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PURIFICATION OF BAST FIBER

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This invention relates to the purification of bast fibers and more particularly to the degumming of such fibers as ramie, sisal, flax, jute and the like, and especially pita.

The principal object of this invention is to provide an efficient and economical process of purifying crude bast fibers, especially for the purpose of rendering them suitable for use as textile fibers.

An important object of the invention is to provide a simple, economical and commercially practicable process of converting crude pita into purified fibers suitable for use in the manufacture of textiles and paper.

Other objects and advantages of the invention will become apparent during the course of the following description.

I have discovered that strong, substantially snow-white fibers suitable for use in the manufacture of paper and particularly for use as textile fibers may be prepared from crude bast fibers by subjecting the latter to the joint action of a soluble sulfite (either a normal sulfite or a bisulfite), with or without a soluble thiosulfate, and a non-carboxylic fatty detergent. The term "non-carboxylic fatty detergent" is understood in the art to mean a water soluble derivative of a normal fatty alcohol of high molecular weight which possesses wetting properties. These water soluble derivatives of higher fatty alcohols of high molecular weight are known in the art and are commercially available, several of the more important members of this class being known to the trade as "Gardinol", "Nacconal", "Igepon", and "Dreft". Among the compounds included in the class of non-carboxylic fatty detergents may be mentioned sodium amyl sulfate, sodium octyl sulfate, sodium lauryl sulfate, and alkali-forming metal alkyl benzene sulfonates such as sodium butyl benzene sulfonate, sodium lauryl benzene sulfonate and the like. All of the group of non-carboxylic fatty detergents are water soluble, possess wetting properties, and are characterized by the fact that their calcium and magnesium salts are water soluble.

In the practice of the present invention, substantially debarked bast fibers, such as the crude pita which is furnished to the domestic market, are cut to suitable length, say four inches, and the resulting material is then introduced into a digester where the fibrous material is heated with live steam until it is at an elevated temperature, preferably approximating the boiling point of water. Either during this treatment or after the fibrous material has been heated to the desired point, which is preferable, there is then intro-

duced into the digester a treating solution comprising an aqueous solution of a soluble sulfite, which may be either a normal sulfite or a bisulfite, and a non-carboxylic fatty detergent. The treating solution may or may not contain a soluble thiosulfate. The treating solution is circulated through the fibrous material in the digester by drawing the liquor off from the lower portion of the digester and returning it through a suitable spray on to the top of the mass of material in the digester. During the treatment, the contents of the digester are heated at an elevated temperature, preferably above the boiling point of water. In preferred practice, the heating operation is conducted under pressure and the material is subjected to the treatment at a temperature of approximately 165° C. After the fibrous material has been treated in this manner for from approximately one to two hours, the treating solution is withdrawn from the digester and the stock is thoroughly flushed with fresh water for the purpose of washing it. Thereafter, the stock is removed from the digester and is dried, preferably by centrifuging. Thereafter the purified fibers may be carded and spun. As a result of this treatment soft fibers of unusual strength are obtained which are very suitable for textile fibers as well as for use in the making of paper. The fibers are practically snow-white after the treatment and do not require bleaching.

The treating solution for degumming and purifying bast fibers in accordance with the present process may be of varying composition. For example, I may employ an aqueous solution of a soluble sulfite, such as normal sodium sulfite, and a non-carboxylic fatty detergent. In some cases, I have found it advantageous to use a soluble bisulfite, such as calcium bisulfite, instead of a normal sulfite, in conjunction with a non-carboxylic fatty detergent. In other cases, a mixture of a soluble sulfite and a soluble thiosulfate, such as sodium thiosulfate, may advantageously be employed in conjunction with a non-carboxylic fatty detergent.

In preparing the treating solutions, I dissolve in sufficient water to dissolve them, a major proportion of a soluble sulfite and a minor proportion of a non-carboxylic fatty detergent. Where a thiosulfate is employed in conjunction with a sulfite, I preferably employ this in minor proportion with respect to the sulfite. The actual amounts and proportions of chemicals employed for treating a given amount of crude fiber will depend upon the particular fiber under treatment and the condition thereof. For example, if

the crude fiber has been substantially completely debarked, the amount of chemicals required will be substantially less than if a relatively large amount of bark remains on the crude material. However, no difficulty will be encountered by one skilled in the art in adjusting the amounts of chemicals required for the treatment of various materials.

The present invention is particularly adapted for the purification of crude pita and for the purpose of specific illustration I am setting forth below several different embodiments of my process as practised in connection with the purification of pita.

Example 1

The crude pita in the form in which it is supplied to the domestic market, in which form the fibers are substantially completely debarked, is subjected to conventional treatment for cutting the fiber bundles into lengths of approximately four inches. The resulting stock is then introduced into a digester and heated with live steam until the stock is at approximately the boiling point of water. For each ton of fibrous material under treatment, approximately 5 to 10 tons of water are mixed with the stock. The water may be added separately or the treating solution hereinafter described may be dissolved in the water. Assuming that the water has been introduced into the digester, I next add a treating solution which, for each ton of stock under treatment, may consist of a solution in approximately 50 gallons of water of say from 30 to 40 pounds of normal sodium sulfite and from 1 to 10 pounds of a non-carboxylic fatty detergent, say sodium lauryl benzene sulfonate. The digester is heated under pressure to elevate the temperature of the stock to approximately 165° C. The liquor is repeatedly circulated through the stock by withdrawing it from the lower portion of the digester and introducing it into the top thereof, preferably spraying it on to the top of the mass of material under treatment. After treatment for approximately 1 to 2 hours the liquor is drawn off and the stock is washed by thoroughly flushing it with an excess of fresh water. Thereafter, the stock is removed and dried, preferably by centrifuging. This means of drying is recommended since I have found that pressing and subsequent air drying does not produce as good a quality of fiber as when it is dried by centrifuging. The dried fibers may then be used as desired.

Example 2

According to this example, the bast fibers under treatment are prepared and treated in substantially the same manner as described in Example 1 with the exception that the treating solution is made up by dissolving in approximately 50 gallons of water about 20 to 40 pounds of sodium sulfite, from 5 to 20 pounds of sodium thiosulfate and from 1 to 10 pounds of a non-carboxylic fatty detergent.

As will be apparent, various other combinations of the indicated ingredients may be used in preparing the treating solutions. For example, instead of using a single non-carboxylic fatty detergent, mixtures of these may be employed. As indicated above, instead of employing a normal sulfite I may employ a bisulfite in preparing the treating solution. In the appended claims, where the term "sulfite" is em-

ployed it is to be understood that this term includes bisulfites as well as normal sulfites.

While I have described in detail the preferred practice of my process it is to be understood that the details of procedure, the arrangement of steps, and the proportions and amounts of ingredients may be variously modified without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The process of purifying bast fibers which comprises subjecting the same to the joint action of a soluble sulfite and a non-carboxylic fatty detergent.

2. The process of purifying bast fibers which comprises subjecting the same to the joint action of a soluble sulfite, a soluble thiosulfate, and a non-carboxylic fatty detergent.

3. The process of purifying bast fibers which comprises subjecting the same to the joint action of a soluble normal sulfite and a non-carboxylic fatty detergent.

4. The process of purifying bast fibers which comprises subjecting the same to the joint action of sodium sulfite and a non-carboxylic fatty detergent.

5. The process of purifying bast fibers which comprises subjecting the same to the joint action of a soluble bisulfite and a non-carboxylic fatty detergent.

6. The process of purifying bast fibers which comprises subjecting the same to the joint action of calcium bisulfite and a non-carboxylic fatty detergent.

7. The process of purifying bast fibers which comprises subjecting the same to the joint action of a soluble sulfite, sodium thiosulfate, and a non-carboxylic fatty detergent.

8. The process of purifying bast fibers which comprises digesting the same with a treating solution comprising a soluble sulfite and a non-carboxylic fatty detergent.

9. The process of purifying bast fibers which comprises digesting the same with a treating solution comprising a soluble sulfite, a soluble thiosulfate and a non-carboxylic fatty detergent.

10. The process of purifying bast fibers which comprises heating the same to approximately the boiling point of water and thereafter maintaining the mass at an elevated temperature while circulating therethrough a treating solution comprising a soluble sulfite and a non-carboxylic fatty detergent.

11. The process of purifying bast fibers which comprises heating the same to approximately the boiling point of water and maintaining the mass at an elevated temperature while circulating therethrough a treating liquor comprising a soluble sulfite, a soluble thiosulfate and a non-carboxylic fatty detergent.

12. The process of producing purified fibers from crude pita which comprises cutting the fiber bundles to predetermined length, heating the resulting material to approximately the boiling point of water, heating the resulting mass at a temperature in the neighborhood of 165° C. in the presence of a digesting liquor comprising a soluble sulfite and a non-carboxylic fatty detergent.

13. The process of producing purified fibers from crude pita which comprises cutting the fiber bundles to predetermined length, heating the resulting material to approximately the boiling point of water, heating the resulting mass at a temperature in the neighborhood of 165° C.

in the presence of a digesting liquor comprising a soluble sulfite, a soluble thiosulfate, and a non-carboxylic fatty detergent.

14. The process of producing purified fibers from crude pita which comprises cutting the fiber bundles to predetermined length, heating the resulting material to approximately the boiling point of water, heating the resulting mass at

a temperature in the neighborhood of 165° C. in the presence of a digesting liquor comprising an alkali-forming metal sulfite, an alkali-forming metal thiosulfate, and a non-carboxylic fatty detergent, withdrawing the treating liquor from the mass, flushing the mass with water, and drying the resulting fibers.

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