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VAPOR PRESSURE TANK

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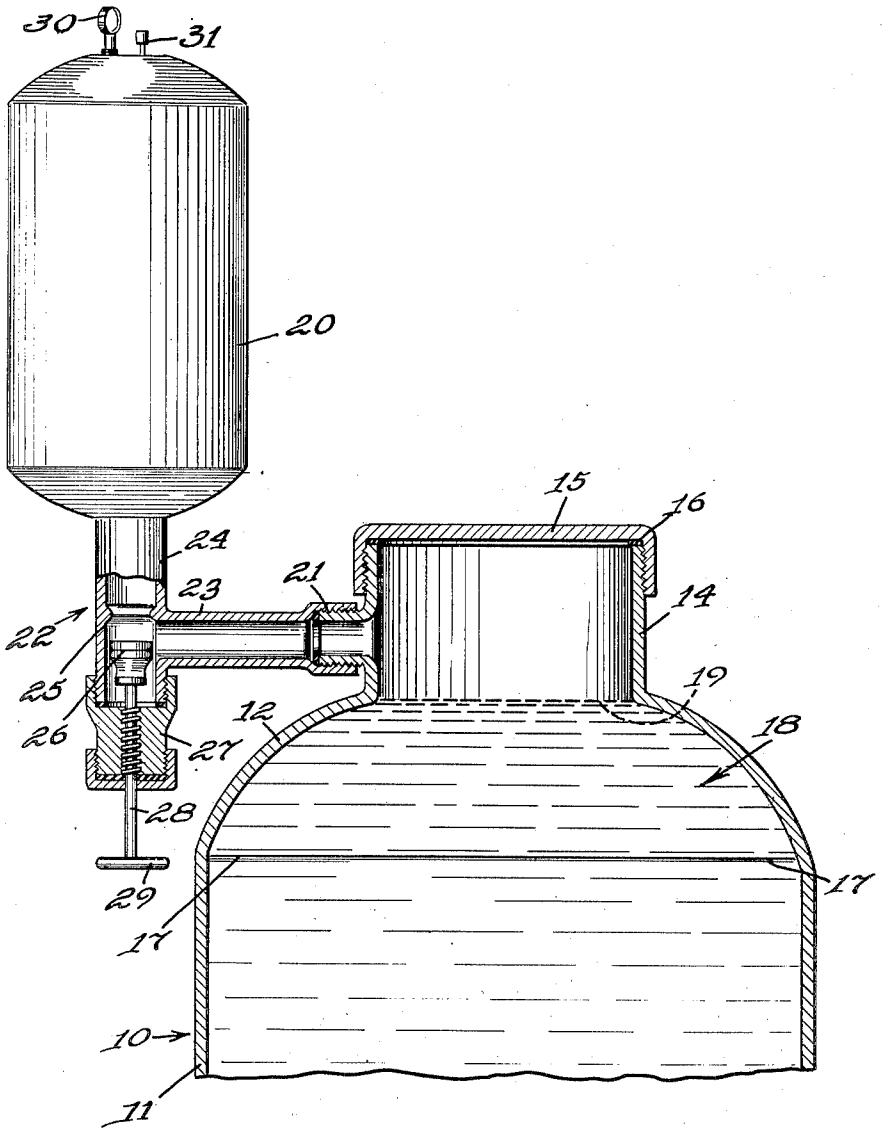

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VAPOR PRESSURE TANK

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2 Claims. (Cl. 220—85)

This invention relates to a fluid holding container, and more particularly to an auxiliary tank for attachment to a fluid holding container.

The object of the invention is to provide a vapor pressure tank for attachment to a container or vessel which is adapted to hold a fluid or liquid such as a liquefied petroleum gas, whereby the vapor pressure tank will receive vapor from the vessel or container so that the container will be able to hold a larger than usual quantity of liquid.

Another object of the invention is to provide a vapor pressure tank which will hold the vapor that results from stored fluids such as liquefied petroleum gas whereby the space that is ordinarily used as a vapor space can be used for holding additional liquid so that the capacity of the tank or container will be increased.

A further object of the invention is to provide a vapor pressure tank which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawing, forming a part of this application, and in which like numerals are used to designate like parts throughout the same, the figure is a side elevational view of the vapor pressure tank attached to a main fluid holding container or tank, and with parts broken away and in section.

Referring in detail to the drawing, the numeral 10 designates a vessel or container which can be made of any suitable material, and the container 10 is adapted to hold fluid or liquid such as liquefied petroleum gas. The container 10 includes a main body portion 11 and an upper inwardly extending portion 12. A neck 14 of reduced size projects upwardly from the portion 12, and a cap 15 is adapted to be arranged in threaded engagement with the upper end of the neck 14. A suitable gasket 16 is interposed between the cap 15 and the top of the neck 14 as shown in the drawing.

The numeral 17 designates an imaginary line which may be at the juncture of the main body portion 11 with the upper inwardly extending portion 12. Formerly before the present invention it was only possible to fill the container 10 with fluid below the line 17 since all of the space above the line 17 had to be kept free to permit or compensate for the thermal expansion and to provide sufficient space for vapors which rose up from the liquid in the container 10. However, with the present invention which includes the auxiliary tank 20, the container 10 can be filled up all the way to an imaginary line indicated by the numeral 19 since the tank 20 will take care of any thermal expansion as well as provide a reservoir for the vapors that result from the liquid in the container 10. Thus, the container 10 will be able to hold an increased amount of fluid or liquid.

Projecting outwardly from the neck 10 and formed integral therewith and secured thereto is a threaded bushing 21. A conduit 22 connects the tank 20 to the container 10, and the conduit 22 includes a first section 23 which is arranged in threaded engagement with the bushing 21. A second section 24 may be arranged angularly with respect to the first section 23, and the section 24 of the conduit 22 may be provided with an inner valve seat 25. A movable valve 26 is mounted for movement into and out of closing relation with respect to the valve seat 25, and a body member 27 may be arranged in threaded engagement with the lower end of the section 24. A rotatable stem 28 is arranged in threaded engagement with the body member 27, and a manually operable handle 29 is connected to the lower end of the stem 28 for rotating the stem. Thus, by rotating the handle 29, the valve 26 can be moved into and out of blocking or closing relation with respect to the valve seat 25.

The upper end of the tank 20 may be provided with a pressure gauge 30 and a safety valve 31, and there may also be provided a thermometer well for receiving a thermometer.

From the foregoing it is apparent that there has been provided a means for increasing the capacity of a storage container or tank such as the tank 10. With the auxiliary tank 20 being used, there can be stored in the container 10 an additional quantity of fluid which is indicated by the numeral 18. This additional quantity of fluid is that amount of fluid which is between the imaginary lines 17 and 19. Formerly it was necessary that all of the space above the imaginary line 17 be kept available for vapors as well as for thermal expansion of the main body of liquid, but now the container 10 can be filled all the way up to the imaginary line 19 at the bottom of the neck 14 since vapors can pass through the conduit 22 into the tank 20. Also, the tank 20 will provide sufficient space for any liquid that enters the tank due to thermal expansion.

With the present invention the vapor space has been relocated. It is well known that in handling such liquids as liquefied petroleum gas in cylinders, tanks or closed vessels, a vapor space must be provided to provide or compensate for liquid thermal expansion. The vapor space or vapor pressure tank of the present invention is especially suitable for use with storage tanks or extraction vessels which may be used in extracting oils or fats from vegetable or animal materials that use liquefied petroleum gas as the solvent. In other words the vapor space is relocated or provided in the closed tank 20. The shut-off valve 26 is provided and the time necessary for removing air from the container 10 can be reduced.

The size of the tank 20 can be varied as desired and the tank 20 is arranged above the container 10. Without the vapor pressure tank system, the container 10 could only be filled to the line 17, but with the tank 20, the container 10 can be filled all the way up to the line 19 so that the additional amount of fluid 18 can be handled in the container 10. The valve 26 can be opened or closed whereby solvent gas vapor can be collected in the tank 20.

Safety codes provide that storage tanks as well as extraction vessels which hold solvents must provide a space at the top to take care of vapors or thermal expansion and by providing the tank assembly shown in the drawing, the vapor can be collected in the tank 20. Thus, the safety requirements can be complied with and also the quantity of liquid being stored can be increased. Thus, there will result a greater output of oil and extracted material over standard practice and also the working time in removing air from the extractor will be reduced. Furthermore, the time required for removing petroleum vapor gas will be reduced and in use the container 10 can be fully charged with material. Then, all ports and valves to the container 10 are closed except the valve 26. Then, air in both the tank 20 and container 10 is removed and a metered amount of liquefied petroleum gas

solvent is then introduced into the container **10** so that the tank **20** functions as a vapor space for the container **10**, the valve **26** being fully opened.

After a predetermined time, as for example after the extraction has been completed, the oil and solvent mixture can be removed from the container **10** and the valve **26** is closed in order to keep the petroleum vapors in the tank **20**. Then, spent material can be quickly discharged from the container **10**. On all subsequent fillings or chargings of the container **10** to the bottom of the neck **14**, the only air that has to be removed is located in the neck space **14** and in the charged material, and after air has been removed from the container **10**, liquefied petroleum gas solvent can be again introduced into the container **10**, and the valve **26** fully opened immediately after introduction of the solvent so that the tank **20** will again function as a vapor space for the vessel **10**.

At no time should air and vapor collect at the same time in tank **20** due to the explosive hazard. The explosive limits of liquefied petroleum gas and air are from 1.5% to 9.5%. The true function of the tank **20** is a vapor pressure tank and by manipulating the valve **26**, the tank **20** can operate as vapor space as needed for the extractor vessel **10** in order to meet the safety requirements.

In an extraction operation, after the extraction has been completed, the container **10** holds the oil and solvent mixture and the spent material as residue. Then, the oil solvent mixture is pumped out of the container **10** leaving only the spent material and some solvent vapor. The vapor is removed by a vapor compressor before the spent material is discharged from the container **10**.

I claim:

1. In combination, a container for holding a liquid and including a main body portion comprising a cylindrical section and an upper inwardly arranged section, a neck extending upwardly from said last named section and being of reduced size, a cap arranged in threaded engagement with said neck, a bushing extending outwardly from said neck, a cylindrical conduit including a first horizontally disposed section arranged in threaded engagement with said bushing, a second vertically disposed section extending from said first section, a body member arranged in engagement with the lower end of said second section, said second section being provided with a valve seat, a valve stem arranged in threaded engagement with said body member, a handle mounted on the outer end of said stem, a valve mounted on the inner end of said stem and mounted for movement into and out of closing relation with respect to said valve seat, and a tank connected to the upper end of the second section of said conduit, said tank being arranged above said container.

2. The apparatus as described in claim 1, and further including a pressure gauge connected to said tank, and a safety valve connected to said tank.

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