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PATENT SPECIFICATION

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(54) ROTARY INTERNAL-COMBUSTION ENGINE

(71) I, GOH HIOU LEE, a citizen of Singapore, of 15 Lorong Siglap, Singapore 15, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to rotary internal-combustion engines.

According to the present invention there is provided a rotary internal-combustion engine comprising a casing defining an oval working chamber and a rotor mounted in the chamber for simple rotation about the chamber axis and resilient sealing means on the rotor to cooperate with the curved chamber wall to provide suction through an inlet port in the casing, compression and expansion, and exhaust through an outlet port in the casing during rotation of the rotor, wherein the sealing means include first arcuate sealing means slidable mounted in the rotor to contact the curved chamber wall surface and second arcuate sealing means recessed into the first arcuate sealing means and projecting through groove means in each end face of the rotor to contact the end chamber wall surface.

Preferably four further arcuate seal parts are mounted in recesses in each end face of the rotor to form on each rotor face a compression ring interrupted only by the second sealing means.

The first sealing means may comprise four arcuate sealing members slidably mounted in pairs in two arcuate passages in the rotor, the members of each pair being spring urged apart into contact with the curved chamber wall surface.

The second sealing means may consist of an arcuate seal part on each arcuate face of each sealing member, the seal parts of each adjacent pair being spring urged apart into contact with the curved chamber wall surface.

Each arcuate seal part is desirably provided with a wavy leaf spring under the seal to support it afloat for close contact

with the end chamber wall surface for air tight sealing.

For a better understanding of the invention and to show how the same may be carried into effect, reference is made to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of an engine of the invention showing the casing, rotor, rotor sealing members and compression seals,

Figure 2 is a cross-section of the engine,

Figure 2a shows a detail of Figure 2,

Figure 3 shows a separate, perspective, view of the rotor,

Figure 4 shows a similar view of a pair of sealing members, and

Figure 5 shows a similar view of a pair of compression seals and additional compression seal.

Referring to Figure 1, the engine has a casing 1 defining an oval working chamber, a combustion chamber 2 with spark plug not shown, an inlet port 3 and an exhaust port 4 and has a rotor 5. The rotor is keyed to a shaft 6 which is supported for simple rotation (i.e. non-eccentric rotation) about the axis of the chamber and is provided with four sliding sealing members 7 A, B, C and D spaced equally about the rotor axis.

As shown in Figure 2, the rotor shaft 6 is supported in bearings 8 in the engine casing which itself consists of two side plates 9 bolted to a finned barrel 10. The bearings are secured by retaining nuts 11 and are covered with end caps 12, oil seals also being provided at 13. The shaft carries a bladed starter pulley 14 and a combined generator pulley and flywheel 15 at one end and an ignition cam 16 for operating a contact breaker 17 at the other end. The shaft is also provided with a longitudinal passage 18 which establishes a connection between chambers formed by the caps 12 and a central reservoir 19 to form a lubrication system. This is supplied through a filler 20 and also includes oil ways 21 leading from the reservoir 19.

Turning now to Figures 3, 4 and 5 each

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pair of sealing members 7 is seated in an arcuate passage 21 in the rotor for sliding motion caused by the curved chamber wall surface when the rotor rotates and the members of each pair are urged apart and into contact with the chamber wall surface by an expansion spring 7a. The rotor is made up of two cylindrical parts bolted together to facilitate the forming of the passages 21 and is also formed with upper and lower peripheral grooves 22 for arcuate compression seals 23 which themselves seat in recesses 24 in the sealing members 7 and also recesses 25 on the rotor end faces for further arcuate compression seals 26. Both the seals 23 and 26 have wavy leaf springs at their bases to support them afloat for close contact with the end wall surface of the working chamber. Actually each seal 23 is comprised of two parts 23a separated by an expansion spring 23b to urge the parts into contact with the curved chamber wall surface also. Lastly the rotor incorporates four combustion recesses 27.

In operation of the engine, the rotor 5 carrying the four sealing members 7 A, B, C, D rotates in the clockwise direction as seen in Figure 1. The sealing member 7 D is moving past the inlet port 3, creates a vacuum and sucks in air-fuel mixture from a carburettor (shown diagrammatically at 28) behind it. Sealing member 7 D carrying a full charge of air-fuel behind it (inlet stroke) is followed by sealing member 7 A which compresses the air-fuel between it and the sealing member 7 D (compression stroke) due to the shape of the working chamber and at the same time sealing member 7 A sucks in a further air-fuel charge behind it. On reaching the combustion chamber 2, the compressed mixture in the combustion recess 27 between sealing members 7 D and 7 A is ignited by the spark plug causing the first combustion/expansion (combustion stroke) forcing the sealing member 7 D with the rotor to spin and to force out the spent gas from the previous combustion between the sealing members 7 D and 7 C through the exhaust port 4 (exhaust stroke).

Whilst sealing members 7 D and 7 A were completing their inlet, compression, combustion and exhaust strokes, the sealing member 7 B following behind was compressing the air-fuel mixture between it and the sealing member 7 A and at the same time, sucking in a further air-fuel charge behind it. On combustion of this charge, the first charge between the sealing member 7 A and 7 D is exhausted through the exhaust port 4. After the first half revolution by the sealing members 7 A and 7 B, the next sealing members 7 C and 7 D will perform the four described strokes likewise and complete the next half revolution. Thus a

total of four inlet strokes, four compression strokes, four combustion strokes and four exhaust strokes take place in one revolution of the rotor.

The supply of fuel is from an electric pump via the carburettor 28 provided with an air filter in the usual manner. The ignition is controlled by the four lobed cam 16 on the rotor shaft in cooperation with the contact breaker 17 connected to a coil. This dispenses with a distributor assembly (since this engine has a single plug), timing chains and gears. A high tension wire will connect the spark plug to the coil in the usual manner.

Lubrication is also provided by the above-mentioned lubrication system in which oil is drawn from a tank and, utilising gravitational force, is caused to flow via the oil filler to the two oil chambers at each end of the rotor shaft and to the reservoir 19 where it is stored. When the rotor is spinning, the resulting centrifugal force will throw the oil from the reservoir 19 through the oilways 21 to the various points requiring lubrication.

WHAT I CLAIM IS:—

1. A rotary internal-combustion engine comprising a casing defining an oval working chamber and a rotor mounted in the chamber for simple rotation about the chamber axis and resilient sealing means on the rotor to cooperate with the curved chamber wall to provide suction through an inlet port in the casing, compression and expansion, and exhaust through an outlet port in the casing during rotation of the rotor, wherein the sealing means include the first arcuate sealing means slidably mounted in the rotor to contact the curved chamber wall surface and second arcuate sealing means recessed into the first arcuate sealing means and projecting through groove means in each end face of the rotor to contact the end chamber wall surface.

2. A rotary engine as claimed in claim 1, wherein four further arcuate seal parts are mounted in recesses in each end face of the rotor to form on each rotor end face a compression ring interrupted only by the second sealing means.

3. A rotary engine as claimed in claim 1 or 2, wherein the first sealing means comprise four arcuate sealing members slidably mounted in pairs in two arcuate passages in the rotor, the members of each pair being spring urged apart into contact with the curved chamber wall surface.

4. A rotary engine as claimed in claim 3, wherein the second sealing means consist of an arcuate seal part on each arcuate face of each sealing member, the seal parts of each adjacent pair being spring urged apart into



pair of sealing members 7 is seated in an arcuate passage 21 in the rotor for sliding motion caused by the curved chamber wall surface when the rotor rotates and the members of each pair are urged apart and into contact with the chamber wall surface by an expansion spring 7a. The rotor is made up of two cylindrical parts bolted together to facilitate the forming of the passages 21 and is also formed with upper and lower peripheral grooves 22 for arcuate compression seals 23 which themselves seat in recesses 24 in the sealing members 7 and also recesses 25 on the rotor end faces for further arcuate compression seals 26. Both the seals 23 and 26 have wavy leaf springs at their bases to support them afloat for close contact with the end wall surface of the working chamber. Actually each seal 23 is comprised of two parts 23a separated by an expansion spring 23b to urge the parts into contact with the curved chamber wall surface also. Lastly the rotor incorporates four combustion recesses 27.

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Whilst sealing members 7 D and 7 A were completing their inlet, compression, combustion and exhaust strokes, the sealing member 7 B following behind was compressing the air-fuel mixture between it and the sealing member 7 A and at the same time, sucking in a further air-fuel charge behind it. On combustion of this charge, the first charge between the sealing member 7 A and 7 D is exhausted through the exhaust port 4. After the first half revolution by the sealing members 7 A and 7 B, the next sealing members 7 C and 7 D will perform the four described strokes likewise and complete the next half revolution. Thus a

total of four inlet strokes, four compression strokes, four combustion strokes and four exhaust strokes take place in one revolution of the rotor.

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1. A rotary internal-combustion engine comprising a casing defining an oval working chamber and a rotor mounted in the chamber for simple rotation about the chamber axis and resilient sealing means on the rotor to cooperate with the curved chamber wall to provide suction through an inlet port in the casing, compression and expansion, and exhaustion through an outlet port in the casing during rotation of the rotor, wherein the sealing means include the first arcuate sealing means slidably mounted in the rotor to contact the curved chamber wall surface and second arcuate sealing means recessed into the first arcuate sealing means and projecting through groove means in each end face of the rotor to contact the end chamber wall surface.

2. A rotary engine as claimed in claim 1, wherein four further arcuate seal parts are mounted in recesses in each end face of the rotor to form on each rotor end face a compression ring interrupted only by the second sealing means.

3. A rotary engine as claimed in claim 1 or 2, wherein the first sealing means comprise four arcuate sealing members slidably mounted in pairs in two arcuate passages in the rotor, the members of each pair being spring urged apart into contact with the curved chamber wall surface.

4. A rotary engine as claimed in claim 3, wherein the second sealing means consist of an arcuate seal part on each arcuate face of each sealing member, the seal parts of each adjacent pair being spring urged apart into



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contact with the curved chamber wall surface.

5 5. A rotary engine as claimed in claim 2 or and dependent claim thereof, wherein each arcuate seal part is provided with a wavy leaf spring under the seal.

10 6. A rotary engine as claimed in any preceding claim, incorporating a lubrication system comprising an oil tank external to the rotor and casing, an oil inlet connected to the tank and leading into an oil cage in the casing which cage surrounds the shaft of the rotor, a longitudinal passage in the shaft which provides a communication between the oil cage and a reservoir in the rotor and oil ways leading from the reservoir.

15 7. A rotary engine as claimed in claim 3 or any dependent claim thereof, wherein a four lobed cam is mounted on the shaft of

the rotor to cooperate with an igniton contact breaker on the casing.

8. A rotary internal-combustion engine substantially as hereinbefore described with reference to the accompanying drawings.

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