

[54] CONTAINER FOR PLURALITY OF IMMISCIBLE LIQUIDS

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[58] Field of Search 61/1 R, .5, 46; 210/170

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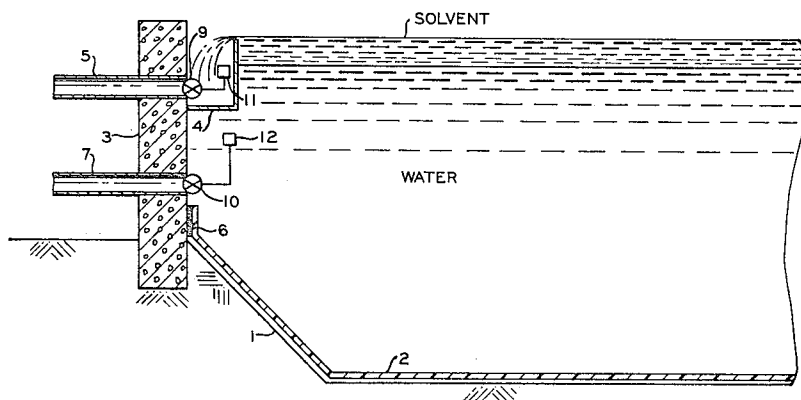
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ABSTRACT

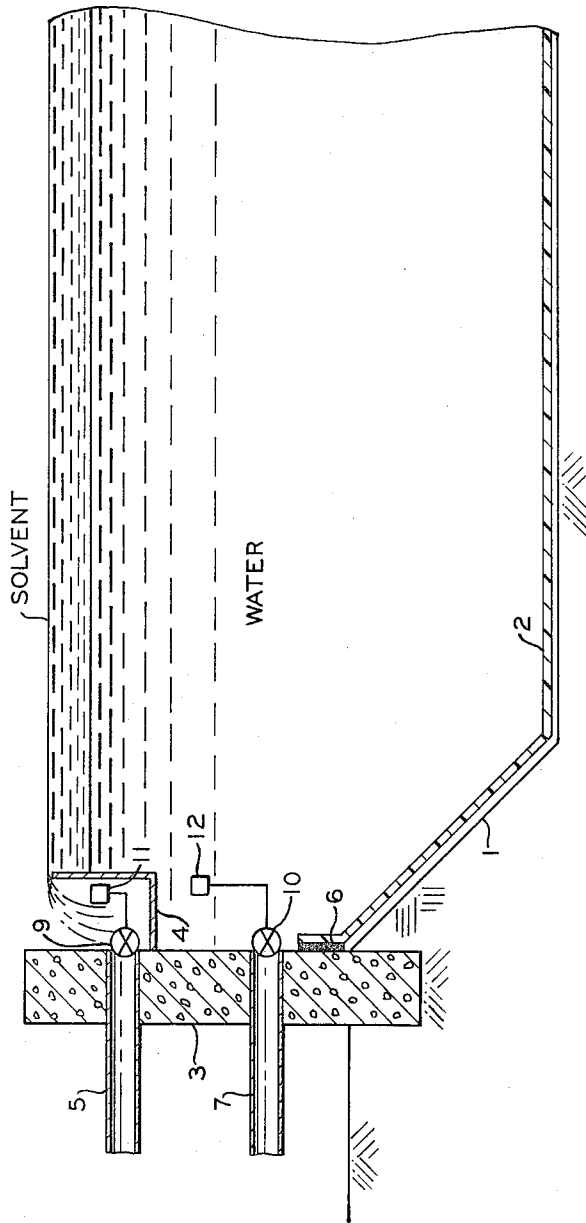
A container or reservoir is provided having a solvent-sensitive liner extending over its wall and bottom. Near the top the liner coats with a wall or walls resistant to the solvent, said wall or walls extending above the top edge of the liner an appreciable amount. A weir or other solvent removal device is provided to skim or otherwise remove solvent from on top of liquid below it in the reservoir.

1 Claim, 1 Drawing Figure



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CONTAINER FOR PLURALITY OF IMMISCIBLE LIQUIDS

This invention relates to a reservoir for storing or handling or treating immiscible liquids. In one of its aspects, the invention relates to a combination structure in which a solvent-sensitive liner is employed in a reservoir for handling immiscible liquids at least one of which is a solvent.

In one of its concepts, the invention provides a combination structure or reservoir comprising a walled-in space, the space containing a solvent sensitive liner, a wall surrounding said space at the top thereof and extending a substantial distance above said liner, said liner and said wall coacting to retain immiscible liquids therein. In another of its concepts, the invention provides a structure as described having in combination therewith a liquid removal device for removing liquid from on top of another liquid with which it is immiscible. In a more specific concept, the invention provides a weir for removing solvent from on top of, say, water in such a reservoir. A still more specific concept of this invention provides a polyolefin liner, which may have been treated with asphalt, suitably attached as with a mastic or otherwise sealed to, say, a concrete or metal wall at the top of the reservoir or container.

Currently there have been installed and many flexible membrane liners are being installed in earthen pits or ponds. Such ponds are helpful to store or otherwise treat liquids. Oftentimes, liquids in such reservoirs will have floating thereon a solvent-like material or organic compound, e.g., a hydrocarbon, which will attack and ultimately destroy most liner materials such as rubber, plastics, e.g. woven and nonwoven fabrics, films or asphaltic or bituminous coatings generally used in the art.

I have now conceived a combination structure in which there is provided above such a liner in a reservoir or container or pit a solvent-resistant wall to coact with the liner, the liner extending to and coacting with said wall without, however, covering said wall for a substantial distance above the top edge of the liner in manner such that liner-destroying liquid or solvent can be prevented from contact with the liner by collecting said liner-destroying liquid well above the top of a non-liner-destroying liquid contained within the reservoir or container. Further, I have conceived that such a reservoir is provided with a skimming device or weir for removing accumulating solvent so that the layer of it above the, say, water in the reservoir will not reach into contact with the liner material. Thus, the weir is so constructed, adapted and arranged in size, configuration and ultimate operation that it coacts with the concrete or metal wall or other wall resistant to the solvent to remove excess solvent before any layer of it would become too deep. Still further, I have conceived that automatic level control means can be provided for controlling separately, but nevertheless with respect to each other, the steps or layers of the immiscible liquids in the reservoir.

An object of this invention is to provide a reservoir for storing liquids. Another object of the invention is to provide a lined reservoir storage container, pond or pit. Still further, it is an object of this invention to provide such a reservoir in which the liner or membrane covering the walls of a substantial part of the pit will not extend up to such a level at which there may be a liner-destroying solvent or liquid. A further object of the in-

vention is to provide a combination structure reservoir or container for handling immiscible liquids one of which will float on the other and which is corrosive to a liner such as a polyolefin liner which may have been impregnated with an asphaltic material.

Other aspects, concepts, objects, and the several advantages of the invention are apparent from a study of this disclosure and appended claims.

According to the invention, there is provided a reservoir for storing or treating or handling a combination of immiscible liquids which comprises a walled-in space, said space containing therein a solvent-sensitive liner, a solvent-resistant wall at the top of said space, said solvent-resistant wall extending above said liner an appreciable distance, said liner coacting with said solvent-resistant wall to contain in said space a solvent floating on a liquid with which it is immiscible.

Also according to the invention such a structure is provided with a solvent removal or skimming device such as a weir.

Still further according to the invention, there are provided automatic means for control of the levels of the immiscible liquids so that, say, water can be removed from below the solvent intermittently or continuously as may be desired while solvent is removed from above the water intermittently or continuously as may also be desired.

One skilled in the art in possession of this disclosure will understand that a wide variety of materials or combinations thereof can be used to produce the container or reservoir structure of the invention and its operation.

In U.S. Pat. No. 3,474,625, issued Oct. 28, 1969, H. L. Draper, Richard J. Bennett and Duane W. Gagle, there are described various structures having liners which are applicable in this invention. The disclosure of the patent is incorporated herewith by reference. U.S. Pat. No. 2,211,958, issued Aug. 20, 1940, discloses a flexible liner oil storage facility wherein a water substrate can exist.

A preferred liner material is one made of Petromat or Loktuft (trademarks) which are nonwoven fabrics of polypropylene fibers, the fabrics being coated with an asphaltic material.

Referring now to the drawing, **1** designates the wall of a pit dug in the earth. **2** is a liner lying within said pit. **3** is a reinforced concrete wall surrounding the upper portion of the pit. **4** is a weir, and **5** is a pipe extending from the weir through wall **3** to without the reservoir for removing solvent from above water and from the reservoir.

In the embodiment shown, the liner is polyolefin such as polypropylene and is sealed at **6** to the wall **3**, thus coacting therewith and with the skimmer to permit solvent accumulation and removal without contact of the solvent with the liner, a pipe **7** extending from below the water line through wall **3** is provided for removing water separately, and independently, from within the reservoir or pit.

The invention is widely useful. It is particularly of importance for preservation of ecologically important areas. It permits a simple, yet efficient, readily economically feasible storage capacity in which use can be made of the relatively but highly effective liner, as described herein, which coacts with the other elements of the combination, as described. By way of example, the invention finds usefulness for a salt water holding pond

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at an oil field where unavoidably some oil is found admixed with salt water.

In operating a controlled withdrawal of liquid from the weir or skimmer section or from the interface of the immiscible layers, there is provided a level sensor 11 and control within the weir 4 which actuates a valve 9 optionally installed in line 5.

A boundary sensing device 12, as for example, a refractometer can be used to actuate an optionally installed valve 10 on line 7.

It is within the scope of the invention to employ a level and/or boundary sensing device to control valves 9 and/or 10 simultaneously or sequentially.

While herein and in the claims the invention has been described in a now preferred form in which the liner-attacking material is a solvent which floats above the liquid with which it is immiscible, e.g., water, it will be understood by those skilled in the art that the order of the structure can be reversed so that a pond having a liner for the principal portion of its walls and a solvent-resistant lower portion with suitable liquid removing devices is within contemplation here.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawing and the appended claims to the invention the essence of which is that there has been provided a combination structure, container or reservoir having a liner in a bottom portion thereof and a wall surrounding the

same at the top and extending above said liner, the structure having in one form of the invention a solvent removal device or skimmer or weir.

I claim:

5 1. A reservoir for storing two immiscible liquids of different densities which comprises a walled-in space, said space containing therein a liner composed of a material selected from the group consisting of asphalt, plastic, or rubbery material which is sensitive to the solvent effects of the lighter liquid, and surrounding the top of said space an impervious wall that is resistant to the solvent effects of said liquid, the lower portion of said wall and the upper portion of said liner being attached in sealing engagement, said wall containing at a point above the liner a first valved conduit outlet means combined with a first liquid level sensing means which allows removal of the heavier liquid in response to the liquid level sensing means such that the level of the heavier liquid is maintained at a chosen level above the outlet means, said wall further containing a weir means located above said first outlet conduit means, said weir means and said impervious wall defining an overflow area containing a second liquid level sensing means being constructed and arranged to control a second valved conduit outlet means such that at least the lighter liquid can be removed from the reservoir.

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