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Seidl

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[54] **PROCESS FOR THE PRODUCTION OF MIXED YARNS**

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[63] Continuation of Ser. No. 130,085, April 1, 1971, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **264/210 F;** 57/140 BY; 264/103

[51] **Int. Cl.**[2] **D01D 5/12**

[58] **Field of Search** ..... 264/103, 210 F; 57/140 BY

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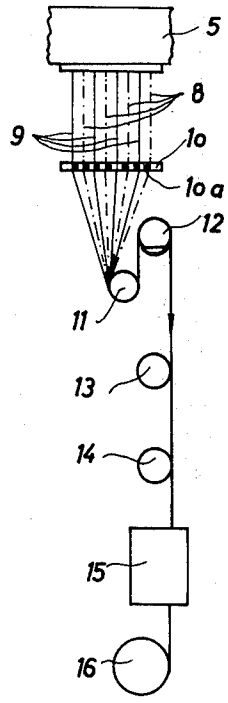
[57] **ABSTRACT**

The invention relates to a process for the production of mixed yarns of synthetic polymers, especially of polyamide and polyester filaments produced according to the melt spinning process. The mixed yarns are prepared from extruded monofilament thread groups of different colors alternately disposed and subsequently gathered into a yarn with the monofilaments intermixed to provide a homogeneous cross section.

7 Claims, 2 Drawing Figures



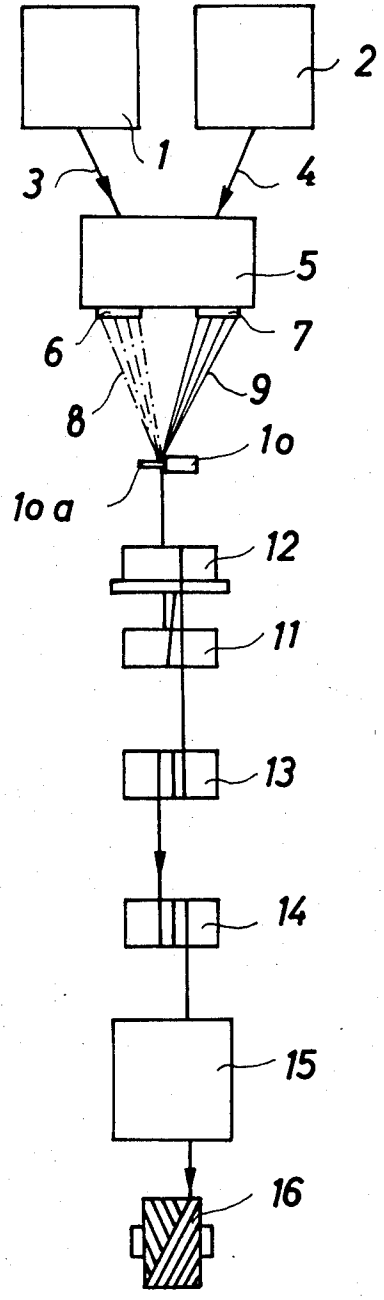


Fig. 1

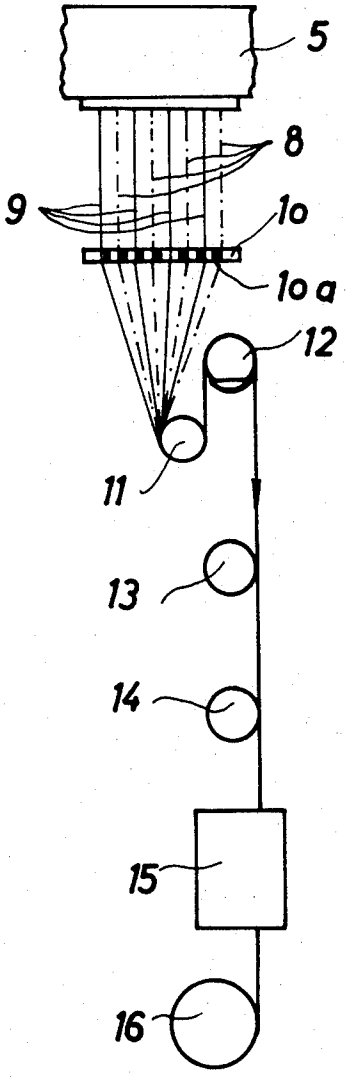


Fig. 2

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PROCESS FOR THE PRODUCTION OF MIXED YARNS

This is a continuation, of application Ser. No. 130,085, filed Apr. 1, 1971 now abandoned.

THE PROBLEM AND THE PRIOR ART

For the production of multicolor textile surface structures there are used so-called mixed yarns which contain two or more differently colored yarn components and thus form interesting patterns and optical effects in the textile surface structure. Mixed yarns of synthetic polymers (especially of polyamide and polyester filaments melt spun and solidified in a known manner) are prepared from thread groups (Fadenscharen) gathered into a multifilament. If desired, they may be finished, moistened, stretched, texturized and wound onto a bobbin body. Accordingly, each bobbin body contains a multifilament which consists of a bundle of capillary threads like one another in their color and properties. For the production of a mixed yarn for use in a finished product, for example a woven material, which is to be given a two-color character in warp or weft direction, two multifilaments differing in color must be taken from two bobbins and brought together by means of a respooling or twist machine, and combined into a mixed yarn which is wound onto a bobbin for further processing. An essential precondition for the achievement of an attractive color effect, in accordance with this prior method, is the faultless mixing of the yarn components in the mixed yarn. This cannot be achieved in the respooling process, especially in the case of synthetic multifilaments. Essentially the fiber bundles of the two filament groups mentioned here by way of example remain intact. Although this mixed yarn does exhibit the character of a two-color effect yarn, a true color homogeneous mixture, or melange, does not come about.

Besides bringing together the two yarn components, the prior respooling process also has the function of cleaning, of eliminating knots and snarls and of equalizing thick and thin places of the yarns. It is obvious that for the yarns spun by conventional methods from staple fibers this function is of considerable importance, but with the use of endless multifilaments it is of negligible importance.

THE INVENTION

A primary object of the invention, therefore, is to provide a process of the kind mentioned, which avoids the additional working processes, allows for continuous production of mixed yarns of differently colored polymers, and simultaneously makes possible a homogeneous mixing of the yarn components.

The object is achieved by spinning two or more fiber-forming polymers, of which at least one is colored, through spinning nozzles allocated to each of the polymers, into at least two thread groups; solidifying the threads; conducting the groups in parallel planes in such a way that the thread groups of one color lie alternatingly adjacent the thread groups of another color; uniting the groups into a multifilament multi-colored mixed yarn; and winding the mixed yarn.

With the process of the invention there is achieved in a manner just as simple as it is effective, a faultless distribution of the threads over the entire cross section of the mixed yarn, and thereby producing an attractive homogeneous melange. A special advantage is that the mixing ratio, as viewed longitudinally as well as transversely, is of an extraordinary constancy and thereby it is possible easily to provide the textile surface structures produced from the mixed yarns by weaving, knitting, fine-knitting or similar process, the desired color impression. The invention makes possible the production of a mixed yarn in any desired color composition in a single continuous working operation, the economic advantage of eliminating the respooling process, and the further advantage that all the threads emerging from the spinning nozzles are subjected to the same processing conditions. Thus, the mixed yarn, although it consists of different-colored components, shows no differences with respect to physical properties. Additionally, mechanical stressing and any possible damage to the yarn caused by such stressing is avoided in this process. The invention is useful not only to mix components of different color, but also of different chemical composition.

To achieve a thorough mixing of the individual thread groups, the multifilaments may be subjected to "finishing" as with a liquid film coating. In such treatment only the thread groups united in the multifilament are acted upon. The thread groups prior to gathering are still fully free and not stuck together by any liquid film, which could lead to the formation of thread bundles of one color within the multifilament and thereby within the mixed yarn. Protective-film finishing keeps the threads of the multifilament supple for further treatment. Such further treatment involves stretching the multifilament before the winding in the continuous operation. Also the multifilament may be texturized in conventional manner after stretching and before winding.

By directly connecting further processing apparatus to the spinning apparatus, the economy of a spinning installation is considerably improved, and the separate installation of additional treating machines is eliminated. The mechanical strain and possible also climatic influencing of the thread, which may result in any discontinuous treatment process in which the thread has to be handled in a new setup following each operation, is here effectively precluded.

In the production of texturized yarn the process of the invention offers the substantial advantage that the conventional dyeing step is omitted and hence quality impairment such as loss of the curling contraction, cannot occur. Likewise my new process eliminates undesirable differences in nuance in the coloration of the texturized yarn between different spools or between individual segments of the yarn.

In another form of my invention at least one of the polymers may contain a matting agent and thereby a mixed yarn can be produced which besides the differing colors exhibits a different luster. Multicolored highly puffy or loop yarn for fashion use can readily be prepared from a polymer which delivers filaments with high thermal shrinkage incorporated in the non-shrinking filaments. By suitable heat treatment the length of the filaments of high shrinkage properties is shortened, while the filaments with low or no shrinkage properties become looped, arched or curled within the multifilament. There results, depending on the relation of the shrinking and non-shrinking filaments to each other, a puffy, voluminous yarn or a yarn provided only

with individual loops, which can be used for the most diverse purposes of fashion.

In practicing the process I use a spinning device having rectangular nozzle plates from which the filaments emerge and are drawn together to form a multifilament. The use of rectangular nozzle plates has the substantial advantage that the filaments are presented not as in the case of round nozzles, in bundles of very nearly circular cross section, but in thread groups whose cross section resembles an elongated flat rectangle, or in which the filaments lie next to one another in rows, for further working. Thread groups whose filaments lie predominantly adjacent to one another permit a considerably more intimate mixing of the filaments than is the case with more or less round and thereby rather closed thread bundles. The production of the mixed yarn is effectively promoted if in the nozzle plates there are arranged several rows of nozzles and the nozzle openings are staggered or offset against one another. Thus before gathering the filament groups, filaments of differing color can be conducted in alternation in planes lying next to one another.

According to a further feature of the invention the nozzle openings within a nozzle plate may have different capillary diameters. Thereby I produce mixed yarns of differing denier such as those used for the production of tufted blankets, velour carpets and certain boucle goods. The number of finer filaments lying in the yarn cross section can be varied in favor of coarser filaments and vice versa, to control the durability of the mixture. In this manner certain qualities may be imparted to the mixed yarn during its production.

The color effect of the mixed yarn also can be influenced by modifying the nozzle openings used for the formation of the multifilament so that they have different capillary profiles. The filaments differing in capillary profile bring about in each case a different refraction of light, which leads to interesting light reflections and irridescent color contrasts.

SPECIFIC EXAMPLE

The process of the invention may be carried out on apparatus illustrated diagrammatically in the accompanying drawings in which

FIG. 1 is a plan view of the apparatus and

FIG. 2 is a side elevational view.

From two separate containers **1** and **2** there is supplied in each case a polymer through the product lines **3** and **4** to the spinning nozzles **6** and **7** situated in a spinning beam **5** and allocated in each case to a particular polymer composition. The containers **1** and **2** are equipped, depending on the type of spinning process used, with, for example, melt-up devices and suitable conveyor devices. The thread groups **8** and **9**, of different characteristics, leaving the spinning nozzles, are solidified in a known manner (not shown here) and pass through a thread guide **10**, or combining station, in such a way that in each case a thread of the thread group **8** is guided beside a thread of the thread group **9**. The thread guide **10** is constructed in the example shown as a separating bar, in which the bars **10***a*, like the leaf bars in a comb (or reed) keep separate from one another the threads of different color. On a godet **11** the thread groups **8** and **9** are united into a multifilament and the multifilament passes over a finishing godet **12**, where it is moistened with a spinning finish, and then to stretching godets **13, 14.** The stretching can, of course, be carried out by means of heated stretching godets as well as stretch-pins and heating bars (not shown). For the production of curled yarns, the multifilament is conducted after stretching through a texturizing zone **15** and thereupon wound on a spool **16.**

Obviously, the unstretched multifilament can be wound after leaving the finishing godet **12** and supplied to a later stretching process. Likewise, it is possible to wind the stretched multifilament after it leaves the stretching godet **14** and have the texturizing process follow later.

I claim:

1. A process for continuously producing a homogeneous, mixed multicolored yarn which comprises the separate steps of:

a. melt spinning a colored, synthetic polyamide or polyester polymer through spinning nozzles and solidifying the resultant polymer to provide a plurality of monofilament groups;

b. melt spinning a second, different colored, synthetic polyamide or polyester through a second different set of spinning nozzles and solidifying the resultant polymer to provide a plurality of monofilament groups;

c. guiding said monofilament groups of different color from the different nozzles in separate, spaced, different colored planes upon emergence from said spinning nozzles, the filament groups of each of said different colored planes being spaced apart and alternating with each other, and combining the monofilament groups of each colored plane to provide a plane of alternately spaced apart, different colored, combined monofilament groups;

d. subsequently gathering said plane of different colored, spaced apart, alternating combined monofilament groups to produce a homogeneous multicolored filament bundle; and,

e. stretching said homogeneous filament bundle.

2. A process according to claim **1** wherein each spinning nozzle is positioned on a rectangular nozzle plate and said thread groups have a rectangular cross section.

3. The process of claim **1** wherein the resultant stretched homogeneous filament bundle is texturized after stretching.

4. The process of claim **1** wherein the monofilaments from one of said sets of spinning nozzles has a higher thermal shrinkage than the monofilaments from the other set of spinning nozzles.

5. The process of claim **1** wherein such monofilament groups are guided as substantially horizontal, parallel planes upon emergence from said nozzles and the plane of alternating spaced apart, different colored combined monofilament groups is a vertical plane.

6. The process of claim **1** wherein the monofilaments from one of said sets of spinning nozzles has a different capillary diameter than the monofilaments from the other set of spinning nozzles.

7. The process of claim **1** wherein the monofilaments from one of said sets of spinning nozzles has a different capillary profile than the monofilaments from the other set of spinning nozzles.

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