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DRY CLEANING SOLVENT

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8 Claims. (Cl. 252—162)

This invention relates to cleaning materials with the use of organic liquids.

The object of the invention is to improve the cleansing power of such liquids by the addition of small quantities of a material of the type described below.

It is already well known to cleanse fabrics, clothing, metals, and other materials by treating them with a dry cleaning solvent such as naphtha, benzol, carbon tetrachloride, trichlorethylene, Stoddard's solvent, or other dry cleaning solvent of the type exemplified by a volatile hydrocarbon or chlorinated hydrocarbon. Such dry cleaning solvents are usually volatile at moderately elevated temperatures, Stoddard's solvent being a special naphtha fraction having a boiling point range of 350° F. to 410° F. It is also well known that the cleansing powers of such solvents can be materially enhanced by adding to the liquid a small quantity of certain materials such as benzine soap, or soap containing free fatty acids, commonly known as dry cleaner's soap, and other materials some of which are completely soluble, others only partially soluble in the organic liquids in the proportions used.

My improvement consists in adding to the organic liquids used for cleansing, such as those above mentioned, a compound of totally different nature which has not hitherto been known to have the property of enhancing the efficiency of such liquids as cleansing agents. The compounds which I use are higher fatty acid esters of polyglycerols, in which the proportion of esterified fatty acid is less than that required for complete esterification of all the hydroxyl groups of the polyglycerol. Stated in another way, the enhancing agents or assistants used in the practice of my invention are polyglycerols incompletely esterified with fatty acids of high molecular weight.

The polyglycerol esters which I have found adapted for use in the practice of my invention may be prepared in accordance with accepted procedures. Two methods are as follows:

1. Incomplete esterification of polyglycerols with individual high molecular weight fatty acids or a mixture of same.

2. Reaction between triglyceride fats and glycerol at sufficiently elevated temperatures to produce polyglycerol esters.

In accordance with the first method, the polyglycerols (di-glycerol, tri-glycerol, etc.) may be prepared by heating glycerol under a reflux condenser at about 280° C. for eight hours (260–270° C. may be sufficient if alkaline catalyst is used) and separating the same from the reaction mixture by fractional distillation under vacuum, following which the fractionated product is reacted with a proportion of high molecular weight fatty acid or a mixture thereof at about 225–275° C. so as to form an incompletely esterified product. This product may be washed with boiling water to remove excess polyglycerol or other water-soluble impurities.

The high molecular weight fatty acids which may be used for esterifying a portion of the hydroxyl groups of the polyglycerol in making the compounds used in my invention may be any aliphatic acid or mixture thereof, whether saturated or unsaturated, containing from eight to about twenty-two carbon atoms per molecule. Examples of such fatty acids are lauric, myristic, palmitic, stearic, arachidic, oleic, linolic, commercial "stearic" acid (usually consisting of about 53% palmitic, 45% stearic, and 2% oleic acids) or the mixed acids from tallow, coconut oil or other natural oils and fats collectively referred to in the claims as "natural fats."

In accordance with the second method for the preparation of the polyglycerides, a triglyceride fat such as coconut oil or cottonseed oil or substantially completely hydrogenated cottonseed oil or any natural occurring fat or oil (referred to as "natural fat" in the claims) may be heated with an equal quantity of glycerol at 280° C., for example, for about half an hour with three per cent soap as catalyst. The reaction product consists predominantly of partial esters of polyglycerols which may be purified by washing with boiling water.

Compounds whose combined fatty acids consist substantially wholly or saturated fatty acids have been found to be somewhat more efficient than those which contain a predominant proportion of unsaturated fatty acids and therefore the former are preferred for use in my invention.

Examples of products which may be formed in accordance with the above procedures and which are suitable for use in my invention are polyglycerol mono-oleate, polyglycerol mono-laurate, the di-ester prepared from diglycerol and commercial stearic acid, polyglycerol partially esterified with the mixture of fatty acids derived from refined cottonseed oil hydrogenated to an iodine number of about 65, and a mixture of di- and triglycerol partially esterified with the mixture of fatty acids derived from coconut oil. A product I have found particularly useful was derived by reaction of glycerol and substantially completely hydrogenated cottonseed oil under conditions

such as those given above. The product consisted predominantly of polyglycerol monostearate and analyzed as follows:

Bichromate glycerol analysis—percent	26.5 (as glycerol)
Hydroxyl number	236
Saponification number	162
Acid number	1.5

In carrying out my invention I add to the organic dry cleaning liquid such as Stoddard's solvent, an amount of ester usually ranging between about .05% to .2% of the solvent, and agitate the material to be cleaned in this mixture and subsequently proceed in the usual manner accepted in dry cleaning processes. A smaller quantity of ester, for example, about .025%, may be used with marked increase in the cleansing action of the solvent, and some increase in cleansing action occurs above the .2% polyglyceride concentration; amounts up to four or six per cent may be used, but I have found that such high concentrations as a rule offer no advantage over the lower range of concentrations. Usually about .025% to .05% of the ester will be ample in obtaining the maximum whiteness on silk fabrics. For wool or heavy rayon about .1% to .5% will be sufficient, depending of course on the fabric being cleaned, the type of soil, and on the ester being employed.

Soiled clothing or fabrics of cotton, wool, silk, rayon, etc., feathers, upholstery, metals, and other materials treated with such a solvent are far more readily cleaned, and cleaned to a higher degree of perfection, than when treated with the same solvent without the addition of any of the esters described herein. The ability of the ester to remove soil and to keep same in suspension in the solvent is shown not only by the much higher degree of whiteness of fabrics treated with solvents containing the esters, but also by the marked action in preventing the redeposition of soil removed from soiled cloths onto clean cloths treated along with the soiled cloths.

The presence of small amounts of water, for example 0.7 per cent, does not noticeably impair the efficiency of the ester compounds as assistants in the removing of oily soil. Dry cleaning solvents containing 0.7 per cent water, for example, and percentages of the ester in the lower range of percentages hereinbefore given, such as 0.05 per cent or 0.1 per cent, are slightly less efficient in removing oily soil than the same compositions dry, and dry cleaning solvents containing 0.7 per cent water and higher percentages of assistant, such as 0.2 to 0.4 per cent, clean as well as or better than the same compositions in dry condition. The same relations hold in regard to the ability of the assistant to prevent the redeposition of soil removed from soiled fabric onto clean fabric present in the solvent in which the soiled fabric is treated.

Furthermore, the presence of the esters improves the ability of the dry solvent to remove oily soil, such as Vaseline-lampblack soil from materials (especially fabrics) even in the presence of a water soluble soil as typified by glucose for example. The esters are even more effective in removing such oily soil in the presence of water soluble soil when the solvent contains a small amount of water such as 0.1 to 1.0 per cent.

The above description will aid in the clear and complete understanding of my contribution to the art and it should be understood that specific limitations are given by way of example only, and are not intended to limit in any way the scope of the invention as defined in the appended claims.

It should be understood that the ester compounds described herein are not in themselves the subject of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. As a new composition of matter possessing improved cleansing power, a dry cleaning solvent in which has been incorporated from about .025 per cent to about 6 per cent of a polyglycerol partially esterified with a mixture of fatty acids containing in predominant proportion saturated fatty acids having from eight to twenty-two carbon atoms.

2. A dry cleaning fluid consisting essentially of a dry cleaning solvent containing from about 0.025 per cent to about 0.5 per cent of a polyglycerol partially esterified with a fatty acid having from eight to twenty-two atoms of carbon.

3. A dry cleaning fluid consisting essentially of a dry cleaning solvent containing from about 0.025 per cent to about 0.5 per cent of a polyglycerol partially esterified with a mixture of fatty acids containing in predominant proportion saturated fatty acids having from eight to twenty-two atoms of carbon.

4. A dry cleaning fluid consisting essentially of a dry cleaning solvent containing from about 0.025 per cent to about 0.5 per cent of a polyglycerol partially esterified with stearic acid.

5. A dry cleaning fluid consisting essentially of a dry cleaning solvent containing from about 0.025 per cent to about 0.5 per cent of a polyglycerol partially esterified with commercial "stearic" acid.

6. As a new composition of matter possessing improved cleansing power, a dry cleaning solvent in which has been incorporated from about .025 per cent to about six per cent of a polyglycerol partially esterified with a fatty acid having from eight to twenty-two atoms of carbon.

7. As a new composition of matter possessing improved cleansing power, a dry cleaning solvent in which has been incorporated from about .025 per cent to about six per cent of a polyglycerol partially esterified with a mixture of fatty acids derived from a natural fat.

8. As a new composition of matter possessing improved cleansing power, a dry cleaning solvent in which has been incorporated from about .025 per cent to about 0.5 per cent of a partially esterified polyglycerol derived from substantially completely hydrogenated cottonseed oil.

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