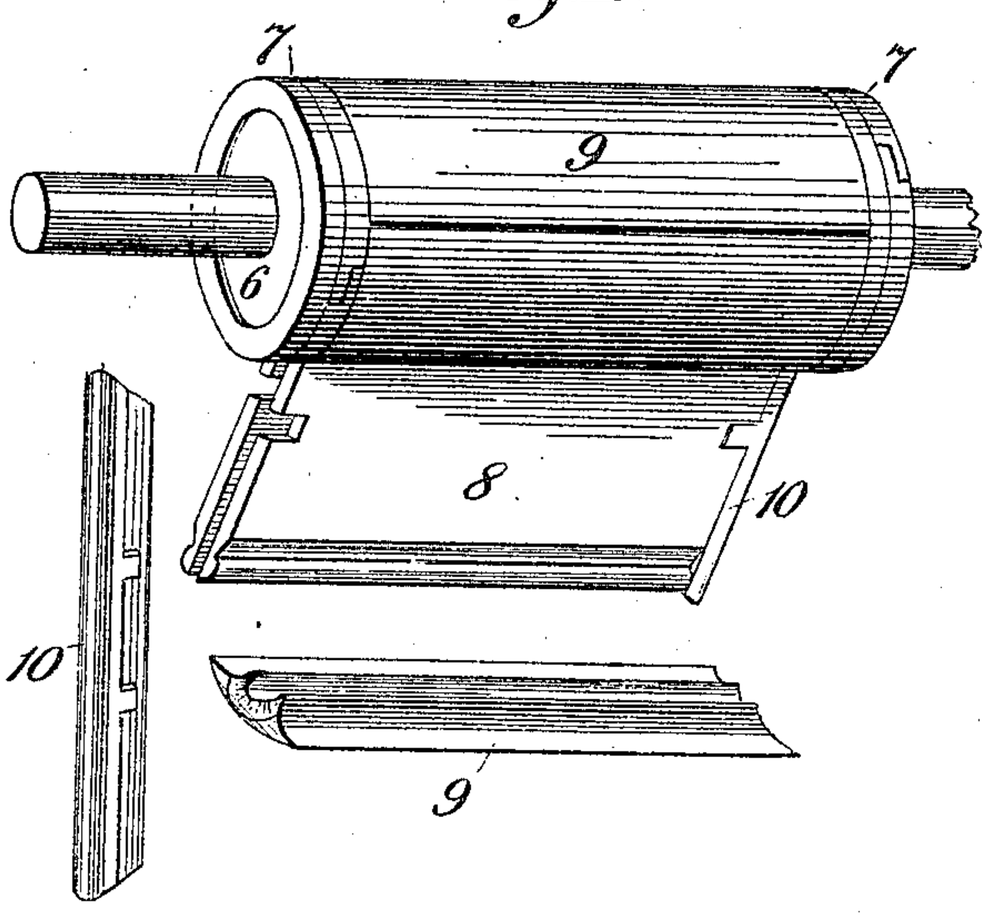


Fig. 4.



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ROTARY ENGINE.

No. 813,024. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed February 23, 1905. Serial No. 247,030.

To all whom it may concern:

Be it known that I, JACOB H. RENNER, a citizen of the United States, residing at Canal Dover, in the county of Tuscarawas and State of Ohio, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to improvements in a practical type of rotary engine to be driven by steam, compressed air, or other pressure fluid which will give double the power that any reciprocating engine does with the same quantity of steam, compressed air, or other pressure fluid.

My objects are, first, to construct this type of reversible rotary engine of a few parts so arranged that there will be no expensive wearing parts to replace and little delay in replacing any worn parts. Secondly, to prevent the loss of pressure fluid around the piston-drum head, thereby also dispensing with the stuffing-boxes around the driving-shaft. These are found unsuitable and costly in practice. Thirdly, to support the cylinder-heads with their shaft-bearing sleeves and brackets on projecting flanges cast on head ends of cylinder, which takes up the heavy strain from the driving-pulley on large engines. Fourthly, to prevent the loss of pressure fluid along the sides of the sliding piston-plate and cylinder-heads, also the unequal wear. Fifthly, to secure a better reversing-valve which can be moved easily by hand when the pressure fluid is turned on it. I will proceed to describe the same with reference to the accompanying drawings, in which—

Figure 1 is a front view of the engine with throttle-governor and lubricator detached. Fig. 2 is a sectional view on the line A A, Fig. 1. Fig. 3 is an internal view. Fig. 4 is a perspective view of the piston-drum and sliding piston-plate with the elastic followers, one side contact-bar and one piston-shoe removed.

Similar numerals refer to similar parts throughout the views.

1 represents projecting flanges cast on head ends of oval cylinder 2, supporting cylinder-heads 3, with their shaft-bearing sleeves, and brackets 4, cast on cylinder-heads 3, against the heavy strain of the driving-pulley in engines of large size. Shiftable bearing-bushings 5, which also serve to hold the elastic circular followers and open piston-rings 7 in elastic contact with piston-drum head 6 to prevent loss of pressure fluid around piston-drum head and also thereby dispensing with stuffing-boxes around the driving-shaft. Said shiftable bearing-bushings 5 are drawn against the elastic followers by screws through their collars and into the bearing-sleeves. The elastic circular followers consist of a thin circular plate of elastic metal with a neck bearing on the outer face, permitting a spring action when the bearing-bushings 5 are shifted against their neck-bearings. I adopt a cylinder of oval form, so that the sliding piston-plate 8, which slides through and revolves with the eccentrically-placed piston-drum 6, will have a positive sliding action and not cause the severe friction due to centrifugal force in rotary engines where the piston-plate 8 is not a single member, like that shown in the drawings. I do not give the piston-shoes 9, hinged on ends of piston-plate 8, an extension or outward movement from the piston-plate, as this would also cause centrifugal forcing of the piston-shoes 9 against cylinder during high speed. Any wear on inner cylinder-surface or piston-shoes 9 will still allow the rear part of shoes to keep contact with cylinder by use of the hinged joints.

The piston-plate 8 has side contact-bars 10, carried in grooves on sides of piston-plate and moved out by springs 11. The ends of side contact-bars 10 fit round sockets in ends of piston-shoes 9. These side contact-bars 10 have projecting wings over the grooves in which they are carried, making their face as wide as the slot through the piston-drum 6, so that they will not wear unevenly into piston-drum and cylinder-heads by their sliding action. The spurs on sides of contact-bars 10, fitting corresponding slots in piston-plate 8, prevent the pressure fluid passing between wings of side contact-bars and piston-plate. To prevent the pressure fluid passing from the admission to the exhaust side of cylinder between inner surface of cylinder and piston-drum 6, I employ a wide contact-plate 12 in a groove the full length of cylinder. This plate is held in contact with piston-drum 6 by the pressure fluid or springs 13.

It will be noticed that I employ means to lubricate the shaft ends of the piston-drum 6, on which are governor-belt pulley 18 and driving-pulley 17. The oil-cups 14 permit oil to flow down to slots 15 in shiftable-bearing-bushings 5, lubricating the shaft-bearings and the neck-bearings of the elastic cir-

cular followers 7, which revolve with the open piston-rings and piston-drum 6. Said piston-drum has turned bosses and stub-shaft ends, which enter eccentric circular recesses in cylinder-heads 3, but leave sufficient space between to insert the piston-rings and elastic followers, the neck-bearings of said followers coming in contact with the inner ends of shiftable bushings 5.

To control and reverse the engine, I use a reversing-valve 19, cast on or attached to cylinder, which can be easily moved by hand in large rotary engines when the pressure fluid is turned on it. This valve has a taper bore fitted with a taper core 24. At the top of the small end of the taper bore enters the supply-pipe 20. At the base of the same end are two feed-ports 21, which alternately coincide with the inlet-slot 25. When the taper core 24 is moved by means of the reversing-lever 27, said taper core has at its small end a threaded valve-stem, with washer and nut to hold and adjust it, and the lever attached to the valve-stem has a telescoping handle resting on the notched guide below it, which is bolted on a bearing-sleeve. At the top of the large end of taper bore is placed the exhaust-pipe 23. At the base of the same end enter from the exhaust-ports in the cylinder the exhaust-conduits 22, which alternately coincide with the semicircular exhaust-slot 26 through large end of taper core 24 and exhaust-pipe 23. At base of cylinder-head 3 is placed a cylinder-cock 16.

The operation of the engine is as follows: When the engine is to run to the right, the reversing-lever 27 is moved to the right, the pressure fluid from the supply-pipe 20 passes through the valve-inlet slot 25 into the right-hand feed-port 21, from thence into the right-hand side of cylinder, the exhaust-port 22 on that side being blanked by the reversing-valve. The pressure fluid is brought to bear against the sliding piston-plate 8, causing it to rotate the eccentric-piston drum 6, through which it slides as its ends follow the variable curve and distance of the inner cylinder-surface. When the piston-plate 8 is in the position shown in Fig. 3, it is at the cut-off point, the upper piston-shoe 9 closes the feed-port 21, and the pressure-fluid expanding drives the lower end of piston-plate 8 past the left-hand exhaust-port 22. From there it leaves the cylinder and passes through reversing-valve by outlet-slot 26 and out of exhaust-pipe 23. Before such exhaust occurs the opposite end of piston-plate 8 is projected into the admission side of cylinder, another pressure-chamber is formed and that end of sliding piston-plate has passed blanked exhaust-port 22, preventing waste of the pressure fluid contained in the blanked exhaust-conduit 22, when said pressure-chamber exhausts at opposite exhaust-port. To reverse the engine, the reversing-lever 27 is moved to the left of the notched guide below it, which causes the pressure fluid to enter at the left-hand feed-port 21, and at the same time blanks the other feed-port and left-hand exhaust 22 and opens the right-hand exhaust 22. To stop the engine, the reversing-lever handle is moved to center of notched guide on which it tags. This rotary engine has no "dead-point" from any position, and with its load on it can be instantly started or reversed. It will run at low or high speed with any load up to its full power, with no more vibration than an electric motor and comparing their power occupies but a fraction of the space.

The driving-shaft of this rotary engine can be directly connected to the shaft of a dynamo, giving desired speed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a rotary engine, of a rotary eccentric piston, comprising a revoluble slotted drum and sliding piston, the cylinder and cylinder-heads thereof, with the shiftable shaft-bearing bushings, and piston-rings having the circular elastic-metal followers, substantially as shown and described.

2. In a rotary engine, the combination of the shiftable shaft-bearing bushings and the piston-drum having the circular elastic-metal followers and piston-rings, substantially as set forth.

3. In a rotary engine, the semicircular flanges cast on cylinder at head ends flush with outer edge of bearing-sleeves and brackets, substantially as shown and described.

4. In a rotary engine, the combination of the cylinder, the revoluble piston-drum and sliding piston, with the projecting winged side contact-bars, the spurs on them, and the corresponding slots in piston-plate, substantially as set forth.

5. In a rotary engine, the combination of the projecting winged side contact-bars, the spurs on them and the corresponding slots in the piston-plate, substantially as described.

6. In a rotary engine, a cylinder with the upper extension, comprising a taper valve-bore, with inlets and outlets, the taper valve-core, with inlet and outlet slot, the threaded valve-stem, washer and nut, the operating-handle and notched guide below it, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

JACOB H. RENNER.

Witnesses:

JACOB P. ZEIGLER,

GEORGE LENGERER.