No. 892,295. PATENTED JUNE 30, 1908.

G. W. NÜTZ.

ROTARY ENGINE.

APPLICATION FILED APR. 16, 1908.

4 SHEETS—SHEET 1.

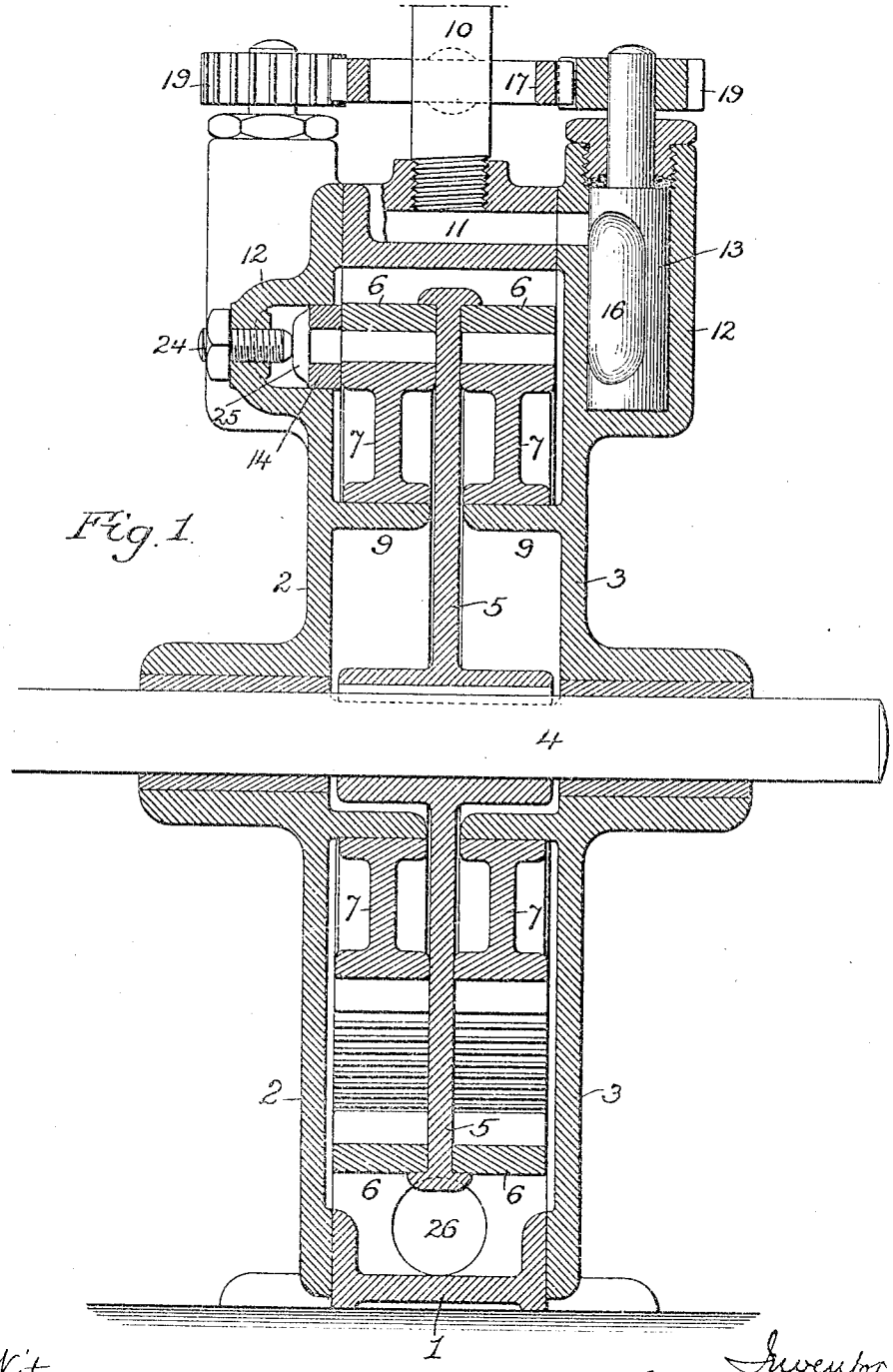


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

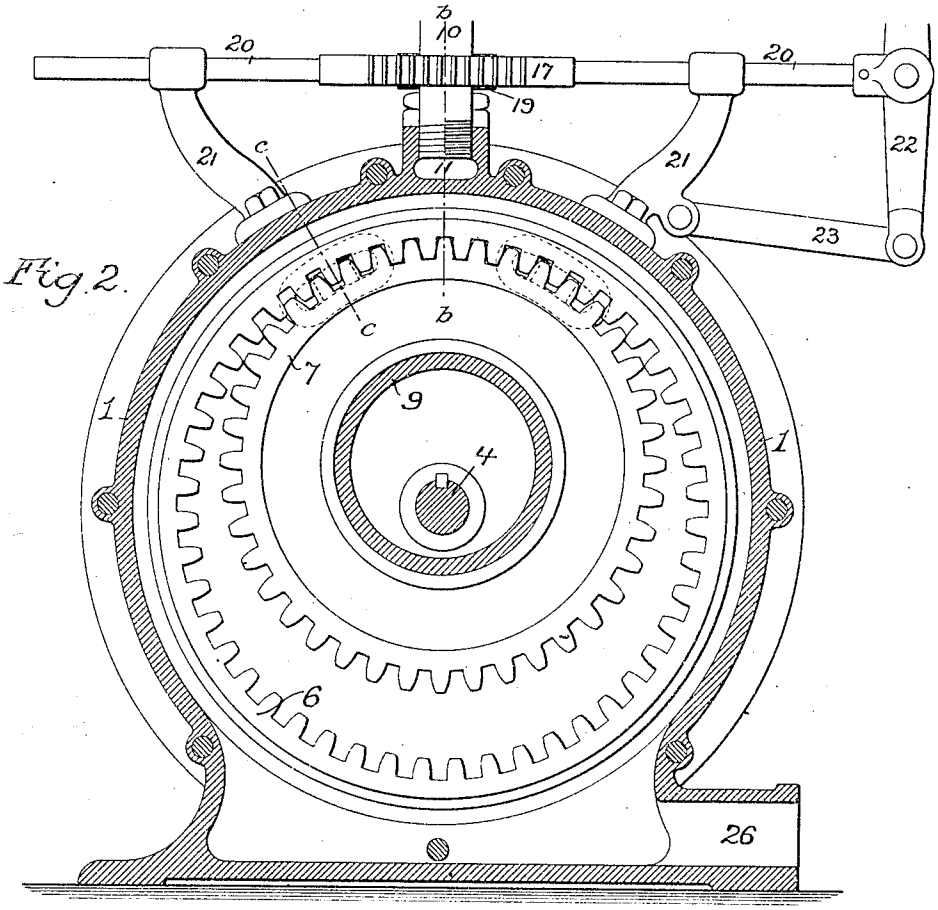
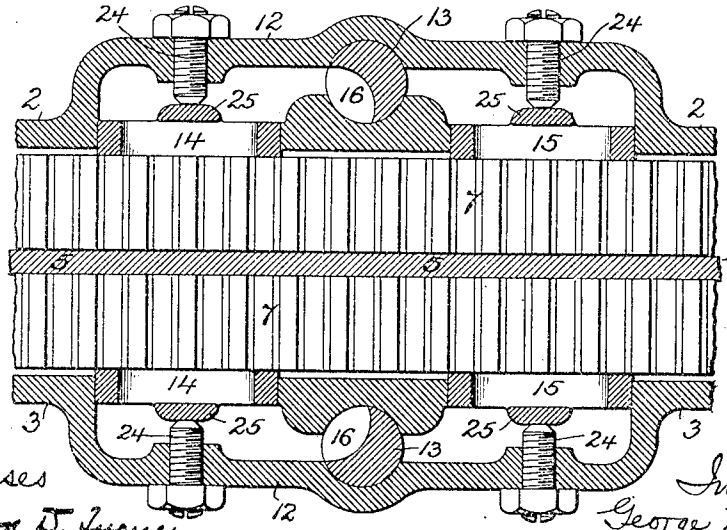


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 3.

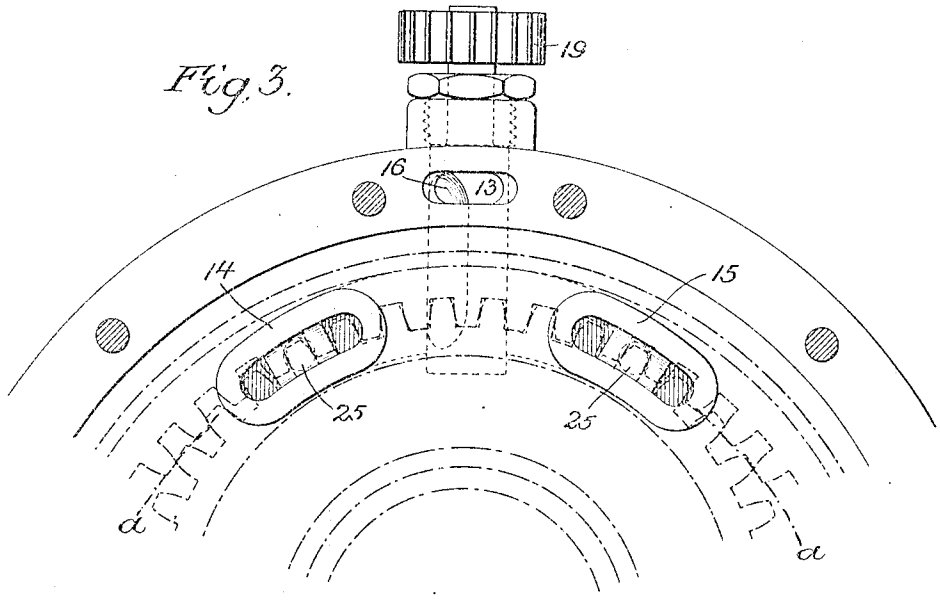
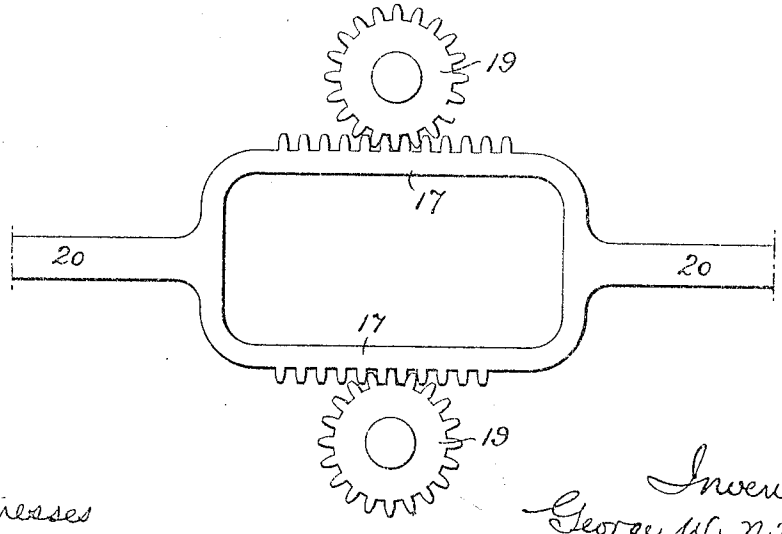


Fig. 5.



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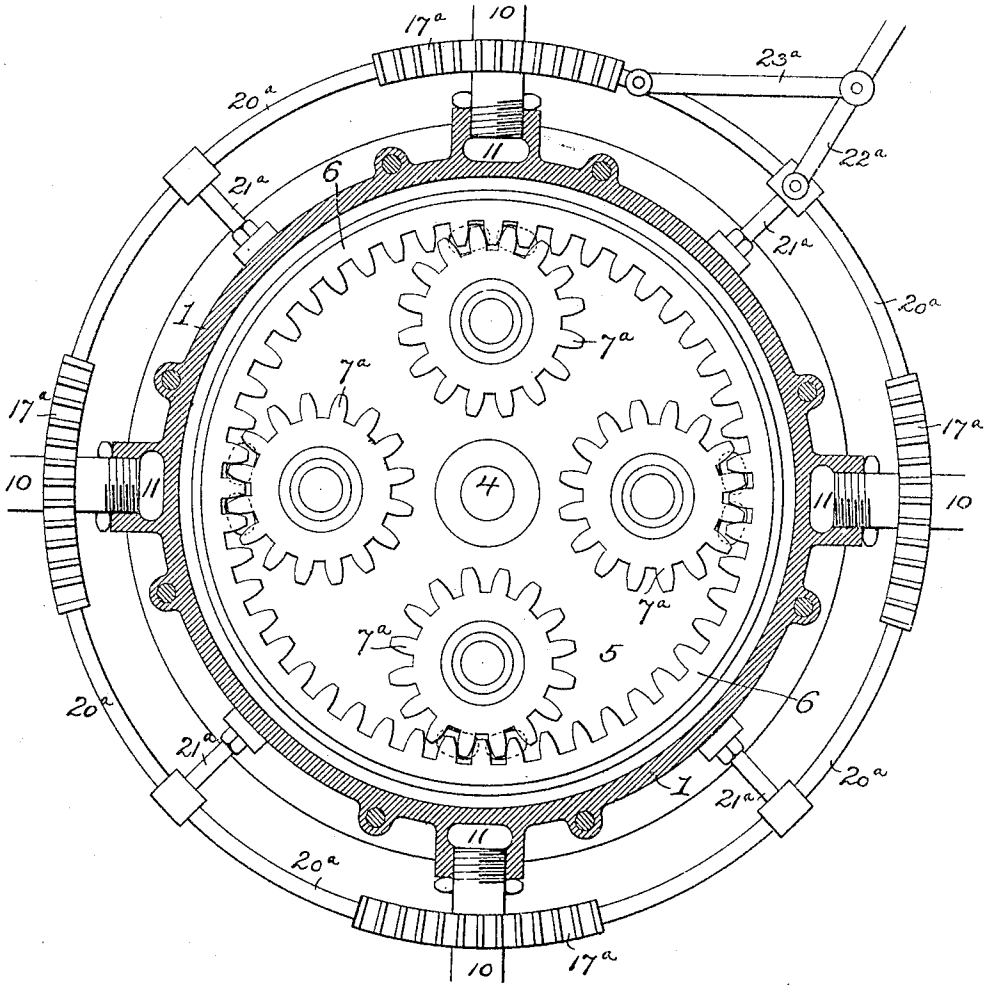
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4 SHEETS—SHEET 4.

Fig. 6



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UNITED STATES PATENT OFFICE.

GEORGE W. NÜTZ, OF BROOKLYN, NEW YORK.

ROTARY ENGINE.

No. 889,895. Specification of Letters Patent. Patented June 30, 1908.

Application filed April 16, 1908. Serial No. 427,476.

To all whom it may concern:

Be it known that I, GEORGE W. NÜTZ, a citizen of the United States, residing in Brooklyn, New York, have invented certain Improvements in Rotary Engines, of which the following is a specification.

My invention relates to that class of rotary engines in which the steam or other motive fluid, (hereinafter, for convenience, referred to as steam) is introduced between the intermeshing teeth of a pair of rotating toothed members in such relation to the axes thereof as to cause rotation of said members.

The objects of my invention are to so construct an engine of this type as to increase the power of the same; to provide for a balanced pressure upon the shaft; to prevent escape of steam in any direction except between the intermeshing teeth of the rotating members, and to provide for the ready reversal of the direction of rotation of said members. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which

Figure 1 is a transverse sectional view of a rotary engine constructed in accordance with my invention, the section being partly on the line *b*—*b*, Fig. 2, and partly on the line *c*—*c*, Fig. 2; Fig. 2 is a view, partly inside elevation and partly in central longitudinal section; Fig. 3 is a side elevation of part of the engine, with portions of the toothed members shown by dotted lines; Fig. 4 is a view, partly in elevation and partly in section, on the line *a*—*a*, Fig. 3, showing the parts developed in a flat plane; Fig. 5 is a view showing certain elements of the reversing mechanism, and Fig. 6 is a view similar to Fig. 2, but illustrating my invention as applied to a multiple engine. Figs. 2 and 6 are on a smaller scale than the remaining figures of the drawings.

The casing of the engine comprises the central shell 1 to which are securely bolted the opposite heads 2 and 3, the latter having bearings for the shaft 4. Upon this shaft is mounted a central disk 5, and to the outer portion of the latter are secured a pair of internally toothed rings 6, one on each side of the disk. With these internally toothed rings intermesh a pair of spur wheels 7, likewise located one on each side of the disk 5, these spur wheels turning upon annular bearings 9, projecting inwardly from the heads 2 and 3 of the engine casing and disposed eccentrically in respect to the axis of the shaft 4, whereby the toothed wheels 7 will be in mesh with the internally toothed rings 6 only at the top of the latter and for a limited distance on each side of such topmost point.

The steam supply pipe 10 communicates with a transverse passage 11 at the top of the shell or casing 1 of the engine and said passage communicates at each end with a valve chest 12 containing a central reversing valve 13 and port rings 14 and 15, one on each side of said reversing valve. The valve 13 is a plug valve, occupying a central position in the chest and having a port 16 whereby the steam can be directed from the passage 11 either to the right hand side of the valve chest 12 or to the left hand side of the same, depending upon the desired direction of rotation of the engine, reversal of position of both of the valves 13 being readily effected by means of a duplex toothed yoke 17, the toothed members of said yoke meshing with spur wheels 19 secured to the stems of the valves 13, as shown in Figs. 1 and 5. The toothed yoke 17 is carried by rods 20, free to slide in suitable bearings in brackets 21 on the casing of the engine, one of these rods being connected to an operating lever 22, hung by means of a link 23 to one of said brackets 21.

Each of the port rings 14 and 15 is of box-like form and fits snugly in its respective portion of the valve chest 12 but is free to move laterally in said chest, in order that it may be so adjusted as to contact with the side faces of the ring 6 and toothed wheel 7 at a point where the teeth of said ring and wheel are in mesh with one another, whereby the flow of steam from the valve chest 12 through either of the port rings 14 or 15 is positively limited to intermeshing toothed portions of the wheel and ring, and waste or leakage of steam is thereby effectually prevented.

Each of the port rings 14 and 15 is maintained in contact with the outer faces of the ring 6 and wheel 7 by reason of a set screw 24 adapted to a threaded opening in the valve chest and bearing upon a bridge 25 at the back of the port ring, as shown in Fig. 1. The outer faces of the rings 6 and wheels 7 are free from contact with the heads 2 and 3

of the casing of the engine, so as to overcome the friction which would otherwise be caused, and also to permit ready escape of steam from the spaces between the teeth as soon as the latter pass beyond the limits of the port rings 14 or 15 which may be in action, the exhaust steam finally escaping from the casing through an exhaust port or passage 26, (see Figs. 1 and 2.)

By reason of the use of a pair of internally toothed rings 6, one on each side of the central disk 5, in co" eration with a pair of similarly disposed "d intermeshing toothed wheels 7, the pressure upon the shaft 4 is equalized and uneven wear of said shaft is prevented, the pressure of the opposite port rings 14 or 15, being also balanced, and having no tendency to cause uneven side pressure upon the disk 5. By utilizing the rings 6 as the power-transmitting members of the engine, the speed of rotation of the shaft is reduced as compared with an engine in which the wheel 7 is the transmitting member, this being an element of advantage in an engine of this type, as it reduces the speed of the rotating power shaft 4 while correspondingly increasing the power of the same.

In that form of my improved engine, shown in Fig. 6, a plurality of toothed wheels 7^a are employed in connection with the internally toothed ring 6, and port rings 14 and 15 are employed at the points where each of the wheels 7^a is in mesh with said ring 6, the steam supply pipes and reversing valves being likewise multiplied in order to provide for the application of power to the ring 6 at different points throughout the toothed portion of the same. In this engine the reversing racks 17^a are carried by segments 20^a adapted to bearings in radial brackets 21^a on the engine casing, and said racks are operated by means of a lever 22^a hung to one of said brackets and connected to one of the segmental rods 20 by means of a link 23^a.

I claim:—

1. A rotary engine in which are combined a casing, a power shaft having a disk with internally toothed ring thereon, a toothed wheel meshing with said ring and mounted eccentrically in respect to the axis of the same, and means for introducing the motive fluid between teeth of the wheel and ring while said teeth are in mesh.

2. A rotary engine in which are combined a casing, a power shaft having a disk with internally toothed rings disposed one on each side of the same, toothed wheels meshing with said internally toothed rings and mounted eccentrically in respect to the axis of the same, and means for introducing the motive fluid between said toothed members where the teeth of the same are in mesh with one another.

3. A rotary engine in which are combined a casing, a power shaft having a disk with internally toothed ring thereon, a toothed wheel meshing with said internally toothed ring and mounted eccentrically in respect to the axis of the same, two motive fluid inlets, one on each side of a line drawn from the axis of the toothed ring midway through the intermeshing portions of the ring and wheel, and a reversing valve for directing the motive fluid to either of said inlets.

4. The combination, in a rotary engine, of a casing having a valve chest thereon, a power shaft having a disk with internally toothed ring, a toothed wheel meshing with said ring and mounted eccentrically in respect to the axis of the same, said ring and wheel being free from side contact with the casing, and a port ring having side contact with said wheel and ring where their teeth are in mesh with one another.

5. The combination, in a rotary engine, of a casing having a valve chest thereon, a shaft having a disk with internally toothed ring, a toothed wheel meshing with said ring and mounted eccentrically in respect to the axis of the same, said wheel and ring being free from side contact with the casing, a port ring having side contact with said wheel and ring where the teeth of the same are in mesh with one another, a bridge on said port ring, and a set screw bearing upon said bridge and serving to maintain the port ring in contact with the rotating toothed members of the engine.

6. A rotary engine having a casing with opposite valve chests thereon, a shaft having a disk with internally toothed rings, one on each side of the same, toothed wheels meshing with said rings and likewise disposed one on each side of the ring-carrying disk and eccentrically in respect to the axis of the rings, said wheels and rings being free from side contact with the casing, and opposite port rings in contact with the outer faces of the wheels and rings where the teeth of the same are in mesh with one another.

7. A rotary engine in which are combined a casing having rotating toothed members with intermeshing teeth and eccentric axes, said casing having a valve chest with central reversing valve and on each side of the same a port ring for directing the motive fluid to the rotating toothed members of the engine at a point where the teeth of the same are in mesh.

8. A rotary engine in which are combined a casing having rotating toothed members with intermeshing teeth and eccentric axes, reversing valves one on each side of said casing, and a duplex rack meshing with spur wheels on the stems of said reversing valves, whereby the simultaneous operation of the same is effected.

9. A rotary engine in which are combined a casing, a power shaft having a disk with internally toothed ring thereon, a plurality

of toothed wheels meshing with said internally toothed ring and eccentrically mounted in respect thereto, and means for supplying motive fluid to said toothed members at points where the teeth of the same are in mesh with one another.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE W. NÜTZ.

Witnesses:
EDWIN B. PEET,
LOUIS A. LUPIEW.