March 15, 1938. O. S. CARLISS 2,111,139

PROCESS AND MECHANISM FOR DRAFTING TEXTILE SLIVER, ROVING, OR YARN

Filed Sept. 18, 1935 2 Sheets-Sheet 1

Fig. 1.

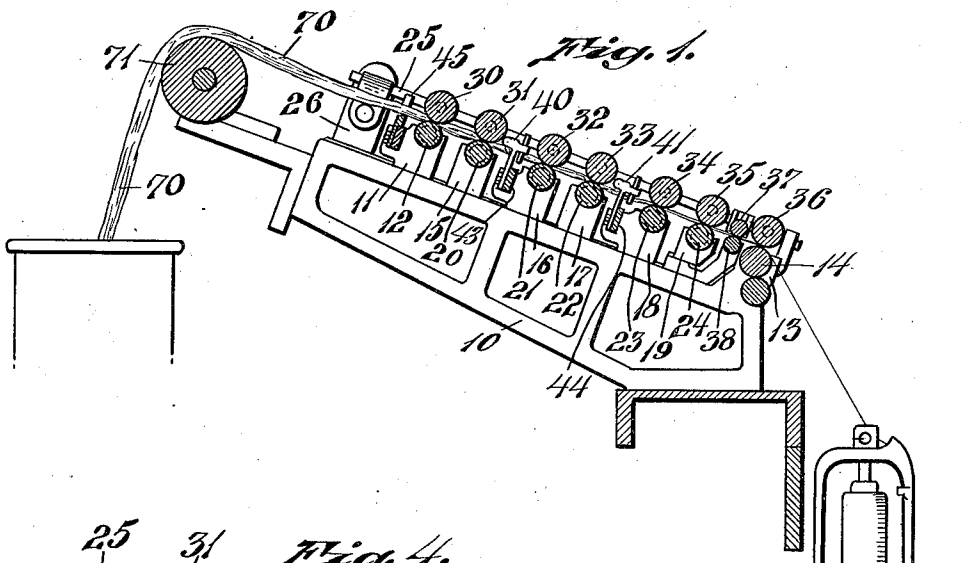

Fig. 4.

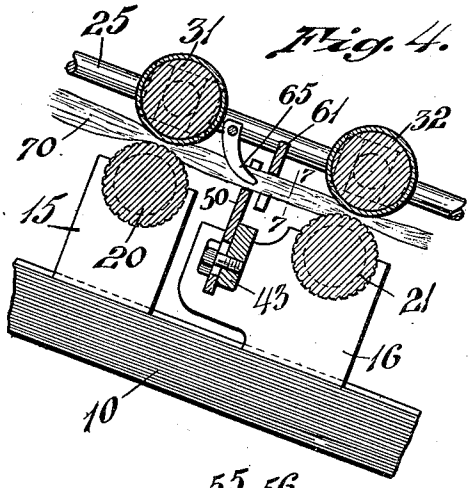

Fig. 5.

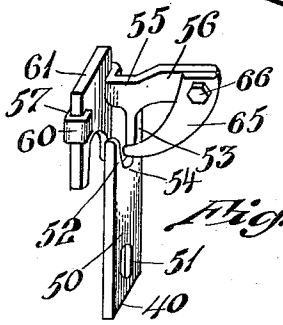

Fig. 3.

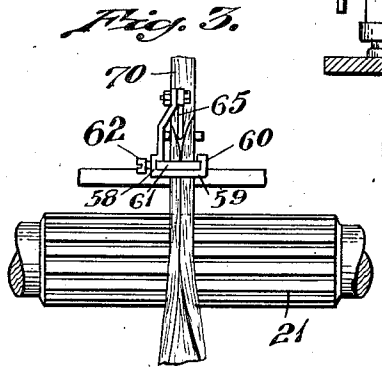

Fig. 6.

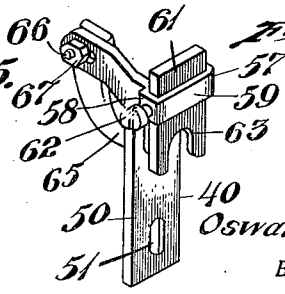

Fig. 7.

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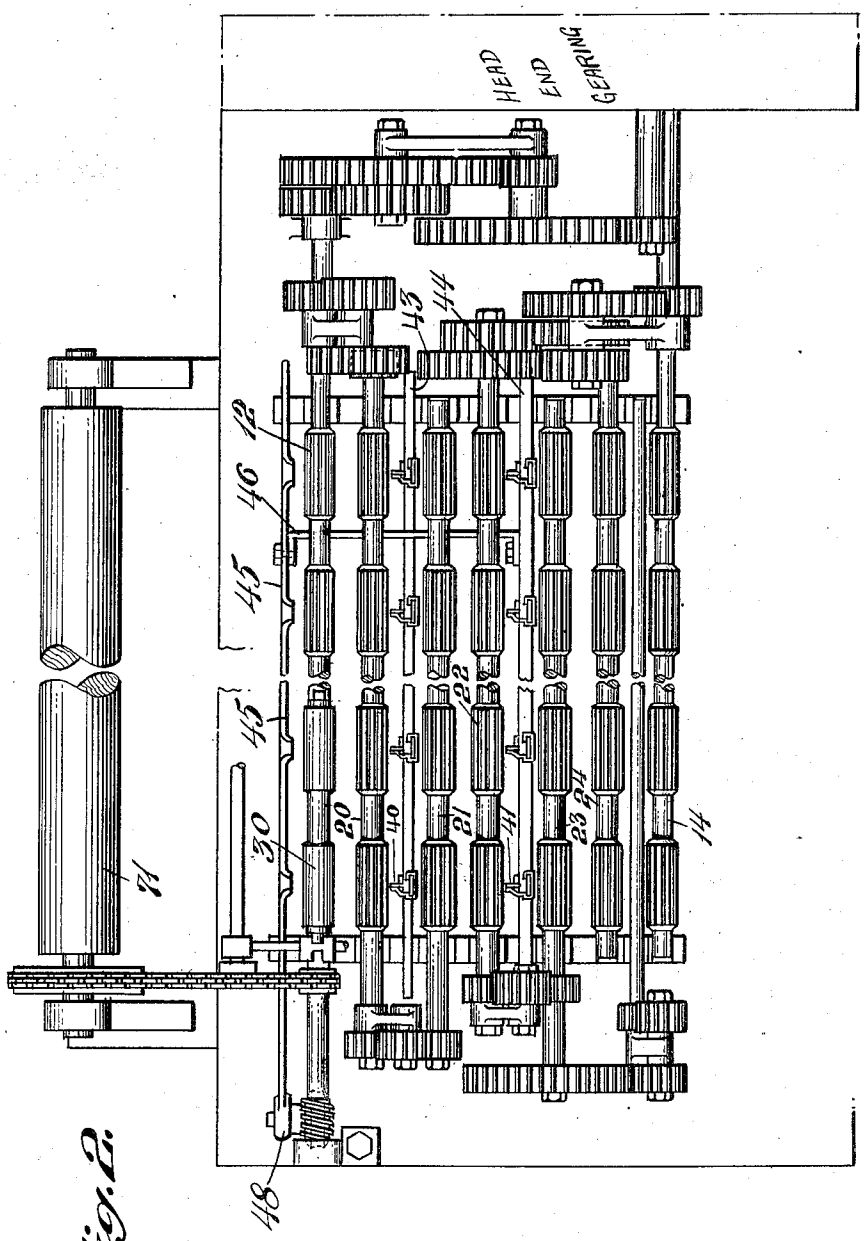

Fig. 2.

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UNITED STATES PATENT OFFICE

2,111,139

PROCESS AND MECHANISM FOR DRAFTING TEXTILE SLIVER, ROVING, OR YARN

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Application September 18, 1935, Serial No. 41,123

12 Claims. (Cl. 19—130)

This invention relates to long drafting textile apparatus, and is a continuation in part of my co-pending application, Serial No. 41,122, which matured into Patent No. 2,067,827, dated January 12, 1937, and has for one of its objects to provide an improved process for the manufacture of fine roving or yarn and a mechanism for making the same in a single continuous process.

Another object of the invention is to eliminate several processes between drawing and the fine roving step.

Another object of the invention is to guide and control the sliver or roving between each successive drafting operation as the strand of sliver passes without interruption of its travel from one set of drafting elements to the next succeeding set of draft rolls of the apparatus.

Another object of the invention is to control the fibers of sliver or roving to support the same and prevent fraying or spreading.

A further object of the invention is to guide and fold the outside edge portions of the sliver in a manner so as to collect and arrange the short or loose fibers thereof in parallel form preparatory for passage between the next succeeding draft rolls.

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.

Referring to the drawings in which like reference numerals indicate like parts:

Fig. 1 is a vertical sectional side elevation of a roving frame embodying the present invention;

Fig. 2 is a top plan view of a portion of the stationary part of the roving frame shown in Figure 1, showing the sliver folder members mounted therein, with the top rolls omitted to show the lower fluted draft rolls;

Fig. 3 is a fragmentary top plan view of a portion of the frame shown in Figure 1 illustrating the operation of a folder device on the strand of sliver;

Fig. 4 is a sectional elevational view on an enlarged scale of a detail of the folder guide illustrating its position relative to the draft rolls;

Fig. 5 is a frontwise view in perspective of one of the folder guides shown in Figure 1;

Fig. 6 is a rear view in perspective of the guide member shown in Figure 5; and

Fig. 7 is an enlarged cross-sectional view of the folded sliver taken on the line 7—7 of Figure 4.

Heretofore, the sliver of cotton or other textile fibers to be drafted have usually been taken as it leaves the drawing frame and after being arranged with one or more ends placed together it is successively subjected to first a slubbing process, then doubled and attenuated in an intermediate roving process, and then further attenuated to produce fine roving. In order to eliminate several of these intermediate processes and thus effect a saving both in time and labor expended therein, it is proposed in accordance with this invention to pass the sliver or roving directly through the fine roving process as it comes from the drawing frame and thus give to it the full amount of attenuation desired in the roving in a single apparatus; and in order to prevent the sliver from sagging, tearing or fraying during its travel from one group of draft rolls to the next succeeding group of rolls, a further feature of the present invention is to control the fibers adjacent to the outer edges of the sliver as it travels through the zones of substantially no draft which occur alternately at points between the consecutive and successive draft stages; and in order that this may be accomplished so as not to tightly compact or compress the sliver, it is proposed to guide and turn the fibers adjacent to the outer edges of the sliver inwardly towards the middle or main body portion of the sliver and to then fold them transversely thereof and arrange them lengthwise about the center without their being condensed or compressed to a greater density than the sliver had originally prior to folding; and in order that this process may be satisfactorily carried out a mechanism is also provided which embodies a series of devices having the dual function of guiding and folding the sliver, one of the devices being placed between two adjacent groups of draft rolls, each of the devices being free from movable or rotatable elements but instead consisting of members which are fixed relative to each other and which are arranged in succession in the direction of travel of the sliver and cooperate to act successively on the edge portions of the sliver in a positive manner to control the fibers adjacent thereto and bring about a proper arrangement and distribution of them relative to the middle portion or central axis of the sliver yet arrange them with respect thereto without compression laterally thereof along its entire length; and the following is a detailed description of the present embodiment of this invention by which these advantageous results may be accomplished:

With reference to the drawings, the drafting mechanism shown in Figures 1 and 2 comprises a roving frame 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 rolls 20, 21, 22, 23 and 24, all of which lower rolls usually are fluted. An overarm 25 is pivotally supported from a standard 26 upon which there is mounted the upper rolls 30, 31, 32, 33, 34, 35 and 36, respectively, in suitable bearings thereon and cooperate with the respective lower rolls in each of the pairs of rolls. These upper bearings are in the form of slots with open ends into which the axles or pins through the upper rolls may be guided and easily removed from the bearings when desired. Mounted between the upper rolls 35 and 36 is a smooth surfaced top roll 37 which is shown in Figure 1 as resting on the fluted bottom roll 38. The roll 37 is known as a slip roll and it is usually made of metal highly polished and has a selected weight, whereas the rest of the upper rolls are leather covered. The upper rolls may be weighted in any suitable manner as is the usual practice well known in the art, and which forms no particular feature of the present invention. The rolls 20, 31 are rotated faster than the rolls 12, 30 to provide a draft of the work. Rolls 21, 32, however, rotate at the same speed as the previous set of rolls 20, 31 so that in this stretch or zone of travel of the work no draft occurs. Similarly, draft occurs between rolls 21, 32 and 22, 33, whereas no draft is incurred between the rolls 22, 33 and 23, 34, the yarn being given the final draft between the rolls 23, 34; 24, 35 and 14, 36, respectively.

In order to support and fold the sliver as it issues from one set of draft rolls and prepare it for the next succeeding drafting operation, folder guide devices 40 and 41 are provided, the device 40 being positioned in the space between the pairs of rolls 20, 31 and 21, 32, respectively, and the device 41 being placed between the pairs of rolls 22, 33 and 23, 34 respectively, the positions of the devices being such that the guiding portions support the sliver so as to maintain it axially aligned on the tangential line between two pairs of draft rolls. The devices 40 and 41 are mounted on reciprocable bars 43 and 44, respectively, which are adapted to slide in suitable guideways formed in the bearing blocks 16 and 18, respectively, wherein they may be oscillated to and fro axially with respect to the rolls and longitudinally of the frame in unison with the back sliver guide 45. This guide 45 is adapted for similar movement and the devices 40 and 41 are suitably coupled thereto by a suitable strap, the back guide being oscillated by means of the reciprocating mechanism 48 which may be of any well known construction.

As illustrated in the drawings, each of the sliver folder devices 40 and 41, respectively, consists of a thin elongated strip member, such as metal sheet stock or stamping, although other suitable non-metallic materials may be employed, having a body portion 50 which forms a vertical standard and is provided with a slot 51 adjacent to its lower end for securing the device to the reciprocable bars 43 and 44, respectively. The upper terminal end of the folder device is bifurcated to provide the fingers 52 and 53 between which is formed a U-shaped notch or recess 54 which is given a slight flare at the entrance and exit sides thereof to provide a smooth rounding surface for the entrance of the sliver and for confining it so that any projecting ends of the fibers will when the strand is folded be lifted and partially turned up and back towards the middle of the strand as it passes therethrough. The fingers 52 and 53 are shown as being of unequal length, the longer finger 53 having formed integrally with its terminal end portion a pair of oppositely extending arms 55 and 56, respectively, the inner ends of which at their point of juncture project outwardly from the side faces of the guide member in a direction at substantially right angles thereto. The arm 55 is shown as being bent to form a frame or clamp member 57 having the vertical clamping portions 58, 59 and 60, respectively, for supporting a removable sliver guide member 61 vertically positioned and adjustably mounted therein, the guide 61 being held in position and locked in the clamp 57 by means of a clamping screw 62 suitably threaded in the side 58 of the clamp.

The clamp 57 is spaced from the adjacent side face of the standard 50 with the clamping portion 59 being substantially parallel thereto. The guide member 61 is provided with an inverted U-shaped notch or recess 63 formed through the wall at its bottom end, the entrance and exit side portions of which are slightly flared to provide a smooth rounding surface for movement of the sliver. When the guide 61 is secured in position in the clamp 57 the lower end portions of the guide will overhang downwardly and extend along the upper end portion of the standard 50 but will be spaced therefrom, the opposed side faces of the guide member 61 and the upright standard 50 being substantially parallel and with the U-shaped notches 63 and 54, respectively, being axially aligned with respect to each other whereby the notch 63 may serve to turn in the outer edges of the sliver towards and into the center portion of the main sliver body and complete the folding process.

In order to direct the sliver to the notch 54 and preliminary turn up the outer edges in the sliver and shape it in advance of its entrance to the notch, a scroll-shaped horn or finger 65 mounted at the outer end of the outwardly extending arm 56 depends downwardly therefrom with the tip of its outer end portion forming a curved finger disposed immediately in front of the U-shaped notch 54 and axially aligned with respect thereto. The inner end of the horn 65 is adjustably mounted on the arm 56 by means of a bolt 66 and a nut 67 passing through a slot 68 formed in the arm 56 and disposed longitudinally thereof, whereby the horn may be adjusted as may be desired.

In practice, it is important that the sliver contacting portions of the notches 54 and 63 and the horn 65 be composed of a material capable of developing considerable smoothness, such as for example, brass or other suitable metal, porcelain, hard enamel or molded resinoid substances, which may be applied thereto as a coating or the whole member itself may be formed entirely of the material selected.

By means of this construction, the open side 52 of the notch 54 renders the guide easy to thread with the sliver. Also, by making the device of a stamping, the small surface of contact provided thereby eliminates drag and bunching of the sliver as it moves therethrough. Furthermore, the absence of moving parts enables all the fibers of the sliver to pass through the device without taking on any speed differential.

In the operation of the process, the sliver 70 passes over the carrier roller 71 and is led through

the draft rolls in succession, the preparatory draft being applied to it between the rear rolls 12 and 30 and the intermediate rolls 20 and 31 and then folded as it passes through the folder guide 40, followed by a second draft thereto by the rolls 21 and 32 and the next adjacent rolls 22 and 33, after which it is again folded by passage through the folder guide 41, and it is then subjected to a longer draft between the intermediate rolls 23 and 34, 24 and 35 and the front rolls 14 and 36. The roving as it emerges from the front rolls 14 and 36 may then be wound upon a bobbin in the customary manner as is well known in the art, during which process it may receive the amount of twist desired to afford it the required strength.

In accordance with this invention, a very simple method and apparatus for accomplishing long drafting of sliver or roving of cotton or other textile fibers which eliminates the intermediate operations of slubbing and intermediate roving and cuts the time and expense of manufacture enormously over the previous standard method of treatment.

It is to be understood that while there has been described the preferred sequence of steps in the method of carrying out the invention into practical effect and the preferred embodiment of the machine for practicing the method, such disclosure is for the purpose of illustration only, and the invention is not limited to the exact sequence of steps or form and arrangement set forth except insofar as is specified in the appended claims.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. A method of long drafting textile sliver, roving and the like which consists in alternately drafting and folding a strand of sliver as it travels without interruption between a series of successive draft rolls in which the steps comprise passing the sliver under a fixed creasing element in the line of travel of the moving sliver to initially crease the same, thereafter turning-in the outer edges of the strand of sliver and folding them transversely over itself and inwardly above and adjacent to the center fibers of the strand body to lay them in a separated uncompact formation after one stretch of the sliver but before being subjected to the next succeeding stretch, drafting the folded sliver by passage between the adjacent draft rolls of the next succeeding drafting stage, repeating the creasing and folding operation on the drafted sliver after being stretched by passage through the drafting elements of the preceding stage, and thereafter drafting the folded sliver to stretch it sufficiently to obtain the desired final size.

2. In an apparatus for long drafting of fibers of textile sliver, roving and the like in a single continuous process, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of drafting stages for drafting the sliver, and sliver controlling means interposed between one of the draft stages and the next succeeding drafting stage to guide and turn in the outlying edge portions of the sliver in its progressive travel therebetween by folding the fibers laterally inwardly of the strand to lay them over but separated from the body thereof, said sliver controlling means comprising a single unit containing a series of fixed cooperating elements to act successively upon the attenuated and flattened sliver during its progressive travel and consisting of fixed creasing means depending in the line of travel of the moving sliver, and folding elements to fold the marginal edges of the creased sliver transversely upon itself.

3. In an apparatus for long drafting of fibers of textile sliver, roving and the like in a single continuous process, the combination of a plurality of pairs of draft rolls acting in groups to form a series of successive drafting stages, said rolls of each draft stage being rotatable at different speeds for drafting the sliver progressively and without interruption of its travel through said drafting stages, and a plurality of sliver controlling devices alternated with said groups of draft rolls, one of said devices being interposed in each span of the sliver between the last pair of draft rolls of one group and the adjacent pair of rolls of the next succeeding drafting group, each of said sliver controlling devices consisting of a unit comprising a non-rotatable support, creasing means thereon depending in the line of travel of the moving sliver for preliminarily forming a longitudinal crease in the sliver in its passage thereunder, and fixed means cooperating with said creasing element on said support and for subsequently turning up the marginal edges of the creased sliver and completing the fold by folding them transversely inwardly to lay them upon the body of the sliver with it being compressed to a materially greater density than it had prior to folding.

4. In an apparatus for long drafting of fibers of textile sliver, roving and the like in a single continuous process, the combination of a plurality of groups of successive drafting stages each consisting of pairs of draft rolls, means for rotating said rolls of each stage at different speeds to attenuate the sliver, and a series of sliver controlling devices alternated with said drafting stages and disposed intermediately between two successive drafting stages and in the line of travel of the attenuated sliver from one to the other thereof to act on the attenuated sliver to crease and fold the same during its progressive travel between the successive stages, each sliver controlling device comprising a unit which is immovable in relation to the direction of travel of the sliver and consisting of fixed folding means in the line of travel of said sliver to fold in the margins of the attenuated and flattened strip transversely inwardly upon itself, and creasing means depending in front of said sliver folding means and cooperating therewith for directing the sliver thereto and initially forming the fold therein in advance of its travel therethrough.

5. In a drafting apparatus, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of draft stages for imparting the principal draft in the sliver, and a device external of said draft stages and interposed between one draft stage and the next succeeding draft stage, said device having means fixed at one end for creasing the sliver, and guide means for the sliver disposed about a substantial portion of the free end of said creasing means for turning in and folding the fibers adjacent to the border edges of the sliver toward its center to longitudinally distribute the in-turned fibers of the selvage edges at each side of the center line of the strand.

6. The method of drafting fibers of textile sliver, roving and the like in a single continuous process comprising the steps of passing a sliver between a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft

stages for drafting the sliver, causing the sliver to pass over a fixed creasing element positioned between one draft stage and the next draft stage and disposed in the line of travel of the moving sliver so as to act thereon to initially crease the same, and then causing a turning in of the fibers adjacent to the outer edges of the creased sliver to fold them transversely of the sliver and lay them over the central body portion thereof in a separated uncompact condition without appreciably changing the density of the sliver from that which it had prior to being folded.

7. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft stages, and a sliver distributing device external of said draft stages, said device comprising a member having a fixed element for longitudinally creasing the sliver and relatively to which the sliver travels, and means arranged in cooperating relation with respect to said creasing means for turning in the marginal edges of the moving sliver toward the center thereof.

8. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft stages, and a device external of said draft stages, said device comprising a member having a sliver supporting portion adapted to guide and inwardly fold the marginal edges of the sliver and relatively to which the sliver travels, and a fixed element within said guide portion extending in the direction of travel of the sliver for creasing the sliver during movement relative thereto.

9. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged in succession to provide a plurality of principal draft stages and a device external of said draft stages and interposed between one draft stage and the next succeeding draft stage, said device comprising a member having a sliver supporting portion adapted to guide and turn inwardly the marginal edges of the sliver and relatively to which the sliver travels, and a finger arranged in cooperating relation with respect to said guide portion and extending axially thereof for creasing the sliver during movement relative thereto.

10. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft stages and a device external of said draft stages, said device comprising a member having a sliver supporting portion adapted to guide and turn inwardly the marginal edges of the sliver and relatively to which the sliver travels, and a finger arranged in advance of said turning in portion of said member and in cooperating relation thereto for creasing the sliver during movement relative thereto.

11. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft stages, and a device external of said draft stages and interposed between one draft stage and the next succeeding draft stage, said device comprising a member having a recessed sliver guiding portion adapted to receive and turn inwardly the marginal edges of the sliver and relatively to which the sliver travels, and means within said guide portion comprising a member having a sliver engaging portion disposed above the bottom of the recess and extending in a direction lengthwise thereof for creasing the sliver during movement relative thereto.

12. In an apparatus for treating a sliver or roving, the combination of a plurality of pairs of drawing rolls arranged to provide a plurality of principal draft stages, and a device external of said draft stages, and interposed between one draft stage and the next succeeding draft stage, said device comprising a member having a recessed sliver guiding portion adapted to receive and fold the sliver inwardly and relatively to which the sliver travels, and creasing means within said guide portion comprising a finger disposed above the bottom of the recess and extending in a direction lengthwise thereof for creasing the sliver during movement relative thereto.

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