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LONG DRAFT APPARATUS AND PROCESS FOR DRAWING TEXTILE ROVINGS

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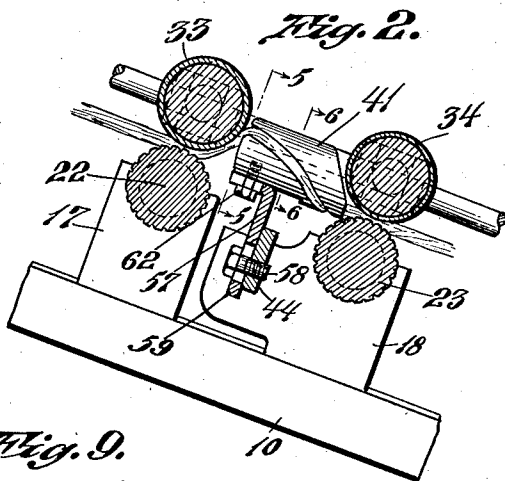
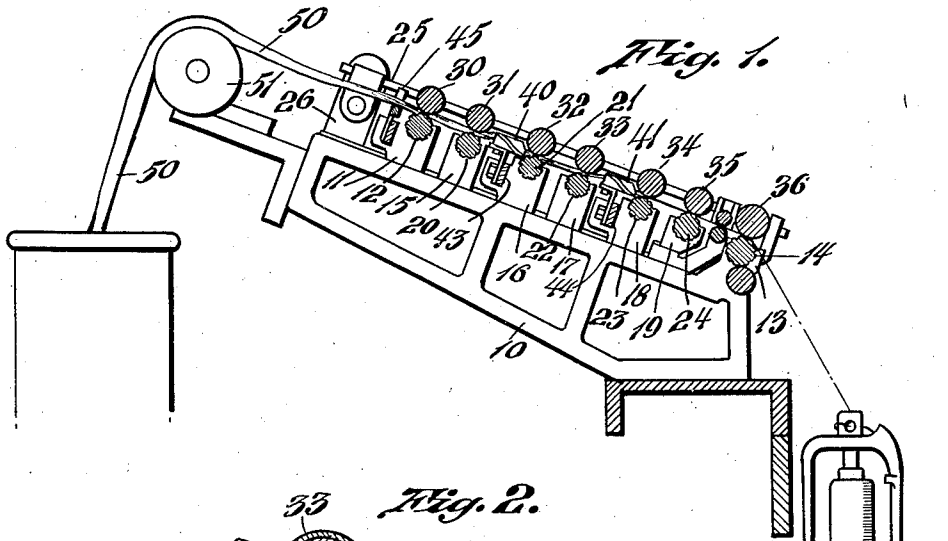


Fig. 4.

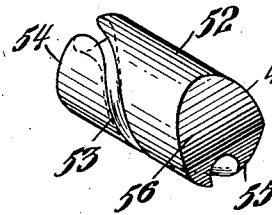
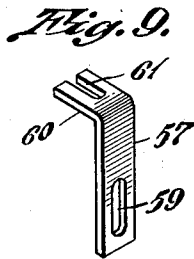
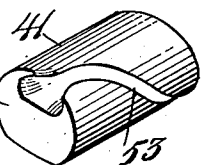
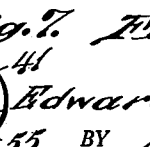
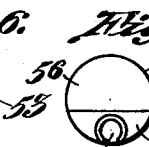
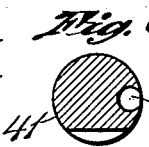
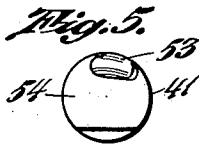


Fig. 5.



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LONG DRAFT APPARATUS AND PROCESS FOR DRAWING TEXTILE ROVINGS

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42 Claims. (Cl. 19—130)

This invention relates to a device for use with mechanisms for drawing fibrous materials, such as may be employed in long-drafting processes, and more particularly to roving frames in which such operations are performed; and has for one of its objects to provide an improved device and method for controlling the condition of the sliver and supporting the same as it passes from one draft stage to the next following draft stage of the machine.

Another object of the invention is to provide an improved controlling device for the sliver adapted to be positioned between the last pair of drawing rollers of one drafting stage and the first pair of drawing rollers of the next following drafting stage, in which the device is arranged to be stationary or non-revolving with reference to the sliver and is of such a character as to present a continuous uniformly changing path of movement for the strand of sliver during its passage therethrough.

Another object of the invention is to provide a device of the above type which is capable of condensing the sliver and folding into the body of the strand the outlying fibers which lie near to and at its selvage edges so as to concentrate, condense and compact them into a dense condition while causing the strand to move in a curvilinear path about the axis of the device while traveling therethrough.

Another object of this invention is to provide a device of the above type by means of which a uniform false twist not exceeding one complete turn may be imparted to the traveling sliver to enable the same to hold its shape without breaking as it is conveyed across the intervening span between two adjacent sets of drawing rollers of a series of draft stages.

Another object is to improve the construction of roving and like drawing apparatus in order that longer drafts of the sliver may be satisfactorily handled, and in which the roving may be made from the sliver in a single drawing operation, thus dispensing with the previous several successive drafting operations heretofore usual by means of a series of separate machines.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a side elevational view in section of a roving frame embodying my invention;

Fig. 2 is an enlarged fragmentary view in elevation, of an intermediate portion of Fig. 1,

illustrating my invention as applied to such a machine;

Fig. 3 is a detail view, in perspective, of one of the sliver condensing-support members;

Fig. 4 is a detail perspective view of the sliver-supporting member of Fig. 3 viewed from the entrance end thereof;

Fig. 5 is a detail end view taken on the line 5—5 of Fig. 2, showing the entrance end of my sliver conducting member, but with the sliver omitted therefrom;

Fig. 6 is a detail central cross-sectional view taken on the line 6—6 of Fig. 2 and with the sliver omitted from its supporting channel;

Fig. 7 is a detail end view showing the shape of the discharge or exit end portion of the sliver carrying channel;

Fig. 8 is a detail cross-sectional view of the sliver body after passing through my condenser device; and

Fig. 9 is a detail view in perspective of the bracket construction for supporting one of my sliver condensing members.

Heretofore, it has been customary in the usual production of yarn and like attenuated fibrous products to effect the requisite drawing or attenuation of the sliver to the desired degree by successively passing the same through a series of separate machines or frames, during which process the sliver in traveling through each machine is drawn as it passes between several consecutive sets of drawing rolls rotating at progressively and materially increased velocities, and then twisted, which operations are repeated until the sliver being drawn has been completely attenuated to the desired degree.

In accordance with my invention, I propose to eliminate the need for the several successive drafting operations and intermediate machines, such as slubbers and intermediate roving, heretofore previously considered to be necessary in the roving process, and I obtain the full requisite draft of the final fine roving in a single machine of high draft directly from the sliver as made by the usual drawing frame; and in order to accomplish this operation and to prevent the sliver from tearing, fraying or breaking as it passes from the last set of draft rolls of the one draft stage to the first pair of rolls of the next succeeding drafting stage, I have provided a novel device for mechanically supporting the sliver and comprising a sliver-engaging member which is stationary and non-revolving with respect to the sliver, the member being detachably supported and extending in the path of travel of the sliver

and positioned in the space between said pairs of rolls; and I have provided the device with means of such a character as to present a curving or sinuous path of travel for the sliver as it is supported thereby to impart to the sliver a false twist in passing therethrough, while simultaneously acting thereon to condense the strand of sliver and turn-in the outlying fibers thereof in the vicinity of its selvage edges and lay them close to the body of the sliver and consolidate them therewith to provide a solid compact strand of materially greater density than it had prior to passing through this device. The device used comprises a member of generally helicoidal form, preferably having a solid elongated body portion, the side surface of which is provided with a circumferential groove formed or cut therein whose shape substantially conforms to a partial helix around a cylinder, the groove being disposed preferably lengthwise of the device and spaced from its axis. The pitch or lead of this sliver controlling helix is preferably made such that the body of the strand of sliver in passing through the folder is given a partial false twist not to exceed one complete turn and usually not greater than half a turn, and in an opposite direction to the subsequent normal roving twist placed therein by the customary traveler and flier after the strand is delivered at the front pair of rollers and passes therefrom to be wound upon a suitable bobbin. The helical groove also extends through an angle which is so disposed as to allow the sliver which is condensed therein to pass through the groove without acting on the sliver to tension the same to an extent sufficient to materially restrain its free movement or retard its travel as to cause rupture thereof in its passage through the groove.

In order to convert the loose, light sliver as made by the drawing frame into a form in which it may be properly carried across the space between the last pair of rolls before entering the device and the first pair of rolls after leaving the device without tearing or breaking of the strand, I preferably provide the sliver carrying groove with a convex flaring mouth, of generally elliptical shape which progressively diminishes inwardly and becomes constricted to merge with a partially circular-shaped portion which constitutes the general form of the groove throughout the major extent of the device. I have provided this variation in shape of the sliver groove in order to effect a condensing action on the ribbon-like strand of roving and compress the same into a more dense mass, and, in addition, to utilize this change in shape and the edge portions of the groove walls to fold or turn-in the outlying shorter fibers of the sliver and thereby effect a consolidation of all the fibers so that a high degree of attenuation may be produced without "bunching" of the short fibers to produce irregular yarn; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawing, the drawing mechanism shown in Figs. 1 and 2 comprises a roving frame of one conventional type having a stationary frame member or roll stand designated 10 provided with support bearings 11 for the bottom back roll 12, support bearings 13 for the bottom front roll 14, and bearing bodies 15, 16, 17, 18 and 19 for the lower intermediate drawing rolls 20, 21, 22, 23 and 24, all of which lower rolls are usually of fluted construction. An overarm

25 is pivotally supported from a standard 26 at the rear of the frame and there is mounted upon this overarm in suitable bearings thereon the upper rolls 30, 31, 32, 33, 34, 35 and 36, respectively, these rollers being arranged so as to cooperate with the respective lower rolls and provide a plurality of sets of drawing rollers between which the sliver travels. The bearings for the upper drawing rolls are of the usual type and in the form of slots with open ends which receive the axles or pin mountings of the upper rolls whereby they may be guided and easily removed from the bearings when desired. The upper rolls usually are leather covered and they may be weighted in any suitable manner as is the customary practice in the art, the particular weighing mechanism used forming no feature of the present invention. The above sets of drawing rollers of the drawing mechanism operate successively on the sliver in the direction of its travel with progressively and with greatly increased velocities to attain the desired degree of attenuation of the sliver and provide the final fine roving. Thus, the rolls 20, 31 are rotated faster than the rolls 12, 30 to impart an initial draft to the sliver in its passage through the machine. In the next draft stage rolls 21, 32, however, rotate at the same speed as the set of rolls 20, 31 in the preceding drafting stage so that in the passage of the sliver across this span between the successive stages no draft occurs. As the sliver passes between rolls 21, 32 and 22, 33, a second draft occurs, whereas a second zone of no draft is formed between the rolls 22, 33 and 23, 34. The final draft is received by the sliver in passing between the rolls 23, 34, 24, 35 and 24, 36, respectively, after which it is delivered at the front rolls to receive the usual twist and be wound on suitable bobbins as finished roving.

In order to engage and support the strand of sliver as it is delivered from the last set of drawing rolls of one draft stage and to concentrate the fibers into a form permitting it to be conveyed to the next succeeding drafting rolls, a plurality of sliver engaging members 40 and 41 are provided which are arranged in series and alternate between the successive drafting stages in the aforementioned zones of no draft. The members 40 and 41 are of identical construction, the former being mounted between the pairs of rolls 20, 31 and 21, 32, respectively, while the other member 41 is interposed between the two sets of rolls 22, 33 and 23, 34, respectively, the positions of both members 40 and 41 being such that the sliver guiding means thereon will be placed so as to deliver the same at a point substantially opposite the line of nip between the two pairs of draft rolls of the next following draft stage. The members 40 and 41 are preferably mounted on slidable traverse bars 43 and 44 which are adapted to slide parallel with the usual traverse bar in suitable guideways formed in the bearing blocks 16 and 18, respectively, wherein they may be reciprocated to and fro axially of the rolls and crosswise of the frame 10 in unison with and actuated by the movement of the rear sliver guide 45. The bars 43 and 44 may be suitably coupled to the traverse bar of the rear guide 45 by a suitable strap (not shown), the rear sliver guide 45 being oscillated by means of any suitable reciprocating mechanism (not shown), as is well-known and common practice in the art.

The sliver 50 is pulled up from a can at the rear of the frame and passes over the wooden carrier roller 51 from which it is fed between the

pairs of draft rolls in succession, the preparatory draft being applied to it in its passage from the rear pair of rolls 12 and 30 to the intermediate rolls 20 and 31. On leaving the latter rolls the sliver 50 is then condensed and given a false twist as it passes through the condensing-guide member 40, followed by a second draft thereof on entering the next draft stage and passing between the set of rolls 21 and 32 and the set of rolls 22 and 33. Upon delivery from the rolls 22 and 33 the sliver is acted upon by the condenser-guide 41, whereof it is condensed and given a false twist. The sliver thus formed is then subjected to an increased draft by the intermediate sets of rolls 23 and 34, 24 and 35, and the front rolls 14 and 36. As the sliver emerges at the front pair of rolls 14 and 36 it is wound upon a suitable bobbin in the usual manner as is customary in the art, during which operation it receives the desired amount of final twist to afford it the required strength.

As illustrated in the drawing, each of the sliver-supporting condenser devices 40 and 41, respectively, comprises a helicoidal member having a substantially cylindrically shaped elongated body 52 provided with an exterior helical groove 53 extending partially around its circumference, commencing at a point adjacent to the end face 54 on the top surface of the body 52 and proceeding in a winding course along the exterior cylindrical surface of the body, the groove terminating in the other end face 55 of the body 52 adjacent to its undersurface and in a substantially diametrically opposite position with respect to the end face 54. The top end portion of the face 55 of each device is chamfered as indicated at 56, in order to provide clearance therefor and enable it to be positioned in close proximity to the curved portions of either of the top rolls 32 and 34, respectively, when the condenser member is mounted in position with respect to these drawing rolls for acting on the sliver, whereby the sliver 50 may be delivered opposite the line of nip of the adjacent pair of rolls 21, 32 or 23, 34, respectively and close to the point of nip thereof. Both the entrance and exit ends of the sliver conducting groove 53 are off-set relative to the axis of the body 52, and the groove 53 presents a uniform continuously curving path for the sliver about the axis of the body 52 and is located at a uniform distance therefrom so that the sliver in passing through the groove 53 from one pair of rolls of one draft stage to the next following pair of rolls of the succeeding draft stage will revolve bodily about the axis of said body 52 and be given a false twist.

The sliver-supporting devices 40 and 41 may each be made of any suitable material, such as metal or moldable plastic materials. One feasible construction may be made by cutting a helical groove in the surface of a metal cylinder composed of steel, brass or aluminum by a suitable milling operation. Various other ways of making such a member will also be apparent, such as by casting the metal body to the helicoidal shape, or the member may be formed of a suitable heat settable material, such as rubber or a resinoid, preferably of the phenolic type, molded and matured under conditions of heat and pressure to provide an article of the desired shape and form. It is essential, however, that the material selected for constructing the devices be of a type which in its final state will be capable of taking a smooth polish and provide a sliver-engaging surface which will not impart a high

drawing resistance or catch and impede the movement of the sliver in its passage through the device.

Each of the sliver condensing members 40 and 41 are supported on an L-shaped support 57, as illustrated in Fig. 1, in which position they are positioned in the no-draft zones and mounted in a vertical position therein on the support 57 by means of a suitable clamping screw 58 which passes through a suitable aperture 59 formed in one leg of the member 57 to secure the latter to the reciprocable bars 43 or 44. The aperture 59 is preferably of an elongated shape and extends lengthwise along the leg of the support 57 in order to provide a vertical adjustment for the folder guide. Formed in the other or short leg 60 of the clamp 57 is an elongated slot 61 extending longitudinally inwardly from the end edge thereof to accommodate a clamping bolt 62 for securely fastening the member 40 or 41 to the support 57 yet permitting detachment or horizontal adjustment of the sliver supporting members with respect to the adjacent draft rolls and for setting the members with respect thereto with reference to the spacing arrangement thereof.

The sliver-supporting and condensing devices 40 and 41, respectively, are each preferably located with relation to the drawing rolls so that the center of the delivery or exit end portion of the groove 53 will be in substantial alignment with the line of nip of the next following rear line of drawing rolls 21, 32 or 23, 34, respectively, which latter arrangement is illustrated in Fig. 2. In both cases, the sliver 50 upon being delivered from between the set of draft rolls 20, 31 and 22, 33, travels upwardly about the lower peripheral face portion of the rolls 31 or 33 to a slightly elevated position above the line of draft of all of the drawing rolls of both intermediate draft groups, and the sliver is then led through the sliver-conducting groove 53 of the devices 40 and 41 where the fibers are condensed and consolidated into a compact condition for entry to the succeeding drafting stage.

The operation of the apparatus will now be apparent from the foregoing description: The sliver 50 is first drawn upwardly from a can container and passed over the revolving rear roll 51 and then through the usual rear sliver guide 45 to the rear line of rolls 12 and 30. The sliver is then drawn as it is fed between the intermediate rolls 20 and 31, after which it passes in succession through the non-revolving condenser guide 40 and condensed and given a false twist there-through. The sliver then receives a second drawing operation while traveling between the next following set of intermediate rolls 21, 32 and 22, 33, respectively. The sliver thus drawn then enters the second non-revolving condenser device 41 which imparts thereto a false twist and condenses the sliver into a solid compact strand during its passage therethrough. The sliver in this condition is fed through the draft rolls 23, 34 and 24, 35, whereupon it emerges at the front rolls 14 and 36 in a considerably attenuated and final drafted condition. After this final draft, the strand of sliver or roving is operated on by the customary flier device whereby the strand is twisted and packaged upon a bobbin for subsequent use.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being de-

fined and limited only by the terms of the appended claims.

I claim:

1. The combination with a long-draft drawing or roving frame having at least three pairs of drawing rolls arranged in series to provide a draft stage followed by a stage of substantially no-draft and between which the sliver being drawn is successively passed as it travels from the rear rolls to the front rolls, of a sliver-supporting member positioned in the stage of substantially no-draft between the front and intermediate pairs of rolls, said member having a helically-grooved guide portion for the sliver, the entrance end of said grooved guide portion being offset relative to the axis of said member and disposed above the line of nip of the adjacent pair of drawing rolls of the preceding draft stage.

2. The combination with a long-draft drawing or roving frame having at least three pairs of drawing rolls arranged in series to provide a draft stage followed by a stage of substantially no-draft and between which the sliver being drawn is successively passed as it travels from the rear rolls to the front rolls, of a sliver-supporting member positioned in the stage of substantially no-draft between the front and intermediate pairs of rolls, said member having a helically-grooved guide portion for the sliver, the entrance and exit ends of said grooved guide portion being offset relative to the axis of said member, said entrance end portion being disposed above the line of nip of the adjacent pair of drawing rolls, said exit end portion being disposed in a substantially aligned position opposite the line of nip of the adjacent drawing rolls of the next drafting stage.

3. In a drawing mechanism of the character described, in combination, three pairs of relatively rotatable drawing rolls arranged in series to provide a draft stage followed by a stage of substantially no-draft and between which the sliver being drawn is successively passed, the intermediate pair of rolls being rotated faster than the rear rolls to attenuate the sliver, and the front rolls being rotated at the same speed as the intermediate rolls, and a non-revolving sliver-engaging member positioned in the stage of substantially no-draft between the front and intermediate pairs of rolls to support and control the sliver as it passes from the latter rolls to the front rolls, said member having a sliver-contacting portion extending in the direction of travel of the sliver and formed to condense the same as it is drawn therethrough, said portion presenting a uniform continuously curving path about the axis of said member for engaging the sliver so that the sliver in passing from one pair of rolls to the next following rolls will revolve bodily about the axis of said member and be given a false twist in passing through said condensing portion.

4. In a drawing mechanism of the character described, the combination of two pairs of drawing rolls arranged to form a stage of substantially no-draft between two successive draft stages, and a sliver-supporting member positioned therein between said pairs of rolls, said member comprising a helicoidal body having a sliver guiding groove therein extending in a helix in the direction of feeding of the sliver, the mouth of said groove being convexly flared and positioned above the line of nip of the adjacent drawing rolls.

5. In a long-draft drawing frame, a plurality of separate sliver drawing mechanisms arranged in series to form alternate drafting and no-draft zones, said mechanisms acting successively on the

sliver with progressively and materially greater velocities in its direction of travel, and a non-revolving sliver-engaging member positioned in each of the zones of no-draft between consecutive pairs of said drawing mechanisms and presenting a curvilinear path of travel for the sliver, said member having a sliver-contacting portion formed to condense the sliver as it is drawn therealong and impart a false twist thereto as it passes from one drawing mechanism to the next following mechanism.

6. The method of long-drafting textile sliver, roving and the like which comprises subjecting a traveling strand of sliver to a plurality of separate successive feeding and drawing actions of materially increasing velocities in its direction of travel, and after each of such successive drafting actions causing a compression or condensation of the drawn sliver by engaging with a non-revolving member interposed in the path of travel of the sliver and intermediate of a pair of successive drafting means as to cause movement of the sliver in a progressively curving path and a consolidation of the fibers thereof and to impart a false twist thereto.

7. The method of long-drafting textile sliver, roving and the like which comprises subjecting a traveling strand of sliver to a plurality of separate successive feeding and drawing actions of materially increasing velocities in its direction of travel, and after each of such successive drafting actions causing a compression or condensation of the drawn sliver by engaging with a non-revolving member interposed in the path of travel of the sliver and intermediate of a pair of successive drafting means as to cause movement of the sliver in a revolving path about the axis of said member to effect a consolidation of the fibers thereof to impart a false twist thereto.

8. In a drafting machine for treating sliver or roving, the combination of two sets of rolls, and means for condensing and folding the sliver, comprising a non-revolving member disposed between the two sets of rolls and relatively to which the sliver being treated is to travel from one set of rolls to the other set of rolls and about which it is to extend in the path of a helix, said member having a helical groove of less than one turn to receive and guide the sliver and of a character such as to cause a folding condensing action of the sliver in passing therethrough.

9. In a drafting machine for treating sliver or roving, the combination of two sets of rolls, and means for condensing and folding the sliver, comprising a non-revolving member disposed between the two sets of rolls and relatively to which the sliver being treated is to travel from one set of rolls to the other set of rolls and about which it is to extend in the path of a helix, said member having a helical groove of less than one turn to receive and guide the sliver and of a character such as to cause folding and condensing of the sliver and impart a false twist thereto of less than one complete turn in passing there-through.

10. In a drafting machine for operating on sliver or roving, the combination of two sets of rolls, and a non-revolving device in which the sliver travels and interposed between said sets of rolls, said device containing a helical groove having a flaring mouth to receive and condense the sliver and relative to which the latter travels for directing the same in the path of a helix, said sets of rolls being so arranged that their lines of nip lie in a single plane, said device being so

positioned that the mouth of the groove is located above the plane containing the line of nip of the sets of rolls and the delivery opening of the groove is in the plane of the line of nip of the sets of rolls.

11. In a drafting machine for operating on sliver or roving, the combination of two sets of rolls, and a non-revolving device in which the sliver travels and interposed between said sets of rolls, said device containing a helical groove having a flaring mouth to receive and condense the sliver and relative to which the latter travels for directing the same in the path of a helix, said sets of rolls being so arranged that their lines of nip lie in a single plane, said device being so located that one end of the groove is above the said plane and the other end of the groove is substantially in said plane.

12. A device for operating on sliver or roving comprising a body member provided with a helical guide extending longitudinally thereof to receive and direct the sliver in the path of a helix and relative to which the sliver travels in passing along the guide, said body member having an end portion beveled at such an angle as to enable the device to be so located that the delivery end of said guide may be positioned close to the point of nip of a pair of cooperating rolls.

13. A device for operating on sliver or roving comprising a body member having a helical groove of less than one turn and extending longitudinally the entire length thereof to receive and direct the sliver in the path of a helix and relative to which the sliver travels in passing through the groove, said body member having an end portion beveled at such an angle as to enable the device to be located between and close to the line of nip of a pair of cooperating rolls.

14. A device for guiding and folding textile sliver or roving comprising a body member having a helical groove of less than one turn and extending longitudinally the entire length thereof to receive the sliver and direct it in the path of a helix, the entrance opening of said groove being outwardly flared and converging inwardly to merge into the main portion of said groove which is of such a character as to maintain the sliver in a condensed and folded state, said body member having the top portion of the end face containing the exit opening of said groove beveled at such an angle that the delivery end of the device may be positioned with respect to an adjacent pair of cooperating rolls so as to deliver the sliver close to the point of nip thereof.

15. A device for operating on sliver or roving comprising a body member provided with a helical guide to receive a sliver and relative to which the latter travels for directing the same in the path of a helix, the side surfaces of said guide throughout a substantial portion of its length being so constructed and arranged that they bear an overhanging relationship with respect to the traveling sliver.

16. A device for operating on sliver or roving comprising a body member provided with a helical guide to receive and direct the sliver in the path of a helix and relative to which the sliver travels in passing along the guide, and means associated with the guide to fold the traveling sliver without restraining or tensioning the same to such an extent as to materially retard its free movement therein.

17. A guide device of the character described, comprising a body member having a longitudinally extending helical guide portion for the

sliver, said guide portion presenting a continuously curving path about the axis of said body member for supporting and condensing the sliver during its passage therethrough, the entrance end of said guide portion having a flaring mouth.

18. A device for treating a sliver comprising an element having a helical groove to receive the sliver and direct it in the path of a helix, the mouth of said groove being flared to condense the sliver as it enters the groove, the sides of said groove having overhanging portions to cause folding of the sliver when traveling there-through.

19. A guide device for drafting machines of the character described, comprising a body member having a longitudinally extending helically grooved guide portion for the sliver, said guide portion being so constructed and arranged that it presents a continuously curving path about the axis of said body member for supporting and condensing the sliver during its passage there-through, the entrance end of said grooved guide portion being convexly flared and of generally elliptical shape and offset relative to the longitudinal axis of said body member, said entrance mouth progressively diminishing inwardly and merging with a partially circular shaped portion constituting the main guide portion of said groove, the side walls of which have their top edge portions extending in overhanging relation over the sliver.

20. A device for treating a sliver comprising an element having a helical groove to receive the sliver and direct it in the path of a helix, the sides of said groove having overhanging edges to cause folding of the sliver, the major portion of said groove being of partially circular shape, and said overhanging sides forming a helical opening on the outer surface of said element narrower than the diameter of said groove.

21. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, the two sets of rolls forming a principal draft stage of the machine, supporting structure, and controlling means including an element disposed on said structure external of the principal draft stage and relatively to which the sliver being treated is to travel prior to being nipped by the retaining rolls and around which it is held in the path of a helix.

22. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, the two sets of rolls forming a principal draft stage of the machine, supporting structure, and controlling means including an element disposed on said structure external of the principal draft stage and relatively to which the sliver being treated is to travel prior to being nipped by the retaining rolls, said element having a helical groove to receive the sliver and direct it in the path of a helix.

23. The combination, with two sets of drawing rolls, one set comprising the last rolls of one draft stage and the other set being the first rolls of the next succeeding draft stage, and supporting structure, of non-revolving means on said structure between the two sets of rolls and extending from a point relatively remote from one set of said rolls to a point close to the nip thereof, to maintain in a state of pressure against each other and in the form of a helix the fibers of so much of the traveling sliver as is at any time between said points.

24. In a drafting machine for treating sliver or roving, the combination of two sets of rolls, and means for folding the sliver, comprising a non-revolving member disposed between the two sets of rolls and relatively to which the sliver being treated is to travel from one set of rolls to the other set of rolls, said member having a helical guide to receive and guide the sliver and of a character such as to cause the selvage edges of the sliver to be folded inwardly and distributed over the body of the sliver.

25. In a drafting machine for treating sliver or roving, the combination of sets of rolls, and means for condensing the sliver, comprising an element disposed between said sets of rolls and relatively to which the sliver being treated is to travel, said member having a helical guide provided with a flaring mouth to receive and guide the sliver and of such a character as to cause a condensing action of the sliver in passing there-through.

26. In a drafting machine for treating sliver or roving, the combination of sets of rolls, and means for condensing the sliver, comprising an element disposed between said sets of rolls and relatively to which the sliver being treated is to travel, said member having a helical guide to receive and guide the sliver and of such a character as to cause a condensing action of the sliver in passing therethrough, said guide having overhanging side walls.

27. In a drafting machine for treating sliver or roving, the combination of sets of rolls, and means for condensing the sliver, comprising an element disposed between said sets of rolls and relatively to which the sliver being treated is to travel, said member having a helical groove to receive and guide the sliver and of such a character as to cause a condensing action of the sliver in passing therethrough, said groove having overhanging side walls to provide on the surface of the element a helical slot of a narrower width than the extreme interior width of said groove.

28. In a drafting machine for treating sliver or roving, the combination of sets of rolls, and means for condensing the sliver, comprising an element disposed between said sets of rolls and relatively to which the sliver being treated is to travel, said element having a helical guide and a beveled end portion so as to permit the element to be positioned close to one set of said rolls.

29. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage and about which it is held in the path of a helix.

30. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage and about which it is held in the path of a helix of less than one turn.

31. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to

provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical groove to receive the sliver and direct it in the path of a helix.

32. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical groove of less than one turn to receive the sliver and direct it in the path of a helix.

33. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical guide to receive the sliver and direct it in the path of a helix, said guide being of such a shape as to fold the traveling sliver.

34. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical guide to receive the sliver and direct it in the path of a helix, the mouth of said guide being flared to condense the sliver as it enters the groove.

35. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical guide to receive the sliver and direct it in the path of a helix, the sides of said guide having overhanging edges to cause folding of the sliver.

36. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical groove to receive the sliver and direct it in the path of a helix, the mouth of said groove being flared to condense the sliver as it enters the groove, the sides of said groove having overhanging edges to cause folding of the sliver.

37. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and

relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical groove to receive the sliver and direct it in the path of a helix, the sides of said groove having overhanging edges to cause folding of the sliver, the major portion of said groove being of partially circular shape, and said overhanging sides forming a helical opening on the outer surface of said element narrower than the diameter of said helical groove.

38. In a drafting apparatus for treating a sliver, the combination of a plurality of sets of drawing rolls coactive to draw the sliver and arranged to provide a plurality of principal draft stages, and controlling means including an element positioned external of said principal draft stages and relative to which the sliver being treated is to travel from one draft stage to the next succeeding draft stage, said element having a helical guide to receive the sliver and direct it in the path of a

helix, one end of said element being beveled so as to enable the element to be positioned close to the bite of a pair of cooperating rolls.

39. In a process of treating a sliver, the step of guiding the fibers of the sliver, directly after being drafted, in a helical path and then again drafting the fibers.

40. The process of treating a sliver, comprising the steps of subjecting the sliver to an initial drafting operation, and then guiding the drafted sliver in a helical path of substantially the length of the fibers and then again drafting the fibers.

41. In a process of treating a sliver, the step of guiding the fibers of the sliver, directly after being drafted, in a helical path of at least a half turn and then again drafting the fibers.

42. In a process of treating a sliver, the step of guiding the fibers of the sliver, directly after being drafted, in a helical path of less than one turn and then again drafting the fibers.

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