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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Rotary Valve Housing Assemblies for Liquid-Cooled Internal Combustion Engines

I, FRANK METCALF ASPIN, a British subject, of Walmer Place, 149, Walmsley Road, Bury, Lancashire, do hereby declare the nature of this invention to be as follows:—

This invention relates to rotary valve housing assemblies for liquid-cooled internal combustion engines, of the kind in which the rotary valve member is mounted in a plug-like housing adapted to be secured in the end of the cylinder or of an extension thereof.

It is obviously desirable, in a liquid-cooled internal combustion engine of the above kind, to provide liquid cooling for the plug-like housing, and the object of the present invention is to provide for such cooling whilst retaining the obvious advantages of the plug-like construction.

According to the invention a rotary valve housing assembly for a liquid-cooled internal combustion engine or the like having the rotary valve member mounted in a plug-like housing adapted to be secured to the end of the cylinder or in an extension thereof, and in which the said cylinder or cylinder extension, and the plug-like member are cored for liquid cooling and their cored spaces connected through registering holes or passages formed in the outer end and inner walls respectively of the said parts, is characterised by an annular sealed zone formed by upper and lower sealing rings located respectively above and below the said registering holes or passages and between the said outer and inner walls.

The rotary valve assembly may be further characterised in that the sealing rings are of rubber located in deforming grooves or recesses in one of the said walls; or in that the said deforming grooves or recesses are of saw tooth shape with one face substantially normal to the wall, in which it is located, and the other face relatively inclined, both grooves having the same direction of in-

clination, as and for the purpose set forth; or in that the said grooves or recesses are formed in the plug-like housing and at the upper end thereof.

In the accompanying drawing showing one example of a rotary valve housing assembly made in accordance with the invention:—

Fig. 1 is a sectional plan of the plug-like housing on line A—A of Fig. 2.

Fig. 2 is a sectional elevation with the plug-like housing in part section on line C—C of Fig. 1.

Fig. 3 is a detail sectional view on line B—B of Fig. 1.

Fig. 4 is an enlarged sectional view of the sealing groove and ring.

As shown in the drawing the rotary valve housing assembly comprises a plug-like housing 10 located in an extension 11 of the engine cylinder, such extension having a cored fluid-cooling space 12 at the upper end of which is a port 13 opening in the inner wall of the extension. The plug-like housing 10, which is adapted to be secured by a cover plate 14, is cored to provide liquid cooling spaces 15 around the exhaust and inlet ducts 16 and 17 of which the ports 16a and 17a are shown in Fig. 2 and also around the ignition plug socket 18 of which the ignition port 18a is shown in Fig. 2. At its upper part the housing 10 has webs 19 on each side of a port 20 adapted to register with the port 13 of the cylinder extension and further ports 21 and 22 adapted to register with other ports, not shown, in the cylinder extension 11. Also, at its upper end, the rotary valve housing 10 is formed with a groove 23 below the port, in which groove is located a rubber sealing ring 23a, whilst its upper end is bevelled to form with the cover plate 14, another groove 24 for a sealing ring 24a. As can be seen from Fig. 4 the upper face 23b of the groove 23 is normal to the outer wall of the plug-

like housing, whilst the lower face 23c is bevelled to 45 degrees.

In assembly the rubber ring 23, normally of round cross-section, is inserted in its groove, and its deformation into said groove permits the housing to be slid into the cylinder extension. The upper face 23b of the groove being substantially normal to the outer wall, prevents any wedging action which might tear or damage the rubber ring 23, whilst the inclined face 23c allows the rubber to withdraw into the groove and later provides a wedge against which the rubber, in attempting to regain its original shape, will press and thereby also press out-

wardly against the inner wall of the cylinder extension. The similar shape of groove formed by the bevel of the end of the housing and by the plate 14 provides similar sealing action. Thus, an annular sealing zone is provided by the upper and lower sealing rings located above and below the registering holes or passages and between the outer and inner walls of the housing and cylinder extension respectively.

Dated this 16th day of November, 1944.

For the Applicant,

WILSON, GUNN & ELLIS,

54/56, Market Street, Manchester, 1.

COMPLETE SPECIFICATION

Improvements in or relating to Rotary Valve Housing Assemblies for Liquid-Cooled Internal Combustion Engines

I, FRANK METCALF ASPIN, a British subject, of Walmer Place, 149, Walmersley Road, Bury, Lancashire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to liquid-cooled rotary valve internal combustion engines of the kind in which the rotary valve member is mounted in a plug-like housing adapted to be secured in the end of the cylinder or of an extension thereof.

It is obviously desirable, in a liquid-cooled internal combustion engine of the above kind, to provide liquid cooling for the plug-like housing, and the object of the present invention is to provide for such cooling whilst retaining the obvious advantages of the plug-like construction.

According to the present invention, a liquid-cooled internal combustion engine of the kind referred to is provided with a plug-like valve housing having gas inlet and exhaust ports towards one end and cooling liquid ports towards the other end, said cooling liquid ports leading to cored spaces proximate to said gas ports, said housing being positioned in the engine cylinder or an extension thereof having cooling liquid passages and ports registering with said cooling liquid ports and said cooling liquid ports being sealed by upper and lower sealing rings extending around the valve housing and below said cooling liquid ports.

The internal combustion engine may be further characterised in that the cooling rings are of rubber and are located

in deforming grooves or recesses in the periphery of the valve housing or the corresponding surface of the engine block; or in that the said deforming grooves or recesses are in cross section of a shape having one face substantially normal to the wall, in which it is located, and the other face relatively inclined, both grooves having the same direction of inclination, as and for the purpose set forth.

The drawing accompanying the Provisional Specification shows one example of a rotary valve housing assembly made in accordance with the invention:—

Fig. 1 is a sectional plan of the plug-like housing on line A—A of Fig. 2.

Fig. 2 is a sectional elevation with the plug-like housing in part section on line C—C of Fig. 1.

Fig. 3 is a detail sectional view on line B—B of Fig. 1.

Fig. 4 is an enlarged sectional view of the sealing groove and ring.

As shown in the drawing the rotary valve housing assembly comprises a plug-like housing 10 located in an extension 11 of the engine cylinder, such extension having a cored fluid-cooling space 12 at the upper end of which is a port 13 opening in the inner wall of the extension. The plug-like housing 10, which is adapted to be secured by a cover plate 14, is cored to provide liquid cooling spaces 15 around the exhaust and inlet ducts 16 and 17 of which the ports 16a and 17a are shown in Fig. 2 and also around the ignition plug socket 18 of which the ignition port 18a is shown in Fig. 2. At its upper part the housing 10 has webs 19 on each side of a port 20

adapted to register with the port 13 of the cylinder extension and further ports 21 and 22 adapted to register with other ports, not shown, in the cylinder extension 11. Also, at its upper end, the rotary valve housing 10 is formed with a groove 23 below the ports 20, 21, 22 in which groove is located a rubber sealing ring 23a whilst its upper end is bevelled to form with the cover plate 14, another groove 24 for a sealing ring 24a. As can be seen from Fig. 4 the upper face 23b of the groove 23 is normal to the outer wall of the plug-like housing, whilst the lower face 23c is bevelled to 45 degrees.

In assembly the rubber ring 23a normally of round cross section, is inserted in the groove 23, and its deformation into said groove permits the housing to be slid into the cylinder extension. The upper face 23b of the groove being substantially normal to the outer wall, prevents any wedging action which might tear or damage the rubber ring 23, whilst the inclined face 23c allows the rubber to withdraw into the groove and later provides a wedge against which the rubber, in attempting to regain its original shape, will press and thereby also press outwardly against the inner wall of the cylinder extension. The similar shape of groove 24 formed by the bevel of the end of the housing and by the plate 14 provides similar sealing action. Thus, an annular sealing zone is provided by the upper and lower sealing rings located above and below the registering holes or passages and between the outer and inner walls of the housing and cylinder extension respectively.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim

is:—

1. A liquid-cooled rotary valve internal combustion engine of the kind referred to having a plug-like valve housing having inlet and exhaust gas ports towards one end and cooling liquid ports towards the other end, said cooling liquid ports leading to cored spaces proximate to said gas ports, said housing being positioned in the engine cylinder or an extension thereof having cooling liquid passages and ports registering with said cooling liquid ports and said cooling liquid ports being sealed by upper and lower sealing rings extending around the valve housing above and below said cooling liquid ports.

2. A liquid-cooled rotary valve internal combustion engine according to Claim 1 further characterised in that the sealing rings are of rubber located in deforming grooves or recesses in the walls of the housing or the co-operating surface of the engine block.

3. A rotary valve housing assembly according to Claim 2 further characterised in that the said deforming grooves or recesses are of a shape having one face substantially normal to the wall in which it is located and the other face relatively inclined, both grooves having the same direction of inclination, as and for the purpose set forth.

4. A rotary valve housing assembly for a liquid-cooled internal combustion engine, constructed and arranged substantially as herein described with reference to and as illustrated in the drawing filed with the Provisional Specification.

Dated this 4th day of December, 1945.

For the Applicant,

WILSON, GUNN & ELLIS,

54/56, Market Street, Manchester, 1.

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Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 2s. 0d. each (inland) 2s. 1d. (abroad) may be obtained.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

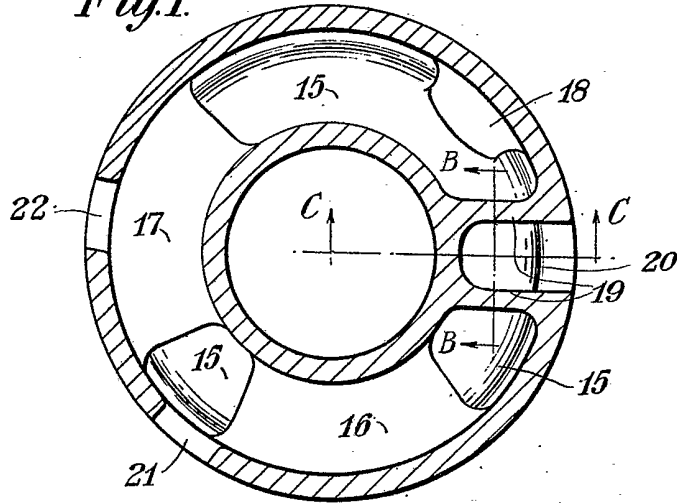


Fig. 2.

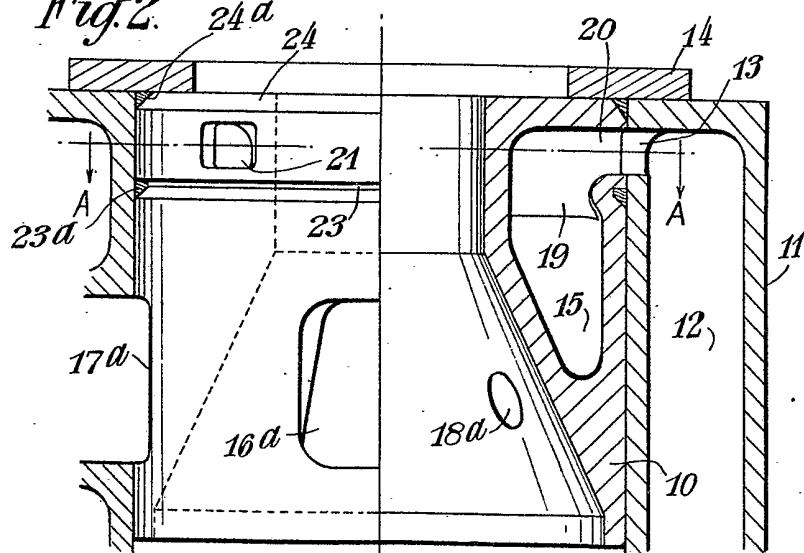


Fig. 3.

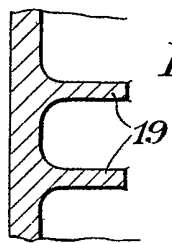


Fig. 4.

