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(54) Combination hose coupling and suction pump.

(57) A hose coupling for the inner product hose of a coaxial vapor recovery hose assembly which has an inner surface which is venturi-shaped and communicates through an aspirator port and a suction tube to remove liquid accumulations for the annular vapor passageway between the product hose and the outer hose.

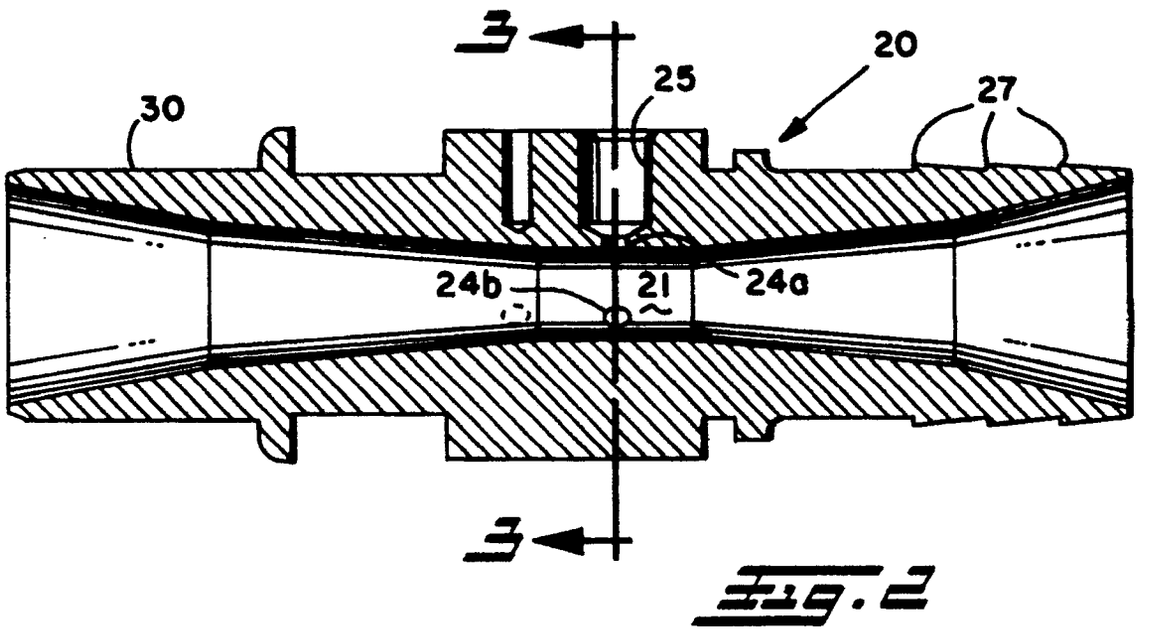

Fig. 2

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COMBINATION HOSE COUPLING AND SUCTION PUMP

Field of the Invention

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 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 United States Patent No. 4,749,009 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 require additional hose fittings in the product hose which may be a potential source of fuel leaks.

Summary of the Invention

In accordance with the present invention, there is provided in a coaxial vapor recovery hose assembly having an inner product hose, an outer hose coaxially surrounding the product hose and defining therewith an annular vapor passageway therebetween, and a suction tube in the passageway having an inlet end extending to a low point in the catenary of the hose assembly while in use and an outlet end; a hose coupling connected to one end of the product hose comprising:

a generally cylindrically shaped outer surface;

a venturi-shaped inner surface with a throat area;

at least one aspirator port communicating between the throat area and at least one chamber bored in the outer surface;

a check valve associated with each chamber;

an elbow fitting extending from each chamber and connected to the outlet end of the suction tube; and

a plurality of barb-like ridges on the outer surface at one end of the coupling inserted into the one end of the product hose.

There is also disclosed a coaxial vapor recovery hose assembly utilizing the hose coupling described above.

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 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 my copending application Serial No. 420,510 , the disclosure of which is herein incorporated by reference. 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.

While certain representative embodiments have been shown for the purpose of illustrating the present invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

Claims

1. In a coaxial vapor recovery hose assembly having an inner product hose, an outer hose coaxially surrounding said product hose and defining therewith an annular vapor passageway therebetween, a suction tube in said passageway 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 connected to one end of the product hose, characterized in that said hose coupling comprises:
a generally cylindrically shaped outer surface;
a venturi-shaped inner surface with a throat area;
at least one aspirator port communicating between said throat area and at least one chamber bored in said outer surface;
a check valve associated with each chamber;
an elbow fitting extending from each chamber and connected to said outlet end of said suction tube; and
a plurality of barb-like ridges on said outer surface at one end of said coupling inserted into said one end of said product hose.

2. A coaxial vapor recovery hose assembly comprising:
an inner product hose;
an outer hose coaxially surrounding said product hose and defining therewith an annular vapor passageway therebetween
a suction tube in said passageway having an inlet end extending to a low point in the catenary of the hose assembly while in use and an outlet end; and
the hose coupling according to claim 1.

3. The assembly according to claim 2 further 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.

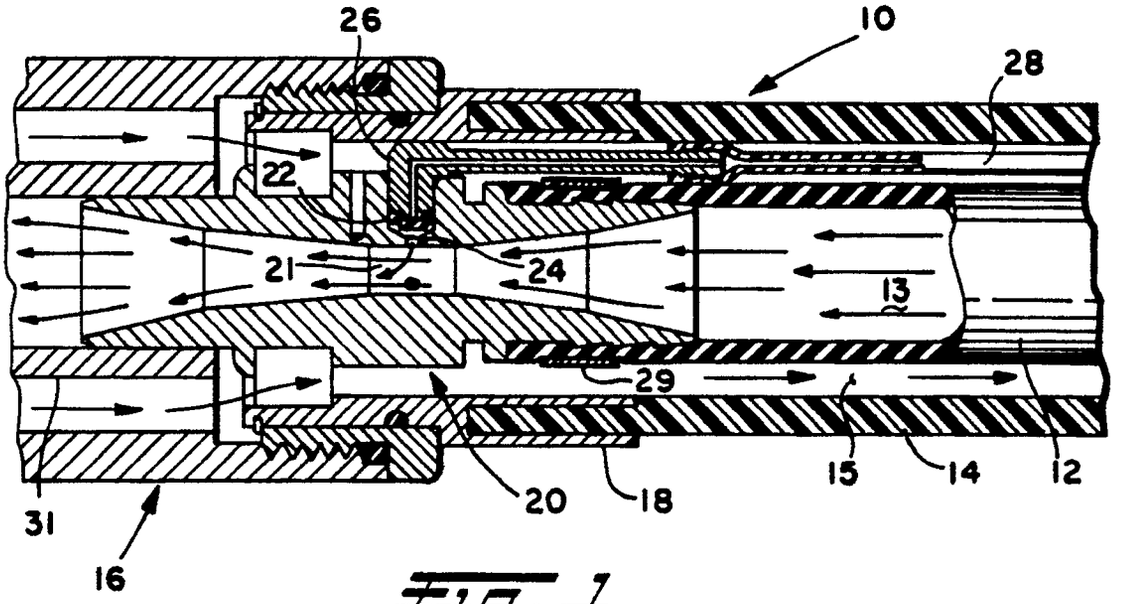

Fig. 1

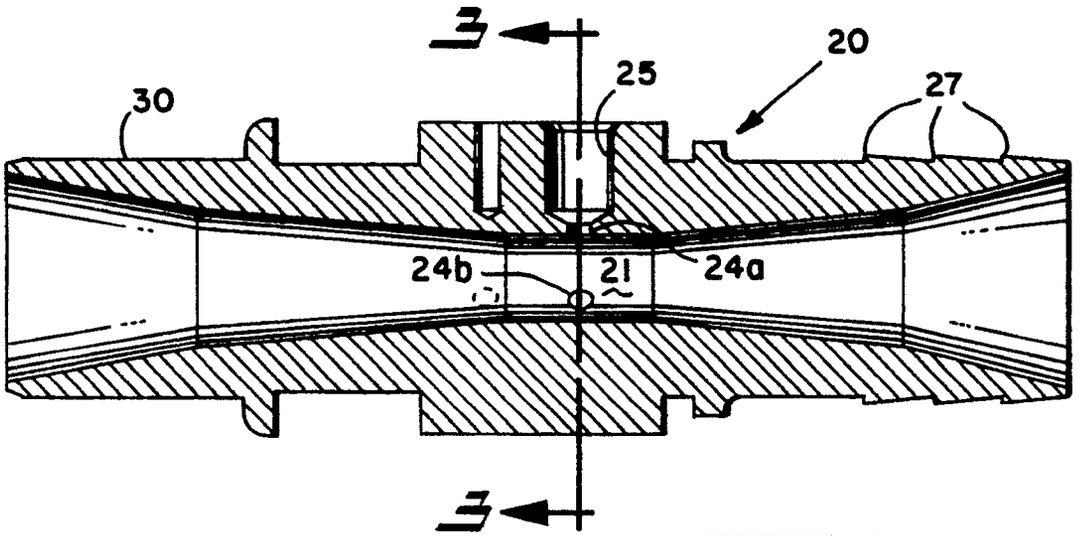

Fig. 2

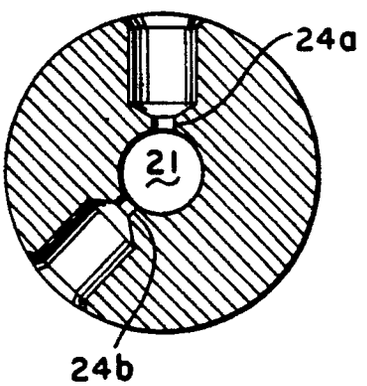

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number

EP 90 63 0174

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,X	EP-A-0 155 186 (GILBARCO INC.) * Whole document * & US-A-4 687 033	1-3	B 67 D 5/378
A	WO-A-8 902 411 (DAYCO PRODUCTS) * Figure 8; page 14, lines 4-24 *	1,2	
A	GB-A-2 016 417 (ATLANTIC RICHFIELD CO.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 67 D

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 January 91	DEUTSCH J.P.M.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
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E: earlier patent document, but published on, or after the filing date
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