

No. 665,970.

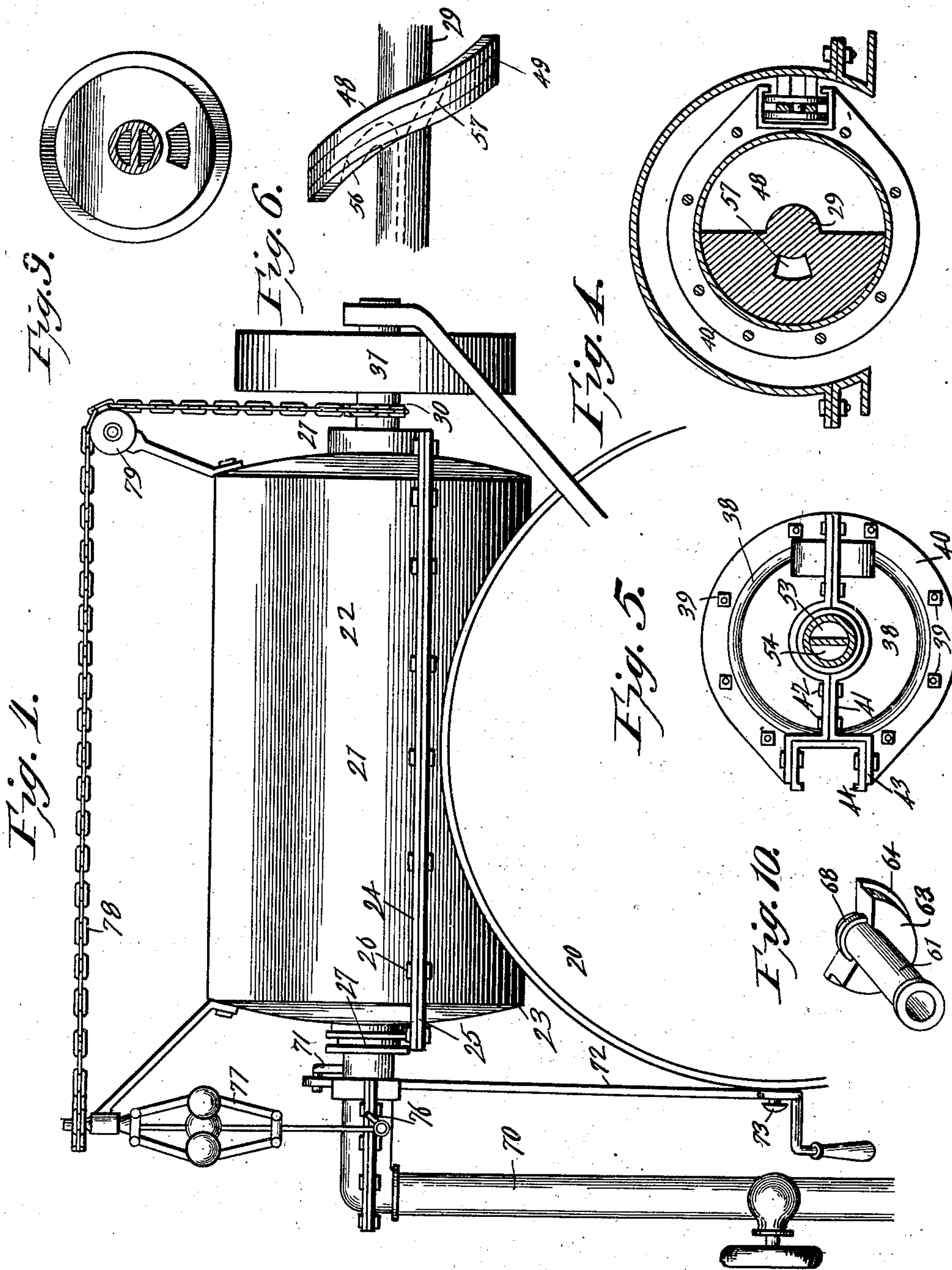
Patented Jan. 15, 1901.

W. OBUCH.
ROTARY ENGINE.

(Application filed May 24, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
C. H. Walker.
Geo. H. Chandler.

William Obuch Inventor
By *his* Attorneys.
C. A. Snow & Co.

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2 Sheets—Sheet 2.

Fig. 3.

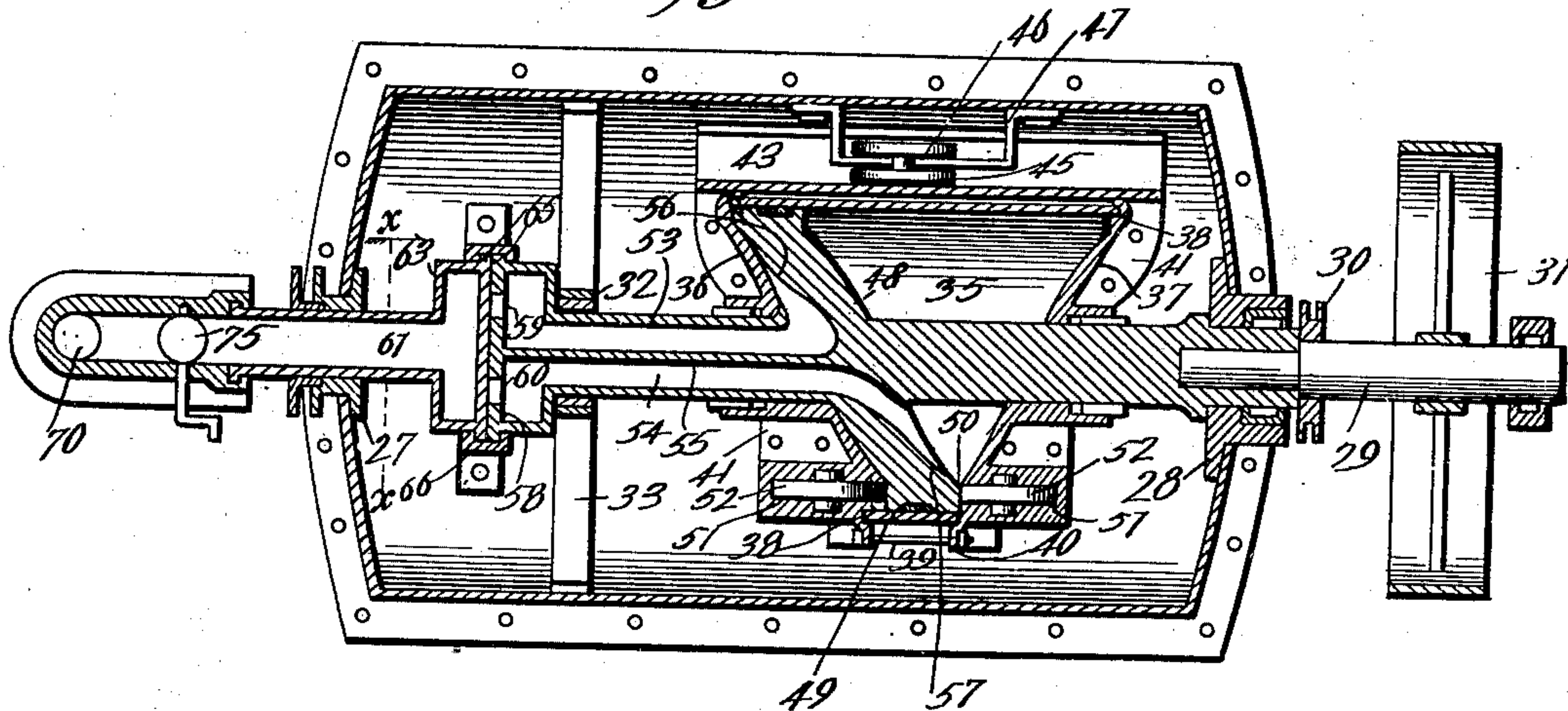


Fig. 7.

Fig. 2.

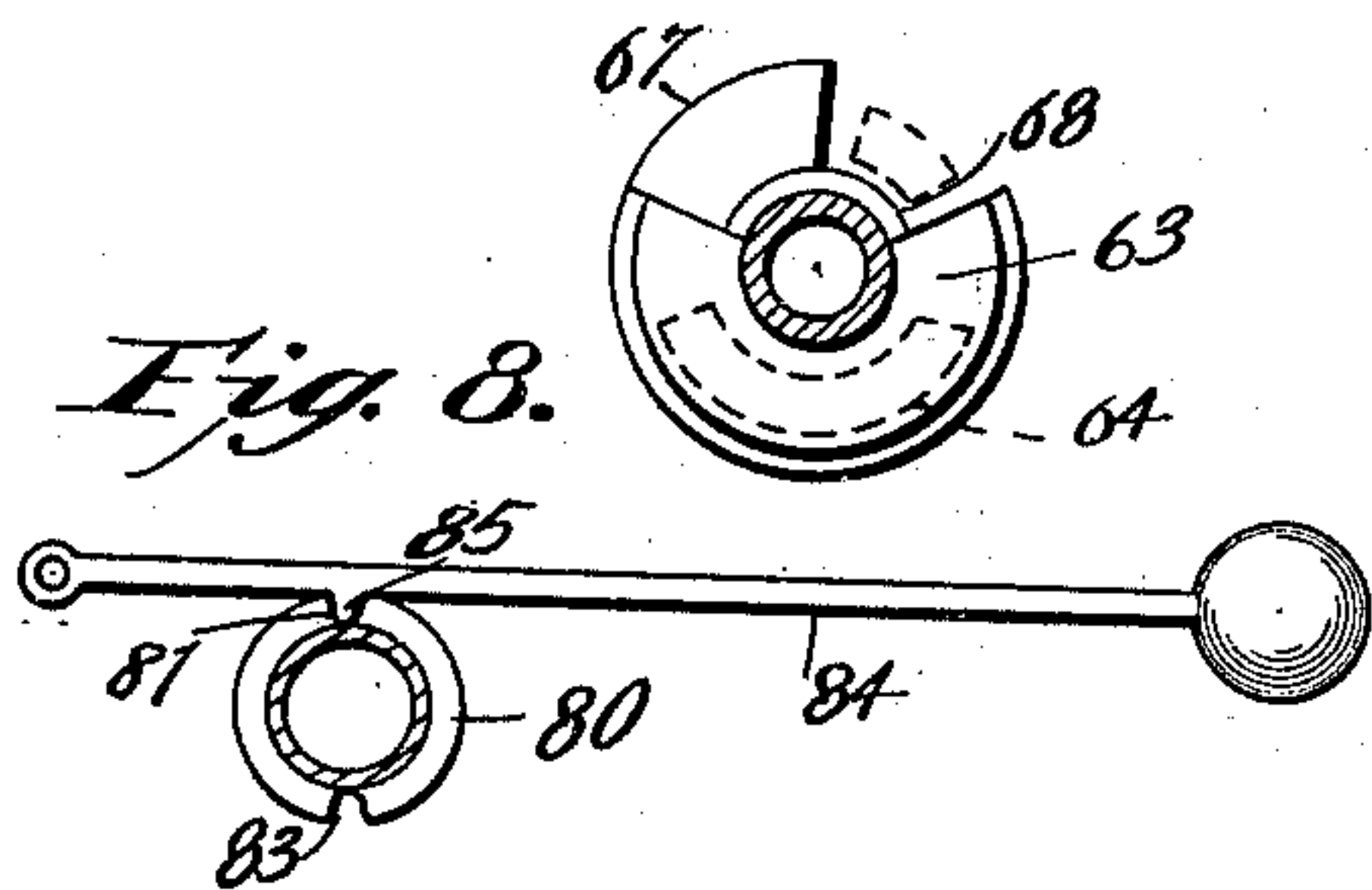
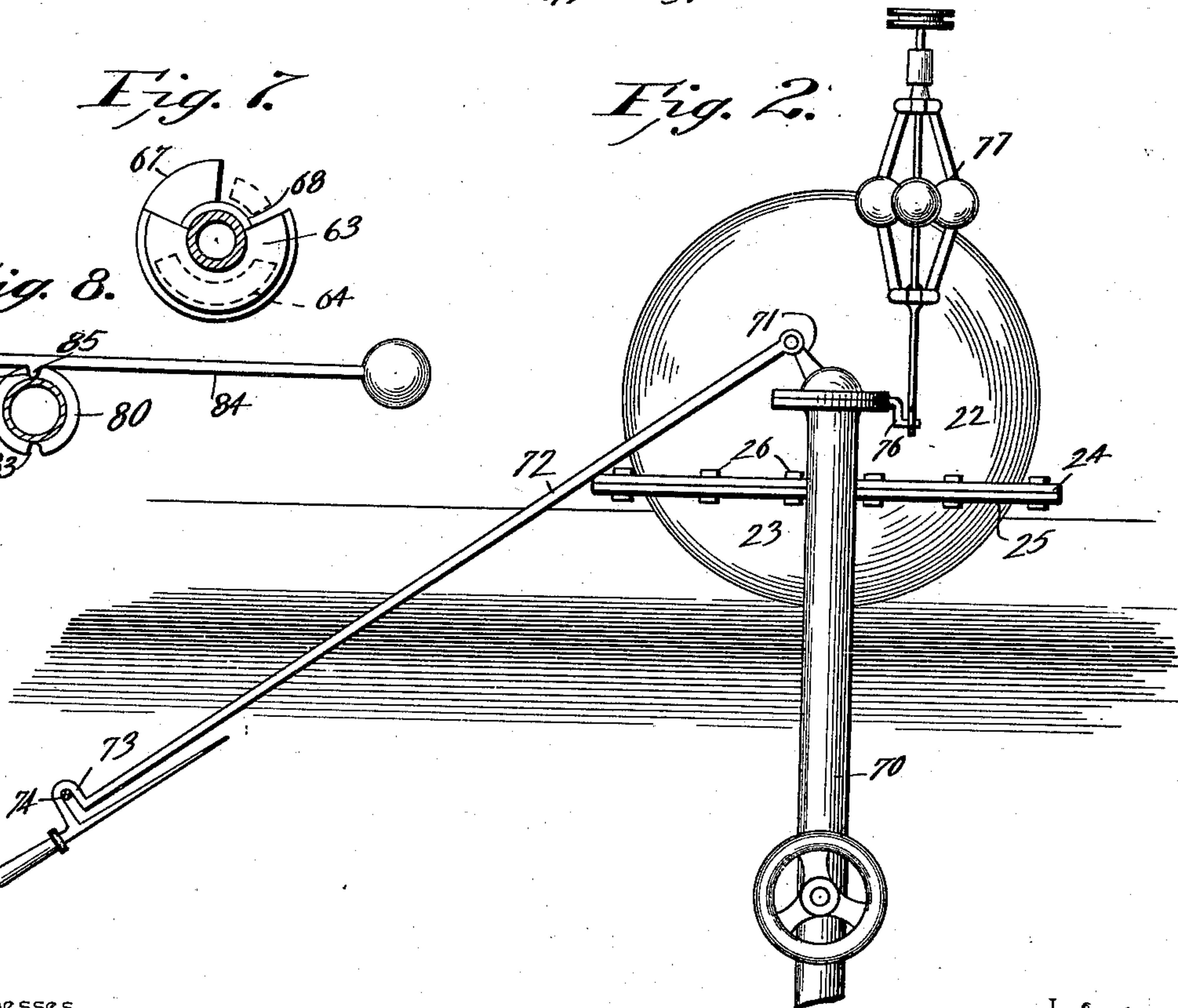


Fig. 8.



Witnesses

W. Walker

Geo. H. Chandler

By His

Attorneys

William Obuch

Inventor

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

WILLIAM OBUCH, OF VALLEY VIEW, TEXAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 665,970, dated January 15, 1901.

Application filed May 24, 1900. Serial No. 17,868. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM OBUCH, a citizen of the United States, residing at Valley View, in the county of Cooke and State of Texas, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to fluid-pressure engines in general, and more particularly to that class known as "rotary" engines, one object of the invention being to provide a construction in which the fluid under pressure will act directly against a piston mounted upon a shaft within a cylinder and which piston will be rotated to rotate the shaft.

A further object of the invention is to so construct and arrange the parts that the fluid under pressure will be conducted to the cylinder in such manner as to reduce the condensation thereof to a minimum and in which the parts will be thoroughly packed and will have a minimum of friction.

An additional object is to provide a simple and efficient means for reversing the engine and for regulating the speed thereof.

Further objects and advantages of the invention will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 shows a side elevation of the complete engine and showing its position upon a boiler. Fig. 2 is an end elevation of the engine and showing the arrangement of the reversing-rod and the ballast-balls. Fig. 3 is a horizontal longitudinal section taken through the engine and showing parts in elevation. Fig. 4 is a section taken through the cylinder and piston. Fig. 5 is an end elevation of the cylinder, the shaft being shown in section. Fig. 6 is a side elevation of the piston and a portion of its shaft. Fig. 7 is a section on line *xx* of Fig. 3. Fig. 8 is a section taken through the exhaust-pipe and showing an alternative arrangement for holding the exhaust-pipe in its different operative positions to change the direction of rotation of the engine. Fig. 9 is an end view of the piston. Fig. 10 is detail perspective view of the rotatably-adjustable exhaust-pipe.

Referring now to the drawings, 20 repre-

sents a portion of a boiler for generating steam and which boiler may be of any preferred style and has a horizontally-disposed and cylindrical steam-dome 21 disposed transversely of its upper side, this dome being formed in an upper section 22 and a lower section 23, divided in a horizontal plane below the diameter of the dome. The lower section 23 has its under side cut away to give access to the dome from the boiler. The sections of the dome have flanges 24 and 25, through which are formed perforations which receive clamping bolts or rivets 26, although bolts are preferable for the reason that they permit ready access to the dome.

In the ends of the dome are engaged bearings 27 and 28, which are steam-tight, and in the bearing 28 is journaled the shaft 29 of the engine, said shaft projecting at one end from the dome and having a pulley 30 and a fly-wheel 31 upon the projecting portion, the opposite end of the shaft terminating within the inclosure of the dome and having a bearing 32 in a cross-brace 33 within the dome, the peculiar construction of the shaft being hereinafter described.

Within the dome and concentric with the shaft 29 is arranged the cylinder 35, said cylinder having its ends cut in converging planes, so that the cylinder is substantially triangular in a plane including the axis of the cylinder. The shell of the cylinder is preferably formed in one piece, and at each end thereof is secured a head 36 and 37, respectively, said heads being of course elliptical and having grooves 38 in their inner faces which receive the ends of the cylinder. The heads are held upon the cylinder by means of the usual bolts 39, which engage flanges 40 upon the heads, and each head is formed in two semi-elliptical sections having flanges 41, through which are engaged securing-bolts 42, this sectional formation of the heads permitting their ready application and removal and the adjustment of the parts within the cylinder. The cylinder is slidable with respect to the steam-dome, and to permit this movement without rotation of the cylinder the flanges 40 are recessed at one side of the cylinder, and the flanges 41 are continued along the edges of the recesses, as shown at 43, and upon the flanges 43 is secured a trough-

like rail 44, with which is engaged a friction roller or wheel 45, which latter has a peripheral groove 46, in which are engaged the webs of two U-shaped brackets 47, secured to the inner face of the steam-dome. The brackets 47 hold the friction-roller from displacement, and the roller in turn holds the cylinder from rotation.

Mounted upon or formed integral with the shaft 29 is an elliptical piston 48, which is disposed at the same angle to the axis of the shaft as are the heads of the cylinder to the common axis of the shaft and cylinder, and the diameter of the piston and its inclination are such that in its rotation with the shaft every point of its periphery will describe a circle of the same radius, the periphery of the piston lying in close contact with the inner face of the cylinder. The periphery of the piston is grooved in the usual manner for the reception of steel or other packing-strips 49, so that in the rotation of the piston and its consequent wobbling motion there will be at all times a steam-tight fit between the periphery of the cylinder and the periphery of the piston.

Instead of the ends of the piston being entirely flat the peripheral edge thereof projects in a plane at right angles to the axis of its shaft, so that it forms in effect a distorted ellipse which acts as a tire for the piston, and at the narrowed side of the cylinder the heads thereof are bent to form a guideway 50, which tapers toward its ends, so that in its rotation the different points of the piston will move into and then out of the groove, the sides of the latter being parallel, and through these sides open recesses 51, in which are mounted friction-wheels 52, which receive direct pressure of the sides of the tire of the piston to relieve the parts of undue friction.

As shown most clearly in Fig. 3 of the drawings, one end of the shaft 29 has a cylindrical bore which is divided into two steam-passages 53 and 54 by a diaphragm or partition 55, the passage 53 communicating with one end of the cylinder through a port or opening 56 in one face of the piston and adjacent the hub thereof, while the passage 54 communicates with the opposite end of the cylinder through an opening or port 57 in the opposite face of the piston. Thus it will be seen that if steam be forced through passage 53 and port 56 to one end of the cylinder the piston will be forced away from the adjacent head of the cylinder, and because of the piston being held against such displacement unless rotated and the cylinder being slidably mounted the cylinder will be moved, and the tire of the piston having the effect of a screw engaging a thread formed by the guideway 50 will act to rotate the piston and correspondingly move the engine-shaft. If the steam be then admitted through the passage 54, the cylinder will be returned and the piston will be further rotated.

When one passage acts as a steam inlet or

feed, the other passage must act as the steam outlet or exhaust. To secure these results with the proper frequency, the outer end of the hollow portion of the shaft 29 terminates in a drum 58, the end of which is closed, save for two diametrically opposite ports 59 and 60 therein, and which ports communicate with the sides of the drum, which in turn communicate with the passages 53 and 54, respectively, it being seen that the partition of the shaft is continued through the drum. Coöperating with this drum 58 is an exhaust-pipe 61, which is rotatably mounted in the bearing 62 at the adjacent end of the steam-dome, the base of this pipe being in the form of a hollow segment 63, having an elongated segmental opening 64 therein. The base of the exhaust-pipe is in practice disposed against the outer face of the drum 58 and coöperates therewith to aline its opening 64 with the ports 59 and 60 successively. The port which is not in alinement with the opening 64 communicates directly with the interior of the steam drum or dome. The drum 58 and the base 63 have flanges 65 at the adjacent edges of their curvilinear faces, and engaging these flanges is a two-part collar 66, secured to the inner face of the steam-dome and having a groove in its inner periphery, which receives the flanges and holds the base and the drum in close contact.

Between the sides of the groove in the collar 66 and lying against the outer face of the drum 58 is a segmental cut-off plate 67, the inner end of the plate lying beneath a flange 68 upon the outer face of the exhaust-pipe to hold the plate in position. This exhaust-plate by lying with all of one face against the outer face of the drum 58 is moved under the influence of the drum rather than under the influence of the flange 68, which engages only a small portion thereof, the object of this plate being to lie alternately against the opposite flat sides of the segmental base of the exhaust-pipe, and thus cover and uncover different ends of what is in effect the feed-passage through the base of the exhaust-pipe, and thus to give proper lead when the engine is rotating in opposite directions. The outer end of the exhaust-pipe, which extends through the adjacent end of the steam-dome, has a swivel connection with an exhaust-main 70, so that the exhaust-pipe may be rotatably adjusted to change the position of the exhaust-port in the base of the pipe with respect to the ports in the drum at the end of the piston-shaft, and to effect this adjustment of the exhaust-pipe a crank-arm 71 is formed thereon and has a shift-rod 72 pivoted to it, the shift-rod having the notch 73, which engages a pin 74 to hold it in its adjusted positions. To reverse the engine, the exhaust-pipe is rotated through one hundred and eighty degrees, so that by properly positioning the crank-arm and the latch-pin a single pin acts to hold the rod in both positions.

A governing mechanism comprises a damper 75, pivoted in the exhaust-main and having a crank-arm 76, which is connected with a common form of ballast-balls 77, which are operated by a chain 78, engaged with the engine-shaft and with the spindle of the ballast-balls and passing over a suitably-disposed idler 79.

With this construction it will be seen that with the parts in the positions above described to cause the engine to rotate in one direction steam will enter through passage 53 and its communicating port in the piston, the port 59 being at that time in communication with the steam-dome and the port 60 being in communication with the exhaust-port in the base of the exhaust-pipe. When the cylinder has been forced to its opposite limit of motion, the piston will have rotated to bring port 60 in communication with the steam-dome and the port 59 in communication with the exhaust-port in the base of the steam-exhaust pipe, when the cylinder will be forced in the opposite direction, this direction of rotation being kept up so long as the position of the cut-off plate is not changed. If, however, the shift-rod be then raised from its latching position, the friction of the drum of the piston-shaft will rotate the exhaust-pipe to its opposite position, when the direction of the rotation of the piston will be reversed and the cut-off plate will be frictionally adjusted to its new position, so as to give the proper correlation between the positions of the inlet and exhaust points.

In Fig. 8 there is shown a modification in which a collar 80 is fixed upon the exterior of the exhaust-pipe and has two diametrically opposite notches 81 and 83. A weighted lever 84 is pivoted adjacent to the collar and has a knife-edge 85, which is positioned to engage the notches alternately. By raising the lever the exhaust-pipe is released and is free for rotation by the piston-shaft, so that by raising and then dropping the lever the exhaust-pipe will rotate to the proper degree and the knife-edge will engage the succeeding notch to hold the pipe in its new position.

What is claimed is—

1. A rotary engine comprising a longitudinally-movable cylinder having a guideway therein, a shaft, a piston upon the shaft and engaging the guideway, said piston lying at an angle to the shaft, said piston having ports therein for admitting steam to the cylinder at the side of the piston to move the cylinder and rotate the piston.

2. A rotary engine comprising a cylinder the ends of which lie in converging planes, a shaft, a piston on the shaft, and lying at an angle to the shaft and fitting closely between the convergent ends of the cylinder, said piston having ports therein for supplying and exhausting steam from the ends of the cylinder, said cylinder being mounted for sliding movement.

3. A rotary engine comprising a cylinder,

the ends of which lie in converging planes and the convergent portions of which are separated by an interspace to form a guideway, friction-rolls at the sides of the guideway, a shaft in the cylinder, and a piston fixed upon the shaft and lying at an acute angle thereto, said piston fitting the cylinder and engaging the guideway, and means for supplying and exhausting fluid-pressure to and from the ends of the cylinder.

4. A rotary engine comprising a cylinder, the ends of which lie in converging planes and are separated at their convergent portions by an interspace forming a guideway, said cylinder being adapted for sliding movement, a shaft in the cylinder, a piston on the shaft lying at an angle to the axis of the shaft and engaging the guideway, ports in the opposite faces of the piston, passages in the shaft leading to the ports, an exhaust-pipe having an opening for registration with the passages alternately as the shaft rotates said pipe having a base adapted to alternately cover and uncover the passages, and means for supplying fluid under pressure to the passages alternately.

5. A rotary engine comprising a slidable cylinder having a guideway, a shaft in the cylinder, a piston on the shaft disposed at an angle to the shaft and engaging the guideway, a steam-dome inclosing the cylinder, a drum on the shaft within the dome and having steam-ports, passages connecting the drum steam-ports with opposite ends of the cylinder through the piston, and an exhaust-pipe having an exhaust-opening disposed for registration with the ports alternately as the piston is rotated.

6. A rotary engine comprising a slidable cylinder having a guideway therein, friction-rolls at the sides of the guideway, a shaft in the cylinder, a piston on the shaft and disposed at an acute angle thereto, said piston engaging the guideway and the friction-rolls therein, a drum at the end of the shaft, a steam-dome inclosing the cylinder and drum, said drum having steam-ports in its end, separate steam-passages formed through the shaft and drum and communicating with their respective ports and with their respective ends of the cylinder through the piston, an exhaust-pipe having a segmental base disposed against the end of the drum to cover the ports thereof alternately as the drum rotates, said base having an opening disposed for registration with the covered port, and means for shifting the exhaust-pipe rotatably.

7. A rotary engine comprising a slidable cylinder having a guideway therein, a shaft in the cylinder, a piston on the shaft disposed at an angle thereto and engaging the guideway, a drum at the end of the shaft, ports in the end of the drum, passages leading from the ports to the ends of the cylinder through the faces of the piston, a rotatable exhaust-pipe having an arcuate base disposed against the end of the drum to cover the ports alter-

nately and the base having an exhaust-opening for registration with the covered port, a plate disposed between the flat sides of the base of the exhaust-pipe and adapted for frictional engagement for movement by the drum to change the space between the sides of the exhaust-pipe base, means for holding the plate in operative position, means for shifting the exhaust-pipe, and a steam-dome inclosing the cylinder and the engaging portions of the drum and exhaust-pipe.

8. A rotary engine comprising a cylinder including a shell the ends of which lie in converging planes, heads for the cylinder having their mutually-adjacent portions separated by an interspace to form a guideway, a grooved rail disposed longitudinally of and exterior to the cylinder, a roller engaging the rail and having a peripheral groove, brackets engaging the groove, a piston in the cylinder dis-

posed at an angle to the shaft and engaging the guideway, and means for supplying and exhausting fluid under pressure to and from the cylinder alternately at opposite ends thereof.

9. In a rotary engine, the combination with a steam-dome, of a cylinder slidably mounted in the dome and having a guideway therein, a shaft, a piston upon the shaft and engaging the guideway, said piston lying at an angle to the shaft, and means for communicating the ends of the cylinder beyond the piston alternately with the dome to supply steam thereto.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM OBUCH.

Witnesses:

R. P. HEAD,

H. H. ALLEN.