A. P. CHARLES.

ROTARY ENGINE.

APPLICATION FILED JULY 7, 1911.

1,023,993.

Patented Apr. 23, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

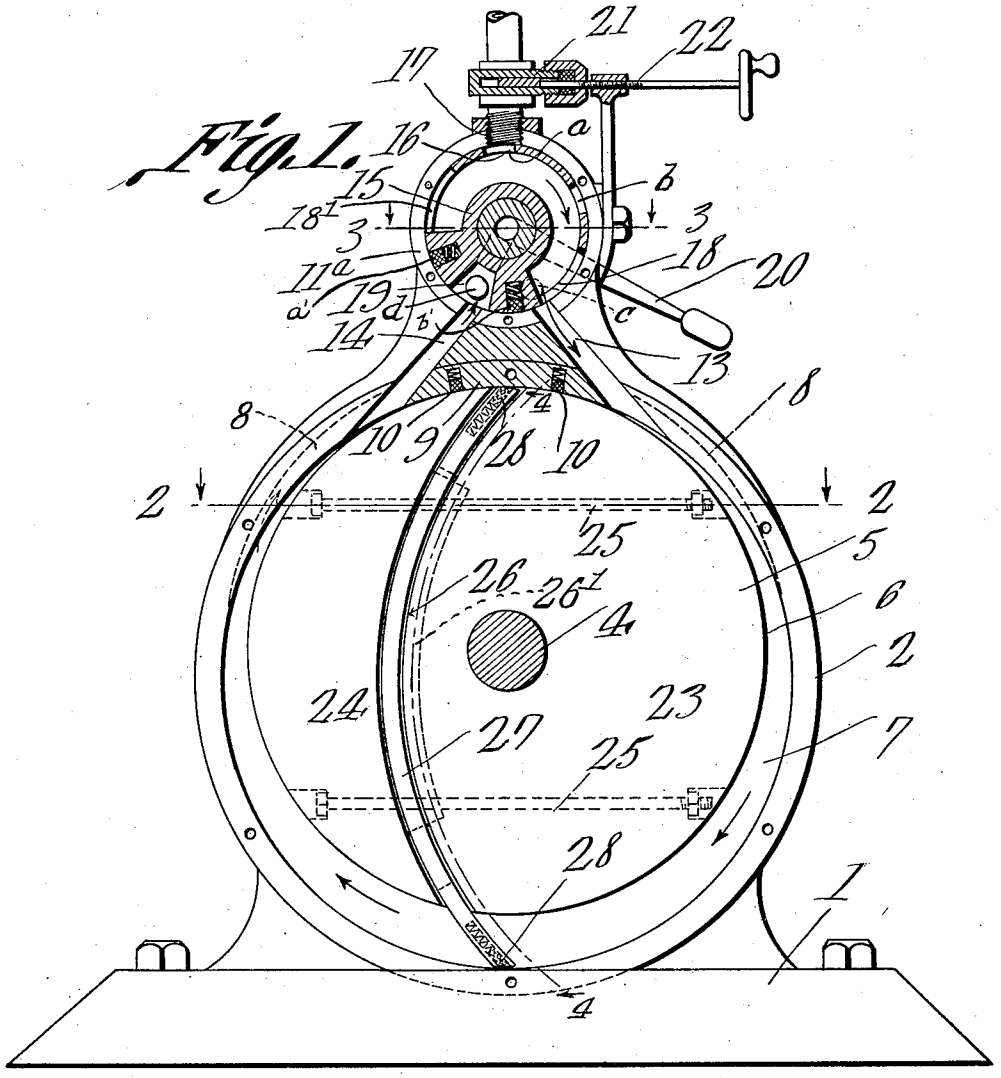
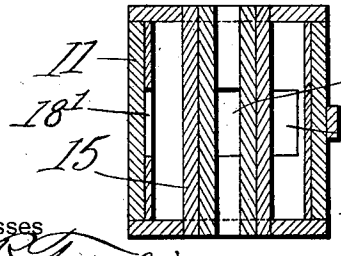


Fig. 3.



Witnesses

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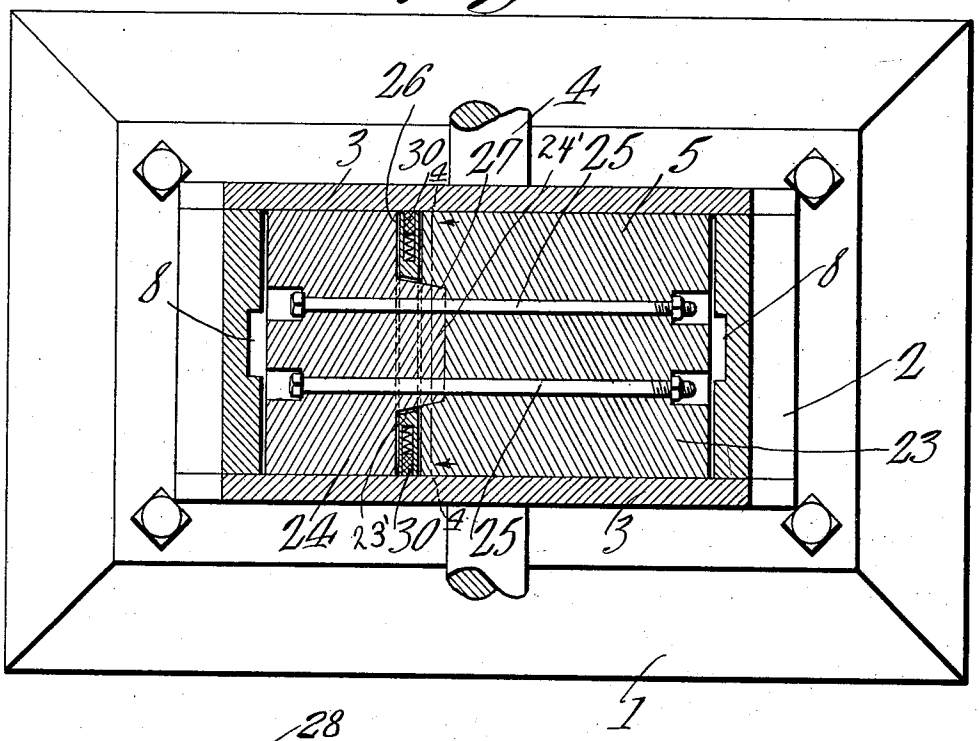
2 SHEETS—SHEET 2.

Fig. 2.



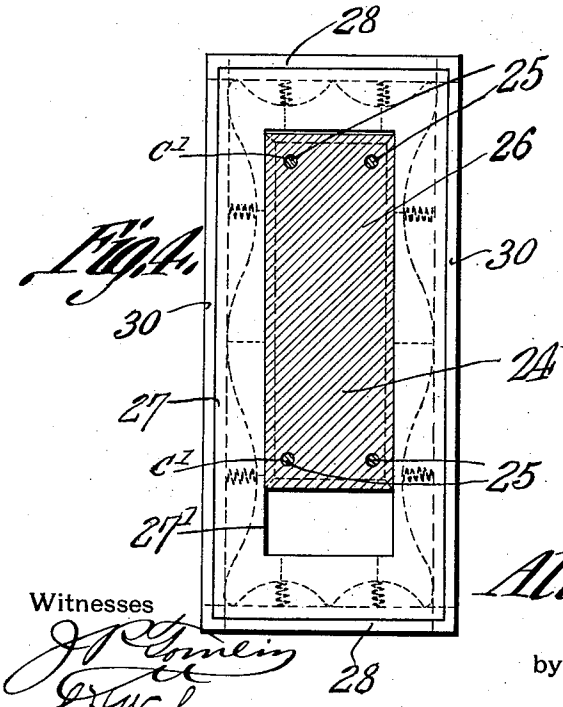


Fig. 4.

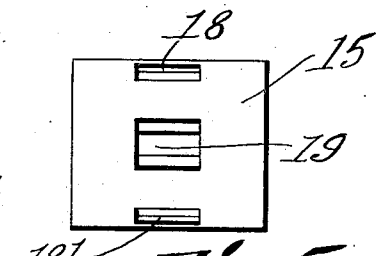


Fig. 5.

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ROTARY ENGINE.

1,023,993. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed July 7, 1911. Serial No. 637,366.

To all whom it may concern:

Be it known that I, ALBION P. CHARLES, a citizen of the United States, residing at Iola, in the county of Allen and State of Kansas, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to an improvement in rotary engines, and the primary object of the same is the provision of a cylindrical rotor mounted in the casing eccentrically thereof and provided with a piston segmental in cross section and mounted through the body of said rotor, so that the ends thereof contact at all times the periphery of the chamber of the casing, to be projected, so that the pressure fluid will actuate the piston and thereby the rotor, and will receive the initial expansive force of the said pressure fluid and the increasing expansion thereof to the fullest extent, before the said pressure fluid is exhausted.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a vertical central sectional view through the rotary engine. Fig. 2 is a section taken on line 2—2 of Fig. 1 looking in the direction of the arrow. Fig. 3 is a cross section on line 3—3 Fig. 1. Fig. 4 is a section of the rotor *per se*, taken on line 4—4 of both Figs. 1 and 2, with the part 23 removed, to clearly show the shape in elevation of the piston carried by the rotor. Fig. 5 is a detail bottom plan view of the valve.

Referring to the drawings, the numeral 1 designates the base of the engine, 2 the cylindrical casing thereof, and 3 the head or ends of the said casing. Mounted eccentrically in the heads 3, is a shaft 4, which has keyed on and rotatable therewith, the cylindrical rotor 5, which as shown in Fig. 1, provides the crescent shape pressure fluid acting space 7 below the lower portion of the rotor, and terminating at its top with two pressure fluid recesses 8, as shown in dotted lines in Fig. 1. At the upper portion of the casing where the periphery of the rotor 5 comes in contact therewith, as at 9, are provided two spring and pressure actuated stuffing or packing strips 10.

Above the casing 2 and communicating therewith through means of the inlet port 13 and the exhaust port 14, is a valve or steam chest 11, in which is mounted the oscillatory valve 15, the said valve 15 being provided with the inlet 16, which is adapted to aline with the pressure fluid supplying pipe 17, so that pressure fluid is admitted through said port 16 and will enter the hollow portion of the valve 15 and follow the direction of the arrow therein through the port 18 of said valve 15 to the upper end of the inlet port 13 of the casing 2. The pressure fluid will then follow the direction of the arrows through the crescent shaped expansion chamber through the left hand recess 8, and back into the exhaust port 14, where it will enter the exhaust outlet 19 of the oscillating valve 15 said valve being a hollow reversing valve and having an exhaust outlet 19, to aline with either port 14 or 13. In order to convey or produce the oscillatory action to the valve 15, to bring ports 18 or 18′ into register with ports 13 or 14, and inlet ports *a* or *b*, of the valve to regulate the pipe 17, the handle 20 is provided, and this handle may be connected by any means such for instance as a governor mechanism or any time device which will keep the said oscillatory valve in time with the rotation of the rotor. The valve 15 is provided with the packing strips *a′* and *b′*, which prevent the leakage of the pressure fluid around the valve body, and are so disposed that either one of the strips will be disposed between the upper ends of the diverging ports 13 and 14. By means of the valve 21 and its operating mechanism 22, the pressure fluid is admitted from the pipe 17 to the engine.

The rotor 5 as shown clearly in Figs. 1 and 2 is composed of two sections 23 and 24 respectively, said sections being held together by means of the tie rods or bolts 25, the opposed faces of said sections 23 and 24 providing the segmental receptacle or channel 26, for the oscillating reception of the segmental body 27 of the piston. This piston as clearly shown in elevation in Fig. 4 is provided with the substantially rectangular opening 27′, which is longer than the slightly tapered, rectangular in elevation, projection 24′ of the section 24 of the rotor.

This rectangular opening 27′ slidably fits over the projection 24′ and thus positions the piston 27 between the opposed faces of the sections 23 and 24 of the rotor. By this construction, the projection 24′ fits in the cavity 23′ of the section 23, while the rods 25 pass through the aperture c' to lock the sections together, but permit ample space between the opposed faces of the sections about the projection 24′ and cavity 23′ so as not to bind the piston. It will also be noted that the piston which though permitted the proper sliding movement is prevented from twisting, as the projection 24′ fits neatly between the long parallel sides of the opening 27′. This piston 27 carries within its outer ends the spring actuated packing strips 28, which are normally held outwardly toward the peripheral circumference of the fluid pressure chamber 7. The ends of the pistons 27, carrying the packing strips 28 which contact the inner peripheral wall of the chamber 7 and are actuated thereby are adapted to be projected and retracted by the contact with the inner circumference of said chamber 7, and are receded at a point upon the circumference of the rotor at diametrically opposite positions. Upon the long sides of the piston are provided the transversely projecting spring actuated packing strips 30, which are adapted to provide a packing means between the heads of the engine and the piston line of the rotor, whereby the pressure fluid is prevented from taking the shortest course around the faces or ends of the rotor, instead of following the crescent shape channel 7.

The piston member of the rotor as clearly shown, is of a size or length sufficiently to have its ends at all times in contact with the inner surface of the circular casing 2, of the engine, and by reason of the rotor being mounted eccentrically therein, and the said piston being of a sufficient length to have its ends beyond the circumference of the rotor, the said piston is moved into and out of the segmental channel of the rotor, so that the terminals thereof will be in pressure fluid receiving position at the desired time. By this construction it will be seen that when the rotor, is in the position shown in Fig. 1, the lower end of the piston will be at its farthest point of projection, while the upper end of the piston will be in its farthest point of recession, but in contact with the inner face of the pressure fluid chamber 7, intermediate of the inlet and exhaust ports of the said casing.

By placing the piston so as its ends are acted upon by the pressure fluid at diametrically opposite points, a smooth and easy running of the rotor is assured, and by producing the main body of the piston arc-shaped or segmental in longitudinal section, the said piston has its terminals diametrically disposed without the body interfering with the shaft 4 and is moved by the contour of the pressure fluid chamber of the engine, thereby presenting the ends thereof at the proper time for the action of the pressure fluid as it first enters the steam chamber 7 through the port 13, the end acted upon being projected farther to receive the full action of the pressure fluid during its travel from thereon to the exhaust port 14.

By constructing the rotor and blades as set forth the efficiency upon the reversal is the same as when the rotor is moving forwardly, thus producing a reversible rotary engine of practical construction.

To reverse the engine, the handle 20 is raised, rotating the valve 15, to bring the port 18′ of the inlet chamber of the valve into register with the port 14. The port b is simultaneously moved to register with the pipe 17, while the port 19 of the exhaust registers with the port 13, to permit the steam to finally exhaust through the port c in the wall of the valve chest. When the valve is in the position shown in Fig. 1, the chest exhaust port c is closed and its exhaust port d is in register with the port 19, thus providing a complete cycle of operations for the pressure fluid.

What is claimed is:

1. A rotary engine, having a rotor chamber, and a cylindrical rotor mounted eccentrically within the chamber and composed of two sections separated on a curved line, the ends of said line being disposed at diametrically opposite points upon the periphery of the rotor, coacting means carried by each section to provide a piston receiving space between the opposed faces of the sections of the rotor, means for locking the sections together, and a piston having an apertured portion surrounding the coacting portions of the sections of the rotor and slidably mounted within the space, said piston being of a greater length than the curved space between the opposed faces of the sections of the rotor and in position to have its ends project beyond the periphery of the rotor at diametrically opposite points.

2. A rotary engine, having a rotor chamber, and a cylindrical rotor mounted eccentrically within the chamber and composed of two sections separated on a curved line, the ends of said line being disposed at diametrically opposite points upon the periphery of the rotor, coacting portions carried by each section to provide a piston receiving space between the opposed faces of the sections of the rotor, means for locking the sections together, and a piston having an apertured portion surrounding the coacting portions of the sections of the rotor and slidably mounted within the space, said piston being of a greater length than the curved space between the opposed faces of the sec-

tions of the rotor in position to have its ends project beyond the periphery of the rotor at diametrically opposite points, the edges of said piston being provided with cushioned packing strips to abut the peripheral wall of the rotor chamber.

3. A rotary engine, having a cylindrical chamber, and a cylindrical rotor mounted eccentrically therein and of a lesser diameter than the diameter of the rotor chamber, said rotor being composed of two separated sections having coacting curved faces, one of said sections being provided with a cavity while the other of said sections is provided with a projection to fit within the cavity and provide a segmental piston receiving space the ends of which terminate at diametrically opposite points upon the periphery of the rotor, a piston mounted within the space between the sections of the rotor and provided with an apertured portion to surround the projection of one of the sections, the length of said piston being greater than the length of the segmental space between the sections of the rotor, whereby the ends thereof will project beyond the rotor surface to engage the inner peripheral wall of the rotor chamber.

4. A rotary engine, having a cylindrical chamber, and a cylindrical rotor mounted eccentrically therein and of a lesser diameter than the diameter of the rotor chamber, said rotor being composed of two separated sections having coacting curved faces, one of said sections being provided with a cavity while the other of said sections is provided with a projection to fit within the cavity and provide a segmental piston receiving space the ends of which terminate at diametrically opposite points upon the periphery of the rotor, a piston mounted within the space between the sections of the rotor and provided with an apertured portion to surround the projection of one of the sections, the length of said piston being greater than the length of the segmental space between the sections of the rotor, whereby the ends thereof will project beyond the rotor surface to engage the inner peripheral wall of the rotor chamber, and packing strips secured to the edges of the piston to engage the respective walls of the rotor chamber.

5. A rotary engine, having a rotor chamber, and a cylindrical rotor mounted concentrically within the chamber and composed of two sections with their points of separation terminating at diametrically opposed parts of the periphery of the rotor, coacting means carried by opposed faces of each section to provide a piston receiving space between the opposed faces of said sections, means for retaining the sections together, and a piston having an apertured portion surrounding one of the coacting portions of the sections of the rotor and slidably mounted within the space between the sections, said piston being of greater length than the adjacent faces of the respective sections and having its ends positioned to project beyond the periphery of the rotor to engage the wall of the rotor chamber at two points.

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

ALBION P. CHARLES.

Witnesses:
ALFRED POTTER,
BEN VERM.