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M. B. STONE

1,973,583

FRAME

Filed Feb. 6, 1933

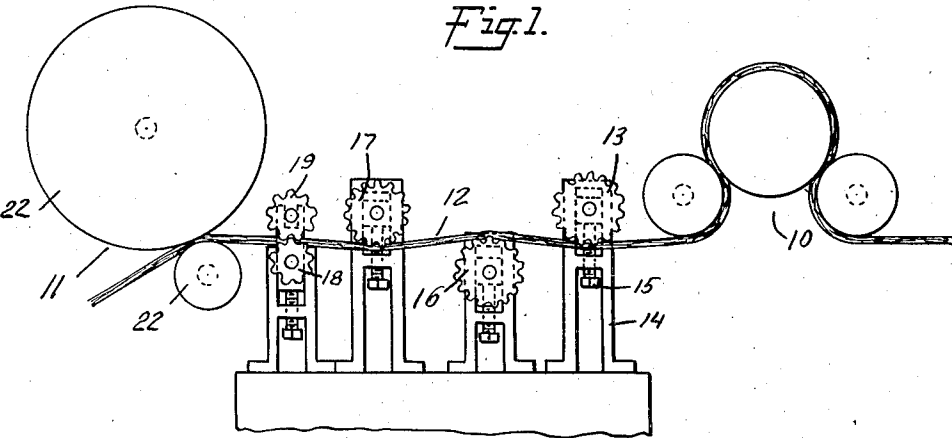
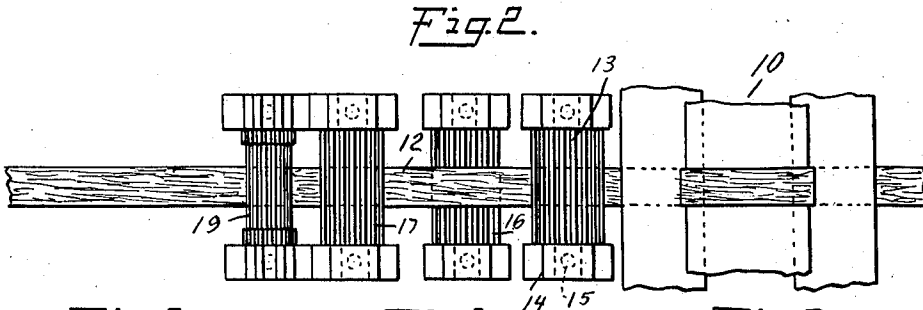


Fig. 3.

Fig. 4.

Fig. 7.

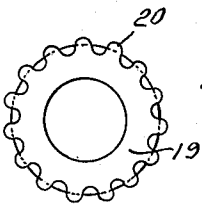
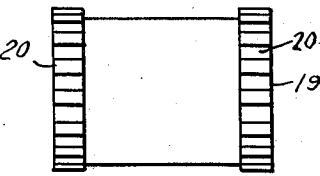
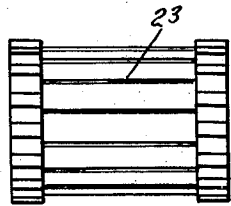
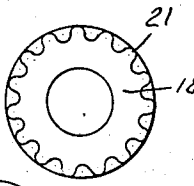
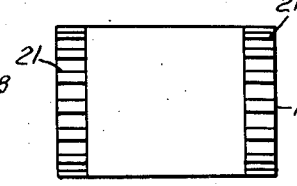
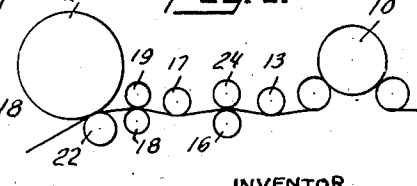
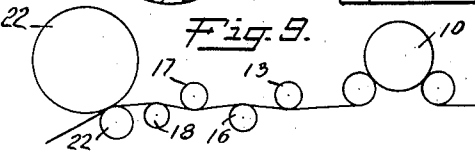


Fig. 5.

Fig. 6.

Fig. 8.



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UNITED STATES PATENT OFFICE

1,973,583

FRAME

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Application February 6, 1933, Serial No. 655,344

10 Claims. (Cl. 19—130)

This invention relates to the drawing of fibres in the manufacture of yarn, and is concerned more particularly with a novel apparatus for controlling the fibres in that part of a fibrous strand undergoing draft, for example, in drawing, roving, or spinning frames. The apparatus of the invention is particularly adapted for use in the manufacture of yarn from long fibres, such, for example, as those of the best variety including jute, hemp, and flax, and for purposes of illustration, embodiments of the invention suitable for use in drawing jute will be illustrated and described in detail, though it is to be understood that the utility of the invention is not limited to the treatment of that specific fibre in a drawing frame.

In the manufacture of yarn from jute, the standard drawing frames used prior to the development of the apparatus disclosed in Stone and Williamson Patent No. 1,893,809, January 10, 1933, commonly included gill bars for supporting that part of the strand undergoing draft between the retaining rolls and the drawing rolls. These bars carried gill pins penetrating the strand and their function was to prevent fibres which are nipped by the drawing rolls from drawing along with them fibres which are not nipped. Without such control means, the fibres would pass to the drawing rolls at an irregular rate and an uneven, irregular product would result. While such gill mechanism has been in use for many years, it is recognized as objectionable, since it is expensive to construct, operate and maintain, and it is limited as to speed of operation, and thus limits the output of the frames in which it is used.

In order to avoid the difficulties and expense involved in the use of gills, I have devised novel apparatus for controlling the fibres in that portion of a strand undergoing draft, this apparatus imposing drag on the strand and preventing fibres which are nipped by the drawing rolls from carrying forward fibres which are not nipped. The new apparatus also acts to feed the fibres forward to the drawing rolls at a uniform rate, although in certain forms of the new apparatus, the feeding action is greater than in others.

One specific form of embodiment of the principles of the invention includes a plurality of bars or rolls rotating in fixed but adjustable bearings and engaging the fibrous strand from opposite sides alternately and in such manner that the strand assumes a tortuous form in passing from the retaining rolls to the drawing rolls. These control rolls are so driven that the portions of their

surfaces which contact with the strand move in the same direction as the latter, their surface speed being somewhat greater than that of the retaining rolls and much less than that of the drawing rolls. Preferably the control rolls rotate at progressively higher surface speeds, and the extent to which they force the strand from its normal straight line path from the retaining rolls to the drawing rolls determines the drag or restraining force with which they act on the fibres. In order that the control mechanism will both restrain the fibres and feed them to the drawing rolls, the driven control roll in fixed bearings lying immediately in front of the drawing rolls forms part of a roll combination which includes a floating roll pressing the strand against the driven roll with a pressure sufficient to restrain fibres which are not nipped by the drawing rolls while permitting fibres which are nipped to pass freely between the rolls of the combination. The floating roll may be driven by its frictional engagement with the strand, but it is preferably positively driven in unison with its associated roll regardless of up and down movements of the floating roll produced by variations in the thickness of the strand.

In another form of the control apparatus, there are two roll combinations of the type described alternating with single rolls. In that construction, the strand leaving the retaining rolls passes beneath a rotating roll, through a roll combination, beneath a rotating roll, through another roll combination, and thence to the drawing rolls.

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

Fig. 1 is a view of one form of the apparatus in side elevation;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Figs. 3 and 4 are end and side views, respectively, of one form of roll which may be used in the apparatus;

Figs. 5 and 6 are end and side views, respectively, of another form of roll which may be used in the apparatus;

Fig. 7 is a side view of another form of roll which may be used in the apparatus, and

Figs. 8 and 9 are diagrammatic views showing a modified form of the apparatus.

Referring now to the drawing, there is illustrated in Fig. 1, a portion of a drawing frame containing one form of the new control apparatus. This frame includes retaining rolls 10, and drawing rolls 11 of conventional construction, these

rolls gripping the strand tightly so that slippage is prevented.

Between the drawing and retaining rolls, that part of the strand 12 undergoing draft is acted on by a plurality of control devices which in the embodiment of the invention illustrated include a roll 13 mounted in fixed bearings in standards 14, the bearings being adjustable up and down by screws 15. The roll 13 bears against the strand from above and displaces it from a straight-line path between the retaining rolls and drawing rolls, the extent of the displacement determining the restraining effect of the roll and being regulated by the adjustment of the bearings. The roll 13 is driven by any conventional means (not shown) so that that part of its surface engaging the strand is moving in the same direction as the strand and its surface speed may be that of the retaining rolls or slightly greater.

Leaving the roll 13, the strand passes over another driven roll 16 in fixed bearings, the roll 16 being so disposed that a horizontal plane tangent to the top of the roll is above a similar plane tangent to the bottom of the roll 13. Roll 16 is driven by appropriate means at a surface speed preferably slightly greater than that of the retaining rolls and also of the roll 13. From the roll 16, the strand passes beneath driven roll 17 in fixed bearings, this roll engaging the strand and forcing it down out of its normal path.

The strand next passes to the roll combination which includes bottom roll 18 in fixed bearings and top roll 19, which rests of its own weight upon the strand and is free to move up and down in accordance with variations in the thickness of the strand. The roll 18 is driven by a suitable means and the roll 19 may also be positively driven at the same surface speed as the roll 18. For this purpose, the rolls may have the construction illustrated in Figure 4, the roll 19 being provided with gear teeth 20 at its ends meshing with gear 21 formed in the ends of the roll 18. These gear teeth are so shaped that they remain in mesh regardless of the floating up and down movements of the roll 19 and the roll 19 is thus positively driven from the roll 18 at all times.

The bearings for the roll 18 are adjusted so that the roll presses upward against the strand and diverts it from its normal path. The rolls 18 and 19 thus impose drag upon the fibres and tend to restrain those which are not nipped by the drawing rolls 22 from being carried forward by the fibres which are nipped. At the same time, because they are positively driven, rolls 18 and 19 act to feed the fibres to the drawing rolls. While the roll 19 bears against the strand and restrains and controls the fibres, those fibres which are nipped by the drawing rolls may be drawn freely between rolls 18 and 19.

In that form of the apparatus illustrated in Figures 1 and 2, the rolls have fluted surfaces and the use of fluting on the rolls has been found to produce the best results. A product which is level enough to be satisfactory for some purposes, however, may be made by the use of rolls with plain surfaces, as shown in Figures 4 and 6, or with rolls having scratched surfaces 23, as illustrated in Fig. 7.

With the apparatus illustrated in Figure 1, the degree of control of the fibres depends on the extent to which the strand is distorted from its normal straight-line path from the retaining rolls to the drawing rolls, and the restraining effect of the rolls can be regulated by adjusting their bearings by means of the adjustment screws

15. For most purposes, only a slight distortion of the strand is required; that is, the top of the rolls 16 and 18 which engage the strand from beneath need lie only a slight distance above the bottom of the rolls 13 and 17 which engage the strand from above. The rolls 13, 16, 17 and 18 are preferably driven at surface speeds progressively higher in the direction of strand movement as, for example, the roll 13 may rotate at a speed approximately the same as that of the retaining rolls, with the other rolls rotating at increasing speeds. The rolls 18 and 19 may rotate at a speed which bears the ratio to that of the retaining rolls of 1.5 to 1.

Instead of employing the construction illustrated in Figure 1, that shown in Figure 8 may be used in which both rolls 16 and 18 engaging the strand from beneath form part of a roll combination, a floating roll 24 similar to the roll 19 pressing the strand against the top of roll 16. This arrangement provides a slightly better control of the fibres than the arrangement illustrated in Figure 1, although the Figure 1 construction is generally satisfactory.

A further modification of the apparatus is shown in Figure 9 which resembles that shown in Figure 1 except for the omission of the floating roll 19. This arrangement provides the desired restraint and control of the fibres but is not as satisfactory as those constructions in which a roll combination including a floating top roll is employed immediately in front of the drawing rolls. With the mechanism illustrated in Figure 9, it is difficult to start the strand through the drawing rolls, and when the frame is first put into operation or the strand breaks and has to be pieced up, this difficulty may cause delays which are not encountered with the other forms of the apparatus.

I claim:

1. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for said strand operating at a higher surface speed than said retaining rolls, and means engaging the strand between the retaining and drawing rolls for controlling the drawing of the fibres therein, said means including a plurality of driven rolls in stationary bearings engaging the strand from opposite sides alternately, and forcing it out of its normal path of travel from the retaining rolls to the drawing rolls and thereby imposing drag upon it, said strand being held in contact with said control rolls only by the tension in said strand, a top roll associated with one of said rolls and resting on the strand where it passes over said roll, said top roll being free to approach and recede from the roll with which it is associated in accordance with variations in the thickness of the strand, and means for rotating said top roll at substantially the same surface speed as the roll with which it is associated.

2. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for said strand operating at a higher surface speed than said retaining rolls, and means engaging the strand between the retaining and drawing rolls for controlling the drawing of the fibres therein, said means including a driven single roll in stationary bearings and a top and bottom roll combination, said strand passing under said single roll and between the top and bottom rolls, and being forced thereby out of its normal path of travel from said retaining rolls to said drawing

rolls, said strand being held in contact with said single roll only by the tension in said strand and said top roll being free to move toward and away from its bottom roll in accordance with variations in the thickness of the strand, said single roll and bottom roll rotating at a surface speed greater than that of said retaining rolls.

3. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for said strand operating at a higher surface speed than said retaining rolls, and means engaging the strand between the retaining and drawing rolls for controlling the drawing of the fibres therein, said means including a driven single roll in stationary bearings and a top and bottom roll in association, said strand passing under said single roll and between the top and bottom rolls, and being held in contact with said single roll only by the tension in said strand, said bottom roll being mounted in stationary bearings and driven and said top roll being free to move toward and away from said bottom roll in accordance with variations in the thickness of the strand, said single roll and bottom roll rotating at surface speeds substantially less than that of said drawing rolls, and means for rotating said top and bottom rolls at the same surface speed regardless of the movements of said top roll relative to said bottom roll.

4. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for the strand, and means engaging the strand between the retaining and drawing rolls for controlling the fibres therein, said means comprising a plurality of driven rolls lying on opposite sides of the strand alternately and forcing it to assume a tortuous shape, and a top roll associated with each of said rolls which lies beneath the strand, each top roll resting on the strand where it passes over the roll with which it is associated and being free to approach and recede from said associated roll in accordance with variations in the thickness of the strand.

5. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for the strand, and means engaging the strand between the retaining and drawing rolls for controlling the fibres therein, said means comprising a plurality of driven rolls lying on opposite sides of the strand alternately and forcing it to assume a tortuous shape, a top roll associated with each of said rolls which lies beneath the strand, said strand being held in contact with the driven rolls lying above it only by the tension in said strand each top roll resting on the strand where it passes over the roll with which it is associated and being free to approach and recede from said associated roll in accordance with variations in the thickness of the strand, and means for driving each top roll in unison with the roll with which it is associated.

6. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, drawing rolls for the strand, and means engaging the strand between the retaining and drawing rolls for controlling the fibres therein, said means comprising a plurality of driven rolls lying on opposite sides of the strand alternately and forcing it to assume a tortuous shape, the roll directly in front of the drawing rolls engaging the strand from beneath, a top roll associated with said roll directly in

front of the drawing rolls and bearing on the strand where it passes over said roll, said top roll being free to move up and down in accordance with variations in the thickness of the strand, and means for rotating said top roll at the same surface speed as the roll with which it is associated.

7. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, rolls for drawing said strand, and a plurality of means operating on said strand between the drawing and retaining rolls for controlling the drawing of the fibres therein, one of said means comprising a driven bottom roll rotating at a surface speed greater than that of the retaining rolls and mounted in fixed bearings, a top roll bearing on the strand where it passes over the bottom roll and free to approach and recede from the bottom roll in accordance with variations in the thickness of the strand, and means for rotating said top roll at the same surface speed as the bottom roll, and another of said means comprising a roll in stationary bearings driven at a surface speed greater than that of said retaining rolls, said strand passing under said roll and being forced thereby out of its normal path of travel from the retaining rolls to the drawing rolls.

8. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, rolls for drawing said strand, and a plurality of means operating on said strand between the drawing and retaining rolls for controlling the drawing of the fibres therein, the means directly in front of said drawing rolls comprising a driven bottom roll in fixed bearings, and a top roll resting on the strand where it passes over said bottom roll, said top roll being free to approach and recede from said bottom roll in accordance with variations in the thickness of the strand, and another of said means comprising a roll in stationary bearings pressing down upon said strand and forcing it out of its normal path of travel from the retaining rolls to the drawing rolls, said roll in stationary bearings and said bottom roll rotating at higher surface speeds than said retaining rolls.

9. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, rolls for drawing said strand, and a plurality of means operating on said strand between the drawing and retaining rolls for controlling the drawing of the fibres therein, the means directly in front of said drawing rolls comprising a driven bottom roll in fixed bearings, and a top roll resting on the strand where it passes over said bottom roll, said top roll being free to approach and recede from said bottom roll in accordance with variations in the thickness of the strand, and another of said means comprising a roll in stationary bearings pressing down upon said strand and forcing it out of its normal path of travel from the retaining rolls to the drawing rolls, said roll in stationary bearings and said bottom roll rotating at higher surface speeds than said retaining rolls and at successively higher surface speeds.

10. In a frame for treating fibrous materials containing long fibres, the combination of retaining rolls for a strand, rolls for drawing said strand, and a plurality of means operating on said strand between the drawing and retaining rolls for controlling the drawing of the fibres therein, the means directly in front of said drawing rolls comprising a driven bottom roll in fixed bearings,

and a top roll resting on the strand where it passes over said bottom roll, said top roll being free to approach and recede from said bottom roll in accordance with variations in the thickness of the strand, and means for rotating said top roll at substantially the same surface speed as said bottom roll, and another of said means comprising a member pressing down upon said strand and forcing it out of its normal path of travel from the retaining rolls to the drawing rolls and placing drag upon it and said bottom roll rotating at a higher surface speed than said retaining rolls. 80

MALCOLM B. STONE.

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