G. P. HERRICK.

ROTARY ENGINE.

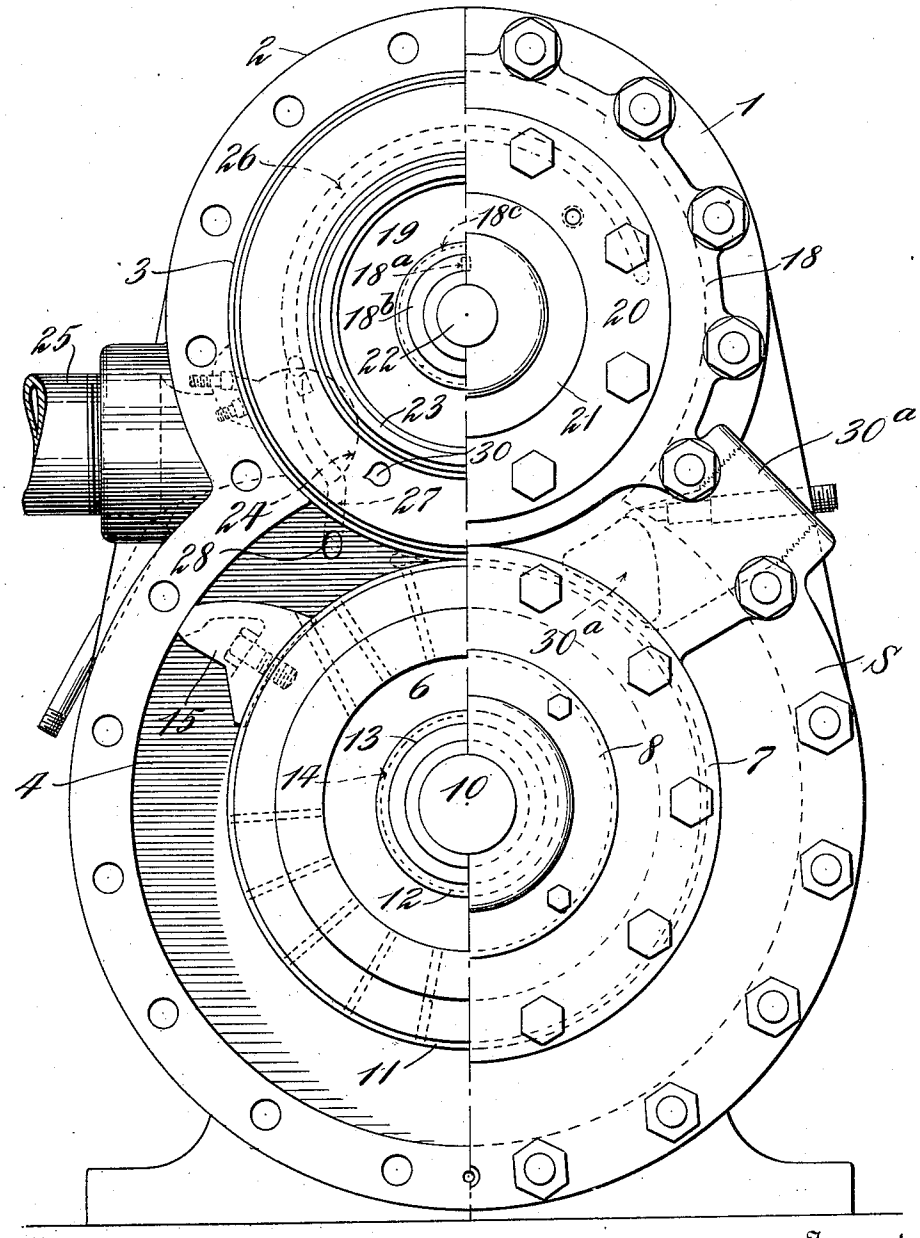
APPLICATION FILED MAY 23, 1910.

1,012,850.

Patented Dec. 26, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Inventor

Gerardus Post Herrick

By his Attorneys Gifford & Bull

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

G. P. HERRICK.

ROTARY ENGINE.

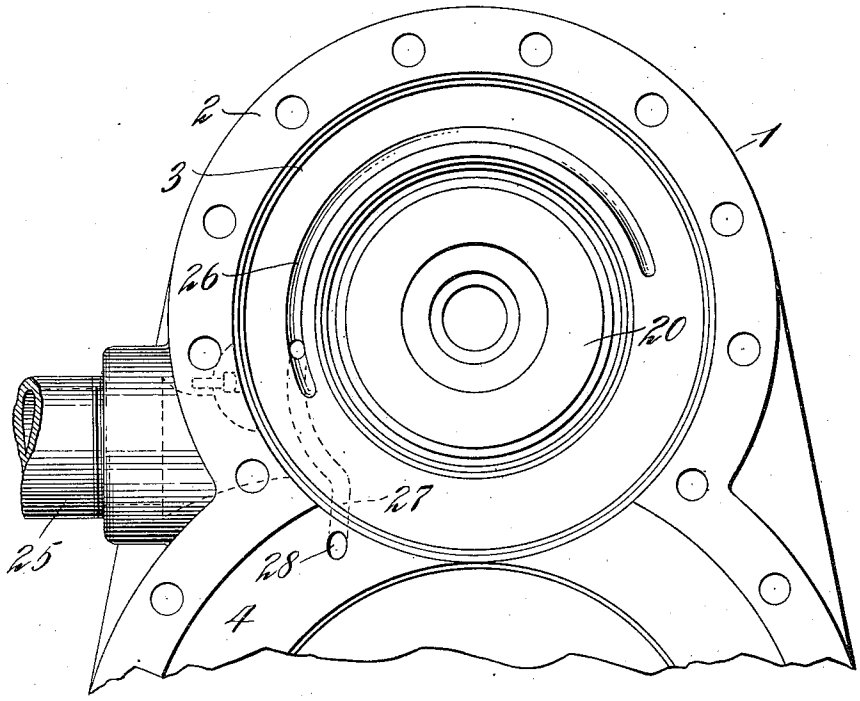
APPLICATION FILED MAY 23, 1910.

1,012,850.

Patented Dec. 26, 1911.

2 SHEETS—SHEET 2.

Fig. 2.



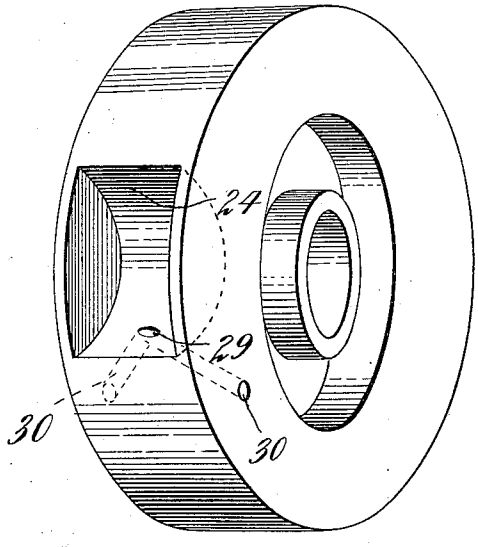


Fig. 3.

Witnesses:
Geo. C. Cheney,
C. F. Reymert

Inventor
Gradues Post Herrick
By his Attorneys
Gifford & Bull

UNITED STATES PATENT OFFICE.

GERARDUS POST HERRICK, OF NEW YORK, N. Y.

ROTARY ENGINE.

1,012,850. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed May 23, 1910. Serial No. 562,822.

To all whom it may concern:

Be it known that I, GERARDUS POST HERRICK, a citizen of the United States, and a resident of New York city, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to new and useful improvements in rotary engines of that character or type including a casing within which rotates a rotor having a radially projecting piston blade and a rotatable abutment having a recess for the passage of the piston blade, and in which steam is admitted between the abutment and blade, and expanded to move the blade to turn the rotor.

The invention is applicable to any engine coming within the terms of the above definition but it is particularly adapted to that refinement of the type defined in which the rotating abutment acts as the valve or cut-off for the steam inlet, the steam passing through the recess in the abutment into the cylinder or casing to act upon the piston blade.

The object of the present invention is to provide improved means for saving for power purposes any steam which may become pocketed in the abutment recess, whereby the economy of steam consumption is enhanced, practically all steam entering the cylinder being used for power purposes.

The invention consists in the improvements to be fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein—

Figure 1 is a view in side elevation of a rotary engine partly in section embodying my improvements; Fig. 2 is a detailed view of the interior of part of the casing showing the return passages for the steam; Fig. 3 is a detailed perspective view of the abutment.

Referring to the drawings by characters of reference, 1 designates the casing generally, the same consisting of a center body 2, formed with upper and lower cylindrical lobes or chambers 3, 4 arranged with their transverse centers preferably on the same vertical line, said lobes or chambers intersecting and opening into each other at their point of union. The lower chamber consists of the casing in which the power rotor is located, and its open ends are closed by end plates S, securely bolted to the center body and each of which has a central opening 6, to receive an axial plug 7, carrying a cap plate 8, adapted to close said openings 6, the cap plates being bolted to the end plates respectively. The plugs 7 are arranged in central longitudinal alinement with each other and with their axes in coincidence with the axis of the lower chamber, said plugs being of less diameter than the openings 6, so that when in place in said openings there will be an annular space between the outer surface of each of the plugs and the wall of the said opening.

Extending through each of the cap plates 8 and the plug supported thereby is a bearing opening 9, the opening in one plug alining with that in the other, and extending through these openings and transversely of the chamber 4 is a rotor shaft 10, upon which is rigidly mounted a cylindrical rotor 11, projecting radially from the shaft, between the adjacent inner ends of the plugs and having cylindrical side flanges or extensions which project into the annular spaces between the plugs and the casing wall. The hub 12 of the rotor is preferably keyed or splined to the shaft to rotate therewith and is held against movement longitudinally of the shaft in one direction by a collar or flange 13 fixed to the shaft and against which said hub abuts and is held by a clamping ring 14 threaded onto the shaft and preventing movement of the hub in the opposite direction.

Bolted to the rotor is a piston blade 15 which blade projects radially from the rotor and is arranged to receive the expansive force of motive fluid, as will be presently described to rotate said rotor.

The ends of the shaft projecting through the plugs are suitably packed as at 16, and anti-friction bearings 17 may be employed for reducing friction between the shaft and the casing. The upper casing lobe 3 is closed by end plates 18, each having a central opening 19, the openings registering with each other, and each receiving a plug 20, in the form of an annular flange carried by a cap plate 21, which closes said opening 19. These plugs are also formed of less diameter than the openings through which they project so that annular spaces exist

between the said plugs and the walls of said openings. Extending through the cap plates and plugs is a shaft 22 upon which is mounted a cylindrical abutment closely fitting the chamber 3, and arranged to project partly within the rotor chamber into rolling contact with the cylindrical surface of the rotor, said abutment having side extensions in the form of annular flanges 23 projecting into the annular spaces between the plugs and the casing wall. As just stated, the abutment rotates in rolling contact with the rotor, and in order to provide for the passage of the piston blade is formed with a recess 24 adapted to receive the said blade as the parts turn relative to each other. The abutment may be secured on its shaft in substantially the same manner in which the main shaft and the rotor are secured together; that is, by a key 18^a, and by fixed and movable collars 18^b, 18^c, on the shaft. The abutment shaft may also be provided with suitable packings between it and the casing, as shown at 22^a, and suitable anti-friction bearings 22^b may also be used in connection with this shaft.

The inlet for the motive fluid is at the base of the abutment chamber, as shown at 25, and is so located that the flow of fluid therethrough into the casing is controlled by the abutment, the cylindrical face of the latter serving to close the inlet for a part of the revolution of the abutment, and the recess in the abutment uncovering the inlet to permit inlet of the fluid. The rotation of the abutment and rotor are so timed that the steam inlet will be uncovered by said recess just after the radial piston blade has emerged from the recess, and the continued revolution of the abutment brings the cylindrical face thereof into position to cut off the supply and permit the charge admitted to exert its force expansively to drive the piston blade.

It is clear that after the steam has been admitted and the abutment is moving toward the point of cut-off that steam will be fed into the recess, and that when the abutment rotates further to carry the recess past the inlet that a quantity of steam will be pocketed in the recess between the abutment and the casing, causing a load on the rotor shaft and reducing the economy of the engine, but I provide means for quickly relieving the pressure in the recess and insuring the flow of the pocketed steam into the rotor chamber to exert its expansive force on the rotor. This means is constructed as follows: In each of the end plates 18 of the abutment chamber I form a groove 26, extending in a circular path taken with the abutment axis as a center, said grooves beginning at a point slightly past the inlet in the direction of rotation of the abutment, and terminating at a point substantially diametrically opposite to the steam inlet. At a point adjacent the inlet these grooves each open into a duct or conduit 27 running through the wall of the casing and opening into the rotor chamber as at 28. In the rear part of the abutment recess is an opening 29 which communicates with laterally extending ducts 30 passing through the body of the abutment and out at the sides thereof, the outlets being located to travel in register with the grooves 26 throughout the length of the latter. It will be seen that by this arrangement any steam which is pocketed within the recess of the abutment will flow through the opening 29 into the lateral openings 30 into the grooves 26, and by way of the grooves 26 into the conduits 27, and thence to the steam side of the piston blade to assist in turning the rotor. The exhaust is shown at 30^a, the same being located in the rotor casing adjacent the point of contact between the abutment and the rotor. The abutment is turned in any suitable manner to be properly timed with the piston as, for instance, by gearing 31 connecting the rotor shaft with the shaft of the abutment.

I prefer to balance the radial load on the rotor by means of the same balancing provisions set forth in my U. S. Letters Patent No. 928,126, dated July 13, 1909. Briefly stated, this balancing is accomplished by conducting the steam from the load side of the piston through ducts 31 which pass through rotor extensions and open into the space between said extensions and the plugs 7. By this arrangement as the rotor turns after the cut-off, a part of the steam which is exerting a radial load on the rotor finds its way through these ducts into the spaces between the plugs and the rotor to exert a counterbalancing force to balance the radial load, the balancing taking place on the rotor to the same side of the shaft upon which the radial load is exerted. It is not thought necessary to describe this construction further as the same forms no part of my present invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a rotary engine, a casing, a rotor having a piston blade, a rotary abutment having a recess for passage of said blade, the abutment having continuous sides inclosing the recess, a groove in the side face of the casing containing the abutment and communicating with the cylinder, and a passage in the abutment communicating with the recess and adapted to travel in register with said groove.

2. In a rotary engine, a casing having an inlet, a rotor having a piston blade, a rotary abutment having a recess coöperating with the inlet to admit steam to the cylinder, said

abutment having continuous sides inclosing the recess, a groove in the wall of the cylinder and communicating with the rotor chamber, and a duct in the abutment communicating with the recess and adapted to travel in register with said groove.

3. In a rotary engine, a casing having an inlet, a rotor having a piston blade, a rotary abutment having a recess coöperating with the inlet to admit steam to the cylinder, said abutment having continuous sides inclosing the recess, a groove in the wall of the cylinder and communicating with the rotor chamber, and a duct in the abutment communicating with the recess and adapted to travel in register with said groove after the abutment has cut off admission to the cylinder.

4. In a rotary engine, a casing, a rotor having a piston blade, a rotary abutment having a recess for passage of said blade, the abutment having continuous sides inclosing the recess, a groove in the side face of the casing concentric with the axis of rotation of the abutment, said groove communicating with the rotor chamber, and a passage in the abutment communicating with the recess and adapted to travel in the said groove.

5. In a rotary engine, a casing, a rotor having a piston blade, a rotary abutment having a recess for passage of said blade, the abutment having continuous sides inclosing the recess, a groove in the side face of the casing and communicating with the rotor chamber, a passage in the abutment communicating with the recess and adapted to travel in register with the said groove, and a closed duct connecting said groove with the steam side of the rotor blade.

6. In a rotary engine, a casing, a rotor having a piston blade, a rotary abutment having a recess for passage of said blade, the abutment having continuous sides inclosing the recess, grooves in the opposite sides of the casing and communicating with the rotor chamber, and passages in the abutment communicating with the recess and adapted to travel respectively in register with said grooves.

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

GERARDUS POST HERRICK.

Witnesses:
GEO. C. CHENEY,
C. G. HEYLMUN.