E. B. RAYMOND.

ROTARY EXPLOSION ENGINE.

APPLICATION FILED FEB. 17, 1914.

1,189,484.

Patented July 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

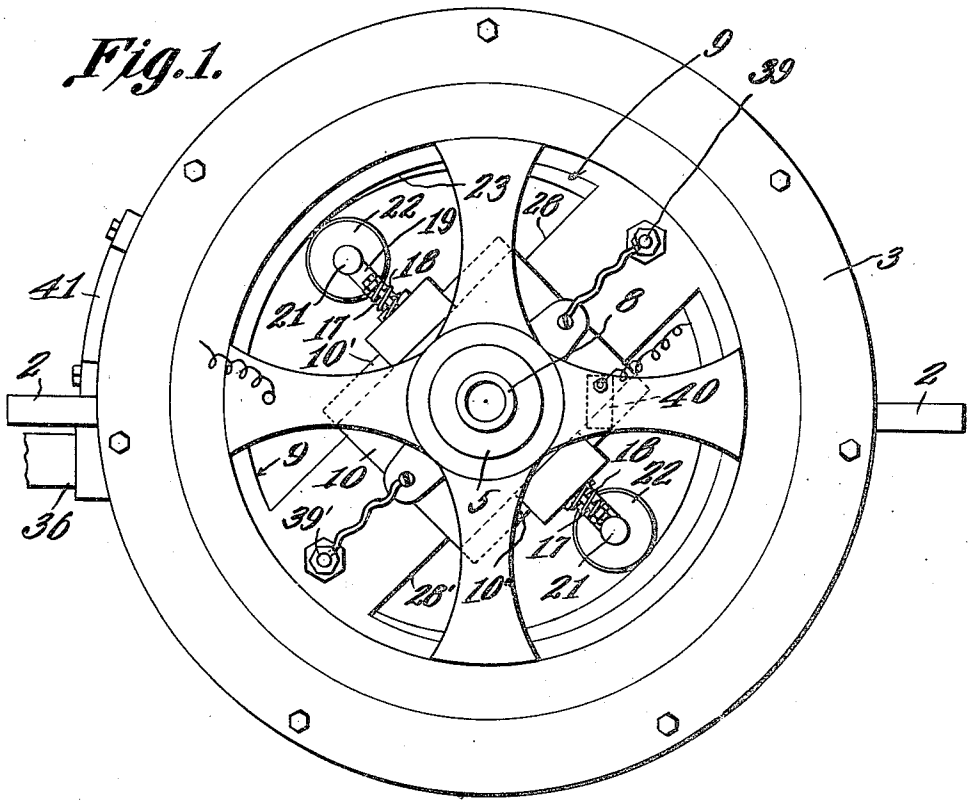


Fig. 6.



Witnesses

J. P. Comein

S. Willson

E. B. Raymond,

Inventor

by C. A. Snow & Co.

Attorneys

E. B. RAYMOND.

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3 SHEETS—SHEET 2.

Fig. 2.

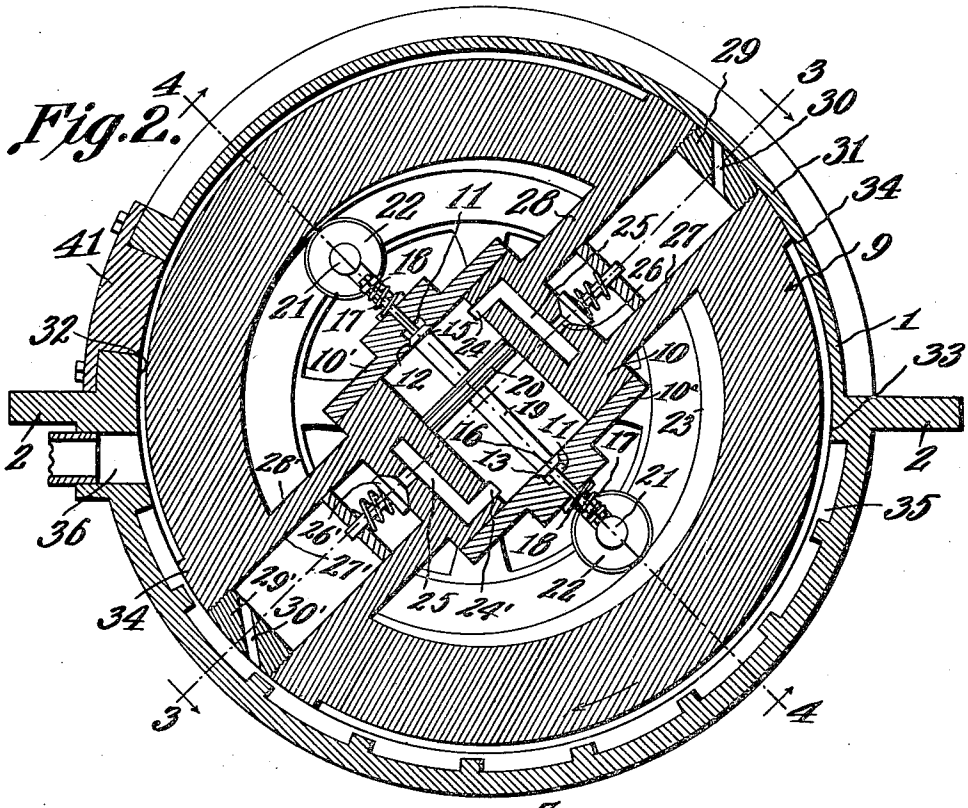
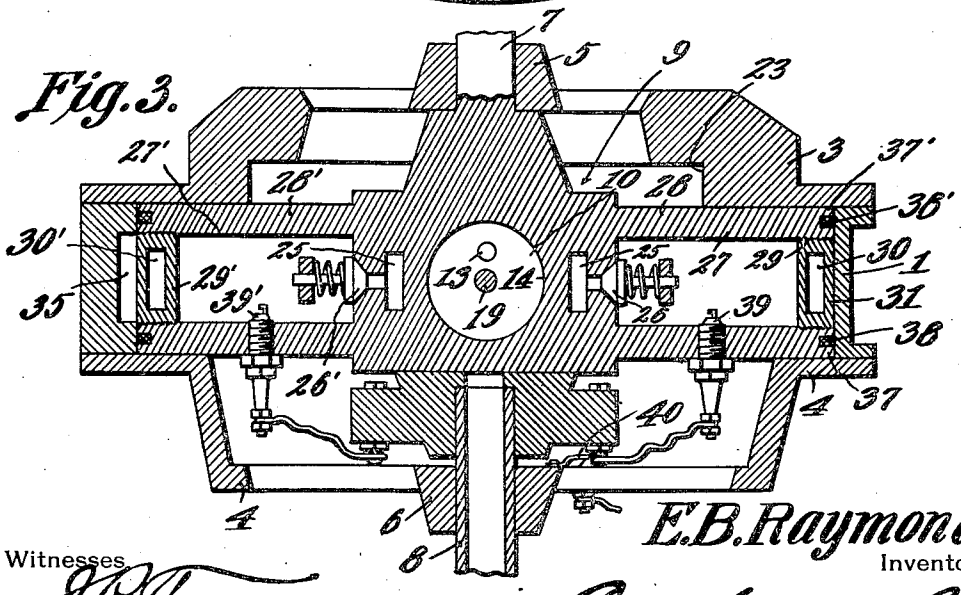


Fig. 3.



Witnesses.

J. Thomas

A. Willson.

E. B. Raymond,

Inventor

by Cashow & Co.

Attorneys

E. B. RAYMOND.

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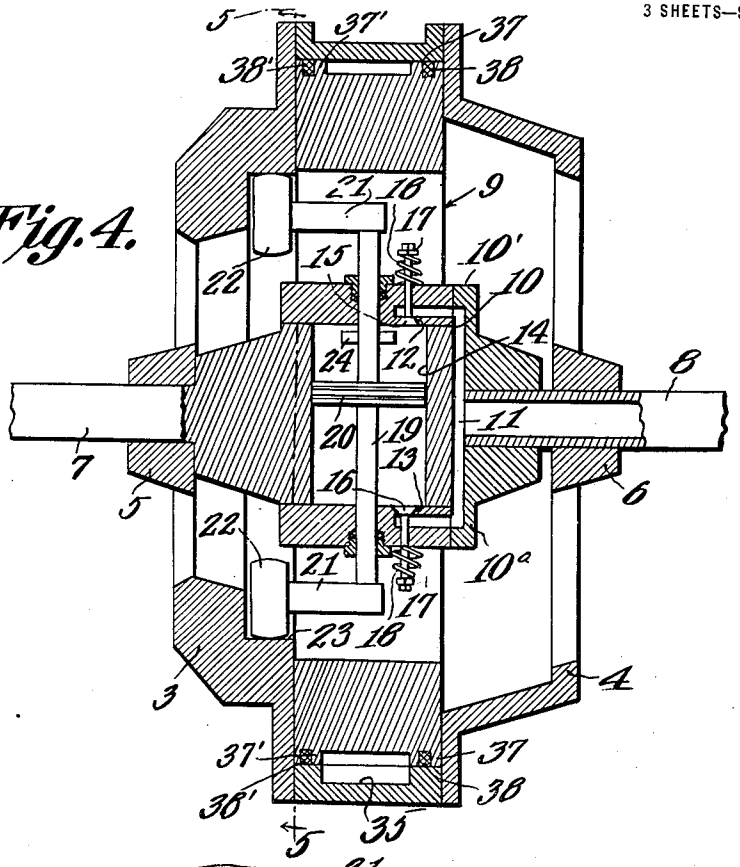
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3 SHEETS—SHEET 3.

Fig. 4.



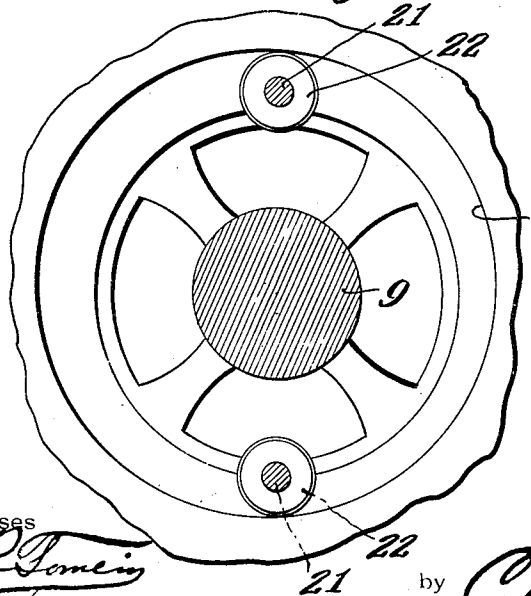


Fig. 5.

Witnesses

J. R. Somers

S. Willard.

E. B. Raymond,
Inventor

by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

EDWARD B. RAYMOND, OF NEWKIRK, OKLAHOMA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO LOYAL M. MARTIN AND ONE-THIRD TO EDWARD A. HODGES, BOTH OF NEWKIRK, OKLAHOMA.

ROTARY EXPLOSION-ENGINE.

1,189,484. Specification of Letters Patent. Patented July 4, 1916.

Application filed February 17, 1914. Serial No. 819,227.

To all whom it may concern:

Be it known that I, EDWARD B. RAYMOND, a citizen of the United States, residing at Newkirk, in the county of Kay and State of Oklahoma, have invented a new and useful Rotary Explosion-Engine, of which the following is a specification.

The present invention relates to improvements in rotary explosion engines, one object of the present invention being the provision of a compact engine of this character, which may readily be used for automobile or aeroplane work, or in fact for any work that the ordinary explosion engine is employed, the present engine being provided with propelling means that exerts an even torque upon the driven shaft and consequently runs with less vibration than a reciprocating engine.

A further object of the present invention is the provision of a rotary explosion engine, in which the explosive charge is taken adjacent the axis thereof and through a novel means is compressed and delivered into an explosion chamber, while at the opposite side of the compressing means a new charge is being admitted, there being two intakes, compressions and explosions each full revolution, the exhaust of the explosion being employed to propel the rotor which in itself constitutes the balance or fly wheel of the motor.

A still further object of the present invention, is the provision of a rotary explosion engine, in which the rotor is so constructed as to carry the compressing, delivering and igniting mechanism of the engine, the stator which is a stationary member being disposed to coöperate therewith to seal the explosion chamber a portion of the revolution of the rotor, the discharge of gases impelling the rotor by the reaction somewhat in the manner of a Barker's mill or Aeolipile or Hero's steam toy.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a view in elevation of the present rotary explosion engine taken from the carbureter side thereof. Fig. 2 is a central cross sectional view through the complete engine. Fig. 3 is a section taken on line 3—3 of Fig. 2. Fig. 4 is a section taken on line 4—4 of Fig. 2. Figs. 5 and 6 are detail views of parts of the engine.

Referring to the drawings, the numeral 1 designates the annulus or stator which is provided with the oppositely disposed and outwardly extending wings or lugs 2 which constitute a supporting means for the engine. Connected to the annulus 1 at opposite sides, are the disks or head members 3 and 4, which are provided with the respective hubs 5 and 6. Mounted for rotation in these hubs concentrically of the stator, are the sections 7 and 8 of the shaft. The section 8 is a hollow section and is adapted to be connected to any form of carbureter for properly mixing and delivering to the engine, as will later appear, the charges of carbureted air. The rotor 9 is connected for rotation with the shaft sections 7 and 8 and constitutes the fly or balance wheel of the present engine, the outer rim thereof being made purposely heavy so that the same will assist in absorbing the intermittent motion and therefore supply a constant torque upon the shaft sections 7 and 8, the section 7 of which is adapted to be connected for delivering the power. The rotor 9 is provided with the rectangular hub 10, which at the side adjacent to the hollow shaft section 8 is provided with the by-pass 11 which is provided with the valve seated outlet ports 12 and 13 respectively, at the opposite ends of the hub carried chamber 14. This chamber 14 as will presently appear constitutes the carbureted air charge receiving and compressing chamber of the engine. Disposed in the respective ports 12 and 13 for controlling the intake of the charge within the chamber 14 are the puppet valves 15 and 16 respectively. Each, as shown, is provided with a stem 17 and a spring 18, whereby the valves are automatically closed and are only opened due to the suction action of the piston 20

mounted for reciprocation within the chamber 14 and carried by the actuating rod 19. This rod 19, as clearly shown, is extended through the heads 10′ and 10ª of the hub and carries the two arms 21, one at each end. Each arm is provided with a roller 22, which engages at diametrically opposite points the eccentric cam rim 23 of the head member 3. Thus it will be seen that as the rotor 9 is rotated, a reciprocating motion is imparted to the piston 20, which when moved in the direction of the arrow Fig. 4, will draw a charge through the port 12 at the rear of the piston 20, and will compress the charge at the opposite side to deliver it to the desired place, as will later appear.

In order to receive the compressed charge of carbureted air from the pressure side of the piston 20, there are two ports 24—24′ leading from the chamber 14 into their respective channels 25 and 25′ formed in the hub and communicating into the lower end of the explosion chambers 27—27′ carried by the diametrically disposed spoke members 28—28′ of the rotor 9. Thus, as illustrated in Fig. 2, when the piston 20 is in the position as shown, the charge is forced into the explosion chamber 28 causing the unseating of the spring closed puppet valve 26, while a new charge of carbureted air is being drawn through the by-pass 11 and port 13 unseating the valve 16 at the other side of the piston 20. At the same time, the valve 26′ is closed, and the exploded charge within the chamber 27′ will exhaust through the port 30′ of the sealing plug 29′ and such port is directed at a tangent to the inner periphery of the annulus 1, the pressure fluid entering the pockets 35 formed in the adjacent surface of the annulus 1, and the rotor moves in the direction of the arrow Fig. 2. The rotor is actuated by the reaction resulting from the discharge of the gases, resembling the operation of a Barker's mill or Aeolipile or Hero's steam toy. In practice, it is essential that the plugs 29—29′ be spaced slightly from the mouths of the pockets or vanes 35 to allow the gas to escape, in order that the reaction will be provided. This spacing of the plugs 29—29′ from the pockets 35 need be only slight, and it will be evident that before the port 30 or 30′ leaves one of the pockets 35, the rear end of the respective projection 34 starts to leave said pocket, to allow the gas to escape from the pocket to provide the reaction. In the position there shown, the impelling force of the explosive charge is about spent, but any additional charge of burnt gases remaining will be expelled through the exhaust port 36 of the stator. In the position there shown, the charge admitted into the compression chamber 27 is prevented from passing out through the port 30 of the plug 29 due to the closure of such port by the sealing rim 31 provided upon the inner face of the annulus 1 and extending from points 32 to 33 thereof. Thus the charge within the chamber 27 is about complete, and will be exploded, as will later appear when the plug is adjacent to the first pocket 35 at the right as viewed in Fig. 2.

In order to provide a pressure tight joint at the connection of the rotor with the sealing rim 31 of the stator, the projecting portions 34—34′ adjacent the respective exhaust port carrying plugs 29—29′ are provided and thus consequently engage snugly the inner face of the band 31 to provide for preventing the escape of the charge during the compression thereof. It will also be noted that the respective plugs 29—29′ are readily removable by removing the plug 41 of the stator so that access may be had to the respective puppet valves 26—26′ for grinding.

In order to further assist in packing the present engine, the rotor is recessed between the respective projections 34 to provide the respective pairs of peripheral rims 37—37′ each one of which carries its respective packing member 38—38′ which bears against the inner surface of the annulus 1 of the stator and thus prevents the undue leakage of the charge under compression and the exhausting propelling burned gases.

In order to provide a means for exploding the compressed charge within the cylinders 27—27′, the spark plugs 39—39′ are disposed, as clearly illustrated in Fig. 3, and each is so wired that at each revolution, the circuit will be closed by means of the fixed contact 40 carried by the head member 4, thus rendering it unnecessary to change the "spark", the speed of the engine being controlled entirely by the throttle of the carbureter, (not shown).

It will thus be seen that with the single unit of engine here shown, that any number of such units may be coupled together and thus the same effect be produced as the multiplication of cylinders in a reciprocating engine.

It will thus be seen that by providing the peripheral grooves between the lugs 37—37′ that the instant the exhaust nozzle 30—30′ has passed the exhaust pipe 36, that the channel so formed in connection with the stator, will provide for conducting the burnt gases that may remain out of the chambers 27—27′, thus insuring the proper scavenging of the cylinder before the introduction therein of a new charge. It is also apparent that in order to reduce the friction at the various parts, that anti-frictional bearings of any character may be introduced, and that where the ignition system engages the contact 40, anti-friction rollers may be

introduced to form the contact as may be desired. It will also be noted that the piston 20 or in fact any other sliding members where there is danger of gas leakage, may be provided with stuffing boxes or packing rings as circumstances may require.

What is claimed is:

1. An engine embodying a stator, a rotor rotatable therein and having diametrically opposite radial chambers provided at their outer ends with oblique exhaust ports, the stator having a portion for closing said ports, the rotor having a transverse chamber between the aforesaid chambers and channels extending from the ends of the transverse chamber to the inner ends of the radial chambers, check valves coöperable with said channels to prevent the flow of the gases from the radial chambers to the transverse chamber, a piston slidable within the transverse chamber and having a stem slidable through one end of said transverse chamber, and a cam carried by the stator and coöperable with said stem for reciprocating said piston when the rotor is rotated, the ends of the said transverse chamber having check valved carbureted air inlets.

2. An engine embodying a stator, a rotor rotatable therein and having diametrically opposite radial chambers provided at their outer ends with oblique exhaust ports, the stator having a portion for closing said ports, the rotor having a transverse chamber between the aforesaid chambers and channels extending from the ends of the transverse chamber to the inner ends of the radial chambers, check valves coöperable with said channels to prevent the flow of the gases from the radial chambers to the transverse chamber, a piston slidable within the transverse chamber and having a stem slidable through one end of said transverse chamber, an axial tubular shaft attached to the rotor, the rotor having passages extending from said shaft to the ends of said transverse chamber, check valves for said passages to prevent the gas within the transverse chamber flowing back into said passages, and a cam carried by the stator and coöperable with said stem to reciprocate the piston.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDWARD B. RAYMOND.

Witnesses:

J. J. CRONAN,

S. H. STEVENS.