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W. A. ALLAN.

ROTARY ENGINE.

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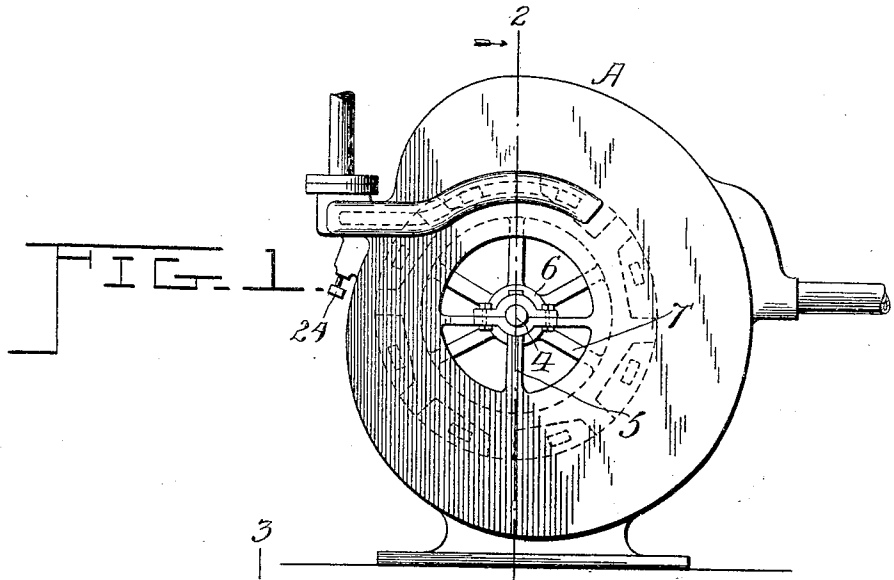


FIG. 1.

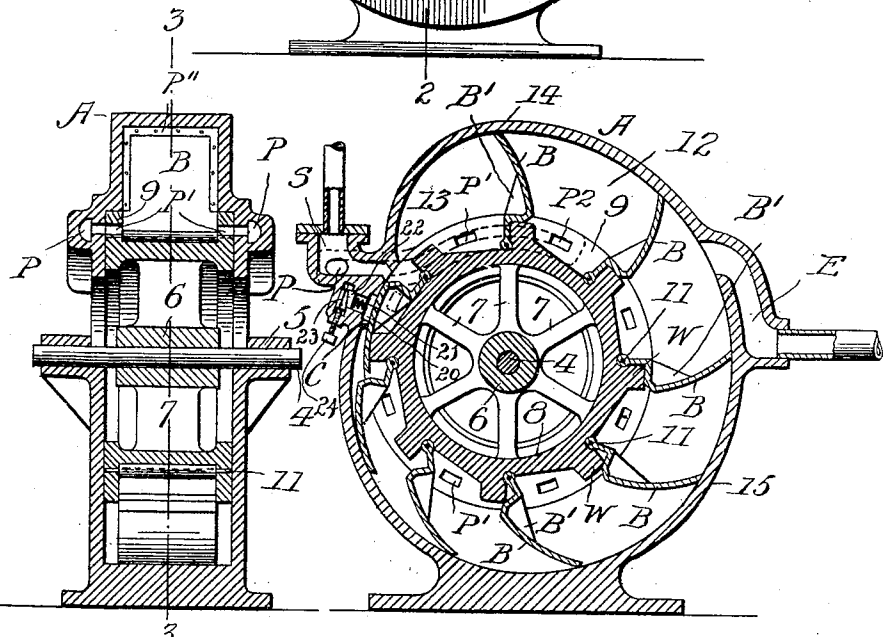


FIG. 2.

FIG. 3.

Witnesses:

J. Ed. Page.

F. H. Gibbs

William A. Allan, Inventor,

By Marion & Marion

Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM ALEXANDER ALLAN, OF MORRIS, CANADA.

ROTARY ENGINE.

No. 823,020. Specification of Letters Patent. Patented June 12, 1906.

Application filed September 15, 1904. Serial No. 224,489.

To all whom it may concern:

Be it known that I, WILLIAM ALEXANDER ALLAN, a subject of the King of Great Britain, residing at Morris, in the county of Morris, Province of Manitoba, Canada, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in rotary engines; and it consists in certain features of novelty in the detail construction and operation thereof, all as hereinafter more fully described, and specifically pointed out in the claims.

The object of the invention is to provide a simple, compact, and durable engine of the type referred to, wherein there is provided a rotatable wheel carrying a plurality of movable blades or buckets which are adapted to extend at predetermined times outwardly from said rotatable wheel to and contact at their edges with the inner face of a steam-passage provided within a casing, within which casing said rotatable wheel is eccentrically supported and comprises certain means whereby steam is supplied to said steam-passage in such a manner as to render effective the said buckets for causing rotation of said wheel and the shaft upon which it is mounted and providing means for accelerating the power of said wheel by a fresh supply of steam after they have passed a predetermined position with relation to the steam-passage in which they travel.

Referring to the annexed drawings, in which similar characters of reference indicate corresponding parts in all the views, Figure 1 is a side elevational view of my improved rotary engine. Fig. 2 is a vertical sectional view taken approximately on line 2 2 of Fig. 1 looking in the direction indicated by the arrow. Fig. 3 is a vertical sectional view taken approximately on line 3 3 of Fig. 2.

Referring to the parts, A is a casing provided with steam-supply conduit S and exhaust-conduit E, supported as shown in Fig. 2. Within the casing A is a shaft 4, which is supported in bearings 5 and extends transversely of the casing A. Carried upon the shaft 4 is a hub 6, from which radiate the arms 7, said arms terminating at the band 8, which is concentric with said hub 6. The band 8 is preferably channel-shaped in cross-section, as shown in Fig. 2, and is provided with flanges 9, having ports or passages P′ at convenient intervals, for the purpose hereinafter specified. Extending transversely of the band 8 and from the flange 9 at one side thereof to the flange 9 at the opposite side thereof are approximately rectangular lugs or shoulders W, extending radially from said band 8.

One of the ports P′ is located between each of the members W, and supported in such position upon the band 8, either within a recessed seat or upon pintles 11, are buckets or wings B, which buckets are of such shape that when they are thrown to their outermost positions they will abut against the lugs W referred to, so that said lugs will serve as stops for the buckets to prevent undue strain thereupon in the operation of the engine.

The buckets B may be formed of any suitable material, either cast, pressed, or of sheet metal of sufficient strength, and secured along the edges of said buckets B, as shown in the sectional view, Fig. 2, there are provided strips P″ of resilient metal, which strips are placed upon the back side of said buckets—that is, upon the side which is in the rear thereof as said buckets travel during the operation of the engine—whereby a packing is provided which will effectually serve to maintain the buckets perfectly steam-tight, prevent leakage therebeyond, and serve as wear-plates during the use of the engine.

Tapping the steam-supply conduit S and extending laterally therefrom at each side thereof there is provided an auxiliary conduit P, which extends to such position that when the buckets are in the position shown in Fig. 3 said conduit will conduct steam from the supply-pipe to the port marked P^2, so that when said port P^2 comes into coincidence with the discharge ends of the conduits P steam will be admitted to the chamber 12, whereby an auxiliary supply of steam is furnished in the operation of the engine after the buckets B have passed the point where the steam-passage 13 has reached its maximum capacity.

The buckets B are provided with reinforce-flanges B′, which flanges are also located upon their rear faces and serve to strengthen the same.

When the buckets B all lie flat against the lugs or extensions W, they form approximately a circle with short breaks between each pair of buckets, in which position they

can pass freely within the casing A without touching except at the point C, where they would come into close contact with said casing for a short distance.

As the buckets pass the exhaust-opening E the steam-pressure in the space between two successive buckets falls to approximately atmospheric pressure. As the buckets continue their forward movement past the exhaust-opening they are finally swung inward gradually by engagement with the casing, thereby gradually reducing the space between successive buckets and causing a compression of the steam contained therein. Referring especially to Fig. 3, it will be noted that the space in front of each bucket will be reduced to a greater extent than the space following said bucket, thereby producing a slight excess of steam-pressure against the front face of the buckets while they are being swung inward by engagement with the turbine-casing. This construction prevents the usual excessive friction of the buckets against the casing and causes the recesses beneath the buckets to be filled with compressed steam, thereby avoiding the steam waste which would be occasioned by filling said recesses with live steam at the initial portion of each bucket's stroke.

It will be clear that should an excessive pressure be engendered in front of a bucket through any cause such excessive pressure would cause a temporary flow past the outer edge of such bucket, and thereby tend to momentarily equalize the pressure on the two faces of such bucket.

The buckets are of the same width as the inside of the casing, and the strip P″ of packing is preferably set at an angle of approximately thirty degrees with the casing. The outer edges of this strip are flush with the outer edges of the buckets and the inside of the casing. When the buckets are under steam-pressure, this will be pressed out against the casing around the buckets, thereby forming a steam-tight joint thereat.

The steam-passage 12 13 is so formed with relation to the shaft 4 that the inner face thereof is approximately in the arc of a circle struck from the center of said shaft from 14 to 15, so as to include in said arc the space shown as between four buckets in proximity to the exhaust of the engine. From this point in the direction toward the supply-conduit S the steam-passage surrounding the inner wheel is of gradually less area and is eccentric to the shaft 4.

The casing A may be of any preferred type and may comprise a plurality of sections which are connected together in any desired manner, as the form thereof, aside from the features hereinafter specifically referred to, is not material to the present invention.

In the operation of the improved rotary engine steam is admitted through the supply conduit S into the chamber marked 13, whereby the first of the buckets B is thrown to its outermost position and the engine is rotated by reason of the expansion of the steam within said chamber 13. As soon as the first bucket reaches the position 14 the port P^2 is brought into coincidence with a port at the discharge end of the conduit P, and a fresh supply of steam is admitted into the chamber 12, and this process is continued intermittently during the operation of the engine, so that as each of the ports P′ in the flanges 9 is brought into coincidence with the discharge end of the conduit P a fresh supply of steam is admitted to the chamber corresponding with such port.

As there are two conduits P, it is evident that each of the flanges 9 should be provided with ports adapted to register with the discharge ends of such conduits at predetermined times during the operation of the engine. These ports are preferably placed opposite each other in pairs, and the buckets are supported between the pairs of ports, as shown, so that when the buckets are closed the steam, if any be admitted through such ports, will raise the buckets

The hub 6, spokes 7, and band 8 comprise a wheel, as shown, which is placed eccentrically within the casing A, and the shaft 4 may be provided with a suitable pulley or gear for utilizing the power of the engine.

While I have shown in the accompanying drawings the preferred form of my invention, it will be understood that I do not limit myself to the precise form shown, for many of the details may be changed in form or position without affecting the operativeness or utility of my invention, and I therefore reserve the right to make all such modifications as are included within the scope of the following claims or of mechanical equivalents to the structures set forth.

It is understood that the casing is adjustable at C by means of the filler-plate 20, spring 21, bearing thereon, and wedge 22 held in the plate 24, the set-screw 24 bearing on said wedge to move the filler-plate to and from the buckets.

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

1. In a rotary engine, the combination of a casing, a wheel rotatably mounted therein, a series of buckets pivotally supported on said wheel, and a stop carried by said wheel between each pair of adjacent buckets and constructed to limit the movement of the two buckets comprising such pair, substantially as described.

2. In a rotary engine, the combination of a casing, a wheel rotatably mounted therein, a series of buckets pivotally supported on said wheel, and a stop carried by said wheel between each pair of adjacent buckets and con-

structed to limit the inward swing of the front bucket of such pair and the outward swing of the rear bucket thereof, substantially as described.

3. In a rotary engine, the combination of a casing, a wheel rotatably mounted therein and provided with a series of peripheral recesses, a series of buckets pivotally supported on said wheel and arranged in their inner position to close the peripheral recesses therein, an abutment constructed to swing said buckets into their inner position, means for admitting steam behind each bucket during its engagement with said abutment, and means for admitting steam to the recess beneath each bucket upon its further travel from engagement with said abutment, substantially as described.

4. In a rotary engine, the combination of a casing, a wheel rotatably mounted therein and provided with a series of peripheral recesses, a series of buckets pivotally supported on said wheel and arranged in their inner position to close the peripheral recesses therein, an abutment constructed to swing said buckets into their inner position, means for admitting steam behind each bucket during its engagement with said abutment, means for admitting steam to the recess beneath each bucket upon its further travel from engagement with said abutment, and means for subsequently admitting a reinforcing supply of steam behind each bucket, substantially as described.

5. In a rotary engine, the combination of a casing, a wheel rotatably mounted therein, a series of buckets pivotally supported on said wheel, means for admitting steam behind each bucket of said series at a predetermined portion of its travel, means for exhausting the steam behind each bucket at a later portion of its travel, and means for progressively compressing the steam behind each bucket at a point in its travel subsequent to said exhaust, substantially as described.

6. In a rotary engine, the combination of a casing, admission and exhaust ports communicating therewith, a wheel eccentrically journaled in said casing and carrying peripheral flanges provided with ports, steam-conduits arranged to register with said ports during the rotation of said wheel, and a series of buckets carried by said wheel intermediate of said ports, substantially as described.

7. In a rotary engine, the combination of a casing, admission and exhaust ports communicating therewith, a wheel eccentrically journaled in said casing and carrying peripheral flanges provided with ports, steam-conduits arranged to register with said ports during the rotation of said wheel, a series of buckets pivotally supported on said wheel, and a stop carried by said wheel between each pair of adjacent buckets, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM ALEXANDER ALLAN.

Witnesses:
I. PIBBLODA,
W. J. DONOVAN.