No. 641,585. Patented Jan. 16, 1900.

H. FISHERING.

ROTARY ENGINE.

(Application filed Aug. 29, 1898. Renewed June 29, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

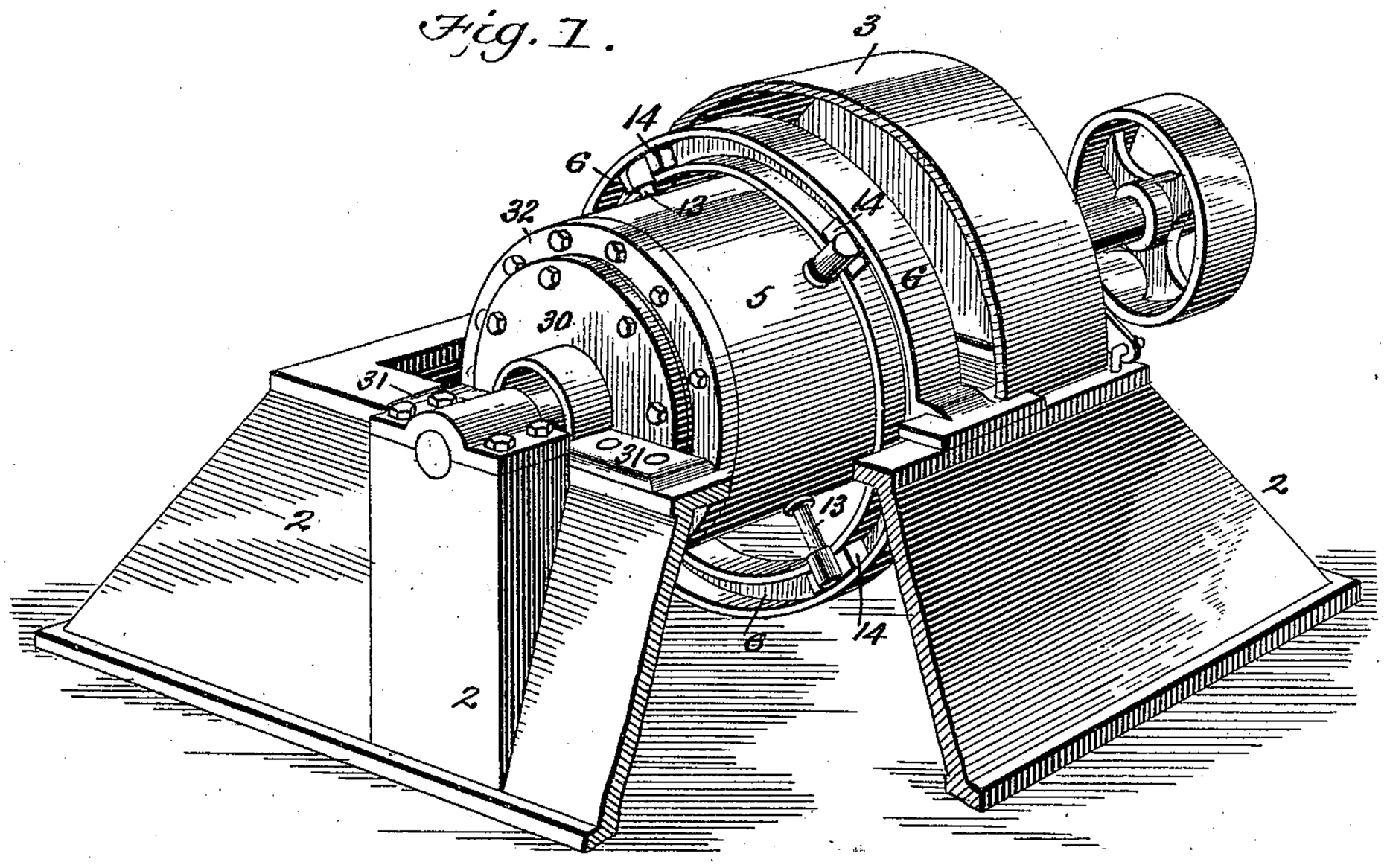


Fig. 2.

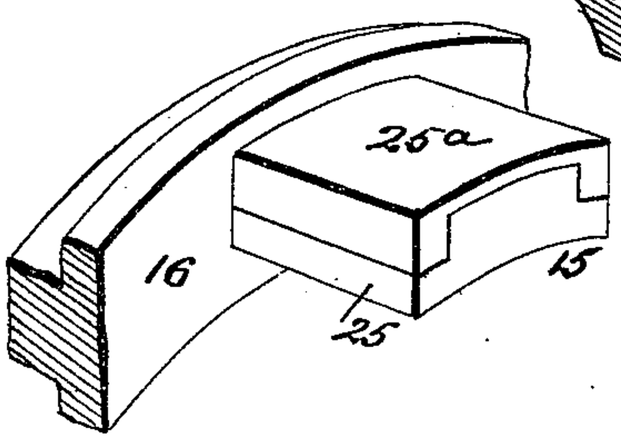


Fig. 3.

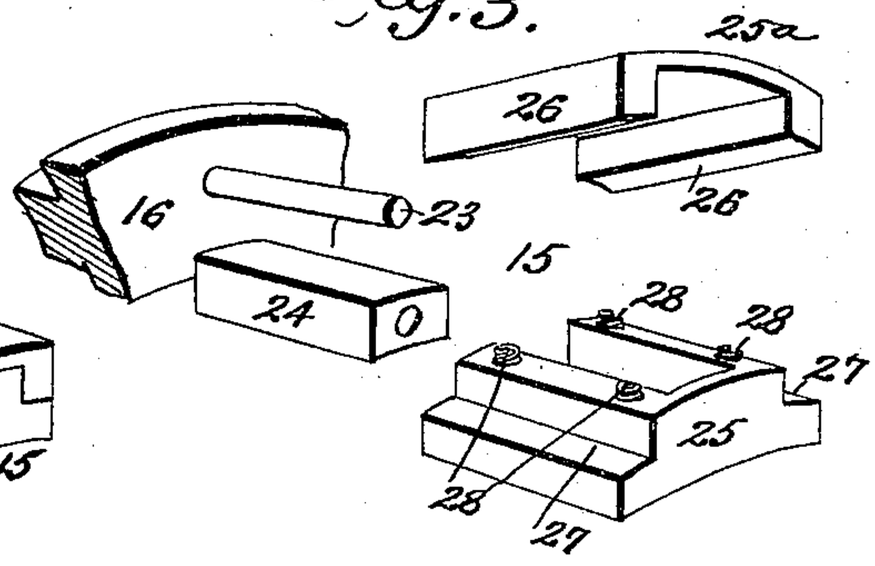
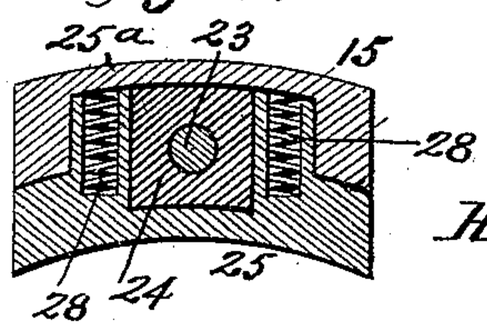


Fig. 4.



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(No Model.) 4 Sheets—Sheet 2.

Fig. 5

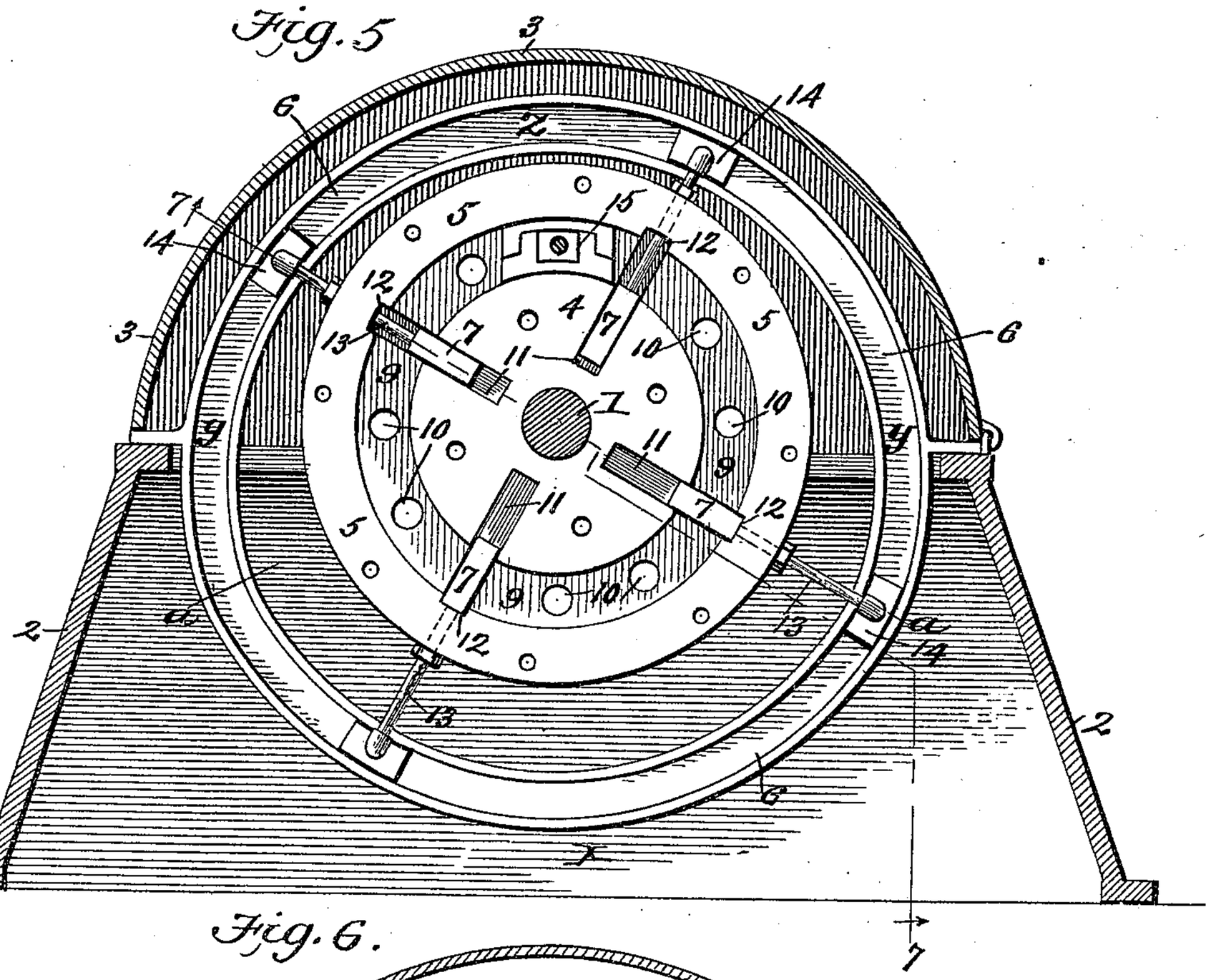
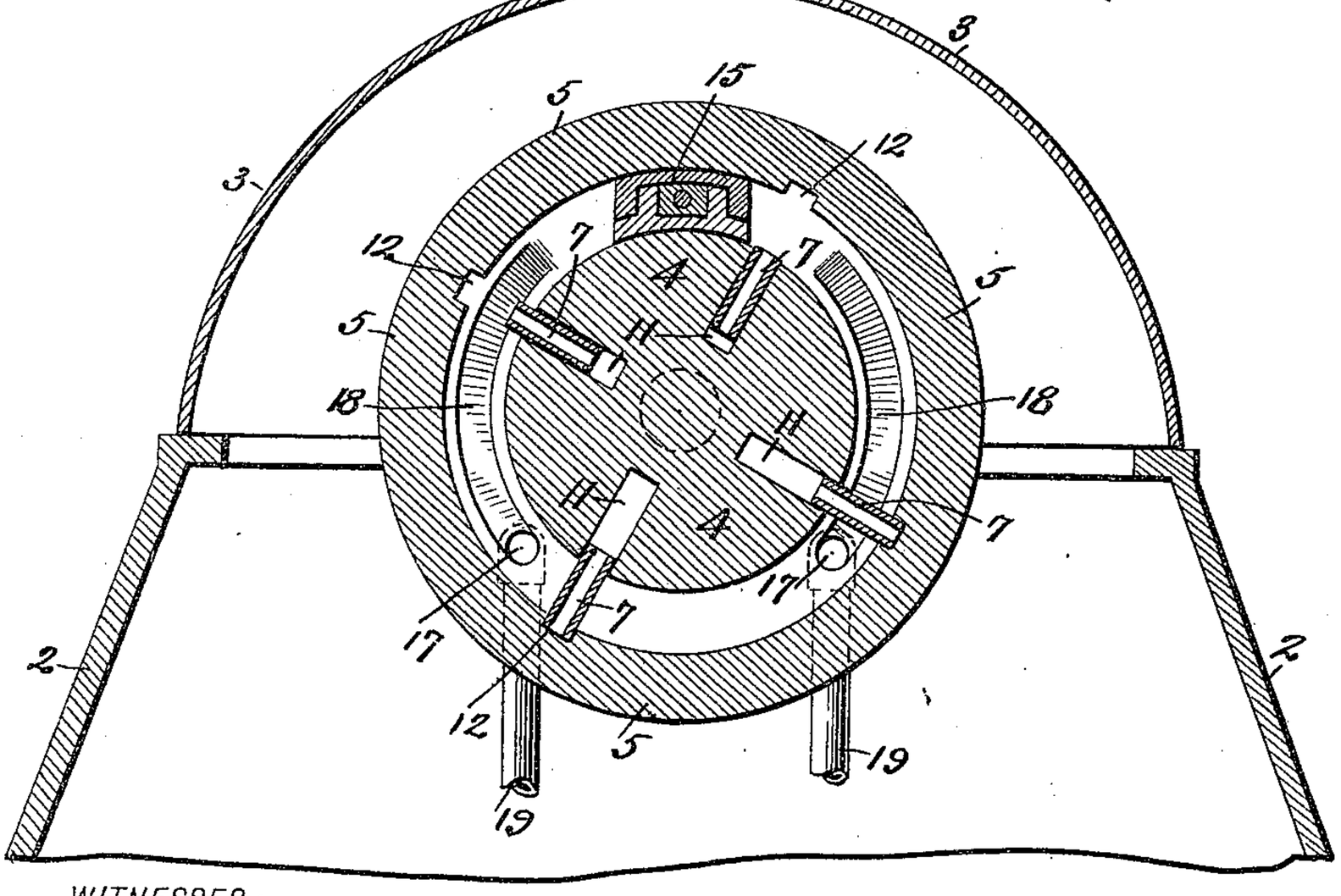


Fig. 6.



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(Application filed Aug. 29, 1898. Renewed June 29, 1899.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 7

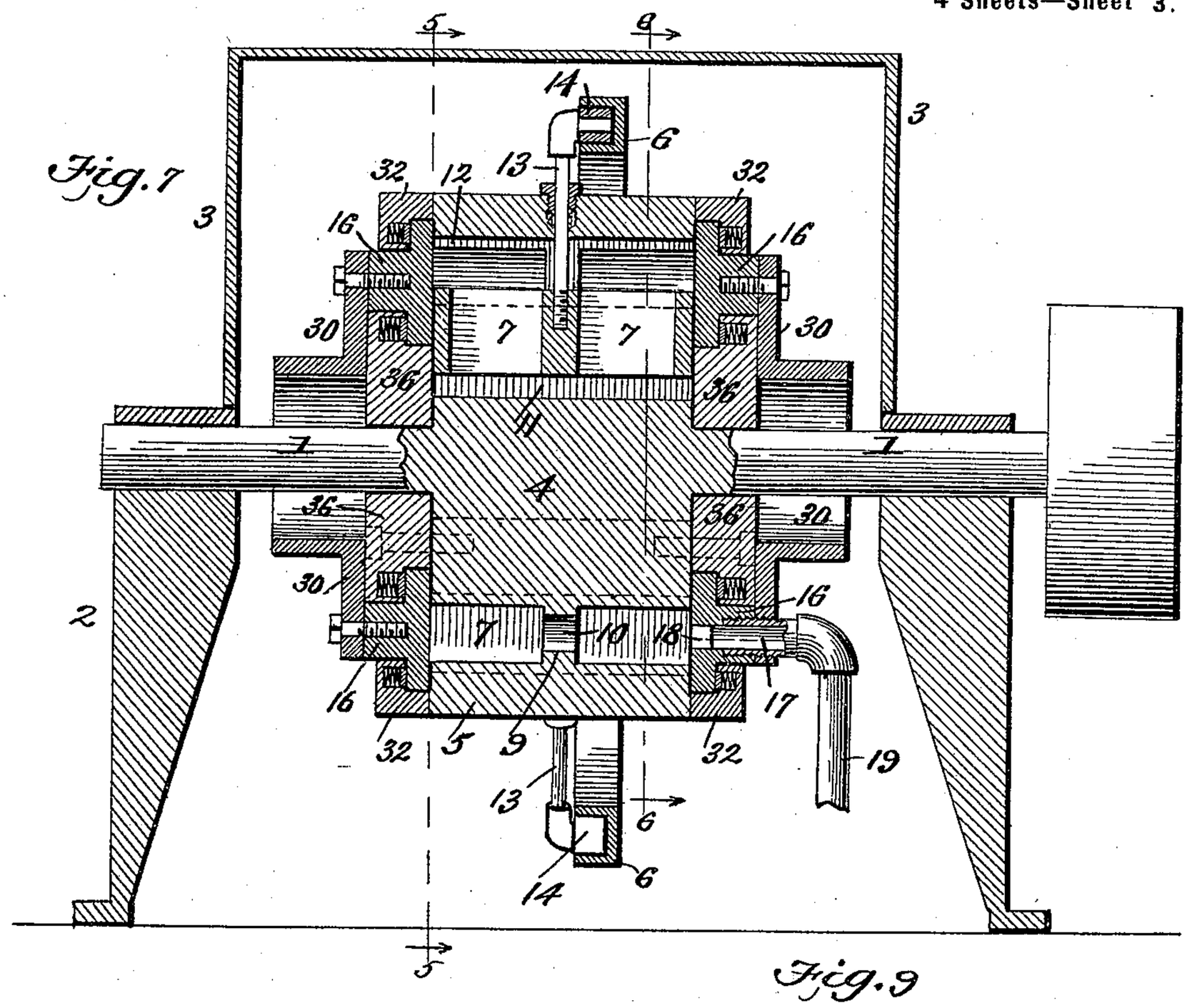


Fig. 8.

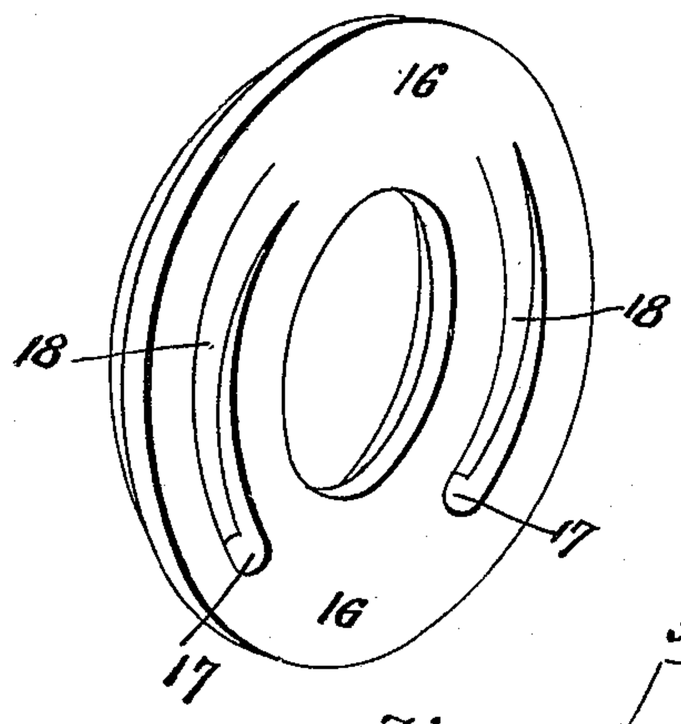


Fig. 9

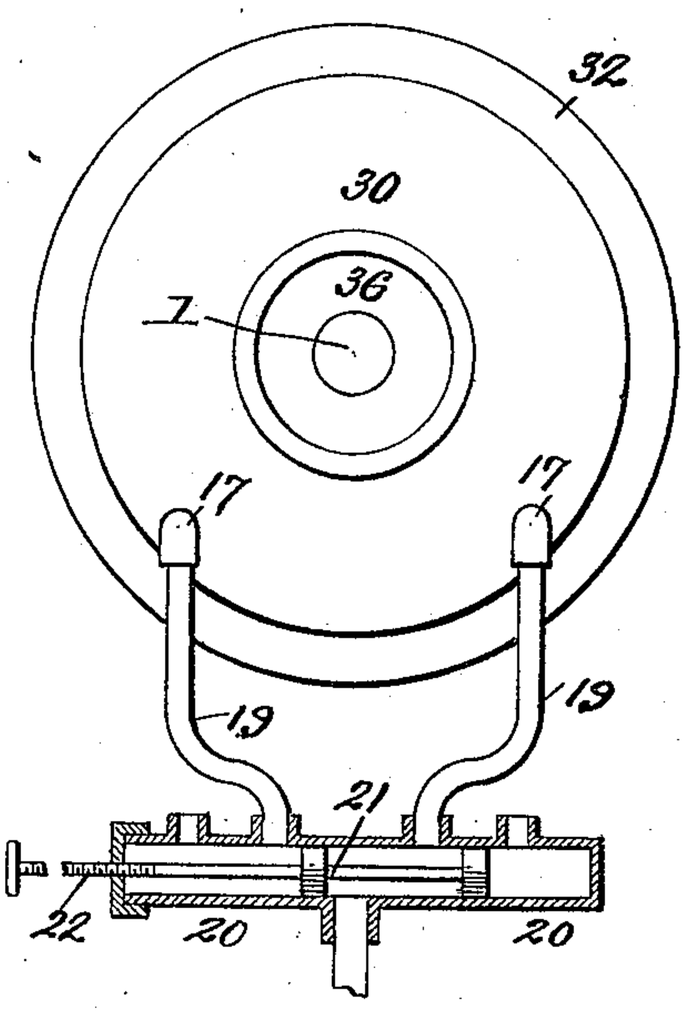
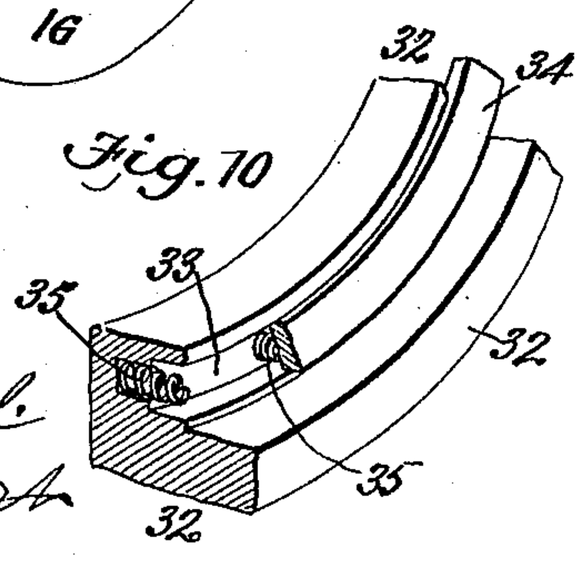


Fig. 10



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H. FISHERING.

ROTARY ENGINE.

(Application filed Aug. 29, 1898. Renewed June 29, 1899.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 11.

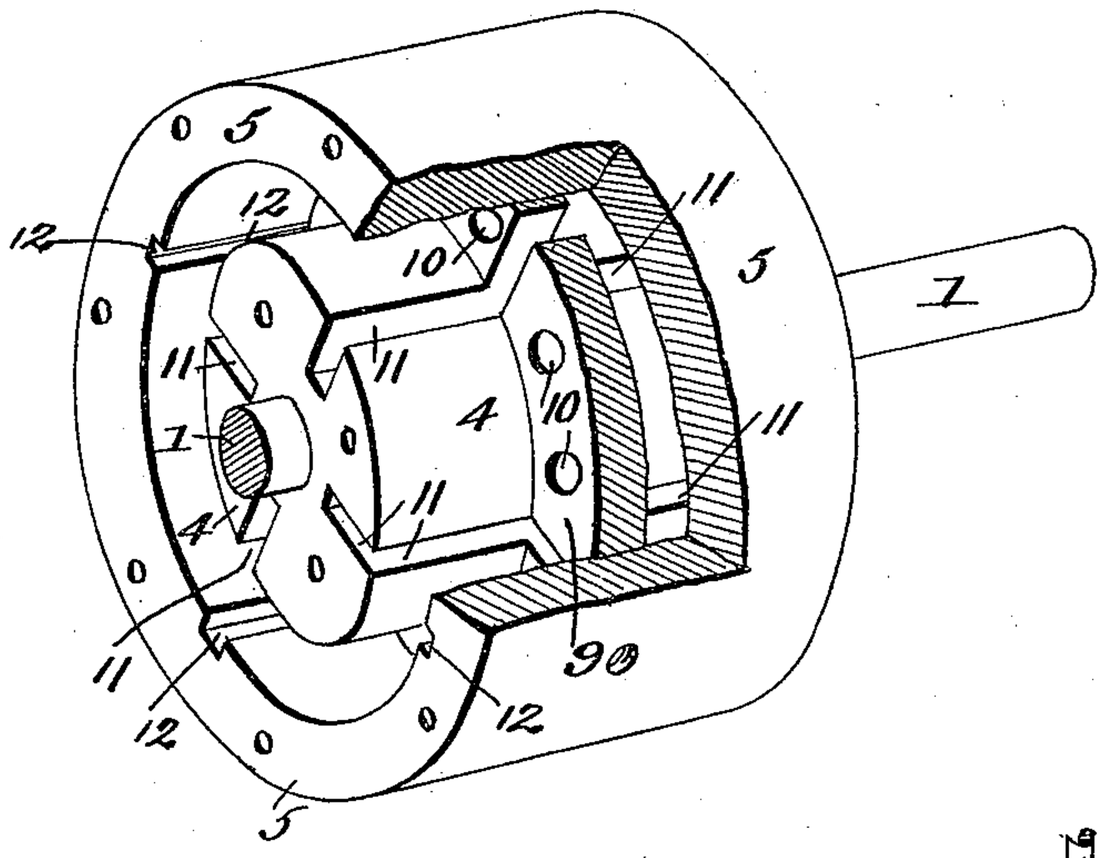


Fig. 13.

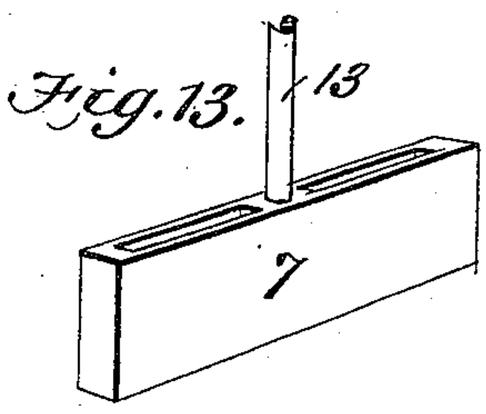
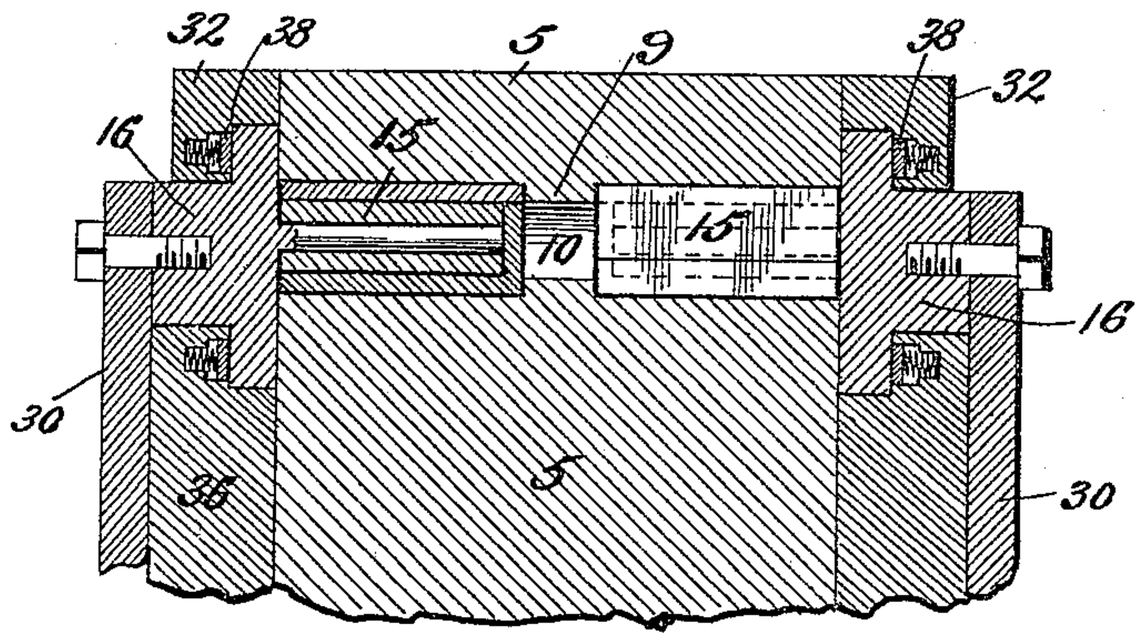


Fig. 12.



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UNITED STATES PATENT OFFICE.

HORACE FISHERING, OF XENIA, OHIO, ASSIGNOR TO HATTIE FISHERING, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 641,585, dated January 16, 1900.

Application filed August 29, 1898. Renewed June 29, 1899. Serial No. 722,325. (No model.)

To all whom it may concern:

Be it known that I, HORACE FISHERING, of Xenia, in the county of Greene and State of Ohio, have invented a new and Improved Rotary Engine, of which the following is a specification.

It is the object of my invention to provide an improvement in rotary engines which shall be distinguished by economy in the use of steam, as well as by simplicity, durability, and economy of construction.

In carrying out my invention I have adopted the construction and combination of parts hereinafter described.

In accompanying drawings, (four sheets,) Figure 1 is a perspective view of the engine, portions of the frame and cover being broken away. Fig. 2 is a perspective view of an abutment and a portion of the fixed ring to which it is attached. Fig. 3 is a perspective view of the parts of an abutment detached. Fig. 4 is a cross-section of an abutment. Fig. 5, Sheet 2, is a vertical section on line 5 5 of Fig. 7. Fig. 6 is a vertical section on line 6 6 of Fig. 7. Fig. 7, Sheet 3, is a central vertical section of the engine in line with the axis or shaft. Fig. 8 is a perspective view of the inner side of that one of the fixed end plates through which steam is admitted and exhausted. Fig. 9 includes an outer or face view of such plate, together with a section of the adjustable cut-off or steam-chest and valve for regulating steam inlet and exhaust. Fig. 10 is a perspective view of a portion of one of the outer rings attached to the rotating body of the engine. Fig. 11, Sheet 4, is a perspective view of the rotatable body comprising the concentric rim and piston of the engine. Fig. 12 is a vertical section illustrating the arrangement and relation of the fixed abutments relative to the body of the engine. Fig. 13 is a perspective view of one of the slidable blades.

As shown, the engine proper has a central horizontal axis or shaft 1, which is supported in suitable bearings in an iron box-frame 2 and provided at one end with a pulley, as shown in Figs. 1 and 7. Said frame 2 incloses the lower portion or half of the engine, and a semicircular hood 3 the upper portion thereof. The revoluble body of the engine 5 is cylindrical in form and fixed on the shaft 1 concentric therewith, as shown in several figures. Exterior to and surrounding this concentric body is an eccentric grooved ring 6, which is fixed and supported on the box-frame 2 and serves to impart the required reciprocation to the several hollow blades 7, which work in radial grooves formed in the inner cylindrical core or piston 4 and web 9. I will now describe these parts in detail.

As shown in Fig. 1, 4 indicates an inner cylindrical portion or core, which is connected with the outer shell or rim 5 by a central radial rib 9. Said central portion may be termed the "piston." These parts are all constructed integrally of a suitable metal. Thus there are two opposite angular grooves or steam-spaces, one on each side of the web 9, as shown best in Fig. 11. The web has numerous transverse holes 10, Fig. 1, for passage of steam from one annular space or groove into the other. The piston 4 and the web 9 have a series of radial ways 11, Figs. 5 and 11—in this instance four—for reception of the reciprocatory blades 7, whose length is exactly the same as that of the piston 4 and rim 5. The latter is provided with transverse recess 12 interiorly, (see Figs. 6 and 11,) which are in radial alinement with the slots or ways 11 and serve to receive the outer edges of the blades 7 when at the outer limit of their reciprocating movement. These blades 7 have transverse open slots which allow passage of steam therethrough.

To reciprocate the blades 7, they are provided centrally with rods 13, that work radially through stuffing-boxes in the rim 5 and have a pivotal connection with blocks 14, that are adapted to slide in the groove of the eccentric guide or track 6, before referred to. These slides 14 are curved conformably to the general curvature of the track 6, so that they move easily therein. As shown in Figs. 2, 5, and 6, an abutment 15 is secured at one end to each annulus or ring 16 and projects horizontally into the space or way formed between the piston 4 and rim 5 on each side of the apertured web 9. The curvature of the guide or track 6 must obviously be such as to enable the blade 7 to pass these abutments 15 and to take steam at intermediate points. Hence the said track is made concentric with the axis 1 in section *x*, Figs. 5 and 6—that is

to say, between the points *a a* on the lower side—and hence while the slides are traversing this section the blades have no radial movement and are subject to the full pressure of steam, which acts between the fixed abutment and that one of the blades which has passed the same and is projected its full extent. The side sections *y* of the track 6 are eccentric to axis or shaft 1, and the slides 14 in traversing these sections move the blades 7 inwardly or outwardly, according as the engine is running one way or the other. The top section *z* smoothly unites the side eccentric sections *y y* and serves to hold the blades retracted or entirely within the slots of the piston when passing the abutments.

In Fig. 5 a blade 7 immediately at the right of the abutment 15 has just begun to move outward and will reach the limit of such movement before passing the inlet-port 17. (See Fig. 6.) This movement takes place in quiet steam, since both ports have ways or passages 18, Figs. 6 and 8, in the nature of vanishing grooves, that are formed in the end rings 16 and lead upward from the ports proper, as shown in Figs. 6 and 8. Steam is admitted to the ports by pipes 19. (Shown in Fig. 9.) Either pipe 19 may serve for inlet or exhaust and according as the engine is run in one direction or the other, and when one is admitting the other is serving as the exhaust. To regulate this, I employ the means shown in Fig. 9, which is practically a cylindrical steam-chest 20, provided with two slidable cut-offs 21, consisting of two disks fixed on an adjusting-rod 22. In the position of the cut-off shown steam is being admitted on the right and exhausted from the left side.

The ports of the abutment are shown detached in Fig. 3 and assembled in Figs. 2 and 4. The abutment 15 as a whole is pivotally supported and adapted to rock on a pin 23, fixed horizontally in the ring 16.

The pin 23 enters an oblong rectangular journal-block 24, that fits in socket formed in the lower plate 25 of the abutment and is covered by a plate 25^a, having parallel side ribs 26, that enter rabbets 27, formed on the sides of the lower plate 25. Both said plates 25 and 25^a are curved on their upper and lower surfaces conformably to the circle in which the abutment travels.

Spiral springs 28 are arranged in suitable sockets between the top and bottom plates 25 25^a for the purpose of holding the latter steam-tight against the respective wearing-surfaces of the piston 4 and rim 5, and it is apparent the side ribs 26 will cut off passage of steam transversely through the abutment even when the aforesaid plates shall have become worn, so that the plates are in consequence separated by the springs 28.

As shown best in Figs. 1 and 7, the circular end plates 30 are fixed, being provided with lateral circular flanges which are concentric with the shaft 1 and constructed with side wings 31, that rest on the box-frame 2 adjacent to the bearings of said shaft and are secured thereto by screws. The rings 16 are shown secured to the said end plates by screws. Such rings are T-shaped in cross-section, being rabbeted on both sides, and have therefore opposite rims or flanges on the upper and lower sides. The end plates 30 and rabbeted rings 16 constitute the fixed parts with which the rotatable parts work in frictional contact. A ring 32 is bolted to the rim or body 5 and provided with a rabbet on the under and inner side to adapt it to overlap the outer flange of the fixed ring 16, as shown in Fig. 7. The overlapping portion (see Fig. 10) is also provided with an interior groove 33 to receive a circular packing-ring or wear-plate 34, and behind the latter is a series of short spiral springs 35, that serve to hold it in close or steam-tight contact with the fixed ring 16.

The piston 4 has circular end plates 36, Fig. 7, that are bolted to it, and hence revolve with it. The rims of such plates are rabbeted on the inner side to adapt them to overlap the inner flange of the fixed rings 16. Such rabbeted portion is provided, like the rim-ring 32, with a circular packing-ring 37 or wear-plate, that is seated on springs and works steam-tight in contact with the said inner flange of ring 16. Thus leakage of steam is prevented and at the same time an easy contact is provided which enables the engine to work with minimum friction.

To recapitulate the general features of construction and operation, it may be stated that the grooved eccentric track or guide 6 and the end plates 16 and 30 are fixed, while the shaft 1, piston or core 4, web 9, and rim 5 all rotate together; also, that the piston and rim are constructed integrally and provided with annular concentric spaces on opposite sides of the apertured web 9, which spaces form ways for the opposite abutment 15, that are supported by and project inward from the fixed rings 16. The blades 7 reciprocate in radial grooves 4 and web 9 as the slides 14 run around in the track 6, and thus avoid the abutments and take steam-pressure on one side or the other of the abutments. Steam entering at one port 17 exhausts at the other and passes freely through the blades 7 and through holes 10 in web 9 from one annular space or abutment-way to the other.

The engine will run either way at high speed and without loss of steam.

What I claim is—

1. The combination of the piston having annular steam-spaces and an intermediate web, radial slots for sliding blades, chambered to obviate cushioning steam, and having rods centrally attached extending out through the rim of piston and engaging a stationary cam causing reciprocation of the blades in the rotating piston as shown and described.

2. The combination of the stationary end plates or rings the piston operating between

the same and having a groove in each end for steam-spaces and a central web, bladeways from end to end of piston and through the web, the fixed end rings holding abutments projecting therefrom into the grooves of piston, and the blades being chambered to prevent cushioning steam in their movement, rods attached to the blades and projecting out through the rim of piston and engaged by an exterior cam which controls the blades in the rotating piston, as shown and described.

3. In a rotary engine substantially as described, the combination of the fixed end plate, the rotating body having end steam-spaces, the blades operating in radial slots and controlled by an exterior stationary cam, and the abutments held by the end plates and projecting into said spaces and formed with an intermediate fixed portion and inner and outer spring-pressed covers or sections for taking up wear and maintaining steam-tight joints, as shown and described.

4. The combination with the track or grooved guide having opposite inner and outer concentric portions united on either side by eccentric portions, of blocks adapted to slide therein, rods pivoted to such blocks, blades attached to the rods, and the rotatable rim and piston having radial bladeways and lateral annular steam-spaces, as shown and described.

5. The combination with the eccentric track, the rotating body having lateral annular steam-spaces and radial slots, and blades operated by said track, of fixed concentric side rings having pivot-pins projecting inward, blocks pivotally mounted on the pins, and the spring-pressed covers or abutments properly secured on said blocks, thus being capable of rocking and adapting themselves perfectly to walls of the steam-spaces of piston, as shown and described.

6. The combination of a rotatable piston with end steam-grooves, blades operating in radial slots, fixed end plates or rings between which the piston revolves, abutments held to the end rings and projecting into the steam-spaces, and the rings or plates being recessed or grooved to equalize the steam-pressure upon the moving blade, thus obviating side thrusting of said blade, as shown and described.

7. A rotary engine comprising a piston, with a central shaft, which rotates between two end rings or plates, said piston having an annular groove in each end to a central web, and radial slots wherein move blades chambered to prevent cushioning steam, and controlled by an exterior stationary track composed of an inner and an outer opposite concentric portion which are united by eccentric portions on either side, the outer concentric portion allowing no radial action of the blade between the inlet and exhaust ports, the eccentric portions guiding the blades inwardly or outwardly as the piston revolves one way or the other, the inner concentric portion smoothly uniting the two eccentric portions serving to hold the blades entirely within the core of piston to pass an abutment, as shown and described.

8. The combination with the stationary end plates, the T-rings attached thereto, between which the piston rotates, said T-rings holding abutments as described, of the rotatable parts comprising the piston with a central core and shaft, the outer rim, and lateral steam-spaces, and the intermediate web, the rabbeted ring attached to said rim and overlapping the outer flange of the T-ring, the groove in the overlapping portion, the packing-ring fitting closely into the groove and held by inner springs in frictional contact against the rear side of said flange, the rabbeted end plate attached to the core of piston and overlapping the inner flange of the T-ring, the groove in the overlapping portion, the ring in the groove held in frictional contact against the rear side of said inner flange by springs, such packing device deflecting leakage twice before reaching the packing-ring and proving efficient, as shown.

9. In combination with a rotatable body having an annular groove in each end to a central web, for steam-spaces, of fixed end plates between which the body revolves said plates holding abutments which project into the grooves of the body to resist pressure and made with an intermediate fixed portion and inner and outer spring-pressed covers for keeping tight friction-joints as shown and described.

10. The combination of a circular body having annular end grooves in both ends to a central partition, and bladeways from end to end and through the partition, chambered blades operating in these ways giving passage for steam and also serving to obviate cushioning or pounding steam as the blade plays automatically in and out of piston-slot or bladeways, rods attached to middle section of blades and extending out through the rim and having slides attached to their outer ends engaging a cam or track the orbit of which is composed of arcs each of an inner and an outer true circle to the center of piston-shaft, the centers of these arcs being diametrically opposite each other from the shaft of piston, the inner arc permitting the blade to be in its innermost position to pass the abutment, and of a length just sufficient to accomplish this, the outer arc permitting the blade to be in its outermost position covering the steam-space, the length of this arc being the distance between the inlet and exhaust port, an arc on either side uniting these two arcs causing the automatic action of the blade, and completing an orbit or track absolutely without an abrupt point.

11. The combination of a circular body having annular end grooves and bladeways, and plates or rings between which the piston rotates, one of which is provided with two port-holes, one on either side of the abutments equi-

distant therefrom, and opening directly into the annular steam-space of piston, said port-holes being recessed or extended as at 18 a distance toward the abutment, the port-holes acting reciprocally as inlet and exhaust ports as to the forward and reverse actions of the piston, a port-hole maintaining an equally-charged section of the steam-space between itself and the abutment (owing to the presence of a blade always between this inlet and the opposite exhaust-port) within which space the blade completes its automatic action across and covering the steam-space, arriving at the port set in its outermost position, simultaneously receiving the force of the steam upon one side, driving the piston toward the opposite port or exhaust, the recess or groove serving to equalize the pressure upon the blade while it is closing the steam-space, before contact with the port-hole, the steam having ingress to the rear side of the blade along the recess, the recess also obviating the momentary closing of the port-hole by the end of blade in passing it.

12. The combination with the eccentric track, the rotating body having lateral annular steam-spaces and radial slots, and blades operated by said track, of fixed concentric side rings, having pivot-pins projecting inward, blocks pivotally mounted on the pins, and the abutments proper secured on said blocks and thereby adapted to oscillate, substantially as shown and described.

HORACE FISHERING.

Witnesses:
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NELLIE BUCK.