United States Patent

Vulliamy

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[54] RUBBER MOUNTED SUMP

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **123/195 C,** 287/189.36, 220/46 R

[51] **Int. Cl.** **F02f 7/00**

[58] **Field of Search** 220/4, 6, 8; 123/195, 106; 287/189.36

[56] **References Cited**

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[57] **ABSTRACT**

A peripheral frame is bolted to the engine block of an internal combustion engine and, by means of a peripheral elastomeric interlay mounts a cover on the engine block. Interfitting flanges on the frame and cover are spaced from each other in a manner that allows a metal-to-metal abutment of the engine block and cover and support the cover in case of a mechanical failure of the interlay. The interlay is disposed between the interfitting flanges and provides damping of audio frequency vibrations emanating from the engine while at the same time providing an effective seal between the engine block and the cover.

9 Claims, 4 Drawing Figures

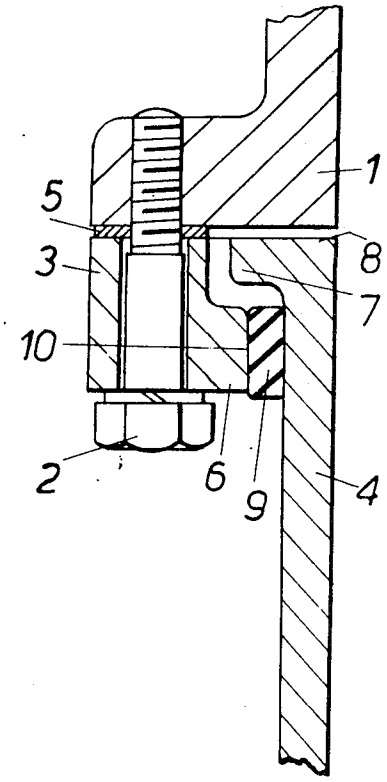


FIG.1

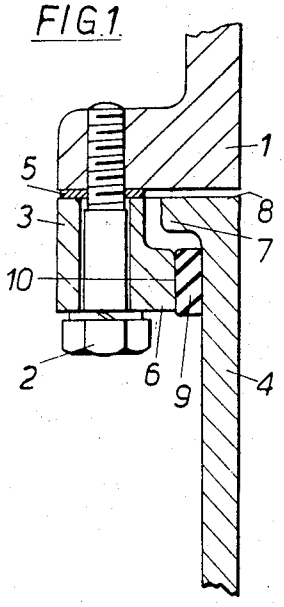


FIG.2

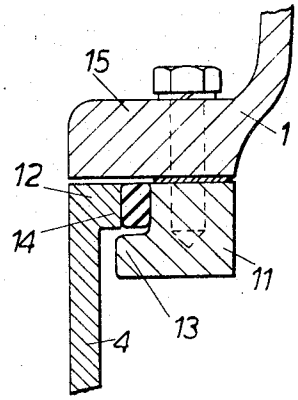


FIG.3

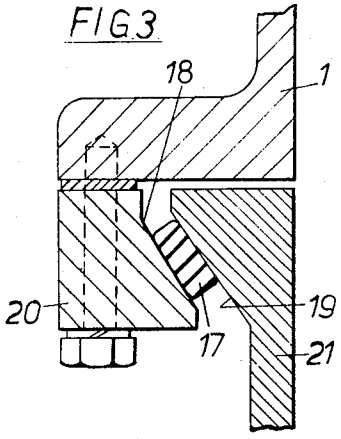
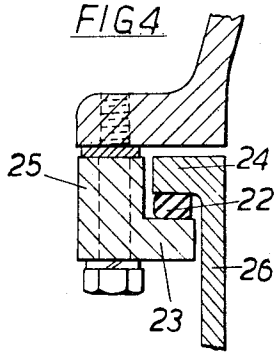


FIG.4



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RUBBER MOUNTED SUMP

This invention relates to cover assemblies for internal combustion engines and more particularly to cover assemblies which are subject to vibration and/or resonance at audio frequency when the engines are running.

It is known to mount internal combustion engines on rubber or other elastomeric mountings for the purpose of isolating the engine so that relatively low frequency vibrations emanating therefrom are damped.

Higher frequency vibrations in the audible range present a more difficult problem and the present invention has as an object the reduction of noise emanation from internal combustion engines.

According to the present invention there is provided a cover assembly for an internal combustion engine, comprising a cover, and a support adapted to be mounted on an engine, said cover being carried by an elastomeric interlay located between the cover and the support.

Preferably, said support comprises a frame, and the frame and the interlay extend around the periphery of the cover, said interlay forming a seal between the frame and the cover.

Preferably also, interfitting formations are provided on the support and the periphery of the cover, respectively, the formations on the support, in use, forming with the engine a recess adapted to receive the formations on the cover so that, in the event of a mechanical failure of the interlay, the cover will be supported by the interfitting formations.

Further, according to the present invention there is provided an internal combustion engine including a cover assembly as aforesaid, and in which the cover forms the oil sump of the engine.

Preferably, the upper face of the sump is so spaced from the lower face of the engine crankcase that, when the engine is supported by the sump, the interlay resiliently deforms sufficiently to allow said upper and lower faces to abut.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, of which:

FIG. 1 is a cross sectional view through a part of one form of cover assembly, in the form of a sump for a reciprocable piston internal combustion engine;

FIGS. 2 to 4 are similar cross sections to FIG. 1 showing modified forms of sump cover.

With reference to FIG. 1 an engine crankcase 1 has fastened to it by bolts 2 a support in the form of a frame 3 which encircles the top of a cover 4. A thin gasket 5 is placed between the frame 3 and the crankcase 1.

The frame 3 has an integral inwardly extending flange 6 extending all the way around it, and the cover 4 is provided with an outwardly presented continuous rim 7 around its upper edge 8.

An interlay 9 of oil resistant rubber or similar elastomeric material is bonded or similarly secured to the inwardly presented face 10 of the flange 6 and to the body of the cover portion just below the rim 7. Thus, the weight of the cover portion 4 and its contents is carried solely by the rubber interlay 9 in shear. The interlay can be trapped between the flange and the cover 4.

The flange 6 and the rim 7 are such that the cover 4 cannot fall off should the rubber interlay 9 fail to support it.

Normally the upper edge 8 of the cover 4 is flush with the top of the frame 3 and is separated from the engine crankcase 1 by the thickness of the gasket 5. However, if the engine is set down to rest on its cover 4 the interlay 9 deflects in shear to allow the edge 8 to abut the crankcase 1 and support the weight of the engine direct.

The embodiment shown in FIG. 2 is a modification in which the frame 11 is located on the inner periphery of the upper edge 12 of the cover 4. A flange 13 projects out from the frame 11 below an inwardly projecting rim 14 from the edge 12 of the cover 4. Bolts passing through a flange 15 on the engine crankcase secures the frame 11. In this embodiment the rubber interlay 16 is bonded or similarly secured to the rim 14 and the main part of the frame 11. The advantage of this is that, should the interlay fail, it will not drop out but will remain trapped between flanges 14 and 15 and maintain a rudimentary seal to prevent a high rate of loss of oil from the sump. By this means the rate of loss could be lowered to a value which would enable the fault to be detected before damage to the engine occured.

In the embodiment shown in FIG. 1 placing of the rubber interlay between the rim 7 and the main part of the frame 3 would give the advantage referred to in the preceding paragraph.

FIG. 3 shows an embodiment in which the interlay 17 is bonded or similarly secured to two parallel sloping faces formed on the flange 18 and the rim 19 on the frame 20 and cover 21, respectively. Movement of the cover 21 with respect to the frame 20 in the direction of the engine crankcase results in components of shear being placed on the interlay though there will be a component of compression or tension in addition.

FIG. 4 shows an embodiment in which the interlay 22 is bonded or similarly secured to both the flange 23 and the rim 24 of the frame 25 and cover 26, respectively.

The prime advantage conferred by the invention is the isolation of engine aperture covers from audio frequency vibrations with which the cover might vibrate and/or resonate to generate noise additional to that from the main engine structure.

As will be seen the secondary advantages are the safety provision for retaining the cover and the provision for preventing damage, in the special case of the sump cover, to the rubber interlay.

I claim:

1. In combination with an engine having an engine block, a cover assembly comprising a cover and a cover support adapted to be mounted on said engine block; said cover and said cover support having co-operatively engageable means, an elastomeric deformable interlay disposed between said co-operatively engageable means, said cover being normally resiliently supported by said interlay and said interlay isolating said cover from said engine block to dampen audio frequency vibrations emanating from said engine block when said engine is in operation.

2. A cover assembly as claimed in claim, 1 in which said support comprises a frame, and in which the frame and the interlay extend around the periphery of the cover, said interlay forming a seal between the frame and the cover.

3. A cover assembly as claimed in claim, 1 in which said co-operatively engageable means comprise interfitting formations provided on the support and the periphery of the cover, respectively, the formation on the support, in use, forming with the engine block a recess adapted to receive the formation on the cover so that, in the event of a mechanical failure of the interlay, the cover will be supported by the interfitting formations.

4. A cover assembly as claimed in claim 3, in which the formations on the support include an inwardly extending flange which defines one wall of said recess, and the formations on the cover include an outwardly extending rim adapted to be received in said recess.

5. A cover assembly as claimed in claim 4, in which the interlay is located between the inner edge of said flange and said cover.

6. A cover assembly as claimed in claim 4, in which the interlay is located between the wall of the recess formed by said flange and the rim on said cover.

7. A cover assembly as claimed in claim 3, in which the formations on the support include an outwardly extending flange which defines one wall of said recess, and the formations on the cover include an inwardly extending rim adapted to be received in said recess.

8. A cover assembly as claimed in claim 7, in which the interlay is located between the inner edge of said rim and said support.

9. A cover assembly as claimed in claim 7, in which said one wall of the flange is angled and a corresponding chamfer is provided on the rim, and in which the interlay is located between the chamfer and said one wall.

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