

W. L. McFARLAND.
 ROTARY MOTOR.
 APPLICATION FILED MAY 8, 1918.

1,350,231.

Patented Aug. 17, 1920.

3 SHEETS—SHEET 1.

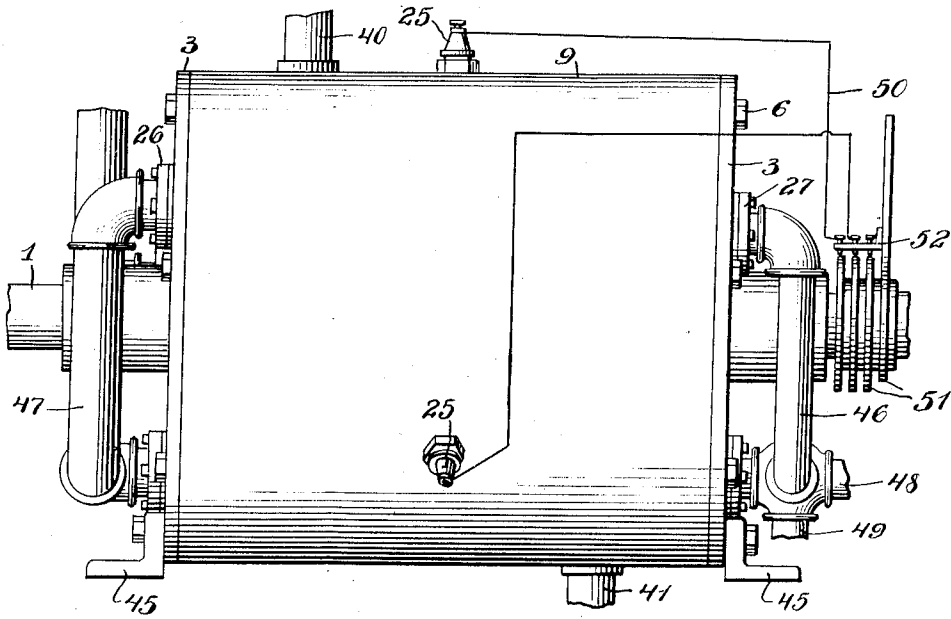


Fig. 1.

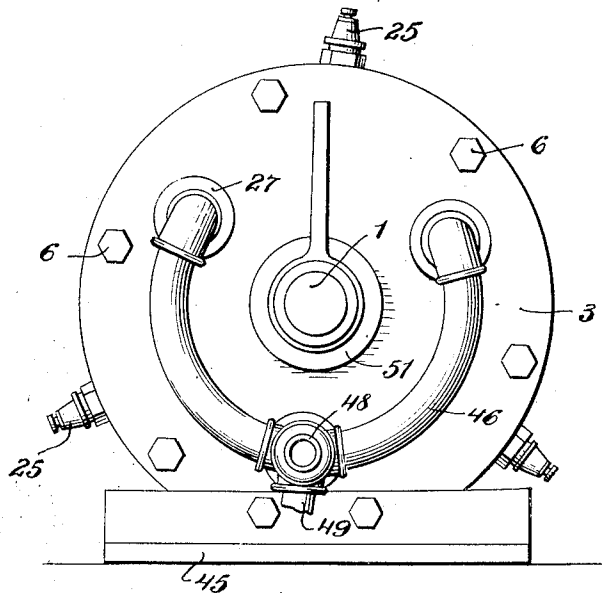


Fig. 2.

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WITNESS:

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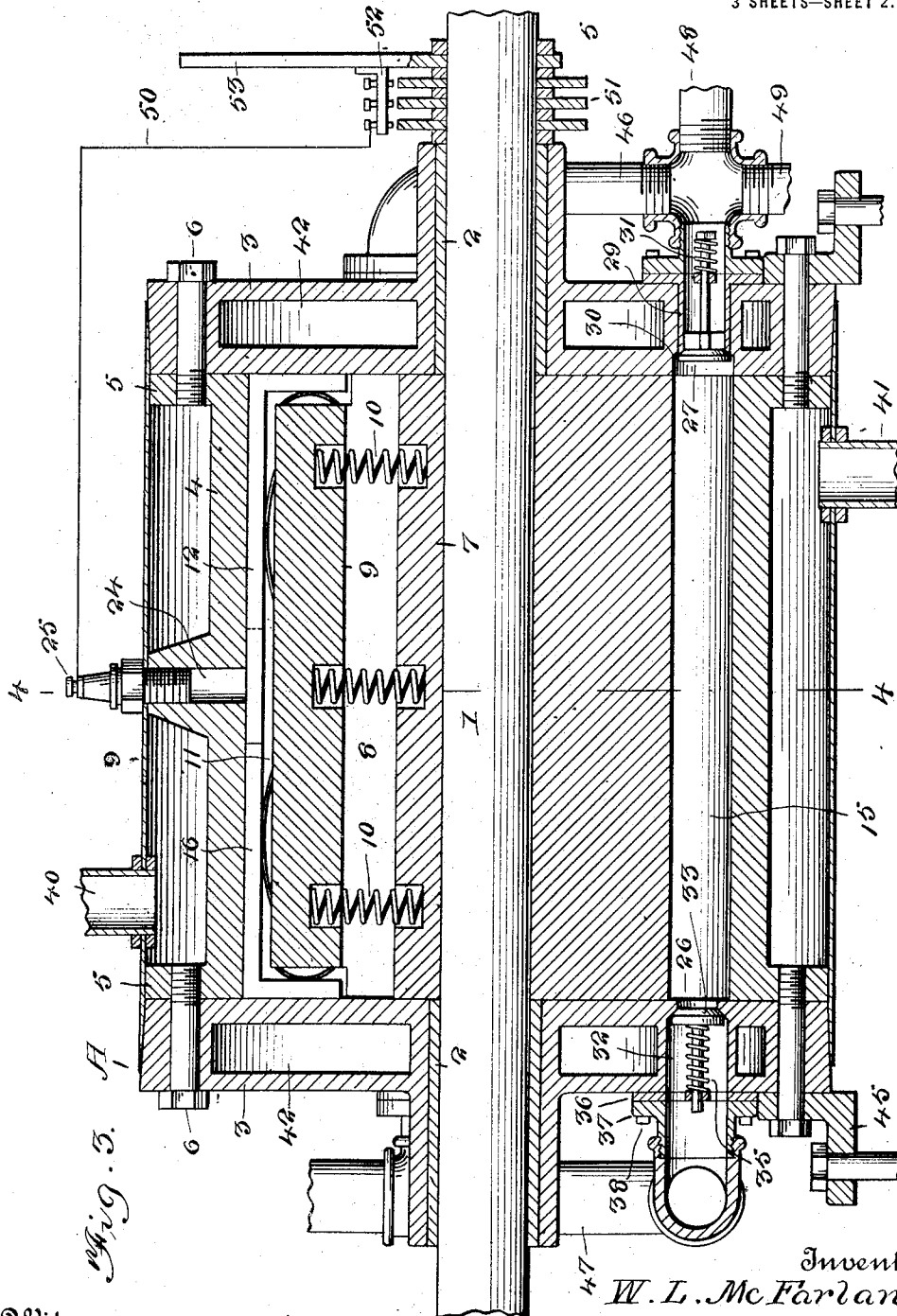


Fig. 3.

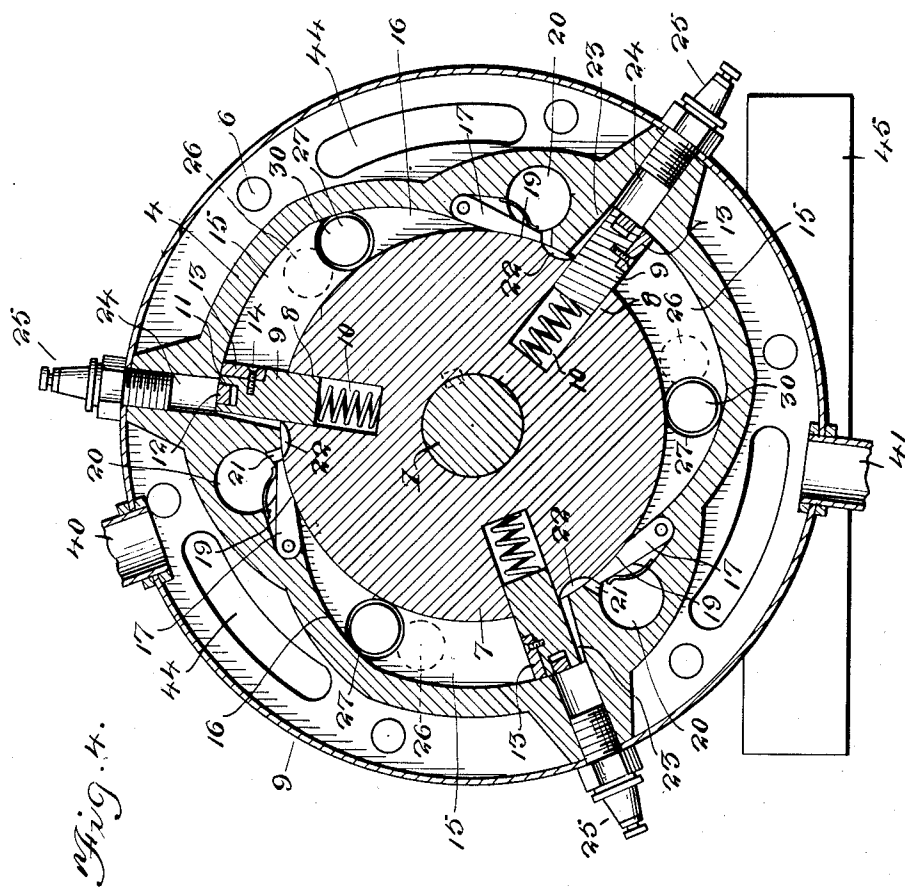
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM L. McFARLAND, OF FAIRFIELD, ILLINOIS.

ROTARY MOTOR.

1,350,231.

Specification of Letters Patent. Patented Aug. 17, 1920.

Application filed May 8, 1918. Serial No. 233,271.

To all whom it may concern:

Be it known that I, WILLIAM L. McFARLAND, a citizen of the United States, residing at Fairfield, in the county of Wayne and State of Illinois, have invented new and useful Improvements in Rotary Motors, of which the following is a specification.

This invention relates to rotary motors or engines, the object in view being to produce a prime mover of the rotary type in which a practically continuous shock is imparted to the engine shaft and vibration and weight reduced to a minimum, thereby adapting the motor particularly for use in connection with automobiles and aircraft of all kinds.

A further object of the invention is to produce a motor of the class described in which a plurality of working strokes or impulses are obtained at each of several different points during each revolution of the engine shaft, thereby increasing the power efficiency of the engine without increasing the size and weight of the same.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts, as herein described, illustrated and claimed.

In the accompanying drawings,

Figure 1 is a side elevation of the improved motor.

Fig. 2 is an end elevation thereof looking toward the intake.

Fig. 3 is a vertical longitudinal section through the motor.

Fig. 4 is a vertical cross section through the same on the line 4—4 of Fig. 3.

The improved motor comprises a central rotary engine shaft 1 which is journaled in bearings 2 located centrally of the water jacketed heads 3 or a stationary or non-rotary casing designated generally at A and comprising in addition to the heads 3 a generally cylindrical or peripheral wall 4 which is provided at its opposite ends with circumferential flanges 5 secured to the heads 3 by cap screws or bolts 6 as shown.

Fast on the shaft 1 within the casing A is a rotor 7 having a plurality of longitudinally and radially extending recesses 8 therein, in each of which is mounted a slidable vane or wing 9 movable in a substantially radial path and pressed outwardly by means

of one or more expansion springs 10 arranged behind the inner edges of said vanes or wings and acting to press the outer edges of said vanes against the inner wall portions of the casing A.

Each of the wings or vanes 9 is formed in the outer and side edges thereof with grooves 11 to receive L-shaped packing ring sections 12 to provide a fluid tight contact between each of said vanes or wings and the contiguous walls of the casing A. Each wing or vane 9 is also provided with a detachable wear plate 13 secured in place by screws 14 or the equivalent thereof, said wear plate being renewable when required, and the outer edge thereof working against the inner peripheral wall of the casing.

The casing A is formed with a circular series of combustion chambers 15, the major portion of the outer wall of which is concentric to the periphery of the rotor 7. Toward the farther end of each combustion chamber 15, the outer wall thereof converges toward the periphery of the rotor as shown at 16 in order to press the adjacent wing or vane 9 into the respective recess 8 of the rotor, overcoming the tension of the springs 10. Adjacent to the constricted end of each combustion chamber 15 there is arranged a swinging valve 17, the same being mounted upon a pin 18, the axis of which is parallel to the axis of the engine shaft 1. Adjacent to its free end, each valve 17 has a concave face 19 which bears against and conforms in curvature to the periphery of the rotor 7. Just beyond each valve 17, the casing 8 is formed with an internal compression chamber 20 having a discharge passage or slot 21 which leads in the direction of the adjacent combustion chamber 15. Throughout a greater portion of the movement of the rotor 7, the latter cuts off communication between each compression chamber and the adjacent combustion chamber but, at a certain time, one of a series of recesses, or ports 22 in the periphery of the rotor opens up communication between each compression chamber and the adjacent combustion chamber, permitting the fluid compressed in the chamber 20 to flow quickly into the adjoining combustion chamber 15 between the respective vane or wing 9 and a fixed abutment surface or shoulder 23 constituting the end

wall of the adjacent combustion chamber, all as clearly shown in Fig. 4. Communicating with the receiving end of each combustion chamber, is a spark plug cavity or chamber 24 in which is inserted a spark plug 25. As shown in the drawings, there are three combustion chambers 15 and three compression chambers 20 arranged to be thrown intermittently into communication with the respective combustion chambers. As the mixture is compressed ahead of one of the wings or vanes 9, it is forced past the adjacent valve 17 into the next compression chamber 20. The casing A is formed in one of the heads thereof with exhaust ports 26 and in the other head thereof with intake ports 27, the number of intake ports 27, corresponding with the number of combustion chambers. Each exhaust port 26 is arranged slightly in advance of the respective intake port 27 so that exhaust is effected before a fresh charge is taken into the combustion chamber, the adjacent vane or wing 9 first passing the exhaust port and then the intake port. As soon as the exhaust port and valve are uncovered by the vane 9, the hot exhaust gases rush out through the exhaust port causing a partial vacuum in the chamber 15, followed by an inrush of a fresh charge through the intake port and valve to fill said chamber due to such partial vacuum.

One of the heads 3 of the casing is formed with a circular series of openings 28 in each of which is inserted the tubular cage 29 of an intake valve 30, shown as of the automatic type, the same being held against its seat formed in the inner end of the cage 29 by means of a spring 31 allowing the valve to open inwardly.

The other head of the casing is formed with a circular series of openings 32 in each of which is arranged an outwardly opening exhaust valve 33 held against its seat 34 by means of a spring 35. The stem of each valve 33 passes through a valve guide 36 which is clamped in place by means of a retaining member 37 secured by fastening means 38 to the adjacent head of the casing as illustrated in Fig. 6.

Surrounding the peripheral wall 4 of the casing A and supported by the peripheries of the flanges 5 is a thin metal water jacket or shell 9 which is secured to the flanges 5 and if desired the heads 3 by any suitable fastening means. This makes a light weight water jacket which has an enlarged nozzle 40 and an outlet nozzle 41 located respectively at the bottom and top of the casing and adjacent to opposite ends thereof, thereby providing for an efficient water cooling of the casing, the heads 3 are also formed with water jackets 42 which are in free open communication with the peripheral

water jacket by means of arcuate ports 44. Angle iron supporting feet 45 are secured to the lower portion of the stationary casing of the engine by the same cap screws 6 which fasten the heads 3 of the casing to the flanges 5 of the wall 4 of said casing. A curved intake manifold 46 connects with the intake ports 27 of the engine, and a similarly formed exhaust manifold 47 communicates with all of the exhaust ports 27 of the engine. The intake manifold 46 is shown as having a separate carbureter inlet nozzle 48 and air inlet nozzle 49.

The spark plugs 25 have connected thereto wires 50 which lead to a commutator 51, one of the elements 52 of which may be turned manually by means of a lever 53 to advance and retard the spark, causing earlier or later ignition in each or all of the combustion chambers of the engine.

To operate the engine, the rotor is turned by means of the engine shaft to the right, until the vanes or wings of the rotor pass the inlet valves. Then the rotor is turned by the same means in a reverse direction against compression until the charges in the combustion chambers are ignited and exploded. This forces the vanes to the right, affecting three impulses, one in each of the combustion chambers. As the engine turns over, fresh charges are drawn into the combustion chambers and compressed ahead of the vanes, burned gases being forced by said vanes out through the exhaust ports. As the recesses in the rotor register with the compression and combustion chambers and place the same temporarily in communication with each other, the compressed charges in the compression chambers are liberated into the combustion chambers and ignited behind the vanes or wings. There are thus three simultaneous explosions and impulses and this is repeated three times in each revolution of the engine shaft. The construction described eliminates all heavy special frame work and base construction, avoids the use of a larger number of vanes or wings and the wear and friction incident thereto, overcomes the necessity of forming the major portion of each combustion chamber in the rotor, does away with the expensive troublesome and heavy cast iron water jackets, and insures better combustion by leading the fresh mixture through warm channels maintained in a heated condition by the contiguous relation thereof to the body of the engine.

The weight of the motor may be carefully balanced by careful designing and in view of the fact that the power is exerted at equal intervals and always in the same direction, vibration is reduced to a minimum and the necessity of employing a fly wheel is avoided. The engine is of simple construction.

struction, may be easily and cheaply manufactured and will be found highly valuable in automobile and aircraft practice, as the engine may be operated in a vertical or horizontal position or at various angles.

I claim:—

1. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, and a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake and exhaust ports in direct communication with said combustion chambers, the rotor having ports in its periphery which intermittently place the compression and combustion chambers in communication.

2. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake and exhaust ports in direct communication with said combustion chambers, the rotor having ports in its periphery which intermittently place the compression and combustion chambers in communication, and pivotally mounted compression trap valves arranged between contiguous compression and combustion chambers.

3. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake exhaust ports in direct communication with said combustion chambers, the rotor having ports in its periphery which intermittently place the compression and combustion chambers in communication, and pivotally mounted compression trap valves arranged between contiguous compression and combustion chambers, the outer walls of the combustion chambers

converging toward said compression trap valves and compression chambers.

4. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake and exhaust ports in direct communication with said combustion chambers, and means for intermittently opening communication between each compression chamber and the adjacent combustion chamber.

5. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake and exhaust ports in direct communication with said combustion chambers, the rotor having ports in its periphery which intermittently place the compression and combustion chambers in communication, a circular series of intake valves in one head of such casing and a corresponding series of exhaust valves in the other head of such casing.

6. In a rotary engine, the combination of a rotary engine shaft, a rotor fast thereon and having a plurality of vanes each movable in a substantially radial direction, and a non-rotary rotor casing formed with a plurality of internal combustion chambers elongated in a circumferential direction, and also having internal compression chambers which are cut off from communication with the respective combustion chambers during the major portion of the rotative movement of the rotor, the casing also having intake and exhaust ports in direct communication with said combustion chambers, the rotor having ports in its periphery which intermittently place the compression and combustion chambers in communication, the casing being further formed with spark plug chambers in open communication with the receiving ends of the respective combustion chambers.

In testimony whereof I affix my signature.

WILLIAM L. McFARLAND.