April 29, 1958 D. K. BEAVON 2,832,378

HATCH CLOSURE ASSEMBLY HAVING FILLING AND VENTING MEANS

Filed June 12, 1956

Fig. 1.

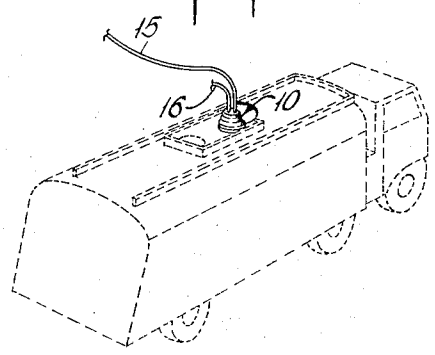


Fig. 2.

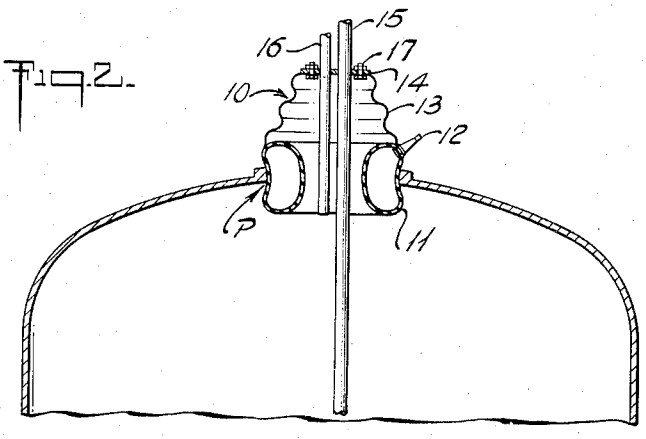
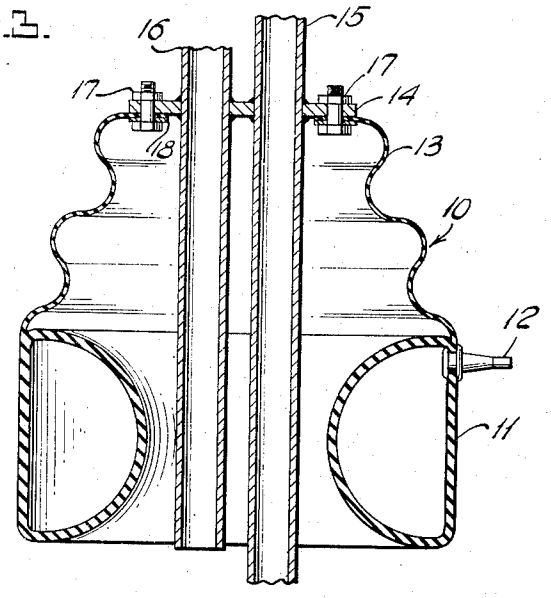


Fig. 3.



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HATCH CLOSURE ASSEMBLY HAVING FILLING AND VENTING MEANS

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1 Claim. (Cl. 141—287)

This invention relates generally to closures and more particularly to a vapor-tight hatch closure assembly for use in the filling of tanks at bulk loading terminals.

During the loading of liquids having low vapor pressures, e. g. gasoline, through the hatches of a tank truck, vapors flash off and may be lost to the atmosphere unless restrained. With the current drives against air pollution and the abatement of smog, especially in areas where petroleum processing activitites are concentrated, efforts to reduce the smog nuisance are being directed to the vapors from plants processing petroleum. Besides polluting the air, these latter vapors are a source of danger because of their formation of explosive mixtures, as well as being a revenue loss, inasmuch as many of these vapors may be recovered and reprocessed.

Accordingly, it is a primary object of the present invention to provide an improved closure means for use in the bulk loading of vapor emitting liquids.

Another object of invention is to provide an improved closure means to prevent the escape of vapors while bulk loading containers with liquids having low vapor pressures.

Still another object of invention is to provide an improved closure means for variations in hatch sizes in containers for vaporous fluids by which air pollution may be reduced.

Another object of invention is to provide a vapor-tight hatch closure assembly having filling and venting means which is easy to insert and remove from operative position.

These and other objects, features and advantages of the invention will become apparent from the following description and claim when read in conjunction with the accompanying drawing wherein:

Fig. 1 is a diagrammatic view of a tank truck adjacent a loading rack during the process of receiving a low vapor pressure liquid;

Fig. 2 is a cross section through the loading hatch of such a tank truck showing the improved closure in operative position; and

Fig. 3 is an enlarged view of the closure assembly.

The invention comprises an adjustable hatch closure assembly of materials resistant to the effects of vapors given off during the process of filling a tank truck, the closure assembly having means for adjustment to various shapes and sizes of hatches and connections for the filling of the liquid and the venting of the vapors produced from such a process.

Referring first to Figs. 2 and 3 of the drawing, the improved hatch closure assembly is indicated at 10, and consists of an expansible tube-like member 11, which is disclosed as an inflatable tube having a substantially straight outer surface, but which may be an ordinary inner tube, and is adapted to be inserted within a tank opening or hatch to contact the periphery thereof as indicated at P in Fig. 2. This substantially straight wall

surface assumes a concave shape upon inflation of the tube-like member 11 when in position, as disclosed in Fig. 2, the means by which this member may be inflated and deflated being disclosed at 12.

Joined to one edge of the member 11 is a flexible diaphragm 13 having a length such as to accommodate differences in levels in the positioning of the inflatable tube within the hatch or opening and to take care of erratic movements which may occur during the filling process. This flexible diaphragm may be joined to the inflatable tube by vulcanization, both the tube and diaphragm being coated by a material impervious to the vapors produced. For example, in the case of gasoline vapors, member 11 could be made of natural or butyl rubber and coated with neoprene and diaphragm 13 would be neoprene-impregnated cloth.

The free end of the flexible diaphragm 13 is joined to a platform member 14, indicated as a metallic plate, and through which extend a filling pipe 15 and a vapor vent pipe 16. Both of these pipes have a vapor-tight connection with the platform 14, achieved by welding or the like.

The flexible diaphragm 13 may be fixed to the platform member 14 by any convenient means, indicated here as comprising a plurality of nut and bolt connections 17, which clamp the diaphragm to the platform by assembly with the compression ring indicated at 18.

The filling pipe 15 is shown in Fig. 2 in the approximate position which it would have during the filling of a container such as a tank truck, and the vapor vent pipe 16 extends only so far within the container as to allow for the collection of the vapors which arise during the filling process. The short length of the vent pipe is to prevent immersion within the liquid during filling so that its function may not be hampered.

Fig. 1 discloses the position that the improved closure assembly would take during the filling of a tank truck, with the filling pipe 15 extending from a suitable supply source (not shown) and the vapor vent pipe 16 leading to a vapor collection manifold of a recovery system (not shown).

In the filling operation of the vapor emitting liquid, the closure assembly such as disclosed in Fig. 3, is first inserted within the edge of the hatch or opening of a tank truck with the inflatable tube-like member 11 in a deflated or collapsed condition, exact positioning being unnecessary. Through the means 12, member 11 is inflated to a suitable pressure (such as 15–25 p. s. i. g.) to expand it firmly against the edge of the hatch to form a vapor-tight seal engagement with it and so prevent any escape of vapors along the contact surface, thus forming a hood enclosing the filling opening. As has been indicated above, the increased pressure in this inflatable tube-like member 11 will deform it as disclosed in Fig. 2 and can accommodate its shape to either round or oval hatches and over a considerable range in sizes.

Completion of the filling through the pipe 15 may be controlled by an automatic metering process for a desired quantity or upon signal from a float, to prevent loss of vapors by the breaking of the seal in order to check the quantity of liquid provided the tank. Upon completion of the filling process and the collection of vapors, which may involve the use of a vacuum pump, the inflatable member 11 is deflated for quick release and removal of the closure assembly 10. The amount of vapors lost during the short interval before the hatch or opening of the tank truck is closed is considerably less than would have occurred had the hatch or opening been unrestricted during the filling process, with the vapors from the container or tank being displaced as the liquid level rises. With the improved closure assembly, valuable vapors are

recovered, a dangerous explosive condition is prevented and air pollution is minimized.

Obviously, many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claim.

I claim:

A unitary vapor-tight hatch closure for a container of a liquid having a low vapor pressure comprising an assembly of an inflatable resilient tube-like member adapted to be inflated and deflated respectively for rapid attachment to and release from vapor-tight sealing contact with the edge of a filling opening in said container, a flexible member joined in vapor-tight seal relationship to said tube-like member, filling and vent means and a platform member fixed in vapor-tight seal relationship to

separate said filling and vent means and joined to said flexible member in a vapor-tight seal and spaced from said tube-like member, said assembly being impervious to chemical action from the vapor from said liquid, said vent means extending into said container substantially not more than the same distance as said assembly, said flexible member serving to accommodate differences in levels and erratic movements occurring during loading.

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