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HIDDEN BARRIER

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Fig. 1.



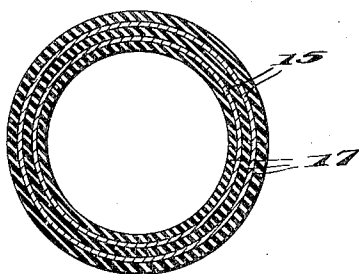
Fig. 2.



Fig. 3.



Fig. 4.



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2 Claims. (Cl. 154—50)

This invention relates broadly to decreasing the permeability or diffusion of flexible laminated wall structures when subjected to fluids, liquids and vapors. The invention is of considerable practical importance in constructing flexible elastic and non-elastic fabrics or walls for use in making up fuel and oil cells, fuel hose, and similar articles.

An object of the invention is to so construct the flexible fabric that it possesses the structural strength, flexibility and durability of conventional constructions and in addition, to impart thereto the factor of reducing diffusion, permeability and solubility of the laminated fabric.

Primarily, the invention comprises making up the laminated fabric to include a barrier membrane which is not in contact with the liquid, or fluid, or in other words, the placing of the barrier underneath the contact surface. This hidden barrier or membrane is preferably composed of the types of nylon which are manufactured by the Dupont Company and obtainable in the open market in the form of a sheet or liquid having the property of drying or setting into a resistant flexible film on exposure. Nylon is chemically a synthetic linear condensation polymer. Nylon is a coined word which is applied to the class of synthetic linear polyamides.

For a complete disclosure of the material used as the barrier membrane of this invention, see the patent to Carothers, 2,252,554, issued August 12, 1941.

It is among the advantages of the above described arrangement that the permeation of the liquids or vapors will be prevented to protect those layers of a laminated fabric that are adversely affected by hydrocarbon liquids and to prevent the delamination of the laminar layers of the walls of the fuel cell.

To illustrate the use of the invention, attention is directed to the accompanying drawing wherein:

Fig. 1 is a fragmental cross-section through a fluid resistant wall using the invention in a cell or balloon fabric.

Fig. 2 is a fragmental section through the wall of a self-sealing fuel or oil tank.

Fig. 3 is somewhat similar to Fig. 2, but shows the use of several laminations.

Fig. 4 is a cross-section through a hose or tube.

It will be appreciated that the figures of the drawing are merely for purposes of illustration and to show several practical embodiments of the invention.

In Fig. 1 there is shown a flexible non-elastic fabric for particular use in preparing "Mareng" cells for holding hydrocarbon fuels and oils. The cells are a well-known development of the Glenn L. Martin Company and are now being used in many modern types of aircraft. The inner layer 1 is composed of a hydrocarbon resistant synthetic rubber lamination which is preferably prepared from neoprene, and secured to the rear surface thereof is a backing barrier or membrane numeral 2 composed of a synthetic linear condensation polymer, or similar plastic material. Exterior of the hidden barrier is an external fabric 3 impregnated with either a soft vulcanized wear-resistant lamination, or if desired, one of the synthetic rubbers may be substituted.

Fig. 2 is another form of flexible lining which possesses self-sealing properties. Here an inner barrier membrane 7 is secured between or sandwiched with exterior synthetic rubber laminations 9.

In Fig. 3, there is disclosed a modification of the laminated fabric illustrated in Fig. 2 and wherein a plurality of synthetic rubber sheets 11 are separated, two or more hidden barrier layers 13 composed of nylon.

Fig. 4 shows the invention applied to a hose. The inner barrier layer or layers 15 are separated and covered by a plurality of concentric rubber or synthetic rubber tubes 17.

In each instance it will be observed that the inner or face lamination of the fabric which is exposed to the fluid is more permeable than the next succeeding lamination, as in each instance the inner or hidden diffusion-preventing lamination, composed of a plastic such as nylon, is covered by the more permeable layer. By building up a structure with the low diffusion membrane behind the inner layer the hidden barrier prevents or at least substantially reduces its permeability without being exposed to abrasion, sloughing or peeling. Thus a laminated fabric is produced which will substantially prevent the permeability or diffusion of liquids or gases there-through. It will be understood that the various laminations of the wall structure are adhesively secured to one another and that the barrier layer may be a sheet, or if desired, the material may be sprayed, brushed or dipped so as to form an adhering coating or lamination on the more permeable lamination.

What I claim is:

1. A hydrocarbon liquid container having a flexible wall structure comprising a plurality of layers of synthetic plastic materials having rub-

ber-like physical characteristics, said layers being bonded together to form a unitary wall structure, and an intermediate membrane having lower diffusion characteristics than the adjacent layers, said membrane consisting of a plastic material formed from a synthetic linear polyamide.

2. A hydrocarbon liquid container having a flexible wall structure comprising a plurality of layers of synthetic plastic material having rubber-like physical characteristics, said layers be-

ing bonded together to form a unitary wall structure and an intermediate membrane having a lower diffusion characteristic than the adjacent layers, said membrane consisting of a plastic material formed from a synthetic linear condensation polymer, preferably formed by the condensation of a diprimary diamine and a dibasic carboxylic acid.

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