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TOW STACKING ASSEMBLY

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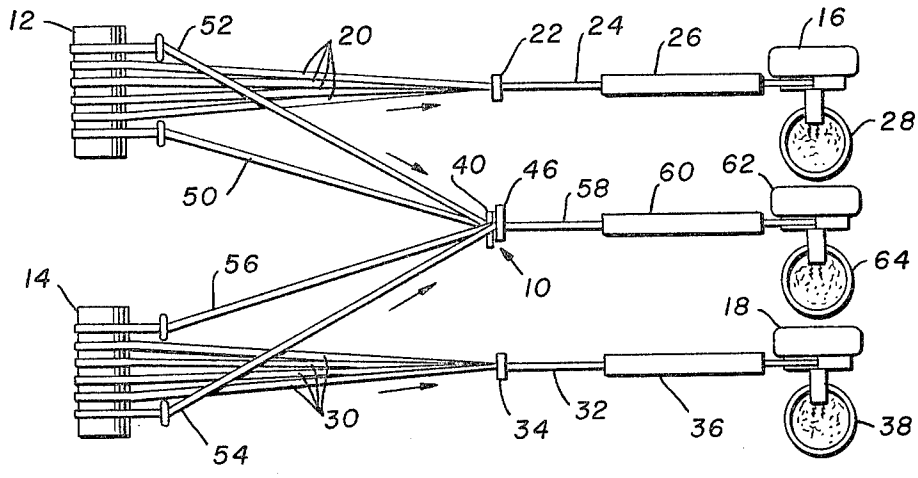


FIG. 1.

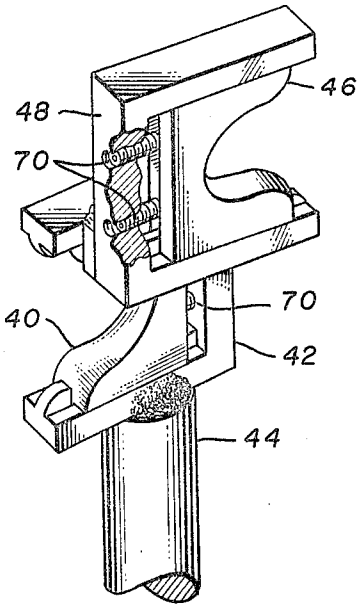


FIG. 2.

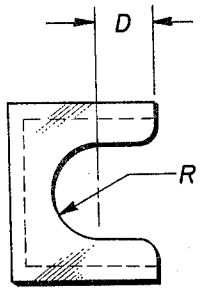


FIG. 3.

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TOW STACKING ASSEMBLY

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The present invention relates to a tow guide assembly and more particularly to an assembly having two adjustable guides arranged in a horizontal position and facing in opposite directions for receiving the outer ribbons of filaments being delivered from two spinning machines and advanced to an auxiliary crimper whereby spinning capacity is increased and cutting quality is improved.

The production of synthetic fiber is accomplished by several types of spinning methods including wet spinning and dry jet-wet spinning. In both of these spinning processes a synthetic thermoplastic filament-forming material, in solution, is extruded through a spinneret or jet having a plurality of small holes in the face thereof into a coagulating bath to form a ribbon of filaments for each spinneret or jet. The filaments are washed to remove the solvents. To effect an efficient washing in which a maximum amount of solvent is removed, each ribbon is advanced along a cascade containing hot water. Thereafter the filaments are passed around a series of heated rolls on which the filaments are extended and dried. The ribbons are advanced through a pot eye where they are converged together to facilitate subsequent processing.

In the conventional practice a single crimping apparatus has been used to receive all of the filaments spun from a spinning machine. This is the preferred operating arrangement in an ordinary situation. However, in certain instances or under particular operating conditions an auxiliary crimper is required. For example, when the jets are doubled in number the capacity of the crimpers is exceeded if the normal spinning rate for each jet is maintained. A further limitation is imposed by the fact that the rolls must provide an adequate surface area for heating the filaments to condition them for promoting better drawing thereof between sets of rolls. Also, the filaments must be exposed to the heated surface of the rolls and the atmosphere for the purpose of reducing the moisture content a desirable amount. The necessary heating required is usually provided by separating the tow ribbons axially on rolls of sufficient width to accommodate several ribbons of filaments. Spreading the ribbons out across a wide horizontal layer presents a problem because of the fact that the several ribbons must be converged together to form a single tow bundle prior to passing through a pre-steaming chamber and crimper. This is usually accomplished by a pot eye in which the outer ribbons tend to "ride" on the vertical portions of the converging means. When the resulting tow bundle is subsequently processed through the staple cutter, the filaments representing the outer ribbons splay or loop outwardly from the bundle thereby reducing cutting quality.

Another operating condition which produces a problem in the manufacture of synthetic filaments by the wet spinning process is the difference in quality between the inner and outer ribbons of filaments. Because of some unexplained phenomenon the filaments advanced along the outside cascades posses a higher solvent content whereby tow quality is reduced substantially. Therefore, it is desirable to divert the outer ribbon ends to an auxiliary crimper so that the poorer quality ends are separated from the higher quality tow.

With the foregoing in mind, a primary object of this invention is to provide an adjustable guide for diverting and converging the outer ribbon ends delivered from two spinning machines to an auxiliary crimping apparatus.

Another object of the present invention is to provide

a novel tow stacking apparatus for improving the cutting quality of the tow.

A further object of the present invention is to provide an improved guide assembly to be used for converging and stacking tow of a homogeneous quality being delivered from two spinning machines which are not in alignment with the desired point of delivery.

Further objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In accordance with the present invention a pair of U-shaped guide members mounted on a vertically extending frame are placed one on top of the other and positioned horizontally to face in opposite directions whereupon a plurality of ribbons being advanced from several directions are converged in each of the guides and stacked to form a single narrow column of the ribbons prior to entering a crimping apparatus. The guides are provided with means whereby simple adjustments can be made to maintain an accurate control of the ribbons being stacked. Thus, the ribbons are stacked uniformly in a single column to from a tow which may be more readily processed during subsequent operations such as annealing, crimping, and cutting.

In order that a clearer understanding of the invention may be had attention is directed to the accompanying drawings illustrating certain features of this invention in which:

FIGURE 1 is a plan view diagrammatically illustrating the invention in use;

FIGURE 2 is a perspective view of the oppositely disposed U-shaped guide members joined to a frame having a portion thereof broken away to illustrate a pair of adjustment screws; and

FIGURE 3 is a side view of a guide member as shown in FIGURE 2.

Referring to FIGURE 1, there is shown a preferred arrangement employed for carrying out the present invention. A guide assembly 10 is disposed between parallel paths formed by filaments spun from two spinning machines not shown. The guide assembly is centrally located between a pair of rolls 12 and 14 which are part of the spinning machines, and a pair of crimping apparatus 16 and 18. The crimper 16 is aligned with roll 12 and the crimper 18 is aligned with roll 14. Ribbon-like bundles of filaments 20 are drawn from the central portion of roll 12 and converged slightly by a pot eye 22 to form a single tow bundle 24 prior to entering a steaming chamber 26. Thereafter, the tow is advanced through the crimper 16 by means of a pair of nip rolls, not shown, and collected in a container 28. Similarly, the filament ribbons 30 from the central portion of roll 14 are reduced to a single tow bundle 32 by a pot eye 34. The stacked tow 32 is advanced through a steaming chamber 36 and the crimper 18 along a path parallel to the stacked tow 24, and thereafter, collected in container 38.

As illustrated in FIGURE 1, the outer ribbons on rolls 12 and 14 are directed to the guide assembly 10 which is located equidistant from pot eye 22 and pot eye 34. Referring to FIGURE 2, in which the guide assembly 10 is shown in greater detail, a U guide member 40 is slidably mounted in a frame 42. The guide member is slotted on the elongated sides thereof to accommodate a pair of shoulders made integral with the frame whereby the guide member is slidable into and out of said frame. The frame 42 is mounted vertically on a base 44 and positioned so that guide 40 faces horizontally with respect to base member 44. A similar U guide member 46 is slidably mounted in a frame 48 juxtaposed vertically above guide 40 and faces the opposite horizontal direction thereof.

The U guide members 40 and 46 are preferably made from Alsimag or a similar ceramic material. The geometry of the guides is such that a plurality of ribbon-like structures comprised of filaments being spun from standard jets are diverted and converged into a composite ribbon of uniformly stacked layers of filaments the width of a single ribbon of filaments. In reference to FIGURE 3, the guide members are defined by an arcuated guiding edge having a radius R and substantially parallel walls extending from said arcuated section a distance D wherein $R=0.75$ inch and $D=0.875$ inch. The preferred thickness of the guide members is approximately 0.50 inch.

In operation, the outer ribbons 50 and 52 on roll 12 are drawn around the guide 40 and the outside ribbons 54 and 56 on roll 14 are drawn around guide 46 to form a single column of stacked ribbons of filaments 58 prior to entering a steaming chamber 60. The stacked ribbons 58 are crimped in a crimping apparatus 62, referred to hereinbefore as an auxiliary crimping apparatus, and collected in a container 64. A pair of set screws 70 are provided for making adjustments to each of the guide members to meet operating conditions which may vary depending upon the number of filament ends and the like. The guide members are maintained against the set screws by the ribbons of filaments being drawn across the guiding surfaces thereof.

While in the foregoing specification the invention has been set forth in considerable detail for the purpose of making an adequate disclosure thereof, it will be apparent to those skilled in the art that numerous changes may be made without departing from the spirit and principles of the invention.

I claim:

1. An apparatus for stacking a plurality of ribbon-like structures being advanced from different directions comprising a vertically disposed base member, a first horizontally facing guide member mounted on the base member, a second guide member disposed vertically above the first guide member, said second guide member facing the opposite horizontal direction from said first guide member, and means for advancing a plurality of said structures across the faces of the said first and second guide members to form a composite ribbon.

2. An apparatus for converging a plurality of ribbon-like structures comprised of filaments being advanced from diverse directions into a single column of uniformly stacked layers of said structures comprising a base member, a pair of guide members mounted at different elevations on the base member, said guide members being positioned to face in opposite horizontal directions, and means for advancing a plurality of the ribbon-like structures across the faces of the guide members to form a composite stack of ribbons.

3. A tow stacking apparatus comprised of a base member, a first U-shaped frame mounted on the base member and facing in one horizontal direction, a second U-shaped frame mounted to the first frame, said second frame being elevated with respect to said first frame and facing the opposite horizontal direction, a guide plate slidably mounted in each of the frames and being characterized by elongated arcuated surfaces facing opposite horizontal directions, means for adjusting the horizontal position of said plates, and means for advancing at least two ribbon-like structures from oblique directions, whereby the ribbon-like structures are converged and stacked into a composite ribbon prior to crimping.

4. A tow stacking assembly for receiving tow ribbons being advanced from two separate sources and diverting the same to a single delivery point comprising a base member, a first frame mounted on the base member, a second frame connected to the first frame vertically above said first frame, a U-shaped guide plate slidably mounted in each of said frames, said guide plates being disposed to face opposite horizontal directions for converging the ribbons and perpendicularly aligned to stack the converging ribbons to form a composite ribbon of tow, a pair of set screws for varying the horizontal position of the guide plates, and means for advancing the said ribbons.

5. The tow stacking assembly of claim 4 wherein the U-shaped guide plates are defined by an arcuated portion having a one half inch radius.

No references cited.

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