R. E. NEAL.

POWER DEVICE.

APPLICATION FILED JUNE 10, 1918.

1,331,997. Patented Feb. 24, 1920.

Fig:1.

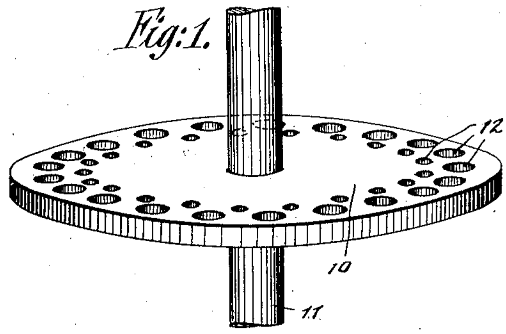


Fig:2.

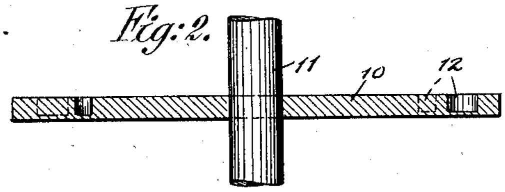


Fig:3.

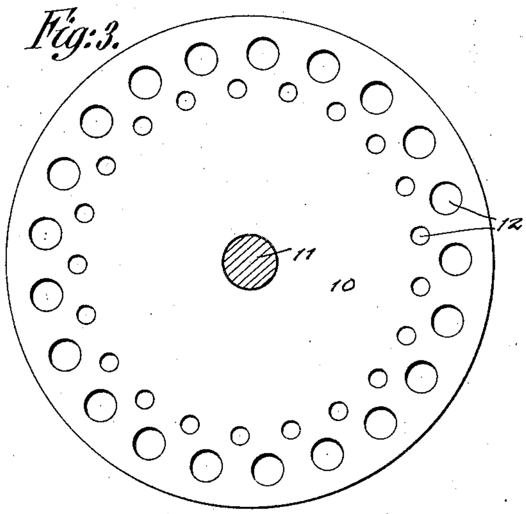


Fig:7.

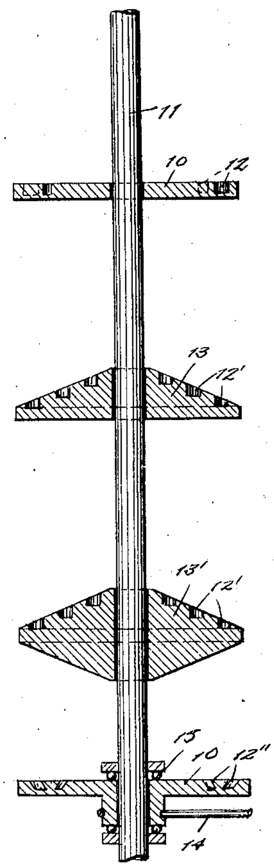


Fig:4.

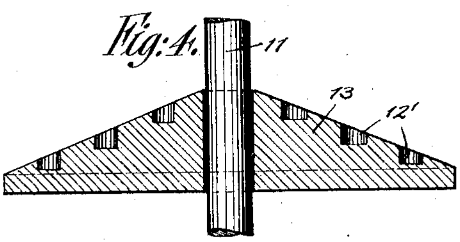


Fig:5.

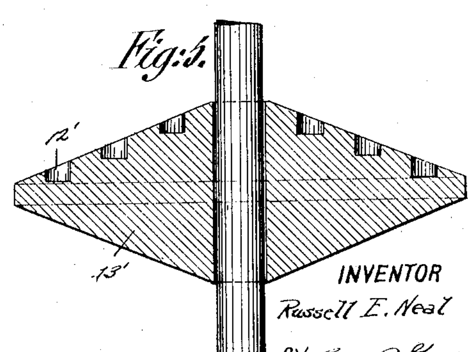
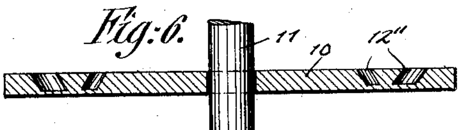


Fig:6.



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POWER DEVICE.

1,331,997. Specification of Letters Patent. Patented Feb. 24, 1920.

Application filed June 10, 1918. Serial No. 239,339.

To all whom it may concern:

Be it known that I, RUSSELL E. NEAL, a citizen of the United States, and a resident of Palisades, county of Bergen, State of New Jersey, have invented new and useful Improvements in Power Devices, of which the following is a description.

This invention relates to power devices and more particularly has for its object to provide a new and improved power device whereby such a device may be operated with efficiency, promptness and at the same time to have a large capacity for the power desired to be obtained.

More particularly, my invention is applicable to airplane motive powers of all kinds and, as will be seen, is simple to manufacture and efficient in its operation.

The fundamental principle underlying my invention is the use of a substantial or partial vacuum. I obtain such a vacuum by rapidly rotating a disk or member, which member is provided at one side with pockets having open ends, while the other side is entirely smooth or closed, and is not provided with any openings or pockets. It is a well-established principle that when recesses or pockets are provided in a rapidly moving object, there occurs an exhaustion of air from the recesses or pockets and a creation therein of a vacuum or a partial vacuum. Thus, if one stands beside a fast moving train the exhaustion of air from the pockets or recesses thereof will tend to draw him toward the train due to the creation in the said pockets and recesses of partial vacuum. In the same manner the rapid rotation of such a disk will cause partial vacuum to be formed on the side having the pockets. With the suction effect or vacuum effect thus produced on one side of the disk, and the atmospheric air pressure acting on the other side of the disk, the difference in pressures will cause the disk to be moved lengthwise of its axis of rotation, and to move with said disk, any shaft or other member secured to, or properly connected with, said disk. The pockets above referred to are preferably arranged only at the outer portion of the disk and on a zone extending inwardly only about ⅓ from the periphery. For instance, if the diameter of the disk is 24″, the pockets would preferably be arranged in a zone from the periphery 8″ inwardly, and such a disk would be about 1″ thick. These pockets may be arranged either in radial or circular series or rows, or in any manner whatsoever, and the longitudinal axes of these pockets may be parallel to the axis of rotation or they may be inclined in different directions, depending upon the particular use to which the device is to be put, and on other circumstances. The centrifugal force action as a result of the rapid rotation of the disk tends to draw air from said pockets and this produces a partial vacuum on the side of the disk toward which the open ends of the pockets face.

When such a disk is applied to an airplane and made to rotate about an upright axis, with the open ends of the pockets facing upwardly, the difference of pressures will produce an upthrust on the disk and on the airplane. In certain cases it is necessary to have two such disks revolving in opposite directions for the purpose of compensation and for securing a better gyroscopic effect. Similarly the axial thrust produced by my invention can be utilized to operate or to control various parts or mechanisms.

In the accompanying drawings, Figure 1 is a perspective view of a part of a power device embodying my invention. Fig. 2 is a sectional view of the same. Fig. 3 is a plan view of the same. Figs. 4, 5 and 6 are side views, partly in section, showing other forms of my invention and Fig. 7 is another view partly in section of another embodiment of my invention.

Similar characters of reference indicate corresponding parts throughout the various views.

In Figs. 1, 2 and 3, 10 designates a disk made of suitable material such as nickel-steel, the diameter of said disk being say 24″ and its thickness 1″, the circumference of the disk being smooth and cylindrical while its two end surfaces are plane and perpendicular to its axis of rotation, the disk being shown as secured rigidly to a shaft 11 which may be assumed as suitably journaled in the frame of an airplane and driven in any suitable manner, say so as to give it a speed of about 6000 revolutions per minute. On one of its faces, which is the upper face in the drawings, the said disk is provided with a series of pockets 12, which extend into the disk but not through it, that is to say, the lower ends of said pockets are closed, and the lower surface of the disk is unbroken.

The arrangement of the pockets relatively to each other may vary and I do not wish to restrict myself to the particular arrangement shown, according to which the pockets form two annular series at different distances from the shaft, both series of pockets being near the periphery of the disk and therefore within the outer third of its face, and the pockets of one series are staggered relatively to those of the other series.

The disk or rotor 13, shown in Fig. 4, differs from the one described above, chiefly by the fact that the upper face of the disk instead of being plane is conical, the pockets 12′ being arranged substantially in the same manner as the pockets 12.

In Fig. 5 the lower surface of the rotor 13′ is conical, tapering in the opposite direction to the upper face, but otherwise the construction is the same as in Fig. 4.

In each of the forms of construction so far described in detail, the longitudinal axes of the pockets 12 or 12′ are vertical, that is to say parallel to the axis of rotation. I do not, however, restrict myself to this specific arrangement, and in Fig. 6 I have illustrated a disk of the same character as in Figs. 1, 2 and 3, but having its pockets 12″ so arranged that their longitudinal axes are inclined and converge toward the axis of rotation, the particular arrangement shown having the outer series of pockets with their longitudinal axes converging downwardly while the longitudinal axes of the inner series of pockets converge upwardly. I may also, if desired, employ radially disposed grooves, annular or spiral grooves, or any other suitable means of indentation.

In Fig. 7 I have shown that a plurality of disks or rotors of the character therein referred to may be mounted on the same shaft 11 to rotate about the same axis. Fig. 7 shows four disks, each of them corresponding to one of the forms hereinbefore described, and three of these disks are assumed to be rigidly secured to the shaft 11, so as to rotate therewith in the same direction. In order to make it clear that the disks need not all be arranged to rotate in the same direction, I have indicated one of the said disks as mounted loosely on the shaft 11, so that this disk may be rotated in a direction opposite the other disks by any suitable means, say the driving belt indicated at 14. This disk, however, would have thrust bearings as indicated at 15 so that the longitudinal pressure acting on this disk will be transmitted to the shaft 11, so that the longitudinal thrust exerted by all of the disks will be increased or combined, it being understood that the disks operate in multiple, as it were, and thus I produce a device having a greater capacity than if a single disk were employed.

It will be observed that in each of the forms of construction shown, both the end surfaces and the peripheral surface of the rotor are surfaces of revolution so that they will rotate with as little disturbance of the air as possible; hence the power required to drive these devices will be relatively small. It will also be seen that in each case the pockets are closed at one end and their open ends face toward one side of the disk or rotor.

As the disk rotates (whether such disk has plane or conical end surfaces) it will cause air to be thrown outwardly by centrifugal force along both end surfaces of the rotor. This outward movement of the air will tend to draw the air out of the pockets at their open ends and will thus produce a partial vacuum on that side of the rotor toward which the said pockets open. On the other side or face of the rotor there will be atmospheric pressure. Thus there will be a preponderance of pressure on one side and therefore a tendency to move the rotor lengthwise of its axis of rotation. This axial movement or thrust may be utilized in a great many different ways. As suggested above, the rotor might be secured to a vertical shaft journaled in the frame of an airplane and the upward thrust of the disks or rotors utilized directly for a lifting effect on the airplane, or on the other hand the shaft may be horizontal and the power produced utilized for propulsion. I do not, however, restrict myself to this particular application. It will be observed that the rotor might be loose on the shaft as has been indicated for one of the rotors in Fig. 7. The longitudinal movement of the motor might be employed to operate say a device which would indicate the rotary speed of the appliance, or such longitudinal motion might exert power to operate any suitable device, for instance, the disk might be connected with a piston in such a manner as to shift such piston lengthwise in a cylinder and produce either pressure or a partial vacuum in such cylinder for the purpose of operating or controlling attachments of various characters.

I have illustrated and described preferred and satisfactory embodiments of my invention, but it is obvious that changes may be made therein within the spirit and scope thereof as defined in the appended claims.

I claim:

1. As a means for producing differences of pressure, a rotary member provided with pockets closed at one end and open toward one face of said member.

2. As a means for producing differences of pressure, a rotary member provided with pockets the longitudinal axes of which intersect planes of rotation, said pockets having open ends facing toward one side of said member and so located that rotation of said

member will produce a partial vacuum on such side of said member.

3. As a means for producing differences of pressure, a rotary member provided with pockets having open ends facing toward one side of said member and so arranged that rotation of said member will produce a partial vacuum on such side of said member.

4. As a means for producing differences of pressure, a plurality of coaxial rotary members and an axial member on which they are mounted in such a manner that the axial thrust of all of said rotary members will be transmitted to said axial member, each of said rotary members being provided with pockets having open ends facing toward the same end of said axial member.

In testimony that I claim the foregoing as my invention, I have signed my name.

RUSSELL E. NEAL.