J. E. SMITH.

ROTARY MOTOR.

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1,011,509.

Patented Dec. 12, 1911.

Fig. 1.

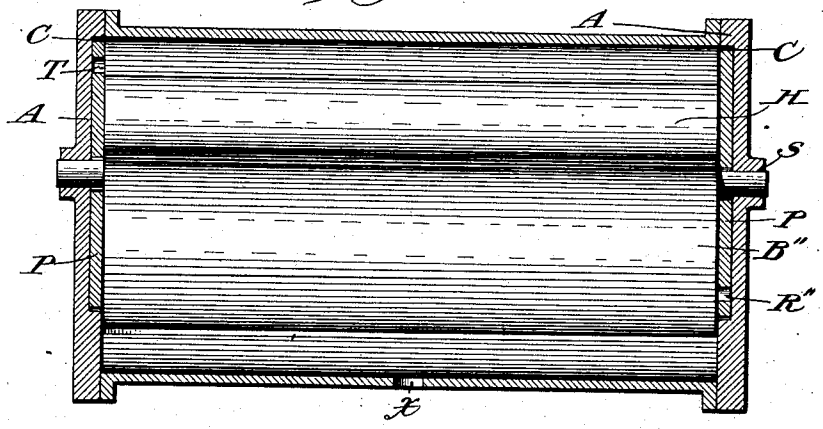



Fig. 2.

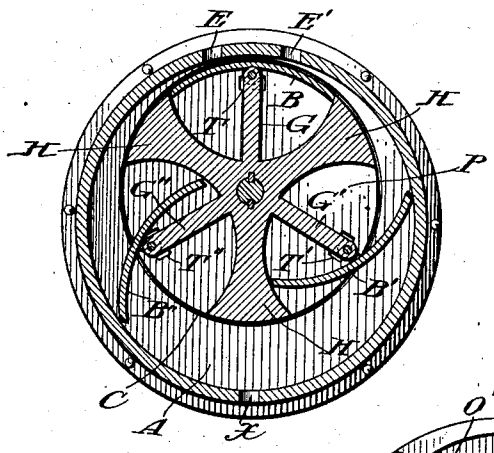



Fig. 3.

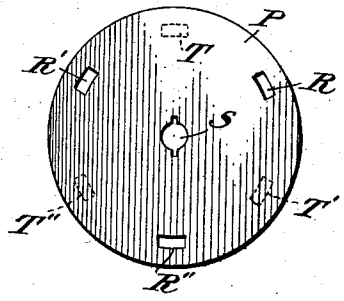



Fig. 5.

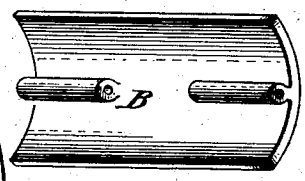
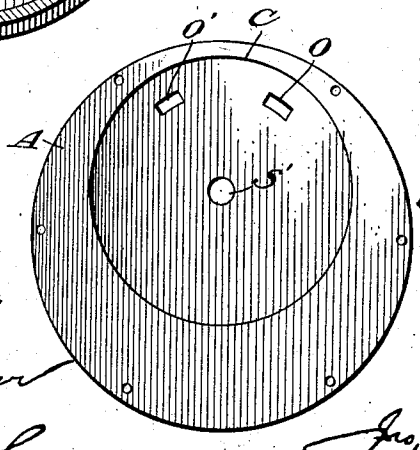



Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## ROTARY MOTOR.

1,011,509. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed June 30, 1909. Serial No. 505,291.

*To all whom it may concern:*

Be it known that I, JOHN ELLSWORTH SMITH, a citizen of the United States, residing at No. 65 South Valley street, in the city of Kansas City, in the county of Wyandotte, in the State of Kansas, have invented a new Rotary Motor, of which the following is a specification.

The objects of my invention are to apply the power of an expansive medium direct to the driving shaft without cumbersome connecting rods, and to utilize all the force of an expansive medium for power purposes. These objects are illustrated in the accompanying drawing.

Similar letters refer to similar parts in the different views.

Figure 1 is a longitudinal section of the cylindrical casing and circular end plates. Fig. 2 is a transverse section through the middle of the mechanism. Fig. 3 is a representation of a circular end plate. Fig. 4 is a view of the inside surface of a cylinder head. In Fig. 5 is shown the inner of a propeller blade.

The arrangement of the inside parts of the motor longitudinally disposed is shown in Fig. 1. The heads A A, are duplicates and the recess, C receives a plate, P as indicated.

X represents the exhaust port in the cylindrical casing.

In the vertical midsection of the motor shown in Fig. 2, E and E′ represent inlet ports and X the exhaust. The formation of the rotor is indicated in this figure.

G, G′ and G″ represent walls or sections formed on the interior of the rotor on its long axis, in the manner indicated. The rotor is further formed interiorly into double concave portions as shown by H. The sides of H are concave and the outer margin is convex as illustrated. The arc of a concave part is adapted to the end sweep of a propeller blade. And the arc of the outer margin is concentric with the axis of the rotor as represented. It will be noted that each longitudinal section or wall is diametrically oppositely disposed to a double concave part.

B, B′ and B″ represent the propeller blades and the manner in which the blades are adapted to the longitudinal sections or walls. The action of the blades is also illustrated. The blade B is in a balanced position, and B′ is opening out under pressure, as it might be received from E′, while B″ is shown as closing by contacting with the cylindrical casing.

Referring to the balanced blade B it will be noted that with all the blades thus balanced, the rotor would form a circular body of uniform diameter. A balanced blade as represented by B would completely close the open spaces or troughs formed on the exterior of the rotor by the longitudinal sections or walls and the double concave portions, except for the communication provided by the openings in the end plate P, Fig. 3. T, Fig. 2 represents the opening in the opposite end of the trough at the left of G, the presenting end would be closed. While R Fig. 3 would communicate with the trough at the right of G, on the presenting end; the opposite end would be closed. The office of the openings R and T is to control the action of the blade B in the position shown in Fig. 2, by utilizing the force of an expansive medium. The explanation is the same for the openings indicated by T′ and T″ when the blades B′ and B″ are in the position of B shown in Fig. 2. The blade B, Fig. 2, is shown in a balanced position contacting with a segment on the inner contour of the cylindrical casing.

The end plate P Fig. 3 has the same circumference as the cross section of the rotor. The reference characters T, T′ and T″ represent the openings in the plate for the opposite end of the rotor in Fig. 2, while R, R′ and R″ indicate the openings in a plate for the presenting end. This illustration also shows the relative position of the openings in each plate, and it will be noted that each plate has three openings and the opening R, will not have a corresponding opening in the plate on the opposite end, and the opening T will not have a corresponding opening in the plate on the presenting end of Fig. 2. These openings are designed to both receive and discharge an expansive medium. The reference character S represents the opening for the supporting shaft.

The manner in which an end plate, P is adapted to the circular recess C in a head A, is shown in Fig. 1. The representation of a head, A, in Fig. 4, also shows the relative position of the head when properly attached to the opposite end of the motor shown in Fig. 2. This view shows the inner surface of a head and C reperesents a circular recess also shown in the section of

the heads, A A, in Fig. 1. The openings O and O′, as named, will serve as a port and an exhaust for T, T′ and T″, Fig. 3, when the motor rotates in the direction indicated; and O will be properly connected to a constant supply of an expansive medium and O′ will be suitably fitted to receive the exhaust. The position of O and O′ will of course be reversed as shown in Fig. 4, on the head for the presenting end of the motor shown in Fig. 2. The action will be the same, in rotating from left to right, R, Fig. 3, will receive at O and exhaust at O′, and R′ will receive at O and exhaust at O′, and so on around. The shaft opening is represented by S′, and the bearing of the heads A A on a supporting shaft is illustrated in the section shown in Fig. 1.

In the representation of a propeller blade, B, shown in Fig. 5, the arrangement for attaching the blades to the longitudinal sections or walls by pintle pins, is illustrated. The arc of the indicated curve is concentric with the outside contour of the rotor as is shown with the blade, B, Fig. 2. A blade thus adapted and held by a pintle pin will respond very readily to the force of an expansive medium in a motor of this design.

The action of the motor is readily explained. Suppose that E′ is connected to the supply of an expansive medium. The blade B′ is in a working position; R, Fig. 3, has already exhausted through O′ on the presenting head, and T, Fig. 3, comes to a register with O, Fig. 4, and the rear part of the blade, B is raised and receives the force of the expansive medium from E′, and continues the rotary movement; and R′ Fig. 3, is brought to a register with O, on the presenting head and the blade, B″, is forced into a balanced position and then, R′, comes to a register with O′, on the presenting head and exhausts and T″, Fig. 3, is carried to a register with O, Fig. 4, and the rear part of the blade B″, is raised to receive the force from E′. The movement of the motor is reversed by changing the supply of the expansive medium from E′ to E, Fig. 2, and this object will be facilitated by adapting sliding valves properly fitted for that purpose. If the supply of the expansive medium was admitted through E it would strike the extended portion of the blade B″, and cause it to change its position rather violently, were it not for the cushion of expansive medium, mixed with air from X, remaining in the trough at the right of the longitudinal section or wall, G″. With this blade in a working position the balance of the movement should be readily comprehended. The expansive medium from the port O, Fig. 4, through T, Fig. 2, forces the blade B, into a balanced position, the contour of the cylindrical casing holding the blade in such a position until released through the port O′. While the expansive medium from the port O, for the presenting head, Fig. 2, acting through the port R, Fig. 3, would raise the rear part of B to receive the force from the port E. It should be understood that the expansive medium in the casing, acting on the blade B″, assists in forcing the blade B, into the working position just described.

I believe the parts of the mechanism described in the foregoing and illustrated in the drawing are new and original with me, and therefore claim:—

1. In a rotary engine, a rotor, curved propeller blades pivotally connected to the said rotor, a cylindrical casing inclosing the rotor, inlet ports centrally located at the top of the said casing and peripherally disposed thereon, one on each side of the vertical plane passing through the axis of the said casing, the latter having also at the bottom an exhaust port suitably disposed, and parallel heads closing the ends of the casing, a supporting shaft adapted to rotate in the said heads, the inner surface of each head having a circular recess concentric with the supporting shaft, the said recesses being adapted to receive the ends of the rotor, each head having near its periphery a suitably disposed inlet and exhaust port.

2. In a rotary engine, a rotor suitably adapted to a supporting shaft, the said rotor being formed into longitudinal sections, each section being symmetrically disposed and radially projected, a curved propeller blade pivotally connected to the outer margin of each of the aforesaid sections, the said rotor being further formed into double concave parts symmetrically disposed, the said longitudinal sections and double concave parts forming a plurality of troughs in the periphery of the rotor, circular plates attached to the extremities of the said rotor, the said plates being concentric with the supporting shaft of the rotor, each plate having a central shaft opening and an opening, suitably disposed near the periphery in each plate, the said openings near the periphery in each plate being adapted as inlet and exhaust ports, and each of the said openings, near the periphery in the aforesaid plates, in rotating, communicates with the inlet and exhaust port in the adjacent cylinder head.

3. In a rotary engine, a rotor, the latter being formed into longitudinal sections, each section being symmetrically disposed and radially projected, a curved propeller blade pivotally connected to the outer margin of each section of the aforesaid longitudinal sections, each curved propeller blade being adapted to be balanced on its supporting section and to be released and to oscillate on the said section, each of the said blades when balanced forming a part of the circular contour of the rotor, the said rotor being fur-

ther formed into double concave parts, extending longitudinally, and symmetrically positioned, the aforesaid longitudinal sections and double concave parts forming a plurality of troughs on the rotor, the said troughs being adapted to receive the inner ends of the propeller blades when the said blades are actuated, the said rotor and curved propeller blades pivotally connected to the said longitudinal sections being adapted to rotate in a cylindrical casing, the balanced blades and the peripheral portions of the rotor contacting with the inner contour of the said casing.

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