Embodiments of a fuel tank flange are disclosed, including a single fuel tank flange plate having multiple fuel tank system components secured thereto.
FUEL TANK FLANGE

[0001] This application claims priority on a provisional patent application filed Feb. 6, 2007, in the name of the same inventor, in the United States Patent Office and assigned application Ser. No. 60/853,874.

TECHNICAL FIELD

[0002] The present invention relates to an improved fuel tank flange for use on a fuel tank.

BACKGROUND OF THE INVENTION

[0003] Fuel tanks may include separate apertures in the fuel tank for supporting various components of a fuel system that may be positioned within the fuel tank. These components may each be separately secured within the fuel tank, which may be a costly, labor intensive process and may not provide a desired stability for the components.

SUMMARY OF THE INVENTION

[0004] The present invention provides a fuel tank flange which supports several fuel system components through a single aperture of the fuel tank. The fuel tank flange may allow installation of the device with a reduced number of welds. Moreover, the flange may be welded to the fuel tank from the outside such that no weld may be conducted inside the fuel tank, thereby decreasing the cost and complexity of the assembly process of the fuel tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is an isometric view of one embodiment of the fuel tank flange of the present invention.

[0006] FIG. 2 is a side view of the fuel tank flange secured on a tank.

[0007] FIG. 3 is an isometric view of the fuel tank flange secured on a fuel tank.

[0008] FIG. 4 is a front view of the fuel tank flange secured on a fuel tank.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0009] FIG. 1 is an isometric view of one embodiment of the fuel tank flange 10 of the present invention including a flange plate 12. Several components may be supported by flange plate 12 including: a supply fitting 14; a return fitting 16; a vent fitting 18; a filler neck fitting 20; and, a fuel level sender assembly 22.

[0010] FIG. 2 is a side view of the fuel tank flange 10 secured within a tank 28, show cutaway so that an interior 26 of the fuel tank 28 is visible. Each of components 14-22 may be secured to the single flange plate 12 such that a single aperture 24 may allow placement of each of components 14-22 into interior 26 of fuel tank 28.

[0011] Referring to FIGS. 1 and 2, supply fitting 14 may be secured to a supply tube 30 that may extend downwardly within interior 26 of fuel tank 28 such that the end 32 of supply tube 30 may be received within a supply tube support 34. Due to placement of supply fitting 14 on flange 10, which may be secured on the top side 36 of fuel tank 28, end 32 of supply tube 30 may be positioned at the bottom 38 of fuel tank 28. Placement of end 32 at the bottom 38 of fuel tank 28 may allow supply tube support 34 to be secured within fuel tank 28 through a drain opening 40 of fuel tank 28. Fuel tanks generally include a drain opening 40 on the bottom 38 of the fuel tank 28. Accordingly, the drain opening 40 may allow placement of supply tube support 34 to be secured to the fuel tank 28 at drain opening 40 without forming an additional aperture within the fuel tank 28. By placing supply fitting 14 on a single flange plate 12 at top 36 of fuel tank 28, the installation of supply tube 30 is simplified, thereby reducing the cost of the assembly process of a fuel tank.

[0012] Supply tube support 34 may include an upwardly extending tube support cylinder 42 and a base 44. Tube support cylinder 42 may define an outside diameter 46 that may be smaller than an inside diameter 48 of drain opening 40. Base 44 may define an outside diameter 50 that may be larger than the inside diameter 48 of drain opening 40. Accordingly, tube support base 44 may be welded to the outside of fuel tank 28 along a single weld line 78 without use of an interior welding operation, thereby further simplifying assembly of fuel tank 28, and reducing the time and expense of the tank assembly process.

[0013] In contrast, prior art fuel tanks may position supply fittings on a side 76 of a fuel tank such that a supply tube support device may not be positioned through a drain opening in the bottom of a fuel tank. Accordingly, prior art fuel tank assembly processes generally include forming an aperture, in addition to a drain aperture, to support a supply tube in place. The prior art assembly process of a fuel tank, therefore, is more complex, time consuming and expensive when compared with the fuel tank assembly process of the present invention.

[0014] Placement of supply tube fitting 14 on the single flange plate 12 of the present invention may also provide safety advantages when compared with prior art fuel tanks. In particular, placement of supply fitting 14 and return fitting 16 on flange plate 12, which may be positioned on top 36 of fuel tank 28, may position the supply and return fittings 14 and 16 away from an exhaust system (not shown) of a semi tractor, which may be mounted adjacent the side of a fuel tank. In particular, low-emissions exhaust systems now in use may be heated to higher temperatures than prior art exhaust systems, such that the importance of moving the supply and return fuel lines away from the improved exhaust system at the side of the fuel tank may prevent overheating of the supply and return tubes. Prior art fuel tanks, which may include a supply tube fitting and return tube fitting each secured in a separate aperture on a side 76 of a fuel tank may place the prior art supply and return fuel lines very close to the high temperature exhaust system of a semi tractor. Accordingly, the use of a single flange to place multiple components on top surface 36 of fuel tank 28 may increase the safety features of the fuel tank.

[0015] Placement of supply tube fitting 14 and return tube fitting 16 on a single flange plate 12 positioned on a top surface 36 of fuel tank 28 may also position the fittings 14 and 16 for easy access during routine maintenance and repair operations.

[0016] Referring still to FIGS. 1 and 2, flange plate 12 may be secured on a single aperture 24 of fuel tank 28 thereby reducing the complexity, time and cost of the fuel tank assembly process because only one aperture, instead of multiple smaller apertures, is utilized for installation of multiple fuel system components. Moreover, aperture 24 may be larger than each of several individual apertures of prior art fuel
tanks, such that larger aperture 24 may allow ease of placement of fuel tank components 14-22 through aperture 24. For example, a return tube 52 secured on return fitting 16 may include a ninety degree bend 54 in a midsection 56 of the return tube 52. The end region 58 of return tube 52 that extends from an end 60 of the return tube 52 to ninety degree bend 54 may be easily placed through aperture 24 during installation without damaging the fuel tank 28 or the return tube 52.

[0017] Large aperture 24 may also allow other large components to be placed through aperture 24 without damage to the fuel tank 28 or to the component. For example, the fuel level sender assembly 22 may extend downwardly into interior 26 of fuel tank 28. The fuel level sender assembly 22 may include a bracket 62, a movable arm 64 mounted thereon, having a float 66 secured to an end thereof. In the figures as shown, movable arm 64 and float 66 are shown in three different positions, a low fuel level 68, a medium fuel level 70 and a high fuel level 72. The long movable arm 64 and float 66 may easily be passed through aperture 24 during installation of flange plate 12 on fuel tank 28 without damaging the sensitive movable arm 64 and float 66 of the fuel level sending unit.

[0018] Accordingly, the advantages of securing multiple components 14-22 on a single flange plate 12 include the reduced time and complexity of the installation process that includes securing multiple components 14-22, for example, on a single flange plate 12, and then securing the single flange plate 12 on a single aperture 24 with a single weld line 74. Cutting of a single aperture 24 and use of a single weld line 74 to secure a single flange plate 12 to the single aperture 24 reduces the cutting time, reduces the welding time, and allows welding from the outside of the fuel tank 28. Moreover, use of a large single aperture 24 may reduce damage to the fuel tank 28 and to the components 14-22 secured to the flange plate 12 because the individual components 14-22 may fit more easily through the large single aperture 24. Additionally, placement of the supply and return tube fittings 14 and 16 to the single flange plate 12 on a top surface 36 of the fuel tank 28 positions the supply and return fittings 14 and 16 and the attached supply and return tubes 30 and 52 away from high temperature exhaust systems at the side of a fuel tank, thereby improving the safety of the present fuel tank design.

[0019] FIGS. 3 and 4 show additional views of the fuel tank flange 10 secured on a fuel tank 28.

[0020] In other embodiments, supply fitting 14 and return fitting 16 may include shutoff valves to allow fuel flow to and/or from the fuel tank 28. Fuel tank flange 10 may include more than one supply fitting 14 and supply tube 30 in order to supply fuel to more than one engine or other fuel consuming accessory on the truck. Fuel tank flange 10 may include more than one return fitting 16 in order to return fuel from more than one engine or other fuel consuming accessory on the truck. Fuel tank flange 10 may include more than one return tube 52. Some installations may not require supply tube support 34. In such installations supply tube 30 may simply terminate near the bottom 38 of the fuel tank 28. Alternatively, installations not requiring a tube support 34 may include a ninety degree bend 54, or any other angle as may be desired for a particular application, in a midsection of supply tube 30 and an end region 58 or supply tube 30. Installations including ninety degree bend 54 and end region 58 as part of supply tube 30 may be easily placed through aperture 24 during installation without damaging the fuel tank 28, return tube 52, or supply tube 30.
11. The method of claim 8 further comprising forming a drain aperture in said wall of said fuel tank, securing a tube in said tube support, and securing said tube support within said drain aperture, wherein said tube is a part of one of said at least three fuel tank system components.

12. The method of claim 8 wherein said flange plate is secured on a top surface of said fuel tank.

13. The method of claim 8 wherein said forming said flange plate includes forming said flange plate to have a cross sectional shape that matches a cross sectional shape of said exterior of said fuel tank.

14. The method of claim 8 comprising forming at least four flange plate apertures in said flange plate, and securing at least four fuel tank system components on said flange plate, wherein individual ones of said at least four fuel tank system components is secured within an individual one of said at least four fuel tank flange plate apertures.

15. A fuel tank flange comprising:

- a flange plate including at least three flange plate apertures formed therein, said flange plate adapted to be secured in a single fuel tank aperture; and
- at least three fuel tank system components, wherein individual ones of said at least three fuel tank system components is secured within an individual one of said at least three fuel tank flange plate apertures, and wherein individual ones of said at least three fuel tank system components is chosen from a supply fitting, a return fitting, a vent fitting, a filler neck fitting, and fuel level sender fitting.

16. The flange of claim 15 wherein said flange plate defines a lower surface having a curved shape.

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