

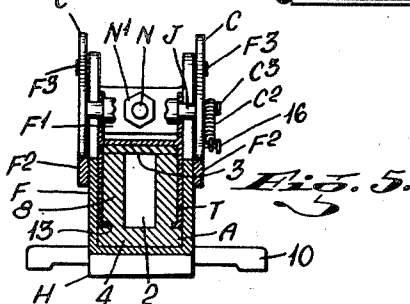
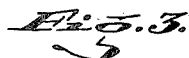
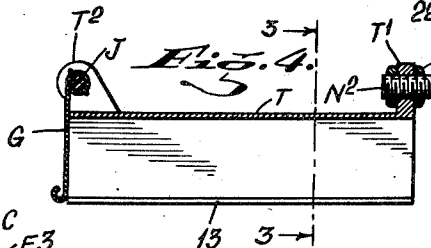
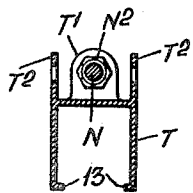
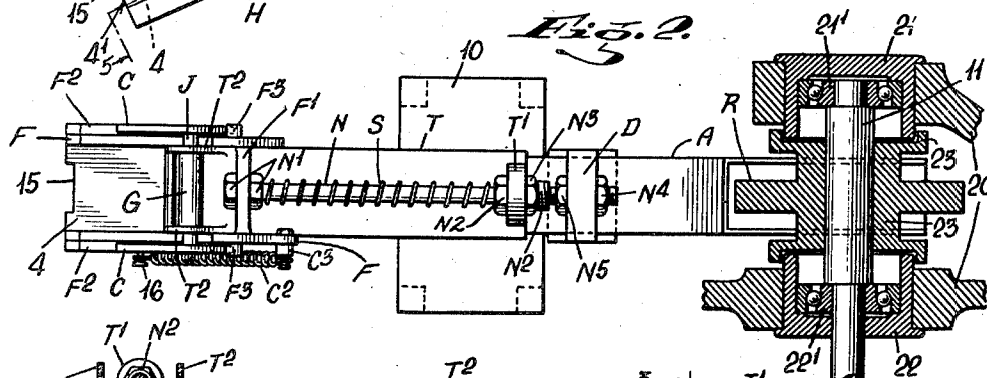
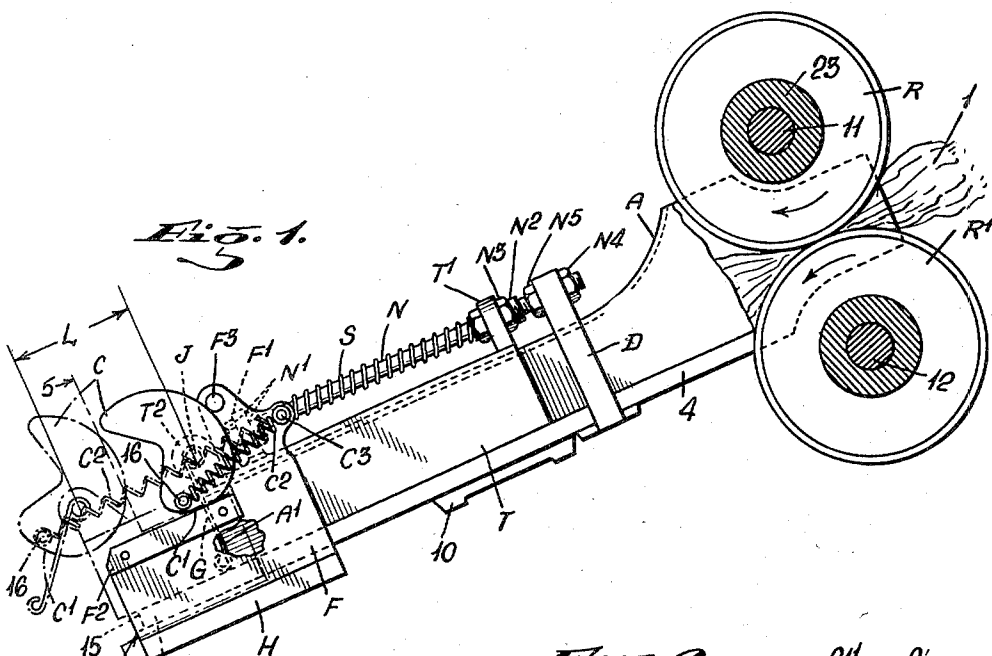
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MEANS FOR TREATING WOOLEN SLIVERS AND THE LIKE

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MEANS FOR TREATING WOOLEN SLIVERS
AND THE LIKE

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This invention relates to the treatment of wool and particularly to the crimping and the improvement of the quality of woollen fibers.

Certain types of wool or their fibers are inherently lacking in sufficient bulkiness or fluffiness and resiliency or springiness, and also in friction due to their luster or slippery character. One such wool is that known in the trade as Lincoln wool which comes from Lincoln sheep and such wool is marketed generally as grades 30s, 36s, 40s and 44s.

One object of the invention is the treatment of such a wool to improve the qualities as to bulkiness, fluffiness, resiliency, friction, etc.

To this end I have devised a method and apparatus for such treatment and improvement of the quality of the wool and in which the pressure to which the wool is subjected is accurately and positively controlled so that the entire length of sliver will be treated uniformly. More particularly, as the woollen sliver comes from the carding machine as, for example, from the sliver tube of a breaker card, I subject the sliver to a treatment for permanently crimping the individual fibers with the result that the quality of the wool in the respects indicated is very substantially improved.

For a better understanding of the invention reference may be had to the accompanying drawings, wherein

Fig. 1 is a view of a mechanism or attachment embodying and adapted for practicing the invention;

Fig. 2 is a plan view partly in section of the mechanism shown in Fig. 1;

Fig. 3 is a sectional view along the line 3-3 of Fig. 4;

Fig. 4 is a sectional view of a part of the mechanism; and

Fig. 5 is a view partly in elevation and partly in section along the line 5-5 of Fig. 1.

In one aspect of the invention it resides in subjecting the wool as, for example, the woollen sliver to a pressing and crushing action or actions to bend and crimp the individual woollen fibers under conditions and in a manner such that the woollen fibers retain or tend to retain permanently their crimped condition.

The wool in its normal state has grease which keeps it alive and non-brittle but when dry the fibers become brittle and tend to break during treatment in the carding machine. Before introduction into the carding machine it is the practice to moisten and treat the wool by applying to it in the preliminary opening or mixing process

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a sufficient quantity of a moistening fluid or emulsion such, for example, as olive oil, mineral oil and the like, to avoid the breaking of the fibers in the carding machine. The moisture or emulsion keeps the wool in flexible condition so that the fibers can give instead of breaking and gives to the wool a certain degree of elasticity.

During the crimping of the wool according to my invention the wool is specially conditioned as will be more particularly described below. I will first describe the mechanical crimping step and the apparatus therefor of my invention.

Referring to the drawing I have illustrated the wool to be treated according to my invention at 1 as, for example, a continuous wool sliver issuing from a sliver tube of a breaker card of a wool carding machine, the illustration of the latter being omitted for convenience. This continuous woollen sliver 1 is fed to the intake side of a pair of driven delivery rollers R and R¹ which forms a part of the apparatus for practicing the invention.

One embodiment of the invention comprises the pressure box or casing A having in the particular embodiment shown a central chamber 2 of rectangular shape which is provided with a cover 3, a bottom 4 and sides 8. The peripheries of the feed rollers R and R¹ are disposed in the chamber 2 and the rollers forcibly feed the sliver 1 into this chamber 2 longitudinally of the pressure box or casing and centrally thereof. The cover 3 of the box is removed in the vicinity of the rollers to permit the extension of the peripheries of rollers into the chamber 2. The bottom 4 of the casing or pressure box A extends to 4' while the sides 8 thereof in the particular embodiment shown are discontinued at a point in the vicinity of A¹. The pressure box or casing A may be supported in any suitable manner as, for example, by a base plate 10. The rollers R and R¹ respectively are mounted by shafts 11 and 12 for rotation in bearings 21' and 22' in bearing housings 21 and 22. Hub structures for the rollers are shown at 23 and bearing frame supports are shown at 20. The roller R¹ extends up through a slot formed in the bottom 4 of the pressure box.

The channel or chamber 2 of the casing A is made expansible in order to have the chamber expand responsively to the pressure on and volume of the wool sliver being built up in the chamber by the forcing of the sliver thereinto by means of the feed rollers R and R¹. In the particular embodiment shown this is effected by mounting on the pressure box or casing A a slidable mount member T, the latter being of channeled shape and embracing the sides 8 of the pressure box.

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This expansible member T is retained in longitudinally telescopic and easy sliding relation upon the pressure box A by provision of longitudinal guide grooves formed on the exteriors of the sides 8 of the box A which accommodate the peened over and inwardly extending edges 13 of the T side flanges. Fixed to the delivery end of the pressure box A is a stirrup or frame member F which carries a cross bar F' and to this cross bar is fastened a rod N by the nuts N¹, these nuts being screw threadedly attached to the rod on opposite sides of the bar F'. This rod is screw threaded at its other end for the reception of clamping nuts N⁴ and N⁵. The rod passes through a bracket D which is also attached in any suitable manner to the pressure box A and the rod is fastened at this end by means of the nuts N⁴ and N⁵. The expansible member T carries a lug T¹ extending upwardly from the rear end thereof. This lug or bracket T¹ is provided with an opening for the accommodation of the rod N and a headed sleeve N² that is fixed in the lug T¹ by the nut N³, the rod passing through the latter, and permitting the free movement of the lug T¹ and the sleeve N² along the rod under the pressure of the volume of wool being built up in the chamber 2.

The movement of the lug T¹ and the expansible member T is yieldingly opposed by the compression spring S which encircles the rod N and engages a nut N¹ at one end and the head of the sleeve N² at the other end. With no appreciable pressure or volume of wool in the chamber 2 compression spring S retains the expansible member T in the position shown in full lines in Figs. 1 and 2, namely with the gate or lid G carried at the rear end of the expansible member T in engagement with the end of the pressure box A. This gate or lid G is held in the closed position until the expansible member T is moved to a position approximating the dot and dash line position shown in Fig. 1. The gate or lid G is carried by a shaft J journaled in the pair of lugs T² formed on the rear end of the expansible member T, the lid G being fastened or keyed to the shaft J in any suitable manner.

The shaft J projects at its ends beyond the lugs T² in which the shaft is journaled and on each overhanging end is fastened or keyed a locking plate C. Each such plate C is formed with a flat surface C¹ that is arranged to slide along a stationary guide F² fastened to the frame F. When the plate surfaces C¹ of the locking plate C are slidably engaged with the upper surfaces of the guides F² the lid or gate G is locked in closed position against the pressure of the volume of wool in the expansible member T. When the pressure and volume in the expansible member T are sufficient to overcome the tension of the compression spring S and move the expansion member T to a position where the flat locking surfaces C¹ of the plate C are disengaged from the upper surfaces of the locking guides F², the pressure of the wool against the lid or gate G opens the latter to a position approximating that illustrated in the dot and dash line position shown in Fig. 1. The compressed and crushed and crimped wool in the expansion member T or a part of it is delivered out through the opening provided by the open gate or lid G. This releases or reduces the pressure on the spring S and the latter then moves the expansion member T backwards toward its former position. For assuring the closure of the gate or lid G when a volume of treated wool is forced outwardly past the open

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gate, a tension spring C² is provided. This spring C² is fastened at one end to a stud C³ which is fixed to one side of the frame F and at its other end to the adjacent plate C at 16. This spring biases the plate C in a counterclockwise direction (Fig. 1) so as to quickly bring the plate C to the gate closing position ready for the flat surfaces C¹ of the plates C to line up with and slide along or adjacent to the upper guide surfaces F². As indicated, the fiber of the wool assumes a crimped or zigzag formation as the strip or sliver of wool is forcibly fed lengthwise into the compression chamber and built up against the gate G and upon the unloading of a volume of treated wool through the open gate or lid G, the latter drops down to a suitable table or is otherwise disposed of, this unloaded portion however being connected by a continuous sliver of wool up to the carding machine. A notch 15 is conveniently formed in the end of the bottom 4 of the pressure box or casing A to facilitate the closing of the gate or lid G with the strip or sliver extending down through the notch 15.

Normally in the processing of the wool sliver with this invention the pressure chamber is made large enough to handle 50 or more feet of the sliver, although any size chamber may be used. The gate or lid G during the compression period is positively locked and the spring S controls the pressure to which the sliver is subjected. As the expansible member T is moved forward against the action of spring S, a point is reached at which the gate lock C is released. The gate G swings open under the pressure of the sliver and the latter leaves the chamber through the action of the compressive force to which it has been subjected. The sliver is a relatively thin loosely packed strand of wool and is readily compressible to a thickness of a 1/64" or 1/32". These thicknesses are less than normal manufacturing tolerances and the sliver extending outwardly through the open gate after discharge of the compressed sliver though being caught by the gate upon closure will not interfere with the normal closure of the gate. A small clearance between the bottom of gate G and the bottom 4 is provided to prevent any possible binding by reason of the presence of the thin strand of sliver. Upon closure of the gate under the action of spring C², the expansible member T moves backward preparatory to receiving and compression of the next length of sliver.

Preferably the crushing and crimping of the sliver in the compression chamber takes place while the sliver is conditioned so as to add permanency to the bulkiness, fluffiness, resiliency, springiness and friction of the wool. This conditioning may be effected in any suitable manner as, for example, by preconditioning the sliver before it reaches the pressure box A and then applying heat to the pressure box during the crimping operation to steam the wool simultaneously with the crimping operation. I have indicated at H a suitable heating means which may be either a steam jacket, an electric heater or other suitable heating means. The preconditioning involves applying sufficient moisture to the wool and moisture of a suitable fluid to provide the steam conditioning atmosphere desired or necessary for the permanent crimping of the woolen fibers. Ordinarily larger quantities of moisture or moisture producing fluids need to be applied to the wool than are employed in the conventional carding machine practice although lesser quantities of moisture would be effective to

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a certain extent. Instead of relying wholly upon a heater for producing the desired conditioning or steaming effect during the crimping operation, I may introduce steam directly into the pressure chamber for this purpose.

The means illustrated for practicing the invention is simple in structure and operation, can be inexpensively built and is automatic in its operation. For example, as described above, when the pressure from incoming sliver overcomes the resistance of the spring S the expansible part T of the compression chamber travels from the full line position to the dotted position shown in Fig. 1. Prior to reaching the end of this traverse the locking plates C pass over and from the stationary guides F² thereby removing the lock that such guides make with the flat surfaces C¹ of the plates C, whereupon the pressure of the packed sliver against the lid G overcomes the resistance of the spring C² and opens the lid. A length of crimped sliver is thereupon discharged from the pressure chamber and the pressure therein is relieved. When this takes place the member T is returned toward its original position by the spring S, the spring C² having moved the plates C and the gate or lid G to the closing position upon the release of the pressure.

The preconditioned or treated woolen sliver is preferably maintained at a predetermined temperature while being crimped as, for example, by a heating element H which is thermostatically controlled to maintain the predetermined temperature. The thermostatic control means is purposely omitted for convenience in illustration and any suitable conventional control of this character may be provided as, for example, a control which is normally maintained in the predetermined position by a spring or weight under the control of a temperature responsive device. The length or volume of the sliver which passes out through the open gate or lid G may enter onto the feed table of a finisher card, illustration of which is omitted herein for convenience.

The stirrup or frame F is provided with upward extensions on the opposite sides thereof and stops F³ are carried by these extensions so as to be in the path of the backwardly moving locking plates C. The expansible member T is thereby limited in its movement in the backward direction by the stops F³. The letter L indicates the approximate maximum movement back and forth of the expansible member T.

While I have described the invention as particularly applicable to the treatment and improvement of the quality of wool, it is understood that certain features of the invention are applicable to the treatment and crimping of other fibrous materials as, for example, jute, ramie, cotton or similar fibers without inherent waviness or crimp.

I claim:

1. In a means for treating woolen sliver and the like, the combination of a pressure chamber having an inlet and an outlet, positively locked closure means for said outlet, means for forcibly feeding woolen sliver into said chamber through the inlet and tightly compressing and packing the same therein, and means for unlocking the closure means upon the attainment of a predetermined pressure in said chamber to discharge the compressed sliver.

2. In a means for treating woolen sliver and the like, the combination of a pressure chamber having an inlet and an outlet, positively locked closure means for said outlet, means for forcibly

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feeding woolen sliver into said chamber through the inlet and tightly compressing and packing the same therein, means for unlocking the closure means upon the attainment of a predetermined pressure in said chamber to discharge the compressed sliver and means for heating said sliver while compressed and packed in said chamber.

3. In a means for treating fibers of the character set forth the combination of a pressure chamber having an expansible portion, means biasing said expansible portion in one direction, said expansible portion having a closing lid, means for forcibly feeding a strip of the fiber into said chamber and packing it against said lid, means for locking the lid in closed position during the first part of movement of said expansible portion against said bias but permitting the opening of the lid when a predetermined pressure inside the pressure chamber is reached.

4. In a means for treating fibers of the character set forth, the combination of a pressure chamber having an expansible portion, means biasing said expansible portion in one direction, said expansible portion having a closing lid, means for forcibly feeding a strip of the fiber into said chamber and packing it against said lid, means for locking the lid in closed position during the first part of movement of said expansible portion against said bias but permitting the opening of the lid when a predetermined pressure inside the pressure chamber is reached, and means bringing the lid to closed position upon the release of pressure.

5. In a means for treating fibers of the character set forth, the combination of a pressure chamber having an expansible portion, means biasing said expansible portion in one direction, said expansible portion having a closing lid, means for forcibly feeding a strip of the fiber into said chamber and packing it against said lid, means for locking the lid in closed position during the first part of movement of said expansible portion against said bias but permitting the opening of the lid when a predetermined pressure inside the pressure chamber is reached, and means for heating said compression chamber.

6. In a means for treating fiber of the character set forth, an expansible pressure chamber having a relatively fixed portion and a movable portion which are telescopically movable with respect to each other, spring means biasing the movable portion in a direction against the pressure created in the chamber, a closing lid for the end of said movable portion, locking means for said lid for holding the lid in the closed position and spring means tending to close said lid but adapted to release the lid for opening under the pressure of fiber packed in said movable portion and means for forcibly feeding a strip of fiber into said chamber.

7. In a means for treating fiber of the character set forth, an expansible pressure chamber having a relatively fixed portion and a movable portion which are telescopically movable with respect to each other, spring means biasing the movable portion in a direction against the pressure created in the chamber, a closing lid for the end of said movable portion, locking means for said lid for holding the lid in the closed position and spring means tending to close said lid but adapted to release the lid for opening under the pressure of fiber packed in said movable portion and means for forcibly feeding a strip of fiber into said chamber comprising a pair of driven rollers.

8. In a means for treating fiber of the charac-

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ter set forth, an expansible pressure chamber having a relatively fixed portion and a movable portion which are telescopically movable with respect to each other, spring means biasing the movable portion in a direction against the pressure created in the chamber, a closing lid for the end of said movable portion, locking means for said lid for holding the lid in the closed position and spring means tending to close said lid but adapted to release the lid for opening under the pressure of fiber packed in said movable portion and means for forcibly feeding a strip of fiber into said chamber, said locking means comprising a plate pivotally mounted and carrying said lid, said plate having a flat sliding and locking sur-

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face and a fixed guide engaging said flat surface and preventing the opening of the lid during a part of the movement of the expansible portion.

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