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54 **Process for improving the feel of yarns and spun fibers.**

57 This is a procedure to improve the feel of yarns and spun fibers, particularly those that have previously spun-dyed or tow-dyed. It is characterized by the fact that in a process of coning, winding, rewinding, shrinking and warping a spindle made of solid softener is applied to the yarn during its longitudinal displacement depositing the material that makes up this solid element along the yarn in a quantity between 0.1 and 1% of the weight of the fiber in the yarn being treated. This solid softening element is made up of a complex mixture of fatty amides and esters, partially quaternized.

**EP 0 282 429 A1**

## Description

### "PROCESS FOR IMPROVING THE FEEL OF YARNS AND SPUN FIBERS"

This invention deals with a process for improving the feel of yarns and spun fibers, particularly those whose fibers have been previously spun-dyed or tow-dyed.

Currently, there exist the so called High Bulk (HB) yarns which were developed and introduced to the market in 1954 by American companies and are being used more and more.

These high bulk yarns are characterized by the way they are spun: dimensionally fixed fibers are mixed with high shrinkage fibers. Once the yarn is made up, it is put through a shrinking process where temperature and humidity give it its great volume.

This shrinking is done to previously dyed yarns (tow or spun dyed) as well as unprocessed yarns to be dyed afterward.

A large percentage of these HB yarns made of polyacrylonitrile that are tow or spun dyed are made for knitwear. This tow, already dyed and in a continuous filament, is ripped up in the converter, making it into a ribbon of cut fiber ready to be spun. This tearing of the fibers by stretching them between cylinders is delicate, because of which the fibers must have excellent sliding qualities, "dynamic friction", and adherence, "static friction". These qualities will depend on the enhancing products used in the post-dyeing of the tow. It is a problem well-known to the dyers specialized in this field that the amount of softener that can be added to this tow is very limited due to the behavior of the fibers in the converter; that is, if one wants to work with large quantities, the process becomes quite difficult, the fiber getting stuck to the walls of the cylinders and making the job impossible.

This lack of softener becomes noticeable once the HB yarns is made up and is shrunk by heat and steamed. The resulting yarn is rough to the touch, and, specially if it is polyacrylonitrile, has a tendency to rustle.

This is to show that all the HB yarns, in particular polyacrylonitrile (PAN), that have been tow or spun dyed present at the end of the process (that is after shrinkage) a roughness which makes them clearly inferior in quality to those dyed in yarn form and softened afterward by the exhaustion of dyebath method.

There have been some attempts made with procedures created specifically for softening PAN (HB) yarns, but they are not generally used due to the great inconveniences they present.

For example one attempt made was the saturation of the yarn with softener before going into the shrinkage phase. The first problem with this procedure is that, because the yarn enters already wet, the time it has to stay in the shrinking chamber is enormously increased. Besides that, the yarn comes out completely soaked and produces terrible corrosion problems as well.

Another method that has been tried consists of applying a softener in the steam, but the effect on the feel of the yarns was not any good, nor is it recommendable for the steam chambers to have

anything in them but water.

The procedure that is the object of this invention overcomes these disadvantages. It has been thought of and developed for softening yarns, preferably of PAN, whose fibers have been previously tow or spun dyed, and that are especially compatible with the above mentioned HB shrinking process.

This procedure is essentially characterized by the fact that during the procedure of coning, winding, rewinding or warping and while the yarn is being longitudinally displaced, a spindle of softener is applied to it, depositing the material that makes up the solid element mentioned earlier. This material is deposited along the yarn or spun fiber in an amount between 0.1 and 1% of the weight of their respective fiber.

Another characteristic of invention is that the softening element mentioned before is made up of a complex mixture of partially quaternized waxes, fatty amides and esters.

This procedure is applied preferably before the yarn or spun fiber enters in the shrinkage phase, which is usually carried out using steam at about 100°C, which helps to spread and fix the softener which was deposited along the yarn by contact.

Surprisingly, it has been discovered that the softening effect obtained with the procedure used with this invention is comparable to that obtained using the dyebath exhaustion method. This procedure also presents the advantages of not adding to the consumption of energy, when raising the temperature or maintaining it at 50°C, nor the consumption of water. This saves 10-45 liters of water per kilogram of yarn. Because of this, no residual waters are produced and therefore no pollution. The level of production is not affected, and the amount of softener used is around 10 times less than that needed for the dyebath exhaustion process. Furthermore, another important advantage of this procedure is that it does not require any investment in special machinery.

Lastly, softening in the dyebath exhaustion process prolongs the elaboration and finishing of the yarn, because it is another operation added on to the normal process, which supposes an elaboration time that diminishes the total yield of the process.

As has been said, this procedure does not influence the critical course of production at all. That is, without altering the normal course of the yarn or spun fiber's production, and maintaining the level of production, the quality of the finished yarn or spun fiber turns out surprisingly improved.

It should be stated that there is another operation parallel to the softening process; that is the well known waxing of the yarns, which improves their dynamic slide when the fibers that make them up rub against the threadguide organs. However, the softening process referred to in the procedure discussed here and the waxing operation are completely different and are carried out separately,

since the effects they produce are totally different.

The softening is a finishing operation by which the textile product is given a softer feel, making is smoother and more flexible. In this way the roughness is taken out of the yarns which lack wax or fat as result of bleaching, dyeing or printing as well as chemical processes such as the chlorination of wool. The softening agents can be classified in the following groups: oils, fats and waxes (used directly in the form of emulsions or indirectly in the form of various compounds), soaps (metallic salts - potassium, sodium - of the fatty acids), soluble oils or sulfonates, sulfated alcohols, condensation products, cation-active softeners (Sapamides), ammonium quaternary compounds and hygroscopic compounds.

On the other hand, yarn waxing is the application of paraffin to the yarn to improve the way it passes through the various mechanical organs of a winder and to make the "weaving" of the yarn easier. Paraffins are organic compounds with branched, lineal carbon chains in which the highest levels of hydrogen saturation are reached. Its formula is C H

Yarn waxing uses members of the higher series that are found in nature in a solid form.

#### Claims

1a.- Procedure to improve the feel of yarns and spun fibers, particularly those whose fibers have been tow or spun dyed previously, characterized by the fact that during the process of coning, winding, rewinding or warping, and while the yarn is in longitudinal displacement, a spindle made of a solid softening agent is applied to the yarn, the material which forms this solid agent being deposited in a quantity of between 0.1 and 1% of the weight to the fiber in the yarn or spun fiber being treated.

2a.- Procedure to improve the feel of yarn and spun fibers as described in claim 1, characterized by the fact that the solid softening element is made of a complex mixture of partially quaternized fatty amides and esters.

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# EUROPEAN SEARCH REPORT

Application Number

EP 88 50 0021

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                               |                                                |                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                              | CLASSIFICATION OF THE APPLICATION (Int. Cl. 4) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DE-A-2 217 952 (ELITEX)<br>* Whole document *<br>-----                        | 1                                              | D 02 J 3/18                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                | TECHNICAL FIELDS SEARCHED (Int. Cl. 4)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                | D 02 J<br>D 06 B                               |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                               |                                                |                                                |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                               | Date of completion of the search<br>07-06-1988 | Examiner<br>PETIT J.P.                         |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                                               |                                                |                                                |