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3,662,056

PROCESS FOR FORMING A COHESIVE TOW BAND FROM A PLURALITY
OF SEPARATE YARN BUNDLES

Filed July 20, 1970

2 Sheets-Sheet 1

FIG. 1

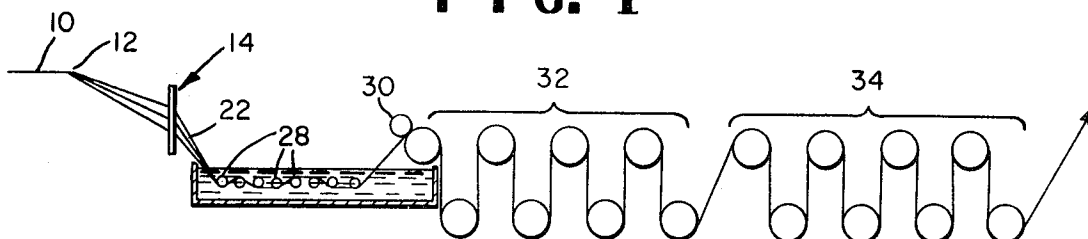
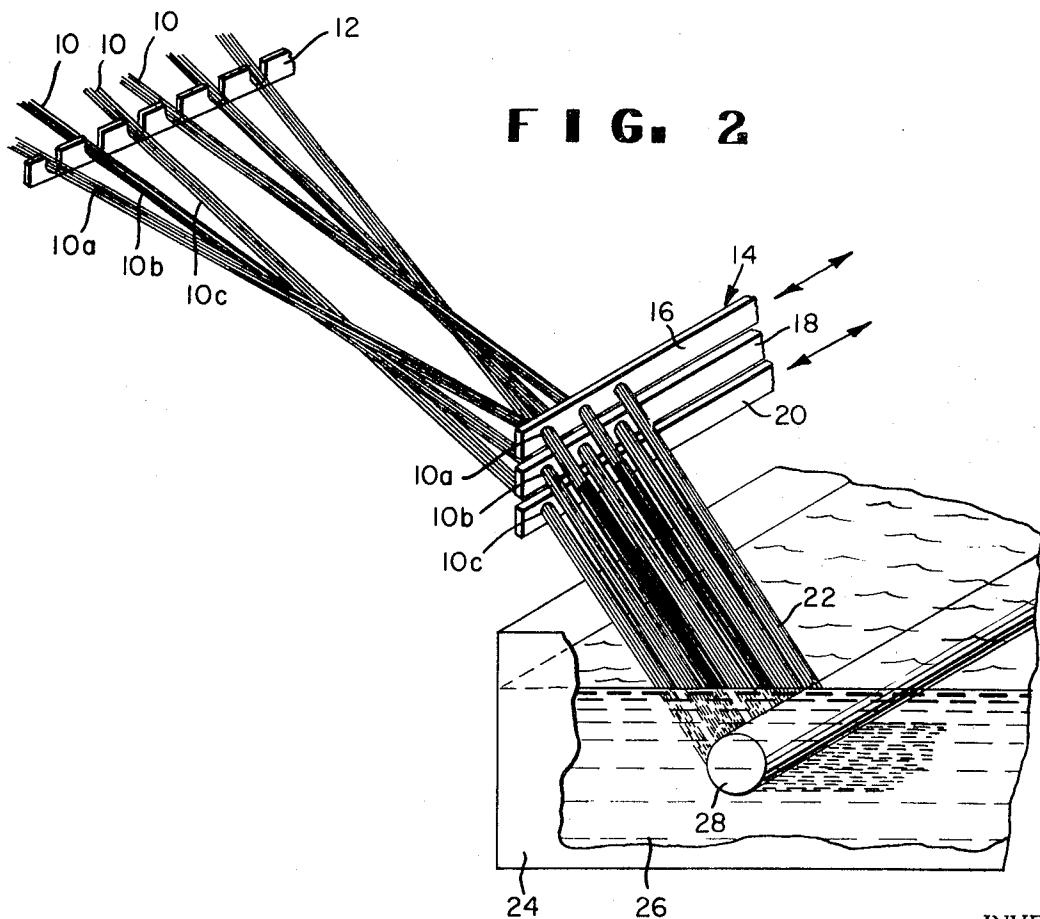


FIG. 2



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FIG. 3

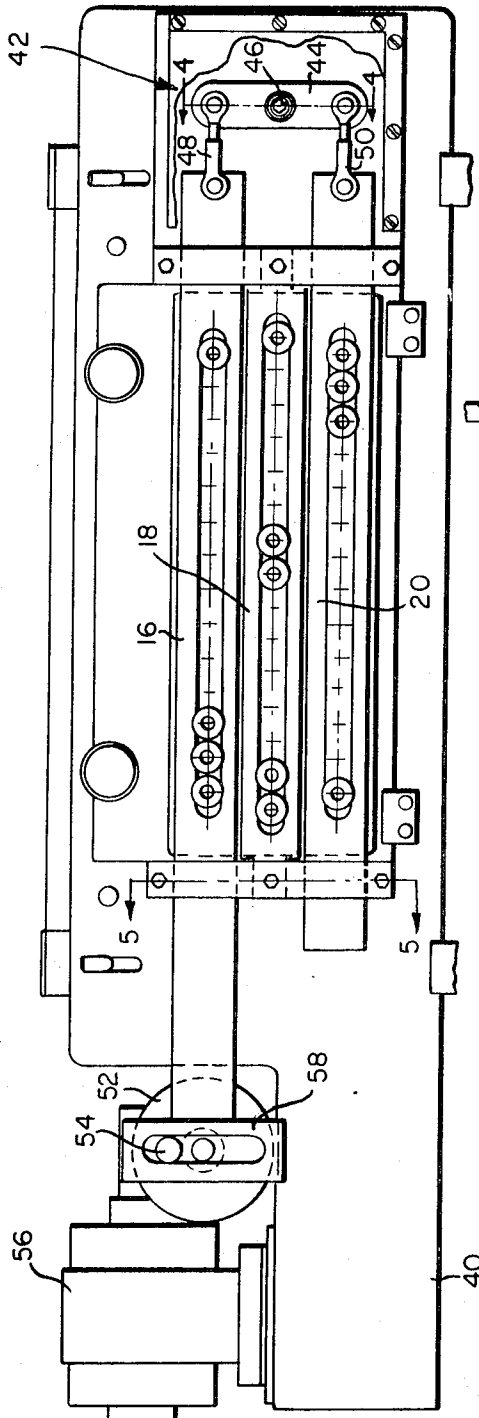


FIG. 4

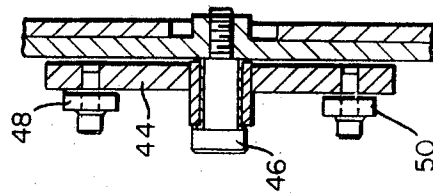
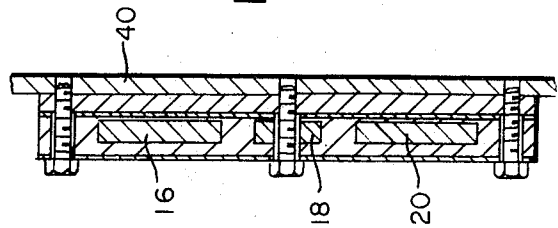


FIG. 5



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PROCESS FOR FORMING A COHESIVE TOW BAND FROM A PLURALITY OF SEPARATE YARN BUNDLES

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6 Claims

ABSTRACT OF THE DISCLOSURE

A tow drawing process in which a cohesive tow band is prepared from multiple yarn filament bundles by passing the bundles before combining them through a multi eyelet guide in which the eyelets are arranged in three stacked parallel rows. The outer rows are oscillated with respect to the center row so that the bundles cross and uncross each other to provide a tow band having a low level of filament intermingling.

BACKGROUND OF THE INVENTION

This invention relates to drawing tow of synthetic filaments, more particularly, it relates to forming a cohesive tow band from a plurality of yarn filament bundles prior to drawing.

A known tow drawing operation described by Mumery in U.S. Pat. No. 3,077,004 forms a uniform tow band from a plurality of separate yarn filament bundles by passing the bundles over and under a number of parallel rods in a bath of liquid prior to drawing. While this drawing process has proven useful in process tow, the resultant draw tow band is easily split into smaller bands which are not entirely satisfactory for packaging or subsequent processing.

SUMMARY OF THE INVENTION

The present invention provides a process for drawing tow wherein a cohesive tow band is prepared from multiple yarn filament bundles. A low level of filament intermingling is introduced to prevent the formation of stringy easily splittable tow bands. The process includes the steps of advancing equispaced yarn filament bundles in a first plane, rotating each successive group of three bundles into a second plane substantially perpendicular to the first plane to form three stacked parallel rows of bundles and then oscillating one of the outer rows of stacked parallel rows so it crosses and uncrosses the center and the other outer row of filament bundles to form a tow band.

Preferably, both outer rows are oscillated with the center row remaining fixed. The outer rows are oscillated out of phase with each other so that each outer row not only crosses and uncrosses the center row but also each other.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic elevation of the apparatus useful in practicing the invention.

FIG. 2 is a perspective view of a portion of FIG. 1, showing the oscillating guide used to combine the yarn filament bundles into a cohesive tow band.

FIGS. 3-5 illustrate one form of an apparatus for imparting motion to the oscillating guide shown in FIG. 2.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

In the drawing, a plurality of synthetic yarn filament bundles 10 are represented as advancing in a substantially

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horizontal first plane and as passing through the openings in guide bar 12 in an equispaced relationship to each other. After passing through guide bar 12, the individual bundles are handled as successive groups of three bundles, e.g., 10a, 10b, 10c (FIG. 2). This particular group is shown threaded through oscillating guide 14 such that 10a is threaded through the first eyelet in the top outer row of guides in bar 16 of guide 14, 10b through the first eyelet in center row of bar 18 and 10c in the first eyelet in bottom outer row of bar 20. This stringup rotates the plane of bundles 10a, 10b and 10c, approximately 90° as they pass between guide bar 12 and oscillating guide 14.

Oscillation of bars 16 and 20 while guide bar 18 remains stationary, forms a tow band 22 by introducing a low level of filament intermingling on the right hand or downstream side of guide 14 between the three stacked parallel rows of yarn bundles passing through bars 16, 18, 20. Tow band 22 then advances into pan 24 containing bath liquid 26. Immersed in bath 26 are rods 28, some of which the tow band 22 passes over and some of which the tow band passes under. Sets of draw rolls 32, 34, receive the tow after it emerges from the pan 24. Squeeze roll 30 presses the tow band against the first draw roll in set 32. After being drawn between the two sets of draw rolls 32, 34, the tow proceeds either to further processing or packaging.

Referring to FIG. 2, guide bars 16, 20 are preferably oscillated out of phase with each other so the rows of bundles emerging from these bars cross and uncross both the center row of bundles (10b) and each other.

There are numerous arrangements for imparting such oscillation to bars 16, 20. Such an arrangement is shown in FIGS. 3-5 wherein, for example, a cross arm linkage connected to adjacent ends of bars 16, 20 and pivoted on a level with center bar 18 and actuated by a driven cam wheel imparts the oscillation needed. Guide bars 16, 20 are slidably mounted in frame 40 and connected to each other at one end by linkage 42 that includes a cross arm 44 pivoted at shoulder bolt 46 which is in line with the longitudinal axis of center bar 18 and links 48, 50 pivoted at one end to the cross arm 44 and at the other end to adjacent ends of bars 16 and 20, respectively. Cam wheel 52, having a cam follower 54 attached to it is driven by variable speed gearmotor 56. Cam follower 54 loosely engages slot 55 in link 58 attached to an extension of guide bar 16. Rotation of cam wheel 52 causes bars 16, 20 to oscillate approximately 180° out of phase with each other.

Successful operation may be obtained with oscillation rates of from 6 to about 200 strokes per minute.

It is apparent that many changes and modifications may be made without departing from the spirit of the present invention which is intended to be limited only by the scope of the appended claims.

What is claimed is:

1. A process for forming a cohesive tow band from a plurality of yarn filament bundles comprising: advancing the bundles equispaced from each other in a first plane; rotating each successive group of three bundles into a second plane substantially perpendicular to said first plane to form three stacked parallel rows of bundles; and oscillating one of the outer rows of the stacked parallel rows so said one outer row crosses and uncrosses the center row and the other outer row to form said tow band downstream from the point of oscillation.

2. The process as defined in claim 1, both of the outer rows of stacked parallel rows of bundles being oscillated with respect to the center row so that each outer row crosses and uncrosses the center row and each other.

3. The process as defined in claim 2, said oscillations being in the range of from about 6 to about 200 strokes per minute.

4. A tow drawing process comprising: advancing equi-spaced yarn filament bundles in a first plane; rotating each successive group of three bundles into a second plane substantially perpendicular to said first plane to form three stacked parallel rows of bundles; oscillating one of the outer rows of stacked parallel rows of bundles so that said one outer row crosses and uncrosses the center and the other outer row to form a tow band downstream from the point of oscillation; forwarding said band through a bath of liquid nonsolvent for the tow; removing the band from the bath and drawing the tow band.

5. The process as defined in claim 4, both of the outer rows of bundles being oscillated with respect to the center row so that each outer row crosses and uncrosses the center row and each other.

6. The process as defined in claim 5, the oscillations

being in the range of from about 6 to about 200 strokes per minute.

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LOUIS K. RIMRODT, Primary Examiner

U.S. Cl. X.R.

15 19—65 T; 28—1 CF