March 12, 1935. M. B. STONE 1,994,052

FRAME

Filed Dec. 14, 1933

Fig. 1.

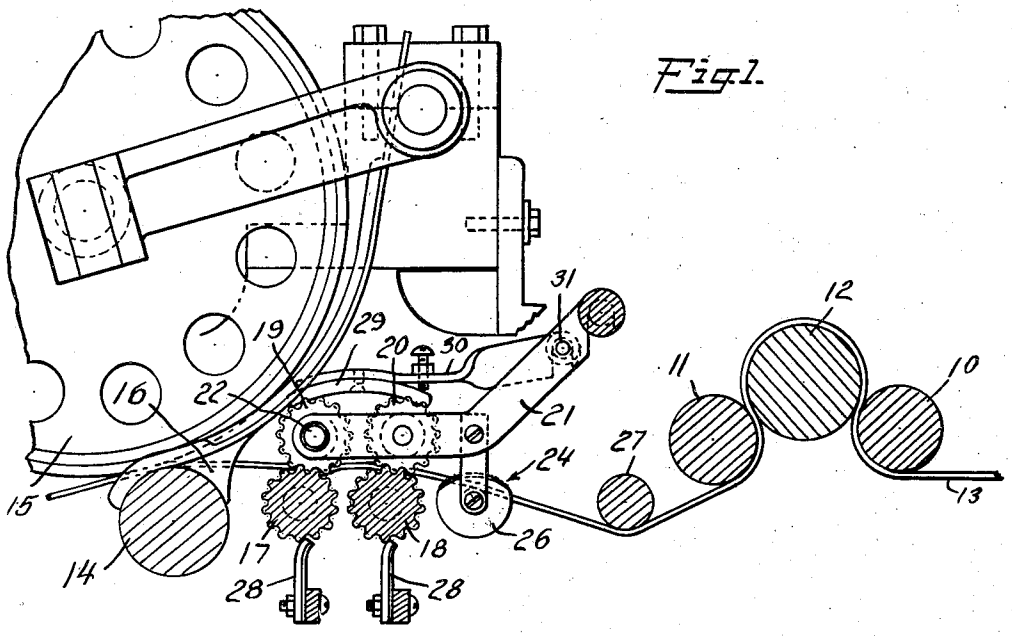


Fig. 2.

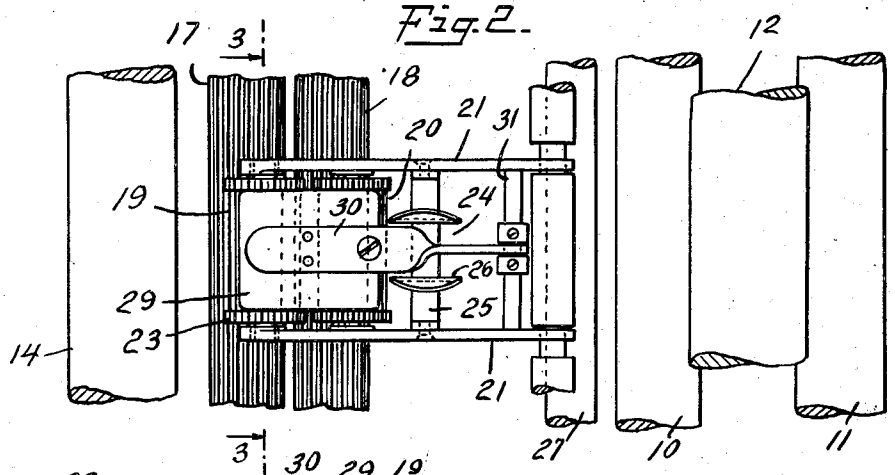
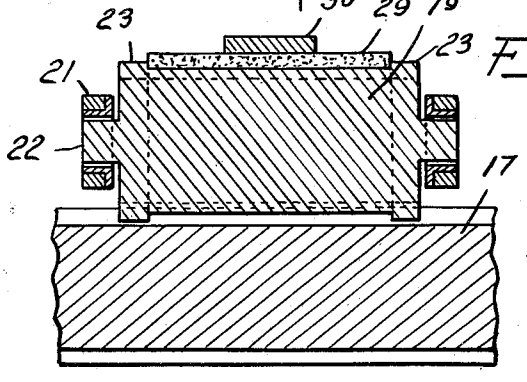


Fig. 3.



INVENTOR
Malcolm B. Stone
BY
Pennie Davis Marvin & Edwards
ATTORNEYS

Patented Mar. 12, 1935 1,994,052

UNITED STATES PATENT OFFICE

1,994,052

FRAME

Malcolm B. Stone, Milton, Mass., assignor to Ludlow Manufacturing Associates, Boston, Mass., trustees

Application December 14, 1933, Serial No. 702,292

9 Claims. (Cl. 19—130)

This invention relates to the drawing of fibers in the manufacture of yarn, and is concerned more particularly with a novel apparatus for controlling and restraining the fibers in that portion of the strand undergoing draft, as for example, in drawing, roving, or spinning frames. The apparatus of the invention is specially adapted for use in the manufacture of yarn from long fibers such, for example, as those of the bast variety including jute, hemp, and flax. Accordingly, for purposes of explanation, embodiments of the invention suitable for use in drawing frames for jute will be illustrated and described in detail, although it is to be understood that the utility of the invention is not limited to the particular fibre.

In drawing and roving frames heretofore used in the manufacture of jute yarn, gill bars have been customarily employed to support that portion of the strand undergoing draft between the retaining and drawing rolls, and these gill bars contain gill pins which extend into and through the strand and serve to hold back and restrain fibres which are not nipped by the drawing rolls. If restraint were not thus imposed upon the fibres, those fibres which are nipped by the drawing rolls would carry forward with them by entanglement other fibres which are not nipped by the drawing rolls, and as a consequence, the fibres would not feed to the drawing rolls at a uniform rate and the strand produced would not be level, but would contain thin and thick spots. Although such gill bars have heretofore been widely employed for the purpose mentioned, the gill mechanism is generally recognized as objectionable because it represents a heavy item of expense in the construction of a frame and is costly to operate and maintain. Also, there is a definite limit to the speed at which the bars may be operated by their screws, and frames equipped with the bars thus have a relatively limited rate of production.

In copending applications, Serial No. 646,266, filed December 8, 1932, of which I am a co-applicant, and Serial No. 674,986, filed in my name June 9, 1933, there are illustrated and described novel apparatus for drawing and spinning which include new devices for controlling the fibres in that portion of the strand undergoing draft and the apparatus of the present invention is a further development of those disclosed in the applications referred to and is particularly adapted for use in drawing frames.

In the apparatus of the present invention, that part of the strand undergoing draft between the retaining rolls and the drawing rolls of the frame is subjected to control by means of a plurality of different devices which engage it, and these devices include a pair of gripping and feeding means, each of which preferably takes the form of a pair of rolls. Each pair of rolls includes a driven roll in fixed bearings and a roll which is free to approach and recede from the driven roll in accordance with inequalities in the strand. The movable or floating roll is driven at the same surface speed as the driven roll and the two roll combinations permit fibers nipped by the drawing rolls to pass freely, while restraining fibers which are not thus nipped. The roll combinations also insure that the fibers will be positively fed to the drawing rolls of the frame.

In addition to the two rotary control devices mentioned, the control means includes a member in the form of a conductor which engages the strand and forces it out of its normal path and imposes drag upon it. The conductor confines the strand laterally and prevents it spreading while thus being acted on and the conductor is movably mounted so that it takes different positions in accordance with the pressure of the strand upon it. The conductor is connected to at least one of the gripping devices so as to vary the effect of the latter in accordance with variations in the pressure referred to. Preferably both floating rolls of the two gripping devices are mounted in a single mounting which may be a pair of swinging arms and one of these rolls is mounted in fixed bearings in the mounting and the other loosely carried in the arms and capable of bodily movement relative thereto. The conductor is also connected to the arms and with this arrangement, any increase in pressure on the conductor causes that gripping device which includes the roll supported in fixed bearings in the arms to grip the strand more tightly and thus exercise a greater restraining action.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which

Fig. 1 is a sectional view of one form of the apparatus of the invention;

Fig. 2 is a plan view of the apparatus shown in Fig. 1 with parts removed; and

Fig. 3 is a sectional view on the line 3—3 of Fig. 2.

Referring to the drawing, the drawing frame illustrated comprises an assembly of retaining rolls which includes rolls 10 and 11 in fixed

bearings and a jockey roll 12 which rides upon the rolls 10 and 11. The strand 13, which is guided to the rolls in any suitable manner, passes under the roll 10, around the jockey roll, and under the roll 11, and the rolls cooperate to grip the strand tightly. From the retaining rolls, the strand passes to a drawing roll combination comprising a drawing roll 14 and a presser roll 15 mounted in arms in the usual way and weighted so that the rolls grip the strand tightly and prevent slippage. The strand is guided to the rolls of the drawing roll assembly by a conductor 16 of standard construction and the rolls rotate at a surface speed higher than that of the retaining rolls and thus draw the strand, the draft being determined by the difference in roll speeds.

In order to control the fibres in that part of the strand undergoing draft and to prevent fibres which are not nipped by the drawing rolls from being carried along by fibres which are nipped, a plurality of control devices are used and these devices include a pair of combined gripping and feeding means which not only serve to restrain the fibres which are not nipped but also act to feed the fibres positively and evenly to the drawing rolls.

In the construction illustrated, the two gripping and feeding means comprise driven rolls 17 and 18 mounted in fixed bearings and driven in any appropriate manner. Ordinarily these rolls are portions of shafts which extend throughout the length of the frame and are provided with driving means at the ends of the frame. Associated with the driven rolls are floating or jockey rolls 19 and 20, and each of the floating rolls acts on a single strand only. Both of the rolls referred to as floating rolls are mounted so that they may approach and recede from their associated rolls in fixed bearings and these movements of the floating rolls are in accordance with inequalities in the strand, although one of the floating rolls is not wholly free in its movements but is under control of a member, the operation of which is responsive to the pressure of the strand moving in engagement therewith. Neither floating roll is substantially weighted.

In the construction illustrated, the mounting employed for the floating rolls comprises a pair of arms 21 mounted for swinging movement on a suitable part of the frame and roll 20 is in fixed bearings in the arms while the trunnions 22 of the roll 19 are received in openings in the arms which are of somewhat greater diameter than the trunnions.

The rolls 17, 18, 19, and 20 may have various kinds of surfaces as, for example, the surfaces may be plain, scratched, or fluted. The latter type of surface appears to give the best results and is illustrated in the drawing. Also, the rolls 19 and 20 are positively driven at the same surface speed as the rolls with which they are associated and, for this purpose, the rolls 19 and 20 may be provided with gear teeth 23 at their ends, the teeth meshing with the flutes of the rolls 17 and 18, respectively. The flutes and the gear teeth are cut sufficiently deep so that the rolls 17 and 18 continue to be driven even though they may be moved away from their respective fixed rolls a substantial distance by thick spots in the strand. The two roll combinations are driven at a slightly greater surface speed than the retaining rolls and preferably the rolls 17 and 19 immediately adjacent to the drawing rolls are driven at a slightly higher speed than the rolls 18 and 20. The speed of the two roll combinations is, however, much less than the speed of the drawing rolls.

Since the rolls 19 and 20 press upon the strand lightly, they do not interfere with the free passage of fibres which are nipped by the drawing rolls but they effectively hold back fibres which are not nipped and which would otherwise be carried along by entanglement with the nipped fibres. The roll combinations also serve to feed fibres to the drawing rolls and this function is of considerable importance in the production of a level strand and is particularly advantageous when the strand breaks and has to be rethreaded through the rolls.

Just in front of the rolls 18 and 20, the strand engages a member 24 which forces the strand out of its normal path and imposes drag upon it and thus restrains the fibres. This member is preferably in the form of a conductor and it may comprise a non-rotating bar 25, extending between the arms 21, and side pieces 26 mounted on the bar. The side pieces engage the strand along its edges and impose drag upon it and they also serve to prevent the strand from spreading laterally to too great an extent, with the resultant formation of ragged edges.

While the conductor 24 would perform a useful function if held in fixed position, it is preferable to mount the conductor on the mounting of the floating rolls, since with this arrangement any increase in the pressure of the strand on the conductor by reason of the passage of a thick spot in the strand over the conductor causes the mounting to be moved downwardly. This in turn causes the roll 20 to press the strand more firmly against roll 18 and the roll combination accordingly exercises a greater restraining action and also feeds the strand more positively.

In the construction described, variations in the pressure of the strand on the conductor 24 act to vary the effectiveness of the first roll combination only, but if desired, both rolls 19 and 20 may be mounted in fixed bearings in the arms, in which event the conductor controls the effectiveness of both of the gripping and feeding means.

In addition to the conductor and the two rotary control devices, the frame illustrated includes a fixed rod 27 and this rod engages the strand as it leaves the retaining rolls and forces it out of its normal path and imposes drag upon it. In some frames, the relative positions of the retaining and drawing rolls are such that the rod 27 is not necessary but in many standard drawing frames, the retaining and drawing rolls occupy substantially the positions illustrated in Fig. 1. In such frames, the rotary control devices and the conductor 24 would have to be raised above the normal path of the strand from the retaining rolls to the drawing rolls in order to insure that the strand pressed firmly against the conductor and the rolls 17 and 18 is mounted in fixed bearings. This might necessitate placing the rotary control devices back from the nip of the drawing rolls a substantial distance. It has been found that best results are obtained when one of the rotary control devices is placed as close as possible to the nip of the drawing rolls. Therefore, in frames of the construction referred to, the rod 27 which is fixed and non-rotatable is mounted so as to deflect the strand downward from the drawing rolls and the strand then bears firmly against

the conductor and the two control rolls mounted in fixed bearings. The rod thus permits the rotary control device to be placed close to the nip of the drawing rolls, and in addition, since it imposes drag upon the strand, it exercises a restraining action upon the fibres supplementing that of the other control devices.

In order that the control rolls may be cleared of loose fibres, a leather cleaner 28 is provided for each roll, and these cleaners are mounted on any suitable part of the frame and have free ends which engage the roll surfaces. A similar cleaner 29 is provided for the floating rolls 19 and 20, this cleaner being mounted on a bracket 30, one end of which is supported on a rod 31 extending between the arms 21.

What I claim is:

1. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining rolls and drawing rolls and undergoing draft, said means including a member engaging the strand and forcing it out of its normal path of travel and imposing drag upon it, said member being movable in accordance with variations in the pressure of the strand upon it, a pair of rotary devices, each of which includes a pair of rolls positively driven and engaging the strand on opposite sides to impose drag upon it and to feed it positively, one roll of one device freely approaching and receding from the other roll of said device in accordance with variations in the thickness of the strand, the second device including a roll approaching and receding from its associated roll in accordance with variations in the thickness of the strand but under the control of said member, and a connection between said member and said second device for varying the restraining and feeding action of said device in accordance with variations in the pressure of the strand upon said member.

2. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining and drawing rolls and undergoing draft, said means including a pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being in fixed bearings and driven and the other roll being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, and means for driving said movably mounted roll at the same surface speed as its associated driven roll, said control means also including another pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being driven and in fixed bearings and the other being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, a movable mounting for said latter roll, said pairs of control rolls permitting fibres nipped by the drawing rolls to pass freely while restraining fibres not nipped, a member engaged by the strand on its way to said control rolls and forcing the strand out of its normal path and imposing drag upon it, and a connection between said member and said mounting, said member acting through the connection to move said mounting to vary the restraining action of said movably mounted roll in accordance with variations in the pressure of the strand on said member.

3. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining and drawing rolls and undergoing draft, said means including a pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being in fixed bearings and driven and the other roll being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, and means for driving said movably mounted roll at the same surface speed as its associated driven roll, said control means also including another pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being driven and in fixed bearings and the other being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, a movable mounting for said latter roll, and means for driving said movably mounted roll at the same surface speed as its associated driven roll, said pairs of control rolls permitting fibres nipped by the drawing rolls to pass freely while restraining fibres not nipped, a member engaged by the strand on its way to said control rolls and forcing the strand out of its normal path and imposing drag upon it, and a connection between said member and said mounting, said member acting through the connection to move said mounting to vary the restraining action of said movably mounted roll in accordance with variations in the pressure of the strand on said member.

4. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining and drawing rolls and undergoing draft, said means including a pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being in fixed bearings and driven and the other roll being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, and means for driving said movably mounted roll at the same surface speed as its associated driven roll, said control means also including another pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being driven and in fixed bearings and the other being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, a movable mounting for said latter roll, said pairs of control rolls permitting fibres nipped by the drawing rolls to pass freely while restraining fibres not nipped, a member engaged by the strand on its way to the said other pair of said control rolls engaging said strand, said member forcing the strand out of its normal path and imposing drag upon it, and a connection between said member and said mounting, said member acting through the connection to move said mounting to vary the restraining action of said movably mounted roll in accordance with variations in the pressure of the strand on said member.

5. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining and drawing rolls and undergoing draft, said means including a pair of driven rolls mounted in fixed bearings and engaging the strand at one side, a movable mounting, a pair of rolls in said mounting, each associated with a driven

roll and engaging the strand on the opposite side, at least one of said rolls being supported in fixed bearings in said mounting and, said mounting permitting the rolls therein to approach and recede from their associated rolls in accordance with inequalities in the strand, said pairs of rolls permitting fibres nipped by the drawing rolls to pass freely while restraining fibres not nipped, means for driving each roll in said mounting at the same speed as its associated driven roll, a member engaged by the strand and forcing the latter out of its normal path and imposing drag upon it, and a connection between said member and said mounting, said member acting through the connection to move said mounting to vary the restraining action of said roll in fixed bearings in said mounting in accordance with variations in the pressure of the strand on said member.

6. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining and drawing rolls and undergoing draft, said means including a pair of driven rolls mounted in fixed bearings and engaging the strand at one side, a movable mounting, a roll in fixed bearings in said mounting, a second roll carried loosely in said mounting, each of said rolls being associated with a driven roll and engaging the strand on the opposite side, said mounting permitting the rolls therein to approach and recede from their associated rolls in accordance with inequalities in the strand, said pairs of rolls permitting fibres nipped by the drawing rolls to pass freely therebetween while restraining fibres not nipped, means for driving each of the rolls in said mounting at the same speed as its associated driven roll, a member forcing the strand out of its normal path and imposing drag upon it, and a connection between said member and mounting, said member acting through the connection to move said mounting to vary the restraining action of the roll in fixed bearings in said mounting in accordance with variations in the pressure of the strand on said member.

7. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand lying between the retaining and drawing rolls and undergoing draft, said means comprising a member fixed in position and engaging the strand and forcing it out of its normal path of travel and imposing drag upon it, a pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being rotatable in fixed bearings and driven and the other roll being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, means for driving said movably mounted roll at the same surface speed as its associated driven roll, a second pair of cooperating control rolls engaging the strand from opposite sides, one of said rolls being rotatable in fixed bearings and driven and the other being mounted to approach and recede from its associated roll in accordance with inequalities in the strand, means for driving the movably mounted roll of said second pair at the same surface speed as its associated driven roll, a movable member engaging the strand and forcing the strand out of its normal path and imposing drag upon it, and a connection between said member and one movably mounted roll, said member acting through the connection to vary the restraining action of said movably mounted roll in accordance with variations in the pressure on said member.

8. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining rolls and drawing rolls and undergoing draft, said means including a pair of driven rolls mounted in fixed bearings and engaging the strand from beneath, a pair of movably mounted arms, a roll mounted in fixed bearings in said arms and pressing the strand against one of said driven rolls, a second roll loosely journaled in said arms and pressing the strand against the other of said driven rolls, means for driving each roll in the arms at the same surface speed as the driven roll with which it cooperates, said cooperating pairs of rolls permitting fibres nipped by the drawing rolls to pass freely between them while restraining fibres not nipped, said rolls in the arms being movable toward and away from their associated driven rolls in accordance with inequalities in the strand, a member engaging the strand and forcing it out of its normal path and imposing drag upon it, and a connection between the member and said arms, said member acting through the connection to move said arms to vary the restraining action of the pair of cooperating rolls including the roll mounted in fixed bearings in said arms, in accordance with variations in the pressure of the strand on said member.

9. In a frame, the combination of rolls for retaining a fibrous strand, rolls for drawing said strand, and means for controlling the fibres in that part of the strand between the retaining rolls and drawing rolls and undergoing draft, said means including a pair of driven rolls mounted in fixed bearings and engaging the strand from beneath, a pair of movably mounted arms, a roll mounted in fixed bearings in said arms and pressing the strand against one of said driven rolls, a second roll loosely journaled in said arms and pressing the strand against the other of said driven rolls, means for driving each roll in the arms at the same surface speed as the driven roll with which it cooperates, said cooperating pairs of rolls permitting fibres nipped by the drawing rolls to pass freely between them while restraining fibres not nipped, said rolls in the arms being movable toward and away from their associated driven rolls in accordance with inequalities in the strand, a member engaging the strand and forcing it out of its normal path, said member imposing drag upon the strand and confining it laterally, and a connection between said member and said arms, said member acting in response to an increase in the pressure of the strand thereon to move said arms to cause the roll mounted in fixed bearings therein to press said strand against its associated roll.

MALCOLM B. STONE.