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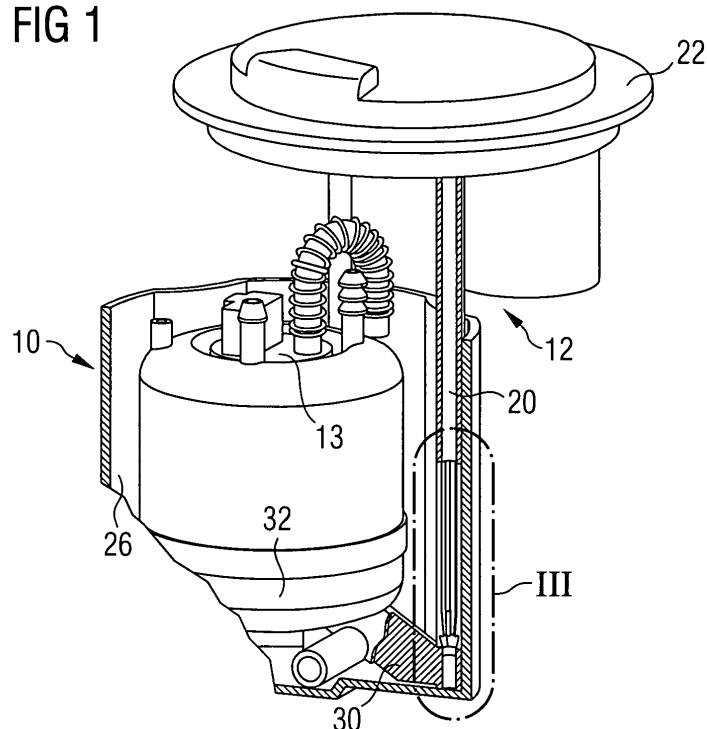
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(54) **Strut guidance structure and pump/filter housing retention structure in a fuel module**

(57) The invention relates to a reservoir assembly (10) of a fuel module, the reservoir assembly (10) comprising: a reservoir (11) having a sidewall structure (16) and a bottom (21) to define an interior space (19) for holding fuel, the reservoir (11) including strut guidance structure (14) coupled with an interior portion of the sidewall structure (16) the strut guidance structure (14) being of generally horseshoe configuration in section and defining an elongated gap (18), the strut guidance struc-

ture (14) being constructed and arranged to receive a strut (20) of the fuel module (12) so as to be movable therein, and retention structure (26) constructed and arranged to retain a part of the module (12) within the reservoir, the retention structure including a coupling member (28) constructed and arranged to be moved through the gap (18) to be in disposed within the strut guidance structure (14) so as to secure the retention structure (26) with respect to the strut guidance structure (14).

FIG 1



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DescriptionFIELD OF THE INVENTION

[0001] This invention relates to in-tank fuel modules for sending fuel from a tank to an engine of a vehicle, and more particularly, to an improved strut guidance and pump and/or filter housing attachment.

BACKGROUND OF THE INVENTION

[0002] In conventional fuel modules, strut rods are used for bottom referencing the fuel module to the bottom of the fuel tank. The strut rods are typically mounted to a flange and glide within guiding holes attached by some means to a reservoir assembly. The fuel pump and often the filter housing are located within the reservoir assembly and retained therein by clipping or press-fitting.

[0003] There is a need to combine the guidance for a strut rod and retention for a pump or filter housing assembly into one feature.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The invention will be better understood from the following detailed description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings, wherein like reference numerals refer to like parts, in which:

FIG. 1 shows a fuel module with a reservoir assembly having strut guidance structure and retention structure provided in accordance with the principles of the invention, with a portion of the reservoir being shown cut-away for clarity of illustration.

FIG. 2 is a top view of the reservoir of the module of FIG. 1 showing the strut guidance structure.

FIG. 3 is an enlarged view of the portion encircled at 3 in FIG. 1.

FIG. 4 is a view of a retaining cup associated with the strut guidance structure and a coupling member of the invention.

FIG. 5 is an enlarged view, partially in section, of the retaining cup associated with the strut guidance structure and coupling member of the invention.

FIG. 6 is a perspective of the retaining cup of the invention.

FIG. 7 is a view of a damping element between the strut guidance structure and a coupling member in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENT

[0005] With reference to FIGs. 1-3, a reservoir assembly 10 of a fuel module, generally indicated at 12, is shown. A fuel pump 13 is disposed in a reservoir 11 of the reservoir assembly 10. The reservoir 11 includes sidewall structure 16 and a bottom 21 defining an interior space 19 for containing fuel. The reservoir 11 includes strut guidance structure 14. In the illustrated embodiment, a pair of strut guidance structures 14 are coupled with and extend generally vertically along an interior of the sidewall structure 16. Each strut guidance structure 14 is of generally horseshoe configuration in section defining an elongated gap 18. The strut guidance structure 14 can be formed integrally with the reservoir 10 by, for example a molding process. Each strut guidance structure 14 is constructed and arranged to receive a strut 20 mounted to a flange 22 of the module 12.

[0006] Since the strut guidance structure 14 is located inside the reservoir 11, the volume of fuel inside the strut guidance structure is captured by the reservoir and therefore utilized by the fuel pump 13. This improves the low fuel handling characteristics of the vehicle because the reservoir 11 holds more volume of fuel.

[0007] Typically, conventional strut guides are on the outside of the reservoir, where fuel cannot be captured for use.

[0008] A taper 24 is provided in the strut guidance structure 14 so that the structure 14 has a large diameter portion 15 and a smaller diameter portion 17. Thus, the taper 24 allows a lead-in for a press fit in the smaller diameter portion 17 that will be described below. The upper half (large diameter portion 15) of the structure 14 supports the strut 20 which can glide up and down freely.

[0009] The reservoir assembly 10 also includes retention structure, generally indicated at 26 in FIG. 3, and can be part of a filter housing or pump holder. The retention structure 26 includes a coupling member 28 constructed and arranged to be coupled to the strut guidance structure 14 near a bottom the reservoir 11. In particular, the coupling member 28 is in the form of a cylindrical tube that is moved through the gap 18 to be in a press-fit engagement with the smaller diameter portion 17 of the strut guidance structure 14. Thus, the retaining structure 26 is secured with respect to the strut guidance structure 14. The retention structure 26 includes a rib 30 extending from the coupling member 28 into the interior of the reservoir 11. The rib 30 is part of a holding member 32 of the retention structure 26. The retention structure 26 is preferably part of an element of the fuel module and is constructed and arranged to retain element(s) of the module 12 within the reservoir. For example, when a filter housing is provided, the retention structure 26 would be part of the filter housing. If no filter housing is provided, the retention structure 26 would be part of a pump holder.

[0010] With reference to FIGs. 4-6, a retaining cup 34 can be associated with the coupling member 28 and strut guidance structure 14. The cup 34 includes a cylindrical base 36 and a cup portion 38 coupled with the base 36. The cup portion 38 includes cut-outs 40 therein to make walls 42 of the cup resilient. As shown in FIG. 5, the base 36 is received in bore 44 of the coupling member 28. The cup portion 38 is received in the strut guidance structure 14. The cup 34 thus provides a "lighter" press-fit between the strut guidance structure 14 and the coupling member 28. This enables the tolerance requirements of the mating features to be relaxed, reduces the assembly time and increases the pull-out force.

[0011] With reference to FIG. 7, another aspect of the invention includes an elastomer damper 46 disposed between the strut guidance structure 14 (shown in dashed lines) and the coupling member 28. This provides an acoustically improved module 12 in an expedited manner since few changes to the overall structure would be necessary.

[0012] With the invention, integration of two functions (strut guidance and pump/filter housing retention) into a single feature simplifies reservoir tooling and reduces reservoir material cost, as well as maximizes fuel volume, compared to conventional configurations that have separate parts for each function.

Claims

1. A reservoir assembly of a fuel module, the reservoir assembly comprising:

a reservoir having a sidewall structure and a bottom to define an interior space for holding fuel, the reservoir including strut guidance structure coupled with an interior portion of the sidewall structure, the strut guidance structure being of generally horseshoe configuration in section and defining an elongated gap, the strut guidance structure being constructed and arranged to receive a strut of the fuel module so as to be movable therein, and retention structure constructed and arranged to retain a part of the module within the reservoir, the retention structure including a coupling member constructed and arranged to be moved through the gap to be disposed within the strut guidance structure so as to secure the retention structure with respect to the strut guidance structure.

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FIG 1

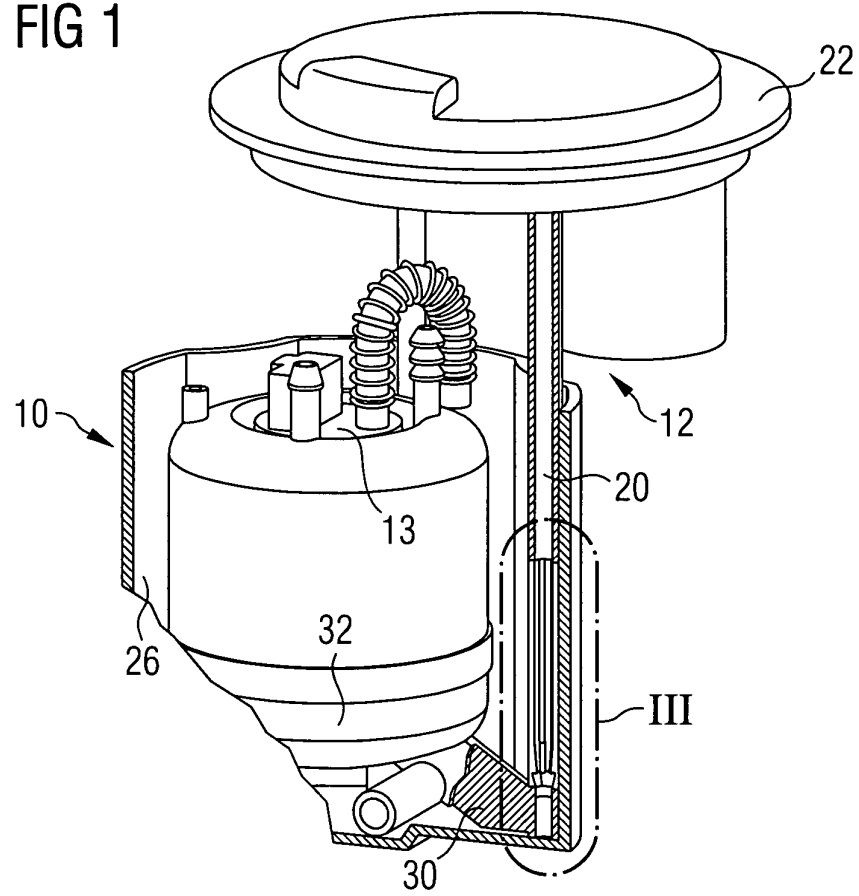


FIG 2

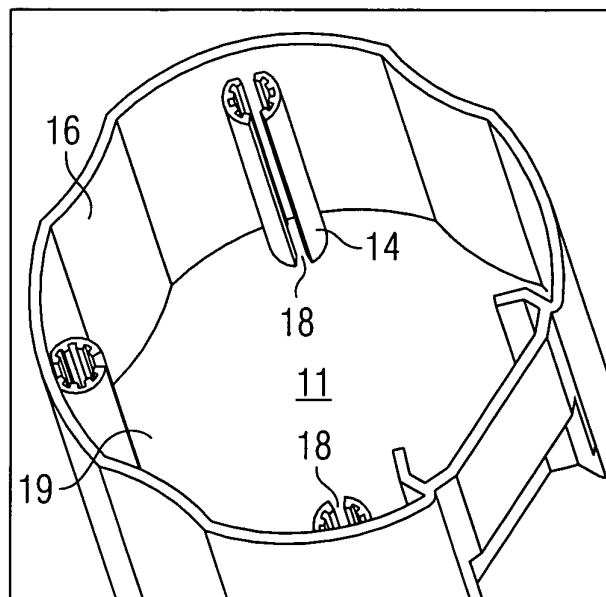


FIG 4

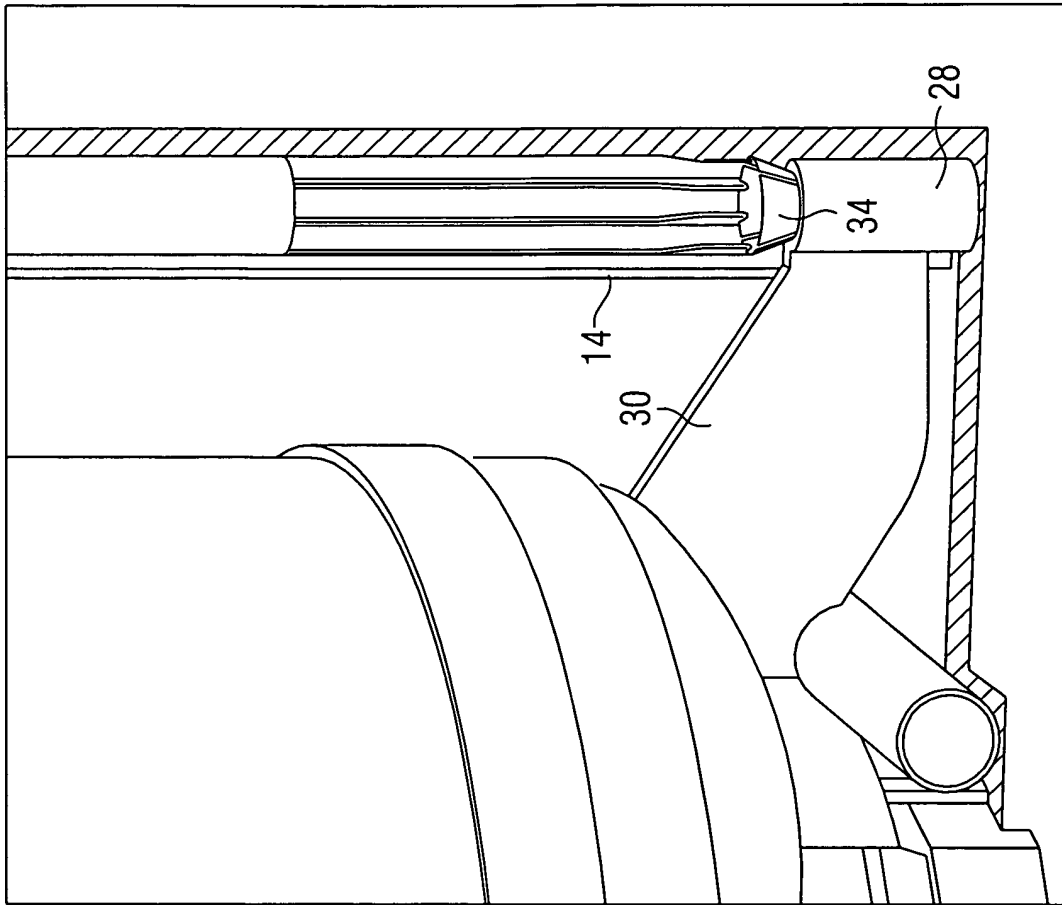


FIG 3

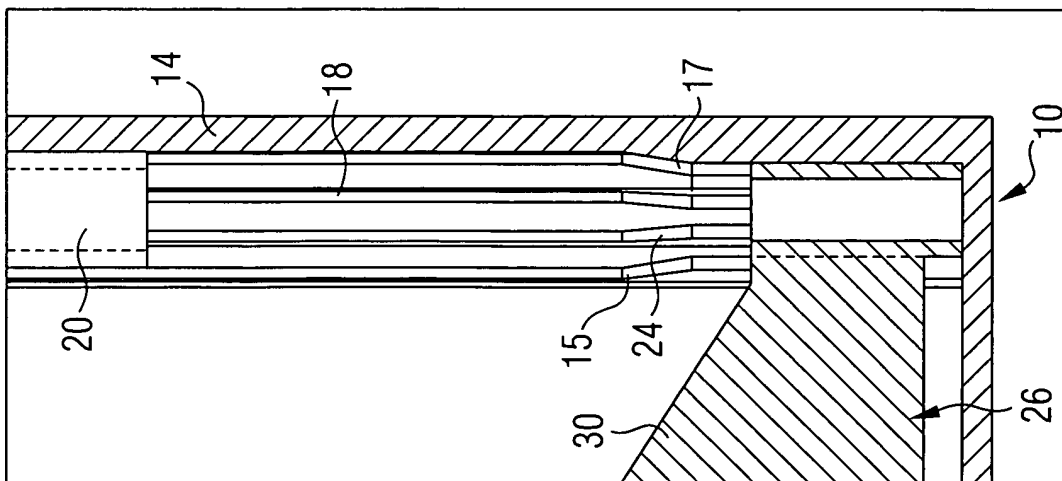


FIG 5

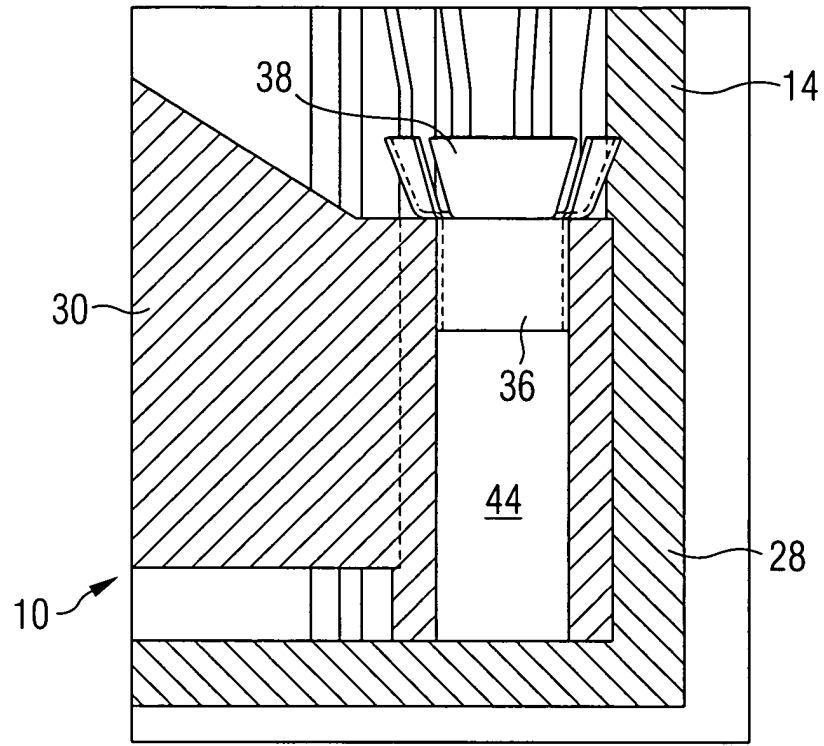


FIG 6

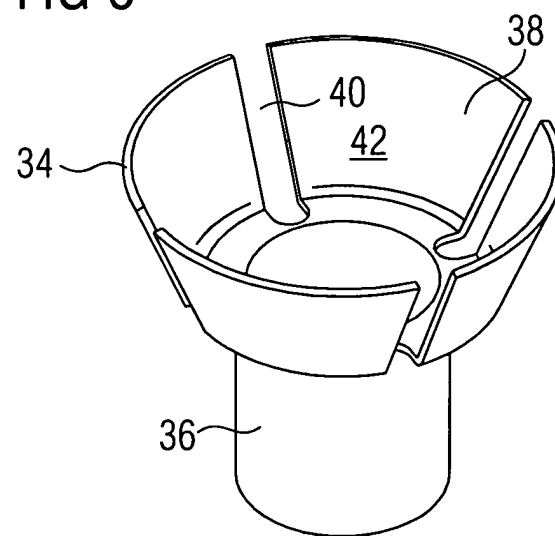
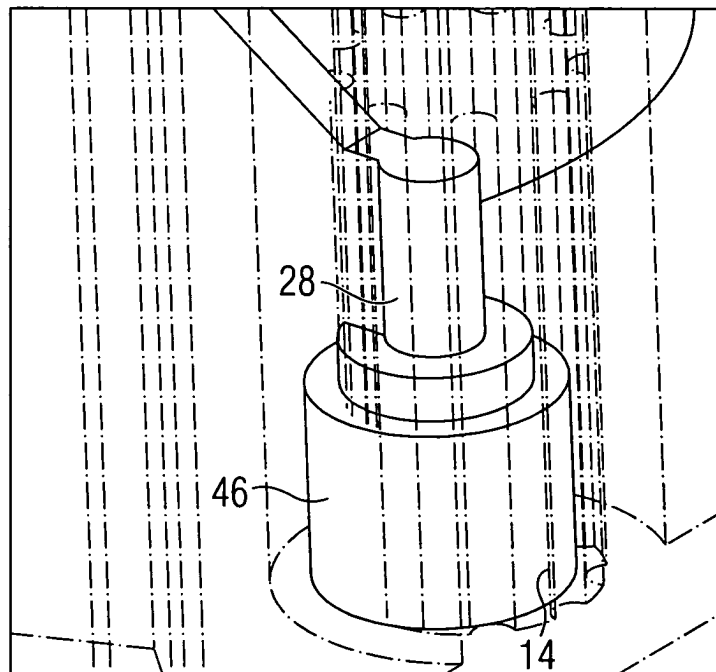


FIG 7





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EUROPEAN SEARCH REPORT

Application Number
EP 04 02 7274

DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	EP 0 701 058 A (GENERAL MOTORS CORPORATION) 13 March 1996 (1996-03-13) * column 4, line 16 - column 5, line 51; figures 3-6 *	1	F02M37/10
A	US 2003/188786 A1 (TOKI TOMONARI ET AL) 9 October 2003 (2003-10-09) * paragraph [0052] - paragraph [0056]; figures 5,6 *	1	
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A	EP 0 728 937 A (WALTER ALFMEIER GMBH + CO PRAEZISIONS-BAUGRUPPENELEMENTE; BAYERISCHE M) 28 August 1996 (1996-08-28) * column 5, line 14 - column 5, line 51; figures 1-6 *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F02M
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 June 2005	Marsano, F
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 04 02 7274

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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82