Sept. 16, 1941. A. S. BELL 2,255,755

PRODUCTION OF COMPOSITE YARNS

Filed Aug. 22, 1940

FIG. 1

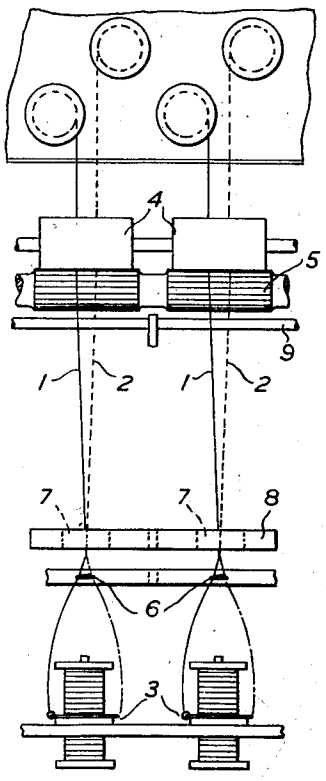


FIG. 2

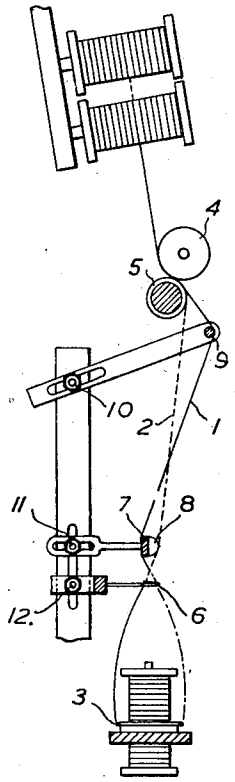


FIG. 3

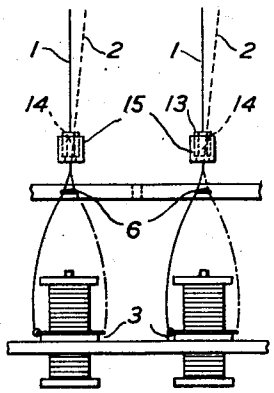
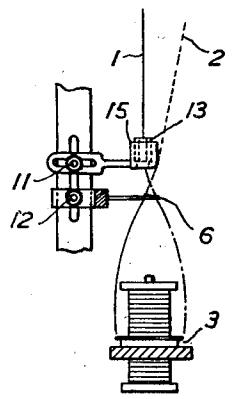


FIG. 4



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Patented Sept. 16, 1941 2,255,755

UNITED STATES PATENT OFFICE

2,255,755

PRODUCTION OF COMPOSITE YARNS

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Application August 22, 1940, Serial No. 353,606
In Great Britain October 3, 1939

4 Claims. (Cl. 57—2)

This invention relates to the production of composite yarns and in particular to the production of composite yarns of which at least one component is a staplised yarn, i. e. a yarn having a basis of continuous filaments, but with some at least of the filaments converted into staple fibre. The invention is particularly concerned with a staplising operation of the type in which a continuous filamentary bundle is brought into contact with cutting means that sever some at least of its filaments into fibres while the bundle is on its way to a twisting spindle.

According to the invention a method of producing composite yarn, comprises feeding a number of component yarns at least one of which is a continuous filament yarn to be staplised, leading yarn to be staplised towards the twisting device by a path different from that of yarn not to be staplised, the path of the yarn to be staplised leading the yarn into contact with a cutting surface so that filaments in the yarn are severed into staple fibre and the path of the yarn not to be staplised being clear of the cutting surface, and uniting the components from the different paths so that they form a common balloon and are twisted together by the twisting device.

Apparatus according to the invention comprises a twisting device, means to feed a plurality of component yarns towards the twisting device, a balloon guide for the twisting device, cutting means so disposed between the yarn-feeding means and the balloon guide as to engage a component yarn passing therebetween and sever filaments in the yarn, and means to direct another component yarn out of contact with the cutting device.

The doubling may serve the purpose of causing all the components to occupy a helical position in the final yarn, or may be arranged to cause one yarn to lie about the other to produce an effect thread, in which latter case different effects may be obtained by suitable differences between the weights of the components and/or the respective delivery rates of the components. The relative tensions of the components are important in determining the final character of the thread and means may be provided for adjusting the tensions; for example, adjustable guide means may be provided for varying the path of one or other of the components from the delivery means to the cutting surface. Likewise the position of the cutting surface may be adjustable in relation to the twisting spindle.

The cutting surface may, for example, consist of a Swiss file or abrasive stick positioned above the twisting spindle, so that the component to be staplised is drawn over it at the rate at which it is taken up and doubled with the other component or components. Again, the cutting surface may be in the form of an abrasive tube through which the component to be staplised is threaded, so that as the yarn balloons on its way to the package it makes contact with the interior of the tube, or rather the abrasive edge of the end of the bore of the tube, and is thus subjected to a cutting action that severs the filaments without breaking the continuity of the bundle as a whole, just before it is doubled with the remainder of the final yarn. Advantageously, the cutting surface is carried by means that serve to guide part of the final yarn clear of the cutting surface.

Two forms of apparatus for carrying out the invention will now be described in greater detail with reference to the accompanying drawing, in which

Figs. 1 and 2 are front and side elevations of apparatus employing a file as the cutting member; and

Figs. 3 and 4 are similar views of apparatus employing an abrasive tube.

In each case the component yarns **1**, **2** are delivered towards the ring-twisting devices **3** by means of feed rollers, e. g. a cork-covered roller **4** resting on a driven fluted roller **5**, the delivery means being disposed substantially directly above the twisting devices, as shown in Figs. 2 and 4. Between the delivery means and the twisting device is placed a balloon guide **6** having an aperture of substantial diameter.

In Figs. 1 and 2, a cutting surface comprising a flat Swiss file **7** is secured to the face of a semicircular rod **8**. The rod and file lie horizontally with the face of the file vertical. Of the pair of yarns fed by the delivery rollers **4**, **5**, the yarn **2** passes in contact with the smooth curved surface of the rod **8**; the yarn **1** of continuous filaments passes over a tension rod **9** and then in contact with the vertical surface of the file **7**. The two components then pass through the balloon guide **6** to the twisting device.

The tension rod **9** is adjustably mounted as shown at **10** so that it can be moved in a vertical and/or horizontal direction to enable the relative tensions of the components to be adjusted as well as the extent to which staplising is to take place on the one component. The file **7** can be similarly adjusted by its mounting **11** to regulate the staplising action, and the balloon guide **6** can be adjusted vertically by its mounting **12**.

In Figs. 3 and 4, the file and its supporting rod are replaced by an abrasive tube 13 formed from an abrasive wheel of the type used for internal grinding, the bore 14 of the tube being vertical so that one component 1 can be threaded through it before passing through the balloon gujde 6. The abrasive wheel is mounted in a smooth holder 15 which provides a guide for the other component on its way to the balloon guide. In this second arrangement it is advantageous to use the tension rod 9 to control the path and tension of the component 2 that is not to be staplised.

The invention may be used to produce a composite yarn containing a crêpe component doubled with a staplised component of continuous filament origin. By the use of components of substantially the same weight and delivered at the same speed, and by control of the respective tensions by suitable positioning of the tension rod 9, a composite yarn may be produced in which the two components are evenly doubled with each other, i. e. one component does not "spiral" about the other. The angle of delivery of the crêpe yarn to the staplised yarn can readily be adjusted to give the necessary even doubling, at the same time ensuring the even ballooning necessary for uniform staplising to be carried out on the continuous filament yarn.

The invention may also be used for the production of fancy yarns, for example an already prepared effect yarn may be brought into contact with the cutting surface and then doubled with a base yarn of crêpe or any other desired characteristics or with another effect yarn. Again, an already prepared effect yarn may be doubled with a base yarn that undergoes staplising by the method described above prior to doubling. Thus, for example, a composite yarn having a staplised component produced by the method according to the invention may be used as a component in a second similar operation in which, however, only the additional component is staplised, thus freeing the already staplised component from excessive shortening of its fibres and consequent possible weakening.

The component to be staplised may be a simple continuous filament yarn of relatively low twist, e. g. natural silk, or yarn of the acetate, viscose or cuprammonium type. The invention may, however, be advantageously employed for staplising a component of voluminous yarn, for example a yarn of any of the types just mentioned, to which voluminosity has been added by setting temporarily inserted twist, as described, for example, in U. S. Patents Nos. 2,089,198, 2,089,199 and 2,111,211. With such voluminous yarn as one component, the other non-staplised component may be a strong yarn, e. g. a stretched, or stretched and saponified cellulose acetate yarn, the voluminous yarn being of heavier weight and delivered at a greater speed so as to cover the base yarn. For example a 100 denier voluminous yarn may be staplised and doubled with a 30 denier strong yarn to give a resultant yarn of about 155 denier, or a 140 denier voluminous staplised yarn may be doubled with a 55 denier strong yarn to give a resultant yarn of about 215 denier. With such yarns, the staplising method described above may be used to give fibre lengths averaging 2–2½ inches.

In order to prevent an effect end slipping on the base yarn, the composite yarn may be run through a light sizing mixture, but in many cases attention to the relative weights and delivery rates of the components renders this expedient unnnecessary, especially since the staplised character of one of the components itself resists any tendency to slipping during subsequent processing of the yarn. Use of a crêpe yarn as one component also assists in reducing any tendency to slipping.

Yarns produced according to the invention, and especially those comprising a voluminous staplised component doubled about a fine strong yarn, have a silk- or wool- like appearance, which makes them particularly suitable for knitting both on circular knitting machines and warp knitting machines.

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

1. Apparatus for the production of a composite yarn, comprising a twisting device, means to feed a plurality of component yarns towards the twisting device, a balloon guide for the twisting device, cutting means so disposed between the yarn-feeding means and the balloon guide as to engage a component yarn passing therebetween and sever filaments in the yarn, and a supporting member for the cutting means said member constituting a guide to direct another component yarn out of contact with the cutting device.

2. Apparatus according to claim 1 wherein the cutting device comprises a file mounted on a member that serves to guide a yarn out of contact with the file.

3. Apparatus according to claim 1 wherein the cutting device comprises an abrasive tube mounted in a holder that serves to guide a yarn out of contact with the tube.

4. Apparatus according to claim 1, comprising means to adjust the relative tensions of the component yarns.

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