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STUFFER CRIMPING APPARATUS

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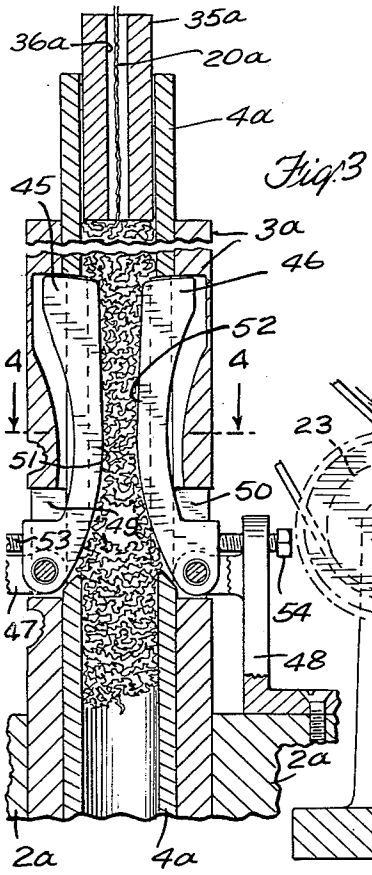


Fig. 3

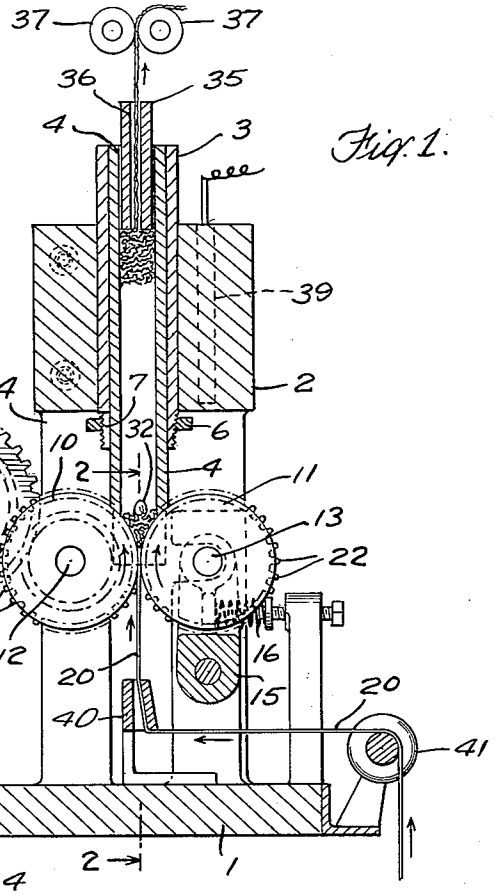


Fig. 1.

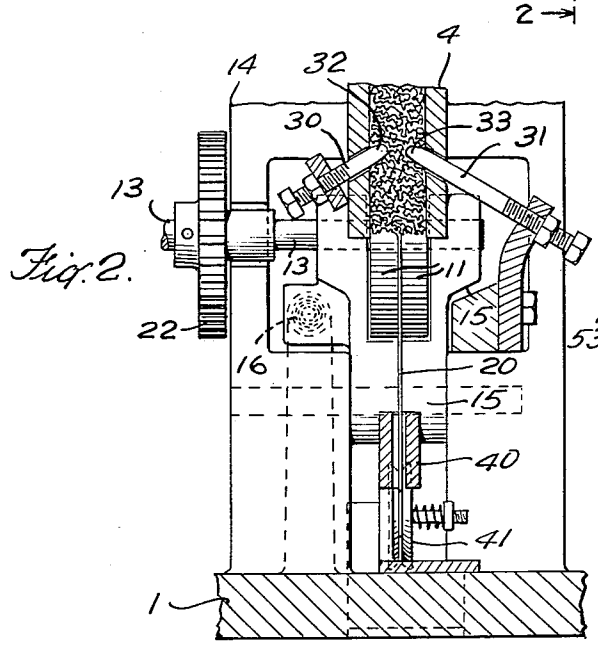


Fig. 2.

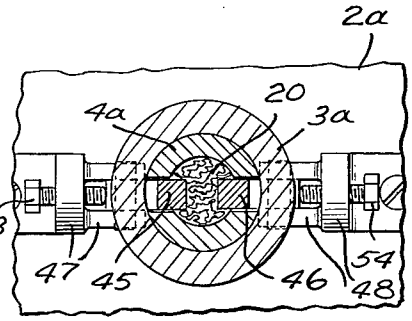


Fig. 4.

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STUFFER CRIMPING APPARATUS

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This invention relates to apparatus for crimping fibers, filaments, tow or yarn and more particularly to apparatus of the stuffer crimper type wherein the material to be crimped is fed into a closed chamber against the pressure of a mass of crimped material held compacted therein.

An object is to provide a novel and improved apparatus of the above type.

Another object is to provide in a stuffer crimper, new and improved means for controlling the pressure on the packed mass of material.

Another object is to provide means for subjecting the packed mass in the chamber to different controlled pressures in various parts of the chamber.

Another object is to improve the crimp uniformity in the treated material.

Another object is to provide a stuffer crimper in which the pressure in the crimping area can be controlled independently of the length of the chamber or of the pressure in the setting area.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

In accordance with this invention the fibers in the form of filaments or tow in continuous or staple form, or yarn spun from such fibers or composed of twisted or untwisted bundles of continuous filaments or tow, hereinafter referred to generally as fibers, are crimped by being fed between feed rolls into a confined crimping chamber against the pressure of a mass of fibers held compacted therein whereby the fibers are folded over into a zig-zag crimp as they enter the chamber from the bite of the feed rolls, as described more in detail in Shattuck Patent No. 2,760,252.

The fibers are compacted in a confined crimping zone at the bite of the feed rolls by a control member in the form of one or a pair of threaded pins extending into the crimping chamber to provide a predetermined constriction adjacent the bite of the feed rolls.

In a further embodiment the fibers may be confined by one or more pressure shoes disposed to enter the setting chamber at a point between the feed rolls and the discharge zone. The pressure shoes maintain the fibers between the shoes and the feed rolls under predetermined pressure while relieving the pressure on the fibers between the pressure shoes and the discharge zones thereby reducing the tension which it would otherwise be necessary to apply to the fibers to extract them from the packed mass.

The details of the invention will be apparent from the following description taken in connection with the accompanying drawings in which certain specific examples have been set forth for purposes of illustration.

In the drawings:

FIG. 1 is a vertical section of a crimping apparatus embodying the invention;

FIG. 2 is a partial vertical section taken on the line 2—2 of FIG. 1;

FIG. 3 is a partial vertical section similar to FIG. 1 illustrating a further embodiment of the invention; and

FIG. 4 is a transverse section taken on the line 4—4 of FIG. 3.

In the embodiments of FIGS. 1 and 2 the crimper is shown as comprising a base 1 carrying a block 2 having a bore in which a sleeve 3 is seated. A tube 4 forming the crimping chamber is mounted in the sleeve 3 and is

clamped thereto by a nut 6 on the split lower end 7 of the sleeve 3. A pair of feed rolls 10 and 11 are mounted on shafts 12 and 13 respectively which are journalled in brackets 14 and 15 carried by the base 1. The bracket 15 is shown as mounted for pivotal movement and is spring-loaded by a spring 16 to hold the feed rolls 10 and 12 in gripping contact with a tow or yarn 20 to be fed thereby into the end of the tube 4. The lower end of the tube 4 is saddle-shaped to receive the rolls 10 and 11 and to form, with the bite of said rolls, a confined crimping chamber.

The shafts 12 and 13 are connected by intermeshing gears 21 and 22, and the shaft 12 is driven by a driving pulley 23 from a source of power not shown.

A pair of threaded pins 30, 31 are adjustably mounted in the block 2 and extend at an upward inclination into the tube 4 at a point above and closely adjacent the bite of the feed rolls 10, 11 and in a plane parallel to the axes of the feed rolls. The ends 32, 33 of the pins 30, 31 are rounded to avoid sharp edges or projections which would interfere with the smooth feeding of the crimped fibers along the tube 4.

The pins 30, 31 form a constriction to compress the fibers in the crimping zone and maintain a controlled pressure on the fibers as they are crimped.

A plug 35 rests upon the mass of filaments in the discharge end of the tube 4 and is of a weight selected to maintain the mass between the pins 30, 31 and the plug 35, under a suitable pressure for setting the crimp. The crimped material is withdrawn through a hole 36 in the plug 35 by a pair of delivery rolls 37 which may be driven at a predetermined ratio to the drive of the feed rolls 10, 11.

The portion of the tube 4 within the block 2 may be heated by heating rods 39 or the like and the fibers may be guided to the feed rolls 10, 11 by a guide 40 and tensioning gate 41.

In the operation of this embodiment the fibers in the crimping chamber or zone are maintained under a selected crimping pressure by the pins 30, 31 which constrict the passage of the fibers and thereby control the back pressure on the mass of fibers within the crimping zone between the pins 30, 31 and the feed rolls 10, 11. The fibers after passing the pins 30, 31 are fed through the setting zone in the tube 4 where they are maintained under a pressure which is determined by the weight of the plug 35. This pressure may be maintained somewhat less than the pressure within the crimping zone so as to reduce the strain on the fibers while they are being set and also to reduce the density somewhat so as to facilitate the uniform heating of the fibers.

The crimped and set fibers are removed under tension through the hole 36 in the plug 35 by the delivery rolls 37 and may be wound onto a package in the usual manner.

Although two pins have been shown a single pin may be used or a multiplicity of pins, depending upon the size of the crimping chamber. For crimping small denier fibers a single pin usually suffices.

In the embodiment of FIGS. 3 and 4 the crimping apparatus is similar to that above described and corresponding parts have been given the same reference characters with the suffix *a*, with the exception that the pins 30, 31 are omitted and the passage is constricted by a pair of shoes 45, 46 which are pivotally mounted on brackets 47, 48 on the top of the block 2 and project inwardly through slots 49, 50 in the crimping tube 4*a*. The shoes 45, 46 are provided with smooth curved inner surfaces 51, 52 so as to constrict the area of the setting zone without forming any rough surfaces or projections on which the fibers might catch as they pass along the tube 4*a*. Adjusting screws 53, 54 are secured in the brackets 47,

48 for adjusting the position of the shoes 45, 46 in accordance with the back pressure which it is desired to maintain on the fibers.

The shoes 45, 46 are disposed above the heating zone so that the fibers are maintained under contacting pressure during their passage from the bite of the feed rolls 10, 11 through the heating zone and through a portion of the cooling zone between the top of the block 2 and the position of the shoes 45, 46. The fibers are substantially unrestricted after passing the shoes 45, 46 and the plug 35*a* may be made only heavy enough to prevent the fibers from matting as they are pulled out by the delivery rolls.

In this embodiment sufficient space is provided between the top of the shoes 45, 46 and the plug 35*a* to effect the necessary cooling of the fibers to setting temperature before discharge.

By reducing the pressure on the mass of fibers during the final cooling stages in this way, it is possible to materially reduce the tension which must be applied to the fibers by the delivery rolls for extracting them from the mass of fibers in the cooling zone.

A pair of shoes 45, 46 has been shown. In some instances, however, a single shoe may be used or a plurality of shoes spaced around the periphery of the tube 4*a*, depending upon the size of the tube and the denier of the material to be crimped.

While the pins 30, 31 and the shoes 45, 46 have been shown as used independently, it is to be understood that both of these elements may be used in the same crimping apparatus to provide an independent control of the fibers in the crimping zone at the bite of the feed rolls, in the heating zone above the pins 30, 31, and in the final cooling zone above the shoes 45, 46.

The operation of the form in FIGS. 3 and 4 is otherwise the same as that described above in connection with FIGS. 1 and 2.

It may be desirable to exert the highest pressure on the fibers in the crimping zone, then subject the fibers to progressively lower pressures in the heating and cooling zones. This or other combinations can readily be effected by suitable adjustment of pins 30, 31, shoes 45, 46 and plug 35 and 35*a*.

What is claimed is:

1. A stuffer crimper comprising an elongated chamber, feed rolls disposed to feed fibers into one end of said chamber to be folded over and crimped due to the pressure of a mass of previously crimped fibers in said chamber, said feed rolls being adapted to exert pressure for advancing the mass of crimped fibers along said chamber to a discharge point, a stationary constricting means comprising a pin projecting laterally into said chamber at a point beyond the bite of the feed rolls to form a confined crimping zone in the area between the bite of the said feed rolls and said pin constricting means, and means for adjusting the lateral position of said constricting means in said chamber for thereby varying the confining effect thereof.

2. A stuffer crimper as set forth in claim 1 in which said pin is located in a plane parallel to the axes of said feed rolls and is positioned closely adjacent the bite of the feed rolls.

3. A stuffer crimper as set forth in claim 1 in which said pin is mounted for axial adjustment.

4. A stuffer crimper as set forth in claim 1 in which said pin projects into said chamber at an upward inclination and provides a smooth surface over which said fibers slide.

5. A stuffer crimper as set forth in claim 1 in which said constricting means comprises a pair of pins projecting into said chamber from opposite sides.

References Cited in the file of this patent

UNITED STATES PATENTS

2,311,174	Hitt	Feb. 16, 1943
2,865,080	Hentschel	Dec. 23, 1958
2,914,810	Robinson et al.	Dec. 1, 1959
2,917,784	Spence et al.	Dec. 22, 1959
3,027,619	List et al.	Apr. 3, 1962

FOREIGN PATENTS

562,720	Belgium	Dec. 14, 1957
487,711	Great Britain	June 24, 1938
835,486	Great Britain	May 18, 1960