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EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of patent specification :
05.01.94 Bulletin 94/01

⑤① Int. Cl.⁵ : **B67D 5/378**

②① Application number : **90630174.2**

②② Date of filing : **10.10.90**

⑤④ **Combination hose coupling and suction pump.**

③① Priority : **13.10.89 US 421033**

④③ Date of publication of application :
17.04.91 Bulletin 91/16

④⑤ Publication of the grant of the patent :
05.01.94 Bulletin 94/01

⑧④ Designated Contracting States :
DE FR GB IT SE

⑤⑥ References cited :
EP-A- 0 155 186
WO-A-89/02411
GB-A- 2 016 417

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EP 0 423 060 B1

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Description

This invention relates to coaxial vapor recovery hose assemblies. More particularly, it relates to hose assemblies having associated therewith suction means for removing any liquid accumulation from a low point in the catenary of the hose assembly while the hose assembly is in use.

Background of the Invention

Coaxial vapor recovery hose assemblies have been known for a number of years. Generally, they include an inner product hose which delivers fuel from a pump stand through a dispensing nozzle to a motor vehicle fuel tank and an outer hose coaxially surrounding the product hose to form an annular vapor passageway therebetween for returning the vapors displaced in the vehicle fuel tank back to the pump stand.

More recently, there has been disclosed in United States Patent No. 4,566,504 an apparatus for removing the liquid buildup in the vapor passageway of a coaxial hose assembly which consists of a tube connected to a vacuum pump within the pump stand and extending through the vapor passageway to a low point in the coaxial hose assembly. There has also been disclosed in United States Patent No. 4,687,033 which corresponds to the preamble of claim 1, a venturi device which is inserted between a coaxial vapor recovery hose assembly and a dispensing nozzle having a suction tube connected to the venturi and extending down to the low point of the vapor passageway to remove liquid accumulations. Such a system has the disadvantage of adding weight to the hose assembly/nozzle combination. Relocating the added unit to the pump stand end of the hose assembly has the disadvantage that it requires additional lift to draw the liquid up the suction tube which can only be obtained by increasing the pressure drop across the venturi, thus reducing the flow of fuel through the product hose. Another system disclosed in documents US-A- 4 749 009 or in WO-A- 89 02411 consists of a venturi block located in the middle of the product hose at a point where liquid would accumulate, having a plurality of radial ports communicating between the venturi throat and the annular vapor passage. This system not only has the disadvantage of the increased weight due to the venturi block, but also has the further disadvantage of increasing the number of fittings required to connect the venturi block between the ends of the product hose.

It is therefore an object of the present invention to provide a coaxial vapor recovery hose assembly with a suction means which does not increase the weight of the assembly. It is a further object of the present invention to provide a coaxial vapor recovery hose assembly with a suction means that does not re-

quire additional hose fittings in the product hose which may be a potential source of fuel leaks.

To meet these objects, the present invention provides a coaxial vapor recovery hose assembly as defined in the appended claims.

Brief Description of the Drawings

Fig. 1 is a cross sectional view of the hose coupling of the present invention in a coaxial vapor recovery hose assembly as connected to a dispensing nozzle.

Fig. 2 is a cross sectional view of the hose coupling of the present invention.

Fig. 3 is a cross sectional view taken along line 3-3 of Fig. 2.

Detailed Description of the Invention

Fig. 1 illustrates a coaxial vapor recovery hose assembly shown generally at 10 having an inner product hose 12 with the arrows 13 indicating the fuel product flow path. Coaxially surrounding the product hose 12 is the outer hose 14 which together with the product hose 12 defines an annular vapor passageway 15 therebetween, with the arrows within the passageway indicating the flow of vapors back to the pump stand (not shown). The hose assembly is illustrated as being connected to the product dispensing nozzle 16 by means of an outer hose fitting 18 and product hose coupling 20. While this is the preferred embodiment, it can be appreciated that the inner hose coupling of the present invention can also be utilized at the inlet end of the product hose at the pump stand but would be subject to the disadvantage alluded to above of requiring extra lift to remove liquid accumulations from the low point in the catenary of the hose.

The hose coupling 20 has a generally cylindrically shaped outer surface and a venturi-shaped inner surface with a throat area 21. The hose coupling 20 has at least one aspirator port 24 communicating between the throat area 21 and at least one chamber 25 bored in the outer surface. Fig. 1 illustrates a hose coupling 20 with one aspirator port 24 while Fig. 2 illustrates a hose coupling 20 having a plurality of aspirator ports 24a and 24b. Each chamber 25 has associated therewith a check valve 22 which prevents the flow of product from the product hose into the annular vapor passageway. Also associated with each chamber 25 is an elbow fitting 26 which extends from each chamber 25 and is connected to an outlet end of a suction tube 28. The inlet end of the suction tube 28 extends through the vapor passageway 15 to a low point in the catenary (not shown) of the hose assembly while the hose assembly is in use. It will be appreciated that a filtration device should be used at the suction tube inlet.

At the end of the hose coupling 20 which is to be attached to the product hose 12, there is a plurality

of barb-like ridges 27 on the outer surface of the hose coupling 20 which is inserted within the product hose 12, and the two are held securely and sealingly together by a crimped ferrule or band 29. The other end of the hose coupling 20, away from the ridges 27, is characterized by an outer peripheral surface 30 which sealingly engages the product conduit 31 of the dispensing nozzle 16.

In operation, the product flowing in the product hose 12 through a flow path 13 into the hose coupling 20 causes a pressure drop across the venturi throat 21 creating a suction through the aspirator port 24, the elbow fitting 26 and suction tube 28 to remove any liquid accumulation at the inlet end of the suction tube 28 which is located in the low point of the catenary of the hose while the hose assembly is in use. It is preferred that the hose assembly of the present invention be used with a hose rotation restrainer such as is disclosed and claimed in US-A-5,082,027. Such a hose restrainer is attached to the product hose at the low point in the catenary of the hose assembly, along with the inlet end of the suction tube 28 to affix the end of the suction tube in the vapor passageway 15 beneath the product hose 12 and to prevent rotation of the product hose 12 in order to maximize the removal of liquid accumulations.

Claims

1. A coaxial vapor recovery hose assembly having
 - an inner product hose (12), an outer hose (14) connected to a product dispensing nozzle (16) by means of an outer hose fitting (18) and coaxially surrounding said product hose (12) so as to define an annular vapor passageway (15) therebetween,
 - a suction tube (28) in said passageway (15) having an inlet end extending to a low point in the catenary of the hose assembly while in use and an outlet end, and
 - a hose coupling (20) having a first and a second end comprising:
 - a venturi-shaped inner surface with a throat area (21);
 - at least one aspirator port (24) communicating between said throat area (21) and at least one chamber (25) bored in the outer surface of said hose coupling (20);
 - a check valve (22) associated with each chamber (25);
 - the second end of said coupling (20) having its outer peripheral surface (30) sealingly engaging the product conduit (31) of the dispensing nozzle (16), characterized
 - in that said outer surface of said hose coupling (20) is generally cylindrically shaped,

- in that there are a plurality of barb-like ridges (27) on said outer surface at the first end of said coupling (20) inserted into one end of said product hose (12),
- in that said check valve (22) is located in each chamber (25), and
- in that an elbow fitting (26) extends from each chamber (25) and is connected to said outlet end of said suction tube (28).

2. A coaxial vapor recovery hose assembly according to claim 1 characterized in that the product hose (12) is held on the barb-like ridges (27) by a crimped ferrule or band (29).
3. A coaxial vapor recovery hose assembly according to claim 1 characterized in that a filtration device is used at the inlet of the suction tube (28).
4. A coaxial vapor recovery hose assembly according to claim 1 comprising a hose rotation restrainer and attaching means to attach said restrainer and said suction tube inlet end to the product hose at said low point.

Patentansprüche

1. Koaxiale Dampfgewinnungs-Schlauchanordnung mit
 - einem inneren Produktschlauch (12), einem Außenschlauch (14), der mit einer Produkt-Abgabedüse (16) durch ein Außenschlauch-Verbindungsstück (18) verbunden ist und den Produktschlauch (12) koaxial umgibt, um einen ringförmigen Dampfweg (15) dazwischen zu definieren,
 - ein Saugrohr (28) in dem Leitungsweg (15) mit einem Einlaßende, das sich zu einem unteren Punkt in der Fahrleitung der Schlauchanordnung während des Gebrauchs erstreckt, und einem Auslaßende, und
 - einer Schlauchkupplung (20) mit einem ersten und einem zweiten Ende, die aufweist:
 - eine Venturi-förmige Innenfläche mit einem Halsgebiet (21);
 - wenigstens einen Sauganschluß (24), der zwischen dem Halsgebiet (21) und wenigstens einer Kammer (25) verbindet, die in die Außenfläche der Schlauchkupplung (20) gebohrt ist;
 - ein Prüfventil (22), das mit jeder Kammer (25) verbunden ist;
 - wobei das zweite Ende der Kupplung (20) mit seiner äußeren Randfläche (30) die Produktleitung (31) der Abgabedüse (16) dichtend eingreift,
 - dadurch gekennzeichnet, daß

- die Außenfläche der Schlauchkupplung (20) allgemein zylindrisch geformt ist,
 - daß eine Vielzahl von widerhakenartigen Stegen (27) auf der Außenfläche an dem ersten Ende der Kupplung (20) sich befinden, eingesetzt in ein Ende des Produktschlauchs (12),
 - daß das Prüfventil (22) in jeder Kammer (25) angeordnet ist, und
 - daß ein L-Verbindungsstück (26) sich von jeder Kammer (25) aus erstreckt und mit dem Auslaßende des Saugrohrs (28) verbunden ist.
2. Koaxiale Dampfgewinnungs-Schlauchanordnung gemäß Anspruch 1, dadurch gekennzeichnet, daß der Produktschlauch (12) auf den widerhakenartigen Stegen (27) durch ein gebogenes Eisenband bzw. Eisenring oder Band (29) gehalten ist.
3. Koaxiale Dampfgewinnungs-Schlauchanordnung nach Anspruch 1, dadurch gekennzeichnet, daß eine Filtrationseinrichtung an dem Einlaß des Saugrohrs (28) verwendet ist.
4. Koaxiale Dampfgewinnungs-Schlauchanordnung nach Anspruch 1, mit einem Schlauchdrehungs-Begrenzer und einer Befestigungseinrichtung, um den Begrenzer und das Saugrohr-Einlaßende an dem Produktschlauch an dem unteren Ende zu befestigen.

Revendications

1. Assemblage coaxial de tuyaux flexibles pour la récupération de vapeur, comportant :
- un tuyau flexible interne (12) destiné au produit, un tuyau flexible externe (14) relié à une tuyère (16) d'alimentation du produit au moyen d'un raccord externe (18) pour tuyaux flexibles et entourant coaxialement ledit tuyau flexible (12) destiné au produit de façon à définir entre eux un passage annulaire (15) destiné à la vapeur;
 - un tube d'aspiration (28) dans ledit passage (15) comportant une extrémité d'entrée s'étendant jusqu'à un point inférieur dans le caténaire de l'assemblage de tuyaux flexibles lors de la mise en service, ainsi qu'une extrémité de sortie; et
 - un raccord (20) pour tuyaux flexibles comportant une première extrémité et une seconde extrémité, comprenant :
 - une surface interne en forme de Venturi munie d'une zone de col (21);
 - au moins un orifice d'aspiration (24)

mettant en communication ladite zone de col (21) et au moins une chambre (25) forée dans la surface externe dudit raccord (20) pour tuyaux flexibles;

une soupape de réglage (22) associée à chaque chambre (25),

la surface périphérique externe (30) de la seconde extrémité dudit raccord (20) venant se mettre en contact d'étanchéité avec le conduit (31) de la tuyère d'alimentation (16) destiné au produit, caractérisé

- en ce que ladite surface externe dudit raccord (20) pour tuyaux flexibles est de forme généralement cylindrique,
- en ce qu'on trouve plusieurs nervures (27) en forme de barbes sur ladite surface externe à la première extrémité dudit raccord (20), insérées dans une première extrémité dudit tuyau flexible (12) destiné au produit,
- en ce que ladite soupape de réglage (22) est disposée dans chaque chambre (25), et
- en ce qu'un raccord coudé (26) s'étend à partir de chaque chambre (25) et est relié à ladite extrémité de sortie dudit tube d'aspiration (28).

2. Assemblage coaxial de tuyaux flexibles pour la récupération de vapeur selon la revendication 1, caractérisé en ce que le tuyau flexible (12) destiné au produit est maintenu sur les nervures (27) en forme de barbes à l'intervention d'une virole ou d'une bande sertie (29).

3. Assemblage coaxial de tuyaux flexibles pour la récupération de vapeur selon la revendication 1, caractérisé en ce qu'on utilise un dispositif de filtration à l'entrée du tube d'aspiration (28).

4. Assemblage coaxial de tuyaux flexibles pour la récupération de vapeur selon la revendication 1, comprenant un dispositif d'antirotation du tuyau flexible, ainsi qu'un moyen de fixation pour fixer ledit dispositif de retenue et ladite extrémité d'entrée du tube d'aspiration au tuyau flexible destiné au produit audit point inférieur.

