

J. A. PIERCE.
 ROTARY ENGINE.
 APPLICATION FILED SEPT. 16, 1918.

1,319,614.

Patented Oct. 21, 1919.
 2 SHEETS—SHEET 1.

Fig. 1.

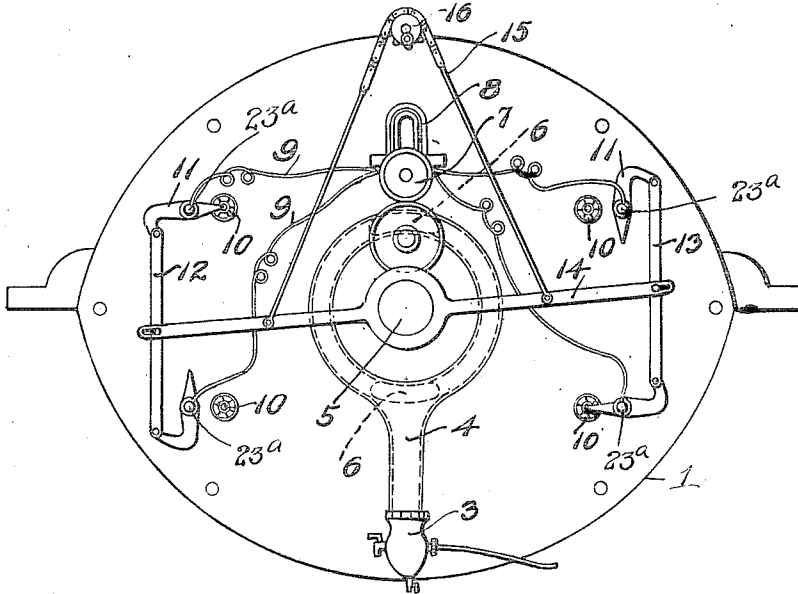
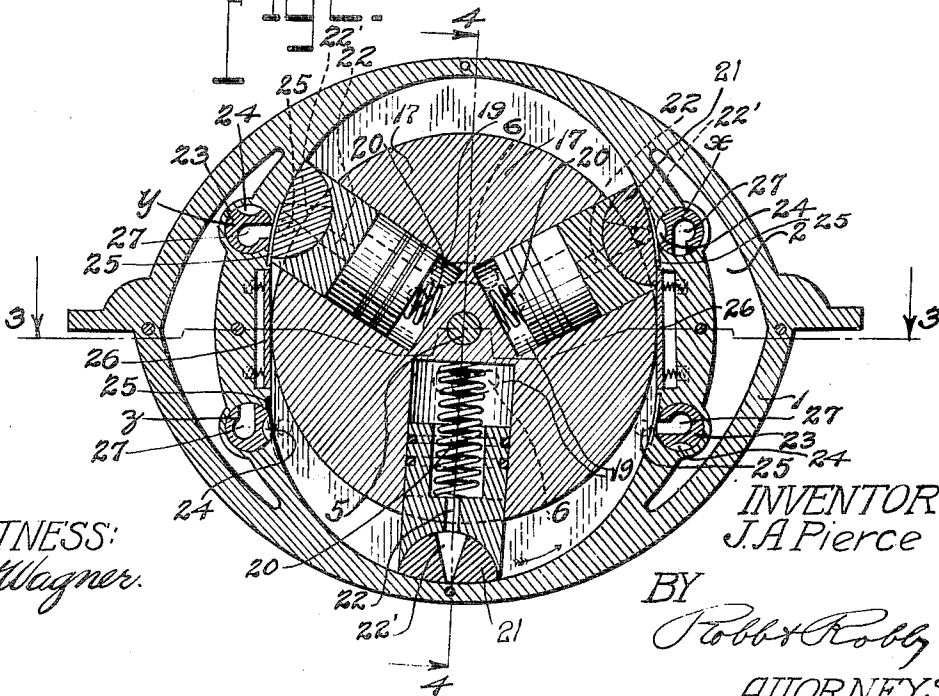


Fig. 2.



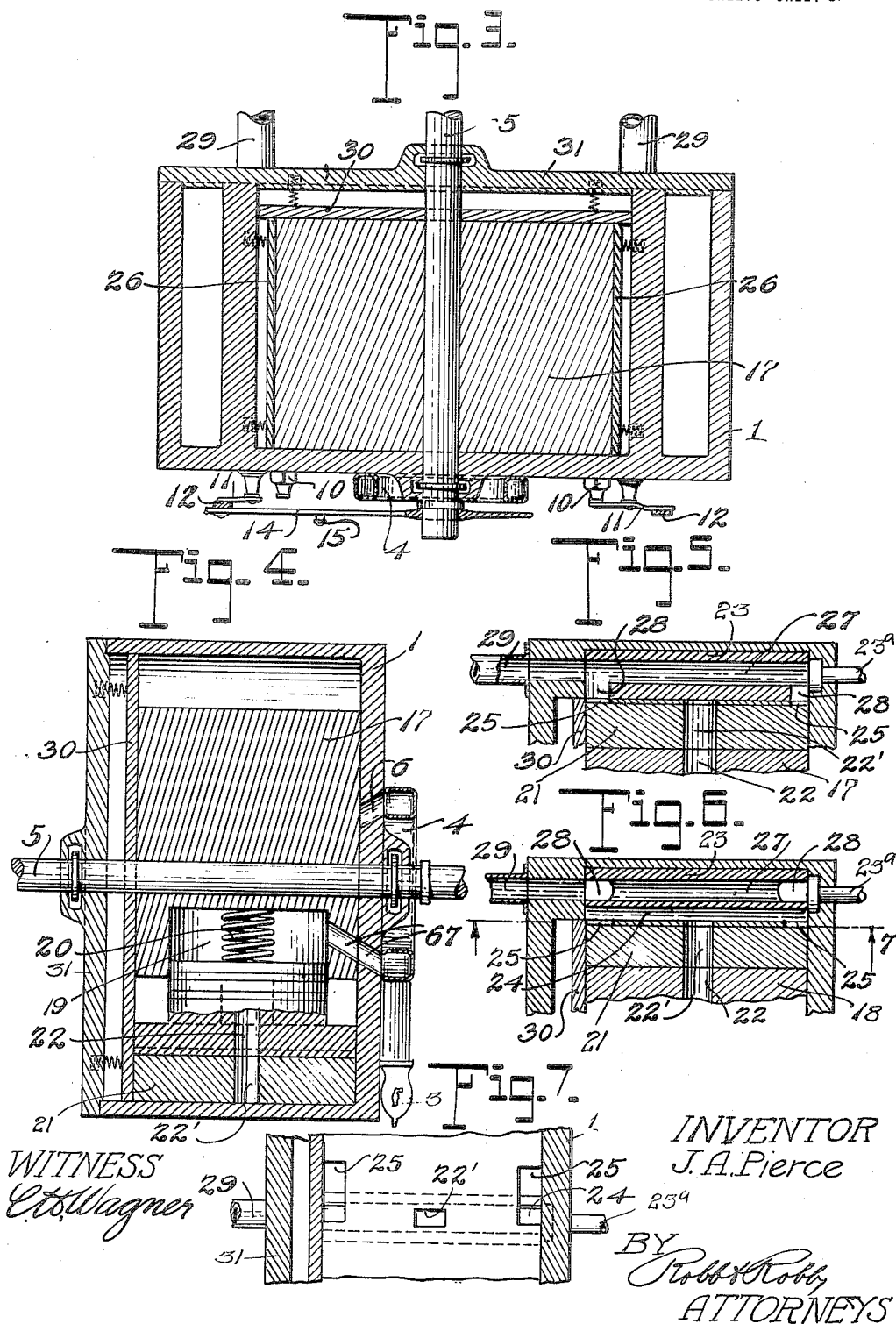
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UNITED STATES PATENT OFFICE.

JOHN A. PIERCE, OF WALNUT GROVE, MISSOURI.

ROTARY ENGINE.

1,319,614.

Specification of Letters Patent.

Patented Oct. 21, 1919.

Application filed September 16, 1918. Serial No. 254,251.

To all whom it may concern:

Be it known that I, JOHN A. PIERCE, a citizen of the United States, residing at Walnut Grove, in the county of Greene and State of Missouri, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

The present invention relates to improvements in that type of engines known as rotary internal combustion engines. It has for its object to provide a simple construction embodying as usual a rotor carrying novel charge compressing means so constructed and arranged as to control the movement of the explosive mixture to the valves by means of which it is inducted into the firing chamber.

A further object is to provide a special type of valve capable of serving as a controlling means for either incoming or outgoing gases through coöperation with the respective compressing means hereinbefore mentioned.

A still further object is to produce a novel reversing arrangement through the combination of elements of the ignition system and the valves above referred to whereby the engine may be readily reversed at will.

Other objects and advantages of my invention will become apparent by reference to the following specification and claims with the illustrations of the annexed drawings, in which:

Figure 1 is a side elevation of an engine constructed in accordance with this invention, showing the reversing instrumentalities, and other general details of construction.

Fig. 2 is a vertical section through the engine.

Fig. 3 is a horizontal sectional view taken about on the plane indicated by the line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary sectional view showing one of the valves in exhausting position.

Fig. 6 is a similar view showing another of the valves in intaking position; and

Fig. 7 is an enlarged sectional view on the line 7—7 of Fig. 6, looking in the direction of the arrows and showing more clearly the arrangement of the intake cavities leading to the firing chamber.

Referring to the drawings and specifically describing the invention, 1 indicates the engine casing or stationary part, which in cross section is somewhat elliptical in shape. The casing is provided with the water jacket 2 passing around the controlling valves hereinafter referred to. Upon one side of this casing is located a suitable carbureter 3 and intake manifold 4 which encircles the axis or driving shaft 5 to provide communication with the diametrically opposite intake ports 6, 6. The manifold openings are arcuate in shape to prolong communication as the intake ports wipe by in a manner hereinafter described. Suitable timing gears are indicated at 7 and the magneto at 8 which supplies current through conductors 9 to spark plugs 10. It will be observed that there are four of these plugs, but as will be explained only two diametrical ones of the same are operative at any one time. By this arrangement, however, I obtain a reversal of the engine which may here be described while referring to the external mechanism of the engine.

The conductors 9 each lead and are connected to a circuit closing member 11 pivotally mounted just adjacent to a plug, one pair of such members being connected by the link 12 and the other pair at the opposite side of the engine being similarly connected by the link 13, which links are in turn connected by the reversing bar or lever 14 pivotally mounted about the driving shaft 5. To this bar is connected a flexible member or chain 15 passing about the wheel 16 which is manually or otherwise operable to shift or rock the bar 14 about its pivot. Now it will be observed that the circuit closing members 11 are so disposed that one of each pair will be in contact with its adjacent plug, while the other of such pair is out of contacting relation; hence the firing of the explosive charge takes place only at two points directly opposite each other. Immediately the bar 14 is rocked disconnecting the contacting parts firing ceases at these two points and takes place at the other plugs, which action will cause an impulse or impulses at the opposite side of the piston members hereinafter described and consequently a reversal of the engine.

Mounted within the casing 1 is the rotor 17 fixed on the shaft 5 and this rotor carries radially arranged reciprocable piston ele-

ments 18 movable inwardly and outwardly of the cavities 19 of the rotor as an incident to the rotation of this member and by virtue of the shape of the path followed under the action of the expansion springs 20 in the cavities tending to force the respective pistons outwardly thereof. These co-called piston elements function not only as impulse receiving instrumentalities but act also as compressing means and valves for the gas, as will later be more apparent from the description following. Each of the reciprocating members carries a rocking shoe 21 at its outer extremity, the face of which conforms to the curvature of the interior walls of the casing about the rotor and said shoes as well as the members themselves are provided with central passages, 22, 22', through which the gas intaking through the ports 6 into the cavities 19 is conducted toward the firing chambers in the regular cycles of operation of the engine.

Referring to Fig. 2, it will be observed that there are provided four rotary valves 23 diametrically arranged and coinciding with the arrangement and disposition of the circuit closing members 11 hereinbefore described. As a matter of fact these latter are fixed in relation to the valves or in other words upon the projecting stems 23a thereof so that when the members 11 are shifted the valves are likewise shifted therewith by the same operation, cutting into operation two opposite valves and plugs and cutting out the other two opposite ones.

The construction of these valves will be more clearly understood by reference to Figs. 5 and 6. Each is cylindrical in form having a laterally and longitudinally extending pocket 24 which is designed to receive the intaking gases from the passage 22' conducting them to the cavities 25 in the wall of the casing 1, adapted to register with its ends, and to the firing chamber, represented by the space between the contact of the periphery of the rotor with the spring-pressed packing plate 26 and the rear side of the reciprocating element 18, where the charge is fired and impulse is given to the rotor. Each valve is furthermore provided with a central bore 27 and end passages 28 through which the exhaust gases pass to exhaust 29 when said valve is in position to establish communication between its bore and the firing chamber.

As a matter of further detail, I preferably provide a cheek plate 30 at one side of the rotor so as to prevent leakage of the gas, this plate being spring pressed similar to the plates 26 referred to above. Preferably also the casing has a removable head or cover 31 for convenience of access to the interior mechanism.

Specifically describing the operation of the engine, it will be observed that the gas

from the intake manifold is induced by the outward movement of the reciprocating member 18 as the latter is permitted to move at those portions in the arc of travel where the casing wall becomes more distant from the periphery of the rotor during the movement of its intake port past the mouth of the manifold, as shown at the bottom of Fig. 2 of the drawings. When past this mouth, moving in the direction of the arrows in said figure, the member 18 having started to move inwardly compresses the gas in the cavity 19 and the passages 22, 22', so that by the time this particular piston member, and valve also, it will be seen, reaches the valve 23, designated in said figure *x*, maximum compression has been secured. When the passage 22' registers with the pocket 24 of said valve, the gas passes thereinto, then through the cavities 25 to the firing chamber where it is fired. This piston member moves on under the impulse given and after passing the next valve 23 marked *y* which is turned to its exhausting position, the gas is allowed to pass therethrough to the exhaust pipe, the following piston member insuring the clearing of the burnt gases from the casing. Another impulse is received upon reaching the valve 23 marked *z* and again the exhausting takes place at the next valve. Each piston member, there being provided three in this instance, obtains its impulse in succession and maintains a continuous rotation of the rotor. With the shifting of the circuit closing members in the manner referred to at the outstart of this description, a reversal of the valves is caused and the reversal of the engine follows.

I do not wish to be limited in respect to the number of piston members which are provided in the construction illustrated and various other details of construction of the invention may readily be changed without departing from the spirit of said invention and within the scope of the appended claims.

Having thus described the invention, what I claim as new is:—

1. In a rotary engine of the class described, the combination of a casing, a rotor in said casing, means for supplying an explosive medium to the rotor, reciprocable means carried by said rotor for compressing said medium as an incident to the reciprocation of said means and constituting means for controlling the admission of the explosive medium to the casing aforesaid, and a valve in said casing for receiving the explosive medium and conducting the same to the firing chamber of the engine.

2. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium thereto, a rotor mounted in said casing having a

cavity into which the medium is admitted from the supply means aforesaid during operation of the engine, a piston member mounted in said cavity and movable to compress said medium, a spring for forcing the piston outwardly of the cavity to receive the impulse of the explosive medium, said piston having a passage therethrough, and a valve in said casing for receiving said medium from the passage aforesaid and conducting the same to the firing chamber of the engine.

3. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium thereto, a rotor mounted within the casing and controlling admission of the medium thereto, said rotor having a series of radially arranged cavities, piston members mounted in said cavities and movable inwardly and outwardly thereof during operation of the engine, means for actuating said members in one direction to induce the medium into the cavities, said members constituting means for compressing the medium in the cavities and conveying means therefor, and valves having pockets to receive the medium from the cavities and to direct the same to the firing chamber of the engine.

4. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium thereto, a rotor mounted in said casing through which the explosive medium passes to thereby control the movement of the medium to the firing chamber of the engine, and diametrically arranged valves for receiving the medium from the rotor and directing the same to said chamber.

5. In a rotary engine of the class described, the combination of a casing, a rotor mounted in said casing having an impulse receiving member, means for supplying an explosive medium to the rotor, and a valve in the casing adapted to receive the medium from the rotor and convey the same to the firing chamber of the engine or the burned gases from the chamber to the exhaust, according to its position.

6. In a rotary engine of the class described the combination of a casing, a rotor mounted in said casing having an impulse receiving element, means for supplying an explosive medium to the rotor to thereby

pass it to the casing adjacent to the firing chamber thereof, reversible means in said casing to receive the medium from the rotor and convey it to the firing chamber, or the burned gases therefrom, and means for reversing said reversible means to reverse their functions and thereby reverse the engine.

7. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium to said casing, a rotor in said casing, valves for controlling intaking and exhausting of the gases, ignition means for firing the explosive charge including circuit closing members coöperating with the valves aforesaid, and means for shifting said valves and the circuit closing members simultaneously to effect a reversal of the engine.

8. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium to said casing, a rotor in said casing, valves mounted in said casing for controlling intaking and exhausting of the gases, ignition means for firing the explosive charge including a circuit closing member mounted on each of said valves, one of said members being disposed to close the circuit while the other of said members is in inoperative position, and means for shifting said circuit closing members into reverse positions and simultaneously shifting the valves to reverse their functioning and thereby reverse the engine.

9. In a rotary engine of the class described, the combination of a casing, means for supplying an explosive medium thereto, a rotor in said casing, ignition means including a plurality of spark plugs and circuit closing members mounted adjacent to said plugs, certain of said members being arranged in circuit closing position while others are in inoperative position with respect to the plugs, shifting means connected to said circuit closing members for shifting the same to reverse their relation to the plugs aforesaid, and valves for controlling the intaking and exhausting of the gases to which the circuit closing members are connected, said valves being reversible by the shifting means when the circuit closing members are actuated as aforesaid.

In testimony whereof I affix my signature.

JOHN A. PIERCE.