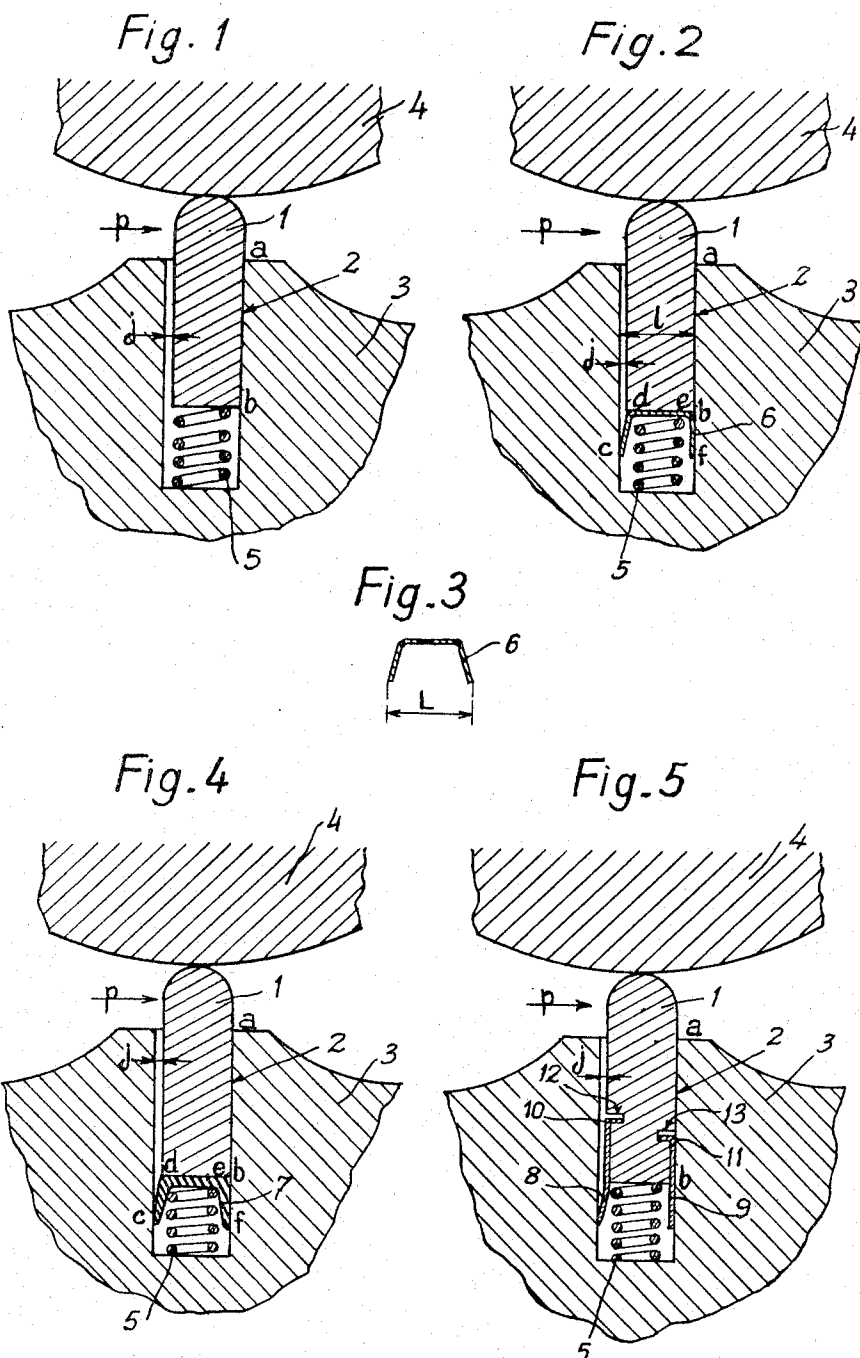


June 20, 1967

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SEALING SEGMENTS FOR ROTARY ENGINES

3,326,454

Filed May 3, 1965



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1

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SEALING SEGMENTS FOR ROTARY ENGINES

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Filed May 3, 1965, Ser. No. 452,468

Claims priority, application France, May 9, 1964,

973,897, Patent 1,403,098

5 Claims. (Cl. 230—145)

This invention relates to rotary engines of the type wherein a rotor performs within a stationary stator a simple or complex rotary motion and more particularly to improvements in segments, packings or like means for sealing the radial joints between said rotor and stator.

In such engines a number of variable-volume working chambers are provided which are bounded by the inner contour of the stator, on the one hand, and by the outer contour of the rotor, on the other hand.

The radial tightness, that is, the separation of two adjacent working chambers, is obtained by means of segments or strips fitted in grooves formed either in the stator at the junction of two adjacent lobes or in the rotor along each ridge, according to the type of engine considered, these segments or strips engaging the conjugate contour of the rotor or stator along a generatrix.

The segments or strips are urged against the opposite member by springs or any other suitable means exerting their force on the segment edge opposite to their bearing surface, and also by the pressure of the gas acting on said surface.

This gas pressure also causes the segment to be urged against the lateral wall of the groove which is opposite to the side face of the segment which is acted upon by said gas, thus providing, at least theoretically, a perfect fluid tightness. However, in practice the two contacting surfaces are not geometrically plane as they are marked by machining operations and subjected to distortion, notably under the influence of heat.

Therefore, more or less important gas leakages take place between said surfaces.

It is the essential object of this invention to eliminate or at least minimize such leakages.

To this end, there is provided in the groove bottom, between the segment and their return springs or other means having the same function, a member acting as a valve which bears simultaneously on the segment edge and on both side walls of the groove, thus preventing the gas from flowing around the segment.

This member may be solid or not with the segment and may be embodied in different manners as will be explained hereinafter with reference to the accompanying drawing, in which:

FIGURE 1 shows the conventional segment mounting;

FIGURE 2 shows a first arrangement according to this invention wherein the segment is provided with a metal valve-forming member having the shape of an inverted U.

FIGURE 3 shows the same valve as in the preceding form of embodiment but in its unstressed condition;

FIGURE 4 shows another arrangement according to this invention wherein a segment is provided with a valve member similar to the preceding one but made from suitable plastic material, and

FIGURE 5 shows a third alternate form of embodiment of this invention wherein the side faces of the segment have valve-forming metal blade-like extensions.

Referring first to FIGURE 1 showing a conventional segment mounting the segment 1 fitted in a groove 2 of member 3 (the latter being the stator or the rotor, according to the type of engine contemplated) is urged against the other member 4 (rotor or stator) by springs 5 (or any other suitable return means).

2

If the gas pressure is exerted on the left-hand side of the segment as shown by the arrow p , the segment is pressed against the right-hand lateral wall of its groove and the small gap j thus left between the left-hand side of the segment and the left-hand wall of the groove permits the ingress of gas to the bottom of this groove, the action of this gas adding itself to that of the springs 5 to urge the segment against the rotor (or stator) surface.

Under these conditions the fluid-tightness would theoretically be perfect if the two contacting surfaces a and b were geometrically plane. Unfortunately it is not so for on the one hand each one of these surfaces is marked by previous machining operations and on the other hand these surfaces are subjected to heat distortion, thus forming gaps therebetween at one or more points.

As a result, a gas leakage takes place in the gaps thus created.

FIGURE 2 illustrates a first arrangement according to this invention.

The same reference numerals as in FIGURE 1 designate the segment 1 in its groove 2, the stator (or rotor) 3, the rotor (or stator) 4, and the springs or like means 5.

Between these springs and the segment a valve member 6 having substantially the shape of an inverted U is interposed.

This valve member, as shown in FIGURE 3, is cut and pressed from spring-grade strip-steel, the width L of the U-shaped member as measured across the outer edges of its side flanges being greater in the free state than the width l of the groove 2, whereby the two flanges of the U-shaped member are urged against the groove walls when fitted therein.

It is obvious that when the gas pressure prevails on the left-hand side of the segment it is also exerted under the valve member 6 by deflecting the lateral flange cd of the valve, this flange then resuming its position, the gas pressure urging with considerable force the other flange ef against the right-hand wall of the groove, thus preventing the gas from flowing through the interstices existing at ab between the segment and the groove wall, and eliminating any substantial leakage, although a small amount of leakage may occur adjacent the lateral ends of the valve member.

The valve member may be either secured to the segment along its base de through any known means or left independent thereof.

FIGURE 4 illustrates a construction similar to the one shown in FIGURE 2, wherein instead of a metal valve member a plastic valve member made from an elastic material adapted to withstand the action of gases and hydrocarbons is used.

This valve member 7 has the same general configuration as valve member 6, the only difference lying in the thicknesses which are consistent with the type of material utilized in its manufacture.

FIGURE 5 illustrates a third form of embodiment wherein the metal valve member of FIGURE 2 is replaced with two separate blades constituting the extensions of the side faces of the segment.

These blades 8, 9 consist of spring-grade strip steel.

They are held in position by a small ledge 10 or 11 engaging a corresponding small groove 12 or 13 formed in each side face of the segment.

Between each lateral groove and the inner edge of the segment the thickness of the segment is reduced, so that the outer face of each blade in its operative position be coplanar with the corresponding side face of the segment.

Of course, the operation of this device is the same as in the case of the valve shown in FIGURE 2.

What is claimed is:

1. A rotary engine having a rotor and a stator moving relative to each other wherein the improvement comprises

3

at least one groove formed in one of said members, at least one sealing segment adapted to seal the radial joint between said members to form at least two chambers, said segments each being fitted in a corresponding groove with a clearance defined between one wall of the groove and said segment, resilient means disposed in the bottom of said groove for urging said segment against the other of said members and permitting slight reciprocal movement of said segment within said groove, and a valve member disposed between each segment and its corresponding resilient means in the bottom of said groove, said valve member having two flanges of a resilient material extending towards the bottom of said groove, the distance between the free ends of said flanges being greater in the free state than the width of said groove so that said flanges are normally urged against the corresponding wall of said groove so that said valve member acts as a one-way check valve permitting flow of gas from a chamber into the bottom portion of said groove but preventing flow from the bottom portion of said groove to said chamber.

2. The improvement according to claim 1 wherein said valve member is U-shaped.

3. The improvement according to claim 1 wherein said valve member is made from strip-steel.

4. The improvement according to claim 1 wherein said valve member is adapted to withstand the action of gases and hydrocarbons.

5. A rotary engine having a rotor and a stator moving relative to each other wherein the improvement comprises at least one groove formed in one of said members, at least one sealing segment adapted to seal the radial joint

4

between said members to form two chambers, said segments each being fitted in a corresponding groove with a clearance defined between one wall of the groove and said segment, resilient means disposed in the bottom of said groove for urging said segment against the other of said members and permitting slight reciprocal movement of said segment within said groove, and two valve members each having a flange of a resilient material extending towards the bottom of said groove and each having a ledge engaging a corresponding groove formed in said segments, the distance between the free ends of said flanges being greater in the free state than the width of said groove so that said flanges are normally urged against the corresponding wall of said groove so that said valve members act as a one-way check valve permitting flow of gas from a chamber into the bottom portion of said groove but preventing flow from the bottom portion of said groove to said chamber.

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