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ARTIFICIAL FIBERS

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vested in the Alien Property Custodian

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1 Claim. (Cl. 19—1)

It is known to produce artificial fibers having single titres of 100 den. and more from viscose or cuprammonium cellulose solutions. Such fibers having single titres of from about 300 den. to about 500 den. are employed, for instance, as horsehair substitutes. However, the hitherto known substitutes of this kind have not been entirely satisfactory. Especially they are not very well suitable in cases where they come into contact with aqueous liquids, because they lose their shape in the wet state. Also their resistance to break is greatly diminished in the wet state. Moreover, the elasticity of such fibers is insufficient so that they lose their shape easily when stretched or bent. In view of these disadvantages such fibers up to now could not find very wide application as substitutes for natural fibers, especially not as upholstery material or as bristles for the production of brushes etc.

We have now found that such artificial fibers of the kind described, i. e. having single titres above about 100 den., are very valuable for the said purpose as have incorporated therewith a synthetic resin. These new fibers containing a synthetic resin display a very high resistance to break in the wet state and are similar in elasticity to the natural fibers for which they are intended as substitutes.

Incorporation of the synthetic resins with the cellulose fibers of the present invention is preferably carried out by incorporating with the fibers in any stage of their production (by adding to the spinning solution or by aftertreating the spun fibers) such starting materials from which synthetic resins are formed, and by producing the synthetic resins in and on the fibers in known manner, for instance by hardening at elevated temperature and/or by the action of suitable catalysts. Care should be taken that the formation of the resin in the fiber takes place as uniformly as possible. For this purpose the fibers having incorporated therewith the starting materials for the production of a synthetic resin or a precondensation product thereof may be immersed for a definite time, for instance a few minutes, in an indifferent liquid of the desired temperature (for instance, paraffin oil) and are thereupon quickly cooled. The amount of synthetic resins to be incorporated with the fibers is preferably between about 10 and about 20% of the weight of the fibers, but, depending on the purpose for which the fibers are to be used, greater or smaller amounts of synthetic resins are not excluded.

Artificial fibers intended for use as upholstery

material according to the present invention are preferably produced in the following manner: A large number of single fibers is strongly twisted to form a thick skein or cable; the twist and tension should be so high that the skeins or cables themselves are no longer straight, but show spiral windings. By hardening the fibers in this state, the windings and the twist are fixed and, after cutting the skeins or cables into staple, a very elastic and voluminous upholstery material is obtained. It has been furthermore found that optimum results in this respect are obtained if the thickness of the skeins or cables is near to about 300,000 den.

Twisting of the fibers, hardening and cutting may be carried out discontinuously or continuously. In the latter case, one of the usual machines for the production of ropes or cables may be used. The fibers containing the starting materials for the production of synthetic resins or the pre-condensation products respectively are wound on spools from which on the said machine a rope or cable is formed, which is thereupon continuously carried by suitable transporting and stretching devices, for instance calendar rolls, under tension through a heated oil bath and thereafter through a cutting device. The cut fibers fall into a bath of carbontetrachloride at room temperature, by which they are quickly cooled and at the same time washed. Finally the fiber bundles are dried and opened.

If fibers are to be prepared as bristle substitutes for the brush industry, the fibers, during hardening, are preferably stretched but not twisted. For instance, skeins containing condensation products of synthetic resins are stretched out between two hooks, or are hung on a horizontal stick and a weight is attached at the lower end, or are wound on spools of such diameter that the slight bend imparted to the fibers thereby does not practically impair their suitability as bristle substitutes. According to still another method, hardening may be carried out continuously by passing the fibers through a suitable heating zone, especially a hot indifferent liquid, and thereafter cutting and cooling them or vice versa.

Fibers having been prepared in this manner are sometimes somewhat brittle immediately after hardening. However, brittleness disappears on storage or may be more quickly eliminated by immersing the fibers in water for a short time and thereafter centrifuging them, or by steaming the fibers.

In the following the method which has proved

the most suitable for preparing our new fibers is illustrated by two examples, without, however, limiting our invention thereto.

Example 1

Cellulose fibers of a single titre of 400 den. having been prepared from a viscous solution are formed into a skein having 800 to 1000 windings per meter. The rope is impregnated with a solution having been prepared by refluxing 32 gs. dicyandiamide with 200 ccms. 30% aqueous formaldehyde for two hours and diluting with water in the relative proportion 1:5, and thereupon dried at 60 to 70° C. The skein is then strongly twisted. About 100 kgs. of such twisted skeins are immersed in a perforated basket in a paraffin oil bath of 180° C. for 5 minutes. Thereupon the basket is immersed into a cold oil bath. Finally the oil is removed by extraction and the skeins are dried, cut and opened. A very valuable upholstery material is obtained.

Example 2

A cuprammonium cellulose solution is spun into concentrated caustic soda to form fibers of 300 den. single titre. After washing with acid and water the fibers are dried under tension. Thereupon they are impregnated with a solution of 150 gs. dimethylol urea and 7 gs. each mono- and disodium phosphate per liter of water at 60° C.; 30

the excess impregnating solution is removed and the fibers are again dried. About 1000 to about 10,000 such fibers are transported together with a velocity of 5 meters per minute by means of rollers under tension through a tunnel drier and thereafter through an oil bath of 2 meters having a temperature of 210° C. After having left the bath the fiber bundle is cooled by blowing a stream of cold air on it. Thereupon the bundle is sprayed with gasoline in order to remove the oil, and is then continuously dried and cut into normal staples. The material is excellently suitable for being used as bristle for brushes etc.

We claim:

15 A process for the manufacture of horse hair substitute from artificial fibers of regenerated cellulose which comprises incorporating in the fibers resin-starting materials ranging between 10% to 20% of the fiber weight to form a urea-formaldehyde resin, forming the fibers into a rope, strongly twisting the rope, hardening the resin while the rope is in the strongly twisted state and cutting the rope of fibers into bundles of the desired staple length, whereby a definite curl is imparted to each staple fiber, and then opening said bundles to separate the curled staples.

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