United States Patent Office 2,822,235 Patented Feb. 4, 1958

2,822,235

METHOD OF LEATHER-FATTING

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No Drawing. Application November 9, 1954
Serial No. 467,894

Claims priority, application Germany November 9, 1953

7 Claims. (Cl. 8—94.23)

This invention relates to leather-fatting agents, and more particularly to fatting agents containing epoxidized fats and oils.

While the use of natural fats and oils and their derivatives as leather-fatting agents has long been known in the leather industry, workers in the art of leather-finishing have endeavored to overcome the disadvantages and shortcomings of those types of fatting agents without success. In particular, the leather-finishing industry has made various unsuccessful attempts to modify the known leather-fatting agents so that white or light-colored leather treated therewith would not fade or discolor when exposed to light for extended periods of time.

It is therefore an object of the present invention to provide leather-fatting agents which will produce leather, particularly white or light-colored leather, of improved quality and appearance.

Another object of our invention is to provide leather-fatting agents which will produce leather, particularly white or light-colored leather, having an improved resistance to fading and discoloration upon exposure to light.

We have found that epoxidized derivatives of oils and fats can be advantageously used as leather-fatting agents, fat-liquoring oils and the like, and that when leather is treated with such fatting agents in accordance with our invention, such leather has light-fastness characteristics far superior to leather treated with the fatting agents heretofore employed in the industry. We have also found that leather-fatting agents composed of epoxidized derivatives of oils and fats have an improved capability to bond themselves to the skin tissue of the leather.

Epoxidized fats and oils which can be used as leather-fatting agents in accordance with our invention include derivatives of unsaturated fatty acids in which all or part of the double bonds have been transformed into epoxide groups by a treatment with peroxides, as well as epoxidized esters formed by esterifying high-molecular fatty alcohols with mono- or polybasic carboxylic acids and subsequently epoxidizing the esterification product with peroxides.

Examples of epoxidized derivatives of unsaturated fatty acids in which all or part of the double bonds have been transformed into epoxide groups are primarily epoxidation products of naturally occurring fats or waxes derived from unsaturated fatty acids, such as epoxidized olive oil, epoxidized linseed oil, epoxidized soybean oil, epoxidized neat's-foot oil, epoxidized sperm oil, and the like, as well as epoxidized esters of the unsaturated fatty acids from which these fats and waxes are derived, such as alkyl-, cycloalkyl-, alkylcycloalkyl- or alkylarylesters and epoxidized fatty acid amides. Specific examples of epoxidized esters of unsaturated fatty acids are hexyl-, octyl-, dodecyl-, oleyl-, glycol-, polyglycol- and polyglycerinesters, as well as cyclohexyl-, naphthenyl-, abietyl-, and alkylphenylesters wherein the alkyl radical contains from 3 to 18 carbon atoms.

In the case of the epoxidized esters formed by esterifying high-molecular fatty alcohols with mono- or polybasic carboxylic acids and subsequently epoxidizing the esterification product with peroxides, examples of unsaturated fatty alcohol components suitable for use in producing such esters are primarily unsaturated high-molecular alcohols which are obtained by reducing naturally occurring unsaturated fatty acids without destroying the double bonds, as well as unsaturated alcohols which can be obtained by splitting naturally occurring wax esters, such as, for example, oleylalcohol and other alcohols containing one or more unsaturated bonds and derived from naturally occurring vegetable or animal-unsaturated fatty acids.

Acid components which are suitable in the formation of the above epoxidized high-molecular esters are mono- and polycarboxylic acids, such as, for example, the lower fatty acids, maleic acid, citric acid, adipic acid, diadipic acid, phthalic acid, and the like.

The epoxidation of all of the above derivatives of fats and oils to form the epoxidized leather-fatting agents in accordance with our invention is carried out according to well-known methods, such as by the action of organic peroxides, for example organic peracids.

The epoxidized derivatives of fats and oils, as above described, can be used as leather-fatting agents in accordance with our invention either alone or in conjunction with other fatting agents, such as, for example, neat's-foot oil, marine animal oils, and mineral oils, as well as with anionic, cationic or electroneutral emulsifiers, such as alkylsulfates, alkylbenzenesulfonates, sulfonated oils, fats and train oils, quaternary ammonium compounds, or ethyleneoxide addition products. However, if it is desired that the fatted leather be completely light-fast and resistant to discoloration, the materials used in conjunction with the epoxidized fatting agents to produce the finished leather, including the tanning agent, must also be light-fast.

The epoxidized fat- or oil-containing leather-fatting agents of our invention can be applied to skins and pelts by any of the methods customarily used in the manufacture of finished leather; that is, for example, by surface application, fulling or heat application, or by drumming of a skin in aqueous emulsions of such leather-fatting agents. In the case of pelts, the leather-fatting agent can be applied by brushing the flesh side of the pelt with the epoxidized fat product or emulsions thereof.

The amounts in which the epoxidized fats and oils are employed for fatting or fat-liquoring of skins and pelts in accordance with our invention depend largely upon the quality of leather desired and the method of treating the leather prior or subsequent to the fatting treatment. In general, however, the fatting solution or emulsion should contain from 1 to 20% of fatty material based upon the weight of the skins or pelts treated.

In fatting or fat-liquoring leather with the above-described epoxidized esters, the character of the finished leather produced thereby can be varied within wide limits. For example, while leathers fatted with the fatty alcohol esters of polycarboxylic esters have a particular fullness, the use of fatty alcohol esters of monocarboxylic acids imparts a particularly desirable feel without excessive fullness to the leather, such as is often desired in the manufacture of finished pelts.

In addition to being light-fast, the epoxidized fats and oils of our invention are marked by their capability of forming firm bonds with the skin tissue of the leather. This bond can be further improved if the unfatted leather is first dried, then fatted and subsequently heated for short periods of time to temperatures between 60 and 100° C., depending upon the type of tanning employed. An increased amount of fat is thereby bonded to the skin tissue.

The following examples will further illustrate our invention and enable others skilled in the art to understand our invention more completely. However, it is understood that our invention is not limited to these specific examples.

Example I

47 parts by weight of epoxidized oleylbutyrate, having an iodine number of 7.5 and an epoxide content of 3.92%, were stirred into a solution composed of 44 parts by weight of water, 0.5 part by weight of a mixture of alkylsulfates wherein the alkyl radicals contained from 13 to 18 carbon atoms, 2.5 parts by weight of a cation-active emulsifier produced by reacting chloroacetic acid dodecylester with hexamethylenetetramine, and 5 parts by weight of an ester produced by esterifying a polyethyleneglycol having a molecular weight of about 9000 with 2 mols of stearic acid. The resulting composition was found to be a cation-active emulsion which, when suitably diluted with water, is highly effective as a fat-liquoring emulsion for white suede leather. If the leather has been tanned with light-fast tanning agents, leather fat-liquored with the above emulsion does not fade or discolor, even when exposed to ultraviolet light for extended periods of time.

Example II

40 parts by weight of an epoxidized phthalic acid dioleylester, having an iodine number of 0.5 and an epoxide content of 4.2%, were stirred into a solution composed of 53 parts by weight of water, 2 parts by weight of a mixture of alkylsulfates wherein the alkyl radicals contained from 12 to 18 carbon atoms, and 5 parts by weight of an ester produced by esterifying polyethyleneglycol having a molecular weight of about 7500 with 2 mols of stearic acid. The resulting composition was found to be highly stable and remained stable over long periods of storage and could be used advantageously for fatting white leather. Leather fatted therewith is light-fast and also has very desirable feel and fullness characteristics.

Example III

32 parts by weight of an epoxidized ester, having an iodine number of 17.7 and an epoxide content of 2.1%, the unepoxidized ester being formed by esterifying unsaturated fatty alcohols, obtained by the reduction of the fatty acid contained in linseed oil, with phthalic acid, were stirred into a solution composed of 54 parts by weight of water, 4 parts by weight of an ethyleneoxide addition product formed by reacting 1 mol of oleylalcohol and about 7.5 mols ethyleneoxide, and 4 parts by weight of an ester produced by esterifying polyethyleneglycol having a molecular weight of about 7500 with 2 mols of stearic acid. The resulting composition was found to be a stable emulsion which, when suitably diluted, is excellently adapted as a fat-liquoring emulsion for the production of light-fast leather having a high degree of fullness.

Example IV

47 parts by weight of an epoxidized train oil, having an iodine number of 3.3 and an epoxide content of 3.2%, were admixed with 1.5 parts by weight of a mixture of fatty alcohols whose molecules contained from 14 to 16 carbon atoms. This mass was then stirred into an aqueous solution containing 1.5 parts by weight of a mixture of alkylsulfates wherein the alkyl radicals contained from 14 to 18 carbon atoms, and 3 parts by weight of an addition product formed by reacting 1 mol stearic acid and 200 mols ethyleneoxide. The resulting composition is a stable, viscous emulsion which can be diluted with water to any desired fat content per unit volume. White leather fat-liquored with the diluted emulsion does not fade or discolor, even when exposed to direct light for long periods of time.

The same results were obtained when epoxidized sperm oil, having an iodine number of 4.9 and an epoxide content of 4.0%, was substituted for the epoxidized train oil.

Example V

80 parts by weight of epoxidized soybean oil, having an iodine number of 3.1 and an epoxide content of 6.4%, were admixed with 20 parts by weight of a 50% Turkey red oil. The resulting mixture is an excellent fatting agent for fatting fine leather.

Example VI

47 parts by weight of epoxidized olive oil, having an iodine number of 1.4 and an epoxide content of 4.5%, were stirred into an aqueous solution composed of 44 parts by weight of water, 0.5 part by weight of a mixture of alkylsulfates wherein the alkyl radicals contained 12 to 18 carbon atoms, 2.5 parts by weight of a cation-active emulsifier produced by reacting chloroacetic acid dodecylester with hexamethylenetetramine, and 5 parts by weight of a polyester product produced by esterifying a polyethyleneglycol having a molecular weight of about 9000 with 2 mols of stearic acid. The resulting comopsition was a cation-active emulsion which, after being suitably diluted, could be advantageously used for fatting white suede leather. The finished leather was found to be light-fast even upon prolonged exposure to direct light.

The same result was obtained when 47 parts by weight of an epoxidized neat's-foot oil, having an iodine number of 3.0 and an epoxide content of 4.5%, was substituted for the epoxidized olive oil above.

Example VII

In the production of white leather, such as Nobuk or white suede, the untreated skin was first tanned, then pared, retanned and finally neutralized with sodium thiosulfate in the presence of 0.5–1% by weight of titanium dioxide, the amount of neutralizing solution being about 200% by weight based upon the weight of leather treated. Subsequently, the tanned and neutralized leather was fat-liquored for 45 minutes to one hour in 3.5–4.5% by weight of the anion-active emulsion described in Example I. Thereafter, the fatted leather was treated in the usual manner to obtain fine white leather, such as white suede. The finished leather was light-fast even when exposed to direct sunlight, provided light-fast tanning agents were used.

Example VIII

In a predominantly synthetic alum tanning process, the leather was first subjected to a preliminary fat-liquoring treatment with an emulsion such as those described in Example IV containing two-thirds of the required amount of epoxidized fat. Thereafter, the fat-liquoring solution was acidified to a pH of about 4.5 to 4.7 with the aid of weak organic acids. Finally, the remainder of the required amount of fatting substance was added to the acidified preliminary fat-liquoring solution in the form of a cation-active emulsion as described in Example VI, and the fat-liquoring treatment was completed in this modified bath. Alum-tanned leather treated in this manner is light-fast even when exposed to direct light for long periods of time.

In order to improve the water-repellent properties of such leather, it may be treated in the manner described in Example VII.

In general, when fat-liquoring light-colored leathers which are intended to be resistant against fading and discoloring, such as, for example, chromium-tanned leather, uppers which will be only aniline-dyed, combination-dyed apparel leather, lining leather, and the like, it is possible to use fat-liquoring solutions which are mixtures of sulfonated animal oils and unsulfonated epoxidized oils, as in Example V, or mixtures of such epoxidized oils with

other commonly used sulfonated animal or vegetable oils.

In a combination natural-and-synthetic tanning treatment or in a purely snythetic tanning procedure, the anionic, epoxidized fat-liquor oil emulsions of Example IV can be used for the production of light-fast leather, or the leather may be fat-liquored with cationic, emulsified epoxidized oils as described in Example VI. In addition, a mixture of the anionic emulsion of Example IV and the cationic emulsion of Example VI will produce similar results.

While we have given certain specific embodiments of our invention, we wish it to be understood that changes and modifications may be made therein without departing from the spirit of the present invention or the scope of the following claims.

We claim:

1. The method of retarding discoloration of leather on exposure to light which comprises fatting said leather by applying to said leather an aqueous emulsion of an emulsifier and a compound selected from the group consisting of epoxidized derivatives of high-molecular unsaturated fatty acids and high-molecular unsaturated fatty alcohol esters of monobasic and polybasic acids.

2. The method of fatting leather which comprises applying to said leather an aqueous emulsion of epoxidized oleylbutyrate having an iodine number of 7.5 and an epoxide content of about 3.92%.

3. The method of fatting leather which comprisees applying to said leather an aqueous emulsion of the epoxidized dioleylester of phthalic acid having an iodine number of 0.5 and an epoxide content of about 4.2%.

4. The method of fatting leather which comprises applying to said leather an aqueous emulsion of the epoxidized phthalic acid ester of an unsaturated fatty alcohol, said fatty alcohol being produced by reduction of the fatty acid contained in linseed oil, said epoxidized ester having an iodine number of 17.7 and an epoxide content of about 2.1%.

5. The method of fatting leather which comprises applying to said leather an aqueous emulsion of epoxidized train oil having an iodine number of 3.3 and an epoxide content of about 3.2%.

6. The method of fatting leather which comprises applying to said leather an aqueous emulsion of epoxidized sperm oil having an iodine number of 4.9 and an epoxide content of about 4.0%.

7. The method of fatting leather which comprises applying to said leather an aqueous emulsion of epoxidized olive oil having an iodine number of 1.4 and an epoxide content of about 4.5%.

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