

A. B. NEWLAND.
 ROTARY ENGINE.
 APPLICATION FILED MAY 31, 1917.

1,326,684.

Patented Dec. 30, 1919.

3 SHEETS—SHEET 1.

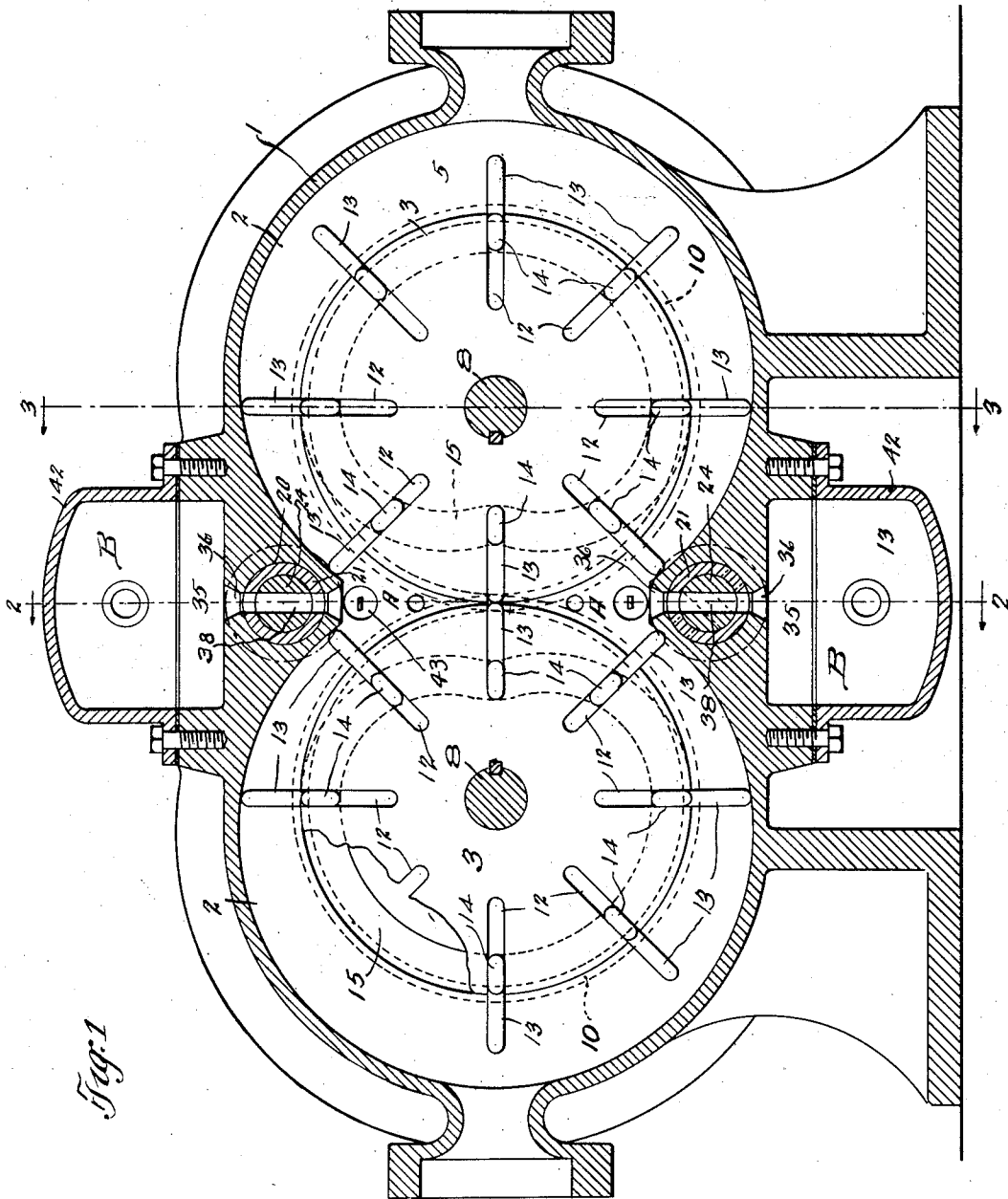


Fig. 1

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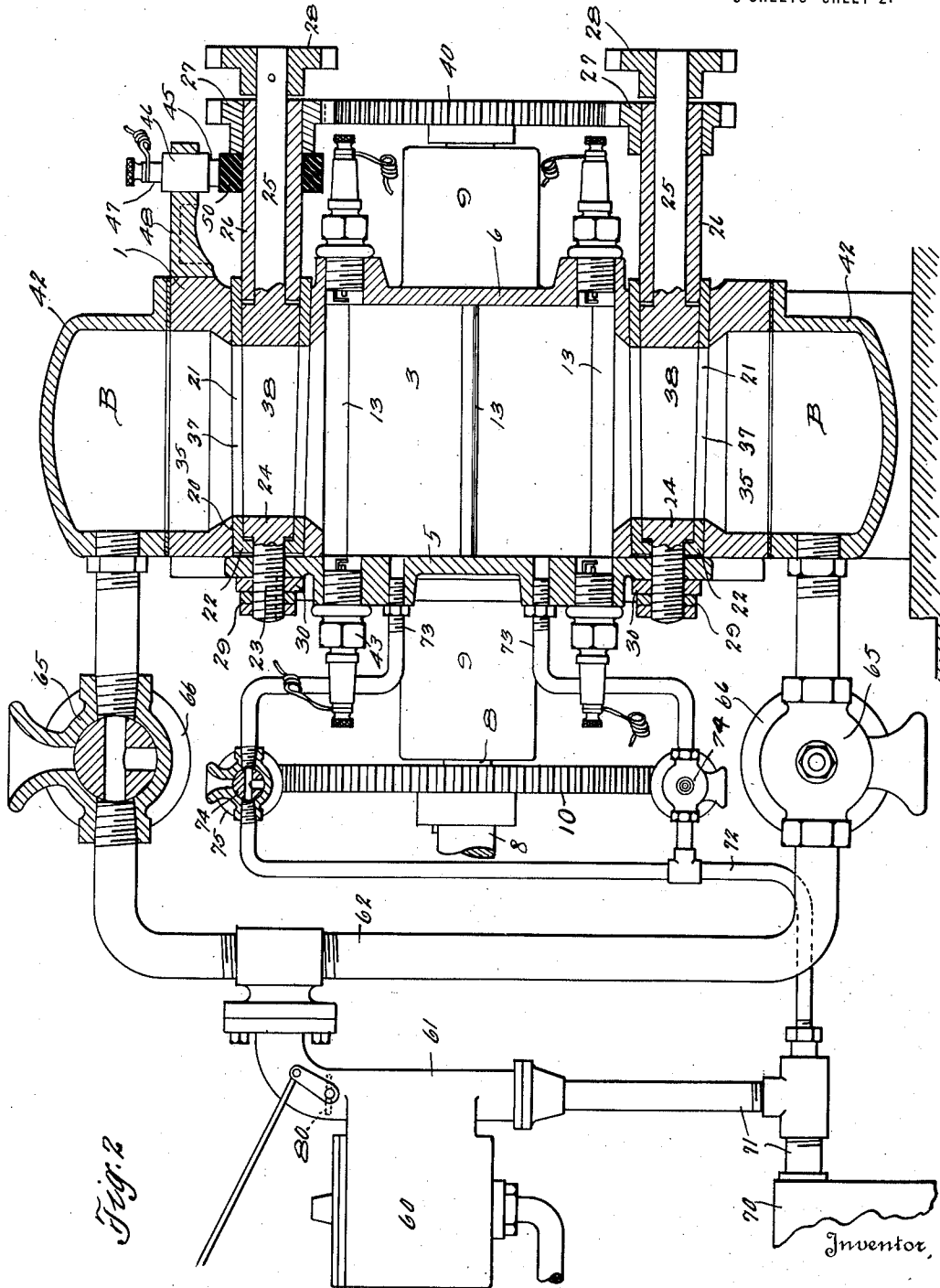


Fig. 2

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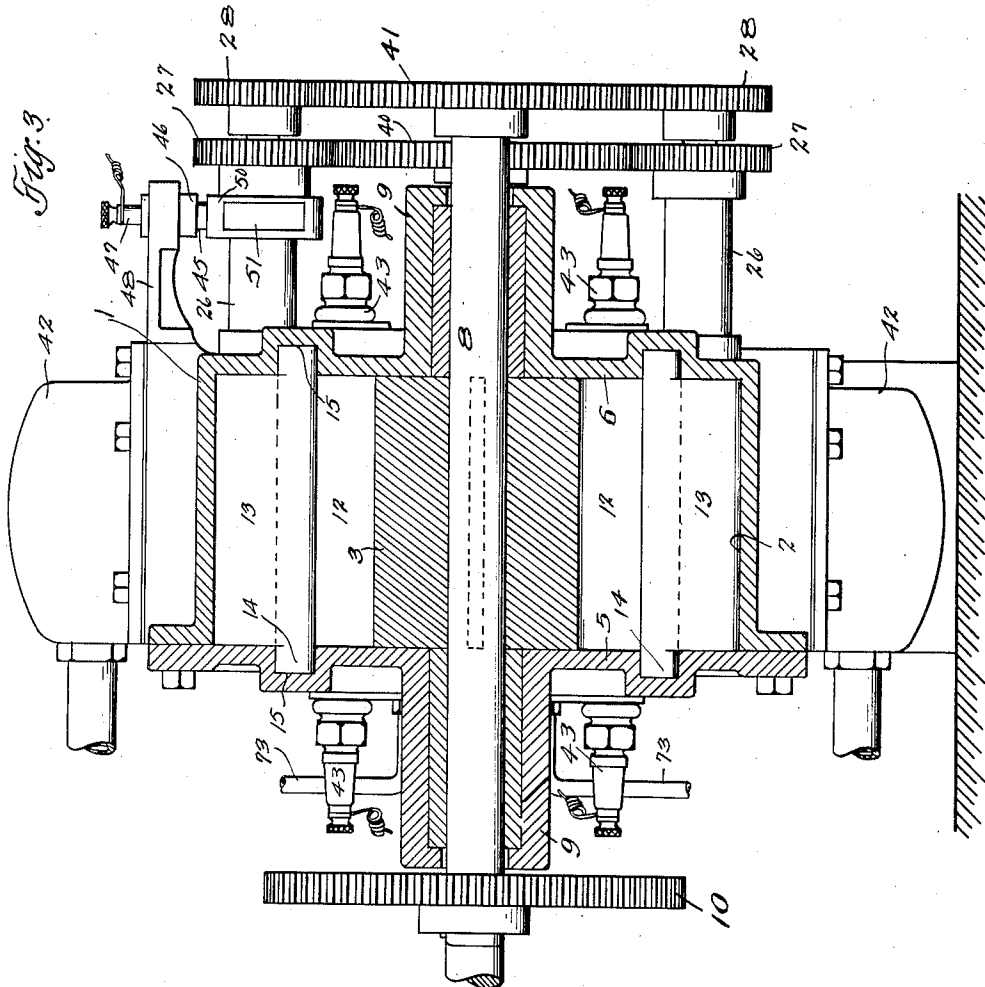
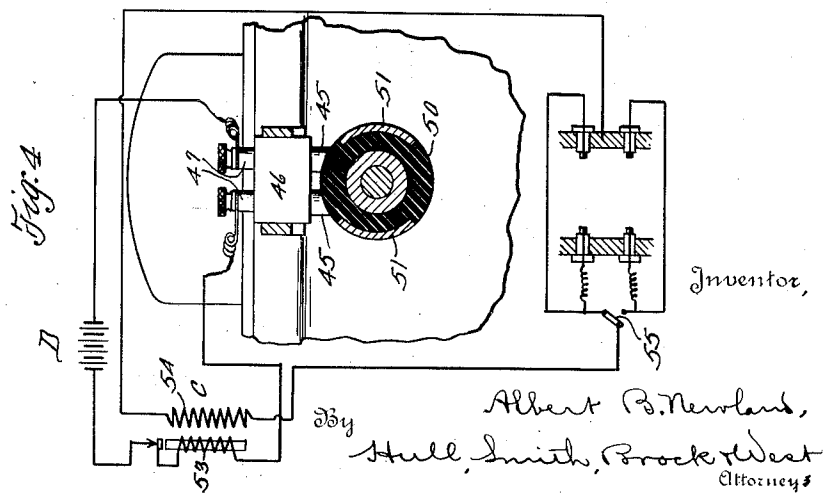
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UNITED STATES PATENT OFFICE.

ALBERT B. NEWLAND, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO
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ROTARY ENGINE.

1,326,684.

Specification of Letters Patent.

Patented Dec. 30, 1919.

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To all whom it may concern:

Be it known that I, ALBERT B. NEWLAND, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates particularly to an improved rotary gas engine, and has for its objects the production of an engine of this sort that is of a compact and sturdy construction; that is very powerful; that is easily started by the injection of pressure fluid into the explosion or working chamber; that operates quietly and without vibration; that is comparatively inexpensive of manufacture; and is of simple construction.

While I have stated that my invention relates particularly to rotary gas engines, certain features are applicable to other apparatus, and as I proceed to describe the embodiment herein disclosed in detail, I desire it to be understood that the invention is not limited to such details further than is required by the terms of the annexed claims.

In the drawings accompanying and forming a part hereof, Figure 1 is a sectional side elevation of a gas engine embodying my invention; Fig. 2 is a section on line 2—2 of Fig. 1, looking in the direction of the arrows, and involving a carbureter, compressed air tank, and connections between them and the engine all of which go to make up a system of which my improved engine forms a part; Fig. 3 is a section on the correspondingly numbered lines of Fig. 1, looking in the direction of the arrows; and Fig. 4 is a detail of the spark controlling switch and ignition circuit.

The engine casing 1 is oblong and contains two cylindrical chambers 2 which intersect or emerge, and a rotor 3 is eccentrically mounted in each chamber, the peripheries of the rotors engaging in rolling contact with each other at the center of the casing. The casing has an open side that is closed by a plate 5 which constitutes one of the side walls of the chambers 2, the opposite side wall being designated 6. Each rotor is keyed to a shaft 8 which has its ends journaled within bearings that are housed within cylindrical bosses 9 extending outward from the walls 5 and 6. Spur gears 10, hav-

ing a pitch diameter substantially equal to the diameter of the rotors, are secured to the shafts 8 beyond the bosses 9 of the plate 5 and these gears mesh with each other so that the rotors are caused to operate in unison, rotating, of course, in opposite directions.

Each rotor is provided with a plurality (eight in the present instance) of radial transverse pockets 12 within which blades 13 have a sliding fit. The body portion of these blades are of a length to accurately fit between the side walls 5 and 6, and end projections 14 of the blades traverse cam grooves 15 in the walls 5 and 6. The purpose of the cam grooves 15 is obviously to retract and extend the blades 13 as the rotors rotate, the grooves being of such shape as to completely retract the blades when they are within the meeting zone of the rotors so as not to interfere with an absolute engagement of the surfaces of the rotors, and then to gradually project the blades as they advance with the rotation of the rotor until their outer edges engage the cylindrical walls of the chambers 2 and maintain them in contact with the walls through substantially 45 degrees of their orbit of travel. Upon consulting Fig. 1 it will be seen that the regions of contact of the blades with the walls occur immediately on opposite sides of the point where the chambers merge, the adjacent portions of the grooves 15 being concentric with these wall portions. The outer half of each groove 15, that is the half toward the end of the casing, is concentric to the axis of the rotor wherefore the blades are held in their extreme extended positions until they are again retracted by the inwardly directed portion of the groove.

What I shall term the explosion chambers A are situated between the receding surfaces of the rotors above, and below their line of contact with each other and the upward extent of the chambers is defined by the last set of opposed blades to engage the walls of the chambers. While I have explained that there are two explosion chambers, it will become evident from the description of the operation of the engine that only one of these is used at a time, the two being employed for the purpose of reversing the engine.

Within a slightly tapered transverse bore 20 which extends through the thickened portion of the casing above and below the re-

spective explosion chambers is contained a correspondingly tapered sleeve-valve 21 having an annular wall 22 at its smaller end through which extends a gudgeon 23 of a tapered valve 24. A stem 25 extends from the larger end of the valve 24 through a sleeve 26 that is attached to the adjacent end of the sleeve-valve 21. The outer end of the sleeve 26 has secured to it a pinion 27, and a similar pinion 28 is fastened to the end of the stem 25 where it protrudes beyond the end of the sleeve. The valve 24 is maintained in frictional engagement with the bore of the sleeve-valve 21, and the latter is held in proper frictional engagement with the bore 20 of the casing, by nuts 29 that are threaded on to the end of the gudgeon 23, with a washer 30 (that is held to the gudgeon against rotation in any suitable manner) interposed between the nuts 29 and the adjacent surface of the plate which constitutes the wall 5. The top and bottom walls of the casing are shown as recessed at 35, and these recesses communicate with the corresponding explosion chamber through ports 36 which bisect the bores 20. The sleeve-valve 21 and the valve 24 are provided with through passageways 37 and 38, respectively, which are adapted to be brought into register with each other and with the port 36 by means which will now be described, and at practically the instant of contact of a pair of opposed blades with the adjacent cylindrical wall portions of the chambers 2.

On the end of one of the shafts 8, opposite the gear 10, is secured a spur gear 40 which meshes with the pinions 27, and a similar gear 41 is carried by the corresponding end of the other shaft and meshes with the pinions 28. It will be seen from this construction that the valves 24 and sleeve-valves 21 are rotated in opposite directions so that the intervals during which their passageways are in register are very brief; and the gearing is so arranged that these passageways will be caused to register at the time the passageways of the sleeve-valves coincide with the ports 36. Furthermore, the ratio of the pinions 27 and 28 to their respective gears 40 and 41, is four to one, so that the ports 36 are opened upon each eighth rotation of the rotors.

A dome 42 covers each of the recesses 35 and constitutes therewith a fuel receiving chamber B.

A spark plug 43 is inserted through each side wall of each of the explosion chambers A, and a diagrammatic representation of the ignition circuit, including these spark plugs, is shown in Fig. 4. Also included in the circuit is a switch that is illustrated in detail in Fig. 4, as well as being shown in Figs. 2 and 3. The switch comprises a pair of contact brushes 45, mounted in a plug 46

of insulating material, and having binding posts 47 at their upper ends for the attachment of wires of the circuit. The plug 46 is supported by a bracket 48 from the casing 1 just above the sleeve 26 of the upper sleeve-valve 21. The sleeve carries a disk 50 of insulating material within which are inserted contact plates 51, so that upon each half rotation of the disk the brushes 45 will be bridged. An induction coil is represented at C and a battery at D. The primary winding 53 of the coil is in circuit with the battery and with the brushes 45 of the switch, while one end of the secondary winding 54 leads to either the upper or lower set of spark plugs through suitable wires and switch 55, and the other end of the secondary winding is shown as grounded through a wire which leads to the casing 1. It follows from this arrangement that when the engine is in operation, the spark plugs of the set selected through the switch 55 will be intermittently flashed alternately with the opening of the valve which controls the admission of fuel to the respective explosion chamber which contains the aforesaid set of spark plugs.

A conventional representation of a carbureter, is shown in Fig. 2, the float chamber whereof is designated 60, and the mixing chamber 61. The latter has connection at its outlet end with the manifold 62 which leads to the upper and lower fuel receiving chambers B, the branch of the manifold which leads to each chamber being provided with a three-way valve 65 through which communication may be established between the mixing chamber of the carbureter and the fuel receiving chamber, or by means of which the fuel receiving chamber may be open to the atmosphere while communication with the carbureter is cut off. The valves are shown in the present instance as having operating handles 66. A compressed air reservoir is represented at 70 and has communication, through the pipe 71, with the inlet end of the carbureter mixing chamber. A pipe 72 is shown as leading from the pipe 71 through two branches 73 to the upper and lower explosion chambers, and each of these branches 73 is equipped with a three-way valve 74, having an operating handle 75.

In describing the operation of the engine, let it be assumed that the valves 65 and 74 are closed and that the switch 55 is thrown in the direction to include the upper set of spark plugs. It may be explained that the compressed air reservoir is charged with pressure fluid of a comparatively high degree of pressure; and that the carbureter is adjusted and connected to deliver fuel to the mixing chamber in readiness to be picked up by the air as it rushes through. Assuming that the engine is to be driven

in a direction in which the right hand rotor (as viewed in Fig. 1) will rotate to the right, the upper valve 65 is turned as shown in the drawing, while the lower corresponding valve may be turned to cut off supply from the manifold to the fuel chamber and permit the latter to exhaust to the atmosphere. Unless the sleeve valve 21 and valve 24 should happen to be open, this would not result in a charge of fuel being introduced into the upper explosion chamber. The lower valve 74 is now turned to exhaust the corresponding explosion chamber, while the upper valve 74 is turned as indicated in Fig. 2 to establish communication between the compressed air reservoir and the upper explosion chamber. Instantly air will accumulate at a high pressure within the explosion chamber and force the rotors to rotate by action upon the rear sides of the blades 13 which are at the moment in contact with the upper walls of the chambers 2. Immediately after this initial movement of the parts, the normal working conditions of the engine will be established and it will continue to operate under the control of the throttle of the carbureter which is indicated at 80. It will be understood, of course, that the upper valve 74 is closed as soon as the engine is operating under its own power; and that the lower valve 74 is left open during the operation in order to prevent compression within the lower explosion chamber, and which if permitted to exist, would result in retarding the engine.

By simply reversing the condition above set forth of the upper and lower valves 65 and 74, and the switch 55, the engine may be caused to operate in a reverse direction.

Power may be derived from either shaft 8. Having thus described my invention, what I claim is:—

1. In apparatus of the character set forth, the combination of a casing having intersecting cylindrical chambers, rotors supported eccentrically of the chambers and in rolling contact with each other, said rotors having peripheral pockets, blades within said pockets, the casing having grooves in its side walls and the blades having portions extending into said grooves, the grooves being of such shape as to retract the blades of the respective rotors in the zone of contact between the rotors and to project the blades with their outer edges in contact with the cylindrical walls of the chambers as the blades of the two rotors depart from each other, the grooves being substantially concentric to the rotors throughout substantially 180°, the casing having exhaust openings located at its ends, and means for injecting a charge of operating fluid into the casing to the rear of departing blades.

2. In apparatus of the character set forth, the combination of a casing, rotors within

said casing in rolling contact with each other and having peripheral pockets, blades within said pockets, means for retracting the blades in the zone of contact between the rotors and for projecting the blades with their outer edges into contact with portions of the casing wall as the blades of the two rotors depart from each other wherefore a working chamber is formed to the rear of departing blades, said chamber having an inlet port for operating fluid, a valve for controlling said port, driving connections between said valve and one of the aforesaid rotors, the working chamber having a second inlet port, and a manually operated valve for controlling said second inlet port.

3. In apparatus of the character set forth, the combination of a casing, rotors within said casing in rolling contact with each other and having peripheral pockets, blades within said pockets, the casing having wall portions into contact with which the blades of the respective rotors are adapted to be projected, means for so projecting said blades, the space between the zone of contact of the rotors and the aforesaid wall portions constituting a working chamber, said chamber having an inlet port, a valve for controlling said port, driving connections between said valve and one of the rotors, the working chamber having a secondary admission port, and a manually controlled valve for governing the supply of fluid through said admission port.

4. In apparatus of the character set forth, the combination of a casing, rotors within said casing in rolling contact with each other and having peripheral pockets, blades within said pockets, the casing having wall portions into contact with which the blades of the respective rotors are adapted to be projected on either side of the line of contact between the rotors, means for so projecting said blades, the space on each side of the line of contact between the rotors constituting a working chamber, each chamber having an inlet port, a valve for controlling said port, driving connections between said valve and one of the rotors, each working chamber having a secondary admission port, and a manually controlled valve for governing the supply of fluid through said admission port.

5. In apparatus of the character set forth, the combination of a casing, rotors within said casing in rolling contact with each other and having peripheral pockets, blades within said pockets, means for projecting said blades with their outer edges into contact with wall portions of the casing as the blades of the two rotors depart from each other, the space to the rear of departing blades constituting a working chamber, said chamber having an admission port, a valve

chamber bisecting said port, a sleeve-valve
within said valve chamber, a valve body
within said sleeve-valve, the sleeve-valve
and valve body having through ports that
5 are adapted to be brought into register with
each other and with the admission port, and
operative connections between the sleeve-

valve and one of said rotors, and similar
connections between the valve body and the
other rotor.

In testimony whereof, I hereunto affix my
signature.

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ALBERT B. NEWLAND.