

UNITED STATES PATENT OFFICE

2,113,453

PROCESS FOR BLEACHING VISCOSE YARN
ON ALUMINUM BOBBINSWinfred M. Mitchell and Edward E. Huffman,
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porationNo Drawing. Application October 20, 1934,
Serial No. 749,275

16 Claims. (Cl. 8—2)

This invention relates to the bleaching of viscose yarn in the presence of metallic aluminum and has for an object control of the bleaching solution to which the yarn is subjected to inhibit fixation of aluminum in the yarn. More particularly, the invention relates to the bleaching of viscose yarn which is on aluminum carriers, supports, perforated bobbins, etc. with a solution of hypochlorite such, for example, as sodium hypochlorite, and contemplates control of the bleaching solution to inhibit corrosion of the aluminum and its consequent effect upon the yarn.

In the manufacture of viscose rayon by the bobbin process, aluminum perforated bobbins are generally used as supports for the packages of yarn. After spinning, the packages are washed and desulphurized either by pressure or by vacuum, and the yarn obtained after this treatment may vary in color from ivory to light tan, depending upon the process of manufacture and the purity of the cellulose used as a raw material in the production of the viscose.

It is desirable to obtain a product of lighter color and attempts have heretofore been made to bleach the yarn by means of hypochlorite solutions. Such attempts have resulted in failure for various reasons among which we may mention the corrosion of the aluminum bobbin with a resulting fixation of the aluminum in the yarn and consequent uneven dyeing, especially with the Allzarine colors. It has been suggested to employ an inhibitor such as sodium silicate to prevent corrosion of the aluminum bobbins but the use of such agents in the solution renders the same too alkaline with a resulting ineffective bleach. If a solution containing sodium silicate be acidified in an attempt to overcome the disadvantages existing in an alkaline solution, there is a decomposition of the sodium silicate and the silica is precipitated in the yarn making it hard and stiff and of inferior quality.

As a result of experimentation we have discovered that various substances may be added to the hypochlorite solution and the corrosion of the aluminum sufficiently inhibited that there is no appreciable fixation of aluminum in the yarn. Such compounds as fatty ester-sulphates, fatty acid-sulphates, and fatty oxy-sulphates, or mixtures thereof, may be added to a sodium hypochlorite solution in proportions as low as 0.1% and effectively inhibit the corrosion of aluminum. Complex compounds resulting from the sulphonation of oils such as soya bean oil, castor oil, tung oil, etc. in the presence of 10 to 15% of benzene, or other hydrocarbons such as tetraline,

have a similar power of inhibiting the corrosion of aluminum. We have also discovered that complex compounds obtained from the condensation of a quaternary base of ammonium of high molecular weight with sulphonated fatty acids having emulsifying properties act as inhibitors. Such substances as have been hereinbefore enumerated have been found particularly advantageous in carrying out the method of the invention because of their stability in acid solutions.

We have found that a particularly effective control of the corrosion of the aluminum resulted when the acidity of the bleaching solution was maintained within certain limits by a proper control of the hydrogen ion concentration (pH). A solution of hypochlorite having a pH of not to exceed 8.5, preferably in the range of from 8 to 8.5, has been found highly effective for the purposes of this invention. Thus, by the maintenance of a proper pH coupled with the use of an inhibitor of the character herein described, we have overcome the disadvantages heretofore experienced in attempting to bleach viscose yarn on aluminum bobbins with solutions of hypochlorites. The invention, in its broad aspects, involves the bleaching of viscose yarn in the presence of metallic aluminum in a solution of hypochlorite of controlled hydrogen ion concentration containing an agent inhibiting the corrosion of the aluminum.

In its more complete aspects the invention contemplates the bleaching of viscose yarn after the desulphurizing treatment has been performed and while on aluminum bobbins. The bleaching is effected in a solution of hypochlorite, for example sodium hypochlorite, containing preferably approximately 0.10% of active chlorine. The pH of the hypochlorite solution is regulated by appropriate means and an inhibitor added thereto. The resulting bleaching solution preferably filtered is circulated through the cake (yarn) until a proper bleach has resulted. After the bleaching has proceeded to the extent desired, the solution is removed, the cake washed and submitted to complete acidification as by treatment with a dilute solution of sulphuric acid. After acidification the yarn is given a thorough washing to remove the acid and this may be done either with or without "Antichlor". An example of carrying out the method of the invention is as follows:

The viscose yarn submitted to treatment is in the form of one-half pound packages, i. e. packages of yarn of 150 denier 40 filament, spun on a perforated aluminum bobbin having a diameter

of 90 mm. and a length of 150 mm. About 600 of such packages are placed on special bobbin holders within a wooden tank and the tank is filled with water. The water is sucked through the bobbins by vacuum until the yarn is free of the residual acid from the preceding stage in the preparation of the yarn.

The water is discarded and the tank is then refilled with a desulphiding solution, which is sucked through the bobbins by vacuum and recirculated. When this desulphurizing treatment is completed the desulphurizing solution is drained and the bobbins are washed with water again until the last trace of ammonium sulphide has been eliminated. The bleaching treatment which is the object of the present invention is then started as follows:

The tank is filled with a sodium hypochlorite solution containing 0.10% of available chlorine and 0.10% of the sodium salt of an oxy-sulphonated oil used as an inhibitor, with the following characteristics:

	Percent
Aliphatic ester sulphates	25.50
Aliphatic acid sulphates	13.30
Unsulphonated fatty esters	11.00
Specific gravity at 25° C.	1.10
Oil content as fatty acid	50.00
Free acidity expressed as sulphuric acid	3.00
Organically combined sulphuric anhydride	8.60

The whole solution is buffered to pH 8 to 8.5 with acetic acid.

The above bleaching solution is sucked through the bobbins by vacuum for 130 minutes at a temperature not lower than 20° C. and not higher than 30° C. When this operation is completed the bleaching solution is drained and a sulphuric acid wash of 120 minutes is given, using a concentration of 0.7% H_2SO_4 . After this acid treatment the bobbins are washed until the water does not give any acid reaction.

The chief advantage of the invention is the production of a viscose yarn of increased commercial value. This is due to a desirable light color and the characteristics of receiving a uniform color after dyeing due to the absence of harmful quantities of aluminum or of aluminum compounds.

Reference made herein to a hypochlorite is, of course, intended to mean any of the compounds such, for example, as sodium, potassium or calcium hypochlorites or the like.

We claim:

1. The method of bleaching viscose yarn in the presence of metallic aluminum in an alkaline solution of a hypochlorite which comprises maintaining the pH below 8.5 and incorporating a sulphonated oil in the solution inhibiting the corrosion of the aluminum.

2. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of a hypochlorite which comprises adding one or more compounds of the group consisting of fatty ester-sulphates, fatty acid-sulphates, and fatty oxy-sulphates to the bleaching solution.

3. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of a hypochlorite which comprises adding one or more compounds of the group consisting of fatty ester-sulphates, fatty acid-sulphates, and fatty oxy-sulphates to the bleaching solution, and maintaining the solution alkaline with the pH below 8.5.

4. The method of bleaching viscose yarn in the

presence of metallic aluminum in a solution of a hypochlorite which comprises washing the yarn free of sulphide after the desulphurizing treatment, and subjecting the yarn to a bleaching treatment in a solution of hypochlorite containing a salt of an oxy-sulphonated oil.

5. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of hypochlorite which comprises washing the yarn free of sulphide after the desulphurizing treatment and subjecting the yarn to a bleaching treatment in a solution of sodium hypochlorite having a pH of from 8 to 8.5 containing a sulphonated oil.

6. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of hypochlorite which comprises washing the yarn after the desulphurizing treatment, and subjecting the yarn to a bleaching treatment in a solution of sodium hypochlorite having a pH of from 8 to 8.5 containing a compound of the group consisting of fatty ester-sulphates, fatty acid-sulphates, and fatty oxy-sulphates.

7. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of sodium hypochlorite which comprises washing the yarn free of sulphide after the desulphurizing treatment, subjecting the yarn to a bleaching treatment in a solution of sodium hypochlorite at a temperature of from 20° to 30° C. containing a sulphonated oil, washing the yarn in a dilute solution of sulphuric acid, and then eliminating the acid by water-wash.

8. The method of bleaching viscose yarn in the presence of metallic aluminum in a solution of sodium hypochlorite which comprises washing the yarn free of ammonium sulphide after the desulphurizing treatment, subjecting the yarn to a bleaching treatment in a solution of sodium hypochlorite at a temperature of from 20° to 30° C. containing a sulphonated oil, then washing the yarn in a solution of not more than 0.7% sulphuric acid, and then washing the yarn until free of acid.

9. The method of bleaching viscose yarn on an aluminum bobbin or similar device in an alkaline solution of sodium hypochlorite which comprises maintaining the pH of the solution at 8.5 or less with acetic acid, and adding a sulphonated oil to the solution to inhibit the corrosion of the aluminum.

10. The method of bleaching viscose yarn on an aluminum bobbin or similar device in a bleaching solution of sodium hypochlorite which comprises subjecting the washed yarn from a desulphurizing treatment to the bleaching solution, maintaining the solution alkaline with a pH below 8.5 and adding a compound of the group consisting of fatty ester-sulphates, fatty acid-sulphates, and fatty oxy-sulphates to the bleaching solution.

11. The method of bleaching viscose yarn on an aluminum bobbin or similar device in a bleaching solution of sodium hypochlorite which comprises using an alkaline solution containing approximately 0.10% of available chlorine and a pH of 8.5 or less, and adding a sulphonated oil as an aluminum corrosion inhibitor thereto.

12. A method of bleaching viscose threads in package form disposed on an aluminum carrier, comprising washing the threads substantially free of adhering or entrained solutions which would react chemically with an alkaline hypochlorite solution, and treating the threads with an alkaline hypochlorite solution, initially buffered

to a hydrogen ion concentration between pH units 7.5 and 8.5 and containing dispersed therein an alkali-metal salt of an oxy-sulphonated oil.

13. A bleaching liquid for bleaching in the presence of metallic aluminum comprising a solution of an alkaline hypochlorite, and a sulphonated oil.

14. A bleaching liquid for bleaching in the presence of metallic aluminum comprising a solution of an alkaline hypochlorite, and an alkali-metal salt of an oxy-sulphonated oil.

15. A bleaching liquid for bleaching in the pres-

ence of metallic aluminum comprising a solution of an alkaline hypochlorite containing an alkali-metal salt of an oxy-sulphonated oil and having a hydrogen ion concentration within the range expressed by the pH units 7.5 to 8.5.

16. An alkaline hypochlorite bleaching liquid for bleaching in the presence of aluminum containing one or more compounds of the group consisting of fatty ester sulphates, fatty oxy-sulphates and fatty acid sulphates.

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