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(54) **Engine with remote oil fill assembly**

(57) A remote oil fill assembly (10) for an internal combustion engine that has an engine oil fill point is provided. The remote oil fill assembly comprises a main body portion (12), an engine oil port end (14), and an oil fill end (16). The engine oil port end (14) is disposed at a first end of the main (12) body portion. The oil port end is fixedly attached to the engine oil fill point. The oil fill end (14) is disposed at a second end of the main body portion (12). A flow path forms between the engine oil port end (14) and the oil fill end (16) to deliver fluid to the engine oil fill point.

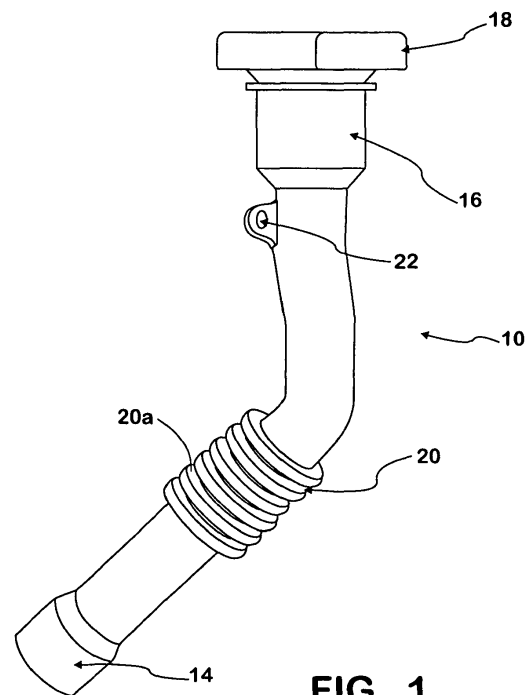


FIG. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to engine having a remote oil fill tube, and more particularly to a single piece remote oil fill tube that allows oil to be added to the engine.

BACKGROUND

[0002] Many modern internal combustion engines are mounted in vehicles in locations that attempt to minimize the amount of space required for a vehicle's engine bay. Modern internal combustion engines contain additional emissions equipment that requires additional space within the vehicle's engine bay, further limiting access to portions of the engine. Additionally, in some vehicles, particularly large trucks, the engine may be large, making it difficult for a person to reach many areas of the engine. For example, in some large trucks having diesel engines, an oil fill port of the engine may be located in an area that is either difficult to reach, due to the physical size of the engine, or difficult to access, due to engine components being in close proximity to each other and the vehicle. As space in the vehicle engine bay is reduced, it may become more difficult to easily access portions of the engine. Thus, adding oil to a vehicle may often be a difficult task that may spill oil, or may slow the process.

SUMMARY

[0003] According to one embodiment, a remote oil fill assembly for an internal combustion engine that has an engine oil fill point is provided. The remote oil fill assembly comprises a main body portion, an engine oil port end, and an oil fill end. The engine oil port end is disposed at a first end of the main body portion. The oil port end is fixedly attached to the engine oil fill point. The oil fill end is disposed at a second end of the main body portion. A flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point.

[0004] According to another embodiment, a remote oil fill assembly for an internal combustion engine having an engine oil fill point is provided. The remote oil fill assembly comprises a main body portion, an over-molded engine oil port end, an oil fill end, and a removable cap. The over-molded engine oil port end is disposed at a first end of the main body portion. The over-molded engine oil port end forms a seal with an engine oil fill point. The oil fill end is disposed at a second end of the main body portion. The removable oil fill cap removably connects to the oil fill end. A flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point.

[0005] According to a further embodiment, a remote oil fill assembly for an internal combustion engine having an engine oil fill point is provided. The remote oil fill assembly comprises a main body portion, an over-molded

engine oil port end, an oil fill end, a bellows region, and a removable oil fill cap. The over-molded engine oil port end is disposed at a first end of the main body portion. The over-molded engine oil port end forms a seal with an engine oil fill point. The oil fill end is disposed at a second end of the main body portion. The bellows region provides a flexible area on the remote oil fill assembly. The bellows region is disposed between the over-molded engine oil port end and the oil fill end of the remote oil fill assembly. The removable oil fill cap removably connects to the oil fill end. A flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a perspective view of a remote engine oil fill.

DETAILED DESCRIPTION

[0007] FIG. 1 shows a perspective view of a remote engine oil fill assembly 10 for an internal combustion engine. The engine oil fill assembly 10 has a body portion 12. The body portion 12 has an engine oil port end 14 and an oil fill end 16. The engine oil port end 14 is located at a distal end of the engine oil fill assembly 10, while the oil fill end 16 is located at a proximal end of the engine oil fill assembly 10. The body portion 12 of the engine oil fill assembly may have a generally elongate shape.

[0008] The engine oil port end 14 of the engine oil fill assembly 10 connects to an oil fill point located on the engine. The engine oil port end 14 forms a sealing surface with the oil fill point of the engine. The sealing surface reduces or prevents oil from leaking between the engine oil fill assembly 10 and the engine's oil fill point. It is contemplated that the engine's oil fill point is located on a valve cover of the engine.

[0009] The oil fill end 16 of the remote engine oil fill assembly 10 is adapted to receive a removable fill cap 18. The removable fill cap 18 prevents oil from flowing out of the remote engine oil fill assembly 10 when the engine is operating. The removable fill cap 18 additionally prevents debris, such as dirt, dust, or other fluids, from entering the remote engine oil fill assembly 10, from which the debris could enter the engine and cause damage to the engine. The removable fill cap 18 may be connected to the oil fill end 16 of the remote engine oil fill assembly 10 in a variety of manners, such as, for example, via threads, a press fit, a friction fit. Thus, the oil fill end 16 may have internal threads adapted to interact with threads on the removable fill cap 18.

[0010] The remote engine oil fill assembly 10 additionally has a flexible bellows region 20 disposed between the engine oil port end 14 and the oil fill end 16. The flexible bellows region 20 forms a bellows that allows the body portion 12 to be flexed for routing the engine oil fill assembly 10. Thus, the remote engine oil fill assembly

10 may be shaped via the bellows region 20 such that the engine oil fill assembly 10 may be used with a variety of engines, in a variety of vehicles, or with a variety of vehicle and engine configurations. For example, certain engine applications may have different accessories, such as air compressors, or hydraulic pumps that vary from one vehicle to the next vehicle, thus the flexible bellows region 20 allows the remote engine oil fill assembly 10 to be routed around, or through, these accessories such that the user may readily access the oil fill end 16 of the remote engine oil fill assembly 10.

[0011] A mounting structure 22 is additionally disposed on a periphery of the body portion 12 of the remote engine oil fill assembly 10. The mounting structure 22 forms a through hole 24 disposed to receive a fastener, such as a bolt, screw, rivet, or the like, to secure the remote engine oil fill assembly 10 to the engine or the vehicle. The mounting structure 22 additionally stabilizes the remote engine oil fill assembly 10.

[0012] The remote engine oil fill assembly 10 is a single component made via blow-molding and over-molding processes. The use of over-molding allows materials with different hardness values to be used in various portions of the remote engine oil fill assembly 10. For example, the main body 12 may be molded from somewhat rigid, oil resistant, and heat resistant material, such as polypropylene, although other polymeric materials may be used. The engine oil port end 14 of the remote engine oil fill assembly 10 may be over-molded with a material that is softer than that used for the main body 12. The softer material used for the engine oil port end 14 allows a better seal to form between the remote engine oil fill assembly 10 and the oil fill point of the engine. Similarly, the oil fill end 16 of the remote engine oil fill assembly 10 may additionally be over-molded with a material softer than that used for the main body 12. The oil fill end 16 additionally is provided with features to allow the removable fill cap 18 to be removably mounted to the oil fill end 16. For example, the oil fill end 16 may be provided with threads to attach the removable fill cap 18, the oil fill end 16 may have a taper to form a friction fit with the removable fill cap 18, or the oil fill cap 18 may be sized such that an interference fit is formed with the removable fill cap 18.

[0013] The bellows region 20 provides flexibility to the remote engine oil fill assembly 10. The bellows region 20 has a number of The bellows region 20 may be sized such that flexibility of the bellows region 20 may be controlled. For example, the geometry of the bellows regions 20 may include a variable number of annular protrusions 20a that form the bellows region 20 by projecting outwardly from the main body 12. Axial spacing between annular protrusions 20a, axial width of the annular protrusions 20a, and lateral protruding extent of the annular protrusions 20a may all be varied to provide control of flexibility of the bellows region 20. Thus, it is contemplated in certain embodiments that the bellows region 20 provides a great deal of flexibility, while in other embodi-

ments the bellows region 20 offers only limited flexibility.

[0014] The use of over-molding and blow-molding allow the remote engine oil fill assembly 10 to be made with a single component comprising the main body 12, the engine oil port end 14 and the oil fill end 16. The use of a single component reduces the likelihood of a leak forming in the remote engine oil fill assembly 10, as no joints are required as would be needed if multiple components are used.

[0015] The remote engine oil fill assembly 10 is in fluid communication with the engine's oil fill point. The remote engine oil fill assembly 10 is adapted to position oil fill end 16 to a location more accessible to a user than the engine's oil fill point, allowing engine oil to more conveniently be added to the engine. The accessibility provided by the remote engine oil fill assembly 10 reduces the difficulty in adding oil to the engine, therefore, making adding oil to the engine a less time consuming process. Thus, the remote engine oil fill assembly 10 may result in better service habits for the engine, as adding engine oil, such as during an oil change or if the engine oil level is low, is a quicker and more convenient procedure.

Claims

1. A unitary remote oil fill assembly for an internal combustion engine having an engine oil fill point, the remote oil fill assembly comprising:
 - a main body portion;
 - an engine oil port end disposed at a first end of the main body portion, the oil port end being fixedly attached to an engine oil fill point; and
 - an oil fill end disposed at a second end of the main body portion,
 - wherein a flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point.
2. The remote oil fill assembly of claim 1 further comprising a bellows region, the bellows region providing a flexible area on the remote oil fill assembly.
3. The remote oil fill assembly of claim 1 further comprising a mounting structure, the mounting structure disposed on a periphery of the main body portion, the mounting structure forming a through hole adapted to receive a fastener to secure the remote oil fill assembly.
4. The remote oil fill assembly of claim 1 further comprising a removable oil fill cap, the removable oil fill cap adapted to be received by the oil fill end.
5. The remote oil fill assembly of claim 4, wherein the removable oil fill cap connects to the oil fill end via threads.

6. The remote oil fill assembly of claim 4, wherein the removable oil fill cap connects to the oil fill end via a press fit.
7. The remote oil fill assembly of claim 4, wherein the removable oil cap forms a generally fluid tight seal with the oil fill end. 5
8. The remote oil fill assembly of claim 1, wherein the main body comprises a first polymeric material. 10
9. The remote oil fill assembly of claim 8 wherein the main body comprises polypropylene.
10. The remote oil fill assembly of claim 8, wherein the engine oil port end is over-molded onto the main body. 15
11. The remote oil fill assembly of claim 10, wherein the engine oil port end forms a seal with an engine oil fill point. 20
12. The remote oil fill assembly of claim 11, wherein the engine oil port end comprises a second polymeric material. 25
13. The remote oil fill assembly of claim 11, wherein the second polymeric material is softer than the first polymeric material. 30
14. The remote oil fill assembly of claim 1, wherein the engine oil fill point is in a valve cover of the engine.
15. A remote oil fill assembly for an internal combustion engine having an engine oil fill point, the remote oil fill assembly comprising: 35
- a main body portion;
 - an over-molded engine oil port end disposed at a first end of the main body portion, the over-molded engine oil port end forming a seal with an engine oil fill point;
 - an oil fill end disposed at a second end of the main body portion; and
 - a removable oil fill cap adapted to be removably connected to the oil fill end 40
- wherein a flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point. 45
16. The remote oil fill assembly of claim 15 further comprising a bellows region, the bellows region providing a flexible area on the remote oil fill assembly, the bellows region being disposed between the over-molded engine oil port end and the oil fill end of the remote oil fill assembly. 50 55
17. The remote oil fill assembly of claim 15 further comprising a mounting structure, the mounting structure disposed on a periphery of the main body portion, the mounting structure forming a through hole adapted to receive a fastener to secure the remote oil fill assembly to a vehicle.
18. The remote oil fill assembly of claim 15, wherein the removable oil fill cap connects to the oil fill end via threads.
19. The remote oil fill assembly of claim 15, wherein the main body comprises a first polymeric material, and the over-molded engine oil port comprises a second polymeric material, the first polymeric material being a harder material than the second polymeric material.
20. A remote oil fill assembly for an internal combustion engine having an engine oil fill point, the remote oil fill assembly comprising:
- a main body portion;
 - an over-molded engine oil port end disposed at a first end of the main body portion, the over-molded engine oil port end forming a seal with an engine oil fill point;
 - an oil fill end disposed at a second end of the main body portion;
 - a bellows region, the bellows region providing a flexible area on the remote oil fill assembly, the bellows region being disposed between the over-molded engine oil port end and the oil fill end of the remote oil fill assembly; and
 - a removable oil fill cap adapted to be removably connected to the oil fill end, 40
- wherein a flow path forms between the engine oil port end and the oil fill end to deliver fluid to the engine oil fill point.

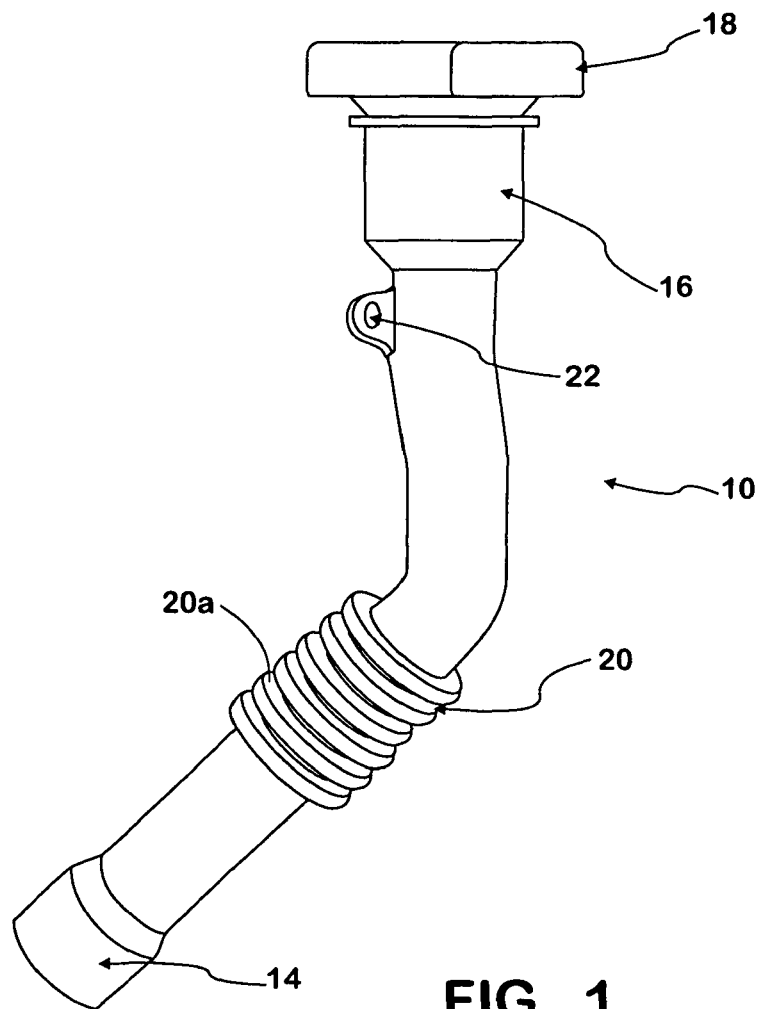


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 10 01 4519

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 41 23 073 A1 (VOLKSWAGEN AG [DE]) 30 January 1992 (1992-01-30) * column 1, line 6 - line 29 * * column 2, line 17 - line 23 * * column 2, line 55 - line 62 * * figure 1 *	1,2,4-20	INV. F01M11/04
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X	US 6 363 905 B1 (DAVIS STEVEN T [US]) 2 April 2002 (2002-04-02) * column 4, line 4 - line 16 * * figures 3a,3b *	1-12, 15-18,20	
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 June 2011	Examiner Flamme, Emmanuel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 01 4519

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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