(12) UK Patent Application (19) GB (11) 2 284 581 (13) A

(43) Date of A Publication 14.06.1995

(21) Application No 9325365.6

(22) Date of Filing 10.12.1993

(71) Applicant(s)
Rover Group Limited

(Incorporated in the United Kingdom)

International House, Bickenhill Lane, Bickenhill, BIRMINGHAM, B37 7HQ, United Kingdom

(72) Inventor(s)
David Edward Beadle
Raymond Paul Doherty

(74) Agent and/or Address for Service
D J Burrage
Rover Group Limited, Patent Department, Gaydon Test Centre, Banbury Road, Lighthorne, WARWICK, CV35 0BL, United Kingdom

(51) INT CL^6
B60K 15/03

(52) UK CL (Edition N)
B7H HLK

(56) Documents Cited
GB 0836923 A US 4371181 A US 3968896 A
US 3884255 A

(58) Field of Search
UK CL (Edition M) B7H HLB HLK HLX , B7W WT
INT CL^5 B60K 15/03 15/06

(54) Vehicle fuel storage and supply system.

(57) A fuel tank 10 has a single aperture 20 which acts as an access point for the fuel pump 26, the breather pipe 28, the fuel level sensor 30, and the venturi pump 32. A mounting means 24 comprising a moulded plastic top plate 24 and an annular plate 34 is mounted in the aperture 20, the fuel pump 26 is mounted on the top plate 23, the breather pipe 28 is rigidly attached to the annular plate 34 and the top plate 24 and acts as a support for the fuel level sensor 30 and the venturi pump 32. This enables different components of the system to be located in regions of the tank remote from each other, but still to be inserted through the same aperture.

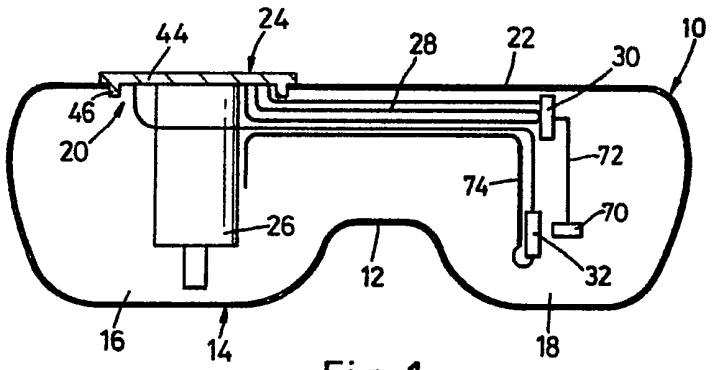

Fig. 1

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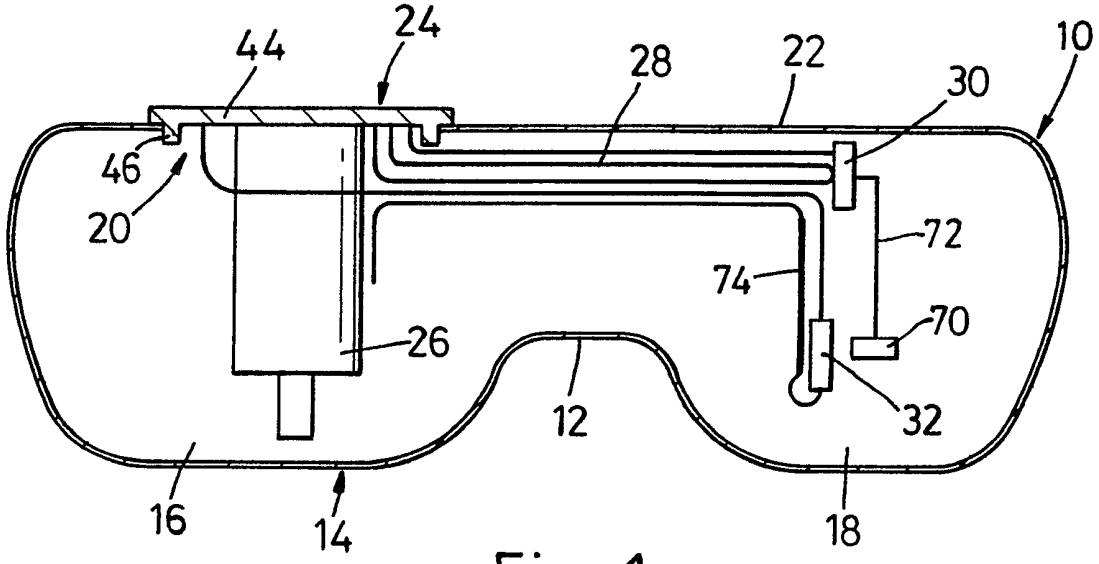
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Fig. 1

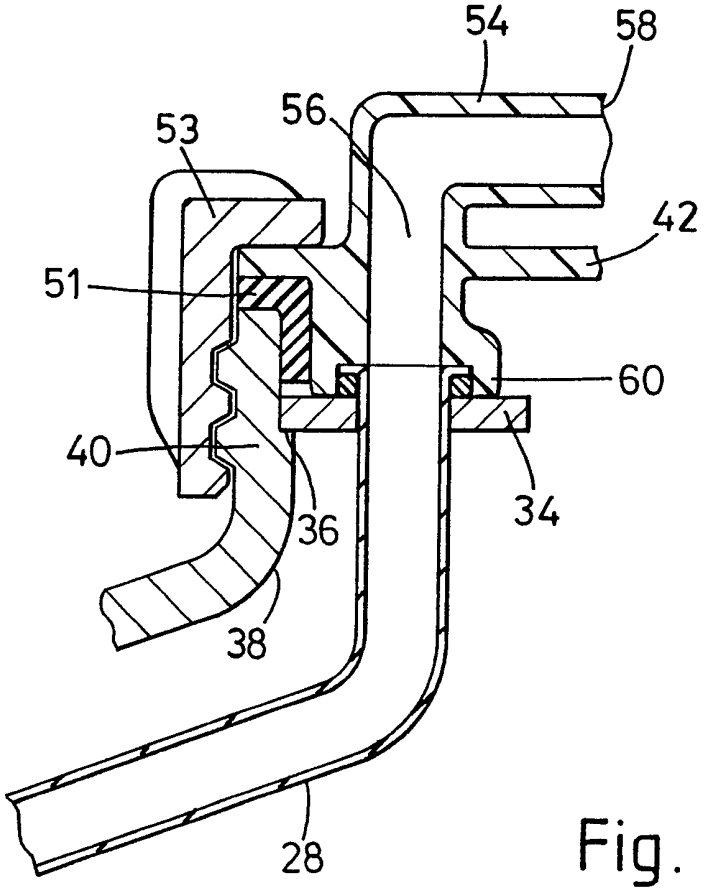
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Fig. 3

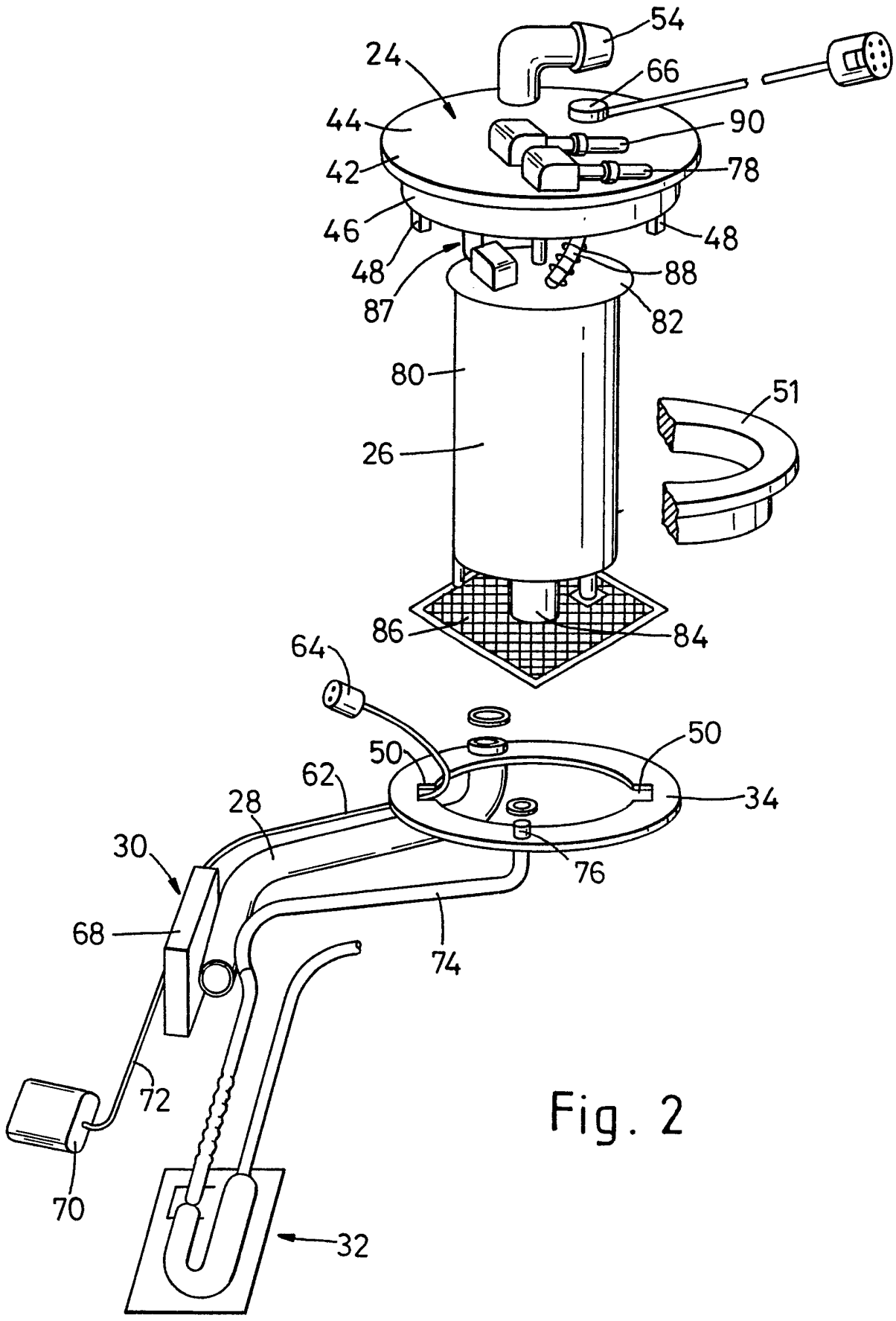
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Fig. 2

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A Fuel System

The present invention relates to systems for the storage and supply of fuel for motor vehicles.

A conventional vehicle fuel system includes a fuel tank for the storage of fuel which has several other components of the fuel system extending into it, such as the fuel pump, breather tube, and fuel level sensors. In some situations, for example where the tank is saddle shaped having two portions separated by a raised section, it is necessary for the fuel system components to extend into different regions of the tank. Conventionally this has been acheived either by providing two or more access holes for the fuel system components in different regions of the tank, or by having one or more of the components attached to the base of the tank in a position remote from the access hole, with flexible connecting wires or pipes from those components extending through the access hole. However it is undesirable to have more than one access hole in the tank because it increases the number of seals required and therefore the possibility of a leak, and attaching components to the inside of the tank is inconvenient and complicates assembly.

Accordingly the present invention provides a fuel storage and supply system comprising a fuel tank having an access hole therethrough, mounting means supported in the access hole, a rigid supporting member attached to the mounting means and extending into the tank at least partly sideways from the access hole, and another component of the system supported inside the tank by the support member in a position displaced sideways from the access hole.

This enables different components of the system to be located in regions of the tank remote from each other, but still to be inserted through the same aperture.

Preferably the mounting means comprises first and second mounting members, the supporting member is attached to the first mounting member, and a further component of the system is rigidly connected to the second mounting member. This enables the components of the system to be assembles separately with their respective mounting members.

Said further component may extend into the tank or be situated in the tank substantially in line with the

access hole. Alternatively, said further component may extend into the tank at least partly sideways from the access hole in a different direction from the supporting member.

The mounting members are preferably concentrically mounted in the access hole.

The support member, or one of the support members, may comprise a breather tube.

The components of the fuel system may include one or more of a fuel pump, fuel level sensing means, fuel transfer means for transferring fuel from one region of the tank to another, and breathing means.

Preferred embodiments of the present invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is section through a fuel storage and supply system according to a preferred embodiment of the present invention,

Figure 2 is an exploded view of part of the assembly of Figure 1, and

Figure 3 is a section through part of the sealing arrangement of the assembly of figure 1.

Referring to Figure 1 a fuel tank 10 is provided which is saddle shaped having a raised section 12 along the base 14, dividing the tank into first and second regions 16, 18. The tank 10 has an aperture 20 through its top 22 which is situated over the first region 16 of the tank and has rigid mounting means 24 mounted in it. The mounting means 24 has a fuel pump 26 and a rigid breather pipe 28 attached to it, and a fuel level sensor 30 and a venturi pump 32 are mounted on the breather pipe. The fuel pump extends from the aperture 20 straight down into the first region 16 of the tank, while the breather pipe extends sideways or horizontally over the raised section 12 of the tank into the second region 18.

Referring to Figures 2 and 3 the mounting means 24 comprises a first mounting member in the form of an annular plate 34, which rests on a ledge 36 on the inner surface 38 of an upturned rim 40 around the aperture 20 in the tank 10, and a second mounting member in the form of a moulded plastics top plate 42 comprising a flat circular top portion 44 with a circular ridge 46 extending downwardly from it near its

outer edge. The circular ridge 46 has a pair of downwardly extending locating lugs 48 which are arranged to cooperate with a pair of cut-outs 50 in the annular plate 34 to locate the annular plate and the top plate 42 rotationally relative to one another. A seal 51 fits around the edge of the top plate 42 and inside the rim 40 on the tank, and a locking ring 53 fits over the top plate 24 and engages with screw threads on the outside of the rim 40 on the tank to hold the assembly in place.

A rigid breather pipe 52 has its upper end passing through the annular plate 34 and rigidly attached to it so that it protrudes slightly above the upper surface of the annular plate 34. The top plate 42 has a breather outlet 54 formed in it which comprises a breather aperture 56 through the top portion 44 of the top plate extended on the top side of the top plate to form a stub pipe 58 and on the under side of the top plate by a rim 60 arranged to fit around the end of the breather pipe 28. Inside the tank the breather pipe 28 extends horizontally along under the top 22 of the tank to a point over the second region 18 of the tank.

The fuel level sensor 30 is of known type comprising a

sensor unit 68 with a float 70 attached to it on the end of a pivotable arm 72. The sensor unit 68 is mounted on the end of the breather pipe 58, and a wire 62 from the sensor unit 68 passes through the centre of the annular plate and has a connector 64 on its end, the connector 64 being attached to a corresponding connector on the under side of the top plate 42 which is electrically connected to a further connector 66 on the top side of the top plate 42.

The venturi pump 32 is arranged to pump fuel from the second region 18 of the tank into the first region 16 so that the fuel pump 26 is continuously supplied with fuel. A flexible pipe 74 has one end 76 passing upwards through the annular plate 34 and connected to a hose connector 78 in the form of a metal insert on the top of the top plate 42. The pipe 74 runs along the breather pipe 28, connected to it and supported by it, to a point near its open end. From there the pipe 74 extends downwards into the bottom of the second region of the tank 18 where it is connected to the input of the venturi pump. From the output of the venturi pump the pipe 74 returns up to the breather pipe and back along it to the fuel pump 26 where it opens into the first region 16 of the fuel tank. The connector 78 is

connected to the return from the fuel injectors so that the return fuel flows through the pipe 74, through the venturi pump 32 where it draws fuel from the second region 18 of the tank into the pipe, and back to the first region 16 of the tank.

The fuel pump 26 comprises a cylindrical unit 80 with a flange 82 around its upper end. At its lower end is an inlet 84 with a filter 86 over it. The pump 26 is electrically connected by wires 87 to the connector 66 and has its output connected via a section of fuel pipe 88 to a hose connector 90 on the top of the top plate 42.

To assemble the system the annular plate 34, the venturi pump 32 and pipe 74, the breather pipe 28, and the fuel level sensor 30 and wire 62 are pre-assembled, and the venturi pump, fuel sensor and breather pipe are inserted into the tank 10 through the apperture 20 and fed along under the top 22 of the tank, until the annular plate can be located on the ledge 36 on the inside of the rim 40 on the tank. The top plate 42, fuel pump 26, filter 86 and seal 51 are also pre-assembled and the fuel pump 26 is fed down through the annular plate until the locating lugs touch the annular plate 34. The top plate is then rotated

until the locating lugs are aligned with the cut-outs 50 and the sub-assembly can drop down so that the flange 82 on the fuel pump rests on the annular plate 34 and the seal 51 fits inside the rim 40 on the tank. Finally the locking ring is screwed down over the top plate 42 to retain the assembly in place.

In the assembly described above the breather pipe 28 is rigid and is rigidly attached to the top plate 42 so that it can act as a support for the fuel level sensor 30 and the venturi pump 32. Where there are components of the system which need to be supported inside the tank in a place where there was no breather pipe, a separate support member can be provided to perform the same function. Similarly if it were necessary to support components in more than one position a plurality of support members could be used extending in different directions. In either case a separate mounting member, such as a further annular plate, could be used to mount the additional components, allowing them to be assembled separately.

It is also anticipated that the invention could be used in a situation where it is desirable to have components of the fuel system entering the tank through an apperture which is also used for filling the tank with fuel. In such a situation a similar annular plate could be used, but

instead of having a fuel pump passed through its centre, the central aperture through the plate could be left open and the plate could be mounted around the aperture in the tank used for filling the tank.

Claims

1. A fuel storage and supply system comprising a fuel tank having an access hole, mounting means supported in the access hole, a rigid supporting member attached to the mounting means and extending into the tank at least partly sideways from the access hole, and another component of the system supported inside the tank by the support member in a position displaced sideways from the access hole.

2. A system according to claim 1 wherein the mounting means comprises first and second mounting members, the supporting member is attached to the first mounting member, and wherein a further component of the system is rigidly connected to the second mounting member.

3. A system according to claim 2 wherein said further component extends into the tank or is situated in the tank substantially in line with the access hole.

4. A system according to claim 2 wherein said further component extends into the tank at least partly sideways from the access hole in a different direction from the supporting member.

5. A system according to any one of claims 2 to 4 wherein the mounting members are concentrically mounted in the access hole.

6. A system according to any foregoing claim wherein the supporting member comprises a breather tube.

7. A fuel storage and supply system substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9325365.6
Relevant Technical Fields (i) UK Cl (Ed.M) B7H (HLB, HLK, HLX); B7W (WT) (ii) Int Cl (Ed.5) B60K 15/03, 15/06	Search Examiner J L TWIN Date of completion of Search 25 JANUARY 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-6

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	**P:**	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	**E:**	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	**&:**	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 836923	(WILLIAMS)	1
X	US 4371181	(MONIGOLD) See eg. Figure 1	1
X	US 3968896	(GIACOLETTI ET AL) See eg. Figure 2	1
X	US 3884255	(MERKLE) See eg. Figure 4	1

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