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STAPLE FIBER AND YARN

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This invention relates to the preparation of spinnable mixtures of artificial staple fibers and spun yarns made of or containing such artificial staple fibers.

An important object of my invention is the preparation of staple fiber mixtures containing staple fibers of such physical characteristics as to permit of the successful spinning of the mixture of staple fibers into a yarn.

Another object of this invention is to provide an improved spun yarn, which is of improved strength characteristics, from a mixture of staple fibers of different physical characteristics.

Other objects of this invention will appear from the following detailed description.

The preparation of a spun yarn from staple fibers made of artificial filaments or threads presents serious difficulties. This is due to the fact that the artificial staple fibers heretofore employed did not interlock or adhere to each other during the carding operation to the extent that natural fibers do. The use of such artificial staple fibers caused uneven drawing during the spinning operation, excessive breaking of the fine denier fibers and the production of an excessive amount of fly in the carding operation.

I have found that the difficulties attendant upon the making of spun yarn from artificial staple fibers may be overcome and that uniform, strong spun yarns may be prepared from artificial staple fibers. Thus, I have found that if artificial staple fibers of different physical characteristics are mixed together, such a mixture of staple fibers may be successfully and expeditiously associated together to form a highly satisfactory spun yarn. Yarns made in accordance with this invention are stronger and more uniform than spun yarns made from artificial fibers by prior processes.

In accordance with my invention, I mix or blend together staple fibers of substantially uniform denier along their length and of irregular length with staple fibers having thick and thin portions along the length thereof and which preferably are of irregular length. This mixture is then subjected to a spinning operation whereby the staple fibers of such different physical characteristics are associated together to form a uniform, strong and commercially satisfactory spun yarn. The staple fibers of substantially uniform denier along their length employed in accordance with my invention may be all of the same average denier, say, from 1 to 14, or may comprise a blend of staple fibers of different deniers within a range of 1 to 14. Either com-

ponent or both components of the mixture of artificial fibers may comprise a mixture of staple fibers of various deniers, that is the staple fibers of substantially uniform denier along their length may be of different deniers or the thick-and-thin staple fibers may be of various average deniers or the mixture may comprise both types of staple fibers the deniers of which are different. The thick-and-thin staple fibers preferably also vary in length.

The fibers employed in accordance with this invention may range in length from 1 to 12 inches. However, it is preferred to use fibers ranging from $1\frac{1}{4}$ to 7 inches in length for most types of processes. Moreover, in a mixture of staple fibers of different deniers, the length of the fibers may vary from 25 to 100%. The staple fibers employed in accordance with the present invention may be made by cutting or tearing into the desired staple length the continuous or substantially continuous filaments of regular or varying denier.

In accordance with this invention, the filaments from which the staple fibers are prepared may have a basis of cellulose acetate or other cellulose derivative produced by the dry or evaporative method or by the wet or coagulation method of spinning. Mixtures of other cellulose derivatives which may form the basis of the staple fibers are cellulose propionate, cellulose butyrate, cellulose aceto-propionate, cellulose aceto-butyrate, thio-carbamic and alkoxy alkacyl esters of cellulose, cellulose ethers such as ethyl and benzyl cellulose, and the condensation products of cellulose with glycols and other polyhydric alcohols. Similarly ester-ethers of cellulose such as, for example, acetates of cellulose hydroxy ethyl ethers and synthetic linear polyamide condensation products may be employed. The yarns of cellulose acetate from which the staple fibers having a varying denier along their length are made, may be given a varying denier continuously with their production by the dry or evaporative method by any of the means described in U. S. Patents Nos. 1,898,085, 2,004,139, 2,064,279, 2,116,548 and 2,116,660. The artificial fibers, moreover, may be made from artificial silk of the reconstituted cellulose type, such as viscose, nitro and cuprammonium artificial silk. Furthermore, natural fibers, such as cotton, natural silk, wool, etc., may be blended with the artificial staple fibers.

The staple fibers employed in accordance with this invention may contain, if desired, suitable effect materials, such as pigments, filling mate-

rials, dyes or lakes, fire retardants, plasticizers, sizes, lubricants, etc. These effect materials may be applied during the formation of the filaments from which the staple fibers are made with or without the aid of swelling agents for the derivative of cellulose are used, or the effect materials may be applied to the staple fibers in other suitable manners.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. A blend of staple fibers comprising artificial staple fibers of irregular length from one to twelve inches and of substantially uniform denier along their individual length mixed with artificial staple fibers having thick and thin portions along the length thereof and having a denier between one and fourteen.

2. A blend of staple fibers comprising staple fibers of irregular length from one to twelve inches and of substantially uniform denier along their individual length mixed with staple fibers having thick and thin portions along the length thereof and having a denier between one and fourteen, said staple fibers having a basis of cellulose acetate.

3. A blend of staple fibers comprising artificial

staple fibers of irregular length from one to twelve inches, of different deniers and of substantially uniform denier along their individual length mixed with artificial staple fibers having thick and thin portions along the length thereof and having a denier between one and fourteen.

4. A blend of staple fibers comprising staple fibers of substantially uniform denier along their individual length mixed with staple fibers having thick and thin portions along the length thereof, said staple fibers having a basis of cellulose acetate and having various deniers ranging from 1 to 14, and being of irregular length from one to twelve inches.

5. A yarn comprising a mixture of staple fibers containing artificial staple fibers of irregular length from one to twelve inches and of substantially uniform denier along their individual length and artificial staple fibers having thick and thin portions along the length thereof and having a denier between one and fourteen.

6. A yarn comprising a mixture of staple fibers containing staple fibers of irregular length and staple fibers having thick and thin portions along the length thereof, said staple fibers having a basis of cellulose acetate and being of different deniers ranging from 1 to 14 and also being of irregular length from one to twelve inches.

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