April 16, 1940. M. HAIN 2,197,638

MANUFACTURE OF YARN

Filed July 12, 1939 2 Sheets-Sheet 1

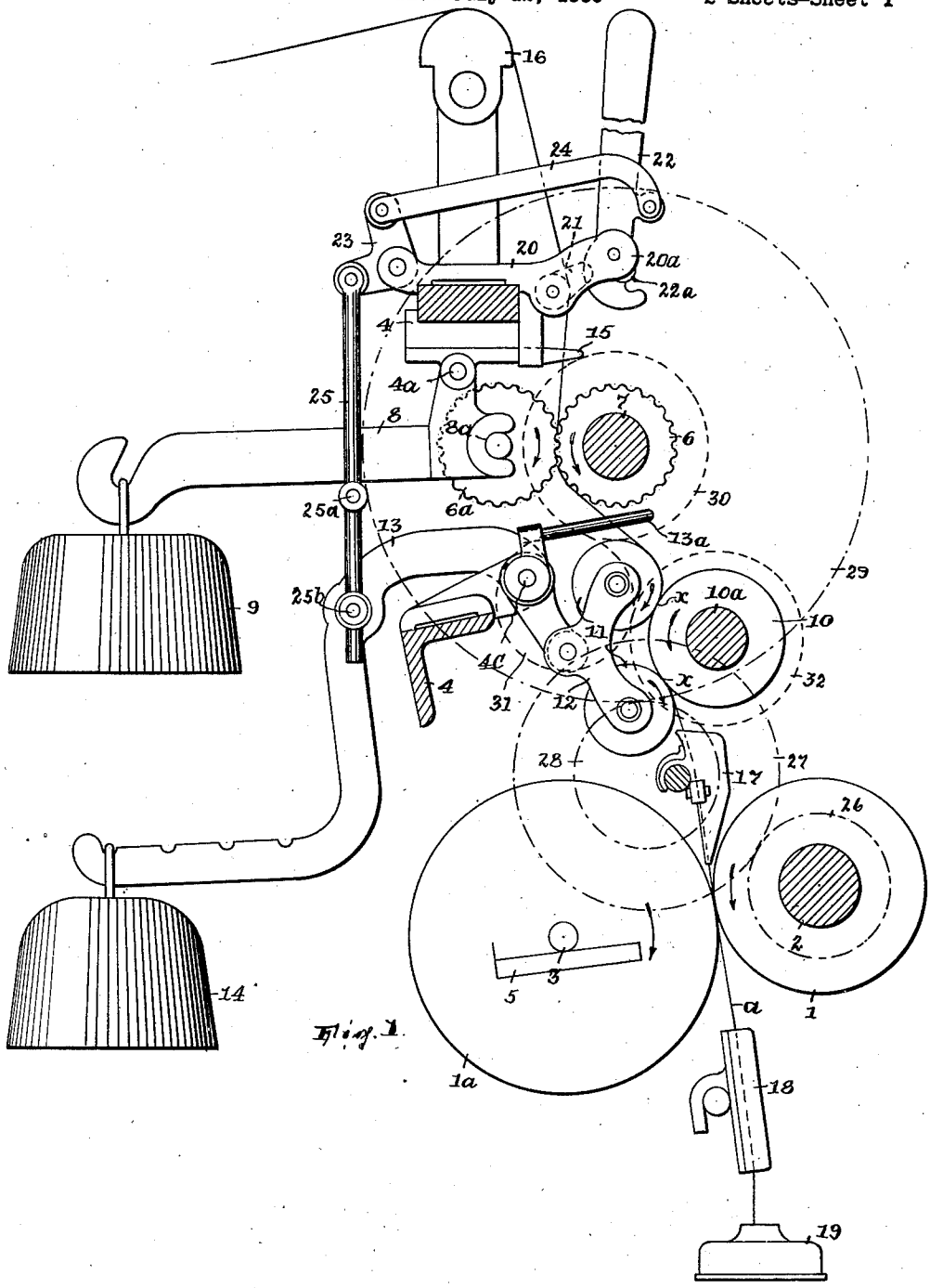


Fig. 1.

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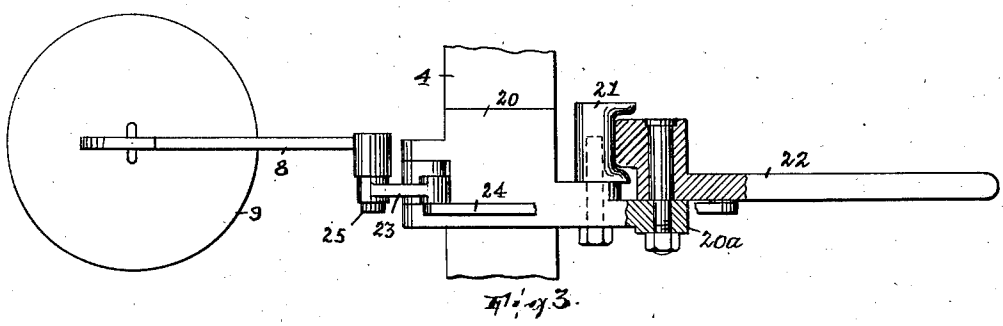


Fig. 3.

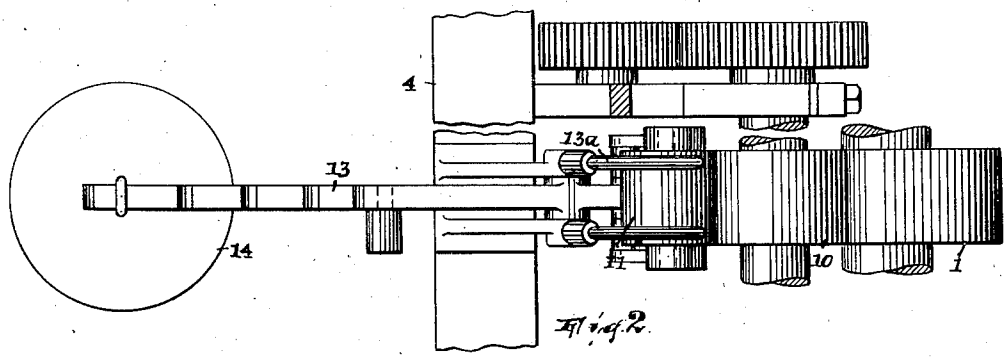


Fig. 2.

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UNITED STATES PATENT OFFICE

2,197,638

MANUFACTURE OF YARN

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Application July 12, 1939, Serial No. 283,934

7 Claims. (Cl. 19—130)

One object of this invention is to provide a drawing system, especially for use in drawing jute or other bast fiber, not involving the use of gill mechanism whereby sliver not twisted or even in rove form may during its passage to the spinning unit be brought to proper state for spinning.

In a system for the drawing of sliver of bast fibers the retaining rolls are set back of the other or drawing rolls a distance somewhat greater than the length of the average longest fiber of the sliver to be treated, thus to avoid disrupting fibers by the pull of the drawing rolls while such fibers remain subject to the resistance of the more slowly rotated retaining roll-pair. Due to this spacing of the roll-pairs the part of the sliver at any time undergoing actual drawing may be said to include three classes of fibers—those nipped by the drawing rolls alone, those nipped by the retaining rolls alone, and those not nipped by either roll-pair. Imperfect drawing usually occurs because the fibers of the third class are not actually subject to true drawing but are advanced only by the adhesion existing between them and those of the first class or actually nipped by the drawing rolls. Such imperfect drawing means a sliver which is not uniform in gauge, being too bunchy in some places and too lean in others. In the effort to overcome this fault pressure on the sliver between the two roll-pairs has been resorted to, as by rolls driven in the direction to favor the advance of the sliver but at a speed less than that of the drawing rolls so to impose a drag on the fibers of the third class and thus overcome the adhesion between them and the fibers of the first class. This application of pressure, usually resorted to in the case of short-fibered sliver, as cotton, of course reduces the non-uniformity in gauge of the sliver by the holding-back of some of the vagrant or third-class fibers, but it cannot, unqualified, result in the inevitable holding-back of more than the minor portion of the vagrant fibers, at least in the case of long-fiber (as jute) sliver, as considerable experimenting by me has shown. Some qualifying factor must be present in the case of the long-fiber sliver if more than a comparatively few of the vagrant fibers are to be held back. This qualifying factor I have discovered to be a definite positioning of the pressure. Thus:

In two different cross-sections of a sliver taken between the roll-pairs at opposite sides of a median point between them, the ratios of the first-class to third-class fibers are not the same. In the section at the retaining roll side of such point there will be more of the vagrant fibers to a given number of the first-class fibers than at the other side, to wit, because the trailing ends of many of the fibers at the latter side reach past said point to the other side. Therefore I apply the pressure at the side adjoining the retaining rolls, or closer to them than to the drawing rolls, to wit, where there is a relatively superior abundance of the vagrant fibers in proportion to fibers of the first class and where they will therefore be more effectively subject to the holding-back pressure than to the pulling (adhesion) effort of the first-class fibers.

To obtain the pressure I use a certain system of rolls, per se known. But, to prevent the sliver bunching up behind such rolls, I rotate the latter at a certain speed, to wit, approximating that of the retaining rolls, such speed being suitable for holding back the vagrant fibers and still favoring the advance of the sliver incident to the drawing.

In the spinning machine there will usually be a number of units each comprising a spinner or spinning means and a drawing system, and when the sliver of any unit breaks between said means and system it is desirable to provide for stopping the drawing as to that unit. Assuming said system to include the aforesaid pressure means, for effecting the stopping I provide for simultaneously applying a brake to the sliver relatively back of the retaining rolls and terminating the coaction of said pressure means and retaining rolls with the drawing rolls in effecting the draft. Since the sliver following the breaking thereof continues more or less to be delivered by the drawing system, the delivered portion usually has to be removed in order to piece up the sliver. This should not be done so that the new end of the sliver will be back of the drawing rolls and thus inaccessible. According to my invention, therefore, when the brake is applied and the coaction of the pressure means and retaining rolls with the drawing rolls in effecting draft is terminated, a parting of the sliver is caused to occur at a convenient point, to wit, substantially if not quite at the drawing rolls, which it will be understood continue running.

In the drawings,

Fig. 1 shows mainly in side elevation but partly in section a drawing system embodying the invention;

Fig. 2 is a plan of what is shown in Fig. 1 taken

in a plane between a certain fork 13a and the rolls 6—6a; and

Fig. 3 is a plan, partly in section, of a part of the means for stopping the drawing.

1—1a designates the drawing rolls of which roll 1 is fixed to a constantly rotating shaft 2 and roll 1a has its axial portion 3, as trunnions, supported by guides 5 of the frame 4, this roll being held bearing a suitable pressure against roll 1 by any well-known means (not shown).

6—6a designates the retaining rolls, fluted as usual and above the drawing rolls and of which roll 6 is fixed to a shaft 7, constantly rotating at a suitably less speed than that of shaft 2, and roll 6a is here journaled in bearings 8a of the forked forward arm of a lever 8 fulcrumed in frame 4 at 4a and carrying on its rear arm a weight 9 to hold roll 6a bearing against roll 6.

Between rolls 1—1a and 6—6a is arranged the mentioned pressure means, thus: On a constantly rotated shaft 10a is fixed a roll 10. A pair of rolls 11 bear against the periphery of roll 10 and these are free to rotate independently of each other in a carrier 12 pivoted in the forward arm of a lever 13 fulcrumed between its ends in the frame at 4c and having its rear arm first bent downwardly and then back and carrying a weight 14.

All the axes of the pivots and bearings described are here horizontal and parallel. The pivot of carrier 12 is in a plane cutting roll 10 and extending between rolls 11, wherefore the latter rolls when both are under pressure bear against roll 10 with substantially equal pressure. In this example the pivoting axis of the device 11—12 is offset with respect to its center of gravity so that when the pressure is withdrawn it bears with only the upper roll against roll 10.

Lever 13 may be equipped with a fork 13a forming a sliver guide and projecting forwardly between the upper roll 11 and rolls 6—6a. And above the latter rolls there may be a fork 15 forming another sliver guide and fast to the frame 4.

The sliver *a* extends over a guide 16 atop the frame, down through guide 15, between rolls 6—6a, through guide 13a, between rolls 10—11, between rolls 1—1a and then through the usual spout 17 and a suitably adjustable grooved guide 18 to and through the cap 19 of the usual spinning unit.

Assume the unit to be in operation: A zone of the sliver, from nip *x* to nip *x* in Fig. 1, of less width than the length of substantially any fiber of the sliver exists under pressure; and the rolls 10—11 exert an advancing influence on the sliver at a speed between those of the drawing and retaining rolls. Hence a state of friction between all the fibers within said zone exists, wherefore those fibers which are not nipped by the drawing rolls are held by this friction against advance merely by such bond as may be existing between them and those actually so nipped, wherefore the drawing proceeds uniformly, or without bunching.

Fast to the frame between guides 15 and 16 is a bracket 20 and fast to this bracket is a fixed clamping member 21 having a crotch to receive the sliver and presenting thereto a rounded surface. Bracket 20 has a forwardly projecting arm 20a in which is fulcrumed a hand-lever 22 whose shorter arm is developed to the form of a cam 22a to coact as a movable clamping member with member 21 when the lever is moved forwardly and down. Bracket 20 affords a pivot for a bell-crank lever 23 one arm of which upstands and the other projects rearwardly. A link 24 is pivoted to the former arm and has a forward downbent end pivoted to the lever 11 between its cam and its free end, wherefore when such lever is depressed until a lug 22a thereon encounters member 21 the pivot between such lever and the link will have passed dead-center so that the lever will be locked in the depressed position. The rear arm of the lever 23 has pivoted thereto and depending therefrom a link 25 which at 25a has a projection under lever 8 and at 25b is pivoted to lever 13.

To stop the action on breakage of the sliver between the drawing rolls and the spinning means the hand-lever is depressed which clamps the sliver above the retaining rolls and simultaneously, through the parts 24—23—25, causes retraction of roll 6a and the carrier 12, so that the described normal action of 10—11 and 6—6a ceases. The sliver thereupon definitely parts at or near the actual nip of the (still active) drawing rolls, that is to say, not above them where access to the sliver to effect now the piecing would be difficult. I account for this as follows: When the brake is applied, the drawing rolls still running and active, the sliver will of course part in some portion thereof under strain at the weakest point. Such point may be anywhere between the brake and the drawing rolls. But when the brake is applied all actual strain or pull on the sliver effected by the retaining rolls and the pressure means simultaneously ceases, so that there remains no tendency of the sliver to part between such means and the brake. But said means, nevertheless, presents a certain continued resistance to advance of the sliver under the pull of the drawing rolls, to wit, by the pressure still exerted by and due here to gravity acting on the upper roll 11, so that from the drawing rolls to such roll 11 the sliver is under strain. That part of the sliver, however, has been fully drawn or attenuated (that is, graduated in strength from roll 11 down to the drawing rolls), wherefore the parting occurs at the drawing rolls.

The means to drive the rolls 1, 6 and 10 at the appropriate speeds (to wit, so that, for example, the speed ratio of the drawing and retaining rolls will be 11.5 to 1 and that of the drawing rolls and rolls 10—11 will be 11.5 to 1.1) here comprises intermeshing gearing 26—27—28—29 connecting the rolls 1 and 6 and intermeshing gears 30—31—32 connecting the rolls 6 and 10.

It is of course assumed that the pressure on the sliver exerted by rolls 10—11 should never be such as to defeat the primary purpose, the drawing of the sliver by the coaction of rolls 1—1a and 6—6a.

Having thus fully described my invention, what I claim is:

1. Mechanism for drawing bast sliver comprising pairs of drawing and retaining rolls, means between said pairs and closer to the latter than to the former pair to impose pressure on the sliver including a driven roll, two freely rotative rolls and means yieldingly urging the latter rolls against the driven roll, all said rolls having their axes substantially parallel and the nips of the freely rotative rolls being spaced apart a distance less than the length of substantially any fiber of the sliver being drawn, and means to drive one drawing roll and one retaining roll, the former at the superior speed, and also drive said driven roll at a speed between those of the latter drawing roll and re-

taining roll and approximating the speed of the latter.

2. Sliver drawing mechanism including a pair of drawing rolls, other rolls relatively back of said drawing rolls and one of which is freely rotative and movable toward but retractive from the other of such rolls, all said rolls having their axes substantially parallel, means to drive one drawing roll and one of said other rolls, the former at the superior speed, and means movable in one direction to brake the sliver at a point relatively back of said other rolls and free the retractive one of the latter rolls and in the opposite direction to free the sliver at said point and urge said retractive roll toward said other roll.

3. Sliver drawing means comprising a pair of drawing rolls, a pair of retaining rolls one of which is movable toward but retractive from the other, all said rolls having their axes substantially parallel, coactive means between said pairs to impose pressure on the sliver one of which is retractive from but movable toward the other, means to drive one drawing roll and said other retaining roll, the former at the superior speed, and means movable in one direction to brake the sliver at a point relatively back of the retaining rolls and free the retractive one of said retaining rolls and the retractive one of said coactive means and in the opposite direction to free the sliver at said point and move the retractive one toward the other of said retaining rolls and the retractive one toward the other of said coactive means.

4. Sliver drawing means comprising a pair of drawing rolls, a pair of retaining rolls relatively back of the drawing rolls and one of which is movable toward but retractive from the other, a driven roll between said pairs, two pressure rolls coactive with the driven roll, a carrier in which the pressure rolls are journaled, a member movable toward but retractive from the driven roll and affording a pivot for the carrier, the axes of all said rolls and the pivot being substantially parallel and said pivot being in a plane between the axes of the pressure rolls and cutting the driven roll and said carrier being normally urged to turn on its pivot in one direction, means to drive one drawing roll, said driven roll and the other retaining roll at such speeds that said driven roll will rotate slower than the drawing rolls and said other retaining roll will rotate slower than said driven roll, and means movable in one direction to brake the sliver at a point relatively back of the retaining rolls and free said member for retraction from the driven roll and free the retractive retaining roll for retraction from the other retaining roll and in the opposite direction to free the sliver at said point and urge the retractive roll toward the other retaining roll and said member toward the driven roll.

5. Sliver drawing means comprising a pair of drawing rolls, a pair of retaining rolls above the drawing rolls and one of which is movable toward but retractive from the other, a driven roll at an elevation between the drawing and retaining rolls, two pressure rolls lateral of and coactive with the driven roll, a carrier in which the pressure rolls are journaled, a member movable toward but retractive from the driven roll and affording a pivot for the carrier further removed for the driven roll than the axes of the pressure rolls, the axes of all said rolls and the pivot being substantially parallel and said pivot being in a plane between the axes of the pressure rolls and cutting the driven roll and said carrier being normally urged to turn on its pivot in one direction, means to drive one drawing roll, said driven roll and the other retaining roll at such speeds that said driven roll will rotate slower than the drawing rolls and said other retaining roll will rotate slower than said driven roll, and means movable in one direction to brake the sliver at a point relatively back of the retaining rolls and free said member for retraction from the driven roll and free the retractive retaining roll for retraction from the other retaining roll and in the opposite direction to free the sliver at said point and urge the retractive roll toward the other retaining roll and said member toward the driven roll.

6. Sliver drawing means comprising a pair of drawing rolls, a pair of retaining rolls relatively back of the drawing rolls and one of which is movable toward and retractive from the other, a driven roll between said pairs, a device to hold the sliver in contact with the driven roll throughout an arc of its periphery, a member movable toward but retractive from the driven roll and affording a pivot for said device, the axes of all said rolls and the pivot being substantially parallel and said pivot being in a plane cutting said arc and said device being normally urged to turn on its pivot in one direction, means to drive one drawing roll, said driven roll and the other retaining roll at such speeds that said driven roll will rotate slower than the drawing rolls and said other retaining roll will rotate slower than said driven roll, and means movable in one direction to brake the sliver at a point relatively back of the retaining rolls and free said member for retraction from the driven roll and free the retractive retaining roll for retraction from the other retaining roll and in the opposite direction to free the sliver at said point and urge the retractive roll toward the other retaining roll and said member toward the driven roll.

7. Sliver drawing mechanism comprising pairs of drawing and retaining rolls, means between said pairs to impose pressure on the sliver including a driven roll, a supporting member yieldingly urged toward the driven roll, a carrier, and two freely rotative rolls journaled in the carrier, the axes of all said rolls being substantially parallel and said carrier being pivoted in said member on an axis substantially parallel with and in a plane between the axes of said freely rotative rolls and cutting the driven roll, and means to drive one drawing roll and one retaining roll, the former at the superior speed, and also drive said driven roll at a speed between those of the latter drawing and retaining rolls.

MALCOLM HAIN.