J. A. MORIN.

GAS TURBINE ENGINE.

APPLICATION FILED JAN. 6, 1913.

1,131,072.

Patented Mar. 9, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

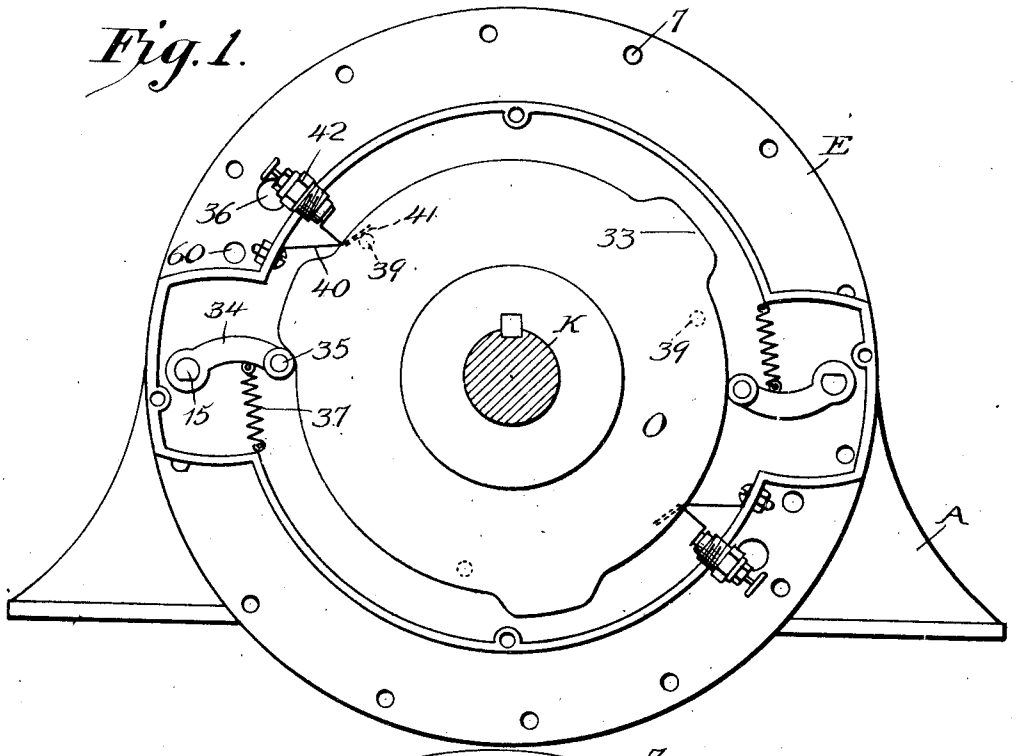
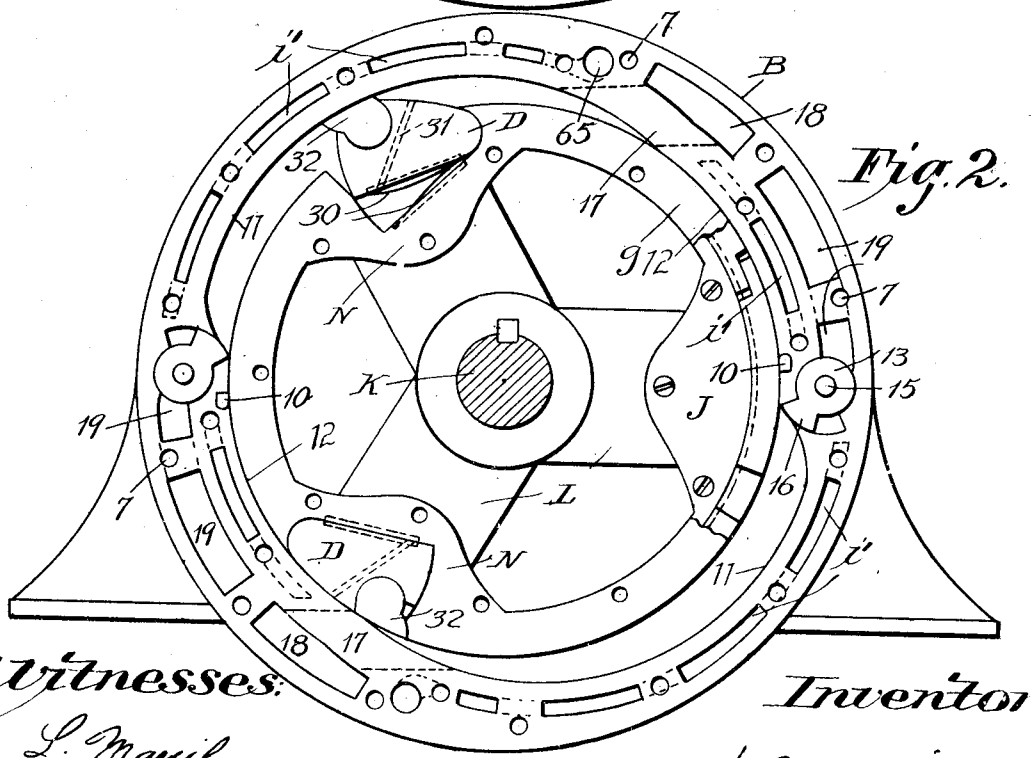


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

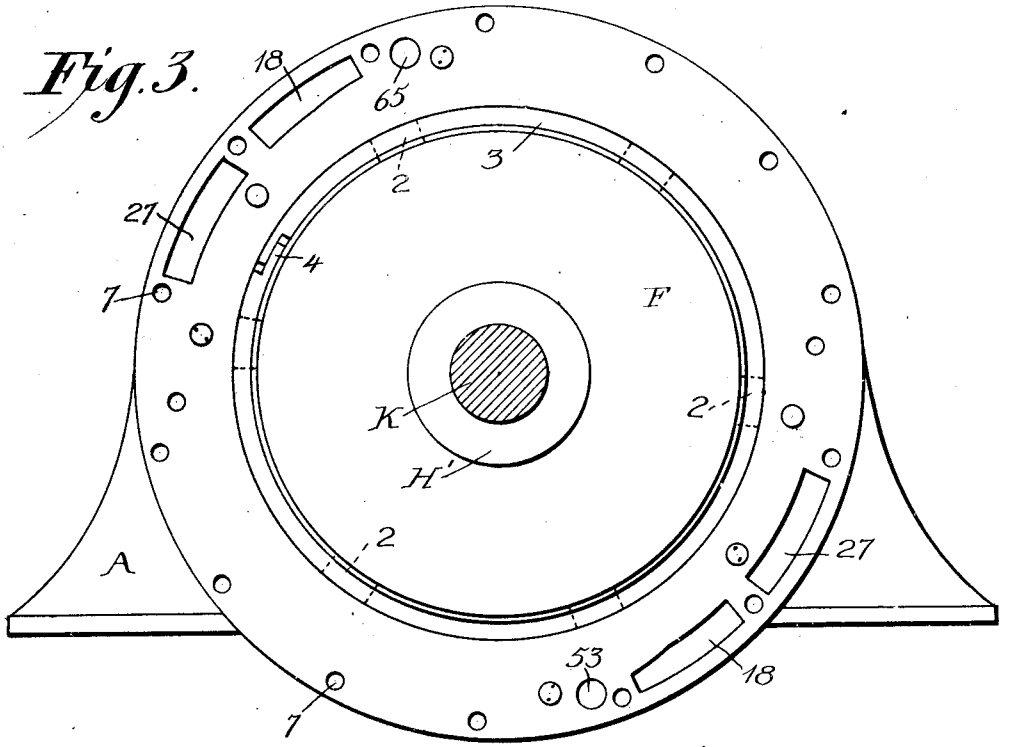
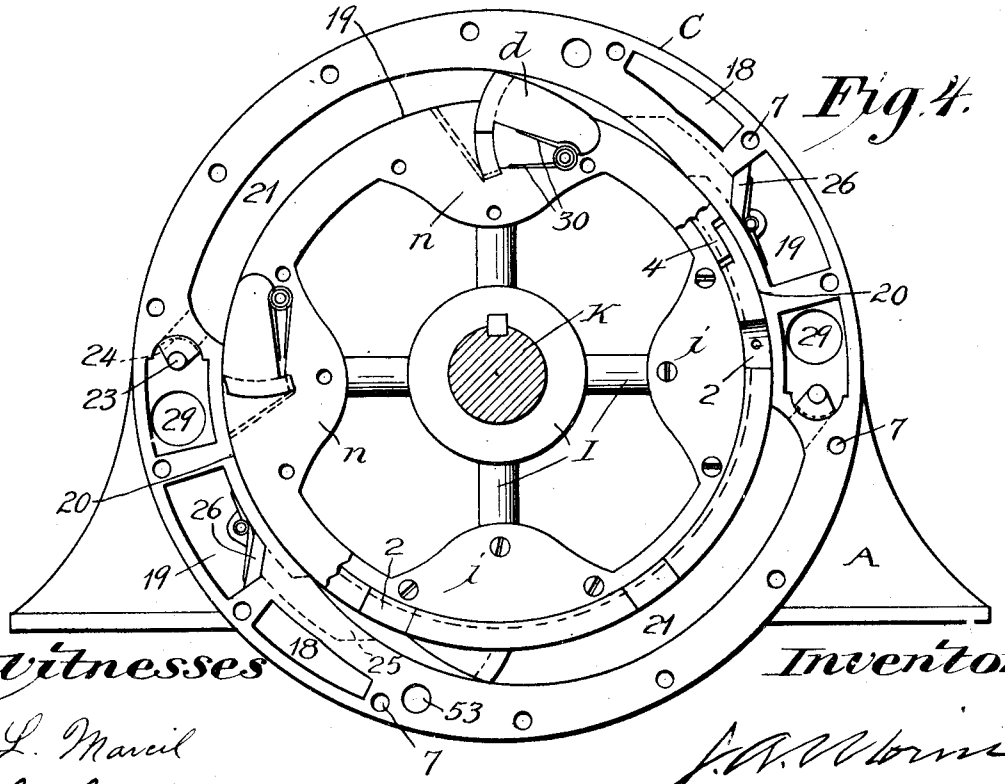


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

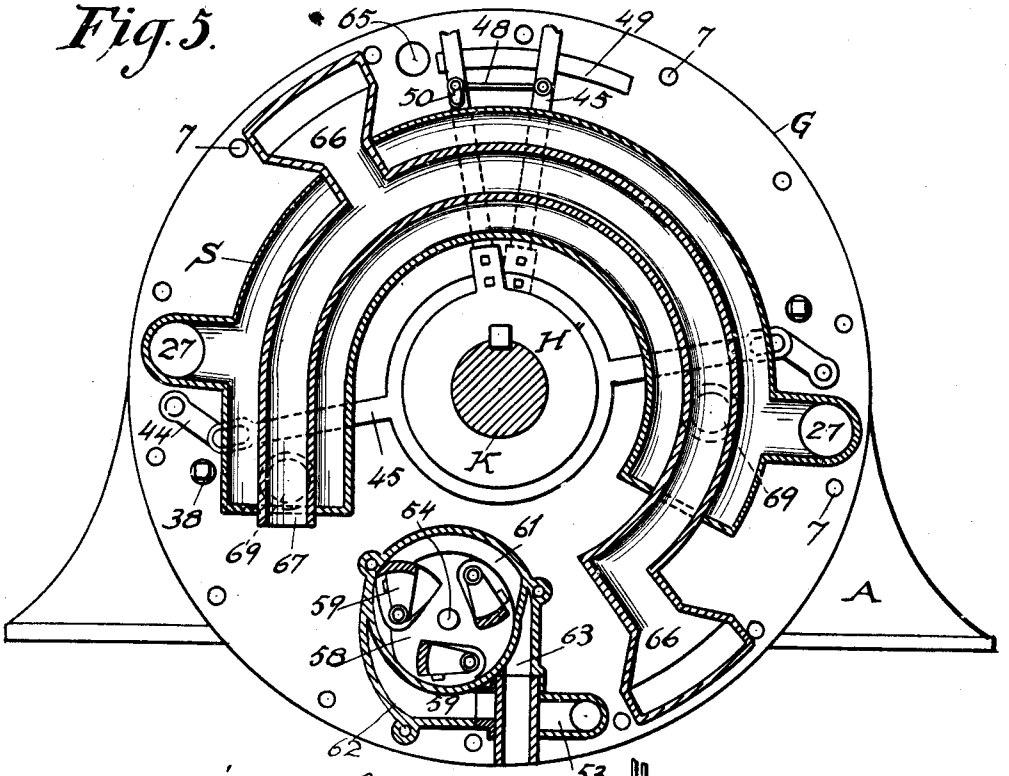
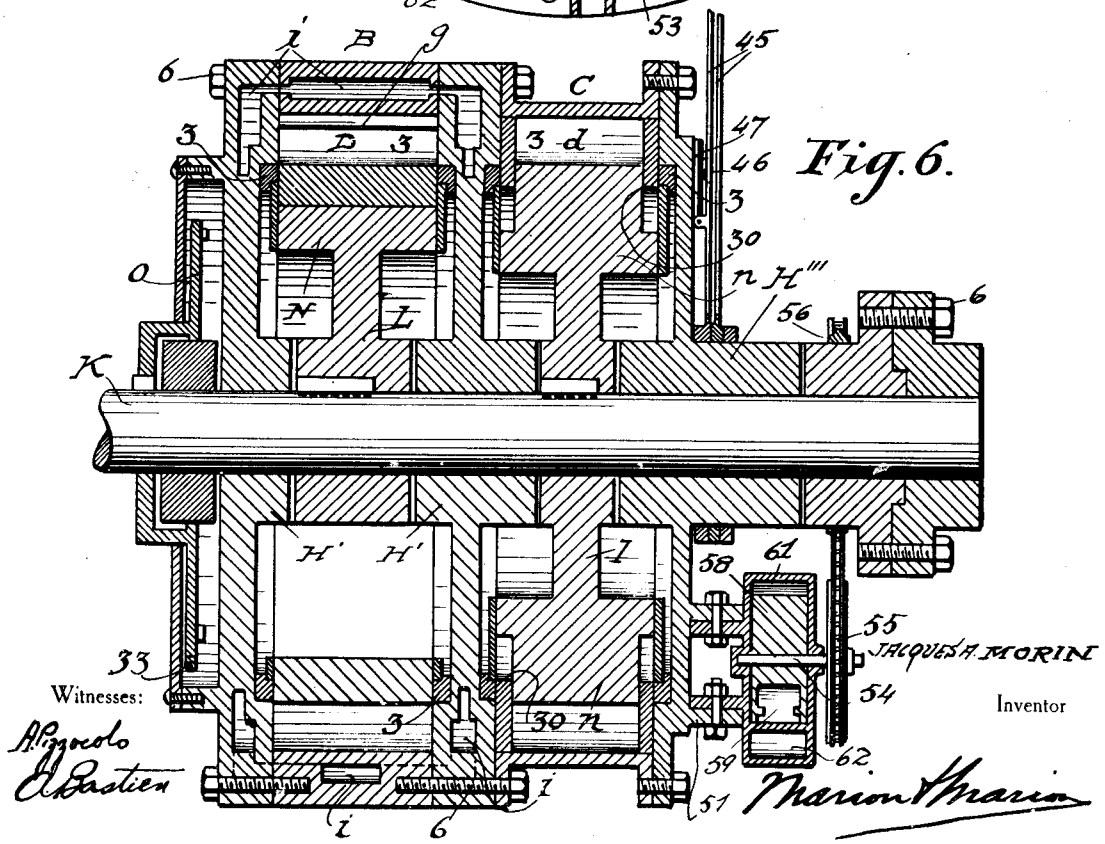


Fig. 6.



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GAS TURBINE-ENGINE.

1,131,072. Specification of Letters Patent. Patented Mar. 9, 1915.

Application filed January 6, 1913. Serial No. 740,572.

To all whom it may concern:

Be it known that I, JACQUES ALFRED MORIN, a British subject, residing in the city of Quebec, Province of Quebec, Canada, have invented a new and useful Gas Turbine-Engine Using Gas or Gasolene or Petroleum-Oil and Gasolene Combined, of which the following is a specification.

The invention to be hereinafter described relates to internal combustion engines.

In order to more clearly disclose the construction, operation, and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings like reference characters designate the same parts.

In the drawings: Figure 1 is a lateral, vertical, cross section, showing the cam plate and valve levers in end elevation; Fig. 2 is an end view of the motor, with one cylinder end removed; Fig. 3 is an end view of the opposite end of the motor cylinder, complete; Fig. 4 is an end view of the compressor with one cylinder end removed; Fig. 5 is a lateral, vertical, cross section through supply and exhaust pipes and circulation pump; Fig. 6 is a central, vertical, longitudinal, cross section through the entire machine, assembled.

The main objects of the invention are to provide a simple, efficient, durable, economical, and compact combined rotary internal combustion engine and rotary coöperating compressor.

Referring to the drawings in detail, A indicates a suitable base or support on which are mounted, either separately or as integral parts, parallel circular plates E, F, and G, constituting cylinder ends or heads and each provided with a hub or journal bearing H, H′, H″, to receive and support the freely revoluble motor shaft K. Between E and F is clamped an annular wall B forming the body of the motor casing or cylinder. Between F and G is secured a similar annular wall C, forming the body of the compressor casing. These walls B and C are secured in position by bolts 6 passed through holes 7 in the plates E and G and into the walls B and C, respectively; and by bolts 6 passed through wall C and into plate F, as clearly shown in Fig. 6.

The outer face of the wall B is circular, but the entire inner circumference is not truly circular and concentric therewith, though it has two diametrically opposite portions 12 concentric therewith, the intervening spaces 11 being cut out to form eccentric explosion chambers as shown in Fig. 2. Keyed to shaft K and freely revoluble within the motor casing, is a rotor L provided with three substantially triangular piston pockets in the rim 9. In these pockets are pivoted swinging pistons D each actuated outwardly by a spring 30. To prevent a retarding vacuum which would normally be formed by the outward movement of the piston, a bore 31 is made through each piston to afford a vent for the chamber beneath the piston to and from the piston pockets. At each piston pocket the rim 9 is extended inwardly at N to form a support or base to which gas check plates J may be screwed or otherwise connected to prevent leakage of gas from the pockets to the interior of the rotor. In order to provide a gas tight traveling contact between the rim 9 and the adjacent surfaces of the walls B, E, and F, gas check rings 3 are provided. They are maintained concentric with the rotor axis K by means of thin rings *i* secured to the edges of the rotor rim 9 and having their edges extending into annular recesses of the gas check rings, all as clearly shown in Fig. 6. These gas check rings are maintained in sliding contact with the surfaces of walls B, E, and F by means of small leaf springs or the like seated in recesses 2 cut in the inner faces of the rings at intervals.

In order to prevent escape of gas between the adjacent concentric surfaces of the wall B and rotor rim, semi elliptical bars 10 are seated in key ways or grooves of the concentric portions of the wall B in such manner that one longitudinal edge of each bears lightly upon the face of the rim of the rotor throughout its width. Suitable leaf springs or the like, seated in recesses in the bars and the wall B, act to maintain the bars in operative position.

The explosion takes place in the rear of the swinging pistons. The rear of each piston is arch shaped, forming a forwardly directed angle between the wall B and the upper part of the rear face of the piston. Thus, an explosion occurring at the rear would have a wedging action which would probably drive the piston into its pocket and escape toward the exhaust passage outlet 17 without any driving effect. To pre-

vent this, a rocking friction plate 32 is slidably and rotatably seated in a part circular groove of about 225°, in the rear upper edge of each piston. This plate has a wide surface which travels in sliding contact with the inner face of the wall B and a rear inclined wall which forms an angle with the rear face of the piston. The explosion, impinging equally against this face and the rear face of the piston, assists in maintaining a gas tight traveling contact between the friction plate and the wall B. The gas is admitted to the explosion chambers through valves 13 provided with spindles 15 and rotatably mounted in the wall B. Each valve spindle is provided with a lever arm 34 carrying a roller 35 adapted to be engaged by successive cams 33 on a cam disk O keyed to the shaft K. This disk is so positioned on the shaft K as to have the cams 33 engage and actuate the arms 34 for admission of gas at the instant that the friction plate 32 of each piston passes the fuel inlet, and the cams are so proportioned as to maintain the valves in open position until the pistons have traveled a pre-determined distance beyond this point, thus permitting admission of a fixed volume or charge of fuel behind the abutment. As each cam passes beyond the roller 35, a spring 37 connected at its opposite ends to the lever 34 and the motor casing, respectively, will swing the lever 34 back, closing the valve. Each valve is provided with an arc shaped portion 16 traveling in a recess in the wall B and falling flush across the gas inlet opening, while the valve is in inoperative position, giving a smooth even surface for the free travel of the pistons, and their friction plates 32. The spent gas of each explosion is wiped out through the exhaust opening 17 by the succeeding piston, passes into an exhaust channel 18, thence into a connecting tube 66 which delivers it into a U shaped exhaust pipe 67 at the opposite end of the machine. The passages 18 lead through the wall B of the motor and the wall C of the compressor.

In the wall of each explosion chamber is a bore 36 to receive a spark plug from which extends a spring terminal 42 which coöperates with a similar terminal 40 secured in the wall B and projecting inwardly. As the disk O rotates, studs 39 thereon engage the terminals 40 and carry them toward the terminals 42, completing the circuit and making the spark. The studs 39 are so arranged as to make the spark immediately after the valve 13 has been closed, of course.

In order to cool the motor casing, it is water jacketed by intercommunicating passages and conduits *i'* Figs. 2 and 6 throughout the width of the wall B and through the adjacent parts of the walls E and F as clearly shown in Fig. 6. As shown in Fig. 2, some of these conduits extend through the wall B where this wall is concentric with the rotor L and thus, through cooling this part of the wall, also act to cool the rotor face.

The compressor, for the most part, is constructed in substantially the same manner as the motor and, therefore, need not be so minutely described. It comprises end walls F and G, and body wall C. Within the wall C is mounted rotor I, keyed to the shaft K and having inwardly extending parts *n* of its rim corresponding to parts N of rotor L. Portions 20 of the wall C are concentric with the rotor and the intervening portions form eccentric compression chambers 21 leading to passages 25 opening into gas reservoirs 19, the inner ends of the openings being closed by spring pressed flap valves 26. The enlargements *n* of the rim are provided with lateral arcuate grooves to receive the arc shaped rear plate of U shaped pivotally mounted swinging pistons *d* actuated to operative position by leaf springs 30 Fig. 4, or the like. Relief bores 31 through the rim to the bottoms of the grooves permit free swinging of the pistons. Gas check rings 3 with recesses 2 and centering rings *i* are provided—as in the motor. Plates *j'* are the same as plates J. As the rotor I revolves, each piston will draw in a charge of gas or explosive mixture through an inlet port, controlled by admission valves 23, and the following piston will compress this charge through the passage 25 and valve 26, and into the gas reservoir 19. The quantity admitted to the compression chambers 21 is governed by the controlling valves 23 having arc shaped plates 24 for closing the inlets. To the spindle of each of these valves is connected one arm of a bell crank hand lever 45, which is journaled about the shaft K and provided with a spring pressed pivoted pawl 46 coöperating with a ratchet 47 fixed to the end wall G, thus permitting the lever to be secured in any set position. To enable equal and simultaneous operation of both valves, the two levers are coupled by a rod 48, eye 49 and turnbuckle 50. Actuation of these valves regulates the inflow of gas or explosive mixture from the supply chambers 29 which communicate by branches 68 with a U-shaped pipe or tube S which receives the fuel from carbureters or other suitable sources of supply through inlets 69, all as shown in Figs. 4 and 5.

The reservoirs 19 are simple continuations of the fuel conduits or passages 19 in the motor casing. The flap valves 26 prevent any possible back flow of the fuel when the machine stops, thus always leaving a supply of fuel ready for starting. Thus, during the operation of the motor, the compressor is continually compressing new charges of fuel into the reservoirs 19 as fast

as it is delivered from them into the explosion chambers. If desired, the carbureters and their immediately coöperating parts and connections may be omitted. Instead of drawing the fuel from carbureters, ready mixed, the petroleum or gas vapor, and the air, may be delivered separately but in the proper proportions to the compression chambers. Thus, the vapor may be delivered into each compression chamber direct by simply coupling a supply pipe to a suitable bore which is normally closed by a removable plug 38 in the wall of each chamber. The air will be drawn in through chambers 29, the pipe S and branches 68 being omitted. The proportion of air will be regulated by the valves 23 and hand levers 45.

In order to maintain a continuous and regular circulation through the passages and conduits *i'* of the motor casing, a rotary pump is used, driven direct from the shaft K. This pump is detachably mounted in brackets 51 of wall G and is very similar in its general construction to the compressor. Therefore, only a brief mention of its parts will be necessary. It comprises a casing R Fig. 6 with pump shaft 54 carrying a rotor 58 in which are slidably mounted spring actuated swinging pistons 59 operating successively in a compression chamber 161 eccentric to the rotor. These pistons draw water in through the inlet 63 which is connected to the feed pipe, and drive it out through the delivery passage 62 which is connected to the supply passage or opening 53 of the circulation system of the jacket. After passing back and forth through the various passages and conduits of the system, the water will pass out through the outlet 65 Fig. 4. The pump is driven by means of a sprocket chain 56 passed about a sprocket wheel 55, fixed to shaft 154 and also about sprocket teeth formed on a collar or sleeve fixed to the shaft K, all as clearly shown in Fig. 6.

It is thought that the construction, operation, and use of the invention will be clear from the preceding detailed description.

The parts E, B, F, C, G constitute in effect a fixed continuous casing provided with the necessary fuel, exhaust and water passages and having its interior divided into two compartments for the rotors arranged side by side.

Changes may be made in the construction, arrangement, and disposition of the several parts of the invention without in any way departing from the field and scope of the same, and it is meant to include all such within this application wherein only a preferred form has been disclosed.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination, an internal combustion motor casing, a motor shaft journaled therein, a rotor keyed to said shaft and revoluble in said casing, swinging pistons pivotally mounted in the rim of said rotor, valves controlling admission of fuel to said motor casing, a cam disk keyed to said motor shaft and provided with cams and pins, levers carried by said valves and adapted to be engaged and actuated by said cams, and spark plug terminals adapted to be engaged and actuated by said pins.

2. In combination, an internal combustion motor casing, a motor shaft journaled therein, a rotor keyed to said shaft and revoluble in said casing, swinging pistons pivotally mounted in the rim of said rotor, valves controlling admission of fuel to said motor casing, levers for operating said valves, spark plug terminals arranged for igniting the explosive charge and a rotary part carried by said motor shaft and provided with means for actuating said levers and means for engaging and actuating said terminals.

3. A rotor and its casing, in combination with means for introducing an explosive mixture and means for exploding it between the said rotor and casing, a swinging piston carried by said rotor and means for moving said piston out toward said casing, the said piston being provided with a transverse bore 31 for the purpose set forth.

4. A rotor and its casing, in combination with means for introducing an explosive mixture and means for exploding it between said rotor and casing, a swinging piston, a pivoted part carried by said piston and a spring acting on said piston to press said pivoted part against the casing, said piston having a transverse bore 31 for the purpose set forth.

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