July 1, 1941. A. S. BELL 2,247,471

MANUFACTURE OF YARNS

Filed May 7, 1940

FIG. 1

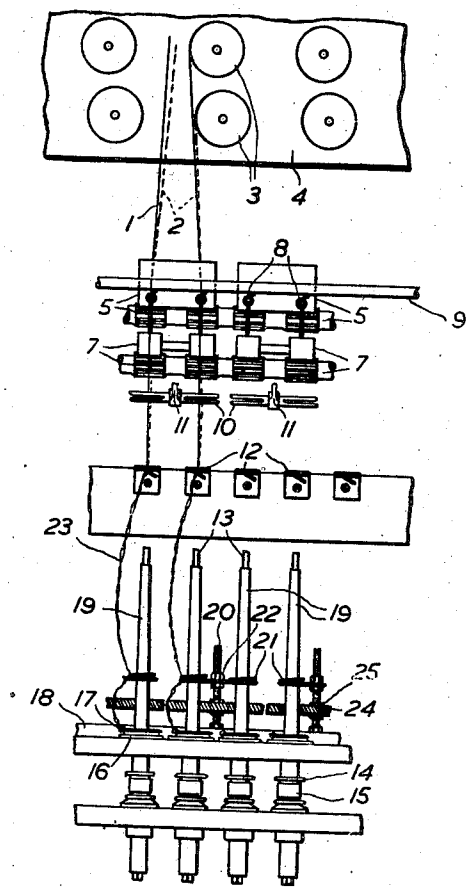


FIG. 2

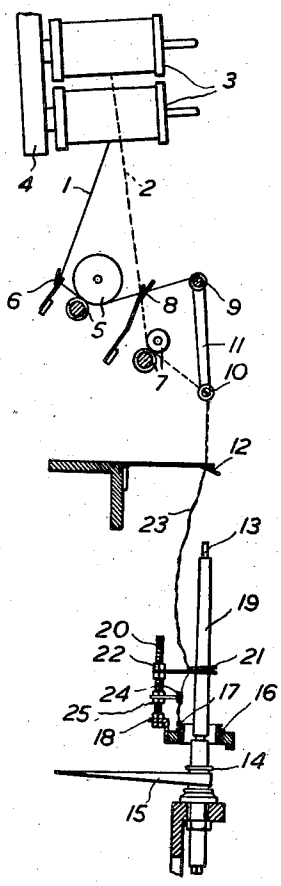
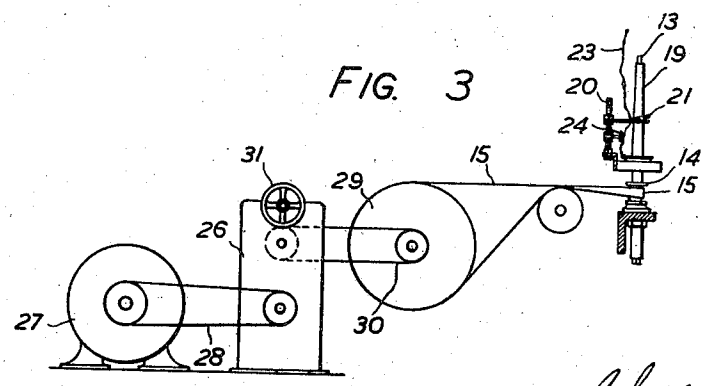


FIG. 3



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Patented July 1, 1941

2,247,471

UNITED STATES PATENT OFFICE

2,247,471

MANUFACTURE OF YARNS

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Application May 7, 1940, Serial No. 333,721
In Great Britain June 9, 1939

13 Claims. (Cl. 57—2)

This invention relates to the manufacture of yarns and in particular to the production of staplised yarns, i. e. yarns 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 described and claimed in U. S. Patent No. 1,956,600, according to which a travelling continuous filamentary bundle describes a surface of rotation, cutting of filaments in the bundle being effected during its passage through such surface.

According to the present invention a method of producing staplised yarn comprises subjecting a bundle of continuous filaments to a ring-spinning operation, in which said bundle forms a balloon about a winding package, controlling said balloon by means of a guide ring surrounding said package and between said guide ring and the point at which said bundle reaches said package, causing said bundle to contact with a cutting device such as a fine file (e. g. a Swiss file) or a stick of abrasive. The bundle is thus subjected to a cutting action that severs the filaments without breaking the continuity of the bundle as a whole. With cutting means such as a file or a stick of abrasive (or two or more of such members), filaments of the yarn are intermittently cut as the yarn balloons around the package.

The guide ring serves to keep the cutting action substantially constant during the traversing of the ring rail for the building of the package on the spindle. It may be advisable to reduce the twisting speed somewhat as the length of the package builds up in order to maintain substantial uniformity of the staplising action. For this purpose, the twisting spindles may be controlled by means of an infinitely variable gear, preferably of the positive type.

A common support may conveniently be used for the guide ring and the cutting member. Radial and/or angular adjustment of the cutting member may be provided in its attachment to the support, and the guide ring may be removably secured to the support to provide for interchange of rings of different sizes. Balloon diameter and cutter position may thus be adjusted in accordance with the cutting effect desired, the weight of the bundle under treatment, and the denier of the filaments in the bundle.

The operation may be carried out on single yarns or on doubled yarns; in the latter case the staplising may be effected on filaments throughout the whole yarns or may be varied between the several components by appropriately adjusting the amount of twist, a higher twist in one component reducing the staplising action on that component. Fancy yarns, e. g. bouclé, spots, knots, slubs and spirals, may also be subjected to the staplising operation.

A form of apparatus according to the present invention, and the method of its employment will now be described in greater detail with reference to the accompanying drawing, in which:

Figure 1 is a front elevation, and

Figure 2 is a side elevation of the apparatus, and

Figure 3 is a diagrammatic representation of the method of driving the spindles shown in Figures 1 and 2.

Referring to Figures 1 and 2, yarns 1, 2, each consisting of a bundle of continuous filaments, are drawn from supply packages 3 mounted in a creel 4, the yarns 1 being drawn by means of feed rollers 5, to which they are conducted by a yarn guide 6, while the yarns 2 are drawn by means of a pair of feed rollers 7 through a guide 8. The feed rollers 5 are driven with a higher peripheral speed than the feed rollers 7 so that the yarns 1 are drawn from the bobbins 3 faster than the yarns 2. The yarns 1 pass over a guide rod 9 and then downwards to a slotted member 10, where they are joined by the yarns 2. The member 10 is mounted on an adjustable arm 11 (Figure 2) pivoted about the guide rod 9.

The yarns 1 and 2 proceed together through the slot in the member 10, and pass through the lappet guide 12 of a ring-spinning device comprising a spindle 13 driven by means of a whorl 14 and tape 15, and a ring 16 carrying a traveller 17. The ring 16 is mounted in the usual way on a ring rail 18. By this means the yarns 1, 2 are wound together as a doubled product on a tube 19 mounted on the spindle 13.

As shown in Figure 1, the ring rail 18 carries a series of rings for a series of spindles 13, each dealing with a pair of yarns 1, 2 drawn from the bobbins 3 on the creel 4. For each pair of rings 16 on the ring rail 18, there is provided a vertical rod 20 secured to the rail behind and between the two rings. The rod 20 carries a pair of wire guide rings 21, secured in position on the rod 20 by means of nuts 22, each guide ring 21 surrounding a spindle 13 and confining the balloon of yarn 23 rotating round said spindle. The height of the rings 21 may be adjusted by adjusting the nuts 22, and the rings may be removed, if desired, and replaced by other rings of different size. At a height between the

guide rings 21 and the ring rail 18, each vertical rod 20 also carries a fine file 24 lying parallel to the ring rail 18 and extending, at each end, past a spindle 13. The file 24 is secured to the rod by means of nuts 25, whereby the height of the file may be adjusted as desired.

In the operation of the device, the yarns 1 and 2 are doubled together and wound as a doubled product on tube 19 by the rotation of the spindle 13. On their way from the lappet guide 12 to the traveller 17, they form the balloon 23 which is restricted by the guide ring 21. The restricted portion of the balloon 23 lying between the guide ring 21 and the traveller 17 is brought, at each revolution of the balloon, into contact with the file 24. By this means the doubled yarn is subjected to an intermittent cutting action that severs the filaments therein without breaking the continuity of the product as a whole. Since the yarn 1 is fed faster than the yarn 2, the yarn 2 acts as a base yarn round which, in the course of the doubling operation, the yarn 1 forms a loose spiral. As the yarn 1 is disposed outside the base yarn 2, the filaments in the yarn 1 are more exposed to the cutting action exerted by the fine file 24 than are the filaments in the yarn 2. As a subsequent separate operation, the final product collected on the tube 19 may be doubled with a further yarn (preferably of continuous filaments) forming a binding yarn about the product.

As the yarn builds up on the tube 19, the form of the balloon 23 tends to change. In order to avoid any substantial variation in the cutting effect arising from a change of form of the balloon, it is desirable that in addition to the provision of the guide rings 21, the spindles 13 should be driven at a speed diminishing throughout the twisting operation as the packages build up on the tubes 19. For this purpose, as shown in Figure 3, the drive to the spindles 13 may be effected through an infinitely variable gear box indicated at 26. The drive is taken from the motor 27 to the gear box 26 by means of a chain 28, and from the gear box 26 to a driving drum 29 by a chain indicated at 30, the drum 29 driving the spindles 13 by means of the tapes 15. The speed at which the drum 29, and consequently the spindles 13, are driven may be varied continuously by means of the control 31 of the gear box 26.

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

1. Method of producing staplised yarn, said method comprising subjecting a bundle of continuous filaments to a ring-spinning operation, in which said bundle forms a balloon about a winding package, controlling said balloon by means of a guide ring surrounding said package, and, between said guide ring and the point at which said bundle reaches said package, causing said balloon to contact with a cutting device whereby the bundle is subjected to a cutting action that severs the filaments therein, without breaking the continuity of the bundle as a whole.

2. Method according to claim 1 wherein the cutting action is performed intermittently on the balloon.

3. Apparatus for the production of staplised yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding same spindle, a guide-ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, and a cutting device disposed between said ring and traveller and said guide ring, said cutting device being adapted to engage said balloon and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

4. Apparatus according to claim 3 comprising a cutting device adapted to be contacted intermittently by the balloon.

5. Method of producing staplised yarn, said method comprising subjecting a bundle of continuous filaments to a ring-spinning operation, in which said bundle forms a balloon about a winding package, rotating said package, during the ring-spinning operation, at a speed diminishing as the package builds up so as to maintain substantial uniformity of the form of the balloon, controlling said balloon by means of a guide ring surrounding said package, and, between said guide ring and the point at which said bundle reaches said package, causing said balloon to contact with a cutting device whereby the bundle is subjected to a cutting action that severs the filaments therein, without breaking the continuity of the bundle as a whole.

6. Method of producing staplized yarn, said method comprising subjecting a plurality of component ends, of which at least one is a bundle of continuous filaments, to a ring-doubling operation, in which said ends form a balloon about a winding package, controlling said balloon by means of a guide ring surrounding said package, between said guide ring and the point at which said bundle reaches said package causing said balloon to contact with a cutting device whereby the bundle is subjected to a cutting action that severs the filaments therein, without breaking the continuity of the bundle as a whole and feeding said continuous filament bundle faster than the remaining components so that the staplized action is mainly confined to said bundle.

7. Method of producing staplized yarn, said method comprising subjecting a plurality of component ends, of which at least one is a bundle of continuous filaments, to a ring-doubling operation, in which said ends form a balloon about a winding package, controlling said balloon by means of a guide ring surrounding said package, between said guide ring and the point at which said bundle reaches said package causing said balloon to contact with a cutting device whereby the bundle is subjected to a cutting action that severs the filaments therein, without breaking the continuity of the bundle as a whole, feeding said continuous filament bundle faster than the remaining components so that the staplized action is mainly confined to said bundle and, as a subsequent operation, doubling the staplized yarn produced with a binding thread.

8. Method of producing staplized yarn, said method comprising subjecting a plurality of component ends, of which at least one is a bundle of continuous filaments, to a ring-doubling operation, in which said ends form a balloon about a winding package, rotating said package at a speed diminishing as the package builds up so as to maintain substantial uniformity of the form of said balloon, controlling said balloon by means of a guide ring surrounding said package, between said guide ring and the point at which said bundle reaches said package causing said balloon to contact intermittently with a cutting device whereby the bundle is subjected to a cutting

action that severs the filaments therein, without breaking the continuity of the bundle as a whole, feeding said continuous filament bundle faster than the remaining components so that the staplized action is mainly confined to said bundle and, as a subsequent operation, doubling the staplized yarn produced with a binding thread.

9. Apparatus for the production of staplized yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding same spindle, a guide-ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, and a fine file disposed between said ring and traveller and said guide ring, said file being adapted to engage said balloon intermittently and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

10. Apparatus for the production of staplized yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding same spindle, a removable and exchangeable guide ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, and a cutting device disposed between said ring and traveller and said guide ring, said cutting device being adapted to engage said balloon and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

11. Apparatus for the production of staplized yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding same spindle, a guide-ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, and a cutting device adjustably disposed between said ring and traveller and said guide ring, said cutting device being adapted to engage said balloon and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

12. Apparatus for the production of staplized yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding same spindle, a guide-ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, means for driving said spindle at a speed varying during the spinning operation, and a cutting device disposed between said ring and traveller and said guide ring, said cutting device being adapted to engage said balloon and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

13. Apparatus for the production of staplized yarn, said apparatus comprising a ring-spinning device including a rotatable spindle and a ring and traveller surrounding said spindle, a removable and exchangeable guide-ring surrounding said spindle and adapted to confine a balloon of yarn formed about said spindle, means for driving said spindle at a speed varying during the spinning operation, and a fine file adjustably disposed between said ring and traveller and said guide-ring, said file being adapted to engage said balloon intermittently and to sever filaments therein without breaking the continuity of the yarn forming the balloon.

ANGUS SMITH BELL.