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TREATMENT OF ARTIFICIAL SILK

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This invention relates to the treatment of artificial silk threads and the like which have been wound in compact form such as, for example, a body of thread built up on a bobbin or spool, a cake collected within a centrifugal spinning bucket, or both of the foregoing types of packages rewound as cops or cones. The present invention more particularly contemplates an improvement in the dyeing operation or other treatments of these compact packages in which an alkaline solution is employed.

It is normally almost impossible to perform the dyeing step successfully on packages having relatively thick layers. The dye bath tends to effect a swelling of the threads. This phenomenon has an unfavorable influence on the permeability of the thread body to the extent that a uniform dye distribution can not be realized. When attempting to pass the dye solution through the body of the package, either by pressure or vacuum, the thread layers swell and prevent or at least retard the speed of penetration of the solution. The result is that the absorption of the dye by the thread far exceeds the speed at which the solution passes through the package so that the concentration of the dye bath in the successive layers of thread decreases rapidly and the dyeing is therefore very irregular.

These dyeing difficulties are particularly evident when certain dyes are used which necessitate employing strong alkaline solutions therewith; for example, dyes or dyestuffs of the type substituted naphthols, sulphur dyes, leuco-vat dyes, et cetera. The strong alkaline solutions increase the swelling of the threads to a marked degree.

The present invention involves the addition of certain chemicals to the dye bath which, when present, will limit the swelling of the threads. This swelling action is particularly noticeable in freshly spun packages of artificial silk and accordingly my invention permits direct dye treatment as soon as the packages are washed free of acid. Naturally, when the threads do not swell, the permeability of the package is not reduced and accordingly the dye solution penetrates all portions of the package before the concentration of the solution changes and a uniform dyeing is obtained. The addition of these chemicals does not affect the solubility of the dye or have any other bad influence on the dyeing operation.

Among the most suitable chemicals for use with my invention are the water soluble aliphatic mono- or polyvalent alcohols such as methyl, ethyl and propyl alcohol, glycol, et cetera. The

quantities to be added are dependent upon the hydrogen ion concentration of the dye bath and also upon the thickness of the artificial silk package. Preliminary experiments should be conducted in order to determine the exact amount of material necessary for providing the best results because an excess might retard the dye absorption. Usually additions of about 5% to 15% based on the weight of the dye solution is sufficient to effect proper permeability of the package and at the same time permit ample dye absorption. With vat dyes of high alkalinity, however, it may be necessary to increase the alcohol concentration to more than 15%.

Specific methods for utilizing my invention are set forth in the following examples:

Example I

A freshly spun package of artificial silk, collected within a centrifugal bucket is washed free of acid and while still moist is dyed black by forcing therethrough a 6% sulphur black solution (Schweifelschwarz, Schultz, Dye Tables 1923, No. 721) in sodium sulphide. Prior to this dyeing operation 10% methanol is added to the dye bath. The thus prepared solution readily permeates the package and uniformly dyes all portions. On the other hand, if the methanol is omitted, it has been determined that the swelling action of the threads is so great that the permeability of the package is decreased to the point that a uniform dye absorption can not be obtained.

Example II

Artificial silk in cop form is treated with a solution of beta-oxynaphthoic acid-anilid in NaOH, to which 15% isopropanol has been added. Despite the high alkalinity of the solution, the solution rapidly penetrates the package.

What I claim is:

1. A process for uniformly dyeing regenerated artificial silk threads in tightly wound package form which comprises impregnating the package with an alkaline dye solution containing a water soluble aliphatic alcohol to prevent swelling of the threads whereby even passage through the package is effected.

2. In the manufacture of artificial silk, a process for dyeing freshly spun regenerated threads in tightly wound package form washed acid free which comprises impregnating the package with an alkaline dye solution containing a water soluble, aliphatic monovalent alcohol whereby the threads are prevented from swelling and an even penetration of the dye solution is effected.

3. A process according to claim 2 in which the alcohol additions are in a range of 5% to 15% based on the weight of the dye solution.

5 4. In the manufacture of artificial silk, a process for dyeing freshly spun regenerated threads in tightly wound package form washed acid free which comprises impregnating the package with an alkaline dye solution containing a substance of the class consisting of methyl alcohol, ethyl
10 alcohol, propyl alcohol, isopropyl alcohol and glycol whereby the threads are prevented from swelling and an even passage of the dye solution through the package is effected.

15 5. A process according to claim 4 in which the alcohol additions are in a range of 5% to 15% based on the weight of the dye solution.

20 6. A process for uniformly dyeing regenerated artificial silk threads and the like in tightly wound package form which comprises impregnating the package with an alkaline dyestuff solution of the class consisting of substituting

naphthols, sulphur dyes and leuco-vat dyes containing a water soluble aliphatic alcohol to prevent the threads from swelling whereby an even passage of the solution throughout all portions of the package is effected.

5 7. A process for directly dyeing freshly spun cakes of regenerated artificial silk which comprises forcing a solution of 6% sulphur black (Schwefelschwarz, Schultz Dye Tables 1923, No. 721) in sodium sulphide containing 10% methanol through the body of the previously washed
10 acid free cake whereby all portions thereof are uniformly impregnated.

15 8. In the process of dyeing regenerated artificial silk in cop form, the step which comprises treating the cop with a solution of beta-oxynaphthoic acid-anilid in sodium hydroxide containing 15% isopropanol whereby all portions thereof are uniformly impregnated.

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