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OIL- AND WATER-PROOF PRODUCT

Wilbur A. Lazier, Marshallton, and James H. Werntz, Wilmington, Del., assignors to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

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This invention relates to oil- and water-proof products, and more particularly, to material coated and/or impregnated to give a product adapted for use in wrappers or containers for oily or aqueous substances such as lubricating oil, paint, milk, and other oily food products.

Heretofore it has not been difficult to oil-proof or water-proof materials when one operation is carried out to the exclusion of the other. For example, sodium silicate is used to grease-proof paper but it is very soluble in water, whereas a large number of organic compounds and compositions are suitable water-proofing agents but they are generally attacked by the common non-aqueous solvents.

An object of this invention is to provide a material which is both oil-proof and water-proof and eminently suitable for wrappers and containers for both oily and aqueous products. Other objects of the invention will be apparent from the description hereinafter given.

The above objects are accomplished according to the present invention by coating and/or impregnating a material adapted for use in wrappers or containers with a substantially hydrogen-saturated, oxygenated fatty acid derivative having a relatively high melting point, preferably of at least 50° C. It has been found that such fatty acid derivatives applied to suitable material, such as paper, fabric, and the like, give products both water-proof and oil-proof to a high degree.

The following examples are given to illustrate the invention:—

Example 1.—Castor oil was hydrogenated by agitating it with 5% of reduced nickel catalyst and hydrogen at a pressure of 500 pounds per square inch and a temperature of 160° C. The filtered oil had a melting point of 84° C. and was a hard wax at room temperature. A paper bottle was filled with the molten hydrogenated castor oil at a temperature of about 150° C. and the bottle was then inverted and the oil permitted to drain out. After cooling, the bottle was then filled with automobile grade lubricating oil and after two months there was no evidence of oil penetration through the sides of the bottle.

Example 2.—A paper bottle was immersed in the molten hydrogenated castor oil of Example 1, removed from the molten material, and the excess oil allowed to drain off. Both the interior and exterior surfaces of the bottle were thereby coated. After cooling for about one hour, a light grade of lubricating oil was placed in the bottle. Examination of the bottle after six months showed no evidence of any leakage of oil through the bottle at any point.

Example 3.—A substantial amount of oxygen was introduced into raw China-wood oil by blowing in the manner commonly used for heat-bodying the oil. The viscous blown oil was then hydrogenated to a wax-like material melting at about 65° C. An unimpregnated paper oyster bucket was passed through the melted material, after which the paper bucket was found to be adequately protected for the intended uses.

Example 4.—A grease-proof wrapper for meat products was prepared by impregnating the fabric ordinarily employed for this purpose with a composition prepared by heating hydrogenated castor oil with the calculated amount of glycerol (1 mol of glycerol per 2 mols of hydrogenated castor oil) to form the diglyceride.

It will be understood that the above examples merely illustrate specific embodiments of the present invention, which is of broad application in the oil-proofing and water-proofing field. In place of the above impregnating and/or coating material may be used other substantially hydrogen-saturated, oxygenated fatty acid derivatives having a relatively high melting point, such as waxy esters of the hydroxy stearic acids with high molecular weight alcohols, such as stearyl alcohol, or the reduction product of hydrogenated castor oil, properly characterized as octadecanediol, its esters and ethers. Likewise, there may be used the esterification products of hydrogenated, oxygenated fatty acids with polyhydric alcohols such as glycol, diethylene glycol, sorbitol, pentaerythritol, and mixtures thereof. Of this general class of compounds, the hydrogenated, oxygenated glycerides such as disclosed in the specific examples, are preferred. Instead of hydrogenated castor oil or blown China-wood oil, other hardened oxygenated oils may be used, such as hydrogenated blown linseed oil, hydrogenated blown menhaden oil, or hydrogenated blown sunflower seed oil. These modified fats, or their derivatives, may be used alone or in mixtures. For example, the impregnating or coating composition may contain both hydrogenated castor oil and hydrogenated, blown China-wood oil.

To overcome the brittleness of these materials softeners may be added, softeners preferably being selected which are immune to the attack of the solvents to be brought into contact with the material. Ordinary soap has been found to be a suitable softener for hydrogenated castor oil. Other softeners may be selected from the class of synthetic or naturally occurring gums, resins,

or waxes. Where a more flexible coating is particularly desired, a hydrogenated, blown China-wood oil is generally to be preferred over hydrogenated castor oil, although hydrogenated castor oil is as a rule the preferred coating or impregnating substance. Drying oils such as linseed oil or China-wood oil, or semi-drying oils like castor oil, may be incorporated in the compositions, as well as resins like rosin, damar, or synthetic resins, such as the vinyl resins, the acetone-formaldehyde, urea-formaldehyde and chlorinated diphenyl resins.

The examples show only the coating and/or impregnating of paper and cloth, but the invention is broadly applicable to the coating of all types of material suitable for use in wrappers and containers. Such materials may be of mineral, vegetable, or animal origin, and fibrous, or not. For example, containers or wrappers made of wood, leather, silk, wool, cotton, hemp, flax, or jute may be used. Likewise, non-fibrous materials such as regenerated cellulose sheets, and the like, may be employed. The particular method of impregnating and/or coating the materials with the above disclosed agents may be varied within wide limits. For example, elementary fibers may be coated or impregnated with the above agents and then made up into sheets, or articles of woven, felted, or braided sheets may be impregnated by dipping into the oil-proofing agents. The impregnated or coated product may be allowed to air dry before use, or it may be heated at a higher temperature, or, if desired, drying accelerators, known to the varnish art as driers, may be incorporated to speed up hardening of the coating where drying oils are used as softeners.

The material prepared according to the present invention is intended for containers and wrappers for holding and wrapping such products as lubricating oils, paints, aqueous emulsions such as milk, rubber latex, lard, butter, and other oily food products, for example, fish, such as sardines in oil. The preferred embodiment of the present invention comprises a paper container coated or impregnated with the compositions herein disclosed, but the application of these compositions to fabric bases and sheets of various cellulosic material is in general highly advantageous in obtaining an oil- and water-proof material.

An advantage of the present invention resides in the fact that it provides a material both water-proof and oil-proof. A further advantage lies in the fact that these materials may be of a very flexible nature due to the fact that the fatty acid derivatives herein disclosed may be softened by the addition of various softeners without materially impairing the water-proofing and oil-proofing properties of the substance. All of the materials heretofore known for this purpose have been open to some serious objection to which the materials of the present invention are not open. Sodium silicate, while oil-proofing paper, is very water sensitive, brittle, cannot be readily softened and has an objectionably high alkali content. Casein coatings are water sensitive. Nitrocellulose coatings are useful in oil-proofing but are brittle and when sufficient softeners are incorporated in the nitrocellulose coatings to flexibilize the material, the coating then becomes water sensitive. Similar objections have become apparent in the use of other materials heretofore known.

In the appended claims the term "coated" is used in its broad sense to designate a material which has been coated or impregnated. In treating materials with the compositions herein disclosed, there will be in all cases some coating and some impregnating, although in particular instances one or the other may greatly predominate. It will therefore be understood that the claims are intended to include materials which have been treated with these compositions regardless of whether the treatment was primarily designed to impregnate the material or coat same.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

We claim:

1. A container for and resistant to lubricating type oils, which comprises fibrous organic sheet material coated with a composition comprising a substantially hydrogen saturated ester of a hydroxyl containing fatty acid, said ester having a melting point of at least 50° C., and being of the class consisting of substantially hydrogen saturated castor oil, substantially hydrogenated blown drying oils, and waxy esters of hydroxy stearic acids with high molecular weight alcohols.

2. A container for and resistant to lubricating type oils, which comprises fibrous cellulosic sheet material coated with a composition comprising a substantially hydrogen saturated ester of a hydroxyl containing fatty acid, said ester having a melting point of at least 50° C., and being of the class consisting of substantially hydrogen saturated castor oil, substantially hydrogenated blown drying oils, and waxy esters of hydroxy stearic acids with high molecular weight alcohols.

3. A container for and resistant to lubricating type oils, which comprises fibrous organic sheet material coated with a composition comprising substantially hydrogen saturated castor oil having a melting point of at least 50° C.

4. A container for and resistant to lubricating type oils, which comprises fibrous cellulosic sheet material coated with a composition comprising substantially hydrogen saturated castor oil having a melting point of at least 50° C.

5. A container for and resistant to lubricating type oils, which comprises fibrous organic sheet material coated with a composition comprising substantially hydrogen saturated blown China wood oil having a melting point of at least 50° C.

6. A container for and resistant to lubricating type oils, which comprises fibrous cellulosic sheet material coated with a composition comprising substantially hydrogen saturated blown China wood oil having a melting point of at least 50° C.

WILBUR A. LAZIER.
JAMES H. WERNTZ.