ABSTRACT

A fuel tank assembly for an automotive application

A fuel tank assembly for an automotive application comprising of bottom shell and top shell configured to be joined at the edges by welding at the seam. The fuel tank assembly is mounted on the horizontal long member of the chassis with the able help of said mounting brackets placed longitudinally along the edge of fuel tank. A surge pot located at bottom of said fuel tank; said surge pot having an aperture on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on said top shell and positioned inside said surge pot; a tubular member connected longitudinally on the surge pot such that an end portion of the tubular member passes through the aperture of the surge pot towards the fuel tank and an opposite end portion of the tubular member being positioned within the surge pot.

Fig 7

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We Claim:

1. A fuel tank assembly for an automotive application comprising

a bottom shell and top shell joined at the edges to form said fuel tank;

a surge pot located at bottom of said fuel tank; said surge pot having an aperture on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on said top shell and positioned inside said surge pot;

a tubular member connected longitudinally on the surge pot such that an end portion of the tubular member passes through the aperture of the surge pot towards the fuel tank and an opposite end portion of the tubular member being positioned within the surge pot.

2. The fuel tank assembly as claimed in claim 1 further comprising a bracket for mounting the tubular member on the surge pot.

3. The fuel tank assembly as claimed in claim 1 wherein the tubular member includes a first end portion allowing entry of fuel into the surge pot, and a second end porting allowing exit of the fuel from the surge pot.

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TATA MOTORS LIMITED
By their Agent & Attorney

Karuna Goleria
Reg. No. IN/PA/584
Of De Penning & De Penning

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TECHNICAL FIELD

The present invention generally relates to automotive vehicle and more particularly it relates to a fuel tank assembly of an automotive vehicle.

BACKGROUND OF THE INVENTION

Generally a fuel tank carrying the fuel required to drive the engine, is assembled on vehicle, behind the rear passenger compartment and between the axles. Conventionally the fuel tank assemblies have an admittance opening covered by a flange. An elongated fuel supply unit is carried on this access hole and is carried and projects downward from the flange, extending up to just few a millimeters away from the bottom of the fuel tank.

The use of fuel pump module to pump fuel from fuel tanks is well known in the automotive industry. A typical fuel pump module may include a fuel pump, a fuel reservoir, a fuel level sensor, a suction filter positioned upstream of the pump inlet and a pressure regulator. Installation of the fuel pump module into the fuel tank is made possible by an opening or a hole in the tank that provides access to the inside of the tank. The opening is normally formed in the top wall of the tank.

The in-tank fuel pumps without an inbuilt / integrated reservoir pot require a separate reservoir pot inside the fuel tank. The reservoir pot inside the fuel tank could be welded or pasted to the fuel tank bottom shell for holding the fuel and for ensuring the fuel availability in and around the fuel pump suction tip. This is required so that the suction tip of the in-tank fuel pump remains submerged in fuel in all the driving conditions, even when the fuel level in the fuel tank is low.

The reservoir pot in sheet metal or in plastic material of a required shape and profile, and to fill the fuel inside reservoir pot a hole or slot at lower most portion on the vertical surface of reservoir is provided. This hole or slot allows the surrounding fuel inside the fuel tank to enter inside the reservoir pot. This is where some restriction / mechanism is required to hold or restrict the fuel inside the reservoir pot when vehicle is driven on different driving or road conditions such as horizontal, uphill & downhill condition

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otherwise this would lead to the fuel starvation issues because of fuel level at suction tip of in tank pump below required height or no fuel, leading to dry run of the in-tank pump. This may finally result in non-functioning of the in-tank pump, also leading to misfire on the vehicle and causing vehicle breakdown.

OBJECTS OF THE INVENTION

An object of this invention is to provide an improved countermeasure for fuel surface level variation and fuel pump module dry run for automotive fuel tank which is simple in construction and cost effective.

Yet another object of the present invention is to provide a simple design for reservoir pot in the fuel tank that has less number of parts, low cost with minimum manufacturing operations & processing, manufacturing, assembly time.

Yet another object of the present invention is to provide a fuel tank assembly for an automobile which ensures that the suction tip of the fuel pump is immersed in the fuel at different road or driving conditions so as to avoid fuel starvation at times of low fuel level inside the fuel tank and avoid dry run of the in-tank pump resulting in non functioning or failure and misfire on vehicle.

SUMMARY OF THE INVENTION

The invention is about a fuel tank assembly for an automotive application. The fuel tank assembly includes a bottom shell and top shell joined at the edges to form said fuel tank; a surge pot located at bottom of said fuel tank; said surge pot having an aperture on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on said top shell and positioned inside said surge pot; fuel lines connected to said supply unit and attached to said fuel tank by a holding clamp.

In an embodiment of the present disclosure, the fuel tank assembly includes a bottom shell and top shell joined at the edges to form said fuel tank; a surge pot located at bottom

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of said fuel tank; said surge pot having an aperture on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on said top shell and positioned inside said surge pot; a tubular member connected longitudinally on the surge pot such that an end portion of the tubular member passes through the aperture of the surge pot towards the fuel tank and an opposite end portion of the tubular member being positioned within the surge pot.

BRIEF DESCRIPTION OF THE DRAWINGS

In accordance to the present invention,

Figure 1 illustrates a side view of an automotive fuel tank mounting location, in accordance with an embodiment of the present disclosure.

Figure 2 illustrates a perspective view of an automotive fuel tank and its peripherals, in accordance with an embodiment of the present disclosure.

Figure 3 illustrates a perspective view of an automotive fuel line holding clamp, in accordance with an embodiment of the present disclosure.

Figure 4 illustrates a sectional perspective view of an automotive fuel tank, in accordance with an embodiment of the present disclosure.

Figure 5 illustrates an exploded perspective sectional view of an automotive fuel tank and its peripherals, in accordance with an embodiment of the present disclosure.

Figure 6 illustrates views of a surge pot the automotive fuel tank, in accordance with an embodiment of the present disclosure.

Figure 7 illustrates a side view the automotive fuel tank assembly, in accordance with an embodiment of the present disclosure.

Figure 8 illustrates a side view the automotive fuel tank assembly, in accordance with an embodiment of the present disclosure.

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Figure 9 illustrates a side view the automotive fuel tank assembly, in accordance with an embodiment of the present disclosure.

Figure 10 illustrates a side view the automotive fuel tank assembly, in accordance with an embodiment of the present disclosure.

DETAILED DESCRIPTION OF INVENTION

Referring now to the drawings wherein the showings are for the purpose of illustrating a preferred embodiment of the invention only, and not for the purpose of limiting the same,

Referring to fig. 1, side view of an automotive fuel tank mounting location illustrating the location of the fuel tank (1) mounted under co-driver seat (2) and towards front left of the vehicle.

Referring to fig. 2, a perspective view of an automotive fuel tank and its peripherals shows a fuel tank made up of bottom shell (3) and top shell (4) from seam welding joinery along edges. The fuel supply unit (5) is mounted on fuel module mounting ring (6) spot welded to the top shell (4) of the fuel tank assembly. Two apertures (7,8) are cut open on the inclined vertical wall of the top shell (4) for accommodating the insertions of the filler pipe and breather pipe of the fuel supply system respectively. This fuel tank assembly disposed of from top with fuel supply unit is mounted to the horizontal long member of an automotive chassis with the able help of mounting brackets (9, 10, 11). These brackets (9, 10, 11) are placed longitudinally along the edge (13) of the fuel tank. There are 3 fuel lines viz., Evaporative line (14), return line (15) and delivery line(16) imminent from top of the fuel supply unit (5). These lines are held against the edge of the fuel tank with fuel lines holding clamp (12).

Referring to fig. 3 which illustrates a perspective view of an automotive fuel lines holding clamp, the clamp consists of 'C' shaped bottom part (17) and three lobed body (19) which holds and separates three fuel lines together. Fuel lines are locked to lobed body (19) with a locking strip (18). This locking strip (18) is hinged (20) at one end and

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press fitted at other notch (21) end. This assembly of clamp is held against the edge (13) of the fuel tank with the able help of the 'C' shaped bottom part (17) of the clamp.

Referring to fig. 4 and fig.5, a perspective sectional view of an automotive fuel tank and its peripherals and an exploded perspective view of an automotive fuel tank shows the details of surge pot (22) mounted on the bottom shell (3). A flow restricting baffle (23) is disposed of between vertical wall of the surge pot (22) and the fuel supply unit (5). The baffle (23) is made from sheet metal and form like an "L" shaped member and one end is attached to the surge pot wall and along the length it is welded to the surge pot bottom. The baffle is running parallel to the other two sides of the surge pot (22) wall and maintains a gap with the fourth wall. The baffle will create partially confined area inside surge pot to retain the fuel in the surge pot area. Referring to fig. 5 an aperture (24) is provided on bottom part of the surge pot (22). This aperture (24) allows fuel to flow inside the surge pot (22) while fuel filling is done from filler pipe (7). The baffle is located in front of the aperture (24) and partially confined the area around the fuel supply unit (5). A flow restricting baffle (23) restricts the direct flow of fuel through this aperture (24) while the vehicle is on a nose down condition on a negative gradient. This avoids the possibility of a dry run of fuel supply unit (5).

Dimensional details of fuel tank: Generally the height to volume ratio of the fuel tank used lies from 4 to 4.25, the ratio used in the current fuel tank lies from 6.2 to 6.4, which makes the fuel tank more flat and it accommodates more volume in transverse direction.

Referring now to another embodiment of the present disclosure disclosed in figures 6 through 10. The embodiment disclosed in figures 6 through 10 is different from the solutions that use the plate or a baffle. Typically, the plate or a baffle have a complex shape that requires press tools and special welding fixtures to weld them at a particular location, higher manufacturing time, and skilled work force. Further, because of the shape and profile of the plate, welding at a number of locations needs to be done to ensure proper fixing of the plate to the reservoir pot and then the pot to the tank, which is time consuming, requires more processing, manufacturing assembly time.

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The automotive fuel tank (100) of this embodiment also includes a bottom shell (3), a top shell (4), a surge pot (22) located at bottom of the fuel tank; the surge pot (22) having an aperture (102) on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on the fuel tank. The distinguishing feature of the automotive fuel tank (100) of this embodiment is that it, instead of baffle plate, includes a tubular member (104) connected longitudinally on the surge pot (22) such that an end portion (106) of the tubular member (104) passes through the aperture (102) of the surge pot (22) towards the fuel tank and an opposite end portion (108) of the tubular member being positioned within the surge pot (22.

As best shown in FIG. 6, the aperture (102) (also referred to as a "hole") has a diameter slightly more than the tubular member (104) (also referred to as a "metal pipe"). The aperture (102) is made on the side wall lowest position of the surge pot (22) (also referred to as a reservoir pot). The tubular member (104) is welded along with the surge pot (22) with one end passing through the aperture (102) on the reservoir pot and extending slightly outside the surge pot (22). A sheet metal bracket (110) is welded to the other end of the tubular member (104) maintaining a fixed distance from the end (108) and with the other side on the inner surface of the surge pot (22), so as to maintain straightness along the length of the pipe/tubular member (104) and to prevent the welding failure at welding joints between the metal pipe and reservoir pot.

Figure 7 illustrated a side view of the automotive fuel tank assembly (100) along with the fuel supply unit (5) (having an in-Tank Fuel Pump module) assembled on to the fuel tank.

Referring now to fig 8, 9 and 10, which illustrates condition of the fuel contained within the fuel tank, with respect to the changing moving condition of the vehicle, and thus the fuel tank. More specifically fig. 8 illustrates a view of the Fuel Tank, when vehicle travelling on horizontal ground level, fig. 9 illustrates the view of the Fuel Tank, when vehicle travelling on slope and fig 10 illustrates a view of the Fuel Tank, when vehicle travelling up a hill.

Whenever the fuel is filled into the fuel tank, the fuel from the tank that surrounds reservoir pot, enters the reservoir pot through the metal pipe (more specifically, the

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aperture 102), and the fuel level within the reservoir pot and the surrounding becomes equal. Figure 8 shows the fuel tank resembling vehicle in horizontal condition for the scenario inside the fuel tank for fuel level and pump suction tip i.e. immersed into the fuel.

At instances whenever the vehicle travels on to a slope, as shown in figure 9, the fuel inside the fuel tank (but outside the reservoir pot) tends to get collected on to a front side away for the location where the in-tank fuel pump is mounted. Similar situation also can be seen for the fuel that happened to be within the reservoir pot, at this instance when the fuel tank in horizontal condition, & no opening/ passage available for the fuel to escape the fuel gets retained inside the reservoir pot and this ensures fuel availability near the pump suction tip so as to keep the tip immersed in the fuel. Only in case of higher fuel level inside the fuel tank, the fuel available just above the other end of the metal pipe i.e. inside the reservoir pot will pass through the metal pipe and get mixed with the surrounding fuel in the fuel tank and get collected to the front side of the fuel tank. The fuel below the metal pipes other end inside the reservoir pot remains within the reservoir pot.

At instances when the vehicle climbs a gradient, as shown in figure 10, the fuel inside the fuel tank (but outside the reservoir pot) tends to get collected on to a rear side away for the location where the in-tank fuel pump is mounted. Similar situation also can be seen for the fuel that happened to be within the reservoir pot, at instance when the fuel tank in horizontal condition, but because of no opening/ passage available for the fuel to escape the fuel on the rear side the fuel remains within the reservoir pot, only in case of higher fuel level, the fuel can overflow out of the reservoir pot through the top of the walls, once the level drops fuel gets retained within the reservoir pot.

The major advantage of this invention being that even when the vehicle is parked on inclined for a certain duration & with low fuel level in the tank, the fuel within the reservoir pot get retained within the reservoir without any leakage as in other existing designs available.

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The foregoing description is a specific embodiment of the present invention. It should be appreciated that this embodiment is described for purpose of illustration only, and that numerous alterations and modifications may be practiced by those skilled in the art without departing from the spirit and scope of the invention. It is intended that all such modifications and alterations be included insofar as they come within the scope of the invention as claimed or the equivalents thereof.

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We Claim:

1. A fuel tank assembly for an automotive application comprising

a bottom shell and top shell joined at the edges to form said fuel tank;

a surge pot located at bottom of said fuel tank; said surge pot having an aperture on its side wall for fluidly communicating with fuel tank at low fuel level; at least one fuel supply unit mounted on said top shell and positioned inside said surge pot;

a tubular member connected longitudinally on the surge pot such that an end portion of the tubular member passes through the aperture of the surge pot towards the fuel tank and an opposite end portion of the tubular member being positioned within the surge pot.

2. The fuel tank assembly as claimed in claim 1 further comprising a bracket for mounting the tubular member on the surge pot.

3. The fuel tank assembly as claimed in claim 1 wherein the tubular member includes a first end portion allowing entry of fuel into the surge pot, and a second end porting allowing exit of the fuel from the surge pot.

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