R. A. MORTON.

INTERNAL COMBUSTION ROTARY ENGINE.

APPLICATION FILED FEB. 25, 1909.

1,019,177.

Patented Mar. 5, 1912.

3 SHEETS—SHEET 1.

Fig.1.

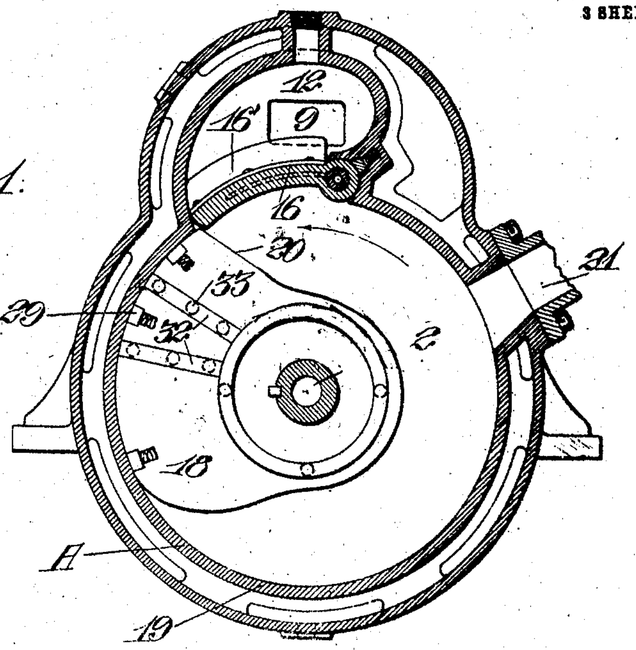
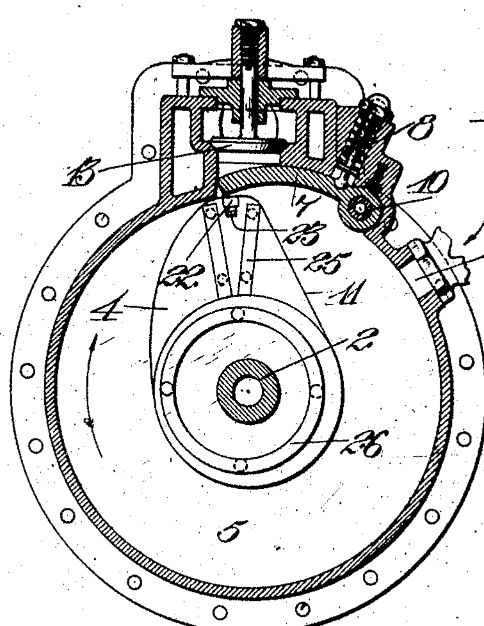


Fig.2.



Witnesses:

[handwritten signature]

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Inventor:

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3 SHEETS—SHEET 2.

Fig. 3.

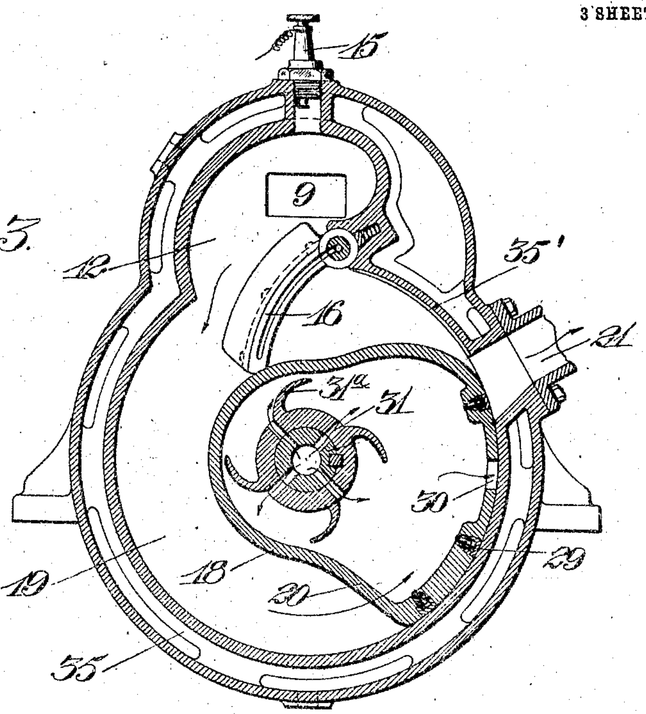
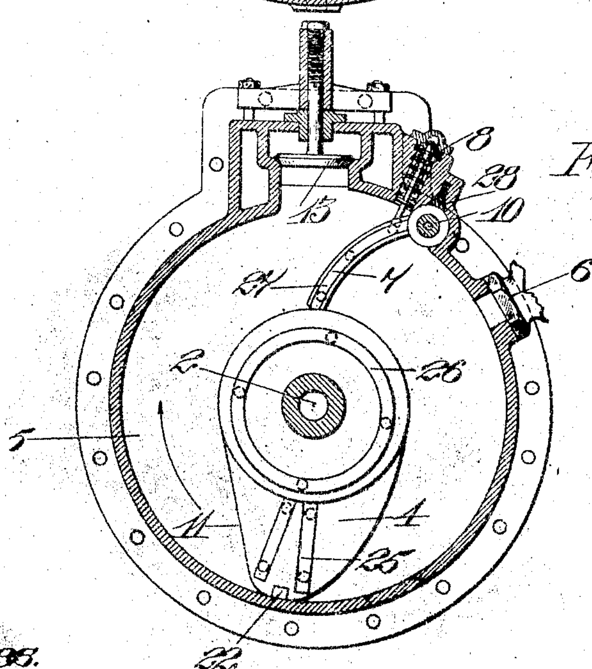


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

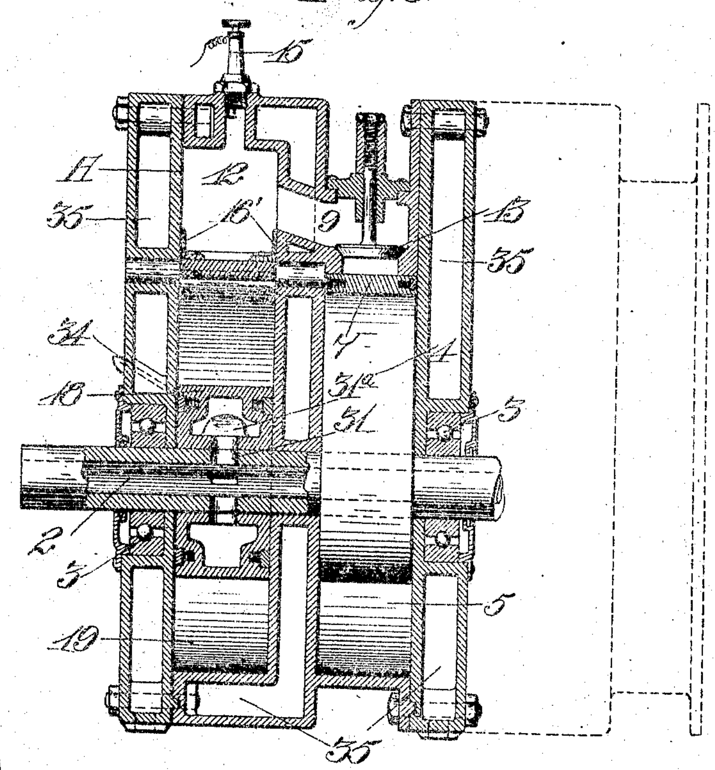


Fig. 7.

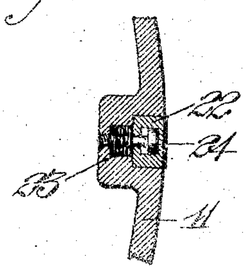
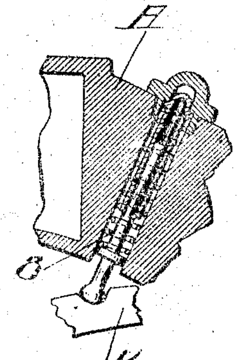


Fig. 6.



Witnesses.

[signature]

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UNITED STATES PATENT OFFICE.

ROLLA A. MORTON, OF FRESNO, CALIFORNIA.

INTERNAL-COMBUSTION ROTARY ENGINE.

1,019,177. Specification of Letters Patent. Patented Mar. 5, 1912.

Application filed February 25, 1909. Serial No. 480,049.

To all whom it may concern:

Be it known that I, ROLLA A. MORTON, a citizen of the United States, residing at Fresno, in the county of Fresno and State of California, have invented new and useful Improvements in Internal-Combustion Rotary Engines, of which the following is a specification.

My invention relates to that class of motors known as internal combustion rotary engines.

It is the purpose of this invention to provide a practical and simple rotary engine of the internal explosive type, wherein the fuel charge is compressed in a relatively cool compression chamber, and is exploded in a separate chamber; and also to provide a novel means for the utilization to maximum advantage of the action of the exploding and expanding gases.

It is the purpose also to provide a motor of this character in which the several parts are designed so as to be maintained at as low a temperature as is practicable.

Several further purposes of the invention will be made manifest in the following specification.

The invention consists of the elements, and the construction and combination of elements, or their equivalents, as herein set forth.

Figure 1 is a vertical section through the explosion and expansion chambers, viewed from the left of Fig. 5. Fig. 2 is a vertical section through the compressor chamber, viewed from the right of Fig. 5, and showing the rotor at the position corresponding to the position of the rotor of Fig. 1. Fig. 3 is a vertical section through the explosion and expansion chambers after explosion has taken place. Fig. 4 is a vertical section showing the relative positions of the members in the compression chamber, to that shown in Fig. 3. Fig. 5 is a transverse vertical section through the motor. Fig. 6 is a section showing the spring 8. Fig. 7 is an enlarged section of the transverse packing bar.

In the embodiment of my invention, as shown in the several figures, A represents a sectional water-jacketed casing, and 2 a transverse, horizontal, hollow shaft journaled upon suitable ball-bearings 3. The casing incloses a compression chamber 5 in which the rotary piston 4 operates, and an expansion chamber 19 in which the rotor 18 operates; these two chambers being each connected with the explosion chamber 12. Both rotors 4 and 18 are fixed to shaft 2.

While I shall only describe the engine as comprising a single compression chamber, a single expansion chamber, a rotor for each, and a single explosion chamber, it will be understood that as many units may be assembled in a single engine and on the same shaft, as desired.

6 is an inlet port to chamber 5, through which the impelling medium is drawn by suction, or otherwise admitted, from any suitable source of supply.

9 is an outlet port connecting the compression chamber 5 with the explosion chamber 12.

7 is an abutment hinged in the outer wall of chamber 5 and between ports 6 and 9 and adapted to close the latter when acted on by the rotary piston 4. The abutment 7 normally depends into chamber 5 through the action of a suitable spring, as 8, and is in constant contact with the rotor or its hub so that communication is always cut off between the inlet port 6 and the outlet port 9. The rotor 4 which is made more or less cam-shape revolves to the right, as indicated by the arrow, Figs. 2 and 4, and against the outer end of the abutment 7. The outer end of the abutment 7 is adapted to engage constantly upon the irregular periphery of the compression piston 4, and is positively oscillated upon the pin 10 by engagement with the rotor 4, in such a manner that the member 7 is first lifted by contact with the face 11 of the piston 4; the charge of gas being forced through port 9 into the chamber 12, and past a check valve 13, which latter is designed to prevent back flow into chamber 5 when piston 4 passes by and allows the abutment 7 to drop again. Thus when the parts are in the position shown in Fig. 2, a charge of gas previously drawn in through the intake port 6 has been impelled forward by the face 11 and into the explosion chamber 12, where a maximum pressure is obtained by the raising of the abutment 7 to force all of the gas past the check valve 13, and by which latter it is held at maximum pressure in the chamber 12 until it is exploded by a suitable ignition device, as 15. The chamber 12 is provided with a hinged segmental closure 16 similar

to abutment 7, but its function is that, first, of an actuator or piston by which the initial force of the exploding gases is communicated to the rotor 18 and shaft 2, and second, of an abutment for closing communication behind the rotor and between the explosion chamber and the exhaust port 21. Figs. 1 and 2 show the relative positions of the rotors 4 and 18 at the moment explosion takes place. During the period that the gases are being forced into the chamber 12 by rotor 4, the broad face of the rotor 18 is pressing the actuator 16 out of the path of the rotor to close the chamber 12. The exploding gas in chamber 12 exerts its force downwardly upon the hinged actuator 16 and causes the latter to act approximately at right angles to the rear face 20 of the rotor and directly on the rotor. At the moment of explosion of the gas, the actuator is in engagement with the extreme outer end of the inclined surface 20 of the rotor 18, and exerts, in addition to the pressure generated by the exploding gases, the additional power due to the wedging leverage of the actuator against the inclined surface 20 of the rotor 18; thereby greatly increasing the power derived from the pressure of the gas for a considerable part of the rotation of the rotor 18. After the wall 20 of the rotor has advanced away from the actuator 16, the actuator is then supported upon the hub of the rotor 18, and the expanding gases exert their energy expansively against the face 20 of the rotor, and also against the face of the actuator 16, and continue to drive the piston around in the expansion chamber. Thus, the force of the gases is completely utilized, and the exhaust port 21 is not opened until the rotor 18 has passed it, by which time the full effective expansion of the gases has been utilized.

In order to prevent leakage of the gases from the chamber 12 around the actuator 16 when the latter is closed, I prefer to pack the actuator by means of the lateral springy flap members 16′ which are of suitable material and made integral with or attached to the actuator, and adapted to be pressed by the gases in the chamber into close contact with the side walls thereof.

It is essential in order to produce a motor of this character, that efficient and practical packings be used throughout the mechanism in order to prevent the leakage, first, of the gas when it is being compressed, and also to prevent leakage of the gas after it has been exploded, and during its expansion; and for this purpose I have provided the extended periphery of the rotor 4 with a transverse packing 22 which is pressed outwardly against the inner periphery of the casing of the chamber 5, by a suitable spring 23, and it is prevented from jumping out of the piston 4 as it crosses the port of the abutment 7, by suitably headed pins 24, but which pins permit sufficient play of the packing 22, so that it is maintained against the wall of the chamber 5 by the spring 23. There are also provided packings 25 upon each of the vertical surfaces of the rotor 4, which are adapted to bear against the side walls of the chamber 5, and are also spring-actuated, and a packing-ring 26 is secured upon each side of the piston 4 approximate the hub, and if desirable this packing-ring may be eccentric, slightly, in order to prevent its wearing a groove in the walls of the chamber. Packings 27 are mounted in each side of the abutment 7, and may be spring-actuated. The hub portion of the part 7 is also provided with a packing 28, thereby preventing loss of pressure around this portion.

The sides of the chambers 5—19—12 are preferably water-jacketed, as at 35.

The piston 18 is hollow, having upon its periphery suitable transverse packings 29, and also having a small air port 30 which communicates with the interior of the piston 18 and with the exhaust port 21, and which port 30 is adapted to permit air to circulate freely by means of ports 31 through the hollow shaft 2, the air being driven through the piston by internal blades 31ª. This serves the important function of reducing the temperature of the piston.

It has been found in engines of this class that they are often rendered impractical by reason of the undue heating and consequent expansion of the several movable members; or if these members are made so as to allow for the expansion of the several parts, there is usually a large loss of pressure due to the inefficiency of the packing. Therefore, it will be noticed that by providing for a constant circulation of cool air through the interior of the piston, the temperature of the parts is maintained at the minimum.

The blades 31ª are inside the piston 18 and operate fan-fashion to induce a strong current inwardly through the hollow shaft 2 and the piston. The air escaping from the interior of the piston 18 through the port 30, as the latter traverses the exhaust 21, acts not only to cool the parts, but to force out the gases remaining in the exhaust passage. The portion of the interior of the casing between the front edge of the piston 18 and the actuator 16 is grooved, as shown at 35ª, so as to allow the air which would otherwise be confined, to escape through the exhaust port as the piston approaches the actuator.

The packings 32 are mounted in the side walls of the piston 18, and are pressed outwardly into contact with the walls of the chamber 19, by suitable springs 33. It is here again that the cooling of the piston

18 is advantageous for the reason that the temper is not drawn from the springs by their becoming heated.

The actuator 16 is positively operated by reason of its engagement with the irregular periphery of the piston 18 which travels as indicated by the arrow in Fig. 3, so that its advance face will engage the lower end of the actuator 16, and lift it gradually until the actuator forms a lower movable wall for the chamber 12.

The compressor piston 4 and the actuator 16 are so timed relatively, that as the wall 11 of the piston 4 is advancing to compress the fuel charge in chamber 12, the actuator 16 is also advanced so as to close the bottom portion of the chamber 12 by the piston 18, and the concentric portion of the piston 18 is of such length as to maintain the actuator 16 in its closed position during the compression of the gas in the chamber 12; and as soon as the piston 4 and the abutment 7 have been brought into the position shown in Fig. 2, at which time the gas charge in the chamber 12 is at its maximum compression, the actuator 16 is then in the position shown in Fig. 1, relative to the piston 18, and the charge exploded. The exhaust gas after each explosion is thoroughly scavenged from the expansion chamber 19 by the rotation of the bottom wall of the piston 18 in its movement through the chamber.

I have herein described one motor in its entirety, but several of these motors may be united so as to form a set; and the right-hand water-jacketed wall, as shown in Fig. 5 of the drawings, is here designed so that the next unit could be readily joined in series upon the shaft 2.

The several movable members are adapted to be oiled through the oil ducts 34, which may be drilled through the casing at any desirable point so as to conduct oil in the most direct and efficient manner to the several journals and bearings.

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

1. In a rotary engine, a casing having inter-communciating compression, explosion and expansion chambers, means rotatable in said compression chamber for pressing an elastic fluid into the explosion chamber, a rotary piston in the expansion chamber, and mechanical means operative by the exploding gases for impelling said piston during a portion of its revolution, said means including an actuator engaging the piston and separating the explosion chamber from the expansion chamber and communicating the initial force of the exploded gases to said piston.

2. An internal combustion engine, comprising a circular water-jacketed casing inclosing a compression chamber and an expansion chamber, a shaft suitably journaled in said casing and carrying pistons for said chambers, an intermediate explosion chamber, an igniter located in said explosion chamber, and hinged abutments between the explosion chamber and the compression chamber and between said explosion chamber and the expansion chamber, one of said abutments closing communication between the explosion chamber and the expansion chamber and operating inwardly directly against the piston of the expansion chamber to assist the action of the exploded gases in propelling said piston.

3. In a rotary engine, a circular casing, a shaft concentric therewith, a cam-shaped piston mounted upon the shaft within the casing, a curved oscillating abutment having its axis exterior to the inner periphery of the casing, means by which the free end of said abutment is held in engagement with the piston hub, an intake passage in the casing upon one side of the abutment, an explosion chamber connected with the casing at the other side of the abutment, a check-valve in said connection through which a charge is forced into the explosion chamber, means within the explosion chamber by which the compressed charge is ignited, an expansion chamber into which the ignited charge is delivered, an actuator adapted to cut off the explosion chamber from the expansion chamber, said actuator being operated inwardly by the pressure of the exploded gases, and a piston on said shaft within the expansion chamber against which the pressure is exerted.

4. In a rotary engine, a casing, a shaft concentric therewith, a hub on the shaft having a piston projecting and revoluble against the interior periphery of the casing, a hinged abutment having its axis exterior to the inner periphery of the casing, means by which the free end of said abutment is held in engagement with the hub, said piston having a cam-shape by which the abutment is raised to allow the piston to pass, an intake passage in the casing upon one side of the abutment, a discharge passage upon the other side closable when the abutment is forced outward by the passage of the piston, an explosion chamber into which a charge is compressed by the action of said piston, a check-valve to prevent the return of the charge, means within the explosion chamber for igniting the charge, an expansion chamber within which the exploded charge is allowed to act, and a hinged abutment between the explosion chamber and the expansion chamber and adapted to cut off the former from the latter, said abutment adapted to be forced inwardly against the piston by the exploded charge to open communication between the explosion and expansion chambers

and to assist the gases of the exploded charge to rotate said piston.

5. In a rotary engine, a casing having a circular compression chamber, with rotary piston and abutment, intake and discharge ports, an explosion chamber, a check-valve between the two chambers adapted to prevent the return of the charge to the compression chamber, an igniter in said explosion chamber, a circular expansion chamber having a concentric shaft, a hub and a piston carried by the shaft, said piston fitting the interior of the casing of the expansion chamber, a swinging abutment having its axis exterior to the inner periphery of the casing, and its inner edge in contact with the piston hub to form a chamber within which the expanded gases may act upon the piston and revolve the shaft, said abutment adapted to cut off communication between the explosion chamber and the expansion chamber, and opening inwardly under the pressure of the exploded charge to open communication between the explosion chamber and the expansion chamber and to assist the gases of the exploded charge in propelling said piston.

6. An internal combustion engine, consisting of a pair of circular casings inclosing compression and expansion chambers, a shaft extending through said chambers and casings, a piston with a cam-shaped outline mounted upon the shaft in each of the chambers, and fitting the interior of the respective chamber, abutments having their axes exterior to the inner periphery of the casings, and their movable edges in contact with the piston hubs, an intake passage connecting with said compression chamber, an explosion chamber located intermediate of the first named chambers, a discharge passage between the explosion chamber and the compression chamber said passage being closed by one of the abutments when the latter is forced out by the passage of a respective piston, a check-valve to prevent the return of the charge to the compression chamber, said explosion chamber being directly connected with the expansion chamber, an igniter within the explosion chamber, one of said abutments separating the explosion chamber from the expansion chamber and having its free end in contact with and adapted to press upon the piston in the expansion chamber to assist the charge in propelling said piston, and an exhaust passage located behind the abutment through which the waste gases are discharged.

7. In a rotary engine, a circular expansion chamber, a centrally journaled revoluble piston fitting said chamber, compression and explosion chambers, an igniter in said explosion chamber, and a swinging abutment between the explosion and expansion chambers adapted to cut off communication between the explosion chamber and the expansion chamber, said abutment having its free end adapted to contact with the piston and transmit the initial pressure of the exploded gases to said piston.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROLLA A. MORTON.

Witnesses:

CHARLES EDELMAN,

C. C. COOK.