No. 714,425. Patented Nov. 25, 1902.

J. F. WILLIAMS.

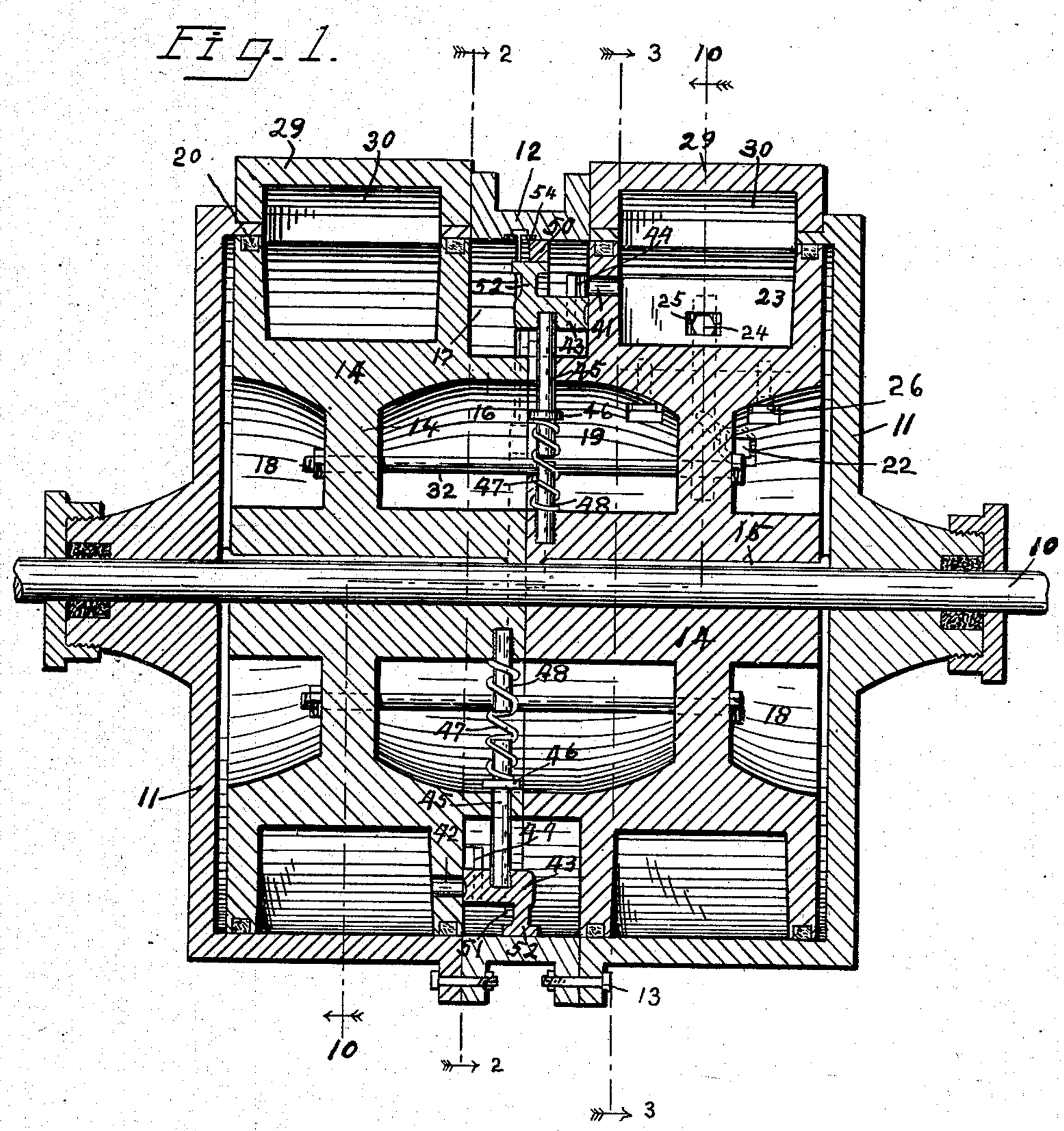
ROTARY ENGINE.

(Application filed Mar. 24, 1902.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

W. L. Bushong.

F. E. Bryant.

INVENTOR.

James F. Williams

BY

V. H. Lockwood

ATTORNEY.

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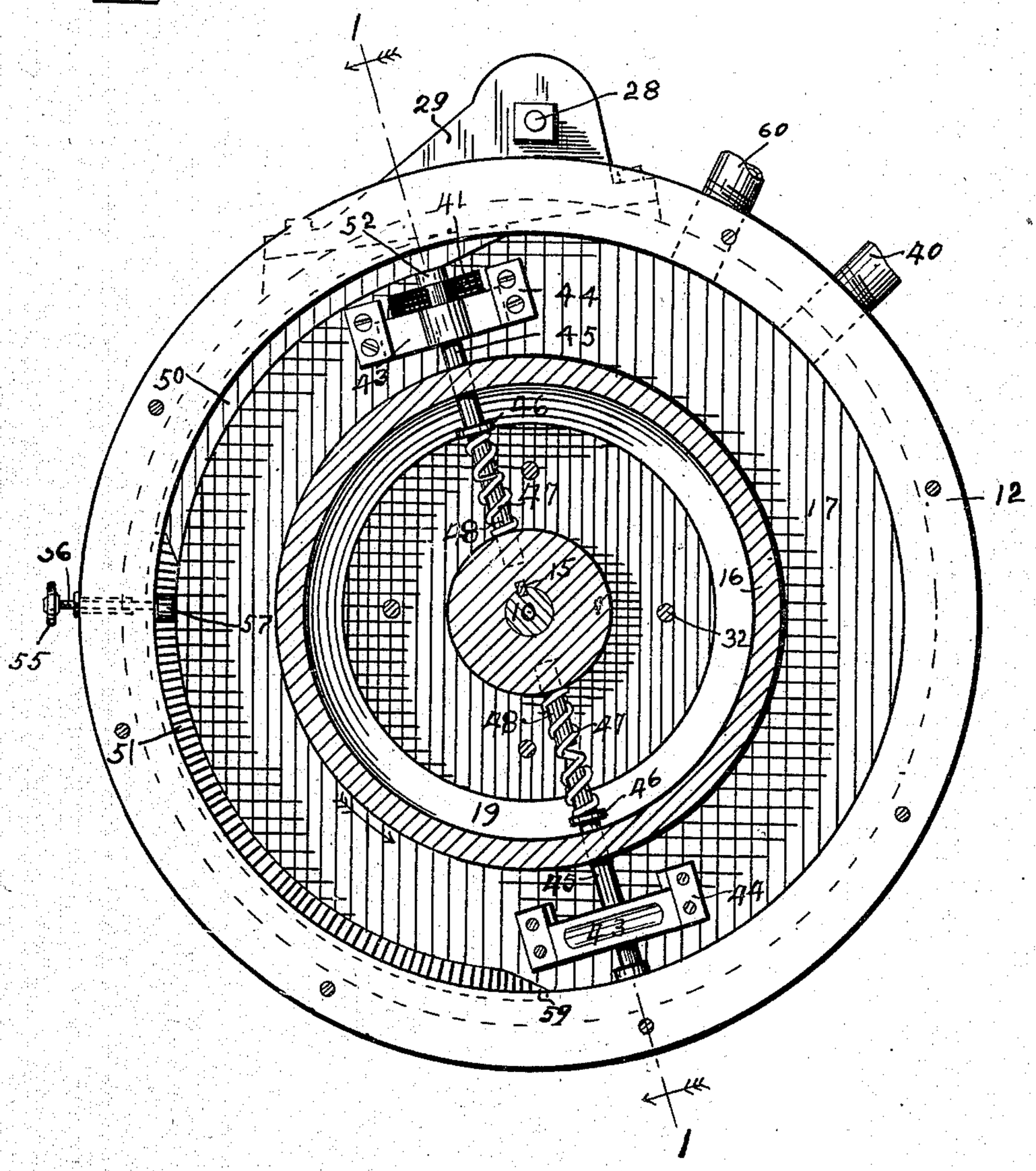
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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F. O. Bryant

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James F. Williams.

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V. H. Lockwood

ATTORNEY.

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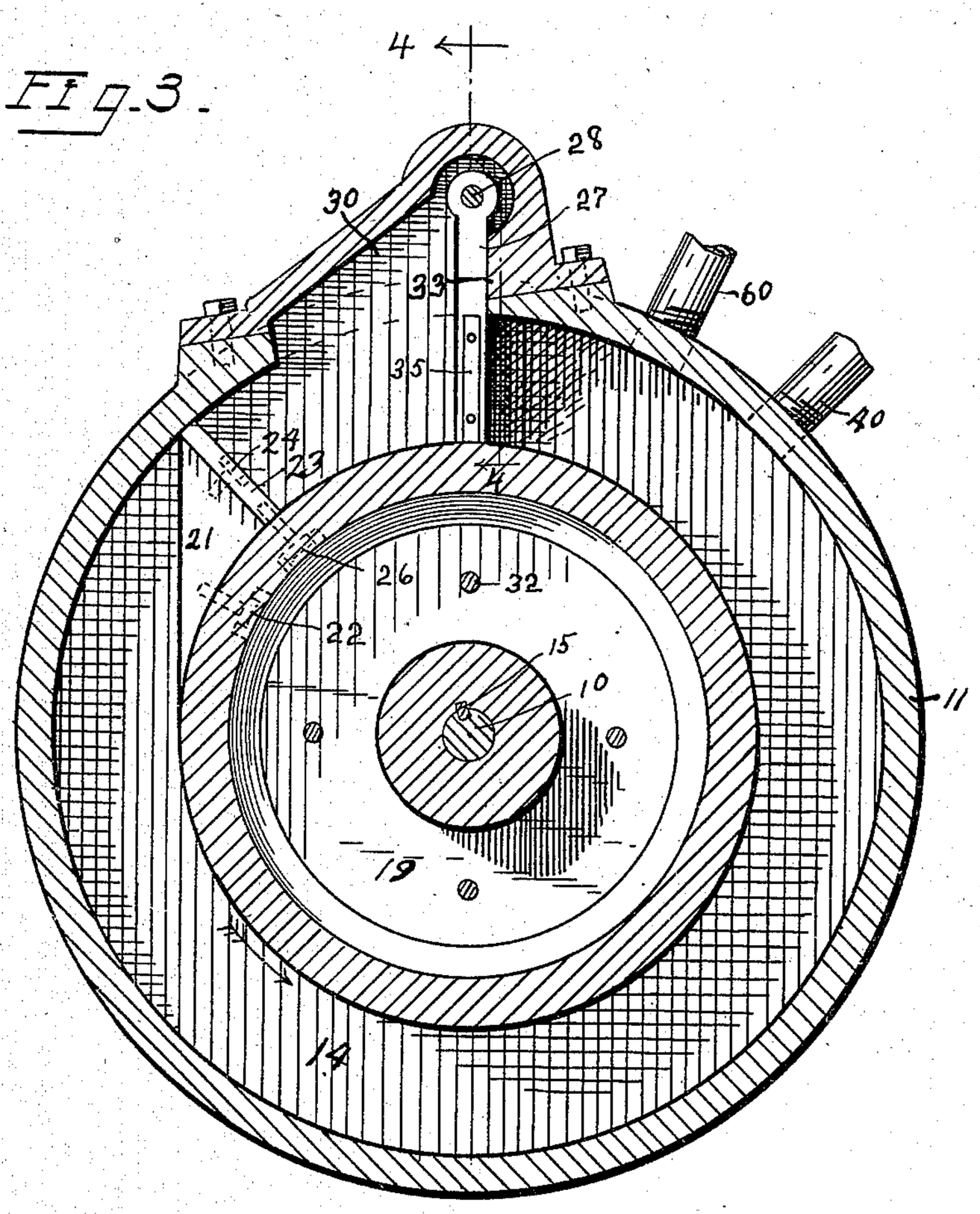
(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



WITNESSES:

W. L. Cushing.

F. E. Bryant

INVENTOR.

James F. Williams

BY

V. H. Lockwood

ATTORNEY.

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J. F. WILLIAMS.

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(No Model.) 5 Sheets—Sheet 4.

Fig. 4.

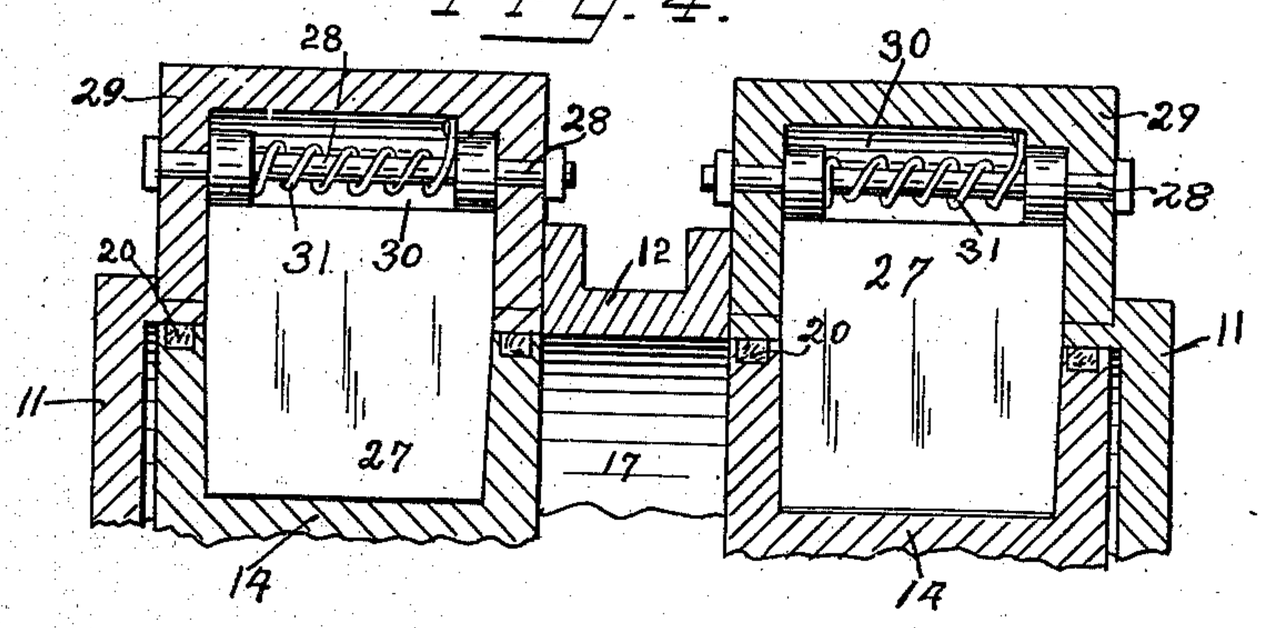
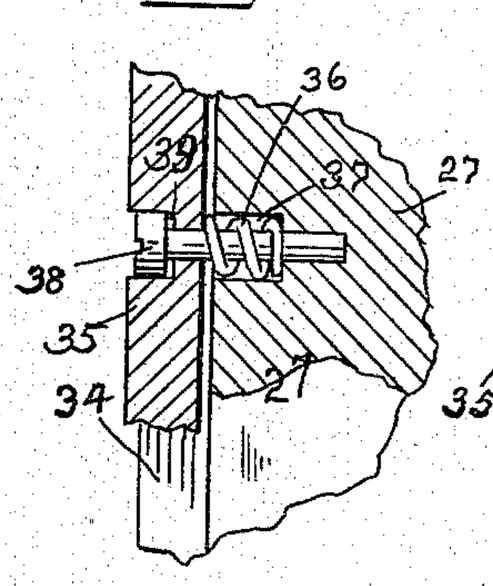
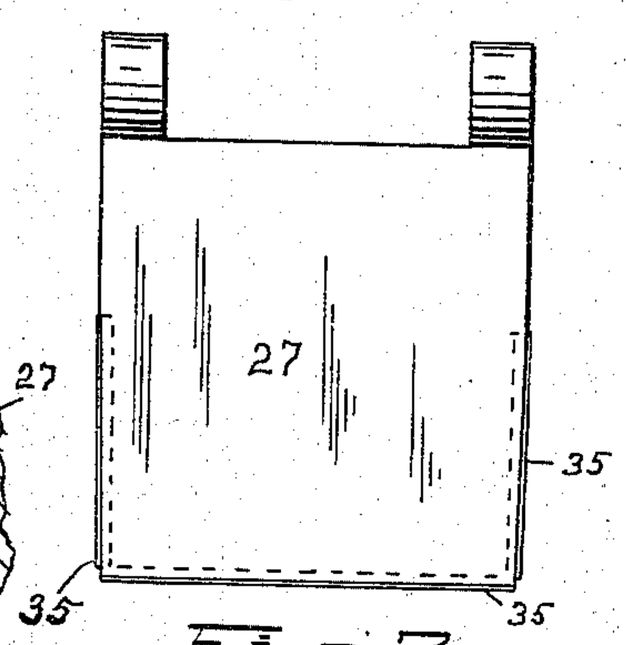


Fig. 5.

Fig. 6.

Fig. 8.





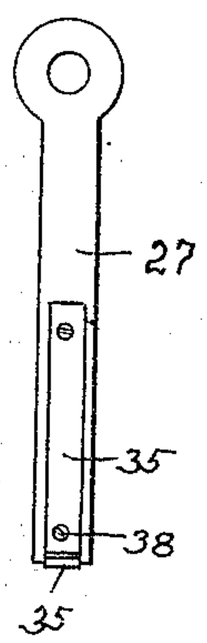


Fig. 7.

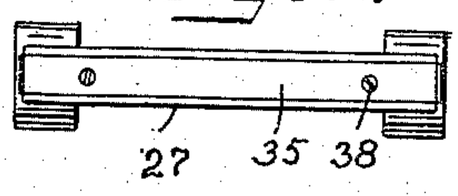
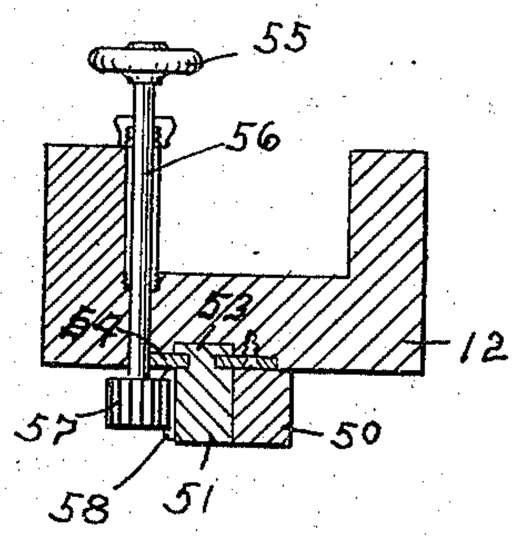


Fig. 9.



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W. L. Bushong

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INVENTOR.

James F. Williams.

BY

V. H. Lockwood

ATTORNEY.

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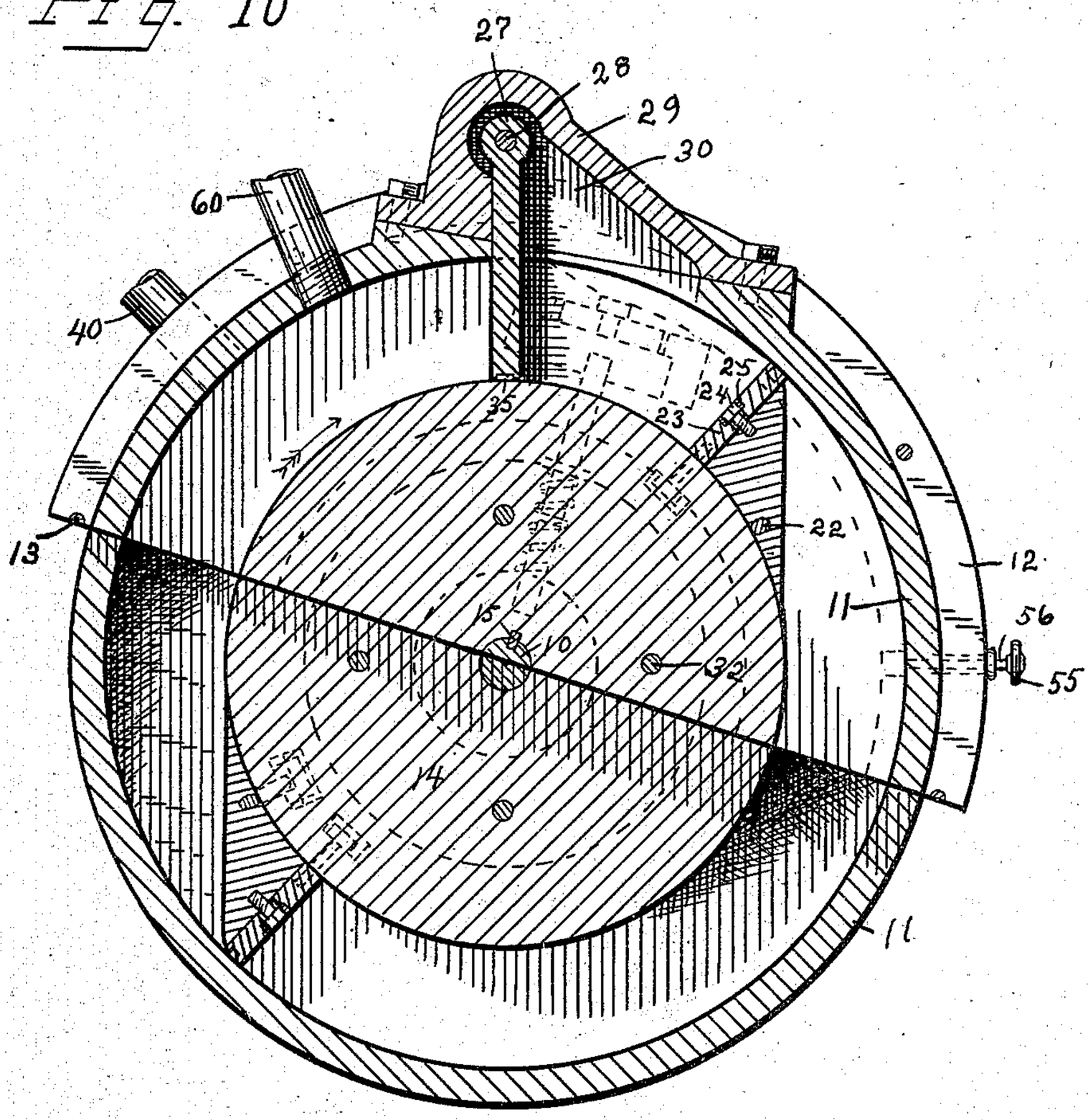
(No Model.) 5 Sheets—Sheet 5.

Fig. 10



WITNESSES:

W. L. Bushong.

F. E. Bryant.

INVENTOR.

James F Williams.

BY

V. H. Lockwood.

ATTORNEY.

UNITED STATES PATENT OFFICE.

JAMES F. WILLIAMS, OF VINCENNES, INDIANA, ASSIGNOR OF TWO-THIRDS TO FRANCIS SCHENKER, OF VINCENNES, INDIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 714,425, dated November 25, 1902.

Application filed March 24, 1902. Serial No. 99,673. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. WILLIAMS, of Vincennes, county of Knox, and State of Indiana, have invented a certain new and useful Rotary Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is to improve the construction and operation of rotary engines of the type shown and described in a former application made by me July 19, 1901, Serial No. 68,976.

The full nature of this invention will be understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a longitudinal section throughout the entire device on the line 1 1 of Fig. 2. Fig. 2 is a cross-section on the line 2 2 of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a longitudinal section of the upper part on the line 4 4 of Fig. 3. Fig. 5 is an elevation of one of the abutments. Fig. 6 is an end view of the same. Fig. 7 is a bottom view of the same. Fig. 8 is a section of a part of the abutment, showing the means for making its fit steam-tight. Fig. 9 is a section showing the means for adjusting the length of the valve-actuating means. Fig. 10 is a cross-section on the line 10 10 of Fig. 1.

In detail the drawings herein show a shaft 10, mounted centrally in a casing formed of three parts — two side parts 11, similarly formed, and a central ring 12, secured between them and to them by the bolts 13. The casing is stationary, and on the shaft a pair of piston-wheels 14 are secured by the keys 15. The main body of each wheel is embraced within one of the side members 11 of the casing, and an annular flange 16 extends inward from each of said wheels to the middle of the casing, where said flanges abut against each other, thereby forming a steam-chest 17 between said wheels and surrounding the flanges 16 that is of smaller dimensions than the steam-chest in the engine shown in my former application, inasmuch as the interior chambers 18 and 19 do not connect with the steam-chest 17. Said piston-wheels 14 have their peripheries centrally and circumferentially channeled, as shown, the inner part of the channel being somewhat narrower than the outer part thereof, which is caused by the walls on each side of the channel being slightly tapered. A steam-fit is made between the wheels forming the periphery of said channel with the casing by the packing 20, embedded in a suitable annular recess therefor. The two wheels are held securely together by the bolts 32, extending through the webs of the wheels, as shown, and drawing them toward each other.

Within the channel of each piston-wheel a piston-head 23 is adjustably secured in a radial position to the inclined rib 21. The rib is removably secured centrally in the channel by the screw 22. The piston-head 23 is removably secured to the rib by the screw 24, that fits in the radially-extending slot 25 in the piston-head, whereby the latter may be adjusted radially by the screws 26.

A pair of abutments or gates 27 are provided to swing into and out of the channels in the piston-wheels. These abutments or gates are pivoted on the rods 28, mounted in the extension-plates 29, that are secured to the upper sides of the end members 11 of the main casing and forming a chamber 30, into which the abutment-plate or gate is thrown by the inclined ribs on the piston-head once during each revolution thereof. The abutment 27 after it has been thrown up out of the way is returned to its radial or vertical position by the spring 31, surrounding the rod 28 and mounted to be torsional.

The inner end and the side edges of the abutment or gate 27 have a recess 34, as appears in Figs. 5 to 8, to receive the packing-bars 35, which are forced outward by the spiral springs 36, embedded in the walls 37 and surrounding the stop-bolt 38. The head of said stop-bolt is secured in the recess 39 in the packing-bar 35, the depth of which is greater than the thickness of the head of the bolt, whereby the bolt will permit the packing-bar 35 to be forced farther outward than the head of the bolt extends and to have sufficient play to create a steam-tight joint between the abutment or gate and the walls of the channels in the piston-wheels. This pre-

vents the escape of any steam around the abutment or gate and makes the engine effective. The abutments are stopped in their return movement when they reach a radial or vertical position by a stop 33, formed by the wall of the casing.

Steam is introduced from any source of supply into the steam-chest 17 through the pipe 40, that extends through the ring 12. From the steam-chest 17 the steam passes through the port 41 into the channel of the right-hand piston-wheel and through the port 42 down at the bottom into the channel of the left-hand piston-wheel. These ports are alternately opened and closed during a half-revolution of the piston-wheels by the sliding valves 43, moving in a guideway formed by the guide-pieces 44. Each valve has a stem 45, that is radially extending and has through it a pin 46, against which one end of the spiral spring 47 acts, set on the other end of said spiral spring surrounding a pin 48, secured in the hub of the piston-wheel. The spring 47 tends to force the valve 43 into a position that closes the port. The valve mechanism for the port in each piston-wheel is connected with and mounted on its particular wheel. The valve-stem 45 extends through the flange 16, which serves as a guide for the movement of said stem.

While the valves are closed by the springs 47, they are opened and held open by the stationary inwardly-extending rib 50 and the movable rib 51, constituting practically a cam arrangement upon or against which the pin 52 rides, and said pin being secured to the valve 43 said valve opens when the pin 52 is forced inward by said ribs 50 and 51. The time or portion of the revolution of the piston-wheel during which the inlet-ports 41 and 42 are kept open or closed is determined by the length of the ribs 50 and 51. Fig. 2 of the drawings shows the combined length of the ribs 50 and 51 to be almost a half-circle, so that the port 41 would be opened during nearly a half-revolution for the admission of steam into the channel of the wheel.

The rib 51 is slidingly mounted beside the stationary rib 50, as is shown in Fig. 9. Along the outer surface of said rib 51 a T-shaped flange 53 is formed that slides in a guideway formed by the guide-plates 54 and 55, embedded in the ring 12, and is moved by a hand-wheel on the shaft 56, that extends through the ring 12, and has on its inner end a pinion 57, that meshes with the rack 58 on the side of the rib 51. The stationary rib 50 and the movable rib 51 are each nearly a quarter of a circle in length, so that the length of the ribs combined may be adjusted anywhere between a quarter and a half circle, the two ends of the ribs lying side by side and overlapping and the movement of the movable rib 51 being limited by the stop 59 at each end of the rack 58, that interferes with the rotation of the pin 57. The ribs 50 and 51 are centrally located between two piston-wheels, so that the valves in both wheels are controlled and actuated thereby, and the port entering one wheel is opened while the port in the other is closed.

An exhaust-pipe 60 leads from the channel of each piston-wheel through the periphery of the end portion 11 of the casing. It leaves the casing immediately in advance of the position of the abutment or gate when it is closed.

The rib 50 begins at a point immediately in front of the abutment or gate when it is closed or down.

In operation the steam from the chest 17 enters the port 41 or 42 immediately after the abutment or gate for one of the wheels has been thrown down into the radial position, for then the valve 43 will be opened by the rib 50. Since the abutment or gate is thrown into this radial or closed position immediately after the piston-head in the piston-wheel has passed, it is seen that the steam enters the channel in the piston-wheel between the closed abutment or gate and the piston-head plate 25 and causes the wheel to which the piston-head is secured to rotate. The steam acts directly, therefore, on said piston-head because of the rotation of such wheel while the port is opened, that is for nearly a half-revolution or less, and after the port is closed the expansion of the steam continues to cause said wheel to rotate until the piston-head passes the exhaust-port 60 whereupon the steam is immediately exhausted. The further movement of the wheel causes the inclined ribs 21 of the piston-head to throw the abutment or gate up out of the way and let it pass, and as soon as it has passed the spring 31 throws the abutment or gate down and steam again enters and the operation is repeated. Since the inlet-ports 41 and 42 are oppositely located and the valves for controlling the same are oppositely located, it is clear that action of the steam on them to cause their revolution will alternate, and while the steam is acting directly in one it will be acting expansively in the other to cause an even propulsion of said wheels and rotation of the shaft 10.

What is claimed to be the invention and to be secured by Letters Patent is—

1. In a rotary engine of the class described, a cylindrical casing, a rotary piston therein with an annular steam-chamber in its periphery, a steam-port leading thereto, a valve mounted on the piston for closing said port, means mounted on the casing that engages said valve for controlling it, said valve-controlling means being adjustable in length, and external means for effecting such adjustment.

2. In a rotary engine of the class described, valves for closing and opening the steam-ports, springs that tend to force the valves into the closing position, a stationary rib that opens said valves, and a rib longitudinally movable adjacent said stationary rib for pre-

determining the period during which the valves shall be opened or closed.

3. In a rotary engine of the class described, valves for closing and opening the steam-ports, springs that tend to force the valves into the closing position, a stationary rib that opens said valve, a rib longitudinally movable adjacent said stationary rib and having a rack on the side thereof, a shaft extending through the casing of the device, and a pinion thereon engaging said rack for longitudinally moving said movable rib.

4. In a rotary engine of the class described, a casing, a piston-wheel mounted therein circumferentially channeled, a steam-port through the side of the wheel entering said channel, a sliding valve for opening and closing said port, a spring tending to close the same, a stationary rib on the internal periphery of the casing, a pin secured to the valve adapted to engage said rib, a movable rib, a guideway through which said rib may be moved longitudinally adjacent the stationary rib, and external means extending through the casing for moving said movable rib.

5. In a rotary engine of the class described, a casing, a piston-wheel mounted therein circumferentially channeled, a steam-port through the wheel leading to the channel, a sliding valve for opening and closing said port with a radially and inwardly extending stem, a pin in said stem, a radial pin in the hub of the wheel in line with said valve-stem, and a spiral push-spring mounted on the adjacent ends of said pin and valve-stem, and means for forcing said valve into an open position when desired.

6. In a rotary engine of the class described, a casing, two piston-wheels mounted therein beside each other with a space between them, each wheel being circumferentially channeled, a steam-port leading through each wheel into the channel thereof, the wheels being so placed that the ports will be on opposite sides of the center of the wheels, sliding valves for opening and closing each of said ports, a common means for opening said valves, and an independent means for closing said valves.

7. In a rotary engine of the class described, a casing, circumferentially-channeled piston-wheels mounted therein side by side with an inward and laterally extending flange on each wheel a distance from the periphery of the wheel which flanges abut against each other and form a steam-closed chamber between said wheels and the casing, means for introducing steam into said chamber, ports leading from said steam-chamber into the channels of the wheels, and means for opening and closing said ports.

8. In a rotary engine of the class described, a casing, two circumferentially-channeled piston-wheels mounted therein side by side with an inward and laterally extending flange on each wheel a distance from the periphery of the wheel which flanges abut against each other to form a steam-chamber, ribs extending through said wheels for drawing them tightly together, ports leading from the steam-chest into the channels of said wheels, and valves for opening and closing said ports.

9. In a rotary engine of the class described, a casing, a circumferentially-channeled piston-wheel mounted therein, a port for the introduction of steam into said channel for driving the piston-wheel, an abutment movable into said channel, a piston-head extending radially across the channel, a screw for securing it in place, an inclined rib behind the piston-head, a screw for holding it substantially midway of the channel, and a screw for securing the piston-head to the rib.

10. In a rotary engine of the class described, a casing, a circumferentially-channeled piston-wheel mounted therein, a chamber over said piston-wheel, a rod extending through said chamber, an abutment pivoted on said rod and adapted to close the channel in the piston-wheel, and a spiral spring mounted on said rod tending to hold said abutment in a closed position, the wall of said chamber serving as a stop to limit the return movement of the abutment and hold it radially.

11. In a rotary engine of the class described, an abutment consisting of a plate with its edge centrally channeled, a packing-plate in said channel, a spring for forcing said packing-plate outward, and means connected by said abutment for limiting the outward movement of the packing-plate.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

JAMES F. WILLIAMS.

Witnesses:
H. C. BECKES,
SADIE REEL.