W. F. NEELY.

ROTARY ENGINE.

APPLICATION FILED OCT. 18, 1910.

1,003,491. Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

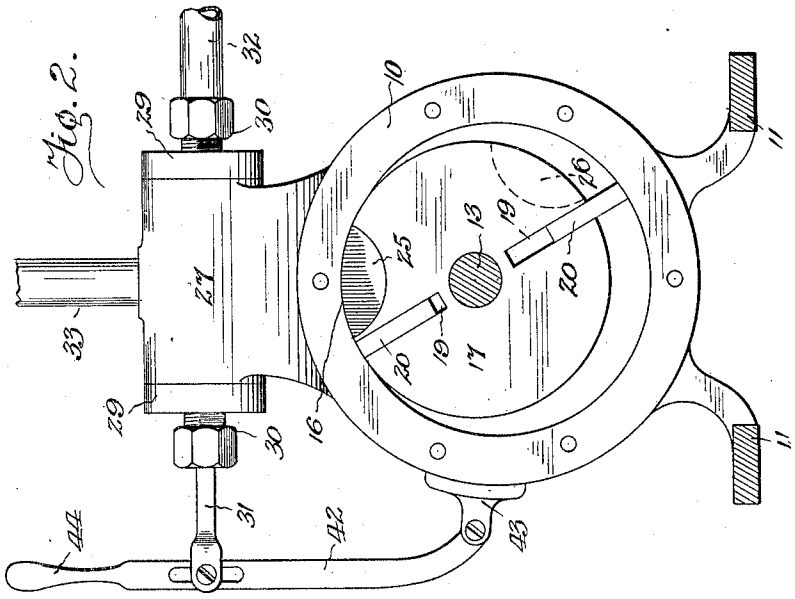
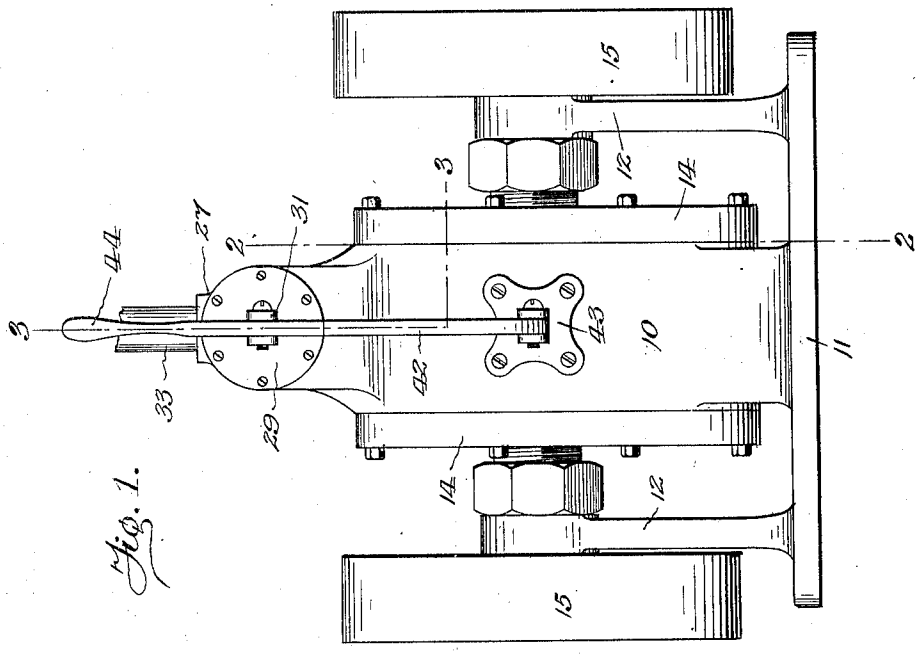


Fig. 1.



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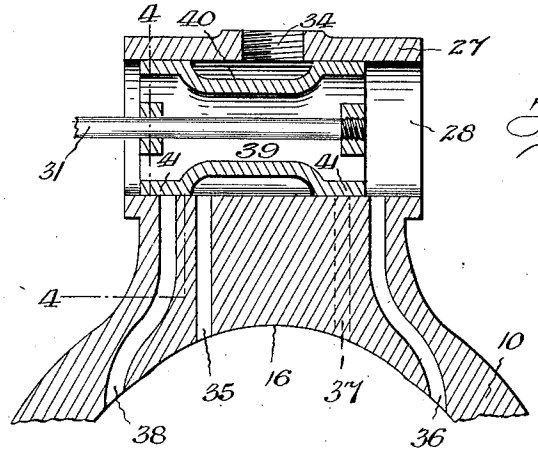

Fig. 3.

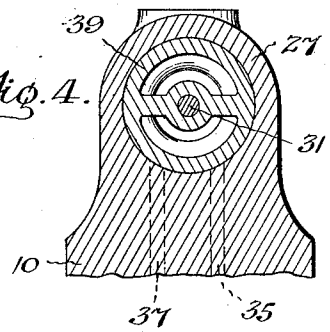

Fig. 4.

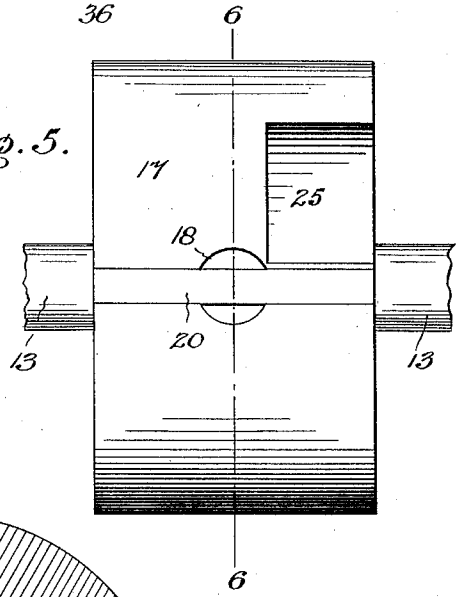

Fig. 5.

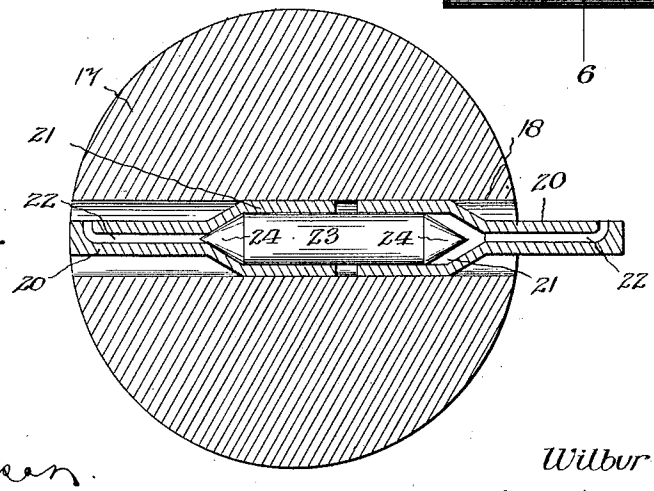

Fig. 6.

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ROTARY ENGINE.

1,003,491. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed October 18, 1910. Serial No. 587,749.

To all whom it may concern:

Be it known that I, WILBUR F. NEELY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to steam engines of the rotary type, my object being to provide one which will embody speed and power and be simple in construction, strong, and durable in use.

Another object is to provide a novel and simple valve arrangement, capable of being readily and easily operated to start stop and reverse the engine.

Another object of my invention is to provide a rotor of novel and simple construction.

A still further object is to provide sliding wings for the rotor, which will be novel and simple in construction and embody means whereby they may be pressed outwardly against the inner surface of the cylinder at all times, by the steam therein, and, lastly, my object is to provide a novel combination of the before mentioned parts, to result in an engine of the present type in which all springs and other delicate parts are dispensed with.

With these objects in mind, my invention resides in the following features of construction, arrangement and operation, reference being had to the accompanying drawings, forming part of this specification, and in which,

Figure 1 is a front elevation. Fig. 2 is a sectional elevation taken on line 2—2 of Fig. 1. Fig. 3 is an enlarged section through the valve chest taken on line 3—3 of Fig. 1. Fig. 4 is a detail cross-section through the valve taken on line 4—4 of Fig. 3. Fig. 5 is a plan of the rotor, removed, and, Fig. 6 is a detail section through the rotor taken on line 6—6 of Fig. 5.

Referring now to these figures, the cylinder 10 is supported upon a base 11, which also supports bearing standards 12, for the ends of the shaft 13, between the cylinder head plates 14 and the fly-wheels 15, which are secured upon the shaft extremities.

The shaft 13 is extended through the head plates 14, concentric with a point in a direct line above the center of the bore of cylinder 10, or in other words eccentric to said cylinder bore, although concentric with the extreme upper portion of said bore which, as shown in Fig. 2, is in the form of a concavity 16. This concavity receives the periphery of the rotor 17 in steam tight rolling engagement, said rotor being cast integral and concentric with shaft 13. The rotor 17 has a bore 18 extending centrally therethrough at right angles to its axis, said bore opening through its periphery at diametrically opposite points thereof, and through the centers of the transverse slots 19 cut radially into the rotor for short distances at diametrically opposite points. The slots 19 receive the extensible wings or blades, each of which comprises a relatively flat plate 20 having a central tubular extension 21 upon its inner edge, said plate fitting, as shown, into the respective slots, and said extension fitting into the bore 18. Each of the plates 20 also has a small central opening 22, one end of which communicates outwardly through one surface of said plate, and the other end of which communicates with the bore of the extension 21. Connecting the extensions 21 of the pair of wings or blades, is a pin 23, the ends of which extend into the bores of said extensions 21, and the extremities 24 of which are tapered so that either may be projected into the inner end of the opening 22 of its respective blade or wing and form a steam tight joint, all of which is plainly shown in Fig. 6. The periphery of the rotor 17 is provided with a pair of pockets 25 and 26 which, as shown, are cut on opposite sides of the transverse median line, and on the same side as the respective wings or blades, one of said pockets being located adjacent each wing.

Cast integral with, and upon the top of the casing 10, is a valve casing 27, which has a horizontal bore 28 and end plates 29 closing said bore, each of said plates 29 having a central stuffing box 30. Through one of these stuffing boxes, the valve stem 31 projects, an exhaust pipe 32 being connected to the stuffing box of the opposite end plate. An intake pipe 33 connects within a threaded opening 34 centrally of the top casing 27. Communicating between the bore of valve casing 27 and the bore of the cylinder 10, are ports 35, 36, 37 and 38, ports 35 and 37 being the inner and adjacent ones and constituting the intakes and ports 36 and 38 being the outer and exhaust ports operating with said intakes respectively. The lower ends of the intake ports 35 and 37 open into

the upper concavity 16 of the cylinder bore, as shown in Fig. 3, and, as indicated in Fig. 4, they also open adjacent to opposite ends of said cylinder bore to coincide with the placement of the respective rotor pockets 25 and 26. The lower ends of the exhaust ports 36 and 38 open into the bore of cylinder 10 beyond the concavity 16 on opposite sides thereof, and while they may open upon opposite sides of the center of said bore to correspond with the position of the respective intakes, this latter is immaterial, and said exhausts may extend across the entire bore.

The valve 39, which is arranged within the casing 27, is cylindrical in form and provided with a central circular channel 40 about which the steam, from intake pipe 33, circulates, the channel leaving end portions 41 which closely interfit the bore 28. The inner end of the stem 31 is secured to valve 39, and the outer end of said stem has a pivotal, sliding connection intermediate the actuating lever 42 therefor, the lower end of said lever being pivoted to a plate 43 mounted upon the cylinder 10, and the upper end thereof is formed with a handle 44.

Thus, when the lever 42 is moved to position the valve 39 as shown in Fig. 3, steam is admitted from around the valve channel 40, into the port 35 and enters the pocket 25 of the rotor 17 as shown in Fig. 2, the result being that the rotor is driven around to the left in Fig. 2. In this position of the valve, no steam can get into pocket 26 because the latter, which coincides with intake 37, is upon the opposite side of the center of the rotor. As soon as the end of the pocket 25 passes the port 35, no more steam can get into the cylinder, as the periphery of the rotor forms an automatic cut-off and a steam-tight joint with the concavity of the cylinder, and thus constitutes the abutment, between which and the respective blade or vane, the steam expansion takes place, thus rotating the rotor until said blade or vane passes the mouth of exhaust port 36, when the steam escapes prior to the taking of a new charge for the next revolution. It will be seen that in this position one end portion 41 of the valve covers the exhaust port 38 and the other end covers the intake port 37. Now, referring to Fig. 6, it will also be seen that the steam will enter the mouth of the opening 22 of the respective blade 20 and pass inwardly, forcing the pin 23 longitudinally until its opposite reduced end 24 enters the inner end of the opposite blade opening 22 and forms a steam-tight joint in order to prevent a complete passage of the steam through the rotor and in order to form a steam space between the first mentioned blade and the adjacent end of the pin 23, which results in said blade being pressed outwardly against the wall of the cylinder bore. It will be seen that the mouths of both of the openings 22 are turned in the same direction, so that when the engine is to be reversed, the steam will act the same way, though in an opposite sense, and press the opposite or reversing vane or blade outwardly. This reversal may, as will be readily seen, take place by moving the lever 42 toward the cylinder, to throw the valve 39 over to a position to cover, with its end portions 41, the intake 35 and exhaust 36, and open the intake 37 and exhaust 38. Steam will then enter pocket 26 of the rotor and drive the rotor in the opposite direction, exhausting through port 28 and out through the valve 39 to exhaust pipe 32, said valve being hollow for this purpose.

I claim:

1. In a rotary engine, the combination of a cylinder having intakes and exhausts, a rotor therein, a pair of radially slidable blades carried by said rotor and having inner tubular extensions, said blades having openings extending inwardly from the same sides, communicating with said tubular extensions, and a pin bridging the said blades and having its ends extending in steam tight relation within the said blade extensions, and movable therein, for the purpose described.

2. A rotary engine comprising a cylinder, a rotor working in the cylinder in contact with the wall thereof at one point, the cylinder having inlet and exhaust ports on both sides of said point of contact, and said inlet ports being located diagonally opposite each other, radially slidable blades carried by the rotor, the rotor having steam pockets in its periphery on opposite sides of its transverse median line, one pocket being located adjacent to one blade and the other pocket being located adjacent to the other blade, and the aforesaid inlet ports coinciding with said pockets, a valve casing into which the aforesaid inlet and exhaust ports open, said valve casing having an intake and an exhaust, and a valve arranged within the valve casing to control the inlet and exhaust ports.

In testimony whereof I affix my signature in presence of two witnesses.

WILBUR F. NEELY.

Witnesses:
MYRON G. CLEAR,
S. W. KING.