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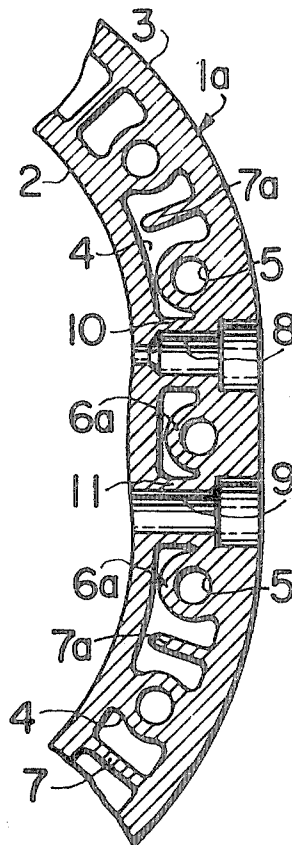
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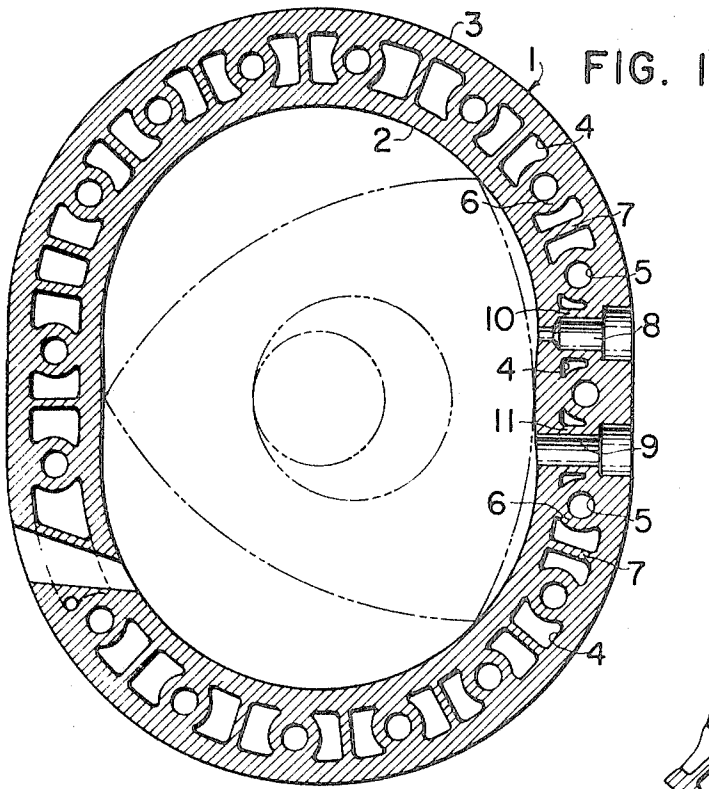
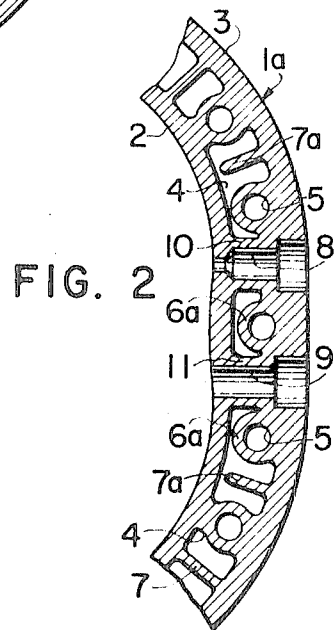
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[54] **CENTER HOUSING FOR A ROTARY PISTON ENGINE**
3 Claims, 2 Drawing Figs.

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ABSTRACT: The center housing of a rotary piston engine has spaced inner and outer wall portions facilitating axial flow of cooling fluid and has some of the bolt bosses and ribs which normally connect the wall portions are integrally formed with the outer wall portion but unconnected to the inner wall portion so that the inner wall portion adjacent to the ignition plug receiving hole is relatively flexible.





CENTER HOUSING FOR A ROTARY PISTON ENGINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a center housing forming a part of a rotary piston engine and more particularly to such a housing which employs axially extending flow passages to facilitate cooling of the engine.

2. Description of the Prior Art

Conventionally, rotary piston engines employ a casing composed of a center housing with a multiarcuate inner surface and a side housing disposed sealingly on both sides thereof, and further employs a polygonal rotor which rotates under planetary motion within the casing. In such an engine, a gas mixture entering through an intake port is compressed, is ignited by firing an ignition plug, expands upon combustion, and is exhausted through an exhaust port. Cooling liquid passages are normally provided in the casing for cooling the engine by removing heat from the engine.

In the provision of cooling liquid passages, such passages generally take two forms; in a circular flow cooling system the cooling liquid passes in a circular direction with respect to the center housing, and in an axial flow cooling system wherein the cooling liquid is passed through the housing in an axial direction. In the center housing employing a circular flow cooling system, the cooling liquid passages are rectangular-shaped in cross section and thus it is difficult to manufacture a core for casting the same, it is difficult to settle the core in the mold and difficult to remove the sands under conventional casting techniques and thus, such center housing with circular flow cooling systems are not applicable for mass production. For mass production, center housings of the axial flow cooling system type are preferable.

Center housings employing conventional axial flow cooling systems for use in rotary piston engines are formed by integrally joining a housing inner wall portion having a multiarcuate inner surface with an outer wall portion and maintaining the cooling liquid passages therebetween by the use of multiple ribs or bosses having bolt holes passing therethrough. Thus, sufficient rigidity is provided in the peripheral and radial directions on the inner wall portion so as to prevent any deformation due to the heat of combustion or explosion pressure resulting therefrom. The casing is formed by tightening the bolts inserted through the bolt holes and passing through the center housing and between the side housings so as to prevent any deformation of the center housing in the axial direction. Further, the center housing is provided with a plug hole for inserting an ignition plug through the inner and outer wall portions in such a manner that the boss forming the plug receiving hole connects the inner wall portion to the outer wall portion. In rotary piston engines of this type, since each stroke is repeated in the same portion of the casing, there are produced, a hot zone locally at the center of the housing and a cold zone at the same location. Particularly, since the portion of the center housing in the neighborhood of the plug hole, and particularly the inner wall portion of the center housing is exposed to the high temperature gas produced during ignition and, at the same time, this area is also exposed to the cold gas mixture at the end of the compression stroke, temperature change is quite abrupt at that portion of the center housing.

Generally, heat stress is produced by restricting the free expansion of the housing material under the temperature change, but in the conventional center housing, where the plug hole has abrupt temperature change, the plug boss increases the rigidity of the inner wall portion against expansion in the circular direction, with the result that a large heat stress is produced in the neighborhood of the inner wall portion to cause the inner wall portion to deform or deflect. In addition, the concentrated stress which is produced around the plug hole opening at the inner wall portion, due to heat stress, is such that cracks may be produced outwardly from the plug hole.

SUMMARY OF THE INVENTION

This invention eliminates the aforementioned disadvantages of the conventional rotary piston engines and provides a new and improved center housing of the axial flow cooling type for a rotary piston engine in which the inner wall portion adjacent to the plug hole is reduced in rigidity within allowable range of reduction in strength and performance as a result of deformation so as to give it proper flexibility sufficient to absorb the heat expansion. Thus, the resilient deformation in the inner wall portion, due to high temperature in the neighborhood of the same portion, prevents it from generating excess heat stress during heat expansion and contraction.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a sectional view of the center housing of a conventional rotary piston engine.

FIG. 2 is a partial sectional view of the center housing of a rotary piston engine constructed in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1 of the drawings, a conventional center housing of a rotary piston engine is indicated at 1 and comprises an inner wall portion 2 having a multiarcuate inner surface and an outer wall portion 3, and cooling liquid passages 4 are provided between the inner wall portion 2 and the outer wall portion 3. Bolt bosses 6, each having a bolt hole 5, extend between the inner wall portion and the outer wall portion, and further, multiple ribs 7, along with the bolt holes, integrally join the inner wall portion 2 with the outer wall portion 3 and maintain and define the cooling liquid passages therebetween. In such a structure, sufficient rigidity is provided in the peripheral and radial directions with respect to inner wall portion 2 so as to prevent the deformation due to heat or explosion pressure under normal operation of the engine. The engine casing is formed by tightening the bolts (not shown) inserted into the bolt holes 5 which extend through the center housing 1 and couple the side housings (not shown) so as to prevent the deformation of the center housing 1 in the axial direction. Further, the center housing 1 is provided with plug holes 8 and 9 allowing insertion of ignition plugs (not shown) through the inner and outer wall portions 2 and 3 in such a manner that the bosses 10 and 11, which receive the plugs, act to connect the inner wall portion 2 with the outer wall portion 3 in the vicinity of the plug holes.

In the operation of the conventional rotary piston engine, as shown, as each stroke is repeated in the same portion of the casing, a hot zone is produced by local heating in the center housing and a cold zone is also produced in the identical manner. In particular, since the localized area of the inner wall portion in the neighborhood of the plug hole of the center housing is exposed to high temperature gas upon explosion of the engine intake mixture, and is also exposed to the cold intake mixture gas at the end of the compression stroke, the temperature change on this localized portion of the inner wall is quite abrupt.

Referring now to FIG. 2 which shows a portion of a center housing constructed in accordance with the present invention, the same parts are designated by like numerals as in FIG. 1. The center housing 1a comprises an inner wall portion 2 having a multiarcuate inner surface and an outer wall portion 3. Cooling liquid passages 4 extend axially therethrough, and bolt bosses 6, each having a bolt hole 5, along with a plurality of ribs 7, integrally join the inner wall portion 2 and the outer wall portion 3 and maintain the cooling liquid passages 4 therebetween as in the prior art arrangement of FIG. 1. In the present invention, however, bosses 6a and ribs 7a, in the neighborhood of plug holes 8 and 9, are integral with the outer wall portion 3 but do not contact the inner wall portion 2 so that a predetermined flexibility is provided to the inner wall portion 2 in the neighborhood of plug holes 8 and 9 to allow

the heat stress to be absorbed by the resilient inner wall upon deformation. In the present embodiment, the ribs 7a are not always necessary but are provided since they have a good heat dissipating effect and transfer the heat from the inner wall to the outer wall.

It is understood from the foregoing description that the center housing of the present invention is constructed in such a manner that the inner wall portion adjacent the plug hole is provided with predetermined flexibility to prevent the inner wall portion from having a heat stress generated therein. Thus, the center housing is not deformed or overly deflected under long usage. It is also understood that, since the heat stress is no longer concentrated around the plug holes, cracks do not develop in the area of the plug holes. Further, though in the illustrated embodiment of the present invention, the engine has two plug holes, it should be clear to those skilled in the art that the center housing may have only one plug hole therein.

We claim:

1. A center housing of the axial flow cooling type for a rotary piston engine having an inner wall portion with a multiarcuate inner surface and an outer wall portion spaced therefrom, axially directed cooling liquid passages, and bolt

bosses and ribs integrally joining the inner wall portion to the outer wall portion and defining cooling liquid passages therebetween and a cylindrical boss extending between said inner wall portion and said outer wall portion and defining an ignition plug hole, the improvement wherein at least said bolt bosses in the neighborhood of said plug hole are integrally formed with said outer wall portion, extend towards said inner wall portion but do not contact the same whereby; predetermined flexibility is provided to the inner wall portion in the neighborhood of said plug hole to absorb the heat stress of said inner wall portion during operation of said engine.

2. The center housing as claimed in claim 1 wherein the ribs in the neighborhood of the plug hole are integral with the outer wall portion, extend toward the inner wall portion but do not contact the same.

3. The center housing as claimed in claim 1 including a plurality of cylindrical bosses forming multiple plug holes, and wherein the bolt bosses on both sides of said cylindrical boss are integrally formed with the outer wall portion, extend inwardly toward said spaced inner wall portion, but do not contact the same.

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