Oct. 13, 1925. 1,556,843

C. L. KINDER

ROTARY ENGINE

Filed March 29, 1923 2 Sheets-Sheet 1

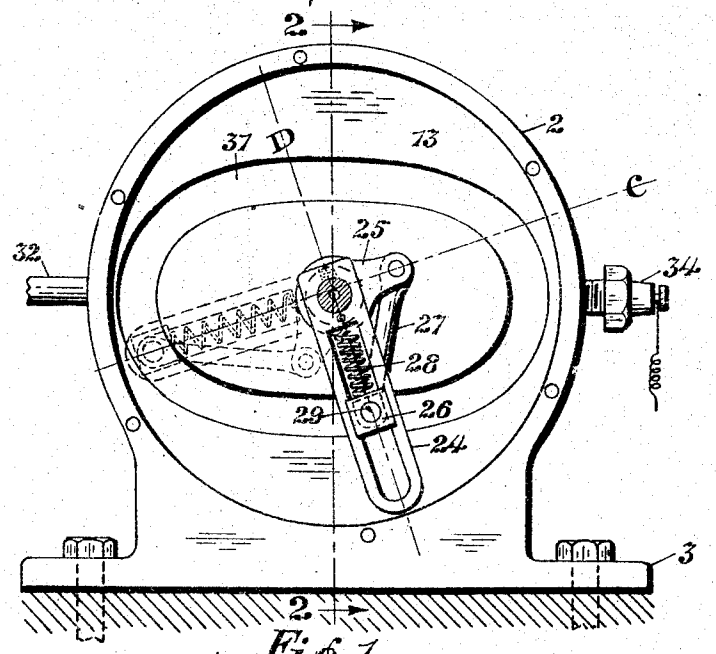


Fig. 1

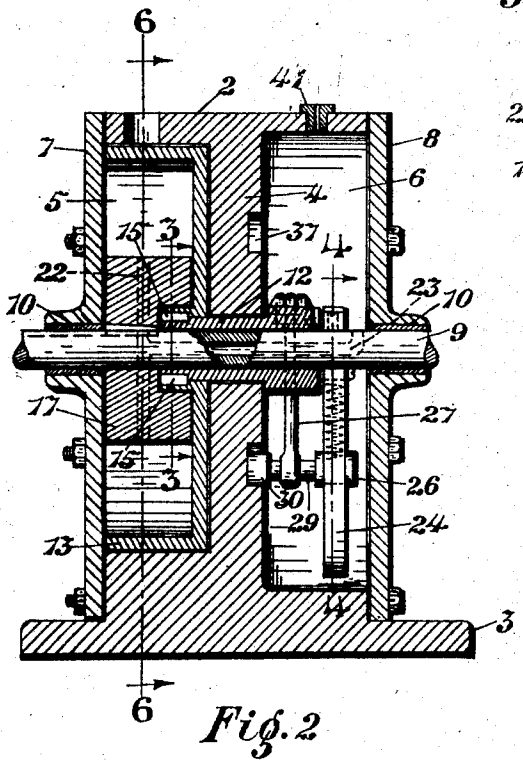


Fig. 2

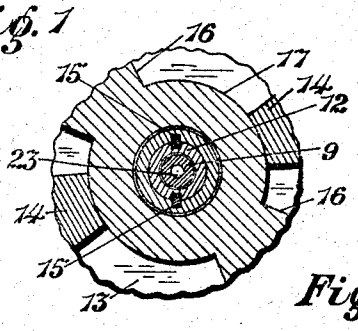


Fig. 3

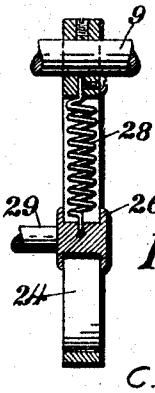


Fig. 4

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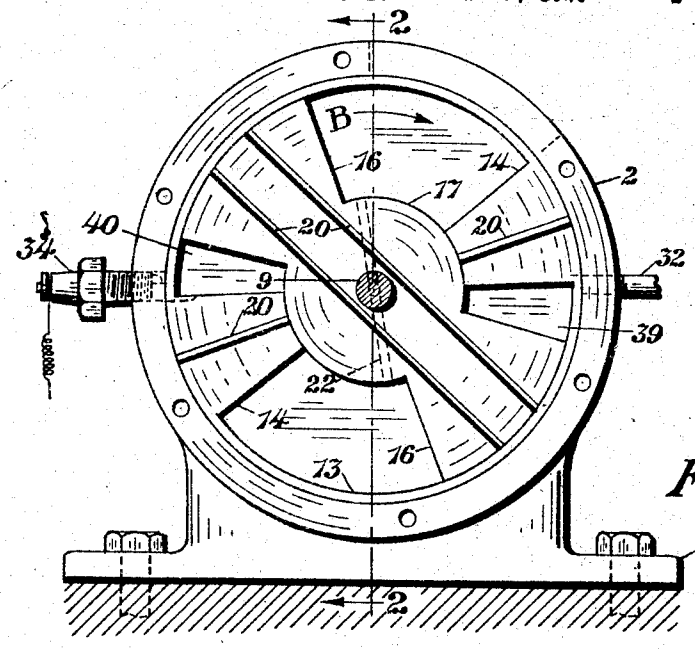


Fig. 5

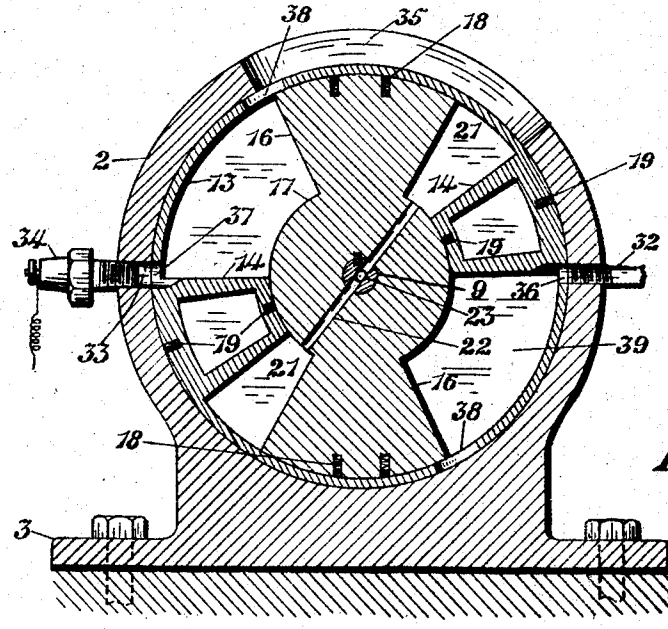


Fig. 6

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UNITED STATES PATENT OFFICE.

CLOYD LELAND KINDER, OF DENVER, COLORADO.

ROTARY ENGINE.

Application filed March 29, 1923. Serial No. 628,633.

To all whom it may concern:

Be it known that I, CLOYD L. KINDER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines and its principal object is to provide a practical, highly efficient engine of very simple construction in which movement is imparted to a rotary piston-element by the expansive force of a motive fluid admitted in a space between said piston and a normally stationary periodically moving pressure head.

A further object of the invention resides in the provision of a simple and efficacious method of lubricating the moving parts of the engine.

With the above and other objects in view my invention consists in the construction, arrangement and combinations of parts as will hereinafter be described with reference to the accompanying drawings.

In the drawings in the several views of which corresponding parts are similarly designated by numerical reference characters,

Figure 1 represents an elevation of my improved rotary engine without the cover which normally closes the crank case thereof;

Figure 2, a vertical section taken on the line 2—2, Figure 1;

Figure 3, a fragmentary section along the line 3—3, Figure 2;

Figure 4, an enlarged section on the line 4—4, Figure 2;

Figure 5, an elevation of the engine looking in the direction of the arrow A in Figure 2, without the cover which normally closes the piston chamber of the engine; and

Figure 6, a vertical section taken on the line 6—6, Figure 2.

The engine as shown in the drawings is of duplex and internal combustion type, having two piston heads which during each revolution are alternately subjected to the impulsive action of an ignited charge of combustible fuel.

It is to be understood, however, that the engine may be provided with one piston head or with more than two piston heads and operated by a correspondingly decreased or increased number of impulses during each revolution, without departing from its principle of operation, and without such changes in the construction and arrangement of its co-operating parts, as would fall outside the scope of the invention as hereinafter described and claimed, and that within the same spirit, its impelling force may be produced by a motive fluid other than a combustible mixture, as for example steam or compressed air.

Referring to the drawings, the reference character 2 designates the casing of the engine which comprises a base 3 at opposite sides of an upright partition 4, a cylindrical piston chamber 5 and a crank case 6, which normally are closed by means of cover plates 7 and 8.

A shaft 9 extending through openings in the covers and the partition, is rotatably supported in bearings 10, and a sleeve 12 likewise extending through the opening of the partition and rotatably fitted on the shaft is provided to connect a pressure element within the piston chamber with a crank movement in the crank case.

The pressure element hereinabove referred to, consists of an annular body 13 fitted in the circular piston chamber of the casing and having within its annulus, integral heads 14 which in the operation of the engine function as abutments to receive the pressure of the motive fluid acting upon the rotary piston element hereinafter to be described. The pressure element which is fastened upon the sleeve 12 by means of keys 15 is open at its side coinciding with the open side of the piston chamber, and its heads 14 which are sectors of the inner circle of the annular body are formed opposite to each other.

The piston element of the engine comprises two piston heads 16 formed integrally and diametrically opposite on a hub 17 which is fastened upon the shaft 9 inside the piston chamber.

The piston heads are of sectoral form and fit within the cylindrical body of the pressure element between the heads thereof. Packing-strips 18 disposed in grooves in the outer arcuate surfaces of the piston heads engage with the inner cylindrical surface of the body 13 to prevent leakage of motive fluid.

The pressure heads 14 are at their inner ends fitted upon the hub 17 of the piston element and both ends of the heads are

equipped with packing strips 19 engaging respectively with said hub and with the inner surface of the piston chamber.

Both the piston element and the pressure element are furthermore provided with packing strips 20 disposed in grooves in their outer faces to engage with the cover plate 7.

The spaces 21 between the piston heads and the pressure heads are in practice partially or entirely filled with a lubricating fluid and the hub of the piston element and the shaft have connecting ducts 22 and 23 which connect said spaces with the interior of the crank case 6 which as usual, contains a supply of lubricating fluid.

The crank movement which in the operation of the engine, causes the pressure element to rotate intermittently and at an advanced speed by the rotary movement of the piston element comprises a longitudinally slotted arm 24 fastened upon the shaft 9, a shorter crank 25 formed on the sleeve 12, a block 26 slidably fitted in the slot of the arm, and a connecting rod 27 pivotally attached to the crank and the block. A coiled spring 28 disposed in the slot of the arm acts upon the sliding block to facilitate its outward movement and thereby render the operation of the mechanism equable under all conditions, but I desire it understood that the spring is not essential to the effective operation of the mechanism and may be dispensed with if so desired.

The pivotal connection between the rod and the slide block is established through the intermediary of a pin 29 which at its inner end carries an anti-friction roller 30 within an oblong, substantially elliptical track-groove 31 formed in the partition 4 of the casing 2.

The piston chamber has in its circumferential wall an intake port 32 which in the operation of the engine by the ignition of a combustible fuel, is connected with a conveniently located carburetor, a firing-opening 33 for the application of a spark plug 32 by which the charge is ignited, and an elongate exhaust port 35.

The pressure element has in its annular wall, ports 36 and 37 adapted to register respectively with the intake port and the ignition opening of the piston chamber, and opposite ports 38 which in the operation of the engine connect with the exhaust opening of the piston chamber for the discharge of spent fluid.

The shaft 9 is as usual provided with a pulley for the transmission of its rotary movement and it may carry a fly wheel to assist in securing a uniform motion of the piston element.

With the parts of the engine in the position illustrated in Figures 1 and 5, a charge of motive fluid enters the compression space 39 between the piston and pressure heads at one side of the piston chamber and the charge previously compressed in the space 40 between the corresponding heads at the opposite side of the chamber is ignited by the spark plug which as usual is connected in an electric circuit with a suitable timing device.

The force of expansion of the ignited charge drives the piston head in the direction of the arrow B owing to the relatively stationary condition of the adjacent pressure head which at this period of the operation, is held by the crank mechanism as will hereinafter be described.

One of the ports 38 in the cylindrical wall of the pressure element is partially in register with the exhaust slot 35 and when said port is uncovered by the moving piston head the spent gases are discharged from the space 40.

During the continued movement of the piston element, the crank mechanism compels the pressure element to move in the same direction but at a relatively increased velocity through an arc of 180 degrees or until the pressure heads have again assumed their operative position illustrated in the drawings.

During this movement, the charge continuously taken into the space 39 during the movement of the piston to the position shown in Figure 6, is compressed owing to the advance of the pressure head at one end of said space toward the piston head at the opposite end of the same and the space containing its compressed charge is brought in register with the ignition opening after which the pressure element is again held against rotation as before and the piston-element is again impelled by the impulse of the ignited fuel upon its respective piston head.

It will thus be seen that during each revolution of the piston element its heads are subjected to two impulses and that accordingly the engine is in this respect the equivalent of a four cylinder reciprocating engine.

The pressure element assumes during each revolution two operative positions during which it is held against rotation for a certain period while the piston element continues its rotary movement.

The position of the crank mechanism which effects the intermittent movement of the pressure element, as illustrated in Figure 1, corresponds with the position of the piston element and the pressure element shown in Figure 5, and the broken line position of the crank movement likewise shown in Figure 1 corresponds with one of the two partitions of the rotary elements delineated in Figure 6.

During the movement of the crank arm 24

to the position indicated by the broken line C in Figure 1, the slide block moves outwardly in the slot thereof thereby causing the connecting rod to move about its pivot on the crank while the latter remains stationary. During the continued movement of the arm 24, the slide block is forced to move inwardly and the crank 25 is rotated until the parts reach the position indicated by the broken line D, which corresponds with the full line position.

Inasmuch as the crank 25 is compelled to follow the elliptical track 31, its velocity will correspondingly exceed that of the arm 24 with the result that the pressure element with which the short crank is connected will rotate at a greater speed than the piston element on the shaft upon which the longer crank is mounted.

During the movement of the cranks from the position D to that shown in broken lines, the crank 25 is again stationary while the crank 24 continues its movement and it will be apparent that in this manner a continuous movement of the shaft imparted thereto by the impulses of the motive fluid upon the piston element is combined with intermittent movements of the pressure element at an increased velocity.

The crank case 4 has in an opening at its top, an apertured screw-plug 41 which provides a breathing-opening for the escape of gases from the spaces 21 between the piston heads and pressure heads, to the atmosphere, thereby relieving back pressure which might be created by leakage of the motive fluid.

The ducts 22 and 23 in the hub of the piston element and the shaft moreover establish a constantly open connection between the reservoir of the crank case and the spaces 21 to provide for a circulating movement of a fluid lubricant between them.

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

1. In a rotary engine, the combination of a housing defining a circular piston chamber having in its circular wall an intake port, an exhaust port and an opening containing a spark plug, the intake port and the said opening being disposed diametrically opposite each other, a cylindrical member of annular cross-section revolubly mounted within the piston chamber, said member having two oppositely disposed ports adapted to alternately register with the said exhaust port and two oppositely disposed ports adapted to alternately register with the said intake port and the said spark plug opening respectively, a rotary piston comprising a cylindrical hub portion and two radially oppositely extending piston vanes, two oppositely disposed resistance heads extending inwardly from the cylindrical member into bearing contact with the hub portion, and mechanism disposed without the piston chamber and connected between the piston and the cylindrical member for translating a substantially uniform motion of the former into intermittent movements of the latter having a rate of velocity greater than that of the piston.

2. A rotary engine comprising a casing having a ported circular piston chamber, a piston element having a plurality of piston heads, a pressure element having a corresponding number of pressure heads, said elements being mounted to rotate in said chamber and adapted to hold a lubricant in alternate spaces between their respective heads, and means to cause the pressure elements to move periodically at an increased velocity during the rotary motion of the piston element.

3. A rotary engine comprising a casing having a ported circular piston chamber, a piston element having a plurality of piston heads, a pressure element having a corresponding number of pressure heads, said elements being mounted to rotate in said chamber and adapted to hold a lubricant in alternate spaces between their respective heads, the spaces being in communication with the atmosphere, and means to cause the pressure element to move periodically at an increased velocity during the rotary motion of the piston element.

4. A rotary engine comprising a casing having a ported circular piston chamber and a lubricant reservoir exteriorly of said chamber, a piston element having a plurality of piston heads, a pressure element having a corresponding number of pressure heads, said elements being mounted to rotate in the chamber, a shaft for the piston element, passing through the reservoir, and having a duct connecting alternate spaces between the respective heads of the elements with the reservoir, and means to cause the pressure element to move periodically at an increased velocity during the rotary motion of the piston element.

In testimony whereof I have affixed my signature.

CLOYD LELAND KINDER.