Patented Nov. 14, 1939 2,180,256

# UNITED STATES PATENT OFFICE

2,180,256

## TEXTILE TREATING

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No Drawing. Application April 12, 1938, Serial No. 201,509

21 Claims. (Cl. 28—1)

The invention relates, in general, to the treatment of fibrous materials and, in particular, to novel compositions adapted, inter alia, for the treatment of fibrous material and to correlated improvements for lubricating and/or finishing textile and other fibrous materials.

In the manufacture of fibrous materials, oils or oil-containing compositions are employed to facilitate certain operations and to impart certain desired characteristics to the final products. Such compositions are used, for example, in the textile industry for the treatment of fibrous materials, such as wool, cotton, natural or artificial silk, glass and other fibers whether of vegetable, animal, mineral or synthetic origin. In the preparation of the above fibers, and throughout various stages of producing yarns, threads and finished goods therefrom, there is a constant demand for improved and efficient lubrication, which will, in turn, have no deleterious effects upon the processing machinery employed or upon the materials themselves. Moreover, the lubricant should also impart the desired softening qualities to the materials and assist in retarding or eliminating the development of electrostatic forces during fabrication thereof. These facts are particularly true with respect to the conventional textile operations, such as spinning, drawing, winding, warping, throwing, weaving, knitting, felting, etc.

A need also exists for improved finishing compositions for textiles, paper, leather, etc., which exhibit decreased oxidizability so as to avoid deleterious effects both on and within these materials, such as development of odor, polymerization and gum formation, tendering of the fibers, etc. While various oils and oil-containing compositions have been employed heretofore with a view to accomplishing the desired results aforementioned, the achievement of such results has not been obtained. In view thereof, there is a persistent demand for improved textile treating processes and for improved compositions for use therein.

The general object of the invention is to obviate the disadvantages existent in the prior art.

A further object of the invention is to provide improved processes and compositions for accomplishing the desired results aforementioned.

A specific object of the invention is to provide a process of treating fibrous materials with improved lubricating and/or finishing compositions.

An additional object of the invention is to provide improved textile treating compositions displaying a decreased tendency to oxidize and become odorous.

Another object of the invention is to provide a novel sulfonated vegetable oil which is particularly adapted, inter alia, for textile treatments.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

According to the invention there are provided compositions adapted for the treatment of fibrous materials which comprise rice oil and/or sulfonated or saponified rice oil with which there may be blended other suitable materials, such as animal, vegetable or mineral oils, soaps or sulfonated products or other derivatives thereof, as well as other desirable substances. The invention further comprises processes of treating fibrous materials with compositions comprising raw and/or sulfonated rice oil.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the composition possessing the features, properties and the relation of constituents, which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

I have found that rice oil, notwithstanding its relatively high iodine value of about 100, has a very low capacity for oxidation, which is, as previously mentioned, a very desirable feature for an oil used in textile and similar treatments. While olive oil, for example, which has a lower iodine value than rice oil and which is widely used in textile treatments, develops a temperature of 295° C. in 288 minutes by the Mackay oxidation test, rice oil develops a temperature of only 255° C. in 548 minutes. This indicates that the capacity of rice oil for oxidation is only approximately half that of olive oil under similar conditions and that rice oil is decidedly superior to olive oil which has heretofore enjoyed widespread use in textile treatments in view of its relatively low oxidizability and good finishing qualities.

I have further discovered that the usually high unsaponifiable content of rice oil (which usually runs about 3% to 5% or less) is apparently responsible for imparting to textile fibers very desirable finishing and softening effects which cannot be duplicated when oils, such as olive oil or similar oils, are employed. I am not aware as to what part of the unsaponifiable matter of rice oil is responsible for this effect, since this unsaponifiable matter is a complex mixture of many substances. However, I do know that its removal, as by solvent extraction, from the alkali-metal soaps

of rice oil, results in a product which is no better than olive oil soap for the treatment of textiles, while the presence of this unsaponifiable matter in soap or oil, gives a textile-treating composition of outstanding merit as fibrous materials treated therewith display a superior softness and finish. This phenomenon is true whether the rice oil is used in its raw state or in a chemically reacted state, as for example, the product obtained by sulfonation, saponification, etc. of the rice oil.

While rice oil may be used alone or in combination with other water-immiscible oils or substances as a textile-treating composition, I have found it advisable, at times, to render such compositions water-dispersible and consequently more easily removable from the fibers. This may be accomplished by blending the water-immiscible composition with suitable emulsifiers, such as soaps or organic base salts of fatty acids, as for instance, the fatty acids of rice oil, olive oil, coconut oil, sperm oil and other vegetable and animal oils. Other dispersing agents such as mineral oil sulfonates may also be employed.

I have further found that rice oil may be sulfonated to produce a water-dispersible or soluble product without affecting the valuable properties inherent in the raw oil. This feature is also true with respect to saponification of rice oil, i. e., the unsaponifiable portion of the oil is not affected by, nor caused to separate or become disturbed in any way, as a result of sulfonation or saponification. Sulfonation of rice oil may be accomplished by treating the same in a known manner with known sulfonating agents, such as sulfuric acid, chlorsulfonic acid, oleum, $SO_3$, etc. The sulfonated rice oil may likewise be used alone or in combination with raw rice or other raw or sulfonated animal, vegetable or mineral oils in the treatment of fibrous materials.

Saponification of rice oil may be carried out in any suitable manner with any suitable alkaline agent normally used for such purposes. In producing a substantially anhydrous rice oil soap (less than 1 or 2% moisture) admirably suited for scouring operations, the Clayton process may be used as disclosed in United States Patents 2,019,775, 2,037,004, 2,037,006 and Reissue Patent 19,456.

The foregoing compositions comprising raw and/or sulfonated rice oil may have included therein other animal, vegetable or mineral oils, as well as soaps, esters, amides, ketones and other suitable fatty derivatives thereof. Synthetic fatty acid esters, such as the methyl, ethyl, propyl, isopropyl, butyl, isobutyl, etc., alcoholic esters of lauric, capric, caprylic, oleic, stearic, palmitic, myristic, ricinoleic, etc. acids, may be blended with raw and/or sulfonated rice oil compositions. In general esters of both saturated or unsaturated fatty acids with monohydric alcohols having less than 10 carbon atoms may be used. Rice oil may be further modified by subjecting the same to blowing according to known methods. A composition comprising blown rice oil and a synthetic fatty acid ester of the aforementioned type has been found valuable in treating textiles.

Any suitable fibrous material, such as textiles, paper, leather, etc. may be treated according to the invention. The textile material treated may be in the form of loose fibers, yarns, staple-fiber, threads, felts, knitted fabrics, woven fabrics, etc. and which may be composed of any one or more of the following: cotton, wool, ramie, hemp, flax, cellulose, cellulose hydrate, cellulose esters, casein, glass, synthetic resins, or other suitable materials whether of animal, vegetable, mineral or synthetic origin.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following examples which are given merely to further illustrate the invention and not to be construed in a limiting sense:

*Example I*

Prior to winding on bobbins, rayon yarn (composed of cellulose acetate or cellulose hydrate) is passed through a bath of rice oil or the oil is applied to the yarn by means of wicks, rolls or otherwise. Yarn thus lubricated will remain free from oxidation for a much longer period of time than will the same yarn treated with olive oil or like oil. After scouring, the rice oil treated yarn will respond to even dyeing due to the freedom of the oil from oxidation.

*Example II*

The rice oil composition set forth under Example I may be rendered water-dispersible by blending therewith a sulfonated oil, such as rice, olive, castor, corn, sperm, etc. and applied to the yarn as a coning oil or in any other suitable manner. This lubricant will be substantially self-scouring and may be readily removed after weaving or knitting by simple scouring.

*Example III*

In the event that it is desirable to include a mineral oil, the following composition may be employed with success:

| | Per cent |
|---|---|
| Mineral oil | 68 |
| Rice oil | 11 |
| Sulfonated rice or other oil (preferably anhydrous and salt-free) | 17 |
| Oleic acid | 2 |
| Moisture | 2 |

This product may be applied to the yarns as a coning oil.

While cellulose fibers have been specifically mentioned under Examples I, II and III, it is to be understood that the other fibers hereinbefore disclosed may also be treated according to the procedure set forth in these examples.

*Example IV*

Rice oil having a suitable quantity (5% to 50%) of a synthetic ester of a fatty acid, such as methyl or ethyl oleate or the like, is used for lubricating or finishing textile materials. In view of the property of these esters to eliminate or retard the development of static, the inclusion thereof in compositions for lubricating cellulosic and other yarns prone to the development of static electricity is highly desirable. The lubricant may be removed by scouring with an alkali metal or nitrogenous base soap of rice or any other suitable oil or fatty acid.

*Example V*

A composition similar to that disclosed in Example IV may be rendered water-dispersible by the addition of a suitable emulsifying agent, the following composition being representative:

| | Parts |
|---|---|
| Rice oil | 40 |
| Butyl stearate | 45 |
| Triethanolamine oleate | 15 |

This composition is self-scouring and may be readily removed from the fibers. Moreover, this

composition may be emulsified in an aqueous bath and applied as a finishing composition.

*Example VI*

In the soaking of raw natural silk, sulfonated rice oil may be blended with raw rice, sperm or any other suitable oil. Moreover, rice oil may be blended with sulfonated sperm, teaseed or any other suitable oil. After soaking, the yarn may be directly spun or thrown before knitting or weaving operations.

*Example VII*

In the treatment of worsted materials, a composition comprising blown rice oil and a synthetic fatty acid ester may be employed. Such a composition displays excellent lubricating and finishing properties for fabrics other than worsted as well. The synthetic ester may be produced by esterifying rice oil fatty acids with an alcohol having less than 10 carbon atoms.

*Example VIII*

In the finishing of textiles, a composition comprising sulfonated rice oil greatly enhances the characteristics of the fabric, such as the feel, hand, drape, appearance, etc. Paraffin or other animal, vegetable or mineral oils may be used in combination with sulfonated rice oil. The composition may be applied by means of spraying, a roller, felt, by running the textile through a bath or by other suitable means. Such compositions may be dispersed in the final rinse water used in laundries to replenish in the fabric the finishing agent removed during the washing operation.

*Example IX*

In the fat liquoring of leather, the following composition has produced excellent results:

| | Per cent |
|---|---|
| Rice oil | 25 |
| Sulfonated fish or other oil | 50 |
| Water | 25 |

Irrespective of the particular use for which the raw and/or sulfonated rice oil compositions are to be put, the proportion of these and other constituents may be varied to suit the conditions at hand which may be readily ascertained by anyone skilled in the art. The proportion of rice oil or its chemical derivatives may be determined by the degree of oxidation permissible in the material under treatment and upon the degree of softness and other properties desired.

The term "rice oil" is employed herein to connote the oil obtained by the expression or extraction of rice meal, and more particularly rice bran, which oil is characterized by having a relatively high content of unsaponifiable matter. Such oils are also referred to as "rice bran oil", but for the sake of brevity, the term "rice oil" will be resorted to. The expression "sulfonated" is used herein in its usual commercial interpretation in connection with animal and vegetable oils and fats including rice oil, and it is to be construed as including the sulfated derivatives of these oils and facts and neutralized products thereof.

This application is a continuation-in-part of my co-pending application, Serial No. 121,289, filed January 19, 1937.

Since certain changes in carrying out the above process and certain modifications in the composition which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described and all statements of the scope of the invention, which as a matter of language might be said to fall therebetween; and that they are intended to be inclusive in scope and not exclusive, in that, if desired, other materials may be added to my novel composition of matter herein claimed without departing from the spirit of the invention. Particularly it is to be understood that in said claims, ingredients or components recited in the singular are intended to include compatible mixtures of said ingredients wherever the sense permits.

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

1. In the treatment of fibrous materials, the step which comprises applying to fibrous materials a composition of matter comprising rice oil.

2. In the treatment of textile fibers, the step which comprises applying to textile fibers a composition of matter comprising rice oil.

3. In the treatment of textile fibers, the step which comprises applying to textile fibers a composition of matter comprising sulfonated rice oil.

4. In the treatment of textile fibers, the step which comprises applying to textile fibers an emulsifiable composition of matter comprising rice oil.

5. In the treatment of textile fibers, the step which comprises applying to textile fibers a composition of matter comprising rice oil and an ester of a higher fatty acid with a monohydric alcohol having less than 10 carbon atoms.

6. In the treatment of textile fibers, the step which comprises applying to textile fibers an emulsifiable composition of matter comprising rice oil and an ester of a higher fatty acid with a monohydric alcohol having less than 10 carbon atoms.

7. In the treatment of textile fibers, the step which comprises applying to textile fibers a composition comprising rice oil and a sulfonated material.

8. In the treatment of textile fibers, the step which comprises applying to textile fibers a composition comprising sulfonated rice oil and a product selected from the group consisting of raw or sulfonated animal, vegetable and mineral oils.

9. In the treatment of leather, the step which comprises applying to leather a composition comprising rice oil.

10. A new composition of matter for treating fibrous material comprising rice oil.

11. As a new composition of matter, sulfonated rice oil.

12. A new composition of matter for treating textile fibers comprising sulfonated rice oil.

13. As a new composition of matter for treating fibrous materials, an emulsifiable composition comprising rice oil.

14. A new composition of matter for treating textile fibers comprising rice oil and an ester of a higher fatty acid with a monohydric alcohol having less than 10 carbon atoms.

15. As a new composition of matter for treating textile fibers, an emulsifiable composition comprising rice oil and an ester of a higher fatty acid with a monohydric alcohol having less than 10 carbon atoms.

16. A new composition of matter for treating

fibrous materials comprising rice oil and a product selected from the group consisting of raw or sulfonated animal, vegetable and mineral oils.

17. A new composition of matter for treating fibrous materials comprising sulfonated rice oil and a product selected from the group consisting of raw or sulfonated animal, vegetable and mineral oils.

18. A new composition of matter for fat-liquoring leather comprising rice oil and a sulfonated fatty material.

19. As a new composition of matter, saponified rice oil.

20. As a new composition of matter for treating textiles, saponified rice oil.

21. A new composition of matter for treating fibrous material comprising blown rice oil.

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