C. E. FERGUSON & G. H. PLEOGER.

GAS ENGINE.

APPLICATION FILED FEB. 23, 1917.

1,237,768.

Patented Aug. 21, 1917.

3 SHEETS—SHEET 1.

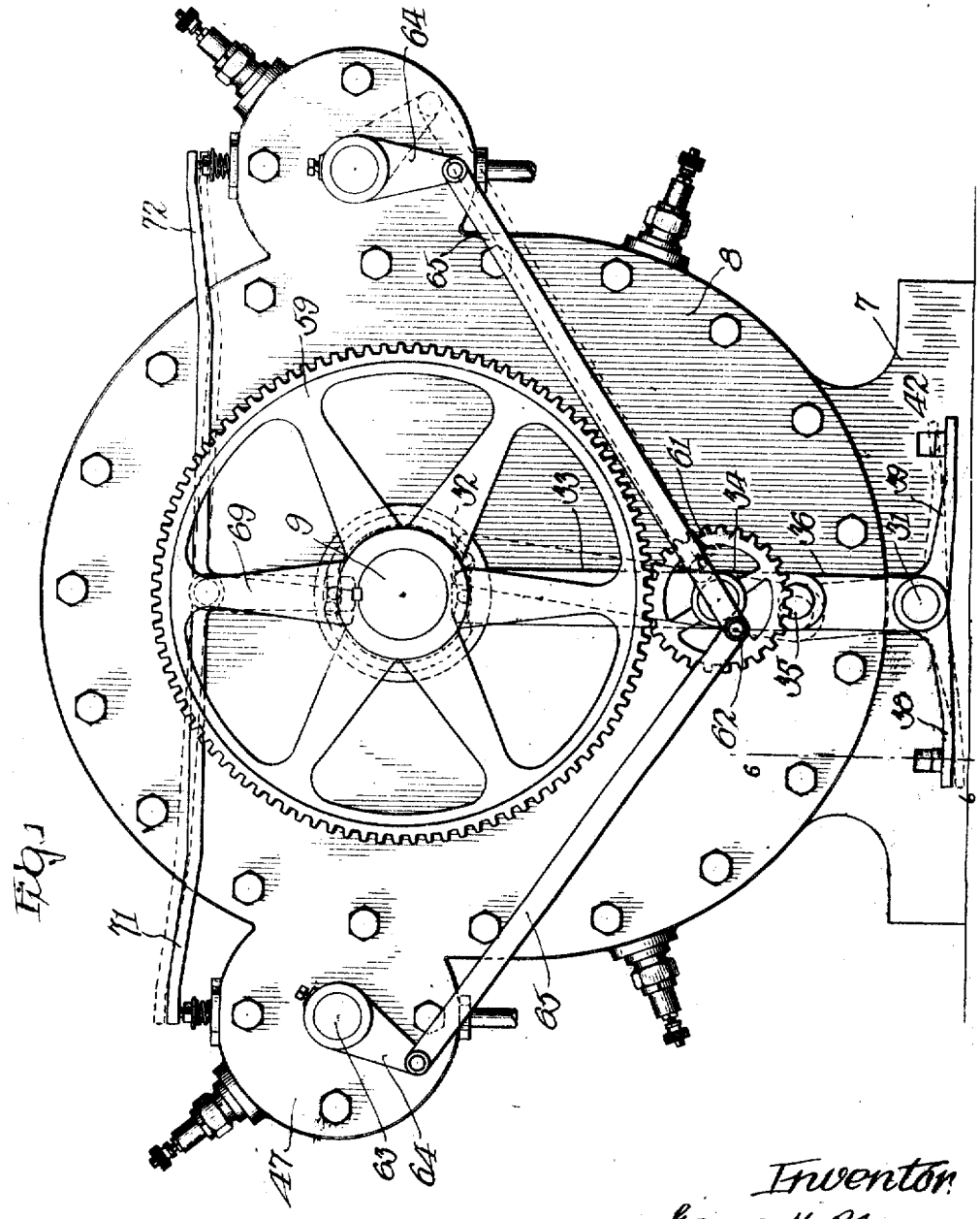


Fig. 1

Witness:
[illegible] Jackson

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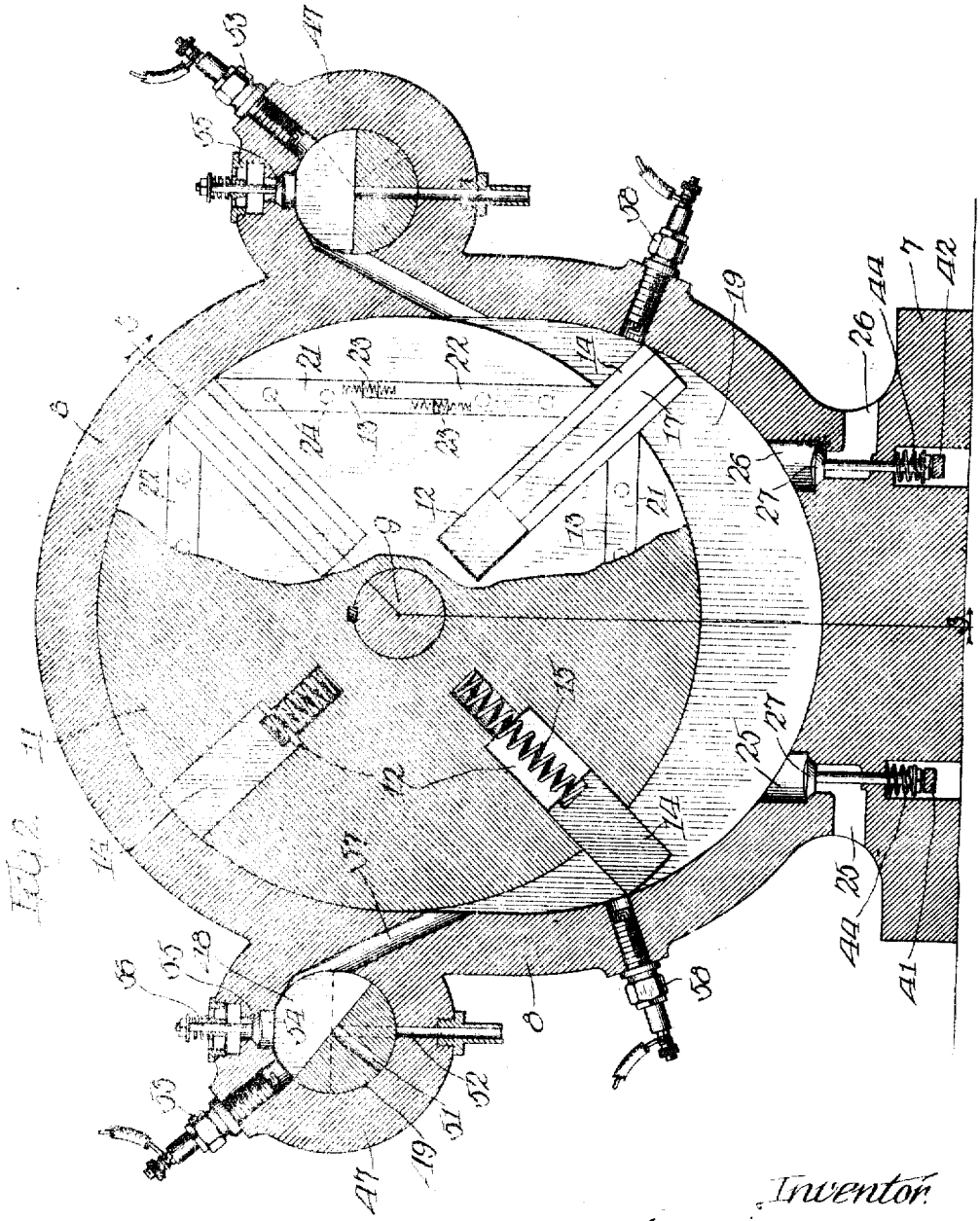
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3 SHEETS—SHEET 2.



Witness:
[illegible]

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3 SHEETS—SHEET 3.

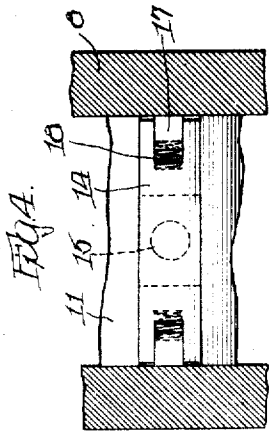


Fig. 4.

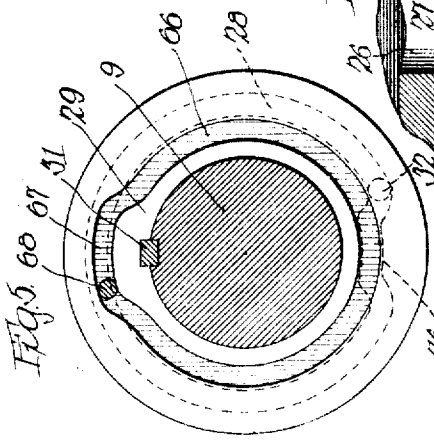


Fig. 5.

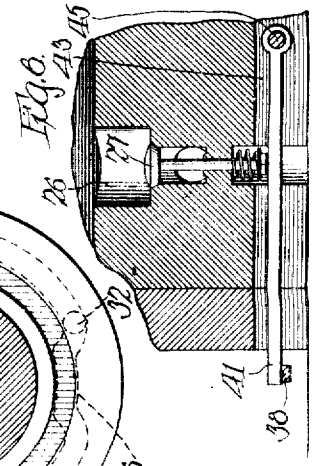


Fig. 6.

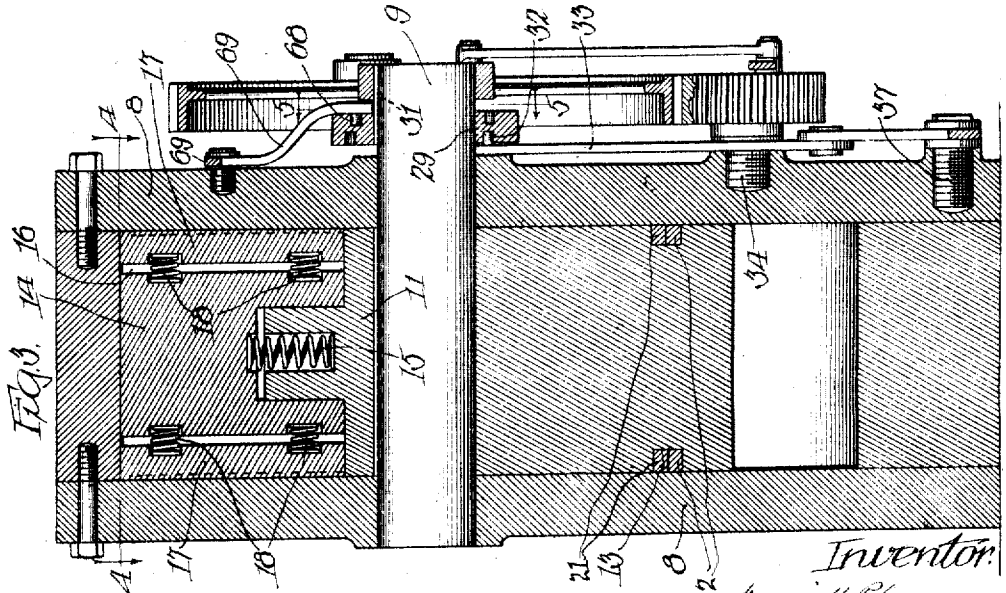


Fig. 3.

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Charles E. Ferguson.
By Robt. Hoth
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UNITED STATES PATENT OFFICE.

CHARLES E. FERGUSON AND GEORGE H. PLEOGER, OF ANTIGO, WISCONSIN.

GAS-ENGINE.

1,237,768. Specification of Letters Patent. Patented Aug. 21, 1917.

Application filed February 23, 1917. Serial No. 150,363.

To all whom it may concern:

Be it known that we, CHARLES E. FERGUSON and GEORGE H. PLEOGER, citizens of the United States, residing at Antigo, in the county of Langlade and State of Wisconsin, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

Our invention relates to gas engines and has for its primary object the provision of an improved gas engine which shall have improved starting means, improved means for reversing the direction of driving, and improved means for preventing leakage of gases under pressure from escaping past the pistons.

Other objects and advantages of our invention will become obvious by reference to the following description considered in connection with the accompanying drawings.

Referring to the drawings:

Figure 1 is a front elevation of our invention;

Fig. 2 is a vertical section through the center of my invention taken in a plane paralleling that of Fig. 1;

Fig. 3 is a section taken approximately on line 3—3 of Fig. 2;

Fig. 4 is a section on line 4—4 of Fig. 3;

Fig. 5 is a fragmentary section on line 5—5 of Fig. 3;

Fig. 6 is a fragmentary section on line 6—6 of Fig. 1.

Reference numeral 7 indicates the base of the engine, which carries a rotor chamber 8. Mounted in horizontal bearings in the rotor chamber is a main shaft 9 to which is keyed a rotor 11 comprising preferably a casting having four radial slots 12, which extend to the periphery of the rotor. The rotor also has straight side channels 13, four on a side, which connect the outer ends of the slots 12. In each slot 12 is mounted a slidable piston blade 14 which is yieldingly pressed outwardly of the rotor by a coiled spring 15. The side edges of the blades 14 are channeled as at 16 and in each channel 16 is positioned a leak plate 17 pressed outwardly against the ends of the rotor chamber 8 by a pair of expansion springs 18. The main shaft 9 is so positioned in the chamber 8 as to cause the rotor with the blades 14 compressed to fit snugly in the upper end of the chamber, leaving beneath the rotor a space 19 crescent-shaped in cross-section into which the blades 14 are pressed successively to form explosion chambers. As the rotor turns through the space 19 it will be noted that springs 15 press the outer ends of the blades 14 into contact with the wall of chamber 8 while springs 18 press leak plates 17 against the ends of chamber 8. In this manner all leakage of compressed gases past the blades 14 is prevented.

Inasmuch as there is constant pressure against each blade 14 as one explosion follows another in the driving of the engine it is desirable to provide means for preventing leakage of compressed gases from the space 19 between the rotor and its blades and into the slots 12. For this purpose leak slides 21 and 22 are provided in each slot 13, the leak slides overlapping at the center of the slot and having one or more springs 23 interposed between them to give them a constant pressure against the surfaces of the blades 14. Expansion springs 24 are provided in the rotor behind each slide 21 to press the slide outwardly against the ends of the chamber 8 in order to prevent leakage of compressed gases from space 19 past the rotor into the slots 12 and the bearings for shaft 9. Connecting with the bottom of space 19 and removed from each other a distance less than that between the two adjacent blades 14 are a pair of exhaust ports 25 and 26, each controlled by a valve 27. By reference to Figs. 1, 2, 5 and 6 the means for controlling the valves 27 will be apparent. These means comprise a cam slot 28 formed in the inner surface of a collar 29 keyed as at 31 to the main shaft 9. A roller 32 (Figs. 1, 3 and 5) is fixed upon a lever 33 and rides in the slot 28. The lever 33 is pivoted on a stub shaft 34 mounted in the wall of the chamber 8 and at its lower end is pivoted as at 35 to a link 36 which at its opposite end is pivoted to a stub shaft 37 mounted in the base of the engine. The link 37 carries two oppositely extending arms 38 and 39 which at their outer ends support valve levers 41 and 42, these levers extending through slots 43 cut in the base of the engine and directly beneath and in contact with the puppet valves 27. The valves 27 are normally held in lowermost or closed position by coiled springs 44 and when in this position are in contact with the levers 41, each lever being pivoted as at 45 in the slot 43. The cam slot 28 approaches the axis of shaft 9 as at 46 and as roller 32 rides into the portion 46 of the cam slot it

rocks the lever 33 into the dotted line position shown in Fig. 1; this rocks the link 36 counter-clockwise upon the shaft 37 elevating valve lever 42 and valve 27 in the exhaust passage 26. Should the engine be reversed the rise of the roller into the portion 46 of cam slot 28 would cause an opening of the valve 27 in exhaust port 25. In the construction of the invention the cam slots 28 may have one or more portions 46 in order to provide an exhaust after the passage of each blade beyond its exhaust port.

Viewing Figs. 1 and 2 the wall of the chamber 8 is provided at the left side with a valve casing 47 forming a valve chamber 48 in which is positioned a valve 49 provided with a passageway 51 for gasolene which, in the normal or open position of the valve (shown in dotted lines at the left in Fig. 2) connects with a gasolene intake passage 52 cored out of the casing 47. A starting spark plug 53 is set into the casing 47 in communication with chamber 48 and chamber 48 is also provided with an exhaust port 54 controlled by a valve 55 held normally closed by a spring 56. The valve chamber 48 communicates with the space 19 in the rotor chamber by means of a slanting passage 57, communicating with space 19 just below the line of meeting of the wall of chamber 8 and the rotor 11. The apparatus above described in this paragraph is duplicated on the opposite side of the engine in order to provide for reversal of rotation of the rotor when desired. At each side of the engine and somewhat below the entry of passage 57 a running spark plug 58 is inserted for exploding mixture in the space 19. Any suitable means for operating the valves 49 and 56 may be employed. For control of the valves 49 a gear 59 may be provided keyed to shaft 9 and meshing with a pinion 61 journaled on stub shaft 34, the pinion carrying a pivot pin 62. Each valve 41 has an end shaft 63 which protrudes from the casing 47 and carries a crank arm 64; links 65 connect pivot pins 62 to crank arms 64. As shaft 9 rotates the valves 49 are alternately opened and closed.

For control of the exhaust valves 55 the means to this end may comprise a cam slot 66 cut in the outer face of the collar 29 and provided with a portion 67 which bears farther from the center of shaft 9 than the remaining portion of the slot. In the slot 66 may be positioned a roller 68 mounted on a T shaped lever 69 having oppositely extending arms 71 and 72, each arm at its outer end being operatively connected to one of the valves 55. As the roller 68 enters the portion 67 of cam slot 66 the lever 69 is rocked to elevate arm 72 of lever 69 and open the left-hand valve 55 in Fig. 2.

In the operation of our invention, and considering the parts in the positions occupied in Fig. 2 the initial rotation of shaft 9, by any suitable means, such as a hand crank, has drawn through passageways 52 and 51 a charge of explosive mixture into chamber 48 and passage 57, following which the left-hand valve 49 has been closed. A spark is now shot through plug 53, exploding the mixture in left-hand chamber 48. This explosion whirls the rotor and as the first blade passes the lower end of left-hand passage 57 the corresponding valve 49 will open and the blade will draw in a charge of explosive mixture, following which the valve will shut and a spark will be shot through running spark plug 58, the starting plug 53 being cut out of circuit. The rotor is now being driven in the direction of arrow A in Fig. 2. As each blade 14 passes the exhaust port 26 the valve 27 is lifted as well as the valve 55 in the right-hand casing 47, the opening of valve 55 being provided to relieve any back pressure on the rotor. Should it be desired to reverse the direction of rotation of the rotor the ignition sparks may be applied to the right-hand spark plug 53 and then to the right-hand spark plug 58.

Our invention is adapted to be operated not only as an internal combustion engine, but it may be driven by steam, compressed air or any other similar fluid medium under pressure. While we have illustrated and described the preferred embodiment of our invention, it will be obvious that one skilled in the art might construct modifications thereof without departing from the spirit of the invention. We wish, therefore not to be limited to the precise embodiment shown except in so far as the same is limited in the appended claims.

We claim:

1. In a gas engine the combination with means for providing a rotor chamber, of a rotor mounted in one end of said chamber, radially slidable piston blades carried in radial slots cut in the rotor, said rotor being provided with end slots which connect the outer ends of said radial slots at their outer edges, a pair of slides mounted in each end slot, expansion springs pressing said slides against the piston blades, and a pair of expansion springs pressing each slide outwardly of the rotor into contact with the wall of said chamber.

2. In a gas engine the combination with means for providing a rotor chamber of a rotor mounted in one end of said chamber, radially slidable piston blades carried in radial slots cut in the rotor, said rotor being provided with end slots which connect the outer ends of said radial slots at their outer edges, a pair of slides mounted in each end slot, expansion springs pressing said slides against the piston blades, and a pair of ex-

pansion springs pressing each slide outwardly of the rotor into contact with the wall of said chamber, said slides having their outer ends beveled for flat contact with the surfaces of the piston blades.

3. In an internal combustion engine the combination with means providing an elongated chamber, of means at each side of said chamber and externally thereof providing valve chambers, a rotor mounted in one end of said rotor chamber, there being passageways provided from said valve chambers to the rotor chamber, means for supplying fuel to said valve chambers, valves controlling the supply of fuel to said chambers, a spark plug inserted in each of said valve chambers, each of said valve chambers being provided with an exhaust port, valves for said exhaust ports, and means driven from said rotor for operating the valves.

In testimony whereof we have affixed our signatures.

CHARLES E. FERGUSON.
GEORGE H. PLEOGER.