No. 763,773. PATENTED JUNE 28, 1904.

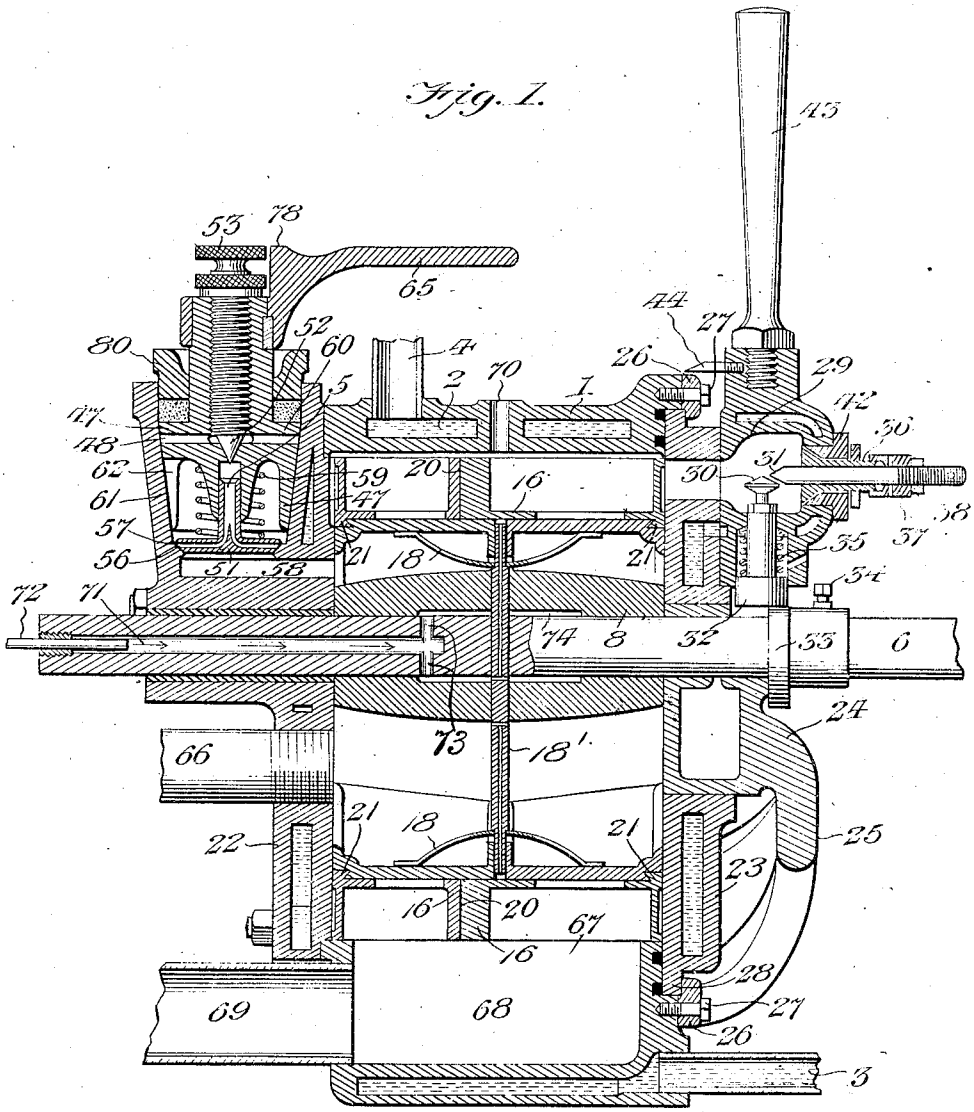
C. A. MARLITT.

ROTARY EXPLOSIVE MOTOR.

APPLICATION FILED MAR. 12, 1903.

NO MODEL. 6 SHEETS—SHEET 1

Fig. 1.



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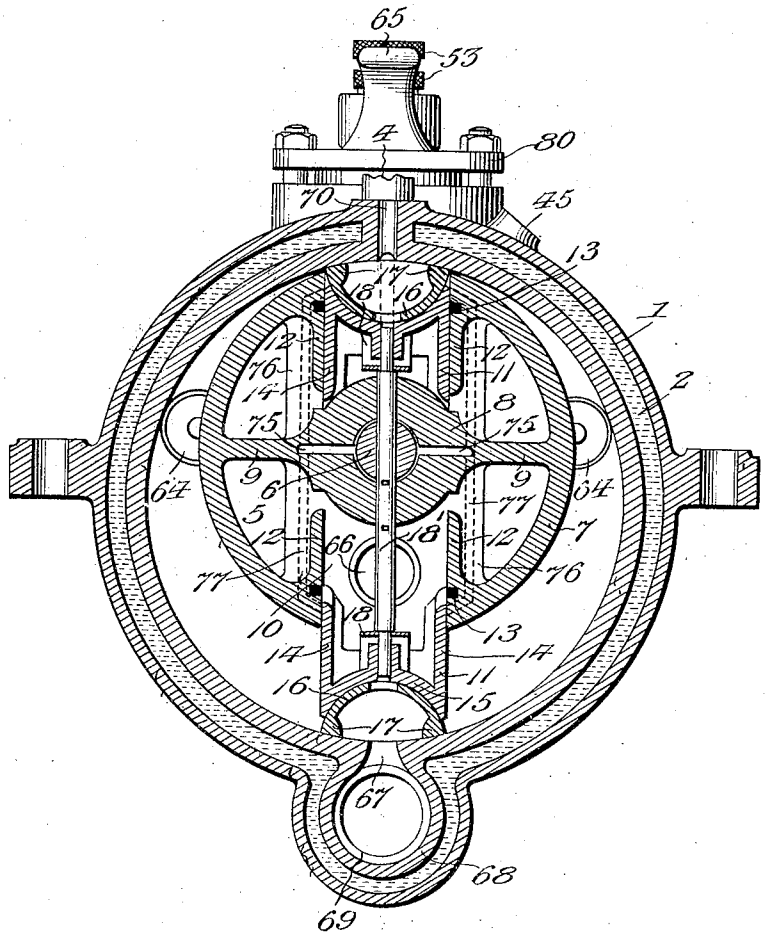
NO MODEL. 6 SHEETS—SHEET 2.

Fig. 2.



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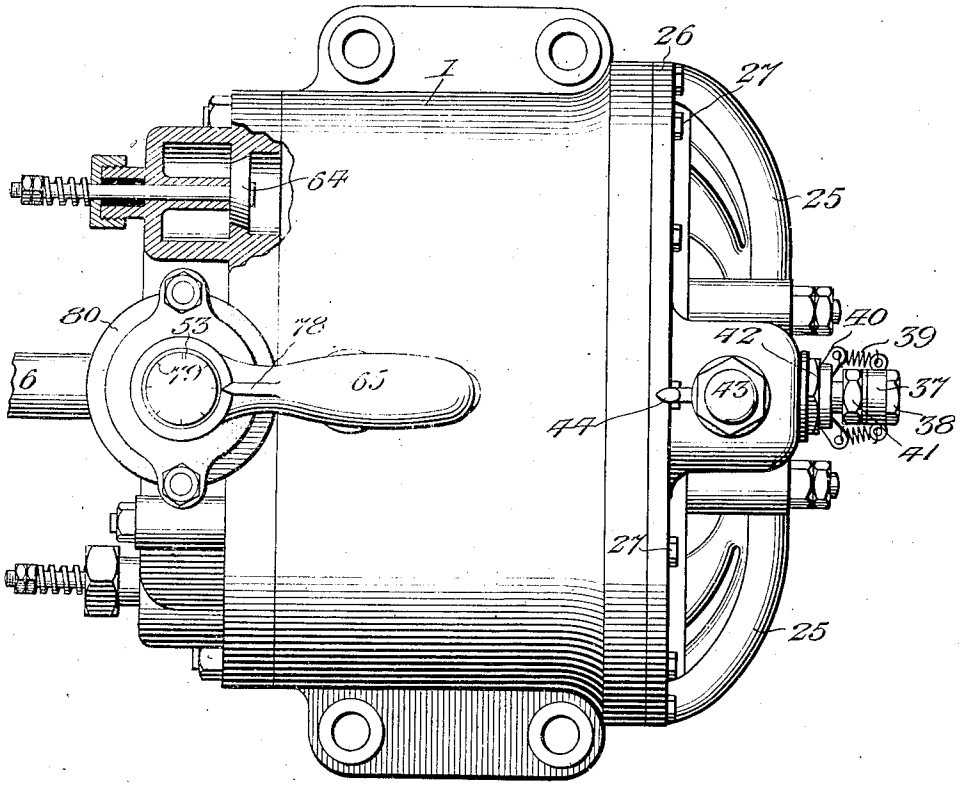
NO MODEL. 6 SHEETS—SHEET 3.

Fig. 5.



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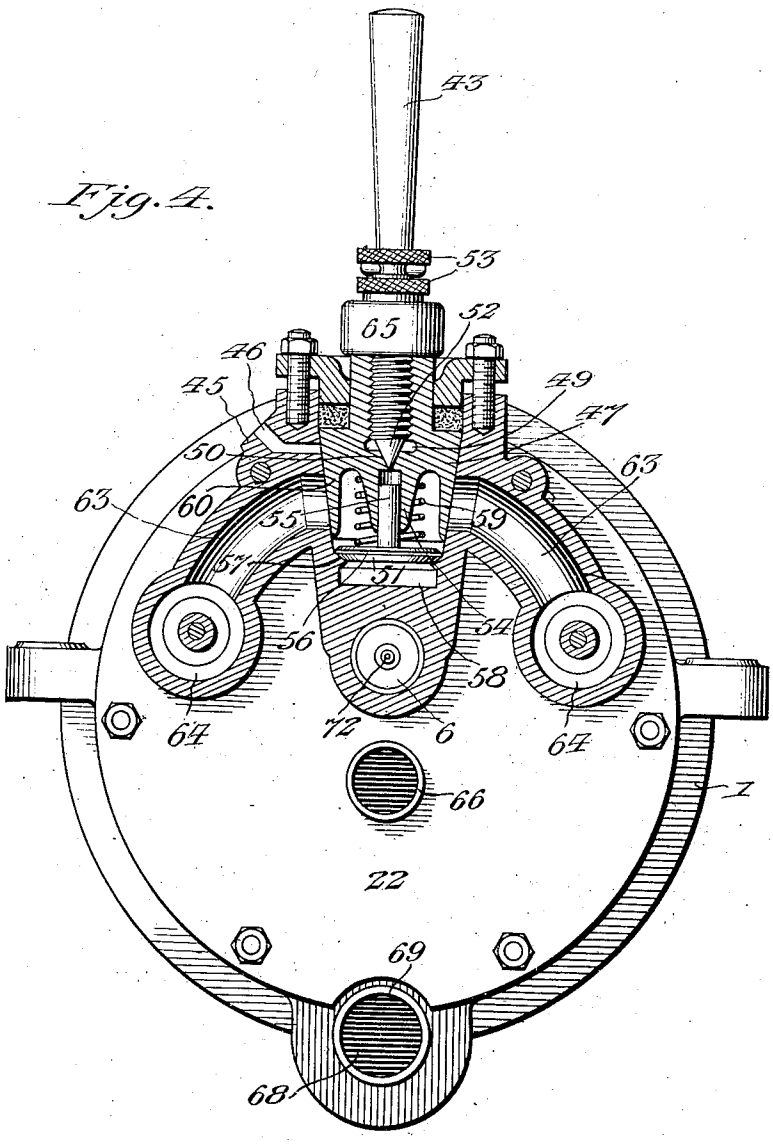
NO MODEL. 6 SHEETS—SHEET 4

Fig. 4.



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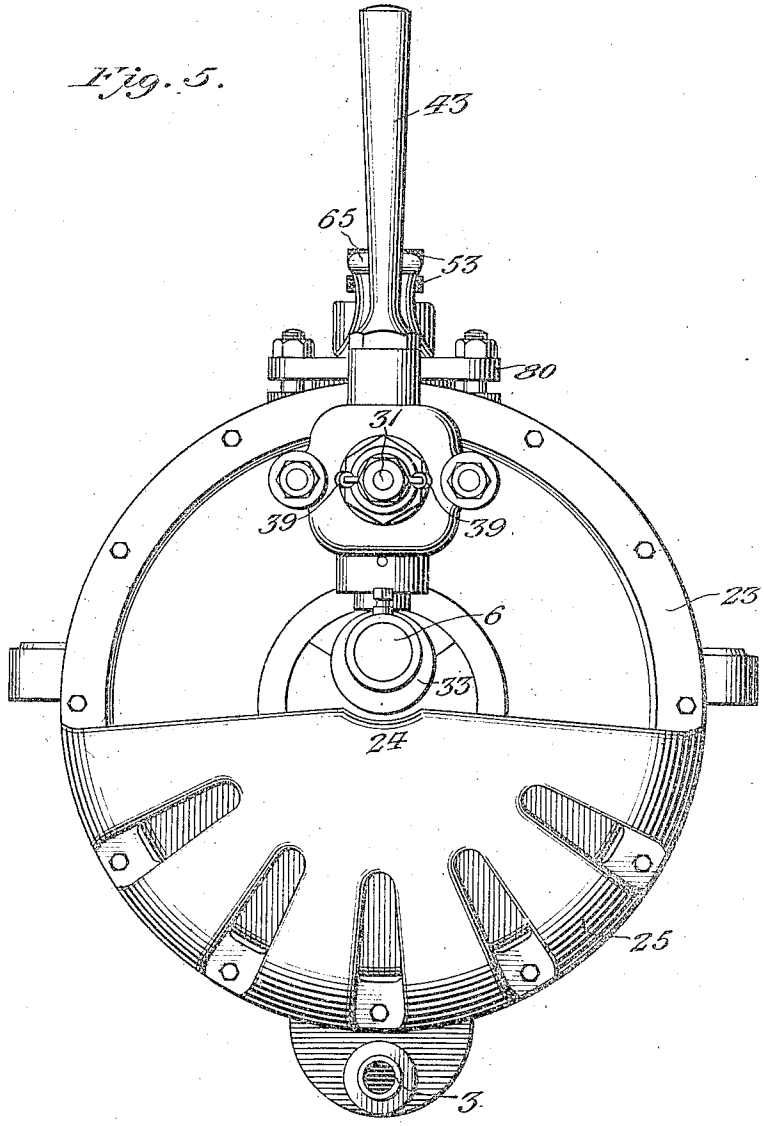
APPLICATION FILED MAR. 12, 1903.

NO MODEL. 6 SHEETS—SHEET 5.

Fig. 5.



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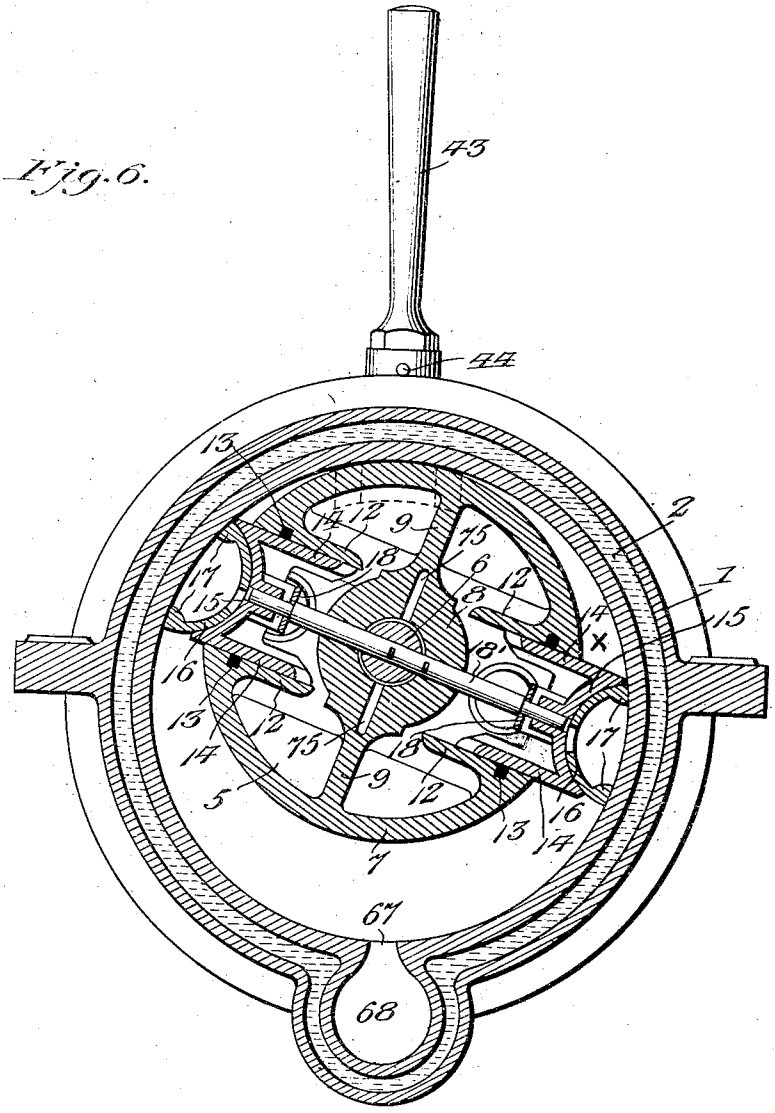
ROTARY EXPLOSIVE MOTOR.

APPLICATION FILED MAR. 12, 1903.

NO MODEL. 6 SHEETS—SHEET 6

Fig. 6.



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No. 763,773. Patented June 28, 1904.

UNITED STATES PATENT OFFICE.

CHARLES A. MARLITT, OF PORTLAND, OREGON.

ROTARY EXPLOSIVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 763,773, dated June 28, 1904.

Application filed March 12, 1903. Serial No. 147,486. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. MARLITT, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented new and useful Improvements in Rotary Explosive-Motors, of which the following is a specification.

This invention retates to rotary explosive-motors, the object in view being to provide a motor or engine embodying a continuously-rotating piston driven by the explosion of successive charges of air and gas mixed in the proper proportion and forced into the cylinder, the piston being connected to the main shaft for imparting its rotary motion thereto.

The present invention has particular reference to the construction of the piston and cylinder, together with the parts immediately associated therewith, whereby the charges of the explosive mixture are properly confined and prevented from escaping prior to and at the time of ignition.

The invention also relates to the means for regulating or adjusting the point of ignition and time of injection of each charge of explosive mixture and also the ignition of the same.

The invention also contemplates novel means for obtaining close joints between the wings of the piston and the walls of the cylinder and at the same time providing for automatically taking up wear between the piston and cylinder.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination, and arrangement of parts, as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a vertical section taken through a rotary explosive-engine in line with the main driven shaft, the latter also being partly broken out in section to illustrate a portion of the lubricating device. Fig. 2 is a vertical cross-section taken through the cylinder, piston, and main driven shaft. Fig. 3 is a plan view of the engine, showing one of the admission-valves in section. Fig. 4 is a cross-section taken near one side of the engine and illustrating the construction and arrangement of the needle-valve, throttle-valve, vaporizing-valve, and passages leading from the mixing-chamber to the admission-valves. Fig. 5 is a view in elevation looking toward the opposite side of the engine and showing the means for adjusting the position of the igniting device. Fig. 6 is a vertical cross-section similar to Fig. 2, illustrating the position of the piston and its wings at the time of one of the two explosions which take place during each complete revolution of the piston.

Like reference-numerals designate corresponding parts in all the figures of the drawings.

The motor or engine contemplated in this invention comprises, essentially, a cylinder 1, provided with double walls to form a water-jacket, containing a water-space 2, encircling the outer curved wall and also extending along the side walls or heads of the cylinder, as shown in Figs. 1 and 2, the water entering through an inlet-pipe 3 and exhausting through an outlet-pipe 4, arranged, respectively, at or near the bottom and top of the engine, thus providing for a constant circulation of water through all parts of the casing or cylinder of the engine.

Within the cylinder is mounted a rotary piston 5, fixed upon the main shaft 6, so as to impart its rotary motion thereto. The shaft 6 is arranged eccentrically of the cylinder, as clearly shown in Figs. 1 and 2, so as to bring the piston at one point in close relation to the inner curved wall of the cylinder, the drawings representing such point as located at the top of the cylinder. The piston comprises a rim 7, a hub 8, and a spider or series of spokes 9, connecting the rim with the hub, as shown in Fig. 2. The rim 7 comprises two parts which are sufficiently separated to leave between them a channel or way 10, in which piston-wings 11 are mounted to reciprocate in lines radial or diametrical to the shaft 6. The piston 5 is also provided with inwardly-extending parallel flanges 12 to give the proper length of bearing to the piston-wings, and at opposite sides the walls of the channel 10 are provided with recesses 13, in which is placed packing of any suitable description to afford close fluid-tight joints between the pis-

ton and its wings as the latter reciprocate. Each of the wings 11 comprises parallel side or cheek portions 14, connected at their outer ends by means of a concavo-convex wall 15, substantially semicircular in cross-section and adapted to receive a yielding abutment cushion or packing 16, which in cross-section is also semicircular and provided with thickened or enlarged projecting edges 17, which extend beyond the end of the wing and bear directly and constantly against the inner curved surface of the cylinder, as clearly shown in Fig. 2. The packing 16 is adapted to turn or oscillate in the concaved bearing formed in the extremity of the wing, and thus said packing is free to adjust itself to the various angles which it must assume in each complete revolution of the piston, two different positions of the piston being illustrated in Figs. 2 and 6.

The wings 11 are forced outward away from the hub 8 of the piston by means of curved flat wing thrust-springs 18, mounted on a shouldered rod 18′, which plays through an opening in the main shaft 6 and holds the springs in contact with the wings. The tension of the springs is just sufficient to hold the packing-pieces 16 in contact with the curved inner wall of the cylinder. In the operation of the engine the compression of air within the piston and the action of centrifugal force both contribute to aid the springs in maintaining a close fluid-tight contact between the wings and cylinder. Each of the wings is also jointed or made sectional by dividing the same, as shown at 19, thus allowing the compressed air within the piston to force the sections apart to compensate for wear and maintain a close joint between the ends of the wings and the cylinder-heads. The yielding abutments or packings 16 are also jointed or made sectional, being divided on the line 20, thus enabling the sections to move apart and maintain a close joint between their end portions and the cylinder-heads. The sections of the packing 16 are also provided with dovetailed extensions or ribs 21, which fit into correspondingly-shaped recesses in the outer corners of the wing-sections. This dovetailed engagement holds the packing-sections in proper position on the end portions of the wings and at the same time permits the packing-sections to adjust themselves by oscillation, as they necessarily change their angle or position with respect to the wings and the curved inner wall of the cylinder.

The cylinder-head 22 is stationary, while the opposite cylinder-head 23 is adjustable, being journaled and adapted to be turned upon a large hollow water-jacketed trunnion or bearing 24, which is connected rigidly with the frame of the engine by means of a spider 25, comprising at its outer portion a rim or flange 26, which is bolted or otherwise secured, as shown at 27, to the engine-frame, so as to overlap the outer edge or periphery of the cylinder-head 23, as shown at 28, and keep said cylinder-head in position, while allowing the cylinder-head to be turned sufficiently to materially change the point of location of the igniting device which is carried by said cylinder-head 23.

At a suitable point on the cylinder-head 23, and preferably near the top of the engine, said cylinder-head is extended or enlarged to form a water-jacketed ignition or combustion chamber 29, in which are located the electrodes 30 and 31 of the ignition device. The shank of the electrode 30 extends in radial alinement with the axis of the shaft 6 and has its inner end enlarged to form a bearing 32, which rests against a cam 33, rotating with the shaft 6 and made adjustable thereon by means of a set-screw 34, by means of which the time of the throw of the electrode 30 may be regulated accurately. The electrode 30 is normally pressed toward the shaft 6 by means of a coiled spring 35, which bears against the head or bearing 32, and is arranged in a recess in the extended ignition-chamber of the cylinder-head 23, as shown in Fig. 1. The shank of the electrode 31 extends at right angles to that of the electrode 30 and is slidingly mounted in an insulator sleeve or bushing 36, passing through the outer wall of the ignition-chamber 29 and being provided on the outside of the engine with a collar 37, held in place by a nut 38 and having connected therewith at opposite sides springs 39, which at their opposite ends connect with brackets or lugs 40, having a fixed relation to the cylinder-head 23. A nut 41 on the threaded shank of the electrode 31 bears against a flanged plug 42 at the outer end of the ignition-chamber and serves to limit the inward movement of the electrode 31, while the springs 39 yield to allow the electrode to recede outward under the action of the other electrode 31.

It will be understood that as the shaft 6, with its cam 33, revolves one complete reciprocatory movement will be imparted to the electrode 30 in each complete revolution of the shaft. The electrodes 30 and 31 are provided with inclined meeting surfaces, as shown in Fig. 1, and therefore as the electrode 30 moves outward it acts on the electrode 31 to force the latter outward. After the electrode 30 passes the electrode 31 the latter springs inward, and upon the return movement of the electrode 30 the electrode 31 is again forced outward and released, so as to be thrown inward by the springs 39. Thus two sparks are made at each complete revolution of the shaft 6, causing two explosions to take place one after the other on opposite sides of the wings of the piston.

It will also be understood from the foregoing description that the igniting device as a whole is mounted upon and carried by the adjustable cylinder-head 23, and for the pur-

pose of moving said cylinder-head and adjusting the igniting device said head is provided with a lever extension 43 and also with a pointer or indicator 44, which extends over the periphery or outer surface of the cylinder, as shown in Figs. 1 and 3. If desired, the outer surface of the cylinder may be graduated for the purpose of enabling the igniting device to be accurately adjusted, the graduations being placed near the point of the indicator 44, so as to be used in connection therewith. Thus the igniting device may be set to cause an explosion at any desired point in the throw of the piston-wings without disturbing the relation of any other parts of the engine.

The gasolene or other oil is introduced through the supply-nipple 45, (shown in Figs. 2 and 4,) and said oil is admitted through a passage 46 to the throttle-valve 47, which is provided with a passage 48, which by turning the throttle-valve may be brought to register with the passage 46 or thrown out of alinement therewith for cutting off the supply of oil. The oil thus admitted to and through the throttle-valve 47 passes to the center of said valve through a channel 49 and thence through an axial opening 50 downward to the vaporizing-valve 51, the passage 50 being controlled by means of a needle-valve 52, screwed into the throttle-valve and provided at its outer end with a knurled head 53 for the purpose of accurately and finely adjusting the same. The throttle-valve is provided with a central extension 54, in which is received the hollow stem 55 of the vaporizing-valve. By reference to Fig. 1 it will be seen that the body of the vaporizing-valve consists, substantially, of a pair of flat disks set slightly apart, so as to form an annular flat oil-space 56, said space communicating with the bore in the hollow stem 55. The space 56 leads outward to the outer cone-shaped or beveled edge of the vaporizing-valve, where it bears against the valve-seat 57. The oil is therefore delivered from the vaporizing-valve in the form of a thin annular film, where it is caught up by the air passing upward from the passage 38, as will hereinafter appear. The vaporizing-valve is normally held seated by means of a spiral spring 59, interposed between the body of said valve and the throttle-valve, as clearly shown in Fig. 1.

The throttle-valve 47 is provided with a conical rim 60, fitting tightly within a correspondingly-shaped casing 61, and said rim at a suitable point is provided with a port 62, through which the explosive mixture is forced to one or the other of a pair of oppositely-extending passages 63, each of said passages communicating with an admission-valve 64. These admission-valves are located on opposite sides of the piston, so that by turning the throttle-valve the gas may be caused to pass to one or the other of the admission-valves and into the corresponding side of the cylinder, thus enabling the engine to be reversed and operated in either direction at the will of the operator. The throttle-valve 47 is turned or thrown by means of a hand-lever 65, mounted on the upwardly-extending portion of said valve, as shown in Fig. 1.

Air is admitted to the inside of the piston through an air-inlet pipe 66 and being confined between the piston-wings is partly compressed and forced into the passage 58, where it acts to unseat the vaporizing-valve 56. This allows the oil to flow in a thin film from the vaporizing-valve, so that it is caught up by the escaping air and together therewith carried into the mixing-chamber within the throttle-valve, from whence it escapes through one of the passages 63 to the corresponding admission-valve 64 and thence into the cylinder at one side of the piston, where at the proper point of throw of the piston the charge of explosive mixture is ignited and exploded, the explosion of the gas acting against the piston-wing which has passed beyond the admission-valve, and thereby propelling or driving the piston.

67 represents an exhaust-port, preferably located at the bottom of the cylinder and communicating with the exhaust-chamber 68, from which the exhaust is carried off through a pipe 69.

In order to lubricate the parts of the engine, the upper wall of the engine may be provided with an opening 70 to receive a suitable oil-cup, which will supply oil to the curved inner surface of the cylinder. In order to lubricate the piston-wings and the walls of the piston with which the wings come in contact, one end of the shaft 6 is preferably made hollow or provided with a central bore 71, in the end of which is inserted a lubricant-supply pipe 72. At its inner end the bore 71 is provided with branches 73, which open out at opposite sides of the shaft into a diametrically-arranged oil-passage 74. The passage 74 in turn communicates with other parallel passages 75, leading through the web portions 76 of the piston, and the passages 75 are provided at their opposite extremities with inwardly-extending branches 77, which open through the opposite inner surfaces of the walls of the passage or way 10, so as to lubricate said walls and also the outer surfaces of the parallel sides 14 of the piston-wings.

The throttle-lever 65 is preferably provided with a pointer or indicator 78, and the head of the needle-valve is graduated, as shown at 79, so as to enable the needle-valve to be readily adjusted to regulate the flow of gasolene. 80 represents a stuffing-box for the throttle-valve.

The explosion occurs approximately when the piston-wings are in the position illustrated in Fig. 6. For the sake of explana-

tion let it be supposed that the explosion takes place at the point marked X. When the wing, after the explosion, passes by and opens up the exhaust-port 67, the exploded or expanded gases escape and continue to do so until the wing passes over the admission-valve 64, when the next compressed charge leaves the admission-valve and entering the space between the wing which has just passed over it and the following wing drives out what remains of the exploded charge until the advancing wing closes or cuts off the exhaust-port. Then as soon as the pressure becomes equalized the admission-valve closes by means of its spring and the advancing wing crowds the charge before it and compresses it, sufficient space being left between the piston and the cylinder to allow the charge to get past that point and into the space on the opposite side of the piston, where when the wings again reach the position shown in Fig. 6 another explosion occurs. This operation occurs twice with each complete revolution of the piston.

The rod 18′ has a central bore or passage, as shown, for conducting oil intermittently from the chamber 75 to the piston-wings to keep the latter lubricated.

Having thus described the invention, what is claimed as new is—

1. A rotary explosive-motor, comprising a cylinder, a piston mounted therein, and provided with a diametrical channel and an inlet thereto, a mixing-chamber communicating with said channel and with the cylinder, and piston-wings mounted to reciprocate in the channel, and constructed to compress the air in the channel and force the same into said mixing-chamber.

2. A rotary explosive-motor, comprising a cylinder, a mixing-chamber connecting therewith, a piston mounted in the cylinder, and provided with a diametrical channel and an inlet thereto, means for admitting air to said channel, and piston-wings mounted to reciprocate in the channel and force the air from the latter into the mixing-chamber under compression.

3. A rotary explosive-motor, comprising a cylinder, a mixing-chamber connecting therewith, a piston mounted in the cylinder, and provided with a diametrical channel and an air-inlet thereto, and piston-wings mounted to reciprocate in the channel and to force the admitted air from the latter into the mixing-chamber under compression, the outer extremities of the wings being concaved and provided with packings which are self-adjusting, in conformity with the curved inner surface of said cylinder.

4. A rotary explosive-motor, comprising a cylinder, a mixing-chamber connecting therewith, a piston mounted in the cylinder, and provided with a diametrical channel and an air-inlet thereto, sectional and jointed piston-wings mounted to reciprocate in the channel, and to force the admitted air from the latter into the mixing-chamber under compression, and springs forcing said wings outwardly to hold them against the inner curved surface of said cylinder.

5. A rotary explosive-motor, comprising a cylinder, a mixing-chamber connecting therewith, a piston mounted in the cylinder, and provided with a diametrical channel and an air-inlet thereto, piston-wings mounted to reciprocate in said channel and to force the admitted air from the latter into the mixing-chamber under compression, and jointed and sectional packings at the outer ends of the wings, adapted to adjust themselves to maintain close contact thereof with the inner surface of the cylinder.

6. A rotary explosive-motor, comprising a cylinder, a mixing-chamber connecting therewith, a piston mounted in the cylinder, and provided with a diametrical channel and an air-inlet thereto, and piston-wings mounted to reciprocate in the channel, and to force the admitted air from the channel into the mixing-chamber under compression, the outer extremities of the wings being concaved and formed with dovetailed recesses, and provided with self-adjusting packings having dovetailed projections fitting in said recesses.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES A. MARLITT.

Witnesses:
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B. P. CARDWELL.