

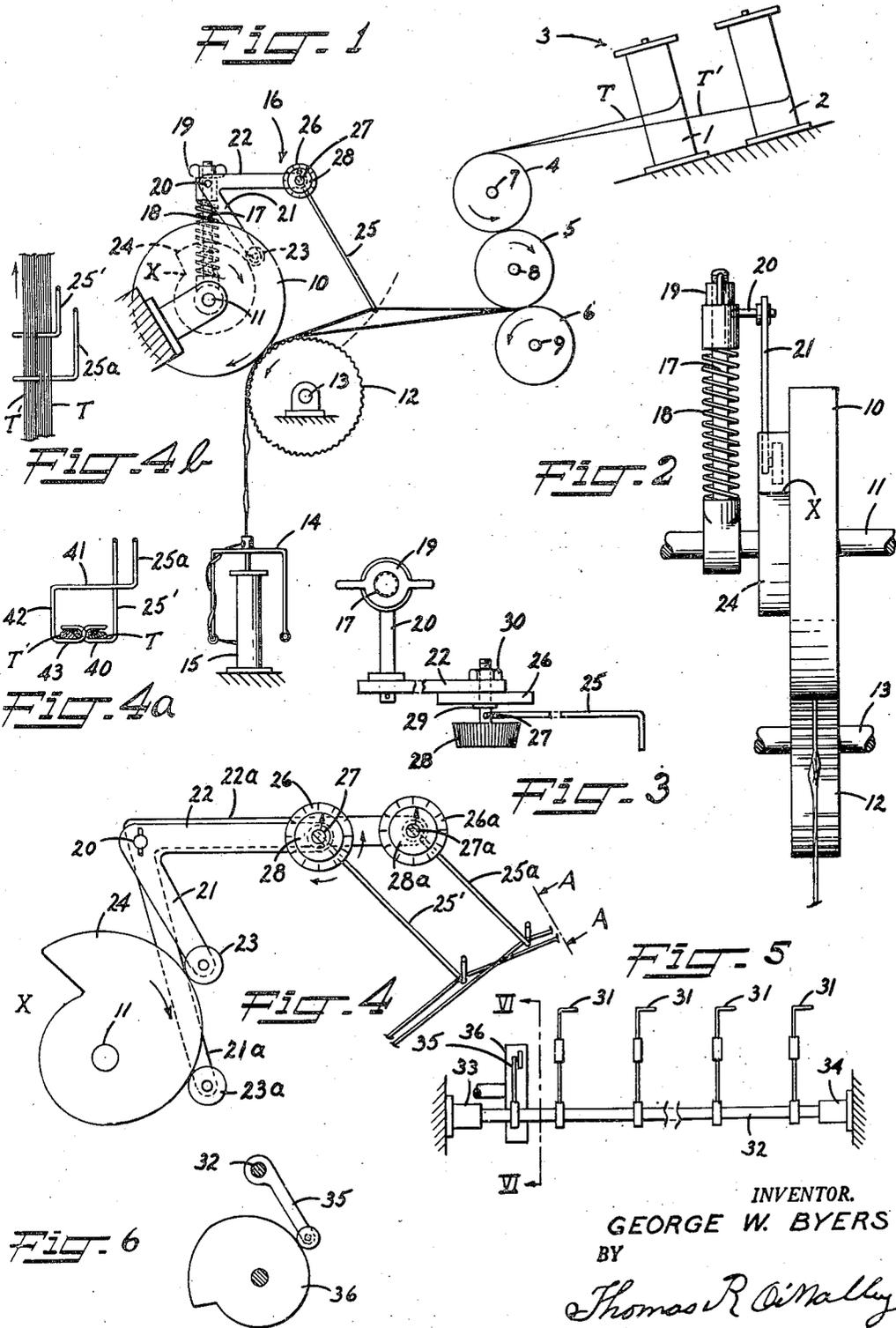
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SLUBBING DEVICE

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SLUBBING DEVICE

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This invention relates to machines that are employed for the purpose of spinning various types of fibers in the preparation of yarn. More particularly this invention relates to a device which may be readily attached to a spinning, or roving machine and will form yarns, rovings or the like having irregular counts.

At the present time in the preparation of yarn from the various types of fibers, such as animal, vegetable or artificial, machines known in the art as spinning frames and roving frames are employed, depending upon the particular nature of the work to be done and the strand product desired. All of these machines have a feature in common, which is the inclusion of a feed roll over which the strand that is being treated passes. This feed roll determines the speed at which the strand is fed to the other instrumentalities of the particular machine.

There is today in the textile and related trades a very noticeable demand for a so-called irregular yarn; that is a yarn in which the diametrical dimension varies at different points along the yarn.

In order to satisfy this demand various attachments for spinning machines have been proposed, which are effective to vary the speed at which the feed roll is driven; this variation being evidenced in the finished yarn in the irregular structure of the latter. However, the known attachments for this purpose have not proven to be entirely satisfactory and this condition is attributed mainly to the complex nature of the now known attachments, and the lack of positiveness in their operation.

With these conditions in mind this invention has in view as its foremost object to provide a means for slubbing yarn or the like which requires no intricate or complicated mechanism for changing the speed of the feed rolls, and which can be readily mounted on a spinning, or roving, machine.

Another object of the present invention is to provide a means for varying the size of the slub produced.

A further object of the present invention is to provide a means for varying the regularity of the slubs produced.

Other objects and advantages of the present invention will become more apparent from a study of the following drawings and description therefor hereinafter.

In the drawings illustrative of the invention: Figure 1 is an elevational view of an embodi-

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ment of the present invention mounted on a drafting mechanism.

Figure 2 is a front view of the embodiment of the invention shown in Figure 1.

Figure 3 is a plan view of the embodiment of the invention shown in Figure 1.

Figure 4 is an elevation of a modification.

Figure 4a is an end view of the strand engaging elements 25' and 25a looking in the direction of the arrows A, A of Figure 4.

Figure 4b is a view looking down at a further modification of the elements 25' and 25a of Figure 4.

Figure 5 is a plan view showing the means employed for mounting a plurality of slubbing arms on a conventional spinning machine or roving machine.

Figure 6 is an elevational view partly in section of the means shown in Figure 5 taken along section line VI—VI of Figure 5.

Referring now to Figure 1 to 3, wherein like reference characters denote corresponding parts, reference characters 1 and 2 indicate two spools of a creel 3 on which the strands T and T' which may be either slivers or rovings are wound respectively. Each of the spools may contain strands of the same or of different fibers. One or more of the strands are drawn off a corresponding number of the spools of the creel so that they are fed together to a drafting mechanism, which may be that of a roving frame or a spinning frame, comprising the slubbing device. They pass side by side or in contiguous relationship over, around and under the upper pressure roll 4 and around and between the pressure roll 5 and the back roll 6 which assembly or set of rolls may be termed the restraining rolls of the drafting system which also comprises a set of drawing rolls 10 and 12 at the front. The feed roll 12 may be fluted as shown. These rolls are all rotatably mounted on the supporting shafts 7, 8, 9, 11, and 13 respectively. Rotation is imparted to the two pressure rolls 7 and 8 by the back roll 9 which has rotation imparted thereto by a driving means (not shown). The pressure roll 10 derives its rotation from the feed roll 12 which is driven by means (not shown) at a peripheral speed higher than that of the back roll 6. Ordinarily the strand passes directly from the set of restraining rolls to the set of drawing rolls. From there the strand has a twist imparted thereto by the flyer 14 on the spindle 15 on which the strand (in the form either of a roving or yarn) is wound.

According to this invention, rovings, yarns, or

similar strands of wool, cotton, artificial silk or the like produced from staple are given a regular or systematic irregularity in count by varying the draft in the course of their formation so as to stretch them variously at any desired intervals. The varying stretch or drawing imparted to the strands results in a correspondingly varying count or weight, the variations or slubs occurring at any desired intervals and at any desired degree. The slubbing may be performed only in the roving frame in which event the ultimate yarn will have portions of greater and lesser count in alternation and each of the portions will be of considerable length because of the subsequent drafting in the spinning frame. If slubbing is performed only in the spinning stage, the yarn will contain relatively short lengths of lesser count alternating with portions having the normal count—the difference in count can but need not be made much greater than in the case just mentioned since no subsequent drafting need be performed on the yarn. There is still a third possibility in that the sliver fed to the roving frame may be converted to a slubbed roving and the roving can be slubbed in the spinning frame. By controlling the frequency of slubs in the two frames, it is possible to avoid a repetition or "patterning" of the slubs in a fabric produced from the slubbed yarn, which is most advantageously used as the filling. Thus, the irregularities produced in the roving stage can be disposed out of phase with respect to the irregularities produced in the spinning stage.

When a plurality of strands of different character are employed, numerous novelty effects may be obtained. Thus a wool roving can be combined with a rayon roving, and either or both of them may be slubbed. Again a rayon sliver may be combined with a wool sliver and one of them may be slubbed in the roving stage while the other may be slubbed in the spinning stage. In this case, the frequency of occurrence of one type of slub in the final yarn may be an integral multiple of the frequency of occurrence of the other type of slub to produce patterning or such relationship can be avoided to prevent regularity or patterning in yarn and the fabric. Alternatively, all of the strands of different materials may be slubbed on the roving frame and only one of them slubbed on the spinning frame. This variation of slubbing is imparted to the yarn by a slubbing attachment generally indicated by reference character 16 in Figures 1, 2, and 3.

Referring now to these figures of the drawing, reference character 17 indicates a spring retaining screw on which the pressure spring 18 is secured by suitable means such as by a wing nut 19. Suitably secured between the wing nut 19 and the pressure spring 18 is a shaft means 20 on which the slubbing attachment 16 is pivotally mounted. The slubbing attachment 16 comprises a cam follower arm 21 and an indicator arm 22 which is angularly spaced a predetermined distance from the cam follower arm to form a bell crank. As illustrated a cam follower 23 is suitably located and mounted on the cam follower arm 21. Although this follower has been shown as a roller follower it can readily be seen that any type follower may be utilized without departing from the spirit and scope of the present invention. The follower 23 contacts a cam 24 which may be suitably mounted on the side of the pressure roll 10 and is rotatable therewith. However it may be mounted in any way so long as it is rotatable and located near the cam follower. 75

The periphery of the cam is generally in the shape of a spiral. That is the radii of the cam gradually increase until they reach a maximum at the origin of the curve. However, it is to be understood that a cam of any shape may be used so long as it imparts a drawing action to the roving or other strand by means of its follower arm. When the cam is rotated it causes the indicator arm 22 and a slubbing arm 25 which is adjustably mounted thereon to slowly rise to a maximum height and then suddenly drop when the follower drops to a point X on the cam. At this point the slubbing arm 25 swings back to a position below the normal course or path of the strands so that the arm 25 is not in contact with the strands, but as the cam rotates the slubbing arm contacts the thread and slowly draws and stretches the strand. The slow movement has very little, if any, effect upon the size of the strand, but the sudden drop of arm 25 corresponding to the cam fall to point X reduces the draft momentarily and thereby causes the formation of a slub. The greater the drop of arm 25, the larger the slub. As shown more particularly in Figure 1 the slubbing arm is in contact with the thread T; however, it is to be understood that this arm may draw either or both of the yarns to form a slub thereon.

Means are provided for changing the size and the regularity of formation of the slubs. An indicator disc 26 is fixedly secured to the indicator arm 22. An indicator shaft 27 is mounted perpendicularly in the center of the indicator disc. Fixedly secured to the free end of the shaft 27 is an adjusting knob 28. Fixedly secured to the shaft 27 between the knob 28 and the flanged portion 29 of said shaft is the slubbing arm 25. This slubbing arm acts as an indicator arm to denote the size of the slubs to be formed. The size of the slubs formed is directly proportional to the amount of draw and stretch imparted to the strand or, more simply, it is proportional to the strand deflection caused by the upward swinging of arm 25 because this determines the effect of the sudden drop of arm 25. A greater drawing or deflection creates a larger slub. By a larger slub is meant one having a greater diameter. To form a larger slub it is necessary to increase the strand deflection which can be done by loosening the nut 30 on the indicator shaft 27 and turning the knob 28 in a counterclockwise direction as viewed in Figure 1. To form a smaller slub it follows that the knob 28 should be turned in a clockwise direction.

Figures 4, 4a, and 4b illustrate an embodiment having a plurality of strand engaging elements 25' and 25a, each for deflecting a separate strand or group of strands at different times. As shown the mechanism for operating element 25' is identical with that of Figures 1 to 3 for the element 25 therein. However, a separate and independently operable bell crank lever comprising arms 21a and 22a is mounted pivotally on shaft 20 to the rear (as viewed in Figure 4) of the lever for element 25'. The arm 21a has a follower 23a for engaging the cam 24 at a position angularly displaced from that of cam 23 so that the bell crank levers are operated correspondingly in succession and there is a time interval between their drops to the low point X of the cam. Instead of using the same cam, a separate cam may be employed for operating each lever. This has advantages in that the followers need not be so widely separated (angularly about a single cam) since the abrupt drop of one cam can be displaced angu-

larly any amount from the corresponding drop of the other cam. The other arm 22a carries a fixed calibrated disc 26a and an angularly adjustable shaft 27a to which is secured the knurled button 28a and the strand engaging element 25a. The elements 25' and 25a are offset and of modified construction so that they can operate upon separate strands.

As shown more clearly in Figure 4a, element 25 has a hook-shaped foot 40 adapted to loosely encircle the one strand or group of strands represented by T. The side of the hook adjacent the other strand or strands T' is gently curved as in the form of a semicircle or the bottom of the letter U to prevent any possible entry of the strand or strands T' into the hook 40 and to facilitate free riding of such strands past the hook 40 during relative motion, therebetween. The element 25a has a laterally extending portion 41 crossing over the strands a sufficient distance thereabove to avoid interference between such portion 41 and the strands at all times of their movement. A laterally offset portion 42 terminates in a hook-shaped foot portion 43 which is gently curved in a manner similar to that of hook 40 and encircles the strand or strands T'. It is possible in this modification to have an additional strand or strands not encircled by either of the hooks 40 or 43.

Figure 4b shows a modified arrangement of the strand engaging elements 25' and 25a which does not necessitate the special construction of Figure 4a. As shown, the foot of element 25' is straight as in Figures 1 to 3 and extends over strand T but under strand T' whereas 25a has a similar foot extending under strand T and over strand T'. When the elements are in their lower positions, the strands pass the feet of the elements with a light rubbing action but when either of the elements lift up, the strand or strands lifted thereby are deflected around the element under which it passes as well as by the element over which it passes.

In this embodiment, other novelty effects can be obtained particularly when the strand or strands lifted by one element are of different fibers than that or those lifted by the other element. The angle of displacement of the cam followers 23 and 23a about the center of cam 24 may be as much as 180° though smaller angles of 45° to 130° or so are generally preferred. In the case of a 180° separation, the cam may have a 180° dwell of the same small radius of point X extending from such point and this dwell may be followed by a gradual rise to the maximum from which a sudden drop to point X may be provided. As shown in Figure 4, the drop may be undercut to accommodate the differently swinging followers.

Figures 5 and 6 illustrate a means for mounting a plurality of such slub producing arms on a common shaft. The slubbing attachments 31 are substantially the same as the one illustrated in Figures 2, 3, and 4 excepting that the cam follower arm 21 is omitted. Each slubbing attachment 31 is fixedly secured to a common shaft member 32. The slubbing attachments are spaced so that they are or will be in contact with the strands coming from the spools when the cam means is in a position to warrant that contacting. The shaft member is placed in the bearing members 33 and 34 so that it is readily removable therefrom. Since the shaft may be readily mounted and dismounted from a roving machine or spinning machine it can be seen that a slub-

bing device of this type adds to the versatility of the aforementioned machines.

Oscillatory motion is imparted to the shaft 32 and slubbing arms 31 by the cam follower arm 35 which is fixedly secured to the shaft 32. The cam follower arm is in constant contact with the cam 36.

A slubbing arrangement of the type just described is advantageous in that less cams are required for operation and it is easier to mount and dismount from a spinning, or roving, machine.

Although this invention has been described with reference to improvements shown, it will readily be appreciated that numerous changes may be made without departing from the spirit and scope of the invention as described in the appended claims.

I claim:

1. In a drafting mechanism, a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls comprising an element disposed for engaging a strand passing between both sets of rollers, and means for oscillating the element to vary the path of the strand between the drawing rolls and the restraining rolls.

2. In a drafting mechanism, a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls comprising a plurality of elements disposed for engaging a strand passing between both sets of rollers, and means for oscillating the elements to vary the path of the strand between the drawing rolls and the restraining rolls.

3. In a drafting mechanism, a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls comprising an element disposed for engaging a strand passing between both sets of rollers, and cam means for oscillating the element to vary the path of the strand between the drawing rolls and the restraining rolls.

4. In a drafting mechanism, a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls comprising a plurality of elements disposed for engaging a plurality of strands passing between both sets of rollers, cam means for oscillating the elements in timed relation to vary the path of the strands between the drawing rolls and the restraining rolls.

5. In a drafting mechanism, a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls which has a strand engaging element that moves to and away from a strand that is passing between both sets of rollers, a cam, means for rotating the cam, a bell crank connecting the cam with the engaging element which is oscillated by the cam to vary the path of the strand between the drawing rolls and the restraining rolls.

6. In a drafting mechanism, a set of restrain-

ing rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls, a slubbing device between the drawing rolls and restraining rolls which has a strand engaging element that moves to and away from a strand that is passing between both sets of rollers, a cam, means for rotating the cam, a bell crank, one arm of the bell crank carrying a cam follower and which contacts said cam, the other arm carrying the strand engaging element which oscillates due to the rotation of the cam, to vary the path of the strand between the drawing rolls and the restraining rolls.

7. In a drafting mechanism a set of restraining rolls, a set of drawing rolls, means for driving both sets of rolls, the drawing rolls at a higher rate of linear speed than the restraining rolls which has a yarn engaging element that moves to and away from a strand that is passing between both sets of rollers, a cam, means for continuously varying the rotation of the cam, a bell crank comprising a follower arm and an adjustable arm, said adjustable arm carrying the strand contacting element which oscillates, due to the rotation of the cam, to vary the path of the strand between the drawing rolls and the restraining rolls, means for changing the angular relationship between the strand contacting element and the adjustable arm.

8. The method of forming a yarn of varying count comprising subjecting a strand to a drafting action as it proceeds from a set of driven restraining rolls to a set of driven drawing rolls operating at a higher peripheral speed than the restraining rolls, intermittently deflecting the path of the strand gradually at some point between the drawing rolls and restraining rolls, and suddenly releasing the strand from its deflected path.

9. The method of forming yarns of varying count comprising subjecting a plurality of strands to a drawing action as they proceed from a set of driven restraining rolls to a set of driven drawing rolls operating at a higher peripheral speed than the restraining rolls, intermittently deflecting the path gradually of at least one of the strands at some point between the drawing rolls and restraining rolls, and suddenly releasing each deflected strand from its deflected path.

10. The method of claim 9 in which all of the strands are deflected.

11. The method of claim 9 in which several of the strands are deflected at different times.

12. The method of claim 9 in which at least two of the strands contain different fibers.

13. The method of forming a yarn of varying count comprising subjecting a sliver to a drafting action as it proceeds from a set of driven restraining rolls to a set of driven drawing rolls operating at a higher peripheral speed than the restraining rolls, intermittently deflecting the path of the sliver between the sets of rolls and twisting the strand leaving the drawing rolls to produce a roving of varying count; subjecting the roving to a drafting action as it proceeds from a set of driven restraining rolls to a set of driven drawing rolls operating at a higher peripheral speed than the restraining rolls, intermittently deflecting the path of the roving as it passes between the sets of rolls, and twisting the strand leaving the last mentioned drawing rolls to produce a yarn of varying count.

14. The method of claim 13 in which a plurality of slivers are passed in contiguity through the first drafting stage.

15. The method of claim 14 in which the roving produced by the first drafting stage is combined with another roving during the second drafting stage.

16. The method of claim 14 in which one of the slivers is of one material and another is of another material.

17. The method of claim 14 in which one of the slivers is of rayon and another is of wool.

18. The method of claim 16 in which the roving produced in the first drafting stage is combined with another roving.

19. The method of claim 16 in which the frequency of deflection in the two drafting stages is predetermined to provide an irregularity which prevents patterning.

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