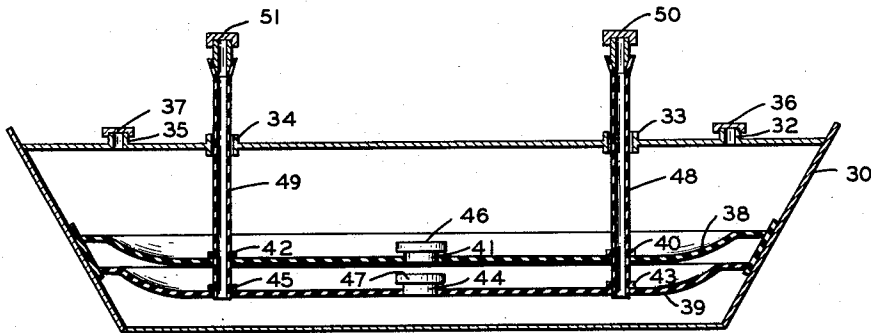


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LIQUID CARGO BARGE
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LIQUID CARGO BARGE

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This invention relates to containers and carriers for fluids. In one of its aspects this invention relates to the storage and transportation of different liquids simultaneously or at different times within one and the same rigid container.

In the storage, handling and transportation of fluids separate storage and transportation facilities, such as tanks, containers, cargo carriers, etc. are oftentimes devoted to the handling of one specific fluid. Usually a finished, refined material, such as gasoline, cannot be stored or carried in a container which previously stored or carried a crude, unrefined material, such as crude oil, without first thoroughly cleaning the container. Because of the time and expense involved in cleaning a container or carrier it is often the practice not to carry different fluids in the same container at different times but rather to devote a container practically entirely to the handling and storage of one particular material. However, when the need or demand for a particular material drops, it is often necessary to thoroughly clean the container before another material can be used therein.

It is an object of this invention to provide a method and means whereby different fluid materials may be carried simultaneously or at different times within the same container and without any significant contamination or mixing of one fluid with another. It is another object of this invention to accomplish the above mentioned object without any substantial decrease in the carrying or storage capacity of the container. It is still another object of this invention to provide a method and apparatus whereby a crude material, such as a crude oil, can be carried at one time, in a container and immediately after being unloaded a refined material, such as a gasoline, lubricating oil, a chemical, etc. can be carried without being contaminated by the crude material in the same container and without requiring any cleaning before the refined material is added. These and other objects will become apparent from the following disclosure wherein the drawing is a cross sectional view of a cargo carrier or barge employing my invention.

In accordance with my invention, I have now provided a method and means whereby it is possible to store and/or carry two or more different materials at different times or simultaneously. In the practice of my invention an impermeable membrane or diaphragm is located within a container and attached to the walls of the container, thereby forming separate compartments therein. The membrane is preferably attached or fixed to the walls of the container at about the mid point or center line thereof and the surface area of one side of the membrane is preferably at least equal to about $\frac{1}{2}$ of the inner surface area of the container. It is desirable that the membrane be made about this size so as to eliminate and/or substantially reduce any stretching of the membrane when the container is filled to capacity with fluid. By this means the membrane is not stretched but rather is supported and pressed against the inner surface of the container. For obvious reasons the membrane should be attached or fixed to the inner walls of the container in such a manner as to be fluid tight.

Any type of liquids may be employed in the practice of my invention provided they do not attack or corrode the container and membrane. Liquids which can be handled include hydrocarbon liquids such as gasoline and lubricating oil, alcohol and acetone, mineral and organic acids, aqueous and non-aqueous solutions, organic chemicals etc.

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Referring now to the drawing, therein is shown in cross section a cargo carrier or barge 30. The top or deck of the barge is shown fitted with 4 outlets 32, 33, 34 and 35. Outlets 32 and 35 are shown covered with suitable closures or hatches 36 and 37 respectively. Fastened and joined to the inside walls of the barge are flexible, expansible, impermeable membranes 38 and 39 which are wholly within the barge and preferably joined to the walls of the barge along about the horizontal center line thereof. Membrane 38 is shown fitted with outlets 40, 41 and 42 and membrane 39 is shown fitted with outlets 43, 44 and 45. Outlets 41 and 44 are fitted with suitable liquid tight closures 46 and 47 respectively and are located preferably one above the other.

Conduit 48, preferably flexible and preferably made of similar material as membranes 38 and 39 is fixed at one end to outlet 43 of membrane 39 and extends upwardly through and fixed to outlet 40 of membrane 38 and then through outlet 33 on the deck. The other end of conduit 48 is fitted with a suitable closure 50. Conduit 49, also preferably made of similar material as membranes 38 and 39 is joined at one end to outlet 45 of membrane 39 and extends upwardly through and fixed to outlet 42 of membrane 38 and then through outlet 34 on the deck. The other end of conduit 49 is fitted with a suitable closure 51. The connections between conduits 48 and 49 and outlets 43 and 45, respectively of membrane 39 are liquid tight, also the connections between conduits 48 and 49 and outlets 40 and 42, respectively of membrane 38 are fluid tight. However, the contact between conduits 48 and 49 and outlets 33 and 34 respectively need not be fluid tight and preferably is such that the conduit fits and slides easily therethrough.

The particular embodiment of my invention illustrated by the drawing can be employed as follows. Crude oil or lubricating oil is loaded into the barge via outlets 32 and 35 until the total capacity of the barge has been reached. As the oil is loaded the weight of the liquid presses membranes 38 and 39 against the lower sides and bottom of the barge and as a result the sides and bottom of the barge beneath the membranes is protected from and does not contact the oil. When the loading is completed the cargo of oil is transported to its destination where it is unloaded by suitable means through outlets 32 and 35. After unloading, a cargo of gasoline or other liquid can be taken on immediately. The gasoline is loaded via outlets 33 and 34 through conduits 48 and 49 respectively. As the gasoline is taken on, membranes 38 and 39 are pressed against the top and upper sides of the barge. No contamination of the gasoline with the crude oil occurs since the bottom and lower sides of the barge had been shielded from the crude oil by the membranes and these membranes now shield the gasoline cargo from the upper sides and top which are wetted with crude oil. After loading of gasoline is completed the cargo can be shipped back, the gasoline unloaded via conduits 48 and 49 and another load of crude oil taken on as described hereinbefore.

As is obvious one or more outlets such as outlets 32 and 33 may be employed. Also one or more conduits such as conduit 48 can be used. Similarly one or more membranes can be used. If desired, and as shown a plurality of membranes can be used in case one leaks. If a leak in one membrane occurs and two membranes are used the liquid is trapped in the space between the membranes, as in the space between membranes 38 and 39 and recovered therefrom by suitable means via outlets 41 and 44. Also it is obvious that any number of separate compartments can be provided within the cargo space of the barge depending upon the number, size and location of the membranes. Also it is possible to load two (or more) different liquids simultaneously, one liquid being loaded via outlets 32 and 35 and another being loaded via outlets 33 and 34 and conduits 48 and 49 respectively.

The membrane employed in my invention is made of any suitable flexible, preferably expansible material which is not attacked by the liquid cargo in contact therewith. Suitable materials include plastic coated cloth, neoprene coated nylon, perbunan coated cloth or nylon; also mem-

branes made of synthetic rubber and plastics such as polyethylene, thiokol, neoprene, etc. are useful.

As is obvious to those skilled in the art upon reading this disclosure many modifications, substitutions and changes which do not depart from the spirit and scope of this invention will suggest themselves and can be made.

I claim:

1. A carrier comprising a barge having a deck, side walls and bottom, suitable for use in carrying a fluid cargo; a plurality of flexible impermeable membranes wholly within said barge, the peripheries of which are attached to the inside of the barge at about the horizontal center line of the walls thereof and dividing the barge into two compartments, said two compartments comprising an upper compartment and a lower compartment; and separate inlet and outlet means to each of said compartments, the inlet and outlet means to said lower compartment being fixed to and extending through said membranes and extending through said upper compartment and slidably extending through said deck.

2. The carrier of claim 1 in which said inlet and outlet means to said lower compartments are flexible.

3. A carrier comprising a barge having a deck, side walls, and bottom, suitable for carrying liquid cargo; an impermeable, flexible membrane wholly within said barge, the periphery of which is attached at approximately the horizontal center line of the walls of said barge and forming within said barge two fluid-tight compartments; and an inlet means and separate outlet means extending through said deck to one of said compartments and also an inlet means and separate outlet means extending through said deck to the other of said compartments.

4. A carrier comprising a barge having a deck, side walls, and bottom, suitable for using in carrying fluid cargo; at least one impermeable, flexible membrane wholly within said barge attached to the inside of the barge at about the horizontal center line of the walls thereof and

dividing the barge into two compartments, said two compartments comprising an upper compartment and a lower compartment; and separate inlet and outlet means to each of said compartments, the inlet and outlet means to said lower compartment being fixed to and extending through said membrane and extending through said upper compartment and slidably extending through said deck.

5. A carrier comprising a barge having a deck, side walls, and bottom, suitable for using in carrying fluid cargo; two impermeable, flexible membranes wholly within said barge, attached to the inside of the barge at about the horizontal center line of the walls thereof and dividing the barge into two compartments, said two compartments comprising an upper compartment and a lower compartment; and separate inlet and outlet means to each of said compartments, the inlet and outlet means to said lower compartment being fixed to and extending through said membrane and extending through said upper compartment and slidably extending through said deck.

6. The carrier of claim 5 in which said two membranes are spaced apart.

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