March 23, 1937. M. HAIN 2,074,468

MANUFACTURE OF YARN

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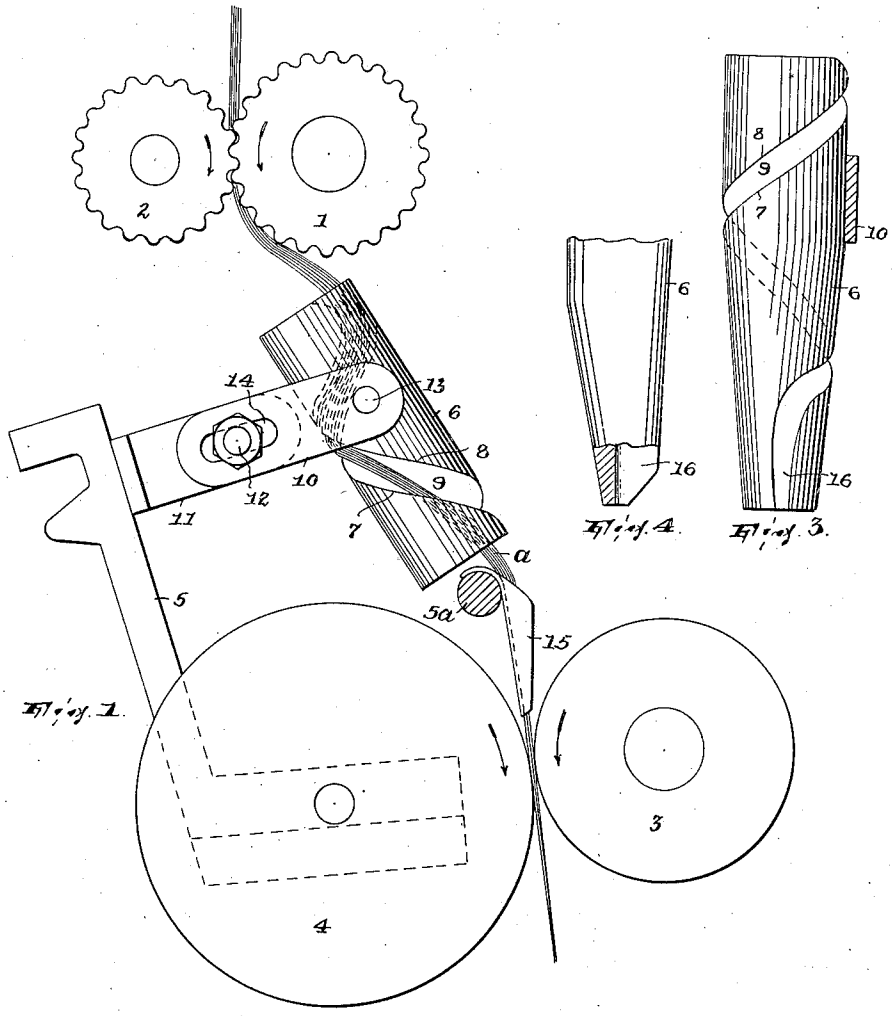


Fig. 1.

Fig. 4.

Fig. 3.

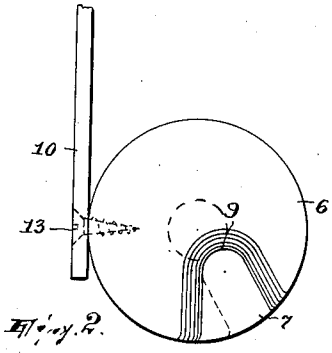


Fig. 2.

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MANUFACTURE OF YARN

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9 Claims. (Cl. 19—130)

This invention relates to the drawing or attenuation of slivers of long or bast fibers of jute, hemp and flax in the manufacture of yarn, for which purpose the sliver is passed first between retaining rolls and then between drawing rolls, the latter rotating at a higher speed than the former. In this operation while the sliver is advancing the drawing rolls are supposed to pull forward at approximately their own surface speed only those fibers which are actually within the nip of such rolls, but actually fibers not nipped by the rolls and clinging or otherwise coupled to those so nipped would go forward with the latter (thus giving the product a bunchy form in places instead of the even thickness desired) if it were not for means to retard such advance of the fibers not so nipped which is usually made a part of the drawing system. This has taken the form of what is known as gill mechanism, or a mechanism involving a set of bars which, arranged between the drawing and retaining rolls, was advanced at a speed between those of the two sets of rolls and equipped with pins penetrating the sliver and in effect acted as an advancing comb to retard the pulling forward with the fibers nipped of those not nipped. This gill mechanism is expensive to construct, operate and maintain and other expedients in substitution therefor have been proposed. These expedients also have their faults, certainly when compared with the subject of this invention, in that either they entail far greater expense for installation, operation and maintenance, they cannot be applied or applied readily to existing machines containing the drawing and retaining rolls, or they do not accomplish their intended purpose as perfectly.

I have found in practice that if, between the drawing and retaining rolls, an element exists around which the sliver stands wrapped in helical form and relatively to which it travels from the latter to the former rolls, said element will act to prevent fibers not in the nip of the drawing rolls from being pulled prematurely thereinto by fibers actually in the nip. I account for this on the following theory: The action of the two sets of rolls being as usual (or the retaining rolls feeding the sliver along at a given speed and the drawing rolls tending to pull it ahead at a faster speed, with consequent attenuation of the sliver) there exists, due to said element, a state of pressure on the fibers in and active transversely through all that portion of the sliver which is wrapped around said element (with consequent friction existing between the adjoining surfaces of such fibers) which pressure represents greater force than that by which, from friction or other cause, fibers actually in the nip of the drawing rolls tend to draw along with them at their own speed what may be termed vagrant fibers not in the nip, such force being so greater and hence adequate for the purpose largely because the pressure is extended throughout a considerable length of the fiber mass. This pressure is an incident of the action of the sliver, longitudinally tensioned as it is between the two sets of rolls, to constrict said element.

Preferably said element maintains the helix with its axis extending more or less toward the drawing rolls, as more or less actually toward the nip thereof, and to oppose distortion of the helix in this case lengthwise of its axis abutment means for the helix will be provided. In such case the abutment means is of course responsible for pressure active on the fibers augmenting that first mentioned, with consequent augmenting friction existing between their adjoining surfaces.

In the example herein set forth said element is supported so as to maintain the helix positioned as indicated, and said element itself is formed to provide the said abutment means, as by providing it with a pair of parallel and helically defined shoulders facing each other and forming a groove and the one of which that is the nearer to the drawing rolls forms said abutment means. If this groove is concave in section, or otherwise gradually reduced from its mouth to its bottom, there will be some crowding of the fibers together and hence still further pressure of the fibers against each other, with consequent increased friction between them.

In the drawing,

Fig. 1 is a side elevation, partly in section, of a drawing system embodying the invention;

Fig. 2 is a top plan view of said element;

Fig. 3 is a front elevation of a modified form of said element, with its supporting arm in section; and

Fig. 4 is a fragmentary left side elevation thereof.

Let 1 and 2 be the retaining rolls, adapted in some way to grip the sliver *a*, as by being fluted and intermeshing. Let 3 and 4 be the drawing rolls. The rolls 1 and 3 may, as usual be mounted in fixed bearings and the rolls 2 and 4 mounted for movement toward and from the respective rolls 1 and 3, being yieldingly urged toward the latter rolls. The rolls 1 and 3 are driven, the latter at some suitable faster speed than the former.

So much is the usual construction. I have not shown the supporting structure or frame (in full); the bearings for the rolls; the means for yieldingly urging the rolls 2 and 4 against their companion rolls; or the means for driving the rolls 1 and 3, since these are or may be all conventional and are well known in the art. A part of the frame is however shown at 5.

The controlling element of this invention is here a bar-like member 6 supported between the two sets of rolls and around which the sliver exists wrapped in the form of a helix. Since in the example it stands with its longitudinal axis extending through the set of drawing rolls, or skewed away from the perpendicular relation to the plane coinciding with the nips of the two roll sets, there is provided abutment means, here on the element itself, which prevents distortion of the helix lengthwise of said axis in response to the pull of the drawing rolls. This takes the form of a shoulder 7 helically developed in parallelism with the helical form in which the sliver is to exist wrapped around said element. In the actual embodiment another such shoulder 8 exists spaced from and facing and parallel with the shoulder 7, and these define a groove 9 which is concave in cross-section.

To support said element a part of the supporting structure may be here a two-part arm extending in a direction through a plane coinciding with the nips of the two roll sets and one part, 10, of which is connected to the other, 11, by a bolt-and-nut device 12, said element being attached to the part 10 by a screw 13; the said device 12 may penetrate a slot 14 in one arm. Thus there may be adjustment toward and from aforesaid plane or angularly with relation to it around the device 12 or the screw 13.

My invention is applicable in any step in the preparation of the yarn, ending with the spinning step, in which a drawing of the sliver is necessary; as shown in Fig. 1 the two sets of rolls are arranged one above the other, as in drawing the sliver followed by spinning it.

To direct the sliver quite to the nip of the drawing rolls there may be a spout-like conductor 15 which may be affixed to a bar 5a of the supporting structure or, as at 16, Fig. 3, be formed in said element itself.

It will be understood that said element permits free slippage of the sliver helix with respect thereto in the travel of the sliver past said element, which is preferably composed of any hard or non-resilient material.

In the drawing according to my invention only those fibers which are actually nipped by the drawing rolls assume the speed incident to the direct action of those rolls. Any such fibers as are not actually so nipped but might tend to be dragged along by the fibers so nipped at the same speed as the latter, thus to produce bunching in the sliver-product, are held to advance only at the speed intended with respect thereto, or that speed which is the component of the advancing influence of the retaining and drawing rolls.

The element 6 maintains the sliver in the mentioned state of pressure, here primarily because it forms as it were a core around which the travelling and tensioned sliver is helically wrapped. Others may have caused the sliver to be maintained under pressure at a point between the retaining and drawing rolls by some other expedient than that involving the helical wrapping of the sliver, but so far as I am aware they have not continued the pressure close to the nip of the drawing rolls, as by conductor 15 or 16. This is important where some of the fibers may be short enough not to remain effectually gripped against the pull of fibers actually in the nip of the rolls. Wherefore, given the two sets of rolls, my invention contemplates maintaining the sliver in a state of transverse pressure between such roll sets and from a point remote from the drawing rolls to a point close to the nip thereof and regardless of whether or not for that purpose the sliver is wrapped around the medium responsible for the pressure.

Having thus fully described my invention what I claim is:

1. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element disposed on said structure between the two sets of rolls and relatively to which the sliver being treated is to travel from the retaining to the drawing rolls and around which it is to be held in the form of a helix.

2. A machine for treating a sliver, including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element disposed on said structure between the two sets of rolls and relatively to which the sliver being treated is to travel from the retaining to the drawing rolls and around which it is to extend in the form of a helix with the helix axis extending toward the drawing rolls and means to oppose distortion of the helix lengthwise of said axis.

3. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element to form an axial core disposed on said structure between the two sets of rolls and having its longitudinal axis extending toward the drawing rolls, and means defining a shoulder facing away from the drawing rolls and conforming to a substantially helical line around said axis, the sliver being treated being adapted to be extended around said element in the form of a helix and in contact with said shoulder.

4. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element to form an axial core disposed on said structure between the two sets of rolls and having its longitudinal axis extending toward the drawing rolls, and means defining a shoulder projecting from the core and facing away from the drawing rolls and conforming to a substantially helical line around said axis, the sliver being treated being adapted to be extended around said element in the form of a helix and in contact with said shoulder.

5. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element disposed on said structure between the two sets of rolls and relatively to which the sliver being treated is to travel from the retaining to the drawing rolls and around which it is to extend in the form of a helix, said element having a helical groove to receive the helix.

6. A machine for treating a sliver including, in

combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and controlling means including an element disposed on said structure between the two sets of rolls and relatively to which the sliver being treated is to travel from the retaining to the drawing rolls and around which it is to extend in the form of a helix, said element having a helical groove to receive the helix which in cross-section is gradually reduced in width from its mouth to its bottom.

7. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and an element arranged on said structure between the two sets of rolls and relatively to which the sliver travels and around which it is to extend in helical form, said element being angularly adjustable on said structure in a plane cutting the drawing rolls and having means to oppose distortion of the helix lengthwise of its axis.

8. A machine for treating a sliver including, in combination, drawing rolls and retaining rolls coactive with the drawing rolls to draw the sliver, supporting structure, and an element arranged on said structure between the two sets of rolls and relatively to which the sliver travels and around which it is to extend in helical form, said element being adjustable through the plane coincident with the nips of the two sets of rolls.

9. The combination, with drawing rolls and retaining rolls and supporting structure, said retaining rolls being coactive with the drawing rolls to draw the sliver, of means on said structure between the two sets of rolls and extending from a point relatively remote from the drawing 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 travelling sliver as is at any time between said points.

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