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**PROCESS FOR SIZING CELLULOSE-BASED FIBRES
AND YARNS AND THE SIZED ARTICLES****Emilio Debenedetti and Vittorio Tappi, Milan, Italy, as-
signors to Snia Viscosa Societa Nazionale Industria****Applicazioni Viscosa, Milan, Italy****No Drawing. Filed May 16, 1966, Ser. No. 550,138****Claims priority, application Italy, June 18, 1965,****13,737/67****Int. Cl. D06m 1/00; C08j 1/36****U.S. Cl. 117—139.5****4 Claims****ABSTRACT OF THE DISCLOSURE**

Process for sizing cellulose-based fibres and yarns by immersing the fibres or yarns in a bath containing a solution or dispersion of sizing agent and an anti-oxidizing agent consisting of a compound obtained by the combination of a fatty acid and triethanolamine.

This invention relates to a process for sizing cellulose-based fibres and yarns, such as rayon yarns and, in general, all products obtained from the spinning of viscose solutions with specific sizing agents that are designed to keep the filaments of which the yarns are composed joined together and lubricated in the course of all the various manufacturing steps to which such yarns are submitted, i.e. both while being woven, and during the processes preparatory to weaving.

The yarns obtained after the spinning step, and which are designed to be utilized as warp yarns in the subsequent weaving operation, are usually treated in a bath containing such sizing agents. After such treatment, the yarn, in the form of a cake (or hank) is properly dried in order to remove the excess of liquid.

The resulting yarns consists of elemental filaments that are sized, and thus bound together, as an effect of the treatment in the sizing bath.

The product, after having been woven, is submitted to a desizing treatment, to remove the previously applied sizing agent, whereupon it is submitted to all the other finishing treatments required to obtain a product suitable for the practical and industrial purposes for which rayon fabrics, and in general the cellulose base fabrics, are designed.

Linseed oil is often utilized as a sizing agent for artificial fibres owing to its high lubricating and binding capacity, as well as to its capacity to cover the filaments with films which have an elasticity sufficient to satisfactorily stand against even the greatest stresses that can be exerted in the course of weaving operation.

However, as is well known, a highly detrimental action is exerted on all artificial fibres by linseed oil, due to its oxidation, whereby the strength of the fibres is greatly reduced in the long run.

To prevent the above ill-effects, it has already been proposed in British patent specification No. 419,119 to have the artificial fibre processed prior to the application of sizing agent, with a neutralizing agent consisting of a non-volatile organic base, such as, for example, triethanolamine, and in general a hydroxyalkylamine which, due to its strong hygroscopicity, is adapted to be held homogeneously distributed in the cellulose while, owing to its insolubility in the usual organic solvents, it is not removed from the fibres in the course of subsequent sizing with oil, and in particular with linseed oil, which is carried out in such solvents.

A complex pretreatment of the artificial fibres consisting in saturation thereof with an aqueous solution of triethanolamine and subsequent thorough drying of the fibres

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is however required in this previously proposed method before the oily sizing can be applied.

It has now been found that an efficient and permanent protection against the ill-effects suffered by the yarn as a consequence of the oxidation of linseed oil, can be obtained with a remarkable simplification of the procedure, and a saving of money as compared with previously proposed methods, by having the artificial fibre treated in one bath only, consisting of a solution or dispersion of linseed oil, or other oxidisable oily sizing agent, together with a novel protection agent.

According to the invention, there is provided a process for sizing cellulose-based fibres or yarns with linseed oil or other oily sizing agent, wherein the fibres or yarns are processed in a single bath containing, in addition to the sizing agent, an anti-oxidising and stabilizing agent consisting of a compound obtained by the combination of a fatty acid with triethanolamine. Preferably the fatty acid contains from 10 to 24 carbon atoms, for example, the anti-oxidising and stabilizing agent may be triethanolamine stearate or oleate. Obviously, the solvent or dispersing agent used in the single bath must be such that both the linseed oil and the stabilizing agent are satisfactorily dissolved or dispersed. Solvents suitable for this purpose are already known in the art, and may be selected, for example, from those belonging to the hydrocarbon group (gasoline or petrol, heptane, benzene, toluene and the like), or amongst the chlorinated solvents, such as trichloroethylene. When however the treatment is to be performed with a dispersion of linseed oil and protective agent, then very satisfactory results have been obtained using water as dispersing agent. In principle, all organic solvents for linseed oil are also solvents for the anti-oxidising agents of the invention however, the solvents should be selected, in each case, in such a manner as to obtain a sufficiently high solubility both of the particular anti-oxidising agent selected, and of the linseed oil.

Obviously, the protective agent should be present in the bath in amounts sufficient to exert an efficient action in respect of linseed oil. The agent is, therefore, preferably added to the bath in amounts in the range of 3-30% and preferably of 10-20% by weight, based on the linseed oil.

Though the self-oxidising phenomena of many organic substances, as well as the protection against such effects, have been thoroughly and extensively investigated, no complete explanation can be given at the present time of the intricate mechanisms of action of the so-called anti-oxidising agents. At any rate, the amine compounds are known as good stabilizing and anti-oxidising agents and therefore, in accordance to the invention, compounds have been selected containing a combined amine and by which the oxidation normally suffered by the linseed oil can be largely prevented, whereby the rayon fibres, or more generally all cellulose-based fibres, are efficiently protected. It may be assumed that the beneficial action of these agents is exerted both by reason of the anti-oxidising power of the compound used towards linseed oil, and the buffering action developed by the compound against the possible acidity that may arise in the course of oxidation and degradation of the linseed oil.

The invention is illustrated by the following examples, in which all percentages are by weight, except where otherwise indicated.

EXAMPLE 1

Cakes of viscose rayon yarn (150/60) were processed at room temperature in a bath consisting of a solution of 20% of commercial boiled linseed oil and 4% of triethanolamine oleate in 76% of a hydrocarbon solvent (heptane); then the cakes were centrifuged to a squeezing ratio of about 20%, which corresponds to 4% of drying

oil present on the fibre after the centrifugation. Finally, the cakes were dried for 24 hours in a forced air circulation stove at a temperature of 60° C.

A loss of about 6% in the tensile strength was suffered by the yarns processed as above, in respect of the value shown before the treatment in the bath, after having been exposed for 12 days in the so called "tropical test stove" at 60° C. and 100% of relative humidity; such loss was about equal to that of the same crude, not sized yarn. A loss of 24% in the tensile strength was however suffered by the same yarn, processed in a bath consisting of a solution at equal concentration of linseed oil in heptane, without any stabilizing agent, and left under the same conditions in the tropical test stove.

EXAMPLE 2

Rayon yarn hands (150/60) were treated in a bath consisting of an emulsion of commercial boiled linseed oil (6.2%), and triethanolamine oleate (0.6%) in water (93.2%), then centrifuged to a squeezing ratio of about 8%, corresponding to about 5% of drying oil left on the rayon yarn, and finally dried for 24 hours at 60° C.

A loss of about 7% in the tensile strength was suffered by the yarns, processed as above, in respect of the value shown before the treatment in the bath, after having been exposed for 12 days in the so called "tropical test stove" at 60° C. and 100% of relative humidity; such loss was about equal to that of some crude, not sized yarn. A loss of about 24% in the tensile strength was however suffered by the same yarn, when processed in a bath consisting of an aqueous emulsion of the same percentage of linseed oil, but without any stabilizing agent.

What we claim is:

1. A process for sizing cellulose-based fibers or yarns which comprises treating the fibers or yarns in a liquid bath consisting essentially of about 6.2–20% boiled linseed oil and as stabilizing agent, a compound selected from the group consisting of triethanolamine oleate and triethanolamine stearate, the weight ratio of linseed oil to stabilizing agent being about 20:4 to 6.2:0.6, and removing the excess liquid from the fibers or yarns.
2. A process according to claim 1, wherein the bath consists essentially of an aqueous dispersion of the boiled linseed oil and the stabilizing agent.
3. A process according to claim 1, wherein the boiled linseed oil and the stabilizing agent are dissolved in a hydrocarbon solvent.
4. Cellulose-based fibers or yarns sized with about 4–5% by weight of a composition consisting essentially of about 6.2–20% boiled linseed oil and as stabilizing agent a compound selected from the group consisting of triethanolamine oleate and triethanolamine stearate, the weight ratio of linseed oil to stabilizing agent being about 20:4 to 6.2:0.6.

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