

[54] **SPACER DECK FOR CYLINDER BLOCK**

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[58] Field of Search 123/193 CH, 193 C, 193, 41.84

[56] **References Cited**

UNITED STATES PATENTS

3,396,711 8/1968 Fangman et al. 123/193

926,540 6/1909 Blomgren 123/41.84
2,703,077 3/1955 Antonsen 123/193

FOREIGN PATENTS OR APPLICATIONS

175,409 1/1950 Austria 123/41.84
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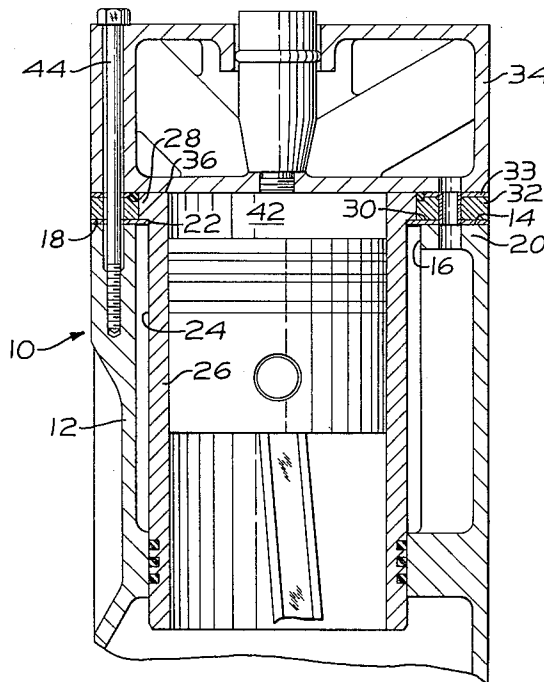
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[57] **ABSTRACT**

A spacer deck for an engine cylinder block comprising two plates between the top deck of the cylinder block and the bottom deck of the cylinder head, the lower plate utilized as a resilient seating member for a cylinder liner flange while the upper plate serves as a spacer.

4 Claims, 2 Drawing Figures



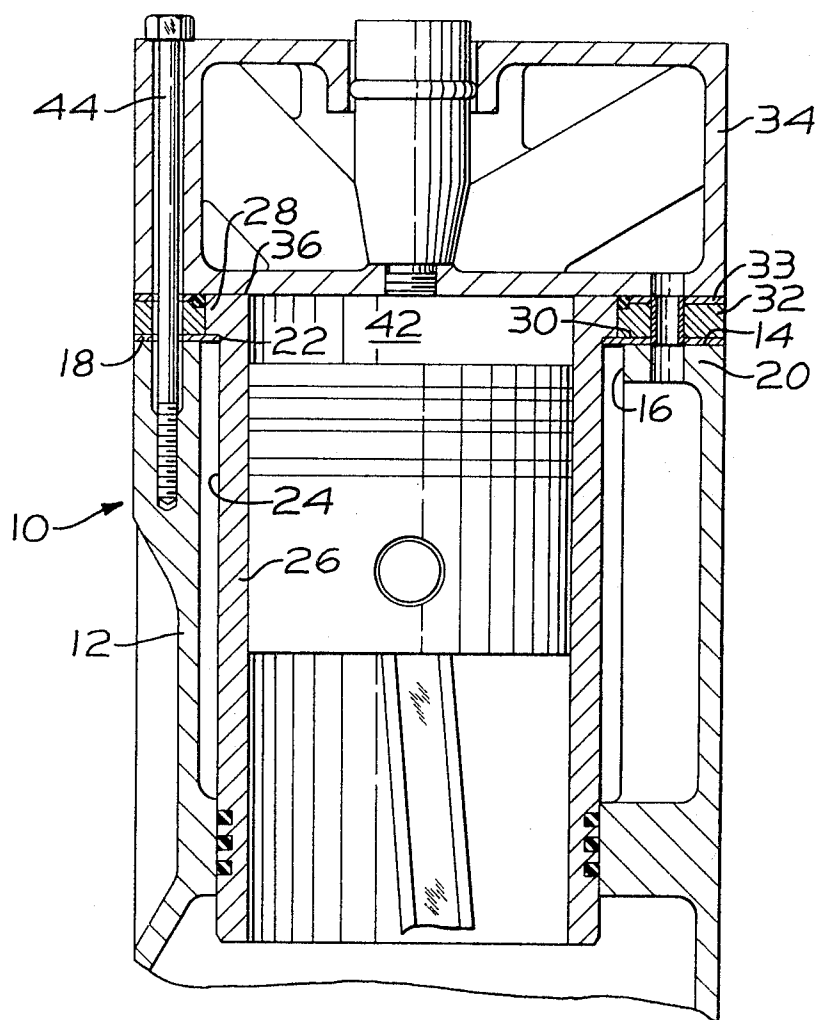


Fig. 1.

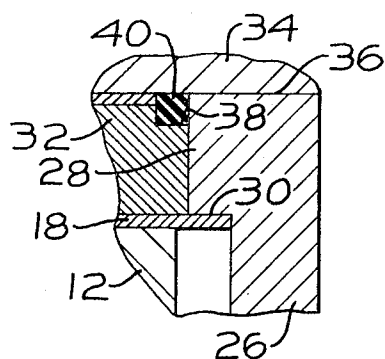


Fig. 2.

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SPACER DECK FOR CYLINDER BLOCK

BACKGROUND AND SUMMARY OF THE INVENTION

High cylinder pressures of modern internal combustion engines have necessitated use of higher bolt torques to effect good gas seals and reasonable gasket life. The increased cylinder head bolt torque and cylinder pressures present in high combustion pressure engines cause severe problems in conventional engines, wherein the cylinder liner is placed in a counterbore in the top deck of the block, by causing liner ledge and flange cracking.

In U.S. Pat. No. 3,396,711, issued Aug. 13, 1968, and assigned to the assignee hereof, a design is shown wherein the cylinder liner flange is sealed on the top deck of the block and a plate surrounding the liner flange acts as a spacer between the block top deck and the head bottom deck. That design has alleviated the notch stresses which cause ledge and flange cracking, but, in some cases, the sealing of combustion gases remains a problem.

Liner projection, which is that portion of the liner flange extending above the block counterbore or top surface of a spacer plate, is provided to compress the cylinder head gasket between the liner flange and the cylinder head, producing a combustion seal. However, projection tolerances cause variation in gasket preload from cylinder to cylinder, and, when combined with cylinder head distortion from high cylinder pressures and cyclic loads, combustion gas leakage often results.

In the present invention, two plates are positioned between the top deck of the cylinder block and the bottom deck of the cylinder head. The lower plate has bores therein which register with the cylinder bores, but are of smaller diameter so that the liner flange is mounted on the plate in such a way that the flange does not extend radially outwardly so as to be over the upper deck of the cylinder block. In this manner the lower plate is utilized as a resilient seal and seat for the cylinder liner flange, while an upper plate serves as a spacer.

Allowing the lower plate to extend over the bore in the cylinder block creates a stiff spring effect which, when the spring is loaded by the cylinder head pressing on the top of the liner flange, retains the liner against the lower plate which is seated on the lower deck of the cylinder head, regardless of the distortions which take place when the engine is operating. The spring rate of the plate urges each liner against the cylinder head with a uniform force, permitting sealing to be less sensitive to variations in liner projections while allowing less torque to be required for securing the cylinder head.

The design disclosed herein may be used on a cast iron block or an aluminum block and the spacer plate itself, while steel is preferred, might be made from aluminum or other metal. The thickness of the plate is determined by the amount of force required for sealing.

Therefore it is an object of this invention to produce an improved spacer deck for engine cylinder blocks.

It is also an object of this invention to provide a spacer deck which resiliently supports a cylinder liner and retains the liner against the lower deck of the cylinder head, regardless of the distortions which take place due to engine operation.

It is also an object of this invention to provide a spacer deck which causes the cylinder liner to be biased against the cylinder head with a uniform force.

It is a further object of this invention to provide such a spacer deck wherein sealing between a cylinder liner and the head lower deck is less sensitive to variations to liner projections.

Other objects and advantages of the present invention will become apparent from the following description and claims as illustrated in the accompanying drawing which, by way of illustration, shows a preferred embodiment of the present invention and principles thereof and what is now considered to be the best mode contemplated for applying these principles. It is recognized that other embodiments of the invention utilizing the same or equivalent principles may be used, and struc-

tural changes may be made as desired by those skilled in the art, without departing from the present invention and purview of the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a vertical cross-sectional view of an engine cylinder block and cylinder head assembly incorporating the present invention; and

FIG. 2 is an enlarged vertical cross-sectional view of part of the assembly of FIG. 1.

DETAILED DESCRIPTION

In FIG. 1, there is shown a block and head assembly 10 of a multi-cylinder internal combustion engine. The assembly includes a cylinder block 12 which is of conventional design and which presents a comparatively flat top surface 14. Formed in the block 12 and opening at the surface 14, are a plurality of aligned cylinder bores 16, one of which is shown.

A thin steel plate 18 is placed upon the surface 14 of the top deck 20 of the cylinder block and has substantially the same shape as the top deck.

An aperture 22 in the plate receives the outer diameter 24 of a cylinder liner 26, and a flange 28 of the liner rests upon a surface 30 of the plate 18. The diameter of aperture 22 of plate 18 is smaller than that of cylinder bore 16 so that the plate extends in a cantilevered fashion over the edges of the bores.

A spacer plate 32 is mounted on surface 30 of the plate 18, the spacer plate being of a lesser thickness than the flange 28. A compressible gasket 33 is positioned on the upper surface of plate 32.

A cylinder head 34 rests directly upon a top surface 36 of liner 26 to produce a static seal.

As more clearly shown in FIG. 2, a groove 38 is provided in the spacer plate 32 and a seal 40 is installed in the groove so as to prevent the entrance of water, oil, etc., into the combustion chamber 42 in the cylinder liner.

Bolts 44, or other suitable means such as studs, may be used to secure the head 34 to the block. Torquing of the bolts or studs causes the cylinder head to press the flange 32 against the extended portion of plate 18 and the resiliency of the cantilevered portion of the plate thus permits retention of the liner against the cylinder head at a predetermined force.

Thus the Applicants have disclosed a spacer deck for engine cylinder blocks which obviates liner ledge and flange cracking while providing satisfactory sealing of combustion gases.

What is claimed is:

1. A spacer deck for an engine block having a top surface and at least one cylinder bore opening at the top surface, the deck comprising a plate adapted for seating on the top surface, the plate being formed with an aperture positioned coaxially with the cylinder bore but having a smaller diameter than the cylinder bore, the aperture being adapted to encircle a cylinder liner and provide the sole support for the cylinder liner which projects into the cylinder bore, a spacer plate being mounted on said plate, the spacer plate surrounding a flange on the cylinder liner and being of a lesser thickness than the liner flange.

2. A seal mounted in a groove of the spacer plate described in claim 1, the groove situated adjacent a liner flange receiving aperture in the spacer plate so that the seal bears against the intersection of the cylinder flange and a cylinder head lower deck to seal the combustion chamber within the cylinder.

3. In an internal combustion engine having a cylinder block with a top deck and a cylinder head with a lower deck, at least one bore in the cylinder block receiving a cylinder liner therein, the cylinder liner having a flange thereon which extends above the top deck of the block and to the lower deck of the head means situated on the top deck of the block supporting the liner flange in cantilever fashion within the bore, the supporting means being a relatively resilient member, a spacer means mounted on the supporting means and surrounding, but

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being of lesser thickness than the liner flange, and means fixing the cylinder head to the cylinder block so that the resilient supporting member retains the liner flange in abutment with the lower deck of the head with a predetermined force.

4. The engine of claim 3 including sealing means mounted in the spacing means for sealing the intersection of the lower deck of the block and the liner flange.

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