



Publication number:

0 424 104 A1

12

EUROPEAN PATENT APPLICATION

21 Application number: **90311339.7**

51 Int. Cl.⁵: **F01C 1/344**

22 Date of filing: **16.10.90**

30 Priority: **18.10.89 JP 272484/89**
22.02.90 JP 42132/90
28.05.90 JP 56210/90

43 Date of publication of application:
24.04.91 Bulletin 91/17

84 Designated Contracting States:
DE FR GB IT SE

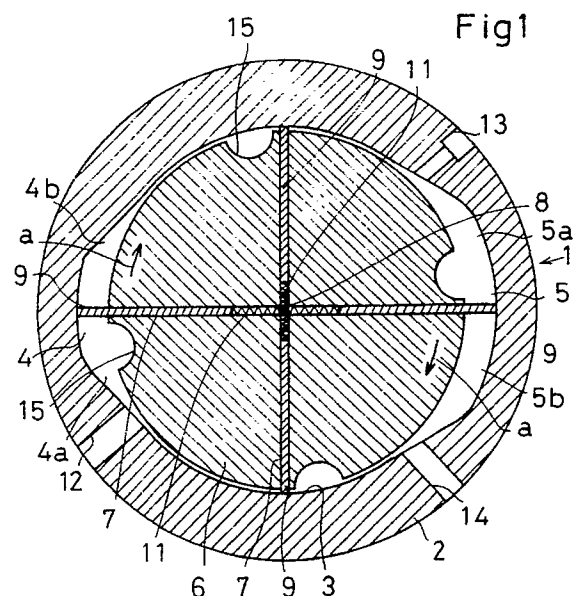
71 Applicant: **Hayashitani, Kaoru**
35-242, Iwase
Kawachinagano-shi, Osaka-fu(JP)

72 Inventor: **Hayashitani, Kaoru**
35-242, Iwase
Kawachinagano-shi, Osaka-fu(JP)

74 Representative: **Brown, John David et al**
FORRESTER & BOEHMERT
Widenmayerstrasse 4/I
W-8000 München 22(DE)

54 **Rotary engine.**

57 The present invention relates to a rotary engine (1) wherein the inside radius of part (3) of a housing (2) having cylinder-like inside wall is enlarged so as to form part of a concentric circle of the circle formed by the inside wall and a suction chamber (4) and a combustion chamber (5) are formed, the capacity of the suction chamber is larger than the capacity of the combustion chamber, explosion energy can be effectively transformed, a rotor (6) does a circular rotation movement directly by the explosion energy, and explosion at an inappropriate time is prevented, so that fuel consumption is substantially saved and improved and effective and smooth driving force can be obtained.



EP 0 424 104 A1

ROTARY ENGINE

2. BACKGROUND OF THE INVENTION

a. Field of the Invention

The present invention relates to a rotary engine wherein the forms of a housing and a rotor rotating in the housing are simple, a capacity ratio of a suction chamber and a combustion chamber can be freely set, blades in blade channels which are in radial directions and which go through the center of the rotor are closely in contact with the inside surface of the housing, and the gap between a blade separating a compression chamber from an explosion chamber and the inside surface of the housing is not enlarged by explosion pressure in the explosion chamber and the explosion pressure does not leak in the compression chamber, so that explosion at an inappropriate time is prevented, stable rotation is obtained, and the fuel consumption can be substantially saved and improved.

b. Disclosure of Prior Art

Conventionally, there are various rotary engines of this kind. A typical example of a rotary engine of this kind which has been put to practical use is a Wankel-type rotary engine. In a Wankel-type rotary engine, a triangular rotor the surface of which is made up of peritrochoid internal envelope is rotated along the inside wall of a cocoon-shaped housing made up of peritrochoidal curve, and when an internal gear disposed in the middle of the rotor is engaged with and rotates around a fixed external gear, an output axis having an eccentric rotor axis neck portion is rotated. Since a rotor made up of peritrochoid internal envelope is rotated along the inside wall of a housing made up of peritrochoidal curve, the maximum capacity of a suction chamber and the maximum capacity of a combustion chamber is the same, fuel mixture sucked in the suction chamber is compressed and has the minimum capacity, the fuel mixture is ignited and explodes at that time, the explosion force rotates the rotor, and the fuel mixture having the minimum capacity explodes in the combustion chamber the capacity of which is the same as the maximum capacity of the suction chamber. Accordingly, part of the explosion energy is used to rotate the rotor, but the rest of the explosion energy is discharged from an exhaust hole without being used. A Wankel-type rotary engine has, therefore, a fault that, since explosion energy which is available can not be effectively used and radiated without being used, the

thermal efficiency is low and the cost of fuel is high. A Wankel-type rotary engine also has a structural fault that one rotation of a rotor generates only one explosion of energy.

In a Wankel-type rotary engine, an apex seal as a gas seal is inserted and engaged at each of the apexes of the triangular rotor through an elastic member so that the apex seals may rise and sink freely and may be closely in contact with the inside wall of a housing. Further, in a rotary engine wherein blades are inserted and engaged in blade channels which blade channels are in radial directions and go through or toward the center of a rotor, the inside wall of a housing along which the rotor rotates is symmetrical. Since the maximum capacity of a suction chamber and the maximum capacity of a combustion chamber is the same, this kind of a rotary engine has the same fault as that of a conventional rotary engine. In this kind of a rotary engine, gas seal for maintaining airtightness between the tip portions of blades and the inside wall of a housing is attained by pushing the blades in blade channels outward from a rotor against the inside wall of a housing by elasticity of springs or by centrifugal force acting on the blades.

3. SUMMARY OF THE INVENTION

The present invention is to enlarge part of the inside radius of a cylinder-like housing having cylinder-like inside wall, form a suction chamber and a combustion chamber, dispose a suction hole at the former end portion of the suction chamber, an ignition device at the former end portion of the combustion chamber, and an exhaust hole at the latter end portion of the combustion chamber, respectively, make the capacity of the combustion chamber large compared with the capacity of the suction chamber, insert and engage blades which can advance and retreat freely in the direction toward the inside wall of the housing in blade channels in radial directions which go through the center of a cylinder-like rotor capable of being inserted and engaged in the cylinder-like housing, and form protruding portions on the surface of the rotor in front of and at the back of the blade channels going through the center of the rotor in the rotation direction of the rotor which protruding portions are closely in contact with the circular inside surface of a connection portion of a compression chamber and the combustion chamber of the housing.

A first object of the present invention is to provide a rotary engine which can attain a maxi-

imum energy efficiency in which a suction chamber and a combustion chamber are formed by enlarging part of the inside radius of a cylinder-like housing having cylinder-like inside wall, and the capacity ratio of the suction chamber and the combustion chamber can be freely set and explosion energy can be effectively transformed into rotation energy.

A second object of the present invention is to provide an effective rotary engine with small mechanical loss wherein a rotor begins circular rotation movement directly by explosion energy and no transmission means such as a gear is necessary.

A third object of the present invention is to provide a rotary engine wherein a gap between a tip of a blade separating a compression chamber from an explosion chamber and the circular inside surface of a connection portion of the compression chamber and the combustion chamber of the housing which tip of a blade and inside surface of the connection portion are in close contact with each other is not enlarged by explosion pressure and compressed gas does not explode in the compression chamber, that is, does not explode at an inappropriate time and a rotor rotates with stability.

A fourth object of the present invention is to provide a rotary engine wherein each of suction, compression, explosion and discharge processes occurs continuously in each chamber separated from each other by blades during one rotation of a rotor, thus the rotor rotates without nonuniformity, and explosion energy can smoothly be transformed into rotation energy.

4. BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described with reference to the attached drawings:

Fig. 1 is a diagrammatic partial vertical sectional view of a four bladed rotary engine when a gear is in neutral wherein springs lie in the middle of blade channels;

Fig. 2 is a diagrammatic partial vertical sectional view of the rotary engine of Fig. 1 just before an explosion;

Fig. 3 is a partial enlarged sectional view of a base end portion of a blade;

Fig. 4 is a diagrammatic partial vertical sectional view of a three bladed rotary engine just before an explosion provided with space for confining explosion pressure in the middle of a rotor;

Fig. 5 is a partial enlarged sectional view of a three bladed rotor different from the embodiment shown in Fig. 3 wherein space for confining explosion pressure is provided with bulkhead;

Fig. 6 is a partial enlarged sectional view of a three bladed rotor different from the embodi-

ment shown in Fig. 3 wherein holes are bored in the bulkhead of space for confining explosion pressure;

Fig. 7 is a partial enlarged sectional view of a three bladed rotor different from the embodiment shown in Fig. 3 wherein devices for adjusting the degree of aperture are additionally provided in the holes bored in the bulkhead of space for confining explosion pressure;

Fig. 8 is a diagrammatic partial vertical sectional view of the four bladed rotary engine of Fig. 1 when a gear is in neutral wherein protruding portions are formed on the surface of the rotor in front of and at the back of each of the blade channels in the direction of the rotation of the rotor which blade channels has springs inside, the protruding portions utilizing protruding boards;

Fig. 9 is an enlarged perspective view of one of the protruding boards of Fig. 8;

Fig. 10 is an enlarged partial vertical sectional view showing another embodiment of the protruding portions wherein the protruding portions are washer based protrusions; and

Fig. 11 is an enlarged partial vertical sectional view showing another embodiment of the protruding portions wherein the protruding portions are formed at a rotor.

5. DETAILED DESCRIPTION OF THE INVENTION

The present invention has been made to attain the abovementioned objects, and embodiments of the present invention will be described in detail according to the attached drawings.

(Embodiment 1)

The present embodiment is shown in Figs. 1 - 3. In the embodiment, springs lie in blade channels in radial directions of a rotor.

A housing 1 comprises a cylinder-like body 2 having cylinder-like inside wall 3. The inside radius of two inside surface portions opposite to each other are enlarged to form portions of a concentric circle of the circle formed by the cylinder-like inside wall 3, one portion being about 30° by central angle and the other portion being about 60° by central angle. Both of the end portions of the enlarged portions smoothly lead to the cylinder-like inside wall 3 and a suction chamber 4 and a combustion chamber 5 are formed. The combustion chamber 5 has larger capacity than the suction chamber 4. A rotor 6 is cylinder-like and inserted and engaged in the cylinder-like inside wall 3. Blade channels 7 are radially bored so as to go

through the center of the rotor 6 and to be at right angles to each other. A bottom portion 8 fixed at the portion where the blade channels 7 cross each other divides each of the blade channels 7 into two equal portions. Each of blades 9 is inserted and engaged in each of the blade channels 7 divided into equal two portions. At the tip portion of each of the blades 9, an apex seal made of new ceramic (not shown) is inserted and engaged so as to maintain the airtightness and to decrease friction between itself and the inside surface of the housing 1. At the base end portion of each of the blades 9, a seal 10 for containing explosion pressure as shown in Fig. 3 is additionally provided, so as to prevent explosion pressure from leaking in the base end portion through the blade channels 7. Springs 11 lie between the base ends of the blades 9 and the bottom portion 8 where the blade channels 7 cross each other. The springs 11 are for pushing the tip portions of the blades 9 against the inside surface of the housing 1 mainly when the rotor 6 is not in motion and when the rotor 6 rotates at a low speed. When the rotor 6 rotates at a high speed, coupled with centrifugal force which acts on each of the blades 9, the springs further maintain the airtightness between each of the tips of the blades 9 and the inside surface of the housing 1. When the airtightness between each of the tips of the blades 9 and the inside surface of the housing 1 can be maintained by centrifugal force which acts on each of the blades 9 and which is caused by the rotation of the rotary engine by a starter when starting, the springs 11 can be omitted. Here, by the blades 9 which go through the inside of each of the suction chamber 4 and the combustion chamber 5, the suction chamber 4 is utilized as an air suction chamber 4a and a compression chamber 4b, and the combustion chamber 5 is utilized as an explosion chamber 5a and an exhaust chamber 5b. Air suction hole 12 is bored in the housing 1 at the former end portion of the suction chamber 4 in the rotation direction a of the rotor 6 and suck fuel mixture. The air suction hole 12 may be a blowing system provided with a fuel injection equipment. An ignition equipment 13 is provided in the housing 1 at the former end portion of the combustion chamber 5 in the rotation direction a of the rotor 6 and comprises a spark plug, etc. (not shown). The ignition equipment 13 is for igniting and exploding the fuel mixture sucked from the air suction hole 12 by compressing the fuel mixture at the former end portion of the combustion chamber 5 with blades 9 according to the rotation of the rotor 6. Here, when the compressed fuel mixture is ignited and exploded at the former end portion of the combustion chamber 5, the areas of the blades 9 which are adjacent to each other and which form the explosion chamber 5a

with airtightness at the former end side of the combustion chamber 5 are different, and due to the difference of the explosion pressure which acts on the blades 9, the rotor 6 is rotated. An exhaust hole 14 is bored in the housing 1 at the latter end portion of the combustion chamber 5 in the rotation direction a. The exhaust hole 14 is for discharging exhaust gas which is exploded and burned when the compressed fuel mixture is ignited and exploded at the side of the former end portion of the combustion chamber 5. Hollows 15 the section of which is arc-like, etc. bored on the surface of the rotor 6 at the back of each of the blade channels 7 in the rotation direction of the rotor 6 adjacent to each of the blade channels 7 are for adjusting the compressibility. By boring the hollows 15 appropriately, the diameter of the cylinder-like portion of the housing 1 and the diameter of the rotor 6 can be made almost the same, thereby the aforementioned difference of the area of the blades can be enlarged.

The hollows 15 may be bored in the direction of the circumference of the surface of the rotor 6 so as to reach the adjacent blade channels 7 or the vicinity of the adjacent blade channels 7, and may additionally have the function as channels which maintain fuel mixture compressed in the compression chamber 4b at the side of the latter end of the suction chamber 4 by the blades 9 due to the rotation of the rotor 6 after being sucked in the air suction chamber 4a at the side of the former end of the suction chamber 4 and which moves the fuel mixture to the explosion chamber 5a at the former end of the combustion chamber 5.

(Embodiment 2)

The present embodiment is shown in Fig. 4. Springs 11 are not in the blade channels 7 and explosion pressure is utilized in order to maintain the airtightness between the tips of the blades 9 and the inside surface of the housing 1.

1 is the same kind of a housing as the one of the embodiment 1. The inside diameters of a lower portion of one side of the cylinder-like inside wall 3 of the housing 1 and a portion from an upper portion to a lower portion of the other side of the cylinder-like inside wall 3 facing the lower portion are enlarged to form portions of a concentric circle, one at the lower portion of the one side being about 30° by central angle and the other one from the upper portion to the lower portion of the other side being about 130° by central angle. Both of the end portions of the enlarged portions smoothly lead to the cylinder-like inside wall 3 and the same kind of a suction chamber 4 and a combustion chamber 5 as the ones of the embodiment 1 are

formed. 6 is a rotor of the same kind as the one of the embodiment 1. Three blade channels 7 of the same kind as the ones in the embodiment 1 are bored from trisecting points of the circumference of the rotor 6 toward the center of the rotor 6. Blades 9 are of the same kind as the ones in the embodiment 1 and each of the blades 9 are inserted and engaged in each of the blade channels 7. Explosion pressure intake holes 16 are bored from the surface of the rotor 6 at the back of each of the three blade channels 7 in the rotation direction a in parallel with each of the blade channels 7 adjacent to each of the blade channels 7 but not until the explosion intake holes 16 reach the center of the rotor 6. Each of spaces for confining explosion pressure 17 which leads to each of the blade channels 7 are bored from the side in the center of the rotor 6. Interconnecting holes 18 which connects each of the explosion pressure intake holes 16 with the space for confining explosion pressure 17 are bored from the periphery of the rotor 6, have nonreturn valves 19 built in them, and are embedded, etc. so as to be just in front of the explosion pressure intake holes 16 and are blocked. A part of the explosion pressure is taken in the space for confining explosion pressure 17 through the nonreturn valves 19 of the interconnecting holes 18 from the explosion intake holes 16, thereby blades 9 in each of the blade channels 7 are pushed strongly against the inside surface of the housing 1 and the airtightness between the tip of each of the blades 9 and the inside surface of the housing 1 is raised. 12, 13 and 14 are an air suction hole, an ignition equipment and an exhaust hole, respectively, which are the same kind as the ones of the embodiment 1. A round-bar-like divider portion 20 is attached to a portion of the housing 1 between the air suction hole 12 and the exhaust hole 14. The divider portion 20 is provided to raise the airtightness between the suction chamber 4 and the combustion chamber 5 when, as in the present embodiment, the suction chamber 4 and the combustion chamber 5 are adjacent to each other, and the divider portion 20 can be attached so as to rotate together with the rotor 6. The rotation of the rotor 6 is, as in the embodiment 1, caused by the difference in the explosion pressure acting on the blades 9 which are exposed to an explosion chamber 5a on the former end side of the combustion chamber 5 and are adjacent to each other.

(Embodiment 3)

The present embodiment is shown in Fig. 5, in which the explosion pressure in the space for confining explosion pressure 17 of the embodiment 2

is utilized only for maintaining the airtightness between the inside surface of the housing 1 and the blade 9 which separates the compression chamber 4b on the latter end side of the suction chamber and the explosion chamber 5a on the former end side of the combustion chamber 5.

Bulkhead 21, as shown in Fig. 5, divides the inside of the space for confining explosion pressure 17 of Fig. 4. The bulkhead 21 comprises three blades radially formed each of the blades connecting the side nearer to the rotor 6 of each of the interconnecting holes 18 in each of the spaces for confining 17 which interconnecting holes 18 connects the explosion pressure intake holes 16 with the spaces for confining 17 with the center of the rotor 6. The bulkhead 21 makes each of the explosion pressure intake holes 16 connect with a base portion of each of the blade channels 7 adjacent to each of the explosion pressure intake holes 16 in the opposite direction to the rotation direction a of the rotor 6. The bulkhead 21 utilizes explosion pressure only for pushing a blade 9 which is adjacent to the explosion chamber in the opposite direction to the rotation direction of the rotor 6 against the cylinder-like inside wall 3 of the housing 1. Thus, the bulkhead 21 prevents explosion pressure from leaking in the suction chamber 4, and at the same time, makes the force pushing the tip of a blade 9 in the combustion chamber 5 and in the normal direction of the rotation of the rotor 6 against the inside wall of the housing 1 reduced, except when it is appropriate to push the blade 9 against the inside wall of the housing 1, and makes the friction decreased between the tip of the blade 9 and the inside wall of the housing 1 to rotate the rotor 6 with ease.

(Embodiment 4)

The present embodiment is shown in Fig. 6. Holes 22 are provided on the bulkhead 21 and part of explosion pressure is utilized also to maintain the airtightness between the tip portion of a blade 9 in the combustion chamber 5 and the inside surface of the housing 1.

The holes numbered as 22 are bored in the three blades of the bulkhead 21, respectively. By boring said holes 22, explosion pressure which is continuously caused and which acts only on a blade 9 in the opposite direction to the rotation direction of the rotor due to the bulkhead 21 provided as in the embodiment 3 is controlled and utilized so as to act on each of the blades 9 equally, without intermission, and effectively.

(Embodiment 5)

The present embodiment is shown in Fig. 7. Devices for adjusting the degree of aperture 23 are additionally provided at the holes 22 of the bulkhead 21 of the embodiment 4. The degree of the airtightness between the tip of each of the blades 9 in the combustion chamber 5 and the inside surface of the housing 1 is adjusted by remote control of the devices for adjusting the degree of aperture 23.

The devices for adjusting the degree of aperture 23 utilize aperture diaphragms as in a camera, etc. and adjust the degree of aperture of the holes 22 according to the friction between the inside wall of the housing 1 and the tips of the blades 9, which friction depends on the nature, for example, viscosity, of the fuel. When great friction acts, the degree of aperture is made small and the rotation of the blades 9 in the suction chamber 4 and the combustion chamber 5 is made easy.

(Embodiment 6)

The present embodiment is shown in Figs. 8 and 9. The same kind of a housing 1 and a rotor 6 as in the embodiment 1 is used and explosion pressure in the explosion chamber 5a on the former end side of the combustion chamber 5 is prevented from leaking in the compression chamber 4b on the latter end side of the suction chamber 4. Circular inside surface 24 is a part of the cylinder-like inside wall 3 and connects the compression chamber 4b on the latter end side in the rotation direction α of the rotor 6 of the suction chamber 4 with the explosion chamber 5a of the former end side in the rotation direction α of the rotor 6 of the combustion chamber 5. Four blades 9 can freely advance and retreat in the blade channels 7 by springs 11 laid between the base portion of the crossing portion of the cross-shaped blade channels 7 and the blades as in the embodiment 1. A blade 9a is the one among the blades 9 which is in contact with the circular inside surface 24 separating the compression chamber 4b from the explosion chamber 5a. Protrusions 25 are provided on the surface of the rotor 6 in front of and at the back of the cross-shaped blade channels 7 in the rotation direction of the rotor 6. The protrusions 25 are in contact with the circular inside surface 24 connecting the compression chamber 4b with the explosion chamber 5a. In the present embodiment, channels 26 in parallel with each of the blade channels 2 are bored in the rotor 6 in front of and at the back of each of the blade channels 2 in the rotating direction α of the rotor 6. Cylinder-like enlarged portions 26a are formed at the base portions of the channels 26. Protruding boards 27 to be inserted and engaged in the channels 26 have

cylinder-like enlarged portions 27a formed at the base portions of the protruding boards 27 to be inserted and engaged in the cylinder-like enlarged portions 26a. The cylinder like enlarged portions 27a at the base portions are inserted and engaged from the side in the cylinder like enlarged portions 26a of the channels 26 so that the tip portions of the protruding boards 27 are in contact with the circular inside surface 24 of the housing 1 connecting the compression chamber 4b with the explosion chamber 5a.

(Embodiment 7)

The present embodiment is shown in Fig. 10. Protrusions as the protruding portions 25 of the embodiment 6 are screwed to the surface of the rotor 6.

Attaching portions 28 are shaped and bored on the surface of the rotor 6 in front of and at the back of each of the blade channels 7 in the rotation direction α of the rotor 6 so as to be in parallel with the blade channels 7. Washer based protruding portions 29 have washers 29a, respectively, which are fit in the attaching portions 28. Protruding pieces 29b are formed which protrude from the washers 29a, respectively, in a reversed T shape, in an L shape, etc. Each of the washers 29a is fixed by screwing to each of the portions of the rotor 6 at each of the attaching portions 28. The tip portion of each of the protruding pieces 29b is in contact with the circular inside surface 24 connecting the compression chamber 4b with the explosion chamber 5a of the housing 1. A reversed-T-shaped washer based protruding portion 29 and an L-shaped washer based protruding portion may be mixedly used as shown in Fig. 10, or, only one of them may be used.

(Embodiment 8)

The present embodiment is shown in Fig. 11. The protruding portions 25 of the embodiment 6 are directly formed at the rotor 6.

Protrusions 31 are formed on the surface of the rotor 6 in front of and at the back of each of the blade channels 7 in the rotation direction α of the rotor 6 so as to be in parallel with each of the blade channels 7. The tip portions of the protrusions 31 are in contact with the circular inside surface 24 which connects the compression chamber 4b with the explosion chamber 5a and are made to be protruding portions 25.

Further, in the embodiments 1 through 8, when the capacity of the suction chamber 4 and the capacity of the combustion chamber 5 are the

same, explosion energy can not be effectively utilized for the rotation of the rotor 6, compared with one when the capacity of the combustion chamber 5 is made bigger than the capacity of the suction chamber 4. However, as in the embodiments, an output axis is not rotated by the engagement of an internal gear and an external gear like a conventional Wankel-type rotary engine but an output axis is directly connected with the rotor 6, explosion energy can be directly transformed into circular rotation movement of an output axis through the rotor 6, thereby energy loss in this part is small and, as a whole, the fuel consumption is smaller than in a conventional Wankel-type rotary engine.

The present invention has the abovementioned structure. As the radius of the cylinder-like inside wall is partially enlarged to form portions of a concentric circle of the circle formed by the cylinder-like inside wall 3 and to form the suction chamber 4 and the combustion chamber 5, the maximum capacity of the combustion chamber enclosed with the inside wall of the housing of peritrochoidal curve and the rotor of peritrochoid internal envelope is not fixed to be equal to the maximum capacity of the suction chamber like a conventional Wankel-type rotary engine. The ratio of the maximum capacity of the suction chamber and the maximum capacity of the combustion chamber can be freely set by adjusting the size of the portions where the radius of the cylinder-like inside wall is enlarged. So the combustion chamber 5 can be enlarged enough compared with the suction chamber 4 and explosion energy which was conventionally radiated from the exhaust hole 14 without being used can be effectively used in the circular rotation. As, different from a conventional Wankel-type rotary engine in which an output axis is rotated by the engagement of an internal gear with an external gear, explosion energy can be directly transformed into rotation movement of the output axis (not shown) through the rotor 6, energy is not lost, heat efficiency is raised, and fuel consumption can be substantially improved. The weak points of a conventional Wankel-type rotary engine wherein a rotor rotates in the housing while moving vertically, which is a quasi-reciprocating movement, can be thus resolved.

Moreover, as continuous explosion strokes can be obtained within one housing, compared with a Wankel-type rotary engine and a reciprocating engine wherein explosion strokes are intermittent, more effective and smooth rotation (driving force) can be obtained.

Further, as protruding portions 25 which are in contact with the circular inside surface 24 connecting the compression chamber 4b and the explosion chamber 5a of the housing 1 are provided on the surface of the rotor 6 in front of and at the back of

each of the blade channels 7 which go through the center of the rotor 6 in the rotation direction a of the rotor 6, three points, that is, the blade 9a, a protruding portion 25 in front of the blade 9a, and a protruding portion 25 at the back of the blade 9a are in contact with the circular inside wall 24 connecting the compression chamber 4b with the explosion chamber 5a. As the protruding portions 25, different from the blades 9 and 9a, do not advance or retreat in the blade channels 7 by the springs 11, there is only a slight gap between the protruding portions 25 and the circular inside wall 24 of the housing 1 necessary for the rotor 6 to rotate in the circular inside surface 24 of the housing 1. Even when explosion pressure acts, the gap between the tips of the protruding portions 25 and the circular inside surface 24 is not expanded, explosion pressure in the explosion chamber 5a does not act between the protruding portions 25 through the gap, the gap between the tip of the blade 9a between the protruding portions 25 and the circular inside surface 24 is not expanded, and the tip of the blade 9a is pushed against the inside surface 24 with stability by the elasticity of the spring 11 or the centrifugal force, so the explosion pressure is prevented from leaking in the compression chamber 4b, explosion at an inappropriate time is prevented, and the rotor 6 is smoothly rotated.

The features disclosed in the foregoing description, in the following claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. A rotary engine characterized in that part of the inside radius of a cylinder-like body having cylinder-like inside wall is enlarged and a housing in which a suction chamber and a combustion chamber is formed is provided, a rotor for being inserted and engaged in said cylinder-like portion of said housing is separately provided, blades are attached so as to advance and retreat freely toward the inside wall of said housing in a plurality of blade channels bored in radial directions of said rotor, and an air suction hole, an ignition equipment, and an exhaust hole are bored in said housing at the former end portion of said suction chamber, at the former end portion of said combustion chamber, and at the latter end portion of said combustion chamber, respectively, in the direction of the rotation of said rotor.

2. A rotary engine of claim 1 characterized in that said combustion chamber is larger than said suction chamber.

3. A rotary engine of claim 1 or claim 2 character-

ized in that said plurality of blades advance and retreat freely toward said inside wall of said housing with springs laid in said blade channels in radial directions of the rotor.

4. A rotary engine of claim 1 or claim 2 characterized in that explosion pressure intake holes is bored in said rotor at the back of and adjacent to each of said blade channels in the direction of the rotation of said rotor, space for confining explosion pressure which leads to each of said blade channels is provided in the middle of said rotor, said intake holes and said space for confining are connected with each other by interconnecting holes having nonreturn valves in them, and seal for confining explosion pressure is additionally provided at the base end portion of each of said blades.

5. A rotary engine of claim 1, claim 2, claim 3 or claim 4 characterized in that a hollow is bored on the surface of said rotor at the back of each of said blade channels in the direction of the rotation of said rotor.

6. A rotary engine of claim 4 characterized in that a bulkhead which connects each of said explosion pressure intake holes and each of said base end portions of said blade channels adjacent to said explosion pressure intake holes in the opposite direction of the rotation of said rotor is provided in said space for confining explosion pressure.

7. A rotary engine of claim 6 characterized in that holes are bored in said bulkhead which connects each of said explosion pressure intake holes and each of said blade channels adjacent to said explosion pressure intake holes in the opposite direction of the rotation of said rotor.

8. A rotary engine of claim 7 characterized in that adjusting devices for adjusting the degree of aperture of said holes are additionally provided in said holes of said bulkhead.

9. A rotary engine of claim 1, claim 2 or claim 3 characterized in that protruding portions which are in contact with the circular inside surface connecting said compression chamber with said explosion chamber of said housing are provided on the surface of said rotor in front of and at the back of said blade channels and the gap between said circular inside surface and the tip of one of said blades inserted and engaged in said blade channels which separates said compression chamber and said explosion chamber is provided from being enlarged.

10. A rotary engine of claim 9 characterized in that channels the base portions of which are enlarged are bored in said rotor in front of and at the back of said blade channels and protruding boards the base portions of which are enlarged are inserted and engaged in said channels as said protruding portions.

11. A rotary engine of claim 9 characterized in that attaching portions are bored on the surface of said

rotor in front of and at the back of said blade channels and washer based protrusions as said protruding portions are screwed to said attaching portions.

12. A rotary engine of claim 9 characterized in that protrusions are formed on the surface of said rotor in front of and at the back of said blade channels as said protruding portions.

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Fig1

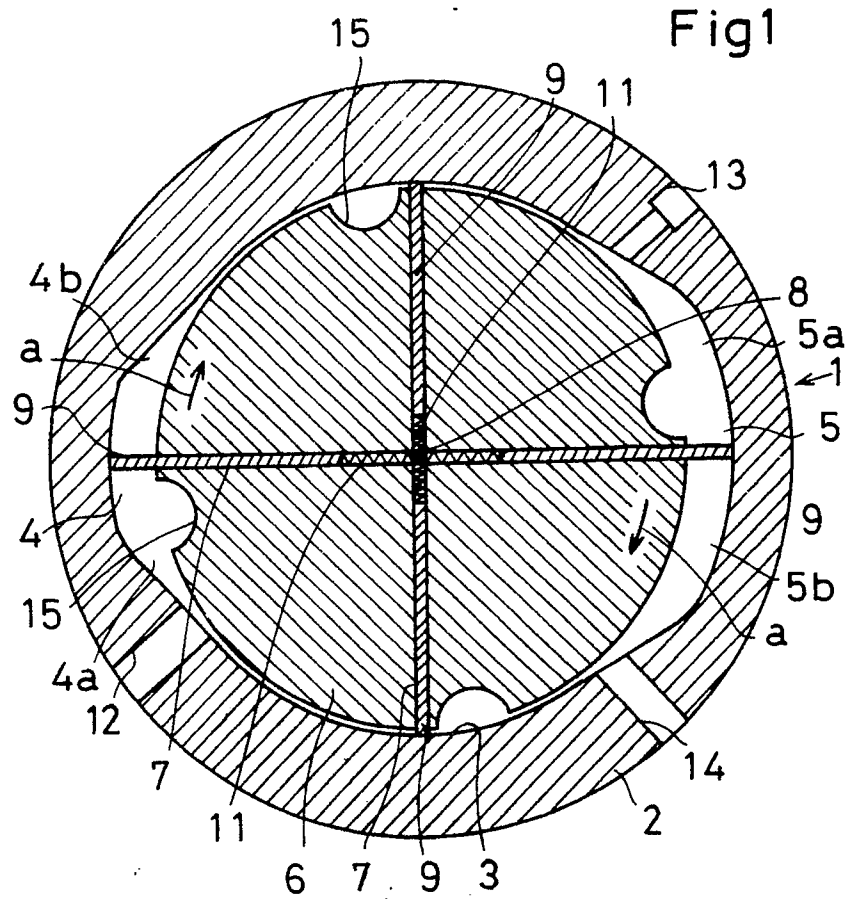


Fig2

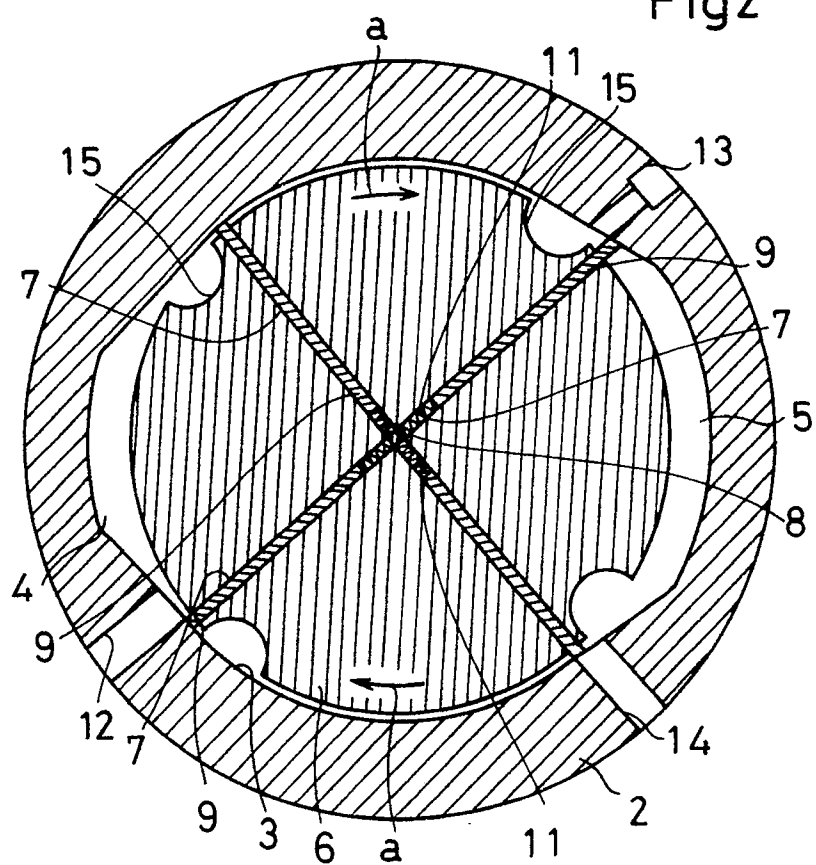


Fig 3

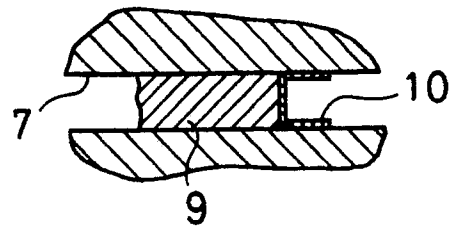


Fig 4

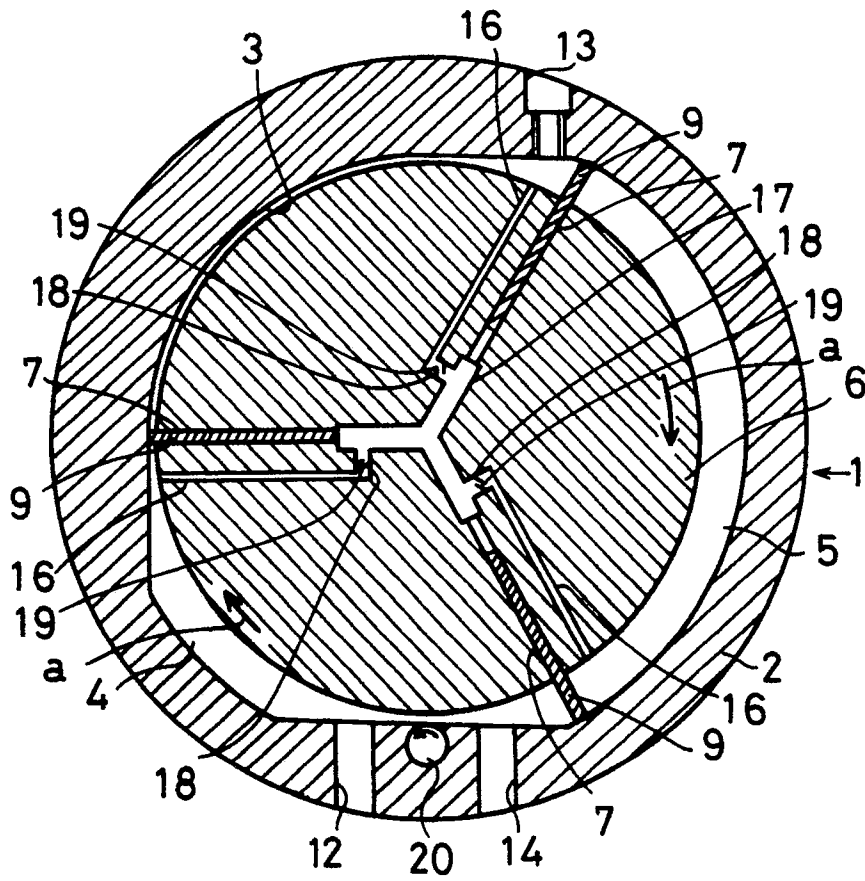


Fig 5

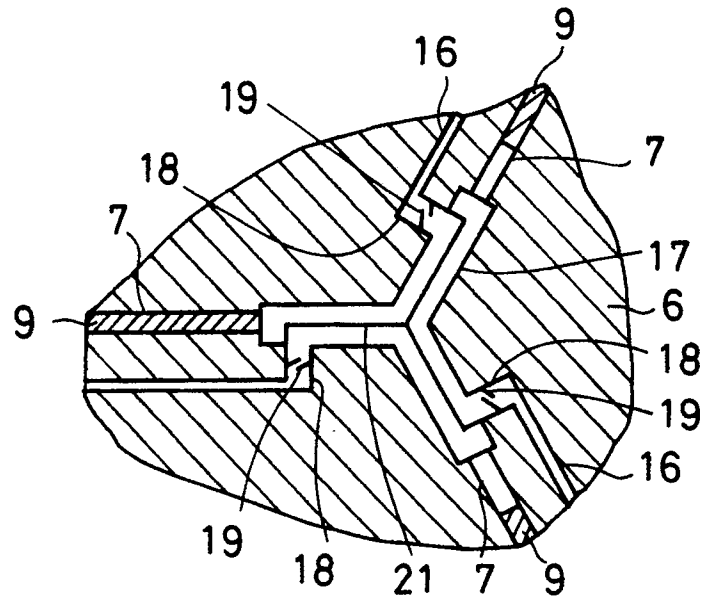


Fig 6

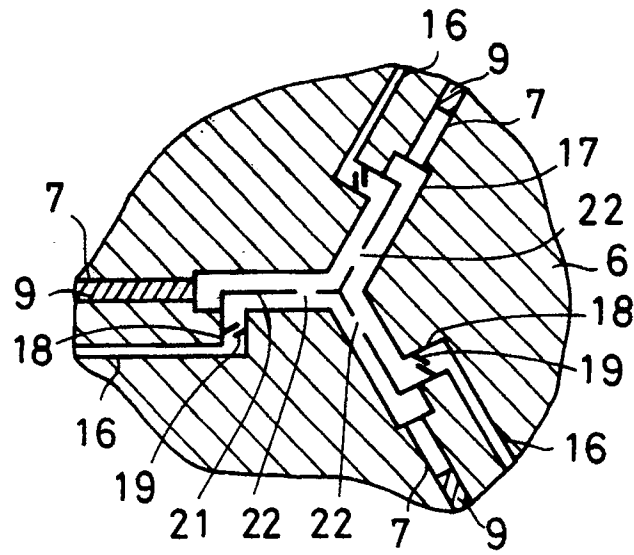


Fig 7

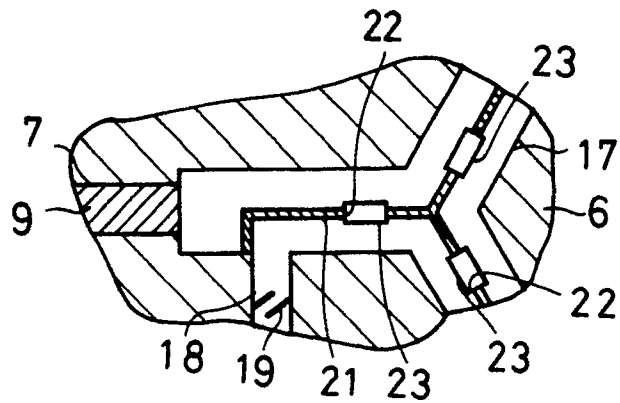


Fig 8

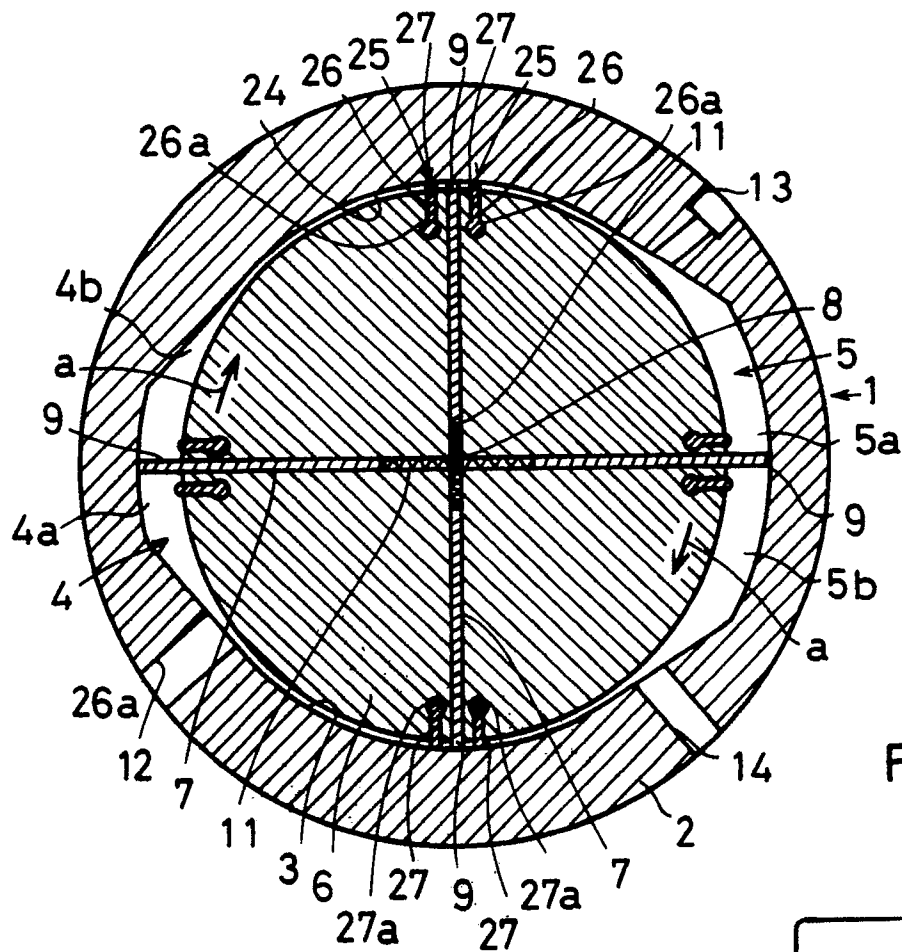


Fig 9

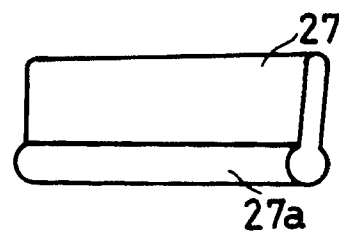


Fig 10

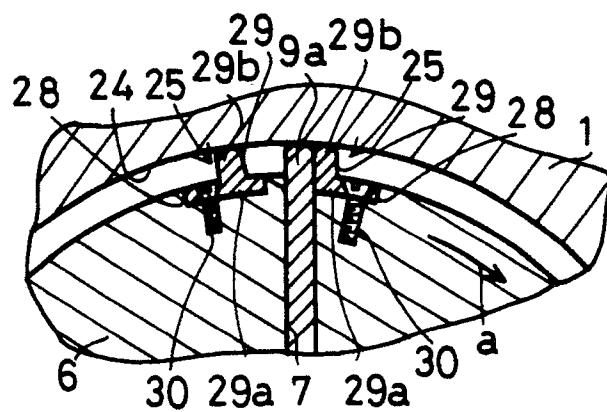
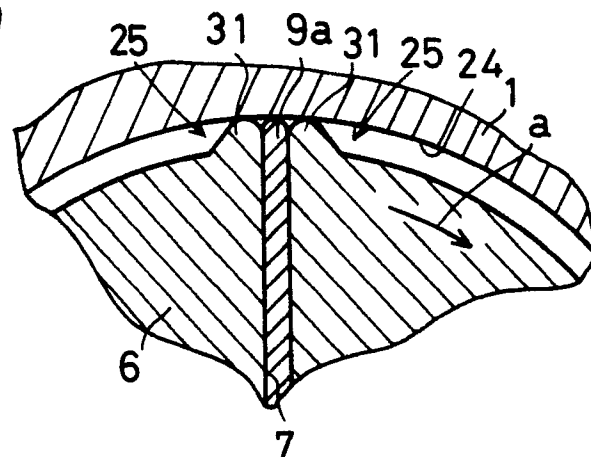


Fig 11





European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 31 1339

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-1 573 552 (RAE) * page 1, lines 46 - 72 ** page 2, lines 38 - 71 @ page 2, lines 97 - 106; figures 1, 2 * - - - -	1,2,3,5	F 01 C 1/344
X,Y	GB-A-2 094 890 (COLLIER ETC.) * page 1, line 85 - page 2, line 38; figures 1, 2 * - - - -	1,2,4	
Y	GB-A-2 059 04 (PHILLIPS) * page 3, line 89 - page 4, line 84; figures 1-4 * - - - -	4	
A	DE-A-2 855 567 (G.DÜSTERLOH GMBH) * page 10, last paragraph - page 11, line 6; figure 1 * - - - -	7,8	
A	DE-A-1 914 222 (LANGEN & CO) * page 4, line 33 - page 6, line 2; figures 1, 2, 3 * - - - -	7,8	
A	US-A-2 752 893 (OLESKOW) * column 2, lines 24 - 33; figure 1 ** column 3, lines 19 - 37 * - - - - -	9,10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 01 C F 04 C
Place of search		Date of completion of search	Examiner
The Hague		21 January 91	KAPOULAS T.
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document			