Dec. 6, 1966 L. PÉRAS 3,289,646

CYLINDER-HEADS FOR ROTARY ENGINES

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Fig-1

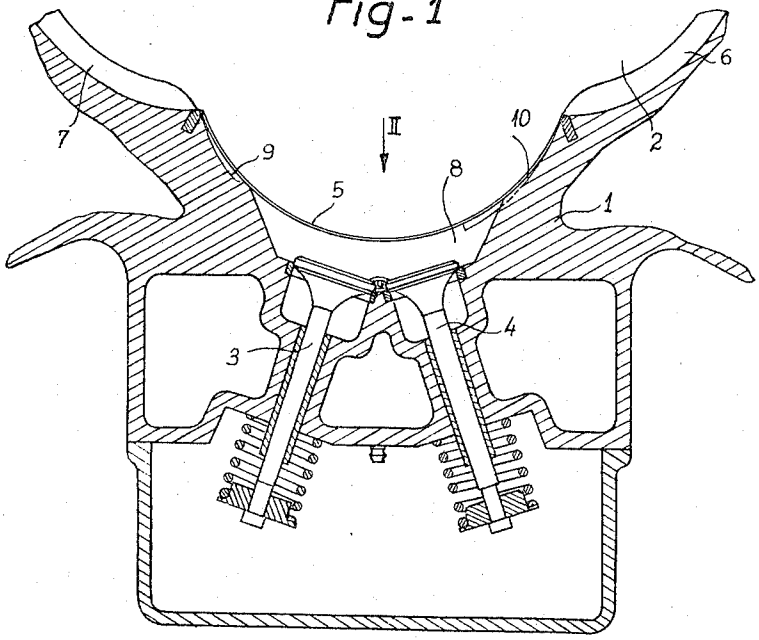
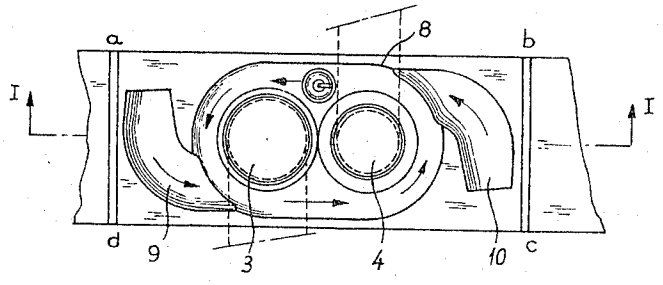


Fig-2



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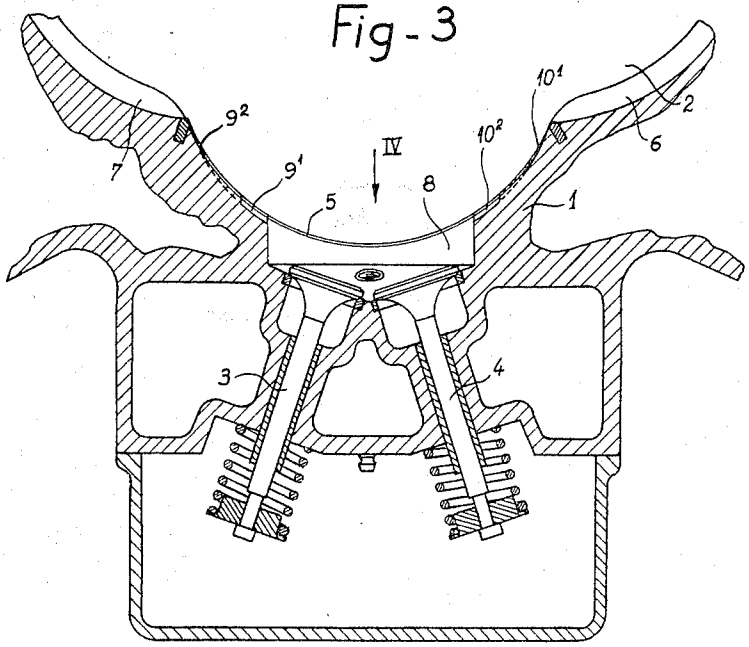
Attorneys

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CYLINDER-HEADS FOR ROTARY ENGINES

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Fig-3



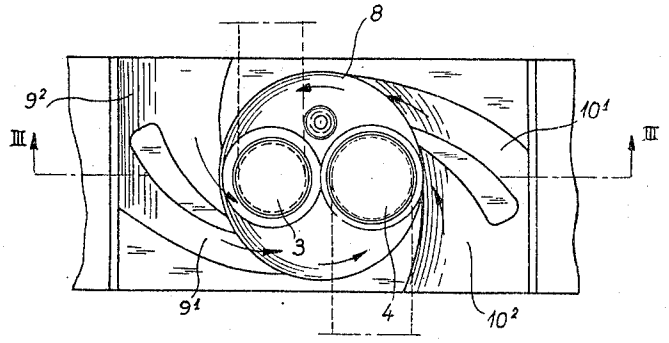


Fig-4

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CYLINDER-HEADS FOR ROTARY ENGINES

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Fig. 5

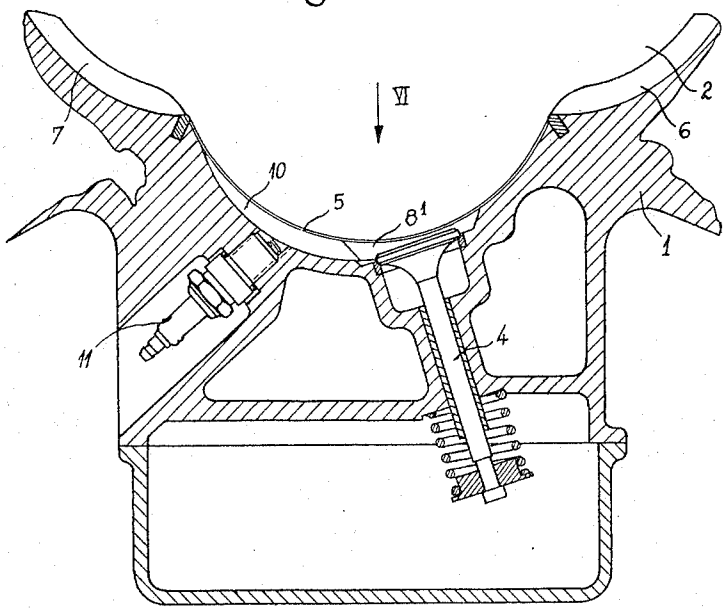
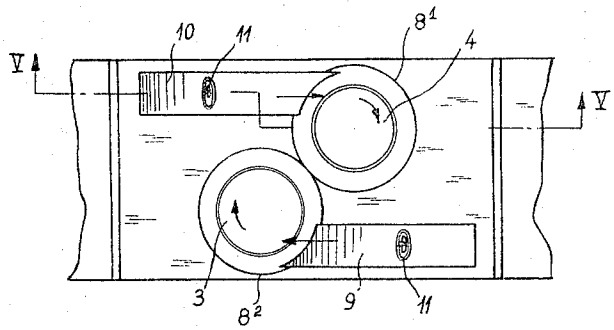


Fig. 6



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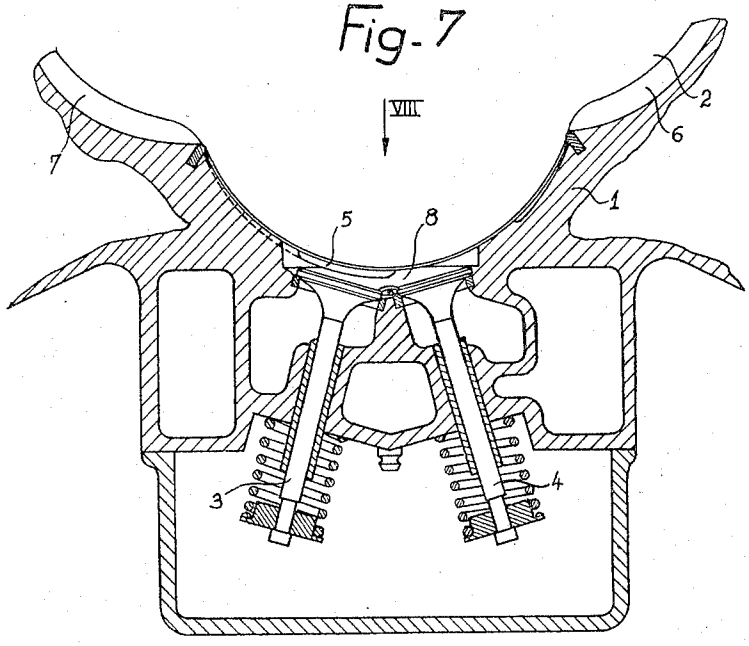
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CYLINDER-HEADS FOR ROTARY ENGINES

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Fig-7



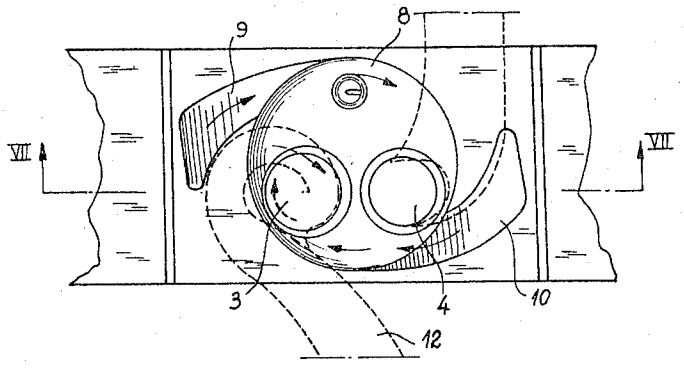


Fig-8

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United States Patent Office

3,289,646

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3,289,646

CYLINDER-HEADS FOR ROTARY ENGINES

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Filed June 25, 1964, Ser. No. 377,930
Claims priority, application France, Aug. 14, 1963, 944,690, Patent No. 1,390,199
3 Claims. (Cl. 123—8)

The present invention relates to rotary engines of the type having a rotor with N-lobes with an epicycloidal profile rotating eccentrically in a stator having $N+1$ lobes, forming $N+1$ working chambers.

By its very design, an engine of this kind frequently has a ratio between the surface area of the working chamber and the swept volume of the cylinder which is substantially greater than that of a conventional piston engine. In consequence of this, in order to obtain a combustion chamber with a sufficient thickness, it must be given a smaller surface area than that of the working chamber, with the result that when the rotor comes into the vicinity of the top dead centre-explosion, there is produced between the moving surface of the said rotor and the surface of the working chamber not occupied by the combustion chamber (known as the "flushing surface"), a flushing effect of the gases which is all the more violent as the flushing surface is large with respect to the surface of the working chamber.

In a piston engine, this flushing effect also exists, but as the flushing surface can, in practice, be made as small as may be desired, it is relatively easy to arrange the surfaces of the cylinder head and the piston in such manner that the flushing effect which results is clearly determined, at the same time in intensity and in direction, and gives rise to a turbulence which is favourable to combustion.

This is not the case in a rotary engine because of the fact that the flushing surface is very large as compared with the surface of the working chamber and also because of the unfavourable shape of the said working chamber, which appears in longitudinal section in the approximate form of a crescent, and thus with extremities of small thickness. If therefore special arrangements are not made, two very intense flushing streams starting from each of these extremities are produced and meet in the centre of the chamber, thus producing a confused agitation which is unfavourable to the combustion (breaking-up of the flame, mixture of the burnt gases with fresh gases).

The present invention has for its object improvements in the cylinder-heads of rotary engines, directed to the rational use of the inevitable flushing movements and organizing them so as to obtain a directed flushing action of a suitable intensity, producing a rotational movement of the air about the axis of symmetry of the combustion chamber or chambers, this movement being favourable to the combustion, since it makes it possible to obtain a flame-front which progresses uniformly.

The improvements forming the object of the invention thus concern the means employed to produce this movement of rotation of the air, which consist of forming in the flushing surface of the cylinder-head, hollows or grooves of a shape such that the air which is compressed between the surface of the rotor and the said flushing surface is channelled in these hollows and flows away so as to terminate tangentially to the periphery of the combustion chamber. A further characteristic feature of the invention consists in giving to the said combustion chamber an approximately circular form, in order that the movement of rotation may be established in it under good conditions before becoming disturbed by the rectangular shape of the working chamber.

In addition, it is known to utilize the speed of the air

as it passes the valves to create a movement of rotation of this air and this is effected by making use of various means: valve masks, deflectors in the admission pipes, pipes with tangential intake, etc. Within the framework of the invention, these known means may be combined with the improvements forming the object of the invention, in order to accentuate the rotational effect which is desired.

The invention will now be described in detail with reference to the accompanying drawings, which represent by way of example, various forms of embodiment of the invention.

FIG. 1 is a cross-section taken following the line I—I of FIG. 2, of a cylinder head with two simple incurved hollows.

FIG. 2 is a developed view in plan looking in the direction of the arrow II of FIG. 1, of this same cylinder-head.

FIG. 3 is a cross-section taken along the line III—III of FIG. 4, of a cylinder-head with two double incurved hollows.

FIG. 4 is a developed view in plan looking in the direction of the arrow IV of FIG. 3, of this same cylinder-head.

FIG. 5 is a cross-section taken along the line V—V of FIG. 6, of a cylinder-head with a double combustion chamber and having straight hollows.

FIG. 6 is a developed view in plan, looking in the direction of the arrow VI of FIG. 5, of this same cylinder-head.

FIG. 7 is a cross-section taken along the line VII—VII of FIG. 8 of a cylinder-head comprising simple incurved hollows combined with admission pipes with tangential intake.

FIG. 8 is a developed view in plan, looking in the direction of the arrow VIII of FIG. 7, of the same cylinder-head.

If reference is now made to FIGS. 1 and 2, which show a first form of embodiment of the invention, there is seen at **1** the stator, at **2** the rotor, at **3** and **4** the admission and exhaust valves of one of the working chambers **5**, while the rotor is in its top dead centre position and the volume of this chamber is reduced to a minimum. At **6** and **7** are shown the working chambers adjacent to the chamber **5**.

The combustion chamber corresponding to the chamber **5** is shown at **8**. As can be seen from the plan view given in FIG. 2, this chamber has an approximately circular shape, while the projected surface of the working chamber is a rectangle *a*, *b*, *c*, *d*. The surface of the combustion chamber is substantially smaller than that of the working chamber and the remaining portion of this working chamber, which constitutes the "flushing surface" (portion shaded in the drawing) is very large, and it will be understood that the air which is compressed between this surface and that of the rotor, at the moment when the said rotor is about to reach its top dead centre, is violently expelled from the extremities in the form of wedges towards the centre at which it produces an impact and a confused agitation.

The invention consists of arranging, in this flushing surface, hollowed portions **9** and **10** which channel this air and lead it tangentially to the periphery of the combustion chamber.

There is in this case a hollow at each extremity of the working chamber, and there has been shown by way of example hollows having an incurved form, but this form is not essential, the necessity being that each hollow should terminate tangentially to the periphery of the combustion chamber.

On the other hand, a further characteristic feature of the invention consists in giving this combustion chamber

an approximately circular shape, in order that the movement of rotation of the air, indicated by the arrows in FIG. 2, may be established and maintained without being destroyed by the eddies which would be caused by a shape which compelled the air to make abrupt changes in direction.

FIGS. 3 and 4 show a second form of embodiment of the invention, in which the chamber is exactly circular (which could also be the case in FIGS. 1 and 2) and is characterized by the fact that the hollows formed in the flushing surface at each extremity of the working chamber are split-up into two furrows 9^1, 9^2 and 10^1 and 10^2.

As has already been stated with reference to FIG. 2, the incurved form of the projection in plan of the hollows is not imperative.

FIGS. 5 and 6 show a third form of embodiment, in which the cylinder-head comprises two separate circular combustion chambers 8^1 and 8^2, corresponding to the two valves **3** and **4**, into each of which opens tangentially a hollow **9** or **10**, in this case shown as straight, but which could be incurved.

In this case, the sparking plugs **11** are placed in the hollows which have a greater depth than in the preceding examples, and form so to speak a part of the combustion chamber.

Finally, FIGS. 7 and 8 show that it is possible to reinforce the rotation effect obtained by means of the hollows by that caused for example by a pipe **12** at the tangential intake to the admission valve **3**. The hollows shown in this case are of course similar to those of FIG. 2, but they may have any other shape. Similarly, other known means making it possible to obtain a controlled turbulence

at the admission, such as a valve mask, a deflector in the admission pipe, etc., may be employed in combination with the hollows, within the scope of the invention.

I claim:

1. Improvements in cylinder-heads of rotary engines having a rotor with N-lobes rotating eccentrically in a stator with $N+1$ lobes forming $N+1$ working chambers, with which are respectively associated combustion chambers into which the valves open, characterized in that in the flushing surface of the cylinder-heads associated with each working chamber are provided hollowed out portions opening into the combustion chambers, these hollow portions having a shape such that the air which is compressed between the surface of the rotor and the said flushing surface is channelled by the hollows and flows through them so as to terminate tangentially to the periphery of the combustion chamber and causes a rotational movement of the air about the axis of the said chamber.

2. A rotary engine in accordance with claim **1**, in which the combustion chambers have an approximately circular shape.

3. A rotary engine in accordance with claim **2**, in which the rotational effect of the air produced by means of the hollow channels is reinforced by the simultaneous use of a further known means, such as an admission pipe with a tangential intake, a valve mask, deflector.

No references cited.

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