

March 30, 1954

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2,673,546

APPARATUS FOR TREATING IMPREGNATED YARN

Filed Jan. 29, 1949

3 Sheets-Sheet 1

FIG. 1.

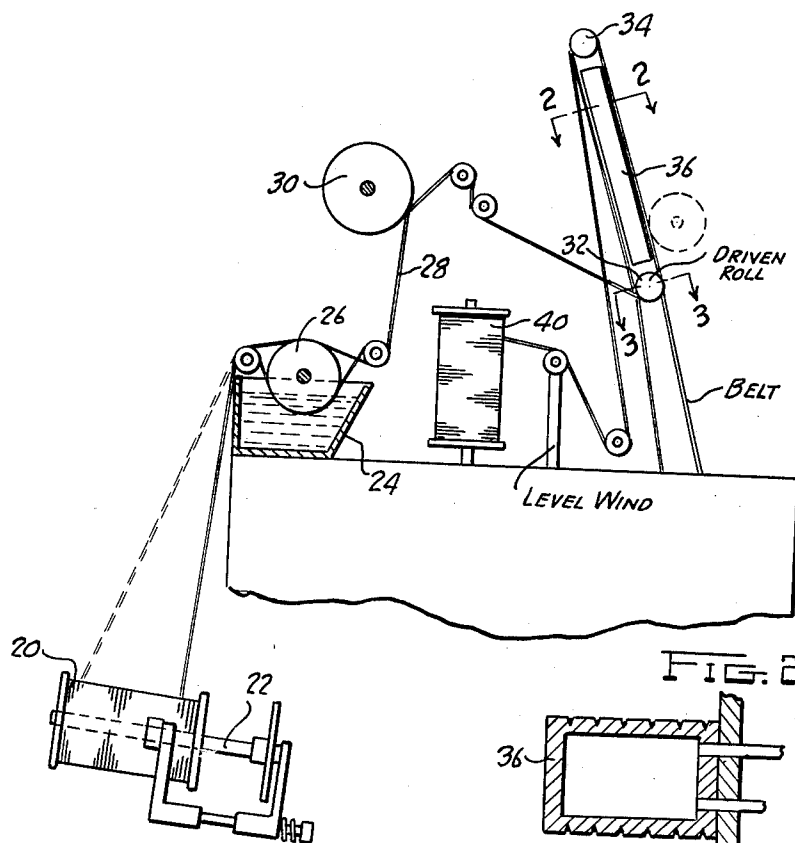


FIG. 2.

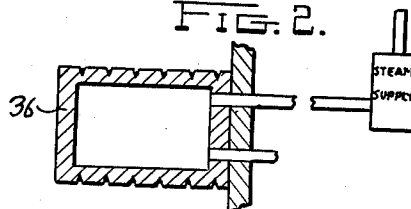


FIG. 3.

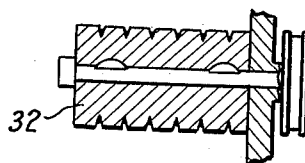
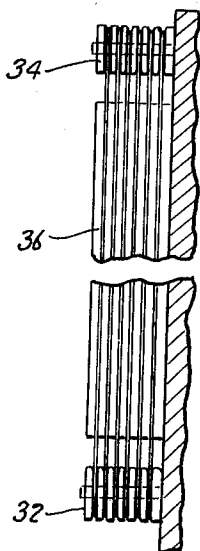


FIG. 4.



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FIG. 5.

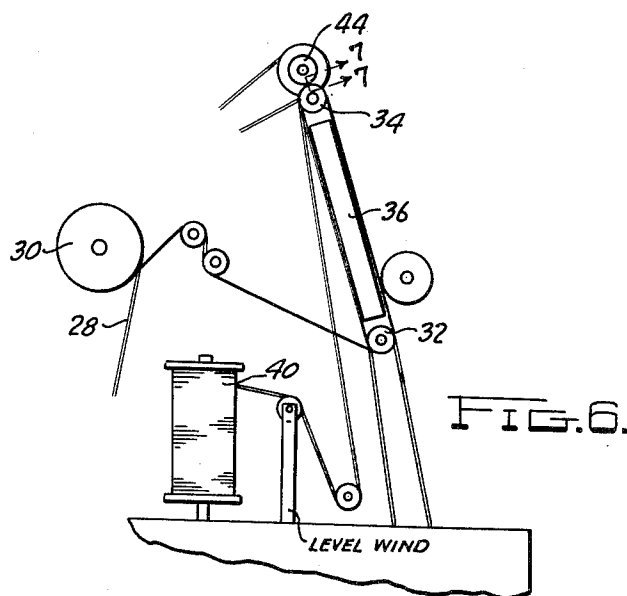
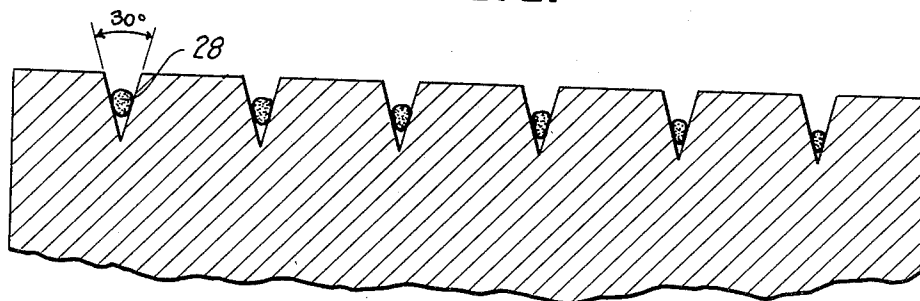
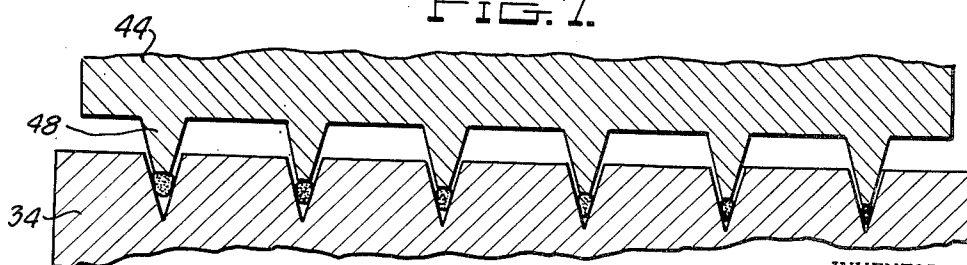


FIG. 6.

FIG. 7.



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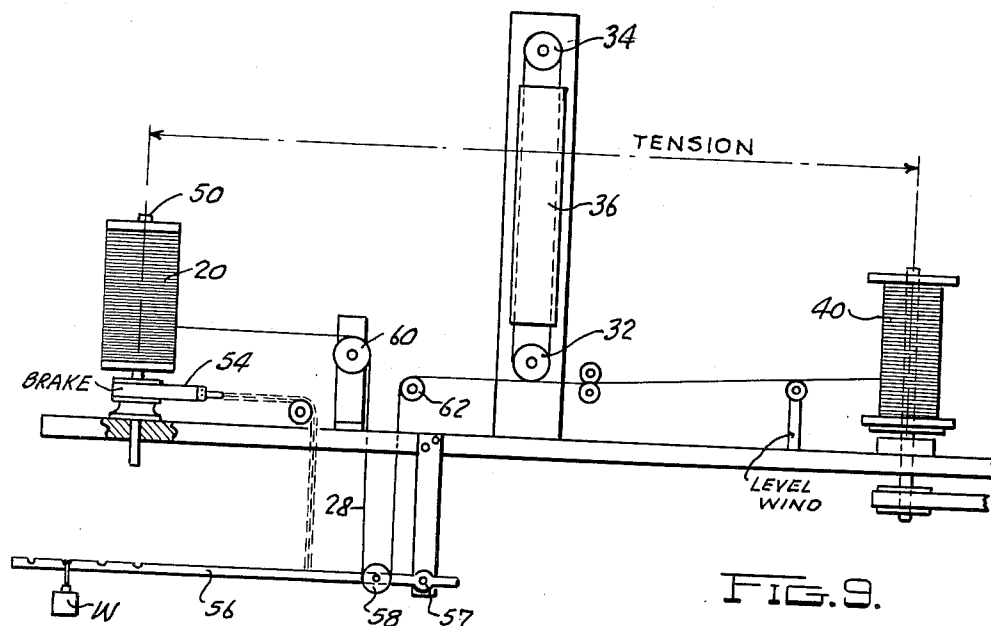


FIG. 9.

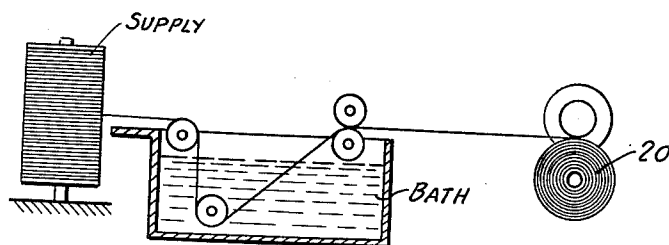


FIG. 8.

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APPARATUS FOR TREATING IMPREGNATED YARN

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Application January 29, 1949, Serial No. 73,528

4 Claims. (Cl. 118—44)

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This invention relates to apparatus for treating impregnated yarn. The present invention is applicable to rovings formed of fibrous filaments of all kinds mixed and otherwise, but more particularly to rovings formed of cotton fibers, and has as its principal object the parallel arranging of the discrete fibers of a length of roving and the condensing of the parallel arranged fibers into as small a space as possible to form a new product comparable in tensile strength and reduced stretch to plied yarns, but having even greater resistance to breaking than comparable plied yarns because of its inherent uniform fiber arrangement and the elimination of the shearing action of the plies themselves.

In the present well known process of making cotton yarn from the raw cotton a roving or sliver is formed at the initial stages of the process after the cleaning operations. This roving is then taken to a spinning machine where it is drawn out and reduced materially in cross section after which the reduced strand is twisted with a plurality of strands to form thread and the threads are twisted together to form yarn. What this amounts to is that the roving is materially cut down in cross section after which it is twisted together to build up the cross section.

It is an object of the present invention to treat the initial roving in such a way that it need never be reduced in cross section beyond the cross section finally desired in the end product.

In this process of treating the roving, it is necessary that the roving be condensed, compacted and twisted; but all this is relatively simple as compared with reducing the roving to a fine thread or yarn and then building up the yarn by twisting together multiple strands. The compacted and condensed roving is treated with a bonding material and compacted in the apparatus to be described and the fibers are then fixed in position by a bonding material.

These operations are described in detail in my copending application Serial No. 765,339, filed August 1, 1947, and now abandoned, of which this application is a continuation-in-part.

It is an object of the present invention to provide an apparatus for the treating of roving which is extremely simple in construction and which has the advantage of creating the necessary driving friction for the particular roving being treated while at the same time causing the compacting, condensing and paralleling of the fibers.

It is another object of the invention to provide a compacting and condensing apparatus which also functions as a drying apparatus for the curing and setting of the treated material which bonds the fibers together.

It is a further object to provide a means for additional compacting of the roving cooperating with the drying and condensing apparatus.

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Other objects and features of the invention relating to details of construction and operation will be apparent in the following description and claims.

Drawings accompany the description and the views thereof may be briefly described:

Figure 1 is a side view largely diagrammatic, of a treating machine for a single end of roving.

Figure 2 is a sectional view of the heating and grid element on line 2—2 of Figure 1.

Figure 3 is a sectional view of a grid roller on line 3—3 of Figure 1.

Figure 4 is an elevation of the combined grid and rollers of Figure 1.

Figure 5 is an enlarged view of the V-grooves of the grid element.

Figure 6 is a modified treating machine showing a compacting roll.

Figure 7 is an enlarged section on line 7—7 of Figure 6.

Figure 8 is a diagrammatic view of a preliminary treating system.

Figure 9 is a diagrammatic view of a two-zone tensioning and treating device of modified construction.

In Figure 1 the thread or roving to be treated originates on a spool or package 20 provided on a suitable friction mount 22. The material may or may not have been treated with a compacting compound. In some cases it may be expedient to utilize a bath 24 to treat the material as it is run through the machine. In other cases it may be best to pretreat the material with the solution and then pass it over the roll 26 rather than under it.

The material 28 in funicular form passes around a snub roll 30 where it contacts the roll in substantially 360°, roll 30 having a V-groove which places binding force on the material. The material then passes to a driven roll 32 and is progressively wound around roll 32 and roll 34 between which is interposed a block 36 having spaced V-grooves, see Figure 2. The block 36 is intended to be steam heated so that the compound on the material passing the V-grooves will be heated as the material is drawn in the progressive loops around the unit. Fully treated material is then taken up on a spool 40.

Figure 4 illustrates the manner in which the progressive loops pass rolls 32 and 34 in the interposed grid 36. A section of the V-grooves utilized in the rolls 32 and 34 and the V-groove block 36 is shown in Figure 5 where in the enlarged view the V-grooves are shown as having an angle of approximately 30°. The material 28 is shown as becoming progressively smaller as it is worked over the rolls and grid.

Frictional resistance may be applied to snub roll 30 and the resistance of the progressive loops on the unit will apply considerable tension to the thread or roving being treated and will insure the material being forced into the bottom of the

grooves in the manner required to cut down the cross-section. The heat applied from the grid 36 will stabilize the cross-section as it dries the treating compound on the material.

In Figure 6 a modified system is shown in which the same unit is utilized but an additional driven roll 44 is provided having annular knurls 48 spaced to correspond with the V-grooves of roll 34 and becoming progressively deeper as they progress to the right as shown in Figure 7. These knurls provide an actual mechanical kneading and compressing of the material into the grooves of roll 34 and thus assist in the reducing operation which is the objective of the treatment.

A modified method of accomplishing a similar result is shown in Figures 8 and 9. In Figure 8 the initial bath for the package 20 is shown. Package 20 is then mounted on a shaft 50 on which is arranged a brake 54, the pressure of which is controlled by a lever arm 56 pivoted at 57 and provided with a movable weight W. A guide roller 58 rotatably mounted on arm 56 receives the material 28 from package 20 over roll 60 after which the material passes to a roll 62 and then to rolls 32, 34 and grid 36 as previously described. Driven take-up roll 40 receives the treated material.

It will be seen that as the tension increases on the thread 28, that tension will serve to lift the weighted arm 56 and release the pressure on the braking strap 54, thereby forming an adjustable thread tensioning device for applying predetermined tension.

Take-up roll 40 is operated by a slip belt to maintain the tension from the supply roll or package 20. The action of the grid is two-fold. There is steam passing through the grid and the temperature is regulated by any suitable means. The grid is first a heating apparatus designed to heat and dry the cords while they are still under tension and thereby set the bonding agents among the discrete fibers while they are stretched into substantially parallel condition. The tension applied preferably approaches the breaking point of the yarn or roving and the heat must be sufficient to set the bonding agent and thoroughly dry the yarns or roving. The second purpose of the grid and V-grooves is to compress the yarns or roving to a lower gauge than conventional yarns or roving and thereby attain additional strength in addition to the high density.

Depending upon the results desired, the bonding materials used in saturating the yarns or roving may be those set forth in my Patent No. 2,454,830 of November 30, 1948, or the bonding agent set forth in my copending application Serial No. 765,339, filed August 1, 1947.

In order to obtain maximum increase in tensile strength it is essential that the tension and/or compression be near the breaking point of the fibers in the cords. The individual fibers must be arranged in a substantially parallel condition and the object of the invention is to bring the parallelly arranged fibers into as small a space or diameter as possible and to bond the fibers in such condition whereby the mass of fibers in the cross section of the yarn is held in close union or bond which approaches the characteristics of the individual cotton fiber or strand.

It will be understood that the V-grooves as used in the machine above described, while assisting in compression of the cord, also compensate for any momentary increase in tension during the processing, in that the V allows the cord to sink deeper into the groove and compact more; other-

wise this momentary increase in tension might normally break the cord. The compression given the cord by the V-grooves will vary somewhat but, of course, when this is supplemented by the positive compression roll it will in all cases be short of the crushing point to avoid damage to the individual fibers.

This invention may also be used to treat any type of cord, thread, yarn or the like where a bonding agent is used and it is desirable to reduce the gauge and consolidate the fibers by a compression action. The net result is an increase in tensile strength, increase in length with gauge reduction, decrease and equalization of the final stretch characteristics.

What I claim is:

1. An apparatus for the treatment of impregnated roving and yarns to compact and condense and set the same which comprises an elongate, hollow member having a plurality of relatively deep sharp angled parallel V-grooves on opposite sides, means to furnish heat to the interior of said member, and means to guide and carry yarn through said grooves comprising a roller member at each end of said member having grooves spaced to correspond to the grooves on the member.

2. An apparatus for the treatment of impregnated roving and yarns to compact and condense and set the same which comprises an elongate, hollow member having a plurality of relatively deep sharp angled parallel V-grooves on opposite sides, means to furnish heat to the interior of said member, and means to guide and carry yarn through said grooves to compact it comprising a roller member at each end of said member having grooves spaced to correspond to the grooves on the member, and additional means to further compact the yarn comprising a roller having annular projections to match and enter the grooves of one of said members.

3. An apparatus as described in claim 1 in which the angle of the V-grooves is around 30°.

4. An apparatus as described in claim 1 in which both the elongate member and the roller members have V-grooves in which the angle is around 30°.

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References Cited in the file of this patent UNITED STATES PATENTS

Number	Name	Date
758,520	Fredenburgh	Apr. 26, 1904
1,165,819	Ware	Dec. 28, 1915
1,729,272	King	Sept. 24, 1929
1,920,111	Schweiter	July 25, 1933
1,946,313	Daniels	Feb. 6, 1934
2,040,105	Ritzert	May 12, 1936
2,220,958	Jennings	Nov. 12, 1940
2,228,710	Shaw	Jan. 14, 1941
2,283,014	Reid	May 12, 1942
2,364,467	Nickerson	Dec. 5, 1944
2,365,069	Grimes, Sr.	Dec. 12, 1944
2,381,398	Bosomworth	Aug. 7, 1945
2,389,878	Symmes	Nov. 27, 1945
2,419,922	Tippetts	Apr. 29, 1947
2,464,502	Hall	Mar. 15, 1949
2,464,536	Solliday	Mar. 15, 1949
2,509,741	Miles	May 30, 1950

FOREIGN PATENTS

Number	Country	Date
30,646	Canada	Jan. 28, 1889
470,331	Great Britain	Aug. 3, 1937