

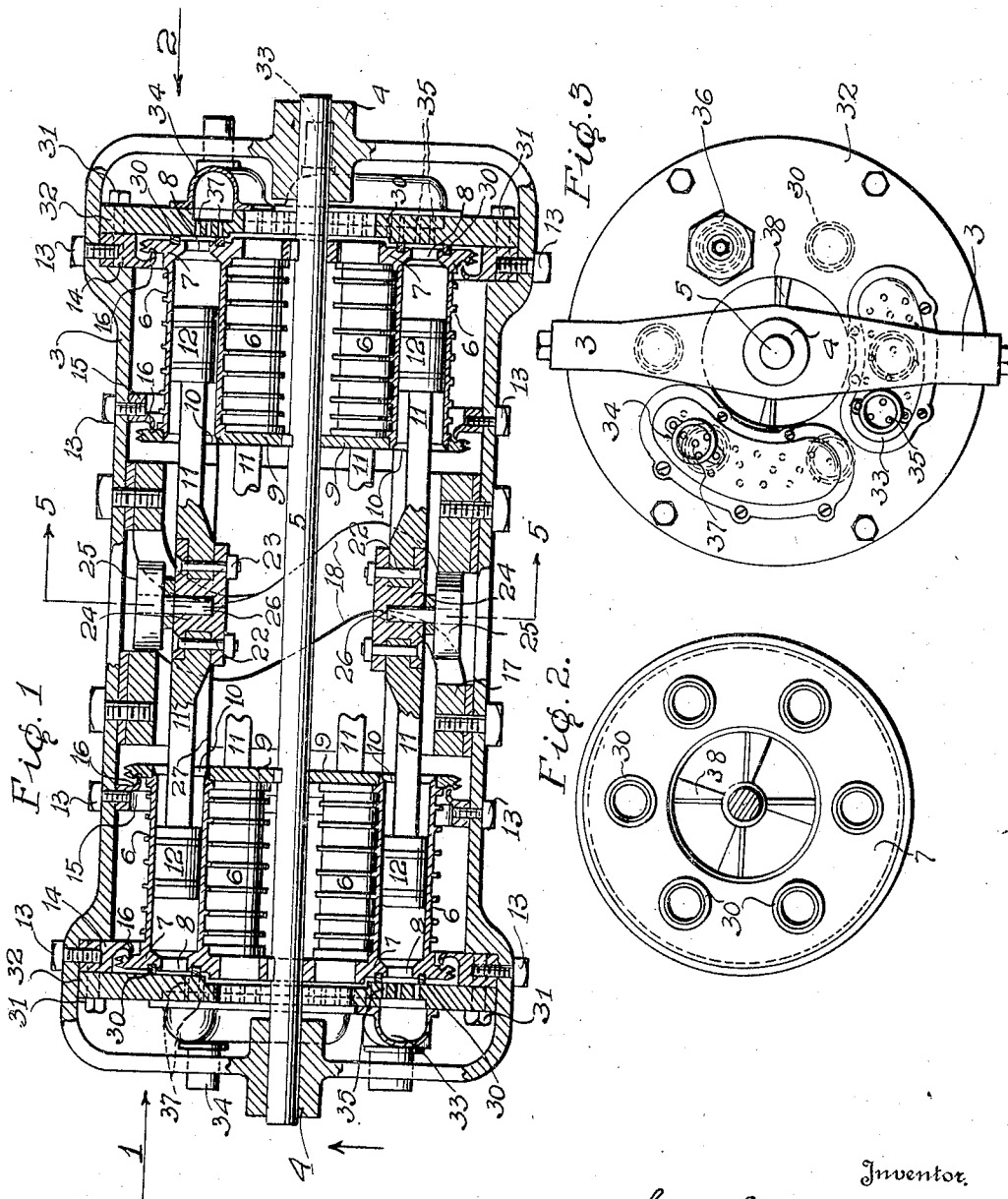
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I. L. OWENS  
ROTARY ENGINE

Filed April 26, 1922

2 Sheets-Sheet 1



Inventor,

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2 Sheets-Sheet 2

Fig. 4.

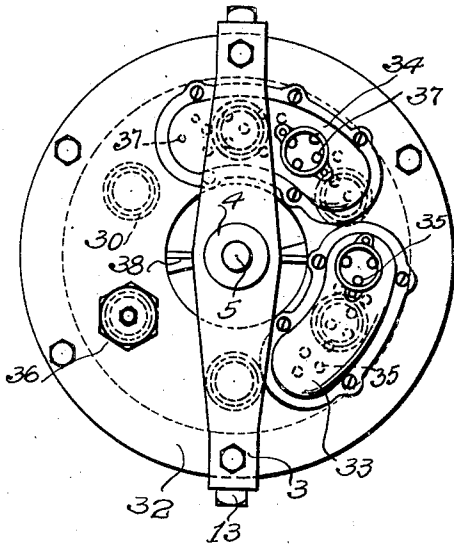


Fig. 5.

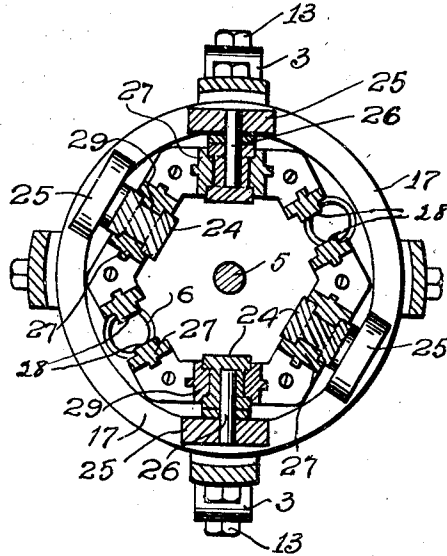
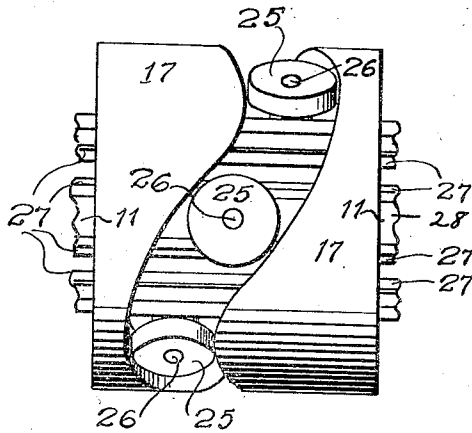


Fig. 6.



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# UNITED STATES PATENT OFFICE.

IVAN L. OWENS, OF WYTHEVILLE, VIRGINIA.

## ROTARY ENGINE.

Application filed April 26, 1922. Serial No. 556,807.

*To all whom it may concern:*

Be it known that I, IVAN L. OWENS, a citizen of the United States, residing at Wytheville, in the county of Wythe and State of Virginia, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to internal combustion engines of the rotary type and is especially designed for use in connection with automobiles and aeroplanes, but may be utilized for any other suitable purposes.

The prime object of the invention is to provide a simple, strong, durable, economical, and efficient engine, that shall be lighter and more compact in construction and specially adapted for the use intended.

Further objects of the invention are to so construct my improved engine that the use of valves in connection therewith is entirely eliminated, and all lateral and rotary movement of the pistons and piston rods is practically obviated.

The foregoing and such other objects as may appear from the ensuing description are accomplished by the novel features of construction, arrangement, location and combination of parts hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the claims appended hereto, it being understood that slight changes in the precise form, proportions, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings forming a part of this specification it will be seen that:—

Figure 1 is a longitudinal section of the engine embodying my invention, showing the supporting frame at each end thereof partly in section and partly in side elevation.

Figure 2 is an end elevation of the outer cylinder head to which is united a group of cylinders.

Figure 3 is an end elevation looking in the direction of the arrow 1, Figure 1.

Figure 4 is an end elevation looking in the direction of the arrow 2, Figure 1.

Figure 5 is a transverse section taken in the plane of the dotted lines 5—5, Figure 1, and

Figure 6 is a detail plan of the cam cylinder and stationary slide-ways, showing the said slide-ways broken away near each end thereof.

Similar numerals of reference are employed to designate like parts throughout the several views of the drawings.

In the embodiment of my invention as illustrated, and which shows a preferred construction, the numeral 3 indicates an outer metal frame formed with intermediate bearing members 4 adapted to support a revoluble drive shaft 5. It will be perceived that this engine is of a multi-cylinder type consisting of twelve cylinders arranged in opposed groups of six cylinders, and is an engine working on the four stroke cycle in which the four strokes are performed during one complete revolution of the drive shaft to which shaft is suitably and fixedly secured the cylinder heads carrying all of the said cylinders, as hereinafter described.

Secured to the outer end of each group of cylinders 6 is an annular metal head-frame 7 which is keyed or otherwise fixedly secured to the drive shaft 5, said head-frame having an opening 8 formed therethrough at the outer end of each cylinder for the entrance of the explosive mixture, and suitably and fixedly secured to the inner end of each group of cylinders is a metallic disk member 9, which is also fixedly secured to the drive shaft and provided with an opening 10 at the inner end of each cylinder for the reception of a piston rod 11 and piston 12 within each cylinder. Rigidly secured to the frame 3 between the head-frame 7 and disk member 9 and adjacent thereto, respectively, by suitable screw-bolts 13, are the rings 14 and 15, each of which is preferably provided with an upturned extension 16 adapted to catch and retain the lubricant used in the proper lubrication of the parts.

Fixedly secured to the frame 3 within said frame is a hollow cam drum or cylinder 17, provided with a sinuous cam slot 18 formed through its cylindrical wall, and a piston rod 11 is arranged in reciprocating relation to each cylinder, each pair of pis-

ton rods being longitudinally alined with the opposed cylinders 6, the outer end of each piston rod carrying a piston 12 slidably disposed within one cylinder, while the inner end of each alined pair of piston rods is rigidly secured by suitable bolts 22 and securing nuts 23 to H-shaped slide blocks 24, having rollers 25 removably mounted thereon by suitable pins 26, each of said rollers being adapted to respectively enter into and ride in the cam slot 18 of said fixed cam drum or cylinder 17. Disposed between the disk members 9 and rigidly secured thereto are stationary guide members 27 adapted to provide longitudinal slide-ways 28 for said respective slide-blocks 24, each guide member 27 being provided with an extension 29 fitted into a recess formed in the said slide blocks, thereby serving to prevent any lateral or rotary movement of the slide blocks and the piston rods secured thereto, as clearly shown in Fig. 5.

Surrounding each opening 8, formed through each of the head-frames 7, and rigidly secured to said head-frame in any suitable or desirable manner is a spring ring 30 formed in a manner similar to the well known piston rings for the purpose hereinafter described.

Mounted securely to the frame at the outer side of each head frame 7, by suitable bolts 31, is a metallic disk 32 adapted to rest in light contact with each of the said rings 30, each of said disks having a series of perforations formed therethrough for the passage of the fuel and the exit of the exhaust, and each disk 32 is formed with a large central opening therethrough for the admission of air to prevent the cylinders from being overheated.

Properly associated with each group of cylinders and connected with the outer face of each disk 30 is a fuel intake manifold member 33 and an exhaust manifold member 34 so positioned with respect to the perforations formed through said disks, that when the fuel mixture is fed through the perforations 35 said mixture will be conveyed by the revolution of its respective cylinder and between the ring 30 and the inner wall of the disk to the usual electric ignition plug 36, the rotary movement of the cylinders being so accurately timed that when the fuel charge is properly compressed it has reached the ignition or spark plug and is fired, the exhaust or spent gases being forced by the outward movement of the piston through the exhaust openings or perforations 37 into and through the exhaust manifold, thereby dispensing with the use of the ordinary intake and exhaust valves usually employed in connection with rotary engines.

It will be seen that this engine includes

a rotating drive shaft to which is mounted two sets of cylinders arranged in opposed groups, all of said cylinders rotating with the shaft, with one group positioned on each side of the fixed cam drive secured to the frame, said cam drive operating a series of slidable blocks to each of which is rigidly fitted one end of two piston rods in alinement, each rod carrying a piston at its outer end, adapted to reciprocate within its respective cylinders, and each slidable block is provided with a centrally arranged removable roller secured thereto by a suitable pin, each roller being fitted within a cam slot so that it engages the inner walls of the said cam slot, thus causing each sliding block and its piston rods and pistons to be reciprocated back and forth within their respective cylinders.

By reference to Figs. 2, 3 and 4 it will be observed that each head frame 7 is provided with a series of fan blades 38, said blades in each head being inclined in opposite directions and adapted to suck cold air through the central opening in each of the disks 30 and forcing the said air to circulate around the group of cylinders, thus serving to prevent the overheating of said cylinders.

The operation of my novel engine may be briefly described as follows:—

Referring to Fig. 1, it will be seen that the two opposed pistons shown at the top are resting in a position about midway between the dead centers and when the cylinders are rotated 45° in the direction of the arrow, Fig. 1, said pistons will be in their respective dead centers, that is, the piston at the right will be at its outer dead center or will have just finished its exhaust stroke or cycle, and when the said piston has finished its exhaust stroke, it is caused to revolve with its respective cylinder 90° which rotation causes the piston to reach its inner dead center thus completing the intake stroke or cycle, and is then caused by the cam drive to revolve 90° causing it to reach its outer dead center which completes the compression stroke or cycle, when the combustible charge is ignited by the spark plug, the resulting explosion driving said piston toward its inner dead center thereby forcing the cylinders and their respective pistons to rotate 90° thus completing the power stroke or cycle and causing said piston to assume its inner dead center position, from which point it is forced to rotate 45° which causes the piston to assume a position between its inner and outer centers, and forces the said piston to advance 45° on its exhaust stroke, thereby completing one complete revolution of the drive shaft and four cycles. Each piston in the right hand group of cylinders performs the same functions at the same points in making one com-

plete revolution, and the pistons in the left hand group of cylinders being adapted to operate and perform the same functions as those in the right hand group, except that the firing point is 90° from the firing point of the right hand group.

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

1. A rotary engine of the character described, comprising a stationary exterior frame extending throughout the length of the engine, a hollow cam cylinder fixedly secured to said frame within the frame, said cam cylinder being formed with a cam slot forming a sinuous abutment, a solid centrally disposed driving shaft mounted at each end of the frame, a series of cylinders disposed at each side of said cam cylinder and rotatable with said shaft within said frame, pistons for said cylinders, a disk secured to the inner end of each series of cylinders, a series of slideways rigidly secured to each disk, a series of H-shaped slide-blocks mounted on said slideways, and a roller removably mounted on each slide-block for slidably operating said pistons.

2. A rotary engine of the character described, comprising a stationary exterior frame extending throughout the length of the engine, a hollow cam cylinder fixedly secured to said frame within the frame, a sinuous abutment formed in said cam cylinder, a solid centrally disposed driving shaft mounted at each end of the frame, a series of cylinders disposed at each side of the cam cylinder and rotatable with said shaft within the frame, pistons for said cylinders, a disk secured to the inner end of each set of cylinders, an integral grooved disk at the outer end of each set of cylinders, a series of slideways rigidly secured to each inner disk, a series of H-shaped slide-blocks mounted on said slideways, and a roller removably mounted on each slide-block within said abutment for slidably operating the pistons.

3. A rotary engine of the character described, comprising a stationary exterior

frame, a cam cylinder within the frame and fixedly secured thereto, a series of revoluble cylinders mounted at each side of the cam cylinder on a solid shaft and rotatable within the frame, a head frame forming the outer end of each set of cylinders provided with openings leading to the cylinders, a perforated disk secured within the frame to each end portion thereof, a fuel intake manifold secured to the outer side of each disk to permit the introduction of fuel through one set of perforations, and an exhaust manifold secured to the outer face of each disk for the discharge of exhaust through the other set of perforations.

4. A rotary engine of the character described, comprising a stationary exterior frame, a cam cylinder within the frame and fixedly secured thereto, a series of cylinders mounted at each side of the cam cylinder on a solid shaft and rotatable within the frame, a disk secured to the inner end of each series of cylinders, a head frame forming the read end portion of each series of cylinders, a ring fixedly secured to the frame adjacent each of said disks, a ring secured to the frame adjacent each head frame, each of said rings being provided with an annular inwardly curved extension for retaining a lubricant.

5. A rotary engine of the character described, comprising a stationary exterior frame, a cam cylinder within the frame and centrally fixed thereto, a series of cylinders mounted at each side of the cam cylinder on a solid shaft and rotatable within the frame, a disk secured to the inner end of each series of cylinders, a head frame forming the outer end of each series of cylinders, each head frame being formed with a series of annular grooves in its outer face for the reception of spring rings therein, a disk within the frame at each end portion thereof and fixedly secured thereto, a central opening formed through each of the last named disks, and a plurality of fan blades secured to said shaft and disposed within said central openings.

IVAN L. OWENS.