W. L. RIPSOM.

ROTARY ENGINE.

APPLICATION FILED JUNE 27, 1911.

1,015,979.

Patented Jan. 30, 1912.

3 SHEETS—SHEET 1.

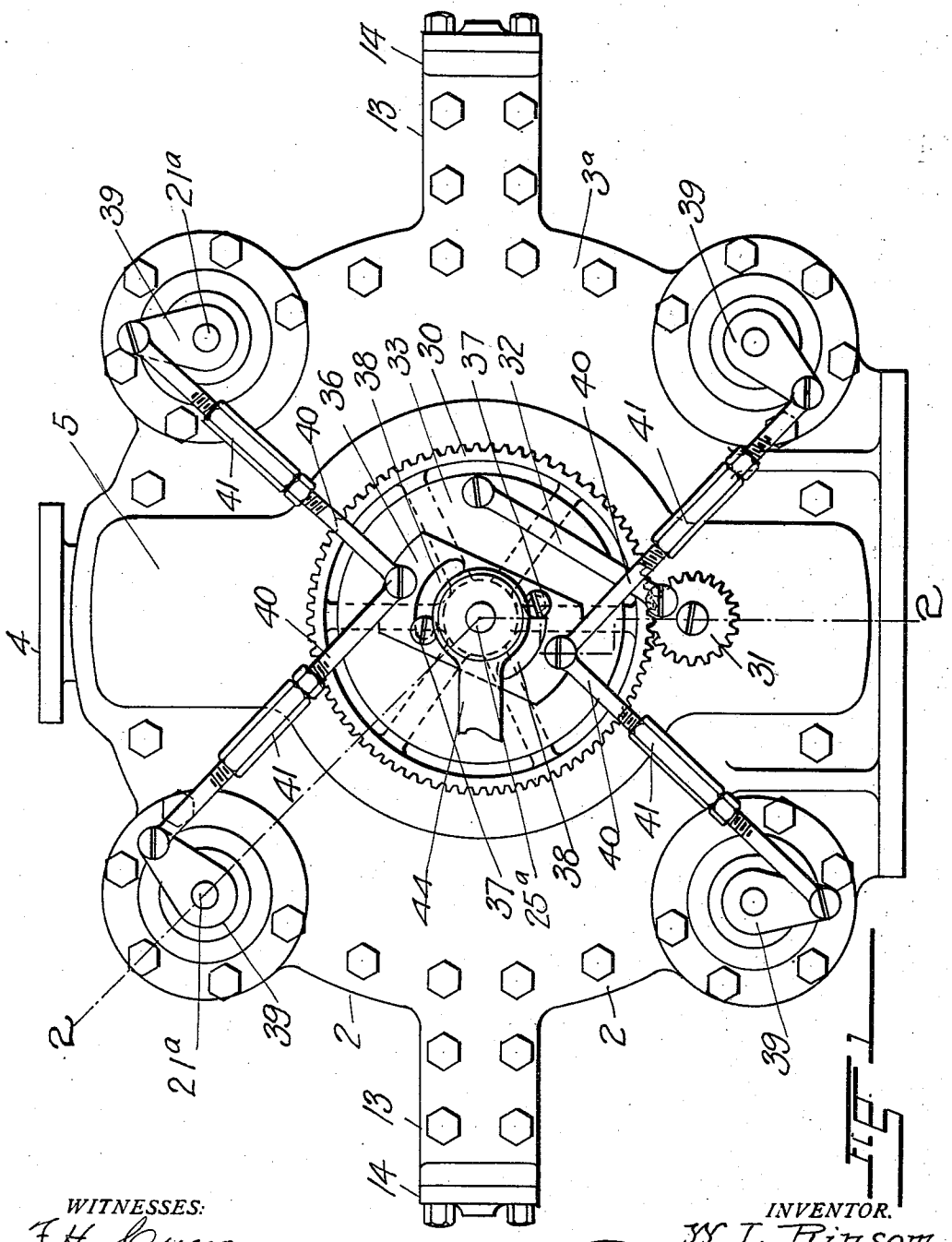

FIG. 1

WITNESSES:

F. H. Cuno.

L. Rhoades

INVENTOR.

W. L. Ripsom

BY

ATTORNEY.

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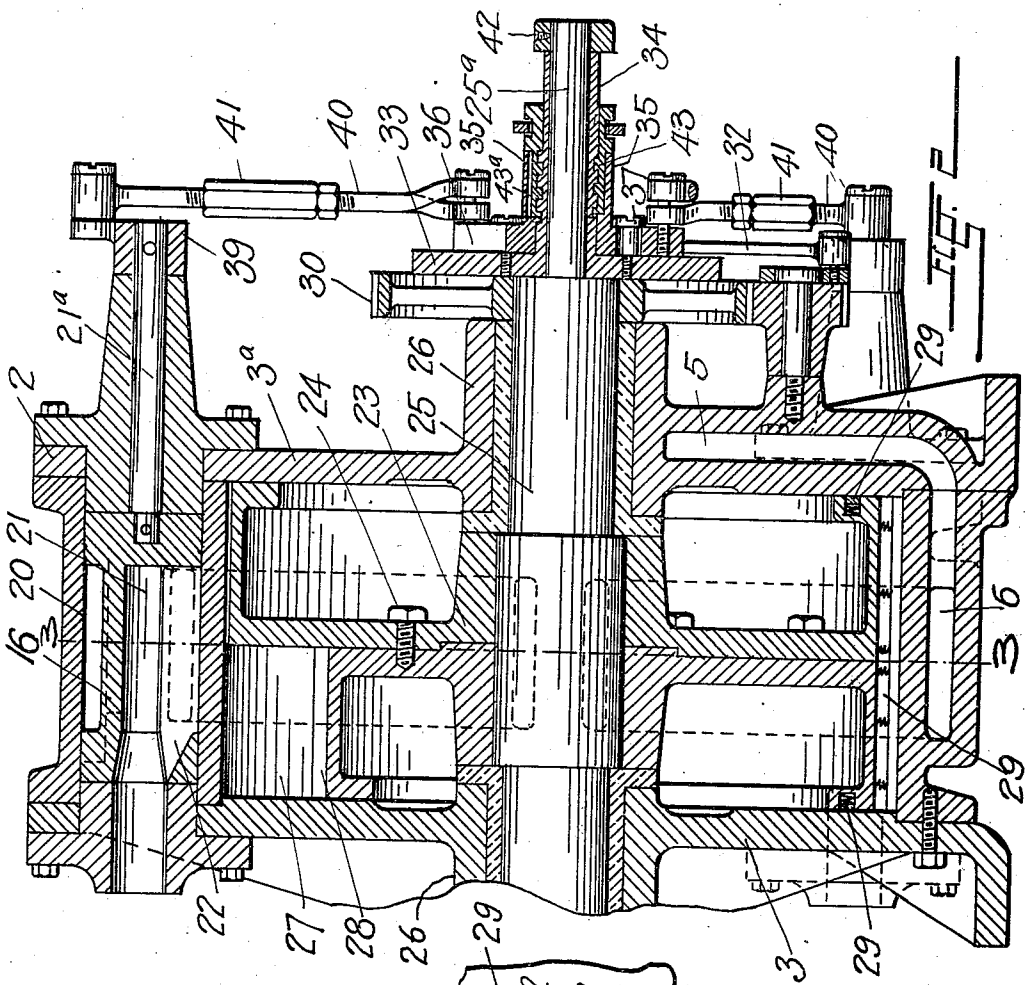

FIG. 2.

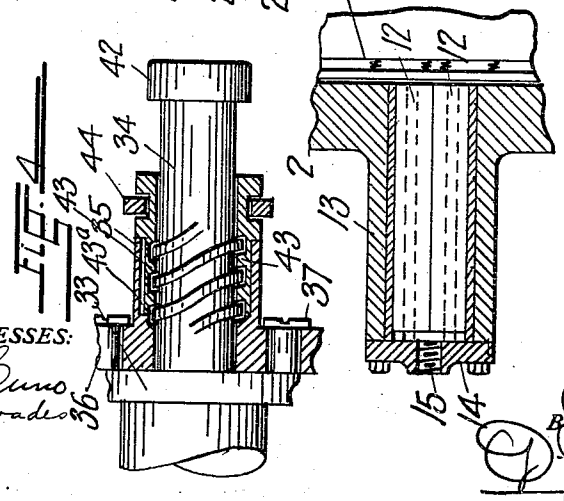

FIG. 4.

FIG. 5.

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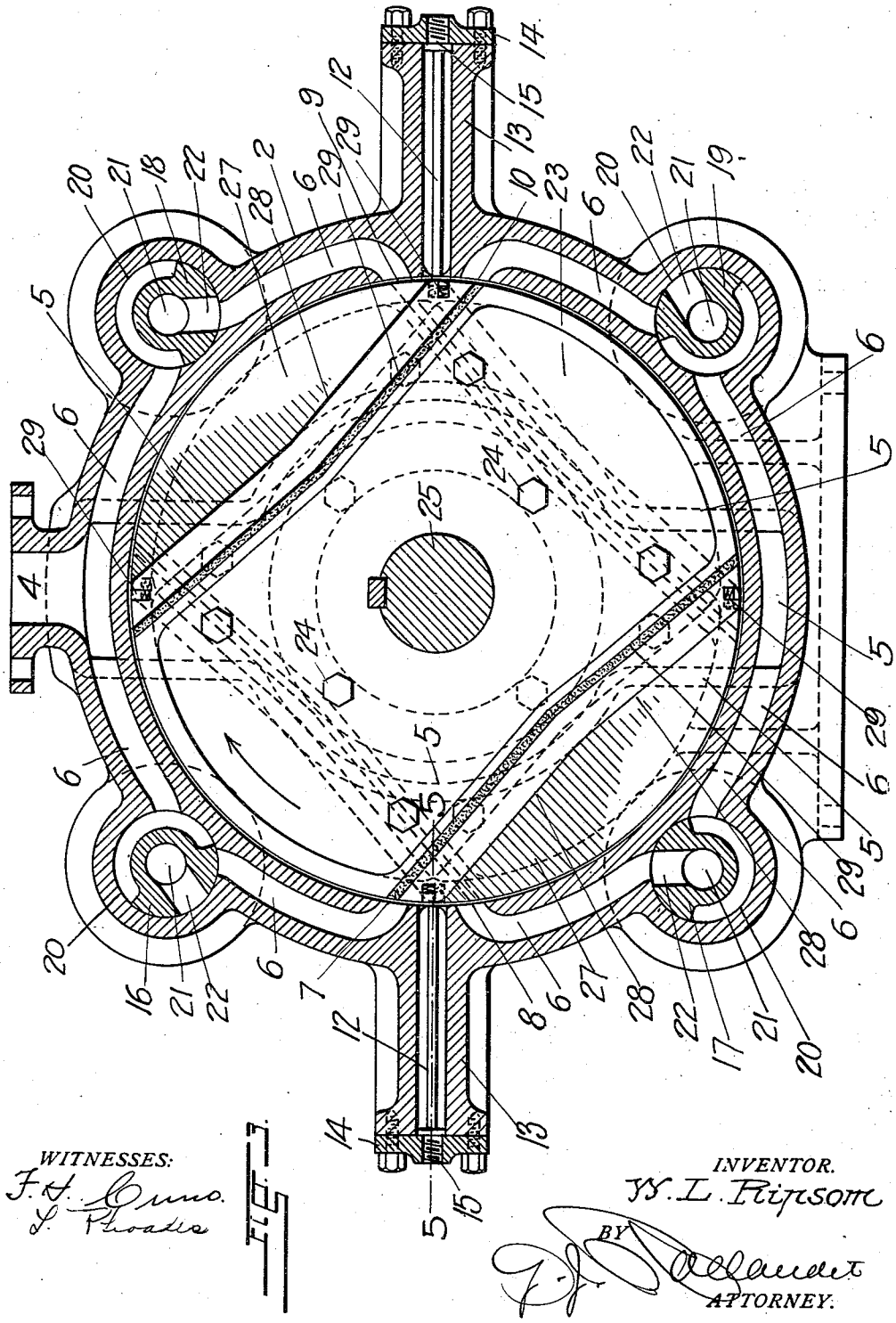

WITNESSES:

F. H. Amo.

L. Rhoades

INVENTOR.

W. L. Ripsom

BY

ATTORNEY.

FIG. 3.

UNITED STATES PATENT OFFICE.

WILLIAM L. RIPSOM, OF DENVER, COLORADO.

ROTARY ENGINE.

1,015,979. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed June 27, 1911. Serial No. 635,608.

To all whom it may concern:

Be it known that I, WILLIAM L. RIPSOM, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines of the type shown and described in the United States Letters-Patent #860,060, issued to me on the 16th day of July 1907, and its object resides in the provision of certain details of construction which will increase the efficiency of the engine and simplify its construction.

In the accompanying drawings in the various views of which like parts are similarly designated, Figure 1 represents a side elevation of the improved engine, Fig. 2, a section taken along the line 2—2, Fig. 1, Fig. 3, a central, vertical section taken along the line 3—3, Fig. 2, Fig. 4, an elevation partly in section of the reversing mechanism, as shown in Fig. 2, and Fig. 5, a horizontal section taken along the line 5—5, Fig. 3.

Referring to the drawings by numerical reference characters, the numeral 2 designates a shell or housing the cylindrical bore of which is closed at its open ends by means of heads 3 and 3ª. The shell is provided in its upper portion with a flanged steam inlet 4 which by means of ducts 5 formed in the head 3ª, and passages 6 formed in the circumferential wall of the housing, is brought in communication with four ports 7, 8, 9 and 10, which open into the interior of the shell at opposite side of and in close proximity to the horizontal plane passing through its axis. Disposed in the said plane, are the abutments 12 which are slidably fitted in pairs, in chests 13 formed integral with the casing at diametrically opposite points. The chests are closed at their outer ends by means of caps 14 which are provided with openings 15 for the attachment of conduits through which steam or other motive fluid is introduced into the interior of the chests for the purpose of constantly maintaining the abutments in engagement with the working faces of the rotor 23, the construction of which will hereinafter be described.

The flow of steam through the passages 6 to the respective ports is controlled by means of rotary valves 16, 17, 18 and 19 which are fitted in chambers 20 formed at quadrant points in the casing by cylindrical enlargements of the passages 6. Each of the valves has an axial bore 21 which is open at one of its ends and which communicates with a radial slot 22 the width of which corresponds with that of the passages 6, it being the object of this construction to exhaust the spent fluid from the interior of the shell through the open ends of the valves when their slots 22 are brought in register with the orifices of the passages 6 in the respective chambers 20.

The rotor 23 above referred to is composed of two complemental parts which are fastened together by means of bolts 24 and it is mounted upon a shaft 25 which is rotatably supported in bearings 26 formed integral with the heads 3 and 3ª. The cylindrical rotor which is fitted within the casing 2 has in its circumferential surface four pockets 27 which are separated at quadrant points in the said surface and which are arranged alternately at opposite sides of a vertical plane passing through the center of the rotor. The pockets 27 provide impact faces 28 upon which the steam introduced into the interior of the casing, impinges to impart a rotary motion to the rotor. Packing strips 29 applied at the divisional points in the circumferential surface of the rotor and in the vertical faces of the same between its axis and the pockets 27, are provided to the usual purpose.

The rotary valves, are in the operation of the engine, adjusted so that two diagonally opposite ones will at determinate periods admit steam to the respective ports in the housings, while those comprised in the other pair will exhaust the spent fluid through their open-ended bores. An adjustment is provided to reverse the relative positions of the two pairs of valves when it is desired to run the engine in the opposite direction and a mechanism operatively connected with the shaft 25 is designed to impart an oscillatory motion to the valves for the purpose of alternately opening and closing the communication between the inlet 4 and the ports in the casing through which steam is admitted into the pockets of the rotor 23.

The valve operating mechanism which is best shown in Fig. 1 of the drawings, consists of a gear wheel 30 which is fixed upon a reduced extension 25ª of the shaft 25 to transmit the rotary movement thereof to a

pinion 31. A pitman 32 connects the pinion with a disk 33 formed integral with a sleeve 34 which is loosely mounted upon the extension 25^a and which is held against longitudinal displacement by means of a collar 42. A second sleeve 35 which surrounds the sleeve 34 has an integral head 36 provided with concentric slots 38 adjacent the disk 33, and bolts 37 screwed into the latter, engage opposite ends of the said slots to compel the head 36 to move in unison with the disk during the oscillatory movement imparted thereto by its connection with the pinion 31. The valves 16, 17, 18 and 19 carry at the protruding ends of their stems, 21^a cranks 39 which by means of rods 40 are connected in pairs with the head 36 at diametrically opposite points thereof. The rods 40 are each composed of two members connected by turn buckles 41 which provide ready means for adjusting the position of the valves with relation to the orifices of the passages 6 in their chambers, by varying the length of the respective rods. The sleeve 34 on the disk 33 has an external screw thread which is operatively engaged by a corresponding internal thread on a bushing 43 which is longitudinally slidably secured in a recess of the sleeve 35 by means of a key 43^a and which is provided with a circumferentially grooved head for the application of a reversing lever 44.

When the parts are in the position shown in the drawings, the diagonally opposite valves 16 and 19 are positioned to alternately open and close the respective passages 6 which connect the ports 7 and 10 with the supply of motive fluid and the other pair of valves 17 and 18 are in the position in which their radial slots 22 are in register with the passages connecting with the ports 8 and 9 to exhaust the fluid from the interior of the casing through the open ends of their bores 21. During the rotary motion of the rotor, the gearwheel 30 imparts a rotary movement to the pinion 31 and this movement is by means of the pitman 32, converted into an oscillatory movement of the disk 33 and the therewith connected head. The movement of the latter is through the instrumentality of the rods 40, transmitted to the different valves and it will be observed that while the valves 16 and 19 are rotated through an arc of sufficient length to alternately open and close the orifice of the passages 6 leading to the ports 7 and 10, the movement of the valves 17 and 18 is so little that their radial slots 22 will remain continuously in register with the passages 6 which connect with the ports 8 and 9. To reverse the engine it is but necessary to change the position of the head 36 so as to bring the opposite ends of the slots 38 in contact with the bolts 37, which reverses the positions of the valves so that the steam will be admitted past the valves 17 and 18 while it is exhausted through the bores of the valves 16 and 19. This result is readily accomplished by moving the bushing 43 longitudinally in the recess of the sleeve 35 by manipulation of the lever 44, which imparts a rotary motion to the said sleeve and the therewith integral head 36.

Assuming that the rotor 23 moves in the direction of the arrow in Fig. 3, the valves 16 and 19 will open to admit steam to the ports 7 and 10 as soon as the points of division between the pockets 27, which in the position shown in the drawings are in engagement with the abutments 12, have passed the same. The steam entering the pockets of the rotor impinges upon the impact faces 28 and by reaction upon the abutments 12 which are constantly maintained in contact with said faces by the steam introduced into the chests 13, causes the rotor to revolve about its axis. Before the rotor has completed a quarter of a revolution the valves 16 and 19, are, by the action of the oscillating disk 33, moved to cut off the steam supply through the respective passages 6 and the steam contained in the pockets will thus act upon the working faces thereof by expansion until by further movement of the rotor, the said pockets are brought in communication with the ports 8 and 9 through which the steam is exhausted while the pockets at the opposite sides of the rotor are at the same time brought in connection with the admission ports 7 and 10.

Having described my invention what I desire to secure by Letters-Patent is:—

1. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, rotary valves disposed to control the flow of fluid through the said passages, a rotor fitted in said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, means for converting the rotary movement of the rotor into an oscillatory movement of the said valves, abutments slidable in the chests and adapted to enter the pockets in the rotor, and means for the introduction of steam into the chests to drive the abutments in engagement with the rotor, the said valves being alternately arranged to admit fluid into the casing and to exhaust spent fluid from the same.

2. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, rotary valves disposed to control the flow of fluid through the said passages, a rotor fitted in said cas-

ing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, and means for the introduction of steam into the chests, to drive the abutments into engagement with the rotor, the said valves being alternately arranged to admit fluid into the casing and to exhaust spent fluid from the same.

3. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow of fluid through the said passages and each provided with a peripheral slot in communication with the atmosphere, and means for converting the rotary movement of the rotor into an oscillatory movement of the valves, the said valves being arranged with relation to the orifices of the respective passages alternately to admit fluid to the ports with which the latter are connected, and to exhaust fluid from the casing through their peripheral slots.

4. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow of liquid through the said passages and each provided with a bore open at one of its ends and a radial slot connected with said bore and adapted to register with the orifice of the respective passages, and means for converting the rotary movement of the rotor into an oscillatory movement of the valves, the said valves being disposed with relation to the orifices of the respective passages, alternately to admit fluid to the ports with which the latter are connected and to exhaust fluid from the casing through their bores.

5. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow of fluid through the said passages, and each provided with a peripheral slot in communication with the atmosphere, the said valves being arranged with relation to the orifices of the respective passages, alternately to admit fluid to the ports with which the latter are connected and to exhaust fluid from the casing through their peripheral slots, means for converting the rotary movement of the rotor into an oscillatory movement of the said valves, and means for reversing the position of the latter with relation to the orifices of the respective passages.

6. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter, and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow of fluid through the said passages, a gear wheel mounted to move in unison with the rotor, cranks connected with the valves, an oscillatory member, rods connecting the latter with the said cranks, a pinion in mesh with said gear-wheel and a driving connection between said pinion and said member.

7. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow of fluid through the said passages, a gear wheel mounted to move in unison with the rotor, cranks connected with the valves, an oscillatory member, rods connecting the latter at two diametrically opposite points with the said cranks, a pinion in mesh with said gear-wheel, and a driving connection between said pinion and said member.

8. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment-chests, ports at opposite sides of the latter, and passages connecting said ports separately with the said inlet, a rotor fitted in the said casing and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the chests and adapted to enter the pockets in the rotor, rotary valves disposed to control the flow

of fluid through the said passages, a gear-wheel mounted to move in unison with the rotor, cranks connected with the valves, an oscillatory member, longitudinally extensible rods connecting the latter with the said cranks, a pinion in mesh with said gear-wheel and a driving connection between said pinion and said member.

9. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment chests, ports at opposite side of the latter, and passages connecting said ports separately with the said inlet, a shaft rotatably mounted in said casing and protruding through an opening in a side of the same, a rotor within said casing, mounted on the shaft and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the said chests and adapted to enter the pockets of the rotor, rotary valves disposed to control the flow of fluid through the said passages, a gear-wheel on the shaft, an oscillatory disk having a sleeve loosely mounted upon the protruding portion of the shaft and provided with an external screw thread, an internally recessed sleeve loosely surrounding the other and having a head adjustably connected with said disk, a bushing longitudinally movable in the recess of the outer sleeve and connected to rotate in unison with the same, the said bushing having an internal thread meshing with the screw thread on the inner sleeve, means for imparting a longitudinal movement to said bushing, a pinion in mesh with the gear-wheel, a driving connection between the pinion and the disk, cranks connected with the said valves, and rods connecting said cranks with the said head.

10. In a rotary engine, a casing having an inlet for motive fluid, diametrically opposite abutment chests, ports at opposite sides of the latter and passages connecting said ports separately with the said inlet, a shaft rotatably mounted in said casing and protruding through an opening in a side of the same, a rotor within said casing mounted on the shaft and having peripheral pockets formed with faces to receive the impact of fluid entering the casing through its ports, abutments slidable in the said chests and adapted to enter the pockets of the rotor, rotary valves disposed to control the flow of fluid through the said passages, a gear-wheel on the shaft, an oscillatory disk mounted on the protruding portion of the shaft, a member adjustably connected with said disk, a pinion in mesh with the gear-wheel, a driving connection between the said pinion and the disk, cranks connected with the valves, rods connecting the said cranks with the said member, and means for varying the position of the latter on the disk.

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

WILLIAM L. RIPSOM.

Witnesses:
G. J. ROLLANDET,
L. RHOADES.