C. PETERSEN.

ROTARY ENGINE.

APPLICATION FILED JAN. 16, 1914.

1,155,092.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

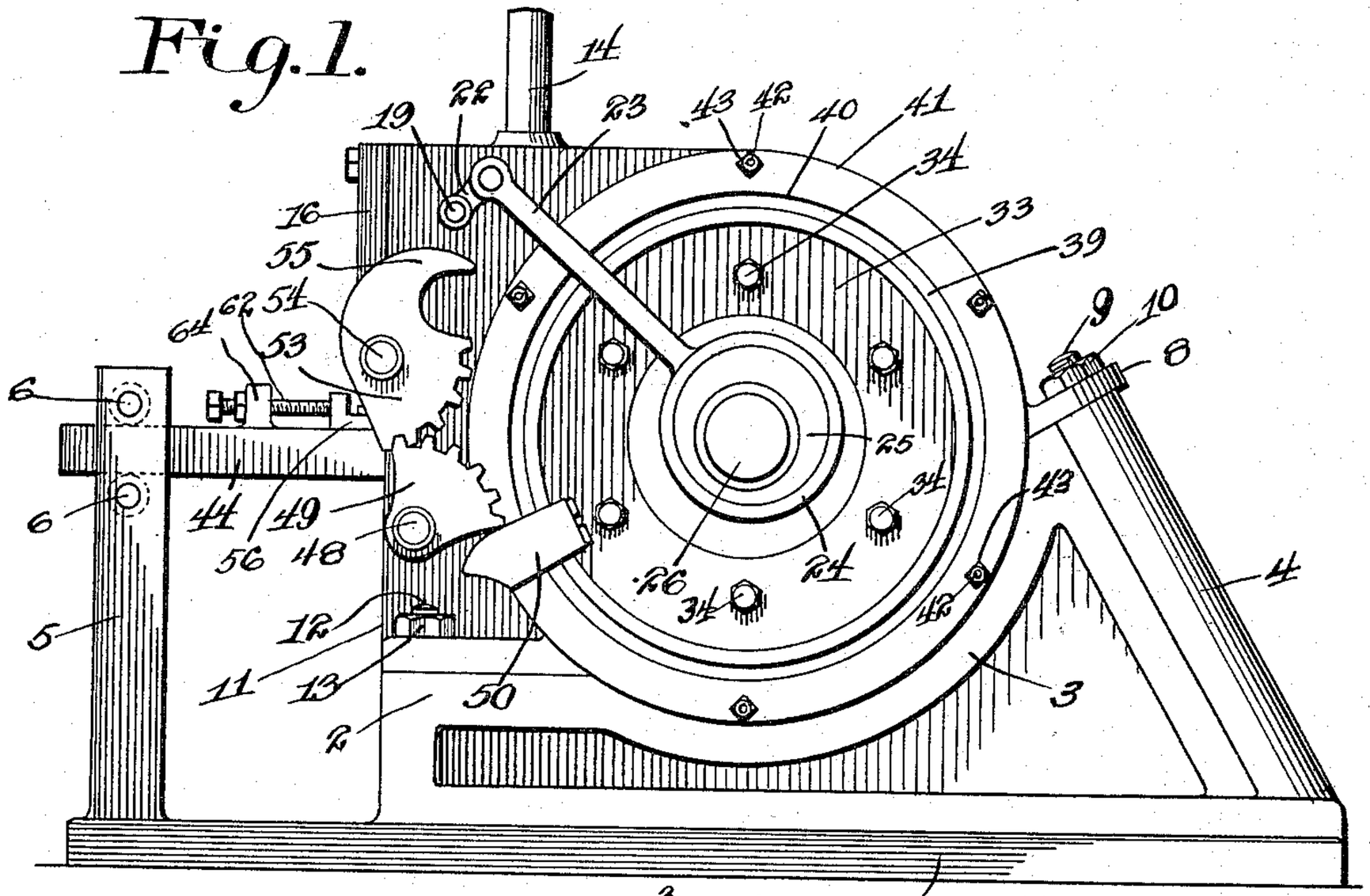
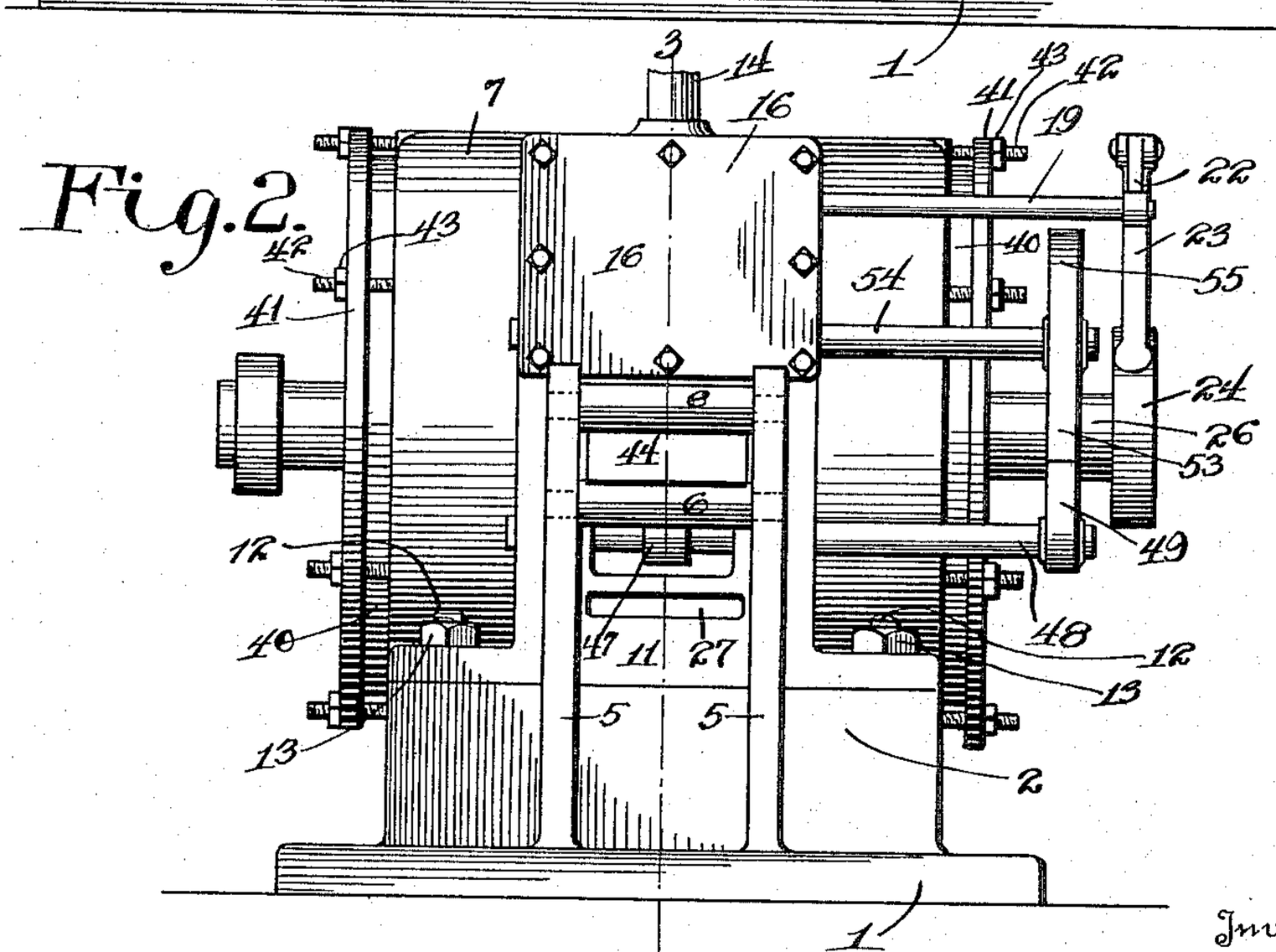


Fig. 2.



Witnesses

Wm. H. Mulligan.

C. N. Crawford

Inventor

Christen Petersen

By Richard Lewen,

his Attorney

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 3.

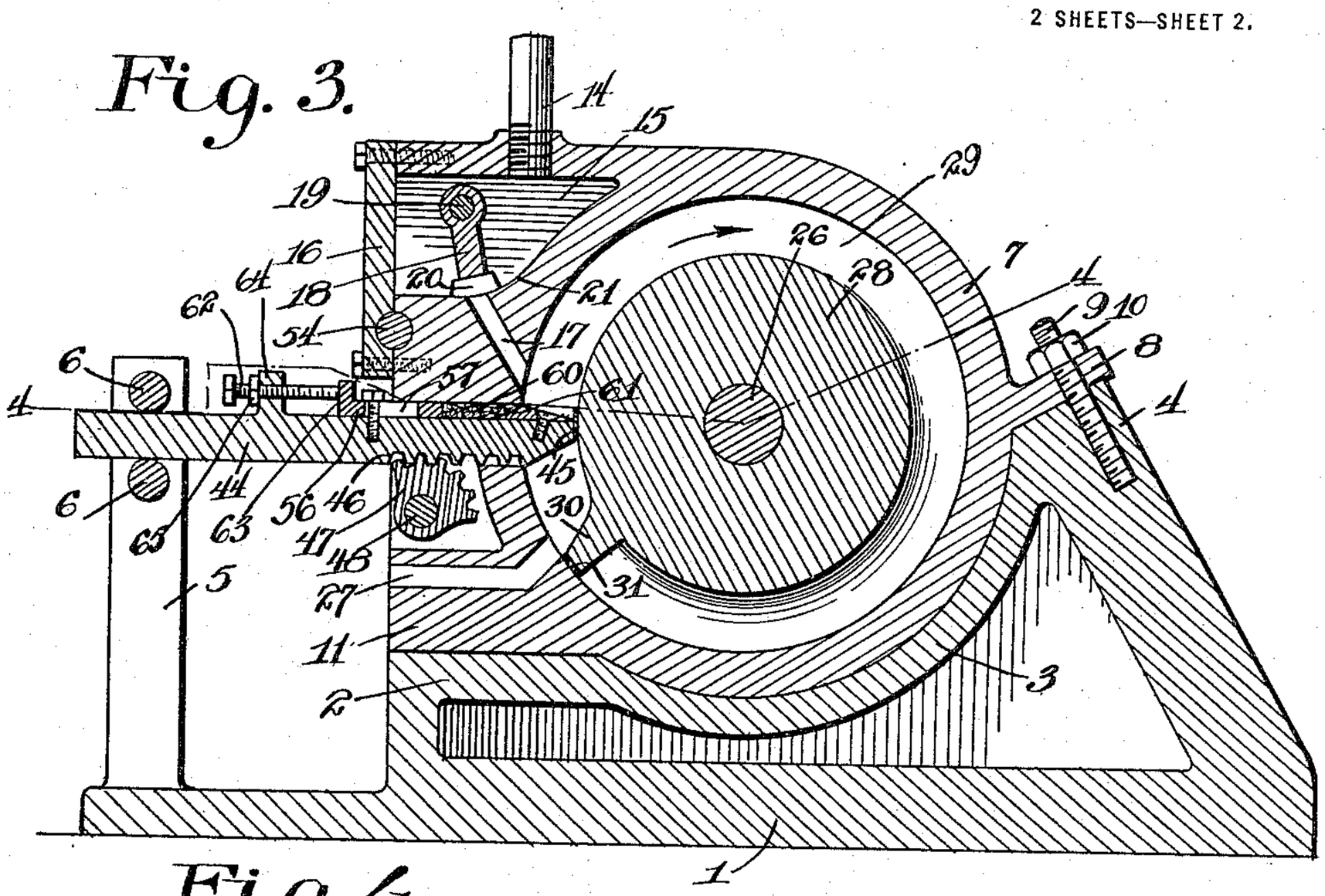
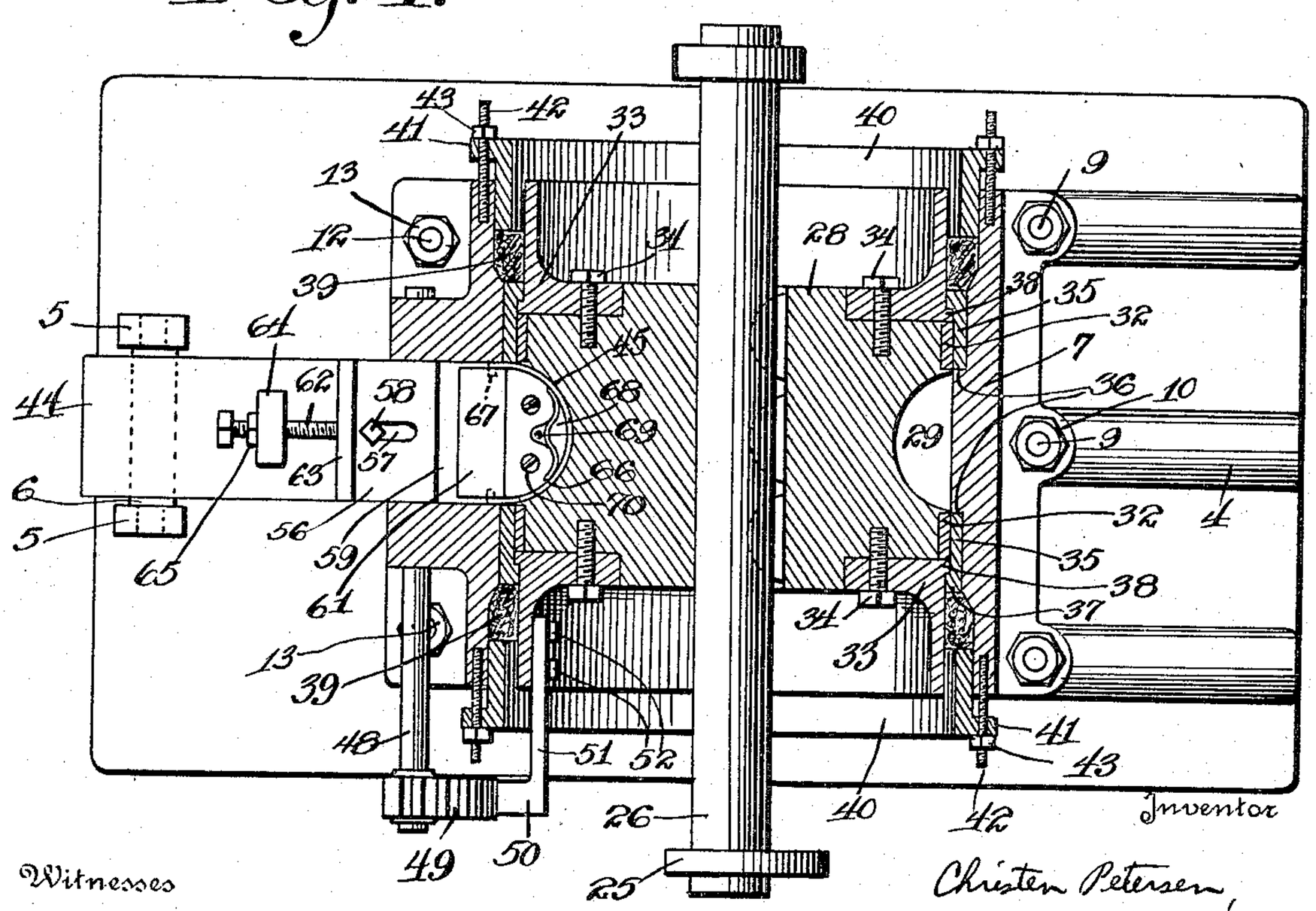


Fig. 4.



Witnesses

Wm. H. Mulligan,

C. H. Crawford

Inventor

Christen Petersen,

By Richard Bowen,

his Attorney

UNITED STATES PATENT OFFICE.

CHRISTEN PETERSEN, OF DAVENPORT, IOWA.

ROTARY ENGINE.

1,155,092. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed January 16, 1914. Serial No. 812,544.

To all whom it may concern:

Be it known that I, CHRISTEN PETERSEN, a citizen of the United States, residing at Davenport, in the county of Scott and State of Iowa, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary steam engines of the low speed type.

The object of the invention is to provide an engine of this character of simple construction and low cost of maintenance and wherein thrust may be applied to the rotary piston substantially throughout a complete rotation thereof, or more specifically, five-sixths of a revolution.

Further objects of the invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out and ascertained in and by the appended claims.

In the drawings:—Figure 1 is a view in end elevation of a rotary engine embodying one form of my invention. Fig. 2 is a view in side elevation thereof. Fig. 3 is a sectional view on line 3—3 of Fig. 2. Fig. 4 is a sectional view on line 4—4 of Fig. 3.

Like characters of reference designate similar parts throughout the different figures of the drawings.

As illustrated, 1 designates a foundation base which is in the form of a saddle and which is adapted to be anchored to the usual foundation for the engine in any desirable manner. The saddle 1 is provided with a cylinder seat having a horizontal portion 2 and a portion 3 of cylindrical form which terminates in an elevated thrust-receiving portion 4, extending at an angle to the vertical downwardly to the base 1, as will be clearly seen by reference to Fig. 3. The base is also provided with guiding uprights 5 in which abutment rollers 6 are journaled.

The cylinder is indicated at 7 and is shown open at its end and is provided with a flange 8 adapted to be anchored to the thrust-receiving portion 4 by bolts 9 having set nuts 10. The cylinder 7 is shaped to conform to the seat of the saddle 1 and is provided with a horizontal portion 11 resting upon the horizontal portion 2. Bolts 12, provided with set nuts 13, serve to anchor the cylinder on the part 2 of the saddle. A steam inlet is indicated at 14 which discharges into a valve chamber 15 provided with a closure 16. The valve chamber 15 is provided with a steam port 17 which opens into the cylinder, as indicated in Fig. 3. A swinging valve 18, mounted to be swung by rotation of a rod 19, is provided with a port closure 20 which is slidable upon an arcuate port seat 21 which is shaped to conform to the path of oscillation described by the port closure 20. The valve rod 19 extends through the wall of the valve chamber 15 and an arm 22 is mounted on the outer end thereof and connected with an eccentric rod 23. The eccentric rod 23 is formed as a continuation of an eccentric strap 24 which embraces an eccentric 25 of the drive shaft 26. It will be seen by reference to Fig. 4, that the drive shaft 26 is not journaled in the ends of the cylinder and that the same, as hereinbefore stated, is shown open at both ends, the piston being mounted on and keyed to the drive shaft. The cylinder 7 is provided with an exhaust port 27 which is shown opening to atmosphere as clearly indicated in Fig. 3. In practice, I will provide heads for closing the ends of the cylinder and boxes for supporting the drive shaft.

The piston is indicated at 28 and the same is supported by the drive shaft 26 and is provided with a peripheral cavity 29 which forms an annular steam space closed by the cylinder 7. The inlet and exhaust ports 17 and 27, respectively, open to the annular steam space 29 and the piston 28 is provided with a steam thrust abutment 30 which interrupts the steam space and projects into engagement with the inner wall of the cylinder 7. A suitable packing 31 is disposed between the outer end of the thrust abutment 30 and the inner wall of the cylinder 7. Laterally of the steam space 29, the piston carries metallic packing rings 32 which are held against inner shoulders, as shown, by retaining rings 33 which are shown anchored to the sides of the piston 28 by bolts 34. The piston packing rings 32 coact with cylinder packing rings 35, also of metal, to prevent leakage of steam laterally from steam space 29. The cylinder packing rings 35 abut against shoulders 36 and are heeled, as at 37 to engage flanges 38 on the retaining rings 33. The retaining rings 33, with the cylinder 7, provide for lateral annular packing spaces 39 which are filled with suitable non-metallic packing which may be

held in position by packing rings 40 which enter between the retaining rings 33 and the cylinder 7, as will be clearly seen by reference to Fig. 4. The packing rings 40 are provided with flanges 41 through which bolts 42 pass into the cylinder 7. Set nuts 43 serving to lock said bolts.

A cylinder abutment 44 is supported and guided by rollers 6 in uprights 5 and enters the cylinder 7 through a radially disposed abutment opening and is provided with a rounded terminal end 45 for projection into the steam space 29 and into engagement with the periphery of the piston 28. The cylinder abutment 44 is disposed between the intake and exhaust ports 17 and 27, respectively, so that when it is in the position shown in Fig. 3, it will force the steam to pass in the direction of the arrow shown to engage abutment 30 on the piston 28 and revolve the same.

In order to permit the piston abutment 30 to pass the cylinder abutment 34 I provide improved means for controlling the cylinder abutment 34, which I will now describe.

Abutment 44 is shown provided with rack teeth 46 for engagement with a toothed actuating segment 47 which is mounted upon a segment actuating shaft 48. Segment actuating shaft 48 is journaled in the cylinder 7 and projects laterally therefrom as will be seen by reference to Figs. 1 and 2 and carries on its outer end a retracting toothed segment 49. An actuator 50 is mounted on the piston 28 and may be provided with an arm 51 secured to one of the retainer rings as indicated at 52. When the actuator 50 strikes the retracting segment 48, as will be seen by reference to Fig. 1, it will rotate the same and the shaft 48 in a contra-clockwise direction so as to retract the abutment 44 from the position shown in Fig. 3 to permit the abutment 30 to pass. A restoring toothed segment 53 meshes with the retracting segment 47 and is mounted upon a shaft 54 which may be suitably journaled in the structure of the cylinder 7. The restoring segment is provided with an actuating tail 55 which is swung in the path of the actuator 50 after the retracting segment 47 has been oscillated into a retracted position. The actuator 50 first oscillates the segment 48 to retract the abutment 44 and then actuate the tail porion 55 to turn the restoring segment 53 back into the position shown in Fig. 1.

The eccentric control for the valve 18 is so timed that it will cut off steam during retraction and restoring movement of the abutment 44 and until the abutment 30 has passed the inlet port 17 whereupon the latter will be opened by the valve 18, first slowly, to take advantage of expansion, and then full open to afford direct pressure thrust on the abutment 30.

In order to prevent steam leakage through the passage afforded for abutment 44, I provide a packing plate 56, which is slotted at 57 for adjustment in different positions by a set bolt 58. The forward edge 59 serves to engage any suitable form of packing which may be disposed in the space 60 to tightly compress the same against a packing abutment 61. The packing plate 56 may be advanced into a tight-packing tightening position by means of a screw 62 adapted to engage a flange 63 and extending through a lug 64, formed on the abutment 44. A set nut 65 may serve to lock the screw 62 in an adjusted position. A metallic packing member 66 embraces the forward curved end 45 of the abutment 44 and is provided with heel ends 67 which loosely engage slightly enlarged openings in the lateral sides of the abutment 44. A spring 68, secured at 69, serves to hold the metallic packing 66 in tight abutment against the wall of the peripheral cavity 29. The lugged ends 67 will prevent the packing member 66 from being forced too far into the cavity 29 when the abutment 44 is retracted. I have shown the packing abutment 61 secured to the abutment 44 by screws 70 and I preferably mount the spring 68 on the packing abutment 61.

It is believed that the advantages and utility of my invention will be clearly understood from the foregoing description and while I have herein shown and described one specific embodiment of my invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. In a slow-speed rotary engine, a cylinder having inlet and exhaust ports, piston packing rings in said cylinder, a rotary piston in said cylinder, packing rings on said piston engaging said cylinder rings, a shaft carrying the piston, said piston having a peripheral cavity between said rings forming with said cylinder a steam space and provided with a thrust abutment projecting into said space and engaging said cylinder, a cylinder abutment disposed between said inlet and exhaust ports and slidable into said cavity into engagement with said piston, and means operated by said piston for retracting and restoring said cylinder abutment, substantially as described.

2. In a slow-speed rotary engine, a cylinder having inlet and exhaust ports, a rotary piston revoluble in said cylinder and having a peripheral cavity forming with said cylinder a steam space and provided with a thrust abutment projecting into said space and engaging said cylinder, a cylinder abutment disposed between said inlet and exhaust ports and slidable into said cavity into engagement with said piston, a shaft supported solely by said piston and extending through the open ends of said cylinder, and means connected to one of the extend-

ed extremities of this shaft operable to control the admission of steam into said steam space.

3. In a slow speed rotary engine, an open ended cylinder having inlet and exhaust ports, a rotary piston revolubly mounted in said cylinder and having a peripheral cavity forming with said cylinder a steam space and provided with a thrust abutment projecting into said space and engaging said cylinder, a cylinder abutment slidably disposed between said inlets and exhaust ports to enter said cavity and engage said piston, shafts above and below said abutment, means carried by one of said shafts to control movement of said abutment, means carried by each of said shafts for mutual engagement, and means carried by said piston for successive contact with each of last said means in retracting and restoring said abutment.

4. In a slow speed rotary engine, an open ended cylinder having inlet and exhaust ports, a rotary piston revolubly mounted in said cylinder and having a peripheral cavity forming with said cylinder a steam space and provided with a thrust abutment, projecting into said space and engaging said cylinder, a cylinder abutment slidably disposed between said inlets and exhaust ports to enter said cavity and engage said piston, shafts above and below said abutment, means carried by one of said shafts to control movement of said cylinder abutment, means carried by each of said shafts for mutual engagement, fixed means on said piston in advance of said piston abutment in the direction of rotation for successive contact with each of last said means in retracting and restoring said abutment, a shaft supported solely by said piston to extend through the open ends of said cylinder, and means operable by said extended shaft to control the admission of steam into said steam space.

5. In a slow speed rotary engine, an open ended cylinder, inlet and exhaust ports therefor, a rotary piston revolubly mounted in said cylinder and having a peripheral cavity forming with said cylinder a steam space, a valve chamber formed in said cylinder and connected with said space by said inlet, a swinging valve mounted in said chamber and covering in its path said inlet, a shaft supported solely by said piston and extending through the open ends of said cylinder, and eccentric means linking said valve to the movement of said shaft to control admission of steam into said steam space.

6. In a slow speed rotary engine, an open ended cylinder, inlet and exhaust ports therefor, a rotary piston revolubly mounted in said cylinder and having a peripheral cavity forming with said cylinder a steam space, a thrust abutment carried by said piston and projecting into said space to contact with said cylinder, a cylinder abutment slidably disposed between said inlet and exhaust to enter said cavity and engage said piston, a valve chamber formed in said cylinder and connected with said space by said inlet, a swinging valve mounted in said chamber and covering said inlet in its path of movement, a shaft supported wholly by said piston, an eccentric means linking said valve to said shaft to control admission of steam into said space, means engageable to control movement of said cylinder abutment, and means carried by said piston in the paths of said engageable means to retract and restore said abutment in conjunction with the admission of steam and the passage of said piston abutment.

7. In a rotary device of the character described, a cylinder provided with inlet and exhaust ports, a rotary piston therein provided with a thrust abutment, a sliding cylinder abutment movable into said cylinder between said ports, retracting and restoring toothed segments in mesh-engagement with each other for operating said cylinder abutment, and an actuator carried by said piston in advance, as regards the direction of rotation thereof of said thrust abutment to successively contact with said segments in retracting and restoring said cylinder abutment to permit of the passage of said thrust abutment.

8. In a rotary device of the character described, a cylinder provided with inlet and exhaust ports, a rotary piston therein provided with a thrust abutment, a sliding cylinder abutment movable into said cylinders between said ports, retracting and restoring toothed segments in mesh-engagement with each other for operating said cylinder abutment, and an actuator carried by said piston and projecting through one of the open ends of said cylinder to contact with one of said segments in advance of the passage of said thrust abutment to retract said cylinder abutment, to force outwardly into its path the other of said segments and to later contact with this latter in restoring said cylinder abutment after the passage of said thrust abutment.

9. In a rotary device of the class described, a cylinder provided with inlet and exhaust ports, a rotary piston therein provided with a thrust abutment, a sliding cylinder abutment movable into said cylinder and between said ports and provided with teeth, an actuating shaft provided with a toothed segment for engagement with said abutment and an actuator segment, an idle shaft, a restoring toothed segment mounted on said idle shaft and meshing with said actuator toothed segment, and fixed means carried by the piston for first operating said

actuator segment to retract said cylinder abutment and then operating said restoring segment to restore said cylinder abutment and then operating said restoring segment to restore said cylinder abutment, substantially as described.

10. In a rotary device of the class described, an open ended cylinder provided with inlet and exhaust ports, a piston revolubly supported in said cylinder and provided with a peripheral cavity forming with said cylinder and annular steam space communicating with said ports, metallic packing rings on opposite sides of said steam space, and annular packing devices for non-metallic packing outside of said rings, substantially as described.

11. In a device of the class described, an open ended cylinder provided with inlet and exhaust ports, a piston revolubly supported in said cylinder and provided with a peripheral cavity forming with said cylinder and annular speed space communicating with said ports, metallic packing rings carried by said cylinder on opposite sides of said space and provided with heeled or shouldered edges, metallic packing rings carried by said piston on opposite sides of said space for engagement with said cylinder rings, retaining rings on the ends of said piston flanged to engage the shoulders of said cylinder rings and projecting in spaced relation to the interior of the ends of the cylinder to form annular packing spaces, and adjustable rings carried by the cylinder for compressing the packing in said spaces, substantially as described.

12. In a rotary device of the class described, a cylinder provided with inlet and exhaust ports, a rotary piston in said cylinder having a peripheral cavity semi-circular in cross section and forming a steam space communicating with said ports and having a thrust abutment projecting into said space, a cylinder abutment movable into said cavity and having a rounded end, a packing strip surrounding the rounded end of said abutment and having lugged end portions movably connected with said abutment, and a spring mounted on said abutment for urging said packing strip into engagement with said cavity, substantially as described.

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

CHRISTEN PETERSEN.

Witnesses:
H. H. VOGT,
HANS P. HOHN.