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TEXTILES AND YARNS

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This invention relates to textiles and yarns and their treatment, particularly with respect to finishing operations, as well as their utilization after such treatment for various purposes.

In the treatment of textiles and yarns, particularly those made from cotton, silk, rayon, etc., various types of finishing and other operations are employed which utilize the application of substances subject to oxidative deterioration. Some of the textile materials themselves are subject to aging changes, both in the condition of yarn and in the textiles manufactured therefrom. Many of the dyed products are produced by the utilization of organic substances which in the presence of air or oxygen, and particularly under the influence of light, are subject to color change, such as fading or bleaching, particularly in moist atmospheres. Materials like starch used in the finishing of yarns or textiles, as well as of various other types of adhesives and finishing materials like fats, soaps, sulphonated oils, etc. are subject to deterioration, the tallow, grease, fatty product, or starch or similar substances undergoing oxidative deterioration. This is evidenced in a number of ways as, for example, in the loss of "feel," decrease in strength, change in color, and the development of rancid odors, etc.

Thus in the manufacture of textiles, it is customary to use tallow, greases, or other fatty products, or their sulphonated products which are subject to rancidity and oxidative deterioration. Thus in the normal laundering of textiles different soaps are used of a greater or lesser stability, and it is not at all infrequent for the laundered textile to develop objectionable oxidized and rancid soap odors. In addition, rancidity and oxidation changes result in a definite weakening of the structure of the textile fibers, since this type of deterioration is cumulative in its effect upon the deterioration of the textile itself. Where sizing is used as, for example, for the purpose of flattening the fibers that protrude from the thread and at the same time to increase tensile strength, sizing is carried out with various starches, such as those derived from tapioca, corn, potato, wheat, sago, rice, etc. These starches are prepared by the usual method of steeping in water, removal of the non-starch material, and subsequent drying. It is customary to use both the starches in their original condition, and also as modified by treatments with acid in water suspension, by chlorine treatment, by dry processing in the presence of acid and heat, and by dextrinising with heat alone. While for certain types of yarns and fabrics, modified or treated starches are preferred to the natural starches, for others the natural starches are preferred, this being determined by the particular yarn and the use to which it is to be put. All such starch materials are subject to oxidative deterioration since any natural antioxygenic substances that might normally be present in the original sources from which the starch is derived, are lost in such treatments.

While the treatment with starch is desirable, it frequently gives the yarns rigidity, and results in loss of flexibility. Such effects are undesirable, and in order to overcome them, most yarns contain added materials, particularly of softening character, such as sulphonated oils, fatty alcohols, tallow, greases, etc., the oils generally being made from castor oil, olive oil, mineral oil, or mixtures of these. In addition, at the time of sizing, fillers may be added, such as clays, glucose, salts, etc., not alone for the filling action, but also as weighting agents.

The yarns and textiles treated in any of these ways are subject to oxidative deterioration not only from the standpoint of the cellulosic or other organic filler, but also because of the presence of the oxidizable substances utilized in such finishing treatments. And such oxidative deterioration is further enhanced by the presence of impurities, particularly various salts present in such added materials, or in the fillers, etc., and more particularly such products as iron, copper, or other metallic compounds which catalyze the oxidative deterioration and aging changes. Rancidity is evidenced by the undesirable and disagreeable rancid odors, but also actually impairs the strength of the finished fabric.

Among the objects of the present invention are methods of treatment and the utilization of materials in such treatments to prevent such aging and oxidative deterioration in yarns and textile materials, both the yarn or textile material per se, as well as substances utilized in various changes of their treatment, or finishing, or other dressing operations.

Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes in that more detailed description may be made by those skilled in the art without departing from the scope and spirit of the present invention, particularly as hereinafter defined in the claims.

In accordance with the present invention aging deterioration in yarns or textiles particularly, or in substances used in treating such yarns or textiles, is prevented by the utilization of oat flour and corn flour which are derived from vegetative materials. While chemical antioxidants can be employed, they frequently have an undesirable effect on the cellulosic or other fibers, or on the materials utilized in the dressing, filling and other finishing operations. The oat flour and corn flour may be utilized in their flour or other finely divided condition, or extracts may be produced therefrom.

The oat flour and corn flour in their natural raw condition are differentiated from starch per se by the presence of a wide variety of materials present in the natural raw condition of such cereals and grains which modify such products, and give them pronounced antioxygenic activity. While such cereal and grain flours have a high starch content, and may be utilized in such finishing operations for this reason, the presence of the antioxidant materials therein make them particularly valuable since they may be used in replacement of starch normally employed to give the yarns and textiles both the properties derived from the starch material per se, as well as the antioxygenic protection, without any substantial change in cost in finishing due to the use of such materials. The corn flour or oat flour, may be used to displace the starch entirely as normally used, or may also be employed as a complement or addition to the normal starch size, or to any of the other stated filling or filling materials to give the latter resistance to aging or oxidative deterioration.

For example, raw unbleached oat flour or corn flour may be used in lieu of corn starch or tapioca starch by boiling such cereal flour with water and employing it as part of the sizing operation, either using such materials by themselves or in conjunction with other sizing operations along with sulphonated castor oil or other greases, fillers, etc., whereby the finished yarn has imparted to it a luster, strength and compressed fiber that is obtained when ordinary starch is used, and in addition protection against oxidative deterioration. While the cereal flours as noted may be used to replace entirely the normal starch materials, they may be used in conjunction with ordinary starches as, for example, a combination of 75% corn starch and 25% corn flour utilized in lieu of the normal corn starch. And in specific experiments it has been found that using oat flour in replacement for starch along with sulphonated olive oil, the finished fabric does not produce the usual objectionable odors that frequently develop when ordinary corn starch alone is employed.

Other examples of mixtures that can be employed include 50% of ordinary starch and 50% of corn flour, or oat flour, or other antioxygenic cereal material, particularly where a definite rigidity of fibers or fabric is required. Proportions of the character indicated above may vary widely. For example, smaller amounts, such as 5% of the corn flour or oat flour may be used together with the normal starch, the cereal flours acting primarily in such cases as antioxygenic substances. Consequently the content of antioxygenic cereal flour depends entirely on the particular combination in which it is utilized and whether it is employed to replace the normal starch material entirely, or whether it is used as a complement with such products.

The oat flour or corn flour need not, however, be used with starch or to replace the latter, but may be added in any desired proportion to the oils, waxes, greases, fillers and other compositions employed in any of the treating or finishing operations applied either to the yarn or textile material or fabric. The yarns may be treated before being converted into fabrics and textiles, or the fabric or textile after weaving, etc. may be treated with any of these vegetative antioxygenic substances in any of the manners set forth above.

The oat flour or corn flour need not be utilized in their natural raw condition, but may be subjected to desirable treatments of various types, provided the natural antioxygenic substances contained therein are not destroyed. Thus the antioxygenic cereal flours may be modified by acid or enzyme treatment in the same way as starch is normally modified, although more desirably the cereal flours are used in their original raw condition, since modification tends only to reduce viscosity of the boiled flour, and is not carried to a point where major conversion takes place, as would be true if diastase, for example, were added to the flour and conversion permitted to go to completion.

When the antioxygenic cereal flours are used in replacement for starch, it has been found that there is an improvement in the yarn or fabric from the standpoint that there is a lessening of the stiffening or loss of flexibility in the yarn or textile, such as is observed when starch of normal character is employed. This is undoubtedly due to the softening effect of materials present in these flours, possibly the phospholipin content, and possibly also due to the natural oils present, since even the cereal flours contain small amounts of natural oils, although the cereals are not generally employed as a source of oil for commercial purposes. Whatever the cause may be which gives the improved result, noticeable improvement in the utilization of the vegetative flours is obtained.

Where oils or analogous materials are employed, the oils may be utilized by first employing them to dissolve out antioxygenic substances from the cereals, and the treated oil then employed in the normal way, since it will carry the antioxygenic substances from the vegetative materials. For example, an oil employed in some treatment step for yarns or textiles, may first be infused with oat flour or corn flour, using, for example, up to 20% of the latter material with the oil and heating the products together to moderate temperatures, for example, 130 to 150° F. for a short period of time, such as from 15 to 30 minutes. Such treatments are sufficient to result in substantial transfer of antioxygenic substances into the oils. The infused oils may be separated from the residues, or the residual material may remain in the oil in its utilization for the yarn or textile. Or suspensions of the oat flour or corn flour in the oils may be employed.

Not only may the oat flour or corn flour be utilized in conjunction with or in replacement of starch as pointed out above in the finishing operations, but similar utilization in lieu of or in combination with starch may be carried out where starch is used as a finish operation in laundering.

Soaps used in laundering operations if not completely removed frequently result in objectionable odors and other undesired characteristics. The present of antioxygenic materials in

accordance with the present invention when added to the soaps utilized for such laundering treatments improve the results secured, and eliminate some of the continuous washings required which are otherwise necessary to remove the objectionable soap materials. Even the cheaper grades of soap may thus be employed without the development of undesirable odors or other characteristics in the fabric or yarn.

Instead of applying the antioxygenic materials in the manner set forth above, oat flour or corn flour may be employed in connection with the wash water in which the clothes, fabrics or textiles are finally rinsed. For example, from 0.1% to 5% by weight of oat flour, corn flour may be used in the wash water as the final rinse.

In lieu of using the vegetative materials themselves, aqueous extracts may be employed, such as those produced by soaking the flours in water and allowing the solids to settle, and using the top water portion. In lieu of aqueous extracts, organic solvent extracts, such as alcoholic extracts of oat flour, the hexane extract, or other organic solvent extract may be employed to produce an antioxygenic extract which can be added to any of the compositions employed for the normal finishing of yarns or textiles, or may be utilized by themselves as part of a separate treatment.

Not only may yarns and textile materials be protected against undesired changes in the materials themselves in accordance with the present invention, but the textile materials are utilized for encasing organic products or other materials subject to oxidative change, the textiles carrying the antioxidant may be utilized to protect the substance to be wrapped or encased. For example, in connection with cheeses which are frequently packaged in an outer casing of fabric or textile material, the latter may carry the antioxygenic material to protect cheeses against undesired aging deterioration.

Having thus set forth my invention, I claim:

1. A process of treating a textile fabric which comprises applying to such textile fabric a finishing oil subject to oxidative deterioration on exposure to air carrying an infusion of 20% of a finely divided, raw, unbleached, antioxygenic cereal flour selected from the group consisting of corn flour and oat flour, said infusion having been carried out at about 130° F. to 150° F. for 15 to 30 minutes.

2. A textile fabric surfaced with a combination of a finishing oil subject to oxidative deterioration on exposure to air and a finely divided, raw, unbleached, antioxygenic cereal flour selected from the group consisting of oat flour and corn flour.

3. A textile fabric provided with a surfacing containing a boiled, raw, unbleached, antioxygenic cereal flour selected from the group consisting of oat flour and corn flour, said cereal flour being utilized in combination with starch which starch constitutes at least about 50% of the sizing composition.

4. A textile fabric provided with a surfacing containing an acid hydrolyzed, raw, unbleached, antioxygenic cereal flour selected from the group consisting of oat flour and corn flour, said cereal flour being utilized in combination with starch which starch constitutes at least about 50% of the sizing composition.

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