Oct. 28, 1941. J. KILLARS. JR 2,260,383

APPARATUS FOR PRODUCING SLIVERS

Filed Aug. 26, 1938 2 Sheets-Sheet 1

Fig. 2.

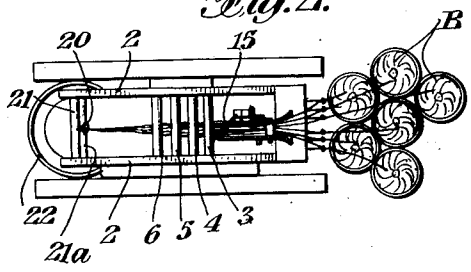


Fig. 1

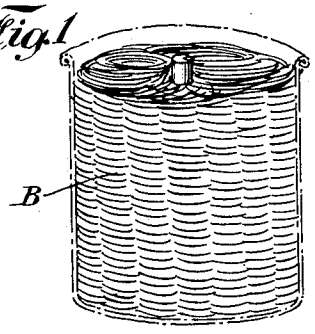
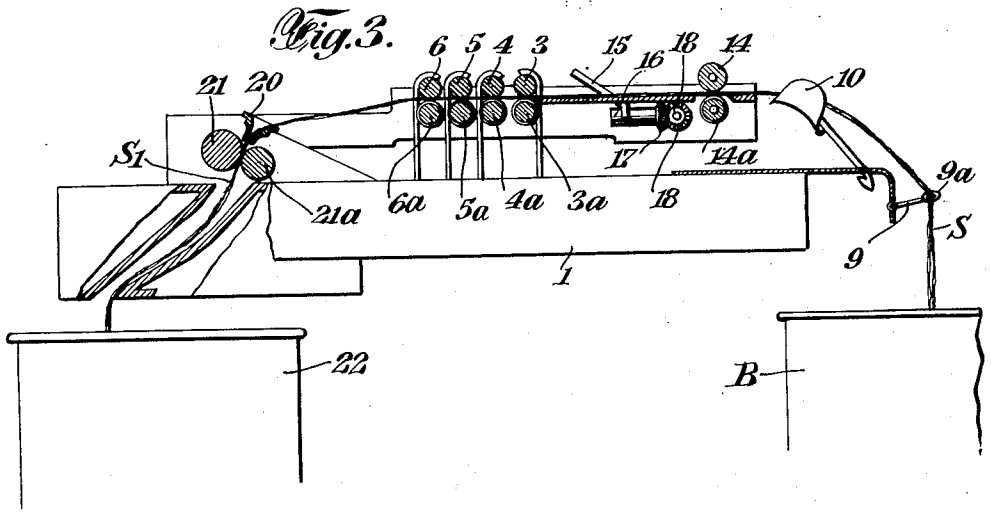


Fig. 3.



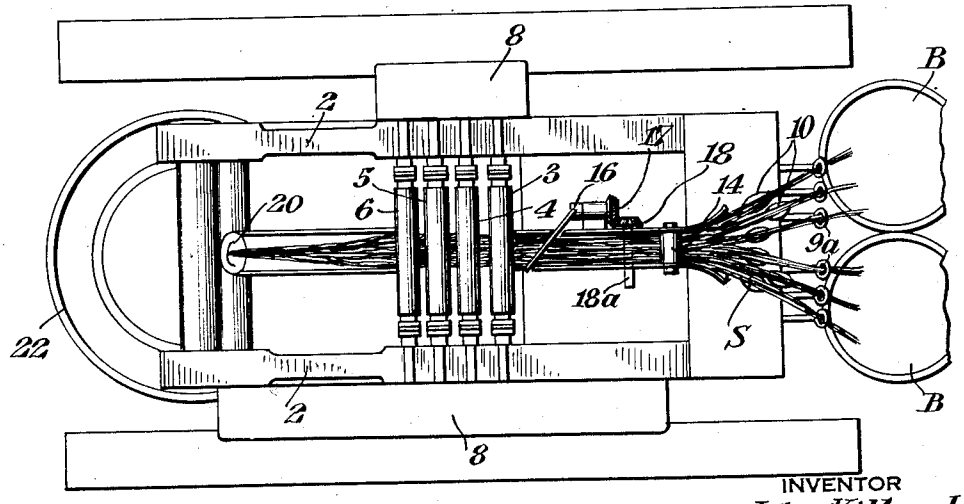


Fig. 4.

INVENTOR
John Killars, Jr.
BY
Ward, Crosby & Neal
ATTORNEYS

Oct. 28, 1941. J. KILLARS, JR 2,260,383

APPARATUS FOR PRODUCING SLIVERS

Filed Aug. 26, 1938 2 Sheets-Sheet 2

Fig. 5.

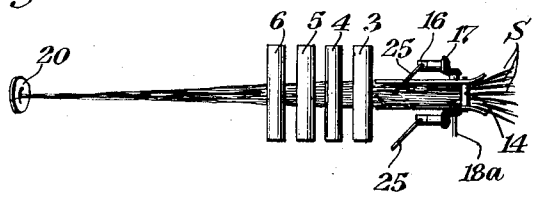


Fig. 6.

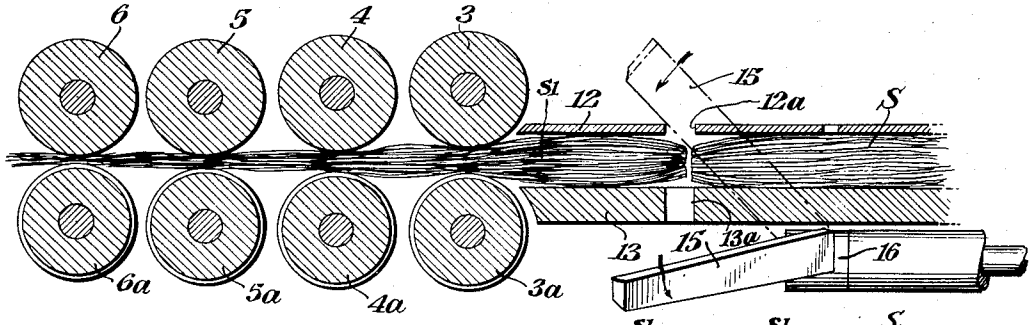


Fig. 7.

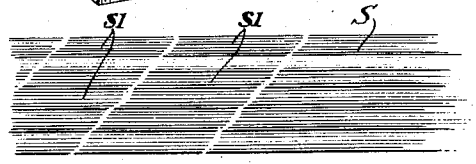


Fig. 8.

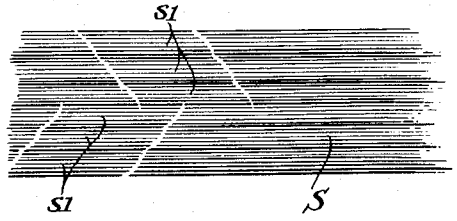
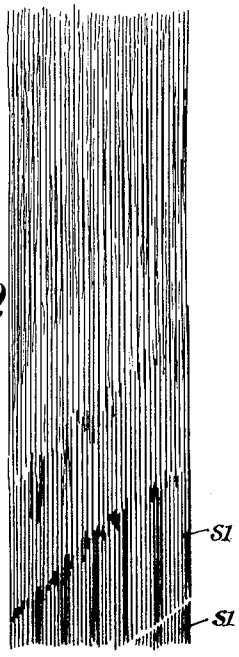


Fig. 9.



INVENTOR
John Killars, Jr.
BY
Ward, Crosby & Heal
ATTORNEYS

Patented Oct. 28, 1941 2,260,383

UNITED STATES PATENT OFFICE

2,260,383

APPARATUS FOR PRODUCING SLIVERS

John Killars, Jr., Greenville, S. C., assignor, by mesne assignments, to Fibres Associates, Inc., a corporation of New York

Application August 26, 1938, Serial No. 226,866

2 Claims. (Cl. 19—150)

My invention relates to apparatus and method of manipulating or producing slivers, rovings or the like formed from filaments or fibers and, further, my invention relates to the novel resulting products.

An object of my invention relates to the production in an improved manner of slivers, or rovings or the like from continuous synthetic filaments and/or tops of natural fibers such as linen, hemp, jute, silk, wool, etc.

Another object of my invention relates to a novel method of producing slivers, or rovings, etc. so that the resultant yarn has a better hand and shows, under the microscope, a more perfect thread due to the greater uniformity of the thread and a greater parallelism of the fibers.

Various other objects, advantages and characteristics of my invention will become apparent from the following detailed description.

My invention resides in the apparatus, method, novel products, features and arrangements of the character hereinafter described and claimed.

For an understanding of my invention and for an illustration of some forms of my apparatus, reference is to be had to the accompanying drawings, in which:

Figure 1 is a perspective view illustrating sliver in wound formation;

Fig. 2 is a plan view, with parts omitted, of apparatus constructed in accordance with my invention;

Fig. 3 is an enlarged, vertical sectional view, partly in elevation, of the apparatus shown in Fig. 2;

Fig. 4 is a plan view of the apparatus shown in Fig. 3;

Fig. 5 is a plan view showing a modified form of cutting mechanism;

Fig. 6 is an enlarged vertical sectional view, partly in elevation, showing the apparatus of my invention;

Figs. 7 and 8 are plan views illustrating slivers as cut in accordance with my invention; and

Fig. 9 is a diagrammatic view illustrating the progressive change in character of a sliver when manipulated by the apparatus of my invention.

It is customary in the art for synthetic fibers such as viscose rayon to be cut, washed, dried and baled in the rayon mill. These bales are forwarded to the yarn-producing mills where, by use of a bale breaker, picking mechanism, carding mechanism and, usually, a sliver lapper, ribbon lapper and comber, the tangled rayon fibers are assembled more or less longitudinally in a sliver suitable for drawing.

In accordance with my invention, I manipulate for the desired purpose sliver balls, i. e., balls formed by the winding into a ball, or equivalent, of a sliver formed from the continuous filaments extruded from a spinneret, or equivalent. In so doing, I eliminate various mechanisms as described above with attendant saving of time and money. At the same time, I produce a superior product in the respects herein noted.

Referring to Figs. 2, 3, 4 and 6, I have shown a base 1 which is adapted to be supported in suitable manner, said base 1 carrying the upstanding frames 2, 2 in which are journaled a plurality of pairs of rollers 3 and 3*a*, 4 and 4*a*, 5 and 5*a*, 6 and 6*a*. As shown, the rollers of each pair are disposed one above the other and each lower roller, throughout the operative section thereof, is provided with ribs extending longitudinally thereof. All of the aforesaid lower rollers, as hereinafter more fully described, are adapted to be rotated at suitable speed and, to this end, there may be utilized gears, not shown, mounted in gear boxes 8, power being delivered to this mechanical arrangement in any suitable manner as will be understood in the art.

The description stated above refers generally to apparatus known to the art as a "drawing frame." Apparatus of this character is well known to those skilled in the art and, therefore, further detailed description thereof is considered unnecessary.

In accordance with the invention, a plurality of sliver balls B, or equivalent, formed from the continuous filaments extruded from a spinneret, or equivalent, are disposed at one end of the described apparatus and each sliver S from a ball B is passed first through an eyelet 9*a* carried by a movable member 9 and then over a spoon 10 pivoted in a manner well known to the art. The members 9 may be utilized to move under spring pressure so that operation of the machine is discontinued in case one of the slivers S becomes tangled. The spoons 10 may be utilized to move under spring pressure so that operation of the machine is discontinued in case a sliver S breaks while passing over the spoon with which it is associated.

After the slivers S have assumed substantially side-by-side relation as shown in Fig. 4, they pass between a pair of horizontally disposed plates 12, 13 supported in any suitable manner, for example, by the frames 2, 2. Adjacent the

entrance to the plates 12, 13 are a pair of rollers 14 and 14a, the lower roller 14a having ribs extending longitudinally thereof.

In accordance with the invention, a suitable sliver severing or cutting means is disposed between the set of rollers 3, 3a and the set of rollers 14, 14a. At present, this cutting means is exemplified preferably by an arrangement comprising a blade-like knife 15 having a width substantially less than its length, Fig. 6. This knife 15 is suitably secured to a holder 16 rotated by a shaft which, in turn, is rotated by suitable bevel gears 17 and 18, the driving arrangement thus described for the knife 15 being supported in any suitable manner, for example, by the bed plate of the disclosed apparatus, and the bevel gear 18 being driven by a shaft 18a.

In Fig. 4, the knife 15 is shown as occupying the position taken thereby just prior to the cutting operation. At this time and during the subsequent sliver-cutting operation, said knife 15 is obliquely related to suitable extent, as at an angle of 45 degrees, more or less, to the longitudinal axes of the respective slivers. This is an important feature of the invention as will be hereinafter described.

As shown in Fig. 6, the plates 12, 13 are provided with the respective slots 12a, 13a which are vertically alined so that the knife 15 may pass therethrough while effecting the cutting operation. As illustrated in Fig. 4, the supporting and operating mechanism for the knife 15 is disposed at one side of the sliver path. Accordingly, the knife 15, for each revolution thereof, moves once through the path of the slivers and, preferably, the direction of knife rotation is such that the cutting action occurs on the downstroke. In Fig. 7, I have diagrammatically illustrated the effect of the knife 15 on the side-by-side slivers S.

The operation is as follows:

Initially, the individual slivers S are threaded through the eyelets 9a, over the spoons 10 and between the rollers 14, 14a. Thereupon, power is applied to the disclosed apparatus so that the rollers 14, 3, 4, 5, 6 are rotated counter-clockwise and the rollers 14a, 3a, 4a, 5a, 6a are rotated clockwise, Fig. 3. While these rollers thus rotate, the knife 15 rotates continuously along its circular path and, once for each cycle of rotation, said knife 15 moves across the path of the slivers in the manner described. By connections, not shown, it is desirable that power be obtained from the lower roller 3a for rotating the roller 14a and the knife 15. Or, other equivalent driving arrangements may be utilized.

The rollers 14, 14a cause the slivers S to move from right to left, Figs. 3 and 4, until they come beneath the knife 15. In this zone, each of the slivers S is cut by said knife 15 along a line which is obliquely related to the longitudinal sliver axis to a desired extent. These cut sliver sections, in side-by-side relation, are moved from right to left, Figs. 3 and 4, by the rollers 3, 3a. The uncut slivers S follow immediately after under the control of the rollers 14, 14a and, dependent upon the timing, the knife 15 sweeps across the sliver path to thereby again cut all of the slivers S in the manner described. In this manner, successive groups of cut sliver sections *s1* having a desired length are produced and these groups, in succession, are moved from right to left, Figs. 3 and 4, by the rollers 3 and 3a, 4 and 4a, 5 and 5a, 6 and 6a. By reason of the angle which the knife 15 takes with respect to the longitudinal sliver axis, it results that the cut sliver sections *s1* have tapered ends, i. e., each sliver section is shaped somewhat like a trapezoid.

As stated, the sets of rollers 3 and 3a, 4 and 4a, 5 and 5a, 6 and 6a move the cut sliver sections *s1* from right to left, Figs. 3 and 4. In addition, particularly by reason of the fact that the slivers S are cut by the knife 15 on the bias as described, said sets of rollers serve to rearrange the individual filaments or fibers in the more or less side-by-side cut sliver sections *s1*. Accordingly, beyond the rollers 6 and 6a, there exists a resultant web formed from filaments or fibers arranged in substantially parallel relation and wherein the biased cuts formed by the knife 15 have entirely or substantially disappeared. This progressive change resulting from rearrangement of the filaments or fibers is indicated in Fig. 9 in a schematic manner.

As shown in Figs. 3 and 4, the aforesaid web may pass through a trumpet 20 and then through the calender rolls 21, 21a whereupon, as a novel sliver S1, it is coiled in a can 22 according to regular drawing frame practice. Thereafter, the sliver S1 may be formed into roving and then passed to the spinning frame.

In accordance with the invention and in order to obtain the desired rearrangement of the filaments or fibers in the cut sliver sections *s1*, the sets of rollers 3 and 3a, 4 and 4a, 5 and 5a, 6 and 6a may be operated at those respective speeds which are customary in the prior art drawing frame practice wherein, as well understood, the speed of the set of rollers 4 and 4a is somewhat greater than the speed of the set of rollers 3 and 3a, the speed of the set of rollers 5 and 5a being somewhat greater than the speed of the set of rollers 4 and 4a, and the speed of the set of rollers 6 and 6a being somewhat greater than the speed of the set of rollers 5 and 5a. Further, in accordance with the invention, it may be desirable to progressively increase the speeds of the various sets of rollers 4 and 4a, 5 and 5a, 6 and 6a compared with the prior art drawing frame practice.

Thus, in accordance with the invention, it has been determined that the rollers 3 and 3a may rotate approximately at 50 revolutions per minute, that the set of rollers 4 and 4a may rotate approximately at 63 revolutions per minute, that the set of rollers 5 and 5a may rotate approximately at 110 revolutions per minute, and that the set of rollers 6 and 6a may rotate approximately at 300 revolutions per minute. It should be distinctly understood that the invention is not to be limited to either the specific or approximate rotative speeds just stated because I have determined that there is a wide range of operative speeds for the described sets of rollers and that over such wide range desirable results are obtained in accordance with the invention.

The rotative speed of the set of rollers 14, 14a should be substantially the same as the rotative speed of the set of rollers 3 and 3a. As stated, the knife 15 may be geared to cut sliver sections *s1* of a desired length. At present, although not necessarily, it is desirable for the length of said cut sliver sections *s1* to be between one and two inches.

Referring to Fig. 5, I have illustrated a modified form of cutting means involving the use of two knives 25, 25 which may be rotatably mounted in the general manner hereinbefore described. As indicated in Fig. 5, the hereinbefore described

shaft 18a may be utilized for driving both of the bevel gears 18a in unison whereby the knives 25, 25 are similarly rotated.

Responsive to the described driving arrangement, the knives, 25, 25 rotate in opposite directions, Fig. 5, and, because positioned as shown, each knife cuts the side-by-side slivers S approximately one-half of the distance thereacross. As clearly appears from Figs. 5 and 8, said knives 25, 25 are preferably so arranged that the cuts are staggered somewhat as shown.

Although the invention finds an important application in the manipulation of slivers S formed from continuous filaments of viscose rayon, it shall be understood that the invention is not to be so limited. Thus, for example, one or more of the aforesaid balls B (which are formed from continuous artificial filaments as described) may have substituted therefor one or more balls, or equivalent, of sliver formed from natural fibers such, for example, as wool or other material. With this phase of the invention, the resultant sliver S1 beyond the calendar rolls 21, 21a is a blend of natural and synthetic fibers.

While the invention has been described with respect to certain particular preferred examples which give satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

1. Apparatus for the continuous conversion of continuous threads into spinnable slivers or yarns of non-continuous parallel fibers, comprising feeding means for said continuous threads, a supporting base or plate over which said threads move, a slot in said base or plate, a revolving knife having substantially greater length than width and capable of passing through said slot, means for mounting said knife for rotatable moving, so that it moves through the path of said threads and said slot obliquely to the longitudinal axis of the threads and a series of drafting rollers withdrawing the cut fiber pieces from the cutting knife without disturbing their parallel position and simultaneously drafting them into a spinnable sliver or yarn.

2. Apparatus for the continuous conversion of continuous threads into spinnable slivers or yarns of non-continuous parallel fibers, comprising feeding means for said continuous threads, a supporting base or plate over which said threads move, two slots in said base or plate, situated one before the other and in oblique position to the longitudinal axis of said threads, both said slots extending from the outside of said base or plate to its center on either side, two revolving knives each having substantially greater length than width and capable of passing through said slots, means for mounting said knives one after the other for rotatable movement through the path of its half of continuous threads obliquely to the longitudinal axis of said threads, each knife from its outer side of said threads to the center, passing through said slots and resulting in the formation of fiber pieces of equal length in staggered position, and a series of drafting rollers withdrawing the cut fiber pieces from the cutting knives without disturbing their parallel position and simultaneously drafting them into a spinnable sliver or yarn.

JOHN KILLARS, Jr.