Feb. 1, 1966 S. F. CHADWICK 3,231,958

APPARATUS FOR GUIDING A TEXTILE TOW

Filed Jan. 20, 1964

FIG. 1

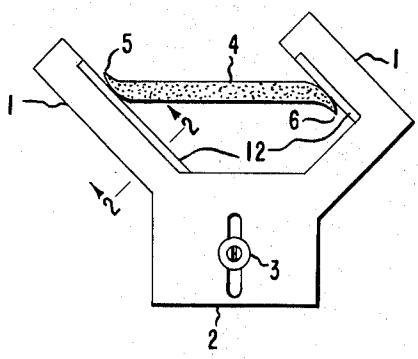


FIG. 2



FIG. 3

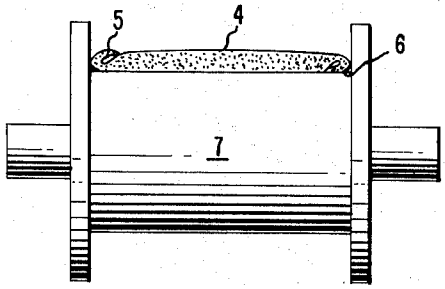


FIG. 5

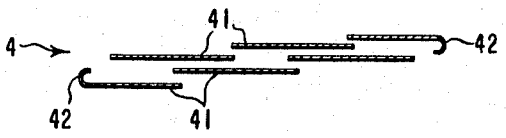
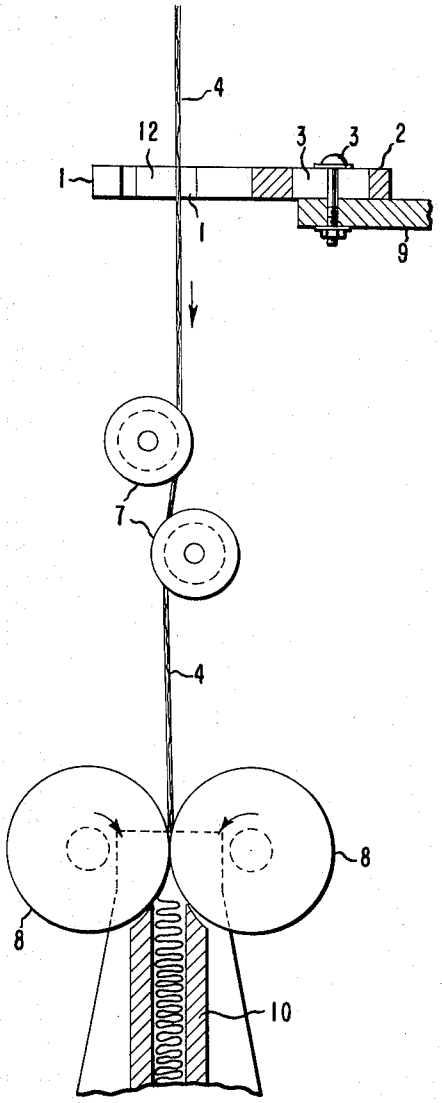


FIG. 4



INVENTOR
STEPHEN FRANCIS CHADWICK

BY David Katz.

ATTORNEY

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APPARATUS FOR GUIDING A TEXTILE TOW

Stephen Francis Chadwick, Camden, S.C., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware

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3 Claims. (Cl. 28—1)

This invention relates to the production of synthetic fibers, and is particularly concerned with that phase of fiber production which involves the formation of tow preparatory to crimping of the fibers.

A tow is a rope or ribbon of fibers with a denier in the hundreds of thousands. The tow in the form of a ribbon is usually crimped by passage through a stuffer-box crimper as described in U.S. Patents 2,311,174 and 2,747,233. In this operation the ribbon first passes through the nip of two feed rolls under very high pressure. These feed rolls force the ribbon of fibers into a confined space where its movement is restricted by a clapper plate which opposes the exit of the fibers from the chamber. Because of the large mass of fibers and the high nip pressures necessary to force the fibers through the stuffer-box, crimping is a critical operation where fiber damage can occur. If the thickness of the ribbon varies, either from side to side or lengthwise, then crimping will also vary. Thick areas of the tow may be damaged by the excess pressure of the feed rolls. Thin areas in the tow may not be fully crimped. Poorly crimped areas may cause splitting of the tow, which will interfere with subsequent operations in which the tow is converted to yarns and fabrics.

It is an object of the present invention to provide apparatus for more accurately controlling the thickness of the tow ribbon prior to crimping. Other objects and achievements will appear from the description which follows.

The control of tow structure throughout its width by carefully putting it together from a number of narrower ribbons, which in turn may have received mechanical treatments to make their cross sections essentially uniform, has been the subject of recent investigations and of novel apparatus designs. One such improvement, for instance, forms the subject matter of copending application of John Charles Resor, Ser. No. 244,443 (filed December 13, 1962), now U.S. Patent No. 3,145,429. Residual problems nevertheless exist, and the improved tow thus obtained generally has a sort of pancake cross section. That is, it is of essentially uniform cross section throughout nearly its entire width, but it thins out at the edges.

In a further copending application (Walter H. Hendrix, Ser. No. 291,069, filed June 27, 1963), the improvement is suggested of passing the tow over a slightly staggered pair of flanged spools. Such spools, if they are slightly narrower than the tow fed through them, cause the edges to fold over upon themselves, thereby making the thickness of the tow at the edges more nearly the same as that throughout its width. However, there is no control over the direction of turning, and the two edges may sometimes be turned onto the same face of the tow and sometimes onto opposite faces.

The present invention is an improvement upon Hendrix and is intended for use in conjunction with his apparatus whereby to further improve the net result.

I have found that in folding the edges of tow prior to crimping, superior results are frequently obtained if the edges are turned in opposite directions; that is, if one edge is turned up onto the upper face of a horizontally moving tow, while the other edge is turned down under the underside of the tow. In other words, the entire folding process is made to follow an S-shaped configuration.

To achieve this result, this invention interposes a novel

apparatus along the line of tow movement just prior to its passage through the spool-shaped former pair of Hendrix. The novel apparatus of this invention comprises a base from which rise two parallel edge guides in a plane essentially at right angles to the line of movement of the tow. But these edge guides do not rise perpendicularly to the base; instead, they are both inclined sideways in the same direction at an angle of about 45° to the plane of the passing tow. The inner faces of the two edge guides are spaced apart at a distance which will cause the passing tow to contact and constrain the latter, whereby to turn slightly one edge of the tow toward the base of the guide and the other edge away from the base. The rest of the bending of each edge upon the face of the tow is achieved by a pair of spools, as in the arrangement of Hendrix, the apparatus of the instant invention serving merely to predispose the two edges for bending in opposite directions, whereby the desired S-shaped configuration will be assured.

For further details, reference is now made to the accomapnying drawing, in which:

FIG. 1 is a top view of the novel channel type apparatus of this invention.

FIG. 2 is a section of FIG. 1 along line **2—2**.

FIG. 3 is a front view of one of the spool shaped formers used in conjunction with the basic apparatus of this invention.

FIG. 4 is a diagrammatic representation of an apparatus layout in which tow is passed first through the predisposing channel of this invention, then through a pair of spool shaped formers of the Hendrix type and finally into the nip rolls of a conventional crimper.

FIG. 5 is a section through a tow made up of two layers of partially overlapping ribbons, and whose edges have been bent inwards by an apparatus layout as shown in FIG. 3.

Now, referring to FIG. 1, **1**, **1** represent parallel bars or edge guides rising from a base **2** which is attached to a support **9** (FIG. 4) by the aid of a notch and screw device **3**. **4** is a cross section of the tow, with the ends **5** and **6** being displaced in opposite directions by the parallel guide bars. **12**, **12** are ceramic liners for bars **1**, **1** to give them improved abrasion resistance.

In FIG. 4, the novel channel unit of this invention is partly in section. So, the top member shows one of the parallel bars **1** in the background with the tow passing in front of it. **7**, **7** are two flanged spools as in the Hendrix application. **8**, **8** are the feed rolls of the stuffing box crimper **10**.

FIG. 5 illustrates the advantage of folding the edges **42**, **42** back on opposite sides of the tow **4**. The ribbons **41** in each layer of the tow overlap, but the bottom layer is staggered with respect to the top layer to avoid piling up the overlaps on top of each other. The result is that initially, the tow is only one layer thick at the extreme edges. Curling back the edges in opposite directions as shown at **42**, **42**, assures a uniform thickness for the tow essentially throughout its width.

The edge guides **1**, **1** may have considerable extent in the direction of the tow motion or they may be no larger in this dimension than in their width crosswise of the line of tow, inasmuch as usually the apparatus of this invention will be placed sufficiently close to the flanged pair of spools, that relaxation and straightening out of the tow widthwise will not occur.

It will be understood that the other details of this invention may likewise be varied widely, within the skill of those engaged in this art.

I claim as my invention:

1. As an element in an apparatus for guiding a moving textile tow, an edge-turning channel situated in the path

of the moving tow, said channel having a base portion and essentially parallel edge-guides rising from said base portion at an angle of about 45° to the plane of the moving tow in the dimension transverse to the tow motion, the inner faces of said edge guides being spaced apart at a distance which will cause said parallel edge guides to contact and constrain the moving tow, whereby one of said edge guides will turn the edge of the tow which it contacts toward one face of said tow while the other edge guide will turn its edge of the tow in the oposite direction.

2. An element as in claim **1**, said parallel edge guides being lined with ceramic material along the faces which make contact with the moving fibers.

3. Apparatus for shaping the cross section of a moving tow of essentially parallel, discrete, continuous textile filaments, whereby to produce a tow of essentially uniform thickness throughout its breadth, which comprises a spool-shaped former situated in the path of the moving tow and having its flanges spaced apart a distance essentially equal to the desired final width of the tow, and an edge-turning channel situated in the path of the moving tow before it comes in contact with said spool-shaped former, said

edge-turning channel having a base portion and essentially parallel edge guides rising from said base portion at an angle of about 45° to the plane of the moving tow in the dimension transverse to the tow motion, said edge guides being spaced apart at a distance which will cause said parallel edge guides to contact and constrain the moving tow and whereby one of said edge guides will turn the edge of the tow which it contacts toward one face of said tow while the other edge guide will turn its edge of the tow in the opposite direction, thereby predisposing the tow to have its thin edges folded upon themselves in S-shaped fashion as the tow subsequently passes through said spool-shaped former.

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DONALD W. PARKER, *Primary Examiner.*