

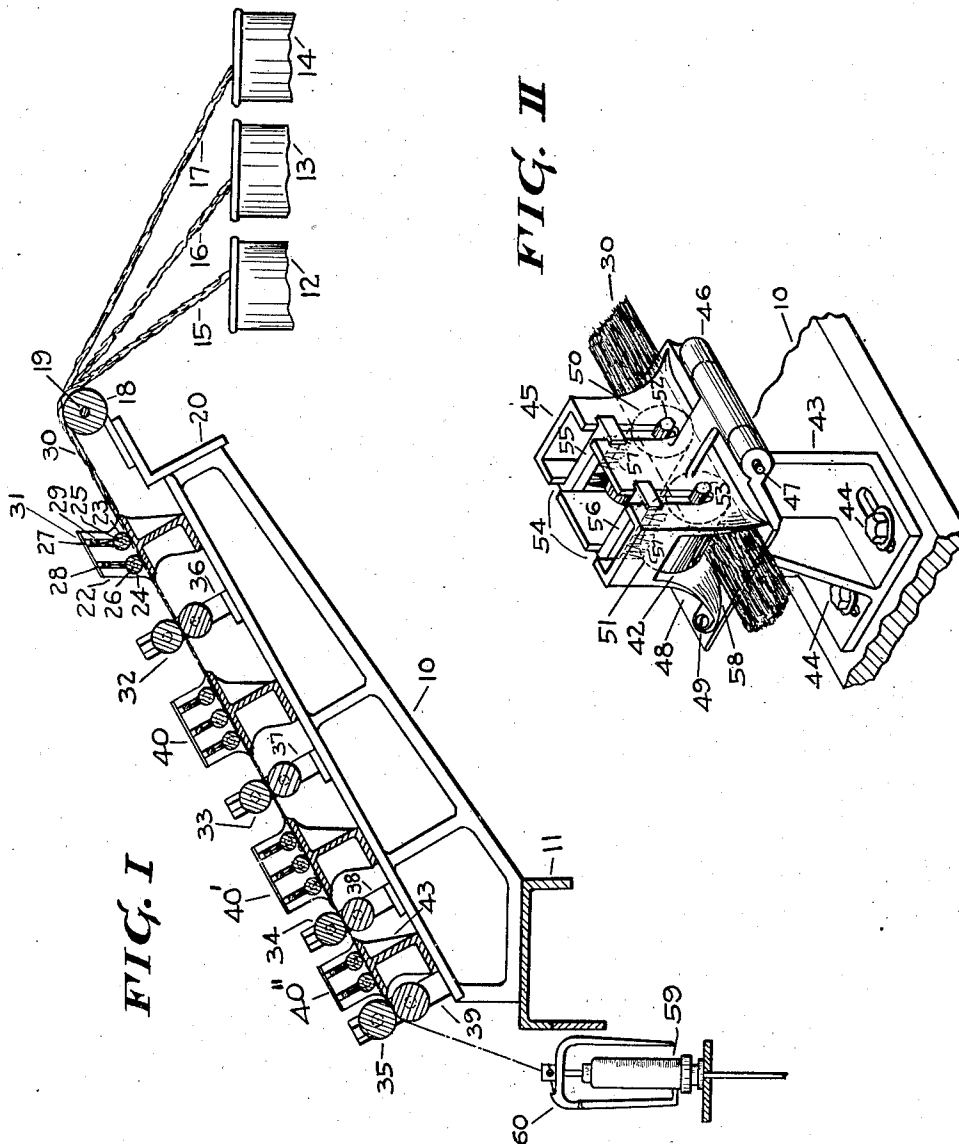
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APPARATUS FOR WORSTED DRAWING

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APPARATUS FOR WORSTED DRAWING

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This invention relates to an apparatus and to a method for applying draft to worsted slivers while controlling the movement of the individual fibers within the sliver.

More particularly, the invention contemplates as within its scope the application of a lateral pressure or pressures to the sliver within the drafting area or areas by the use of properly proportioned control units which preferably are relatively deep so as to support and cooperate with rolls mounted to enter their open side and yieldably rest for free rotary motion on the sliver being drafted.

Heretofore worsted spinning has usually involved numerous steps and/or a large investment in equipment and has generally been carried out by the so-called Bradford or French systems, or modifications or combinations thereof. One such combination system is the Anglo-Continental System. In addition to these systems, attempts have been made to continuously reduce slivers to worsted yarns with porcupine combing units in multiple stage drafting, as set forth in the United States patent to Knowles No. 2,127,410, which is mentioned as being illustrative of prior efforts to avoid the multiplicity of steps or machines of the more conventional systems.

According to the present improvements, a means and method have been provided which involve relatively simple but efficient devices to be used in combination with either single or multiple stage drafting units. The parts between the draft rolls preferably do not contain positively driven parts and are readily detachable so that changes of these parts according to the stock being run can readily be made.

It is well understood that worsted yarns contain short, medium and long fibers and that an important difficulty of control results from the presence of the short fibers and from their tendency to form slubs in the final product. This difficulty and tendency has been overcome by the present improvements, as pressure on the outside of the sliver for a substantial portion of the drafting area apparently creates an inter-fiber surface friction within the sliver, and hence a relatively proportional movement of fibers within the entire sliver proper to the number of fibers being actually pulled forward by the front nip rolls. In this way accumulation of short fibers in any one place is avoided and a uniform product substantially free of slubs produced.

When the product produced is light, such as a final yarn or roving, it is preferred to use a relatively high single draft, or in the case of mul-

multiple stage drafting a relatively high draft in the last stage, because this facilitates the provision of the inter-fiber surface friction above mentioned.

Various means may produce desirable results, according to these improvements, but the use of sliver shaping devices made of smooth sheet steel or other finished or polished material is especially suitable.

The control units may have their opposed sides correspondingly slotted at spaced intervals to provide a bearing surface or support for the shaft of a smooth or fluted roller fixed to or loosely mounted thereon and resting on the sliver being processed. The rollers lend flexibility to the mechanism and a wider range of stock can satisfactorily be processed than if an elongated rectangular, circular or other tube were used, or floating of the rollers were inhibited as by a close fitting fixed bearing surrounding the shaft.

Refinements, including lengthwise tapered control units, to increase the uniformity of control may be used and are especially desirable when the stock contains a relatively high percentage of short fiber.

The drafting rolls are set apart to provide a ratch consistent with good practice and to avoid breakage of an excessive number of fibers, although the control features herein set forth prevent the ends of such broken fibers from flying out away from the body of the sliver.

An object of this invention is to provide an apparatus which effectively controls the fibers of untwisted worsted slivers and creates an inter-fiber surface friction substantially uniformly in single or multiple stage drafting.

Another object is to eliminate many of the steps and machines common to present day worsted spinning and to substitute therefor sliver control methods and devices which shape the sliver in the drafting stage or stages and create an inter-fiber frictional resistance by pressure applied to each outer portion of the sliver as it moves through the drafting area or areas.

Another object is to provide a sliver control unit which is easy to thread.

Another object is to maintain the untwisted worsted slivers substantially rectangular in cross section and in compression as they move through single or multiple stage drafting devices.

Another object is to provide cleaning means for the pressure rollers.

Another object is to provide a control unit for untwisted worsted fibers which comprises a suitable channel and a cooperating roll or rolls.

Another object is to provide a control unit for untwisted worsted fibers which comprises a suitable channel and floating or yielding mounted rolls which rest on and are turned by the sliver being processed through the machine.

Another object is to provide an effective and economical method of producing exceedingly high drafts in the production of worsted yarns.

Another object is to provide a relatively high single draft or high last stage draft while controlling the sliver and reducing it to small size for high or low twisting, as in final rovings or in final spinning.

Another object is to reduce the number of steps involved in production of yarns by the conventional systems.

These and other objects will be manifest from a consideration of the following description, claims and drawing, in which,

Figure I is a partly diagrammatic elevational view, partly in section, of a stage draft arrangement incorporating a preferred embodiment of my improvements.

Figure II is a detail assembly of the control unit nearest the front rolls of Figure I.

Referring to Figure I of the drawing, wherein an inclined frame 10 is supported at a suitable height on support 11, it will be seen that cans 12, 13 and 14 are receptacles for the slivers 15, 16 and 17 which are fed or drawn over roller 18 on shaft 19 secured to bracket 20 on frame 10. The untwisted slivers 15, 16 and 17 converge at flared channel 22 and are compressed by the sides of the channel and rollers 23, 24, which have projecting shafts 25, 26 to engage vertical slots 27, 28 of the channel 22. Suitable loosely mounted brushes 29 contact the top of the freely rotatable rollers 23 and 24 to keep them free of loose fibers and to avoid the possibility of lapping of a portion of the sliver or slivers 30 passing through the channel 22. A detachable top plate 31 conveniently closes the top of the slots 27, 28 to prevent dislodgment of the brushes and rollers.

All the channel roller assembly units are aligned with the nips of the drawing rolls for a substantially straight line movement of the stock through the several draft stages. In general, each unit preferably has a plurality of rollers. The number and weight of the rollers may be varied according to the particular worsted blend and the size of the stock being run. The channel slots may be inclined or vertical throughout both types being shown for purposes of illustration.

The pairs of draft rolls 32, 33, 34 and 35 are driven at progressively higher speeds and the intermediate pairs 33 and 34 function both as front and rear rolls for the stock being drawn. These draft rolls are of conventional design and are supported by brackets 36, 37, 38 and 39, which are adjustable lengthwise of the frame 10 so that the ratch may be varied. The lower rolls of each pair are usually of fluted construction and the upper rolls are of the usual type and are removable from the slots of their bearing brackets 36, 37, 38 and 39.

The control units 40, 40' and 40'' between the pairs of rolls are similar to each other and to the arrangement described in connection with channel 22 and the cooperating parts and, as will be seen from Figure II, comprise a channel 42 having a base 43 adjustably secured at 44 to the inclined frame 10. The upper portion 45 of the control unit is hinged at 46 about pin 47 and fastened to plate portion 48 by screw 49. For

threading the machine the screw 49 is backed off or removed and the upper portion 45 pivots about pin 47, whereupon the stock may be positioned so as to be compressed by the rollers 50 and 51 when the control unit is secured in operative position.

The rollers 50 and 51 have projections 52 and 53 on each end resting for free rotating movement in the slots 54 of the control unit. The members 55 and 56 have T-shaped ends and support bristles or brushes 57 which rest on the rollers 50 and 51 and move freely up and down therewith. Any suitable cover, such as a snap clamp or secured plate may be used if desired to prevent the brushes and rollers from falling out when the upper portion is turned far back about its pivot 47.

While my illustrated embodiment discloses a hinged portion, it is to be understood that this feature is not essential to my broad concept. For example, satisfactory results have been obtained by the use of fixed channels, completely open at the top, and merely slotted to receive the rollers and brushes. In this case the threading is done by removing the rollers and re-inserting them after the stock is positioned within the channel.

In Figure II the stock of untwisted worsted sliver 30 is shown relatively large to illustrate the compressive and shaping action of the side walls of the channel as well as of the base plate 48 and rollers 50 and 51. The sliver is entirely surrounded by these parts and the compression is kept uniform throughout the cross-section of sliver by the movements of the weight rollers 50 and 51.

The upper or channel forming portion 45 is preferably chamfered and flared as shown at 58 so that the unit can operate very close to the nip of the rolls and to avoid presenting a square shoulder to the sides of the untwisted sliver 30. The sliver 30 is not folded but compressed on its sides as it moves under the rollers 50 and 51.

The control units of the first and second drafting stage have been generally depicted as 40 and 40'. Each is shown as having three rollers, but in other respects they are the same as the forward unit illustrated in detail in Figure II and need no detailed description.

Complex fiber blends, including several varieties of wool, mohair, acetate and other fibers, have been drawn on the device. For example, satisfactory results have been obtained by taking two slivers of such a make-up having a combined weight of 704 drams per 40 yards. The slivers were combined and subject to successive drafts of 3.6, 4.5 and 8.7 or a total draft of 141 before being twisted on bobbin 59 by flyer mechanism 60.

The rollers 23 and 24 may be made of metal and approximate one inch in diameter. The control units are progressively more narrow in the successive stages as it is apparent that the cross section of the stock is reduced in proportion to the previous amount of draft the sliver was subjected to. The weight of the rollers 23 and 24 will depend on the character and length of the fibers as well as the bulk of the fibers in the particular stage. If the weight of the rollers is too great, a pinching action will result and cause excessive breakage, especially when the sliver has been substantially reduced. Proper weights for the particular stock are readily determinable and are in the nature of 4 oz. in the first stage and .4 oz. in the last stage.

It will thus be seen that I have provided a control unit in the path for the stock being worked and that in the illustrated embodiment the roll-

ers 50 and 51 constitute a yielding cover which compresses the slivers and maintains a uniform pressure at all times. The base plate portion 48 of the control unit preferably extends the major portion of the distance between the rolls to support the sliver and very close to the nip of the front drawing rolls of each stage. This base, together with the side walls of the upper portion 45, constitutes a channel.

Having described a preferred embodiment of my invention and wishing to be limited only by the scope of the following, I claim:

1. In an apparatus for attenuating slivers, the combination of pairs of drawing rolls arranged in series to provide draft stages through which the sliver being drawn is passed as it travels through the draft stages, sliver supporting and compressing means positioned in the draft stages, said supporting and compressing means comprising a stationary support extending the major portion of the distance between the pairs of rolls of each draft stage, and a yielding cover which together with the support proper completely surrounds a portion of the path of the sliver in each stage, whereby said support and cover will successively engage the entire periphery of the sliver as it is processed, and an inter-fiber frictional resistance will be created within the sliver in each draft stage.

2. A drafting device for worsted slivers which includes a set of back feed rolls, a set of forward drawing rolls, and sliver control means positioned between the back and forward rolls, said control means consisting of a suitably mounted stationary channel sliver supporting member which extends the major portion of the distance between the pairs of rolls and through which a sliver moving between the sets of rolls may pass, and means cooperating with and extending into and across the inside width of said channel to exert a yielding pressure on a sliver being processed, whereby the entire periphery will be successively engaged within the draft stage and an inter-fiber frictional resistance created within the sliver.

3. A drafting device for worsted slivers which includes a set of back feed rolls, a set of forward drawing rolls and sliver control means positioned between the two sets of rolls, said control means consisting of a suitably mounted stationary channel sliver supporting member which extends the major portion of the distance between the pair

of rolls and through which a sliver moving between the sets of rolls may pass, and freely mounted rollers extending into the channel groove and across the width of the groove to exert a yielding pressure on the sliver as it is being processed, whereby a portion of the entire periphery of the sliver will be engaged within the draft stage and an inter-fiber frictional resistance created within the sliver.

4. In the combination set forth in claim 1, further characterized in that the yielding covers comprise a roller.

5. An apparatus as set forth in claim 1, further characterized in that the stationary supports are progressively narrower three-sided channel members.

6. An apparatus as set forth in claim 1, further characterized in that the stationary supports are progressively narrower three-sided channel members, and that the yielding covers comprise a roller which is approximately the width of the cooperating channels.

7. In an apparatus for attenuating slivers, the combination of a pair of feed rolls and a pair of drawing rolls arranged to provide a draft stage for drawing slivers, sliver supporting and compressing means positioned in the draft stage, said supporting and compressing means comprising a stationary support extending the major portion of the distance between the pairs of rolls of the draft stage, and a yielding cover, which together with the support completely surrounds a portion of the path of the sliver in the draft stage, whereby said support and cover will successively engage the entire periphery of the sliver as it is processed, and an inter-fiber frictional resistance will be created within the sliver in the draft stage.

8. In the combination set forth in claim 7, further characterized in that the yielding cover comprises a roller.

9. An apparatus as set forth in claim 7, further characterized in that the stationary support is a three-sided channel member.

10. An apparatus as set forth in claim 7, further characterized in that the stationary support is a three-sided channel member and that the yielding cover comprises a roller member which is approximately the width of the channel.

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