

March 27, 1962

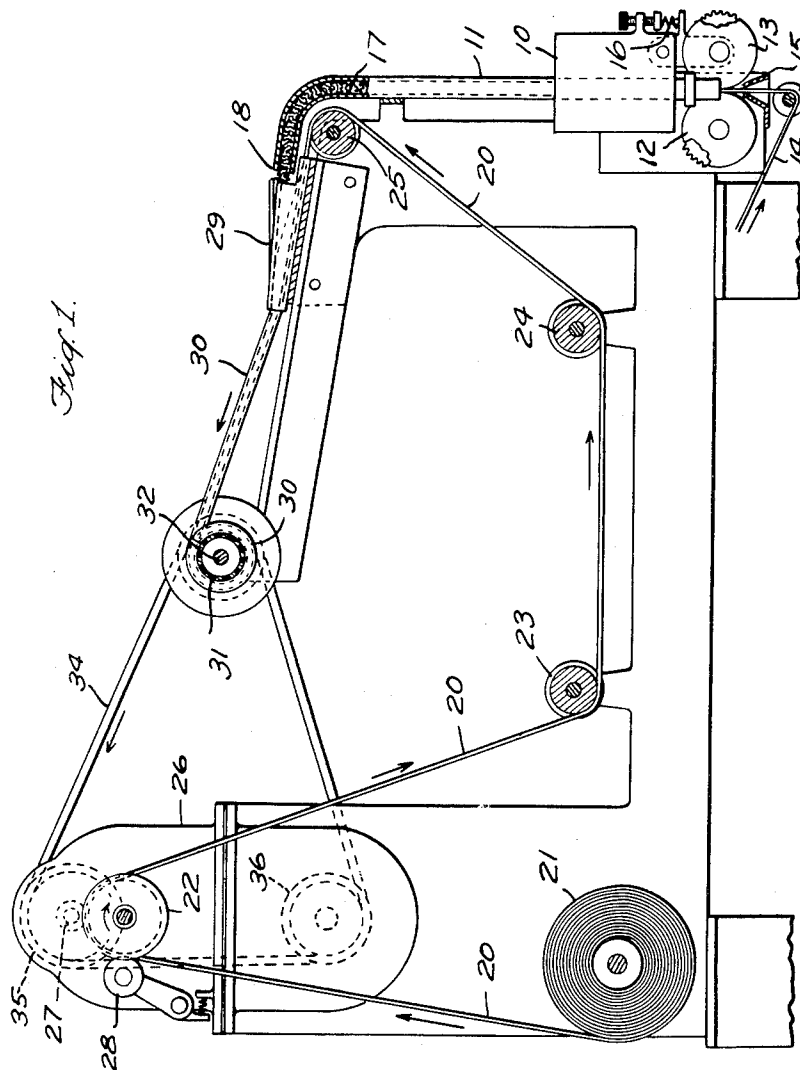
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3,027,108

APPARATUS FOR WITHDRAWING YARN FROM A CORE PACKAGE

Original Filed Feb. 4, 1957

4 Sheets-Sheet 1



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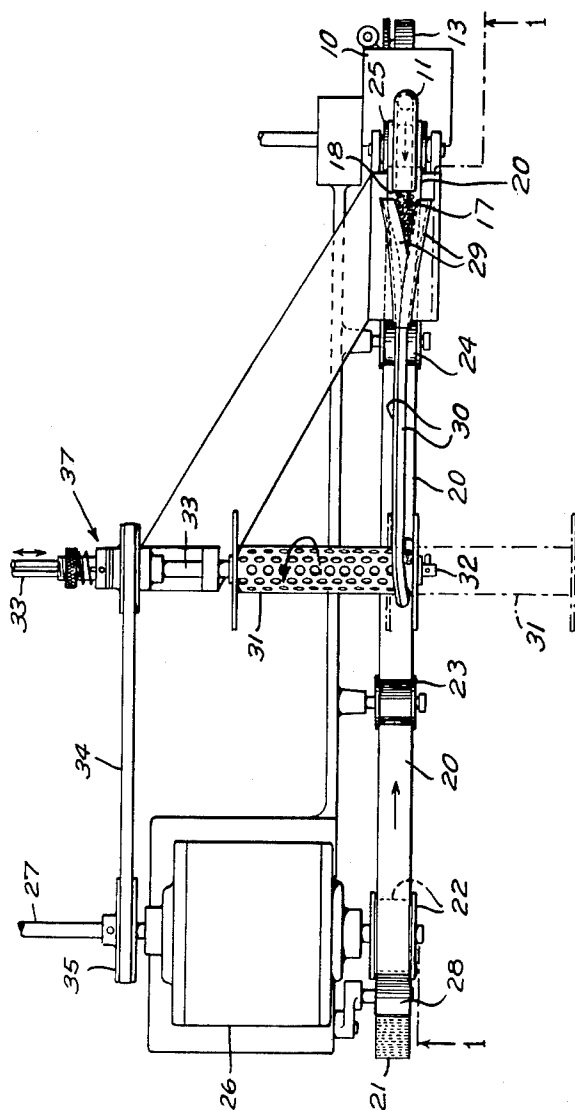


Fig. 2.

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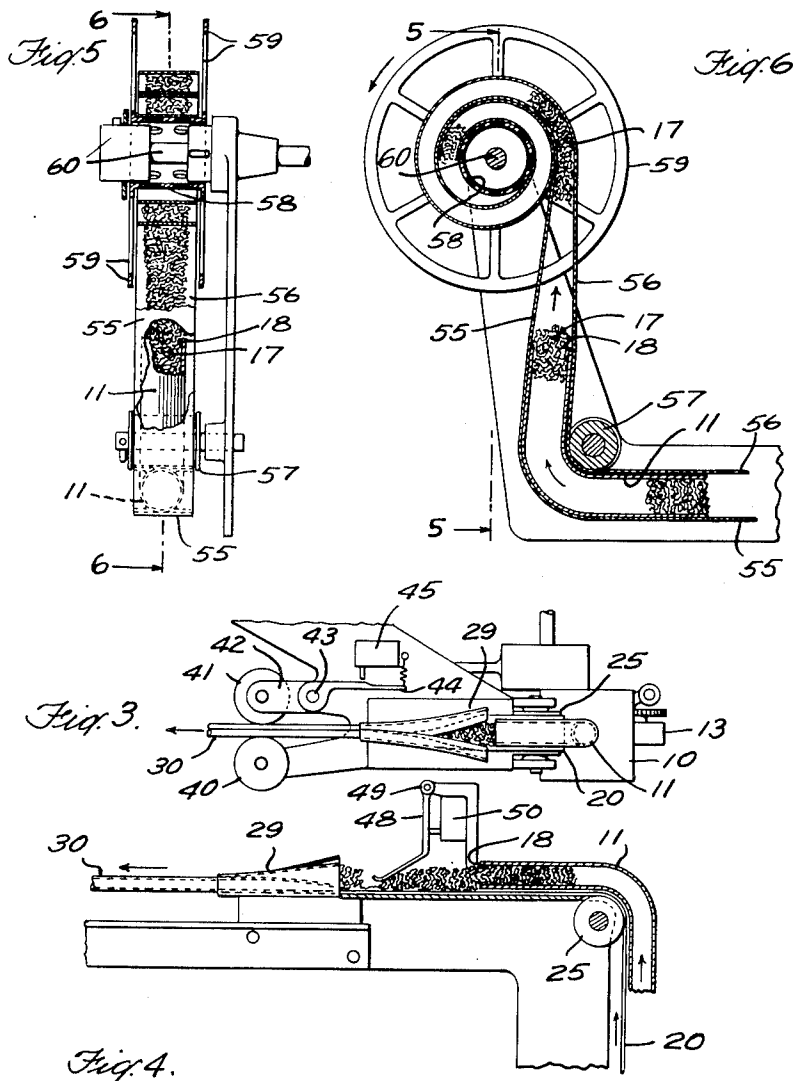
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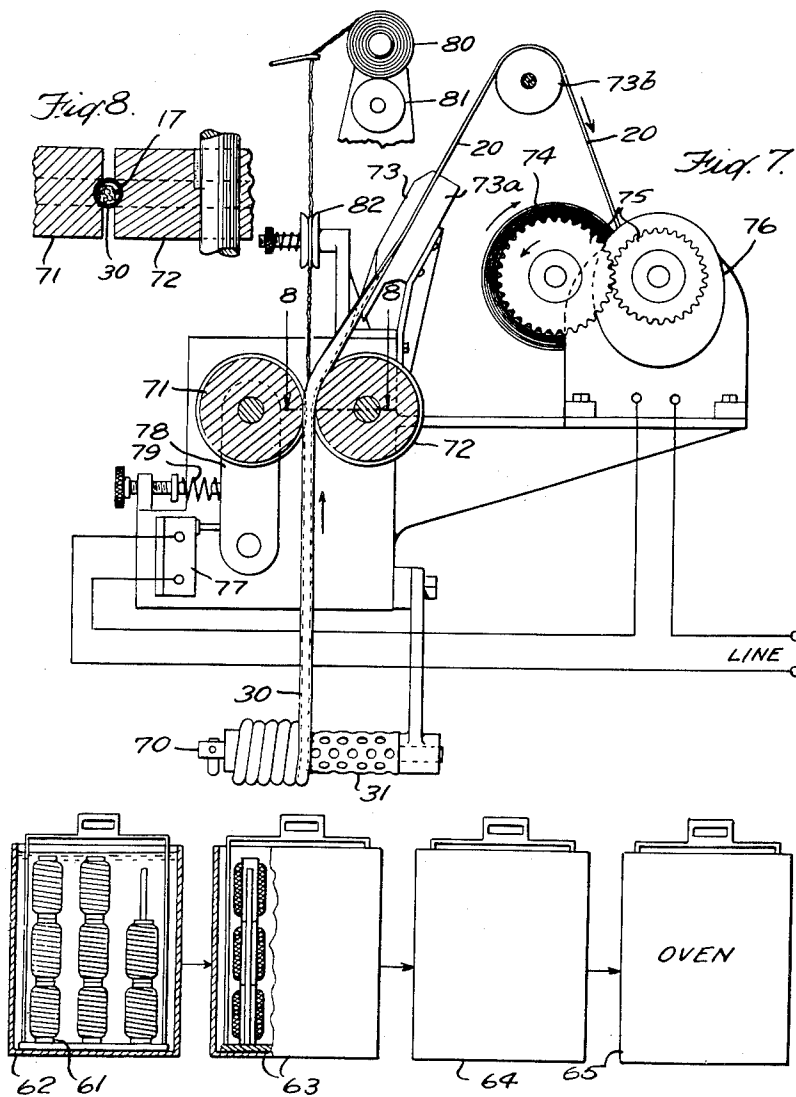


Fig. 9.

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APPARATUS FOR WITHDRAWING YARN FROM A CORE PACKAGE

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Original application Feb. 4, 1957, Ser. No. 638,027, now Patent No. 2,960,729, dated Nov. 22, 1960. Divided and this application Mar. 9, 1960, Ser. No. 13,924
4 Claims. (Cl. 242-54)

This invention relates to a method and apparatus for handling and treating fibers which have been crimped in a stuffer crimper.

This application is a division of our copending application Serial No. 638,027, filed on February 4, 1957 now Patent No. 2,960,729 for Method and Apparatus for Treating Textile Fibers.

An object of the invention is to provide a method and apparatus of the above type having novel and improved characteristics.

Another object is to provide a novel and improved system for maintaining the crimp in a mass of crimped fibers during subsequent treating and setting operations.

Another object is to provide improved mechanism wherein the crimped fibers may be treated and set independently of the operation of the stuffer crimper.

Another object is to provide means for packaging the mass of crimped fibers as discharged from the stuffer crimper and for maintaining the mass in compacted form during the setting and processing stages.

Another object is to provide means whereby the processed fibers in filament or spun yarn are withdrawn from the package and wound onto a spool or cop for subsequent use.

The features of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings in which certain specific embodiments have been set forth for purposes of illustration.

In the drawings:

FIG. 1 is a side elevation of an apparatus for wrapping and reeling the mass of crimped fibers which are discharged from the stuffer crimper, with parts in section for clarity;

FIG. 2 is a top plan view of the apparatus shown in FIG. 1;

FIGS. 3 and 4 are detail views illustrating different embodiments of mechanism for controlling the operation of the packaging apparatus of FIGS. 1 and 2;

FIG. 5 is a partial section taken on the line 5-5 of FIG. 6 illustrating a further embodiment of packaging apparatus;

FIG. 6 is a vertical section taken on the line 6-6 of FIG. 5;

FIG. 7 is a side elevation of an apparatus with parts in section for unreeling and winding the processed fibers;

FIG. 8 is a partial section taken on the line 8-8 of FIG. 7; and

FIG. 9 is a diagrammatic view illustrating the package treating stages.

Referring to FIGS. 1 and 2 the stuffer crimper is shown as of the general type disclosed in United States Patent No. 2,760,252 and comprises a block 10 which may be heated if desired and which carries a tube 11 forming the crimping chamber. A pair of feed rolls 12 and 13 which are driven by suitable means not shown are adapted to feed a filament tow or yarn 14 into the lower end of the tube 11 for crimping. Suitable yarn guides 15 are provided for guiding the yarn 14 to the bite of the rolls 12 and 13. The roll 13 may be spring-pressed as by

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means of a spring 16 for gripping the yarn for feeding the same into the tube 11 against the pressure of a mass 17 of crimped yarn held therein and for forcing the means of crimped yarn along said tube until it is discharged from the discharge end 18 thereof.

In the embodiment shown the discharge end 18 of the tube 11 is bent to alter the path of the mass 17 by about 90°. This change in direction of the path of the mass of crimped yarn alters the back pressure which is exerted against the entrance of the yarn by the feed rolls 12 and 13. This pressure may be varied or adjusted to the desired value by varying the length of the tube 11 and the angular bend at the discharge end 18.

A tape 20 is withdrawn from a supply roll 21 by a driven roll 22 and is fed around guide rolls 23, 24 and 25 to underlie the mass of crimped fibers 17 as they are discharged from the end 18 of the tube 11. The roll 22 is driven through gears in a gear box 26 from a drive shaft 27 which is driven by a suitable motor not shown. A presser roll 28 presses the tape 20 against the driven roll 22 to provide the necessary traction for withdrawing the tape from the reel 21.

As the tape 20 advances from the guide roll 25 with the mass of crimped fibers disposed thereon, the tape is folded over by a folder 29 into tubelike form so as to wrap and confine the mass of crimped fibers 17 in the form of a continuous tube-like package 30.

The tape 20 may be of the thermoplastic type in which case the overlapped edges may be heat-sealed in the usual manner for retaining the tape in tubular form during subsequent operations. The tape may be made of pervious material such as an open mesh fabric to permit penetration of a treating agent into the packaged mass of fibers, and the overlapped edge may or may not be sealed depending upon the nature of the subsequent treatment.

The tube 30 of crimped fibers thus wrapped is reeled on a perforated sleeve 31 which is held on a spindle 32 carried by a shaft 33 which is driven by a belt 34 from a pulley 35 on the motor shaft 27. The tension of the belt 34 may be maintained by idler pulley 36.

The shaft 33 is driven through a tension drag 37 which is adapted to exert the necessary force for reeling the tube 30 of crimped fibers on the sleeve 31, and to provide slippage when the tension of the tube 30 exceeds a predetermined value. Means is provided for shifting the spindle 32 and the shaft 33 axially as required for laying the tube 30 on the sleeve 31 in the form of uniform layers as in the usual winding machine. The sleeve 31 is provided with flanges removably mounted thereon.

The operation is continued until the winding of crimped fibers on the sleeve 31 reaches the required size after which the sleeve and winding is removed and a new sleeve with flanges thereon is substituted.

FIG. 3 illustrates one form of control for the feed of the wrapped mass of fibers. In this form the tube 30 as it advances from the folder 29 passes between a pair of rolls 40 and 41. The roll 41 is mounted on an arm 42 which is pivoted at 43 to bear against the tube 30 and to shift in position in accordance with the fullness of the tube. The arm 42 is provided with an extension 44 which is adapted to actuate a microswitch 45 when the roll 41 approaches the roll 40. The microswitch 45 is connected by means not shown to control the drive for the spindle 32 and is adapted when a loosely packed portion of the tube 30 passes the rolls 40 and 41 to interrupt the feed of the spindle 32 until the mass of material discharged from the crimper tube 11 again fills the package 30 to the predetermined extent. The roll 41 also serves to interrupt the feed when the discharge of material from the discharge end of the crimper tube 11 is interrupted. Obviously a mechanical linkage may be substituted for the microswitch for controlling the feed.

A further embodiment of control means is shown in FIG. 4. In this figure a feeler 48 is disposed to contact the mass of crimped yarn between the end 18 of the crimper tube 11 and the folder 29. The feeler 48 is pivoted at 49 and is adapted to actuate a microswitch 50 as the feeler rises and falls due to differences in the quantity of the mass of crimped yarn which is delivered from the crimper tube 11. The microswitch 50 is connected to control the feed of the tape 20 so as to interrupt the feed when the feeler 48 senses a break in the mass of fibers passing the feeler station. In this way the operation is controlled so that the wrapped package 30 of fibers is maintained substantially uniform.

In the operation of the systems shown in FIGS. 1 to 4 the crimped fibers are discharged in the form of a compact mass from the end 18 of the crimper tube 11 and it has been found that the mass tends to retain its form as it is discharged from the end of the crimper tube, although the mass may open up slightly due to the release of pressure. This mass of fibers is immediately laid on the tape 20 and passes through the folder 29 with the tape so that the tape is progressively folded around the mass and tends to hold the same in compacted form. The tape serves as a convenient carrier for packaging and handling the fibers and at the same time prevents the crimp from opening up between the crimping and setting steps.

The wrapped tubular package 30 is reeled onto the sleeve 31 to form a compact winding which may be subsequently handled and passed through various treating and setting stages to be described.

In the embodiment shown in FIGS. 5 and 6, the mass of crimped fibers discharged from the end of the crimping tube 11 is advanced and reeled between a pair of tapes instead of being wrapped as in the embodiment of FIGS. 1 and 2. In FIGS. 5 and 6 the mass of crimped fibers which is discharged from the end of the crimper tube 11 is fed between tapes 55 and 56 in substantially the form in which it is discharged from the crimper tube. The fiber mass is sufficiently compact and self-supporting so that it retains its form even though the sides of the mass remain unconfined. The tape 55 passes around and in contact with the outer surface of the bent end 18 of the crimper tube 11. The tape 56 is held in contact with the opposite face of the crimper tube 11 by an idler roll 57. The mass of fibers at the discharge end of the tube 11 is picked up between the two tapes 55 and 56 and is reeled with the tapes into a sleeve 58 between side flanges 59. The sleeve 58 is disposed on a spindle 60 which is driven by suitable means not shown. When the desired quantity of material has been wound onto the sleeve 58 the sleeve together with the flanges 59 is removed and the package thus formed is passed through the subsequent treating and setting stages without the necessity of removing the flanges 59.

The yarn packages on the sleeves 31 or 38 may be treated for setting the crimp or dyeing the yarn in various ways. As shown in FIG. 9 the wound packages are stacked on dye tubes 61 of standard pressure dyeing tank 62. The dye may be forced through the masses of fibers onto the various packages from the dye tubes 61 and circulated in the usual manner. From the tank 62 the packages may be removed to a second tank 63 wherein they may be centrifuged for removing the excess liquid and may be dried in an oven 64.

If the fibers are to be resin-treated they may be impregnated with the resin in the first tank 62, centrifuged for removing excess impregnant in tank 63, dried in oven 64 and cured by heating in a curing oven 65.

Alternatively the packages may be impregnated with a resin in tank 62, centrifuged to remove excess resin in tank 63, impregnated with a catalyst in stage 64 and dried and cured in oven 65.

If the fibers are to be steam set, steam may be passed

through the tubes 61 in tank 62 for setting the crimp and the packages may be dried in oven 64.

In a further embodiment the crimp may be set while the fibers are in the stuffer crimper by the application of heat to the block 10 in which case the crimp-set fibers in the packages may be dyed in the pressure dyeing tank 62 and dried in oven 64.

Various other combinations of steps will be readily apparent. In any event the mass is treated in such a way as to set the crimp in the fibers and to dye or further process the fibers as desired while still wound in package form.

The mechanism for withdrawing and winding the crimped yarn is shown in FIGS. 7 and 8. In this mechanism the sleeve 31 carrying the packages of treated and crimp-set yarn is disposed on a de-reeling spindle 70 and the wrapped tube 30 is withdrawn between a pair of rolls 71 and 72. The tape 20 is unwrapped from the package as it passes over the roll 72 and is smoothed out by the pressure shoe 73 and a backing plate 73a feeds over a roll 73b and is reeled onto a roll 74 for subsequent reuse. The roll 74 is driven by a gear train 75 from a drive motor 76. The tape may be slit in advance of the rolls 71 and 72 if necessary.

The operation of the drive motor 76 is controlled by a microswitch 77 which is adapted to be actuated by an arm 78 carrying the roll 71 and spring-pressed into engagement with the wrapped tube 30 by means of a spring 79.

The crimped yarn is withdrawn under tension from the mass of yarn in the package by means of a winder comprising a spool 80 on which the yarn is wound and a driving roll 81 on which the winding rests. The winder is shown as a constant speed winder of the usual construction. The crimped yarn on its way to the winder passes through a friction drag device 82.

In the operation of the embodiment shown in FIGS. 7 and 8 the mass of crimped yarn is fed from the sleeve 31 to the discharge point at the bite of the rolls 71 and 72 at which point the mass is unwrapped and the crimped yarn is withdrawn by the constant speed winder.

As the yarn is withdrawn from the mass between the rolls 71 and 72 the roll 71 approaches the roll 72, thereby actuating the microswitch and operating the motor 76 to withdraw a further quantity of the wrapped tube 30 from the sleeve 31 so as to maintain a substantially uniform quantity of yarn at the discharge point. The yarn is thus uniformly withdrawn without danger of tangling and is wound onto the spool 80 to form a yarn package of the usual type.

What is claimed is:

1. Apparatus for extracting a yarn from a package containing a continuous core composed of a mass of crimped yarn and a confining tape wound in successive convolutions in a plurality of layers of helical windings with the core in adjacent convolutions separated by the intervening tape which comprises an unwinding spindle for said package, tape winding means connected to withdraw said tape from said package and thereby progressively advance said core to a discharge point, constant speed delivery means withdrawing said yarn from said core at said discharge point, and control means connected to control the withdrawal of said tape for maintaining said core exposed at said discharge point.

2. Apparatus as set forth in claim 1 in which said control means comprises a feeler responsive to the quantity of core at said discharge point.

3. Apparatus as set forth in claim 1 in which said core is wrapped in said tape and means is provided at said discharge point to remove said tape from said core for exposing the latter.

4. Apparatus as set forth in claim 1 in which said control is yarn actuated.