United States Patent

[11] **3,530,751**

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[54] **APPARATUS FOR CUTTING TOW**
7 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **83/176,**
83/420, 83/431, 83/436, 83/444, 83/913
[51] **Int. Cl.** **B26d 1/10,**
B26d 7/08
[50] **Field of Search** 83/17, 176,
420, 425, 431, 436, 444, 449, 913

[56] **References Cited**
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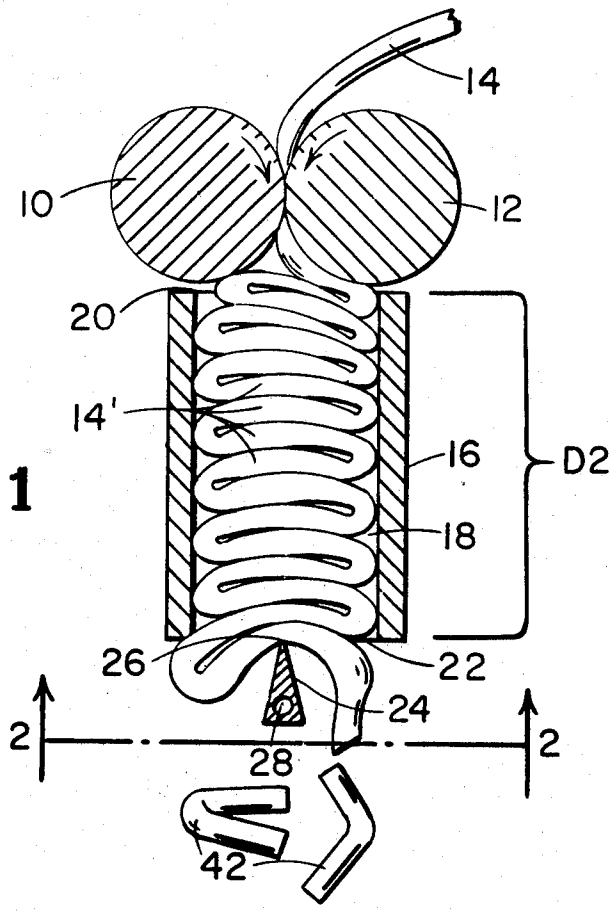
ABSTRACT: Tow is advanced by a pair of feed rolls into one open end of a stuffer chamber, where it is folded upon itself and moved to and through the other open end of the chamber. An oscillating blade at the other end of the chamber severs the folded tow segments transversely of their length as they exit from the chamber.



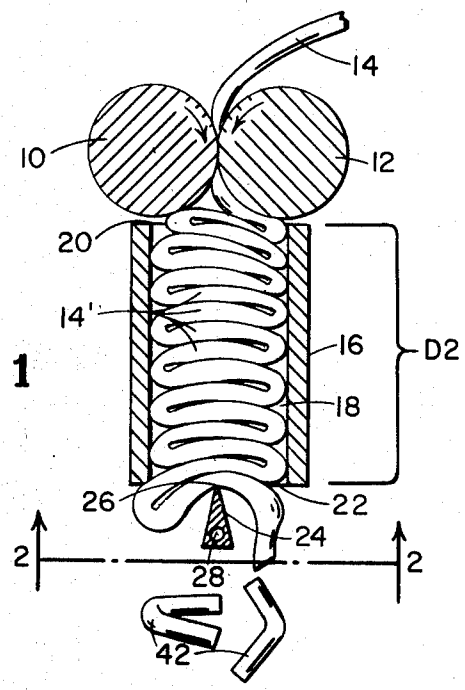

14
10
12
20
14'
16
D2
18
26
22
24
2
2
28
42

FIG. 1

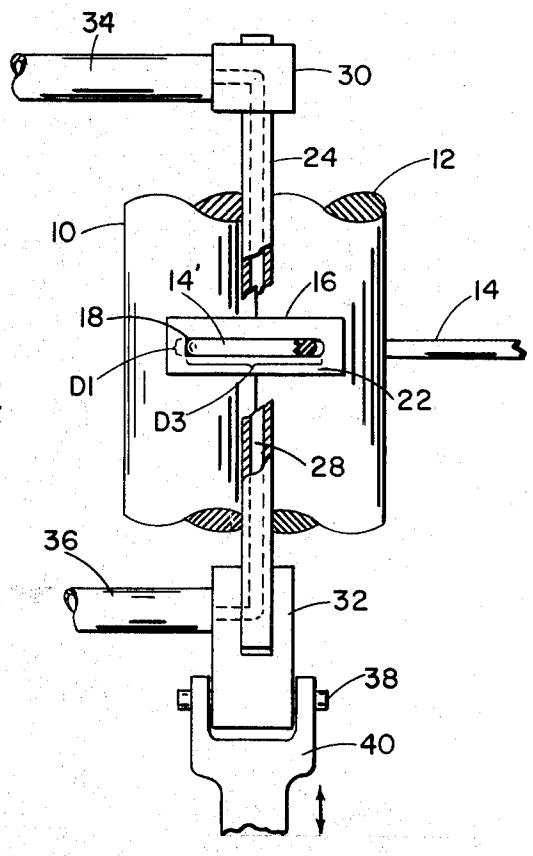

34
30
24
12
10
14'
16
14
18
D1
22
D3
28
36
32
38
40

FIG. 2

APPARATUS FOR CUTTING TOW

This invention relates to tow cutting, and more particularly to a method and apparatus for cutting a continuous filament tow into staple length fibers.

A principal object of this invention is to provide a simple, high speed method and apparatus for cutting continuous tow, particularly of monofilamentary material, into staple length fibers in order that they may be incorporated in fiber blends. It is also an object to provide such a method-apparatus by which tow may be cut into predetermined staple lengths, and may be cut without a likelihood of jamming during operation. Still a further object is to provide for such cutting of tow without appreciable dandruff or fusion.

In a preferred embodiment, the invention contemplates advancing the tow by a pair of feed rolls into the adjacent open end of a stuffer chamber, the dimensions of which are such that the tow folds therewithin upon itself to form interconnected and generally parallel and coplanar tow segments. The tow segments are moved through the chamber, by the subsequently entering tow, and from its other open end. A blade positioned at the other open end of the chamber engages and severs each tow segment as it exits from the chamber.

Other objects, features and advantages of this invention will be apparent to those skilled in the art from the following detailed description thereof taken together with the accompanying drawing in which:

FIG. 1 is a sectional, elevation view of apparatus according to the invention; and

FIG. 2 is a view, partially broken away, along the line 2–2 of FIG. 1.

With reference now to FIG. 1 of the drawings a pair of counterrotating feed rolls **10, 12** are provided in adjacent relationship defining a nip therebetween for gripping the continuous tow **14** extending from a source (not shown), and for advancing the tow to a walled member **16** in the nature of a stuffer box.

Walled member **16**, as best shown in FIG. 2, is formed to define a rectangular chamber **18** having a pair of open ends **20, 22**. Chamber **18** has a first dimension D1 or width approximately equal to the thickness of tow **14**, and has another dimension D2 or length at least twice its width and preferably about 15 times its width. The remaining dimension D3 of chamber **18** is, in the preferred embodiment shown in the drawing, approximately equal to the length of the staple into which the tow is cut, and is therefore at least several times the dimension D1. The upper open end **20** of chamber **18** is spaced below rolls **10, 12** a distance less than the thickness of the tow **14**, with the nip of rolls **10, 12** extending in the width direction and positioned at approximately the middle of chamber **18**.

Severing means in the form of an oscillating blade-type cutting element **24** is positioned with its cutting edge **26** adjacent, below, and facing the lower open end **22** of chamber **18**. Edge **26** is spaced from end **22** a distance less than the width of the tow **14** and extends transversely of the approximate middle thereof in the direction of chamber dimension D1, *i.e.* in a common plane with the nip of rolls **10, 12**. Blade **24** has a tubular chamber **28** therein which is connected via members **30, 32** to rubber tubes **34, 36** for the circulation of a coolant, *e.g.* water, therethrough. Member **32** is connected via pin **38** to a reciprocating arm **40** for reciprocating blade **24** in the direction of its length.

In operation, the apparatus is initially primed by suitably restricting the movement of tow through chamber **18**, as by use of a gate or other temporary obstruction (not shown), following which tow **18** is continuously advanced by feed rolls **10, 12** from its source and into upper end **20** of chamber **18**. The entering tow is folded upon itself, due to the restrictive dimensions of chamber **18** and the backpressure therewithin, to form a plurality of interconnected and generally parallel and coplanar tow segments **14'** extending longitudinally in the direction of chamber dimension D3. The feeding of additional tow **14** into chamber **18** by rolls **10, 12** moves the previously

formed tow segments **14'** transversely of their length, in the direction of chamber dimension D2, toward lower end **22** of the chamber. As each tow segment **14'** reaches and passes through chamber end **22**, it engages blade **24** and is severed thereby centrally of its length.

The thus-formed bundles **42** of cut filaments, and the individual filaments thereof, have upon their return to a more linear condition a length determined by dimension D3 of chamber **18** and by the number and position of the cutting elements adjacent end **22** thereof. In the case of the single cutting element **24** positioned centrally, as shown, the cut filament length is approximately equal to chamber dimension D3. Cut filaments of different staple length may be obtained by using a chamber **18** having a different dimension D3, and/or by varying the number of cutting elements adjacent chamber end **22** or the lateral position of the single element **24**.

While rotating circular saws or other types of cutting elements may be employed, the oscillating blade-type element **24** is preferred. The reciprocatory movement thereof and the circulation of coolant through its chamber **28**, via tubes **34, 36** and the members **30, 32**, renders its cutting action highly efficient and assists in preventing damage to the tow during cutting, minimizing dandruff and fusion. Also contributing significantly to the latter result is the cushioning of each tow segment **14'**, during the cutting thereof, by the following tow segments which force it into engagement with cutting element **26**. The present method affords precise control of the cutting operation without the same transpiring by interaction between two rigid, non-yielding surfaces.

A suitable stationary or movable guide member (not shown) may if desired be interposed between feed rolls **10, 12** and chamber **18** to assist in the tow's passage therebetween and/or its folding within the chamber.

Other modifications and embodiments of this invention will be apparent to those skilled in the art, and are within the scope of the following claims.

I claim:

1. Apparatus for cutting continuous tow, comprising:

means for continuously advancing the tow from a source, and for folding the advanced tow upon itself within a stuffer chamber to form a plurality of interconnected and generally parallel and coplanar folded tow segments of substantially equal length, and for moving said folded tow segments in a direction transverse to the length thereof; and

means for severing said tow segments intermediate the length and during said movement thereof.

2. Apparatus for cutting continuous tow, comprising:

means including a stuffer chamber having an inlet and an outlet for continuously advancing the tow from a source and for folding the advanced tow upon itself to form a plurality of interconnected and generally parallel and coplanar folded tow segments of substantially equal length, and for moving said folded tow segments in a direction transverse to the length thereof; and

means including a cutting element adjacent said outlet of said chamber for severing said tow segments intermediate their length and during said movement thereof.

3. Apparatus for cutting continuous tow, comprising:

means including a pair of counter-rotating feed rolls, and a stuffer chamber having an inlet and an outlet, said tow being advanced by said feed rolls and passing from the nip thereof into said inlet of said chamber, for continuously advancing the tow from a source, and for folding the advanced tow upon itself to form a plurality of interconnected and generally parallel and coplanar folded tow segments of substantially equal length, and for moving said folded tow segments in a direction transverse to the length thereof; and

means for severing said tow segments intermediate their length and during said movement thereof.

4. Apparatus as in claim **3**, wherein said chamber has a first interior dimension approximately equal to the thickness of the

tow, a second interior dimension approximately equal to the length of one of said folded tow segments, and a third interior dimension at least twice the thickness of the tow.

5. Apparatus as in claim 4, wherein said inlet and outlet of said chamber are separated by said third dimension thereof, and wherein said severing means includes a cutting element adjacent said outlet of said chamber extending in the direction of said first dimension.

6. Apparatus as in claim 5, and further including means for reciprocating said cutting element.

7. Apparatus as in claim 4, wherein the axes of said feed rolls extend generally in the direction of said first dimension of said chamber.