No. 736,787. PATENTED AUG. 18, 1903.

J. J. O. R. RULIANCIH.

ROTARY EXPLOSIVE ENGINE.

APPLICATION FILED OCT. 16, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 3.

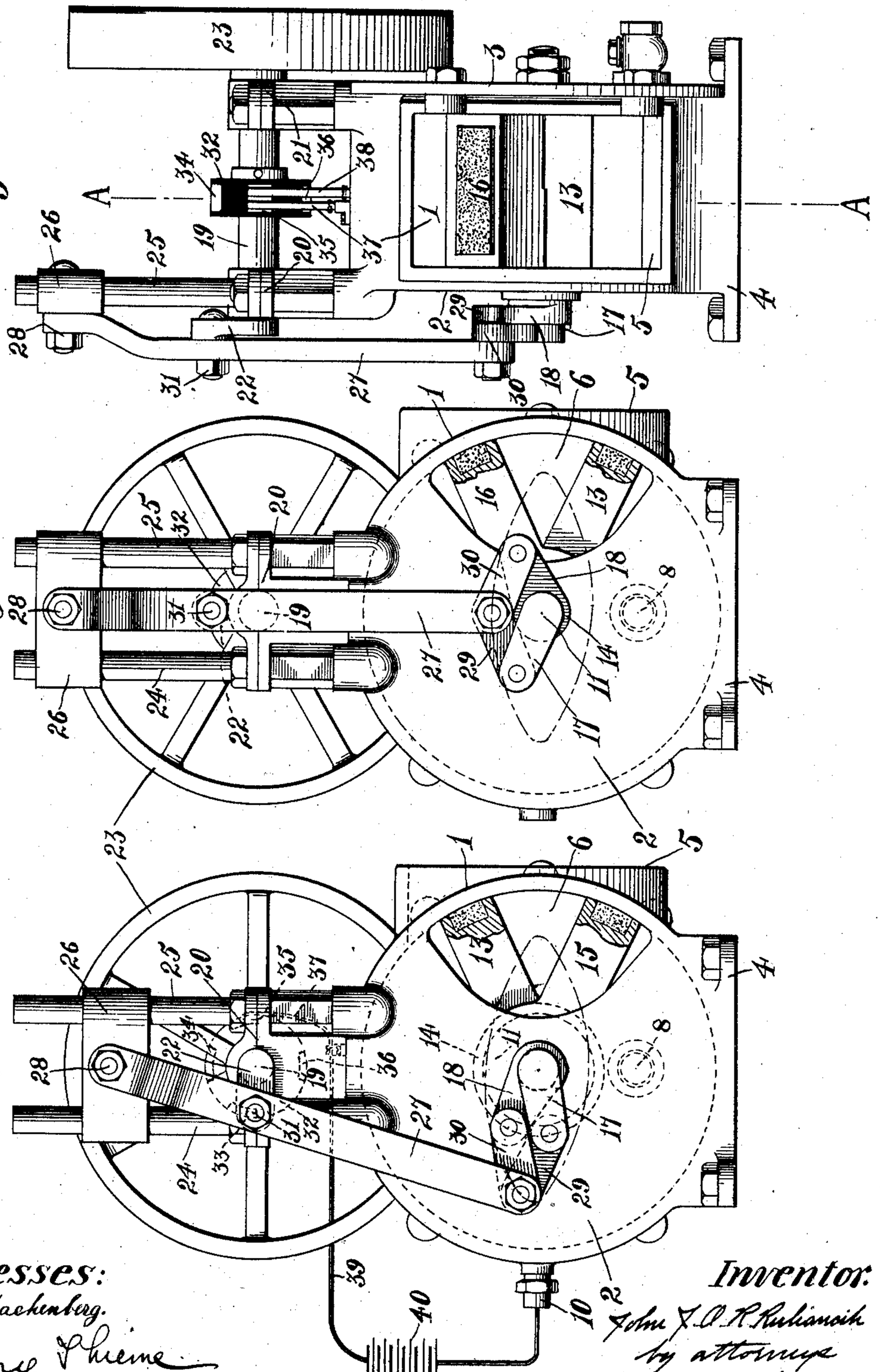

Fig. 2.

Fig. 1.

Witnesses:
F. G. Hachenberg.
Henry Pheine

Inventor:
John J. O. R. Ruliancih
by attorneys
Brown & Lenard

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

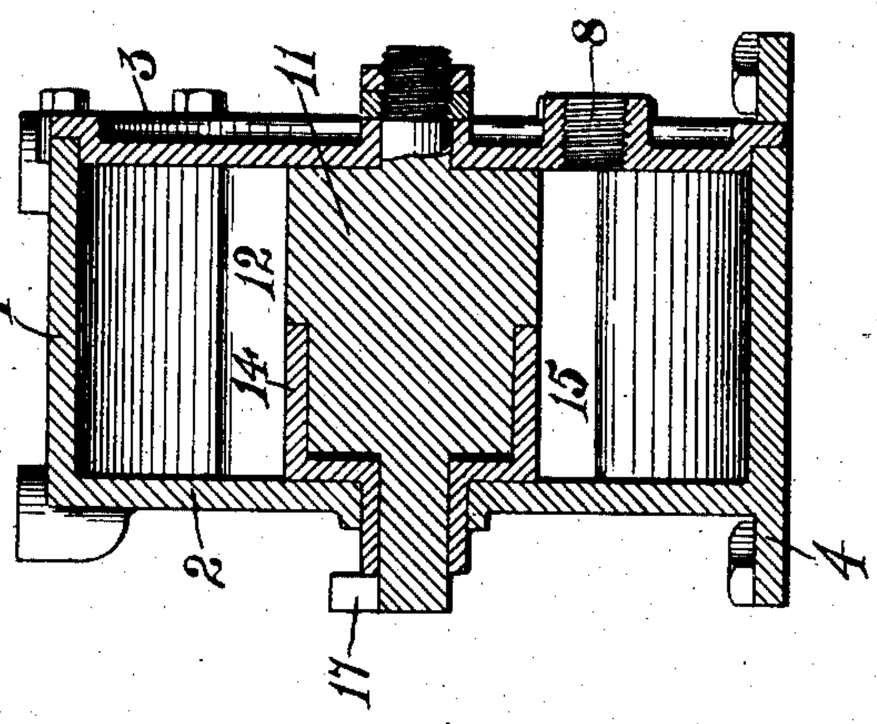


Fig. 4.

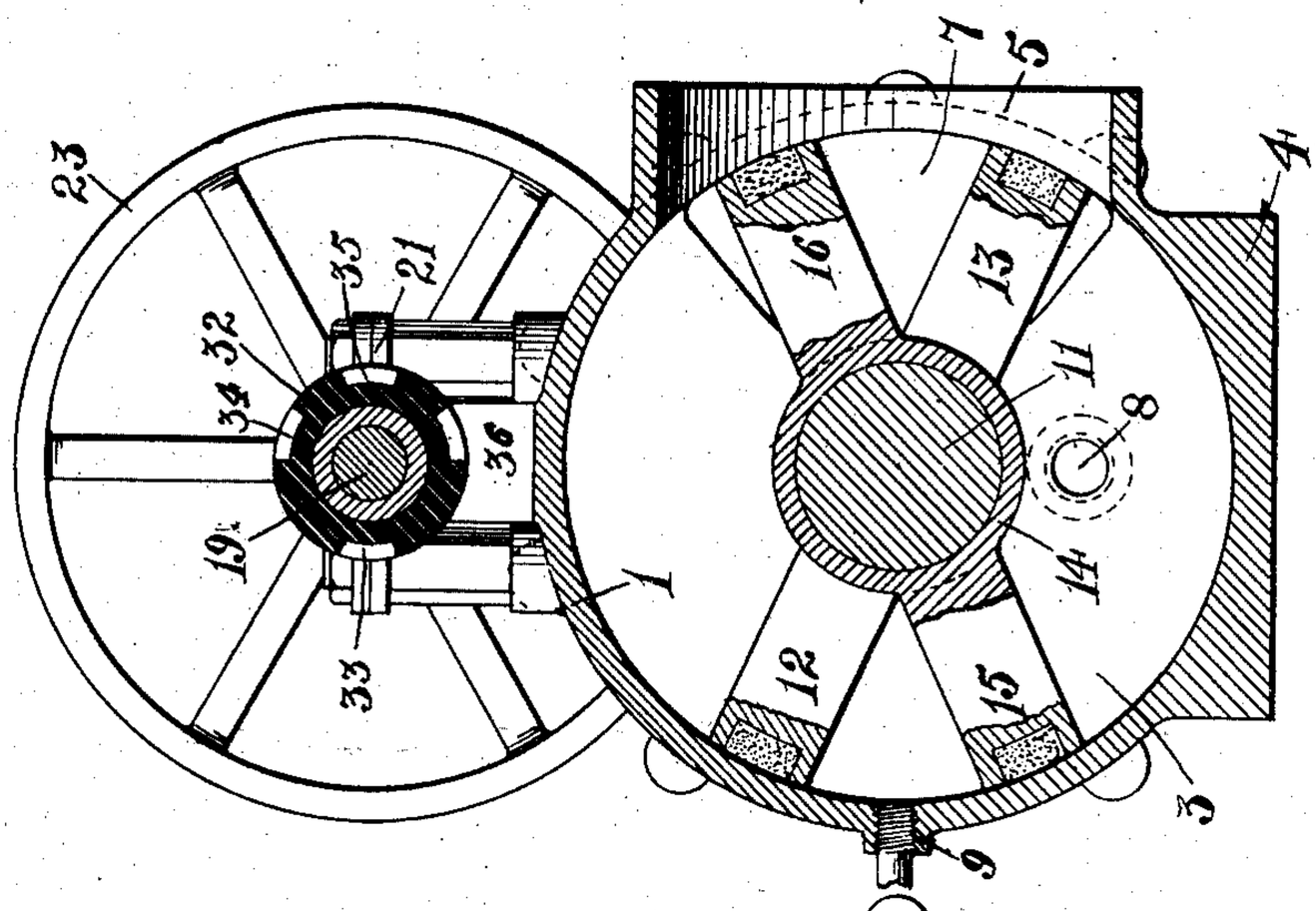
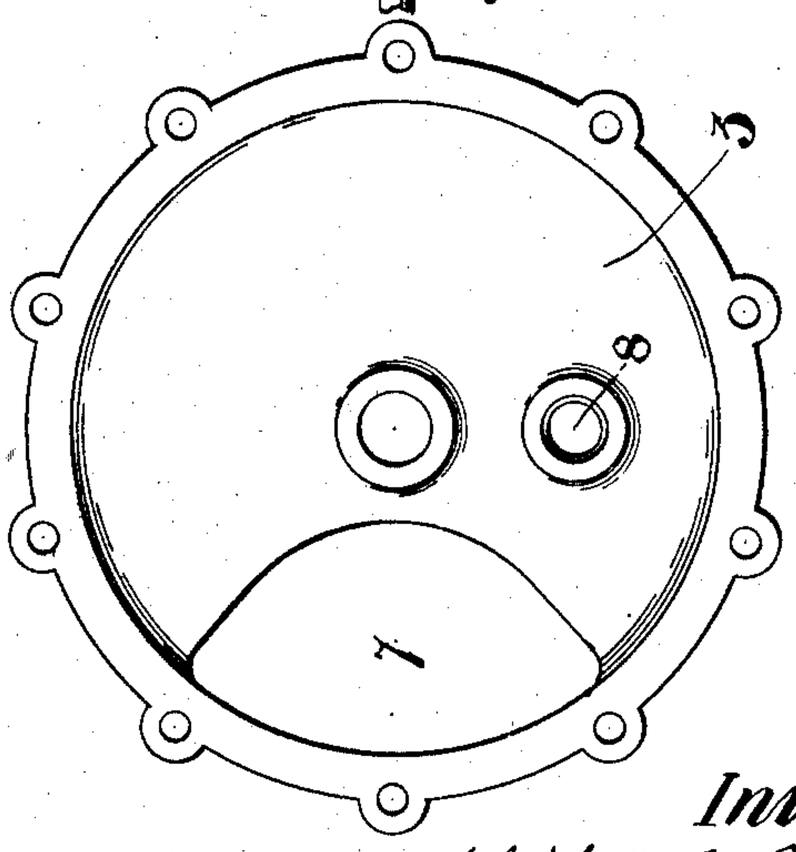


Fig. 5



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F. G. Hachenberg.
Henry Theime

Inventor:
John J. O. R. Ruliancih
by attorneys
Brown & Lewand

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 736,787. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

JOHN J. O. R. RULIANCIH, OF CLAYTON, MASSACHUSETTS.

ROTARY EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 736,787, dated August 18, 1903.

Application filed October 16, 1902. Serial No. 127,470. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. O. R. RULIANCIH, a subject of the Emperor of Austria-Hungary, and a resident of Clayton, in the county of Berkshire and State of Massachusetts, have invented a new and useful Improvement in Rotary Explosive-Engines, of which the following is a specification.

My invention relates to an improvement in hydrocarbon explosive-engines of the rotary type, in which the rotary pistons are so connected by a series of levers to the driving-shaft that the use of clutches is entirely obviated.

A further object is to provide an engine of the above character in which four charges of the mixed gases are admitted, compressed, ignited, and exhausted during one complete revolution of the driving-shaft.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the engine in side elevation with the pistons in one position. Fig. 2 is a similar view with the pistons in another position. Fig. 3 is a rear elevation of the engine with the parts in the position represented in Fig. 2. Fig. 4 is a vertical section from front to rear through the engine in the plane of the line A A of Fig. 3. Fig. 5 is a view of the cylinder-head removed from the engine, and Fig. 6 is a transverse vertical central section through the engine proper.

The circular wall of the engine cylinder or casing is denoted by 1, its permanent head by 2, its removable head by 3, and its suitable supporting-base by 4.

The circular wall 1 of the engine is provided with a very large exhaust-port 5, and the cylinder-heads 2 and 3 are provided with large ventilating-holes 6 and 7 adjacent to the exhaust-port 5. An inlet-port 8 for the mixed gases communicates with the interior of the cylinder, which port in the present instance is located in the cylinder-head 3. A hole 9 is tapped through the circular wall 1 of the cylinder opposite the exhaust-port 5 for the reception of a sparking-plug 10 of any well-known or approved construction. Two pairs of concentric overlapping pistons are mounted to rotate within the cylinder. One of the said pistons comprises an enlarged crank-shaft 11, having two oppositely-projected wings 12 and 13, fitted to the cylinder-chamber. The other piston comprises an enlarged crank-shaft 14 and a pair of oppositely-projected wings 15 and 16, corresponding to the wings 12 and 13 of the first-named piston. These pistons are mounted in suitable bearings in the cylinder-heads 2 and 3 and are provided with concentric cranks 17 18, located in different planes exterior to the cylinder-head 2.

The driving-shaft is denoted by 19, which shaft is mounted in suitable bearings 20 21 at the top of the cylinder. This driving-shaft 19 is provided at one end with a crank 22 and at its other end with a driving-pulley 23, which serves also as a balance-wheel for insuring the even rotary movement of the shaft. A pair of uprights 24 25 project from the top of the cylinder adjacent to the crank 22 of the driving-shaft 19, which uprights serve as guides for a vertically-reciprocating slide 26. The upper end of a lever 27 is pivoted at 28 to the slide 26, and the lower end of the said lever is connected to the ends of the piston-cranks 17 and 18 by short links 29 and 30. This lever 27 is pivoted at 31 to the end of the crank 22 of the driving-shaft at such a point that when the lever is in a vertical position the crank 22 will be at the limit of its upward movement. This connection of the lever 27 with the slide 26 and crank 22 will cause the free end of the lever 27 to describe an ellipse as the shaft 19 rotates. Because of the link connection between the lower end of the lever 27 and the piston-cranks 17 and 18 the wings of one of the pistons are alternately moved rapidly away from the wings of the other piston and then slowly away from the wings of the other piston while the pistons are constantly rotating in the same direction.

The ignitions of the gases are timed at the proper periods mechanically by the following arrangement: The driving-shaft 19 is provided with an insulated collar 32, in which are set four contact-plates 33 34 35 36. Two brushes 37 38 are provided, the brush 37 being connected to one point of the sparking-plug 10 by a wire 39 through a battery 40. The brush 38 is connected to the engine, and as the other sparking-point of the plug is also

connected to the engine the circuit is completed whenever the brushes are engaged with any one of the contact-plates on the driving-shaft. To produce the proper times of sparking the contact-plates are so arranged upon the driving-shaft 19 that three of the plates—viz., the plates 34 35 36—are arranged in one half of the circumference of the shaft and the plate 33 is located in the other half of the circumference of the shaft.

The operation of the engine is as follows: The driving-shaft 19 is positively rotated to start the engine by hand or by any other suitable means. As the shaft 19 is rotated the charge of gas which has entered the space between the piston-wings 13 and 15 (see Fig. 4) through the inlet 8 will begin to be compressed as soon as the wing 13 cuts off the said gas-inlet 8. The complete compression of the gas is obtained when the wing 15 has traveled to the point held by the wing 12 in Fig. 4 and the wing 13 has traveled to the point held by the wing 15 in Fig. 4. This is a position which the wings assume when the lever 27 is in the position shown in Fig. 1. As the shaft 19 is rotated a slight distance farther—viz., enough to start the lower end of the lever 27 along the flattened portion of the ellipse—the gas which has been compressed between the wings is ignited by the sparking-plug 10. As there is less resistance back of the wing 10 past the sparking-plug than back of the wing which has not yet reached the sparking-plug the wing which has passed the sparking-plug will be forced rapidly away from the wing which has not yet reached the sparking-plug. In the meantime the wing which has not reached the sparking-plug follows slowly after the other wing referred to until the two wings reach the positions shown by the wings 12 and 16. The exhausting of the ignited gases then begins through the upper part of the exhaust-port 5. This will create a suction outwardly through the said port, which will draw air in through the side openings 6 and 7 in the cylinder-heads for cooling the piston-wings. The exhaust-port 5 and the side openings 6 and 7 are so arranged with respect to each other that the exhaust-port is opened and the products of combustion are permitted to escape before the side openings are uncovered, thus insuring the drawing in of air through the side openings 6 and 7. As this series of admission, compression, ignition, and exhaust have been taking place between one set of adjacent piston-wings the next succeeding set of piston-wings have been following the same series of steps. As there are four of these piston-wings it will be seen that there is a continuous succession of admission, compression, ignition, and exhaust during a constant rotary movement of the driving-shaft. It will be seen that it is necessary to accurately determine the time of ignition, so that there will always be less resistance back of the advance piston-wing than there is back of the next succeeding piston-wing. It will thus be seen that by the arrangement of the levers between the rotary pistons and the rotary driving-shaft I am enabled to entirely do away with the clutching of one of the pistons, as has heretofore been deemed necessary. Furthermore, by the use of the large exhaust-port and the air-inlet openings in the cylinder-heads adjacent thereto I am enabled to utilize the suction due to the exhausting of the spent gases to cool the pistons. It will furthermore be seen that the engine is a very simple one and is one that is not liable to become disarranged, as all of the parts are mechanically connected. Furthermore, the cutting off of the inflowing gases is always accurately determined according to the speed of the driving-shaft. The times of ignitions are also absolutely dependent upon the speed of the driving-shaft.

It is to be understood that the air-admission openings 6 and 7 and the exhaust-port 5 may be extended downwardly for a greater or lesser distance to produce the best results.

As the wings pass the air-admission openings 6 and 7 a certain amount of air will be admitted into the lower portion of the cylinder, which air will be mixed with the gases which are admitted through the inlet 8. The amount of this air admitted may be accurately determined by the size and position of the said admission-openings 6 and 7 and the exhaust-port 5.

What I claim is—

1. An explosive-gas engine comprising a cylinder, a pair of double-winged rotary pistons therein, a gas-inlet, a sparking device and a gas-outlet so arranged that the gases are successively admitted, compressed, ignited and exhausted between adjacent wings of the pistons, the said cylinder being further provided with ventilating-holes for the pistons adjacent to the gas-outlet.

2. An explosive-gas engine comprising a cylinder, a pair of concentric rotary pistons therein each provided with a crank, a rotary crank-shaft and a lever connected intermediate its ends to the crank-shaft and having a sliding support at one end, the other end of the said lever having a link connection with the piston-cranks whereby a varying rotary movement in the same direction of the pistons will produce a continuous rotary movement of the crank-shaft at a predetermined speed, and means for exerting pressure between the pistons at predetermined points in their rotary movements for driving the same.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 13th day of October, 1902.

JOHN J. O. R. RULIANCIH.

Witnesses:
H. E. HYLET,
A. S. HUGGINS.