Feb. 7, 1950 J. D. ROBERTSON 2,496,312

BOW CORRECTING APPARATUS

Filed May 28, 1946 3 Sheets-Sheet 1

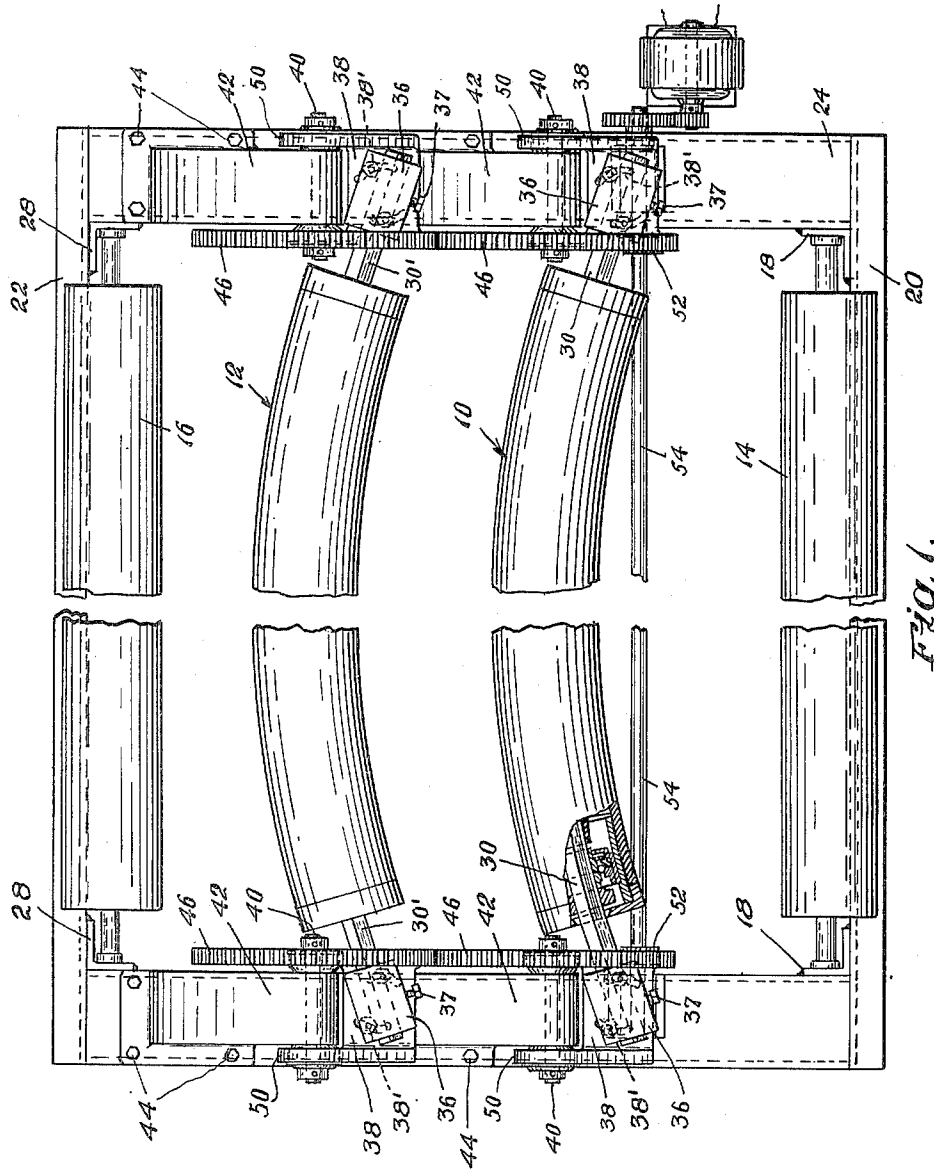


Fig. 1.

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BOW CORRECTING APPARATUS

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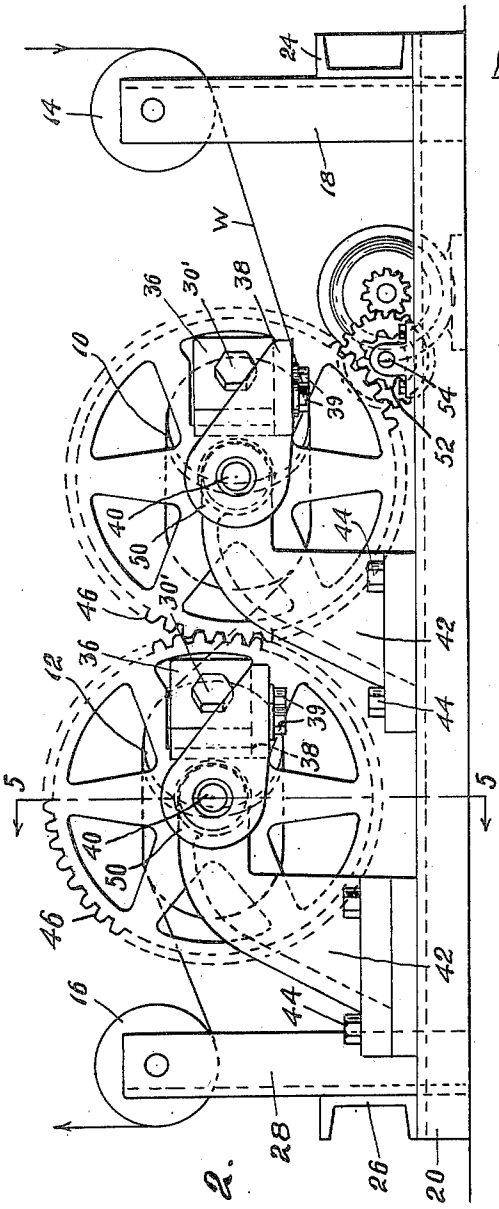


Fig. 2.

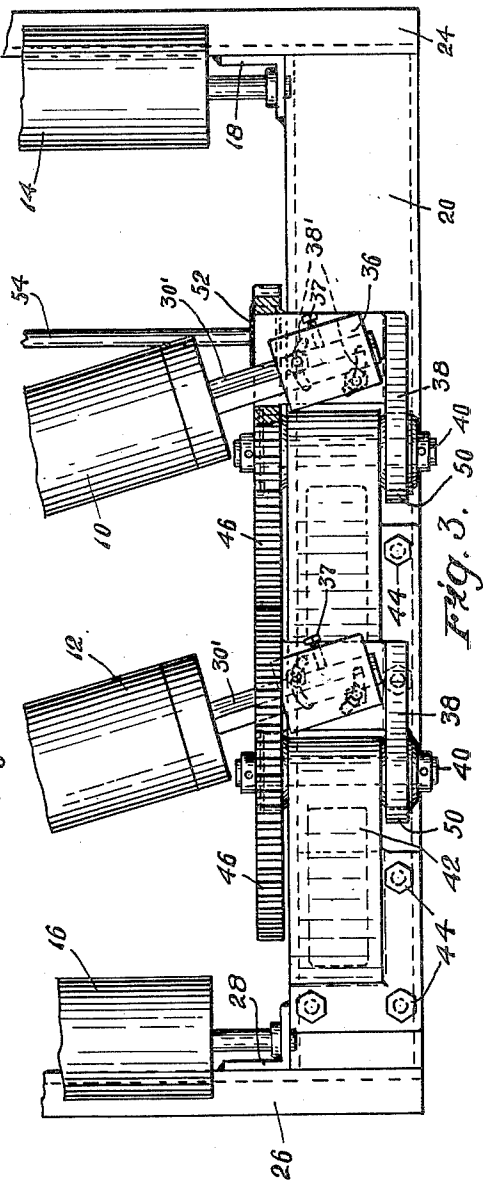


Fig. 3.

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BOW CORRECTING APPARATUS

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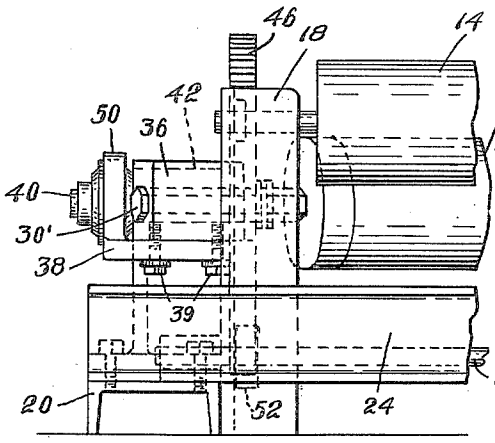


Fig. 4.

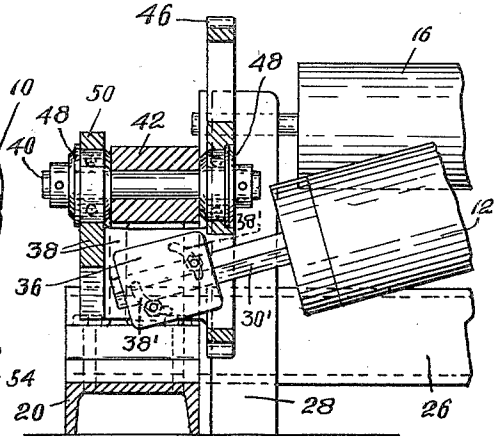


Fig. 5.

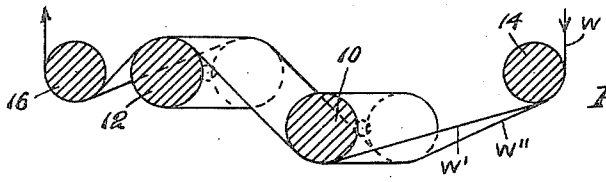


Fig. 6.

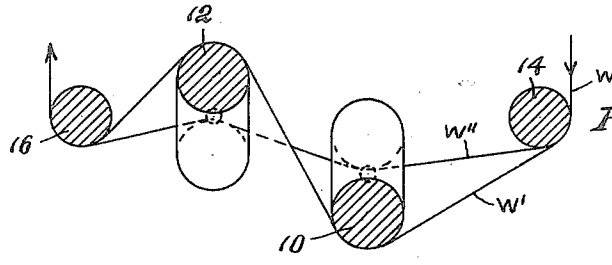


Fig. 7.

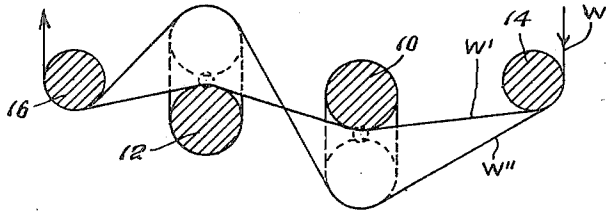


Fig. 8.

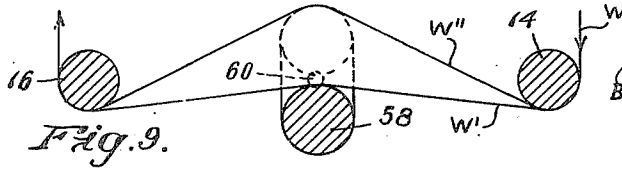


Fig. 9.

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Patented Feb. 7, 1950

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UNITED STATES PATENT OFFICE

2,496,312

BOW CORRECTING APPARATUS

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Application May 28, 1946, Serial No. 672,774

3 Claims. (Cl. 26—63)

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This invention relates to improvements in apparatus for restoring woven textile webs and the like to a desired predetermined condition following processing treatments which may have caused a web to depart from said desired predetermined condition. More particularly the invention provides means which readily may be operated either manually or automatically for correcting bowed conditions of the weft or filler threads and operative also for spreading a web laterally.

It has been proposed heretofore to correct a bowed condition of the filler threads in a fabric web by applying tension to the central portion of the web over and above the tension applied to its edges.

Also, longitudinally curved rolls have been employed heretofore for lateral spreading of a web engaged therewith, the opposite ends of the curved axles of the rolls having been adjustably secured in clamps which have been fixed in position.

It is among the objects of my present invention to provide an apparatus wherein a longitudinally curved roll may be effectively utilized for bow correction as well as for lateral spreading of a web, the roll being arranged for constantly engaging the travelling web at a location where the web passes from one relatively fixed guide to another and being readily movable from a neutral position, in which the central portion and edges of the web have equal travel between the guides, to positions selectively on either side of the neutral position in which selective positions of the roll the central portion of the web has a length of path of travel between the guides selectively either longer or shorter than the length of the path of travel of an edge of the web between the guides.

Another object is to provide an apparatus for bow correction wherein a longitudinally curved roll has its opposite ends mounted in clamps which are adjustably fixed on pivoted supports which are rotatable for moving the ends of the roll and the crest of the roll selectively to positions to one side or the other of a neutral position of the roll in which the central portion and the edges of a web engaged with the roll have equal travel between longitudinally spaced relatively fixed guides.

Still another object is to provide a bow correcting apparatus having a plurality of longitudinally curved rolls constantly engaging a travelling web passing from one relatively fixed guide to another and having means for swinging said rolls in opposite directions to bring the crests of the rolls to opposite sides of a neutral position of the rolls.

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Yet another object is to provide a bow correcting apparatus having a plurality of longitudinally curved rolls constantly engaging a travelling web passing from one relatively fixed guide to another and having means for swinging said rolls in opposite directions to bring the ends of the rolls to opposite sides of a neutral position of the rolls.

A further object is to provide a bow correcting apparatus employing at least one longitudinally curved web engaging roll which is movable for bow correction either manually by an operator personally scanning a travelling web or automatically in response to electrical scanning means of any available variety.

It is, moreover, my purpose and object generally to improve the structure and effectiveness of apparatus for restoring distorted woven webs to a predetermined condition, and more especially for correcting a bowed condition of the filler threads of a woven fabric web.

In the accompanying drawings:

Fig. 1 is a top plan view of a bow correcting apparatus embodying features of the invention, the central portion of the apparatus being broken away;

Fig. 2 is a side elevation of the apparatus of Fig. 1, on a larger scale;

Fig. 3 is a top plan of one side of the apparatus of Figs. 1 and 2, on the same scale as Fig. 2;

Fig. 4 is an end elevation of the portion of the apparatus shown in Fig. 3;

Fig. 5 is a cross-sectional view on line 5—5 of Fig. 2, but with the roll 12 shown swung through ninety degrees from its position of Fig. 2;

Fig. 6 is a diagrammatic view showing a web engaging the bow correcting rolls in their neutral positions;

Fig. 7 is a view similar to Fig. 6 but with the bow correcting rolls swung through ninety degrees from their positions of Fig. 6, thereby to increase the travel of the central portion of the web and to decrease the travel of the edges of the web;

Fig. 8 is a view similar to Figs. 6 and 7 but with the bow correcting rolls swung to their positions for maximum increase of the travel of the edges of the web and maximum decrease of the travel of the central portion of the web; and

Fig. 9 is a diagrammatic view of a modified form of bow correcting apparatus having but a single bow correcting roll.

Referring to the drawings, the particular em-

bodiment of the invention therein illustrated employs a pair of longitudinally curved rolls 10, 12 mounted in spaced relation so that a web W (Fig. 2) passing between the guide rolls 14, 16 can engage under one of the curved rolls and over the other. As herein represented, the guide roll 14 is rotatably mounted at its opposite ends in standards 18 which conveniently may be suitable lengths of angle iron welded or otherwise secured at their lower ends to a generally rectangular frame which, as shown, comprises the channel iron side members 20, 22 and the channel iron end members 24, 26. The other guide roll 16 is similarly mounted in the angle iron standards 28.

The curved rolls 10, 12 are of a known general type having a longitudinally curved axle 30 cn which the roll body is rotatably mounted for rotation about the curved axis of the axle, the outer surface of the roll being a tube of flexible material, such as rubber, and there being suitable anti-friction means 34 intervening between the flexible tube and the axle 30. Preferably the rolls 10, 12 will be constructed in accordance with the disclosure in my United States Patent No. 2,393,191, granted January 15, 1946, to which reference is made for a more detailed disclosure of the preferred roll structure.

Heretofore, however, such longitudinally curved rolls have been mounted so that they could be set to provide a lateral spreading of the web as the web passes in engagement with the curved roll surfaces. Also, the prior mounting of such rolls could provide for elimination of bow in one direction but not in the other, and the difficulties involved to adjust the rolls have made it impractical to use them for bow elimination of any kind.

According to my present invention, one or more longitudinally curved rolls may be utilized effectively to correct bow of the filler threads of a travelling web with facility of adjustment for accommodating varying degrees of bow as well as varying directions of bow. Each roll 10, 12 has the opposite ends 30' of its axle 30 secured against rotation in suitable end clamps 36 which are adjustably secured on pivoted members 38 whose aligned pivot pins 40 are supported in brackets 42 secured as by screws 44 to the opposite side members 20, 22 of the frame. Each pivoted member 38 has a spur gear 46 thereon with an anti-friction bearing unit 48 intervening between the gear and the inner end portion of the pivot pin 40. Also, each member 38 has a ring-shaped ear 50 thereon engaging around the outer end portion of its pivot pin 40, with an anti-friction bearing unit 48 within the ring and operative between the ring and the outer end portion of the pivot pin. Hence each pivoted member 38 is swingable about the axis of its pivot pin 40 with a minimum of friction.

The gears 46 of the two pivoted members 38 at one side of the frame are in mesh and the gears 46 of the two pivoted members 38 at the other side of the frame similarly are in mesh. Also, the two members 38 carrying one of the rolls 10 or 12 preferably have their gears 46 connected, as by gears 52 on shaft 54, for rotation in unison. Hence, rotation of any one of the gears 46 will cause a like rotation of the opposite gear 46 at the other side of the frame, and a similar but opposite rotation of the other two gears 46.

Each of the end clamps 36 may be a block having a non-round hole therethrough in which

the non-round end 30' of a roll axle 30 may be loosely inserted and then be clamped by tightening one or more set screws 37, after which each clamp may be adjusted to a proper setting on its pivoted member 38 by tightening screws 39 which pass through slots 38' in member 38 and screw into the clamping block 36.

When rolls 10, 12 are in their positions of Figs. 1–4, wherein the planes of curvature of the rolls are horizontal planes, all portions across the width of the web will have equal travel in passing from guide roll 14 to guide roll 16, as best seen in the diagrammatic showing of Fig. 6, where the line W' indicates the center of the web and the line W'' one of the edges or selvages of the web. If it happens that the filler threads are bowed in the direction of travel of the web, a correction of this condition requires either a lengthening of the path of travel of the central portion of the web or a shortening of the path of travel of the selvages, so that the selvages can catch up with the central portion. According to the invention, the path of travel of the central portion of the web quickly and conveniently may be lengthened by swinging rolls 10, 12 bodily about the axes of their pivot pins 40, and, simultaneously, the path of travel of the selvages is shortened. In the diagrammatic showing of Fig. 7, the roll 10 is shown swung ninety degrees counter-clockwise from its neutral position of Figs. 1–4, and the roll 12 is shown swung ninety degrees clockwise from its neutral position of Figs. 1–4. It will be obvious from a comparison of Figs. 6 and 7, that the central portion W' in Fig. 7 must negotiate a much longer path between the guide rolls 14, 16, and the selvage W'' a much shorter path, as compared with the comparable parts in Fig. 6. Hence, the selvages quickly can catch up with the central portion of a web bowed in the direction of travel of the web. Obviously the rolls 10, 12 may be swung to any desired intermediate positions between their neutral positions of Fig. 6 and their positions of Fig. 7, to vary the relative amount of increase and decrease in the paths of travel of the central portion of a web and the selvages respectively.

If, on the other hand, the filler threads are bowed in the opposite direction, the correction involves providing so that the central portion of the web can catch up with the selvages. Hence, the path of travel of the selvages is increased and the path of travel of the central portion of the web decreased. According to the invention, this is accomplished by swinging rolls 10, 12 in directions opposite their directions of swinging as heretofore described. Hence, looking at Fig. 8, roll 10 is shown swung ninety degrees in clockwise direction from its neutral position, and roll 12 is shown swung ninety degees in counter-clockwise direction from its neutral position. Comparing Figs. 6, 7 and 8, it will be obvious that the selvage W'' in Fig. 8 has a much longer path than it has in either of Figs. 6 or 7, and that the central portion W' of the web has a much shorter path in Fig. 8 than it has in either of Figs. 6 or 7. Hence the mid-portion W' quickly can catch up with the selvages to correct the bowed condition. As in the previously described case, the rolls 10, 12 may be set in any intermediate positions between their neutral positions of Fig. 6 and their positions of Fig. 8.

It will be apparent from a comparison of Figs. 7 and 8 with Fig. 6, that both the central portion and the selvages have their paths of travel sub-

stantially increased or decreased when the curved rolls 10, 12 are swung from their neutral Fig. 6 positions to the positions as represented in either Fig. 7 or Fig. 8. In other words, any correction is not accomplished by subjecting only a central region of the web, or only selvage regions of the web, to increased tension. Rather, the tension is changed throughout the width of the web, any substantial increase in tension at the central region being accompanied by substantial decrease in tension at both selvage regions. Or, any substantial increase in tension at selvage regions is accompanied by substantial decrease in tension at the central region. Actually, the tension is increased or decreased different amounts throughout the width of the web, tending to maintain an approximately uniform average tension in all positions of the curved rolls. This permits a maximum correction of bow with a minimum of increase in tension at any region across the width of the web.

Swinging of the rolls 10, 12, for correcting bow, may be accomplished by an suitable means applied for rotating any one or any pair of the gears 46. Conveniently, the gear-connecting shaft 54 may be extended beyond the frame at one or both sides so that the shaft may be rotated either manually by a handle (not shown) applied to shaft 54, or by power means connected to shaft 54. In Fig. 1, a reversible electric motor is represented at 56 connected for driving shaft 54 which, through gears 52 and 46 can swing the rolls 10, 12 as conditions may require, the motor 56 being adapted for operation in response to any of the available mechanisms for detecting bow in woven fabrics.

While I have illustrated in Figs. 1–8 a preferred bow-correcting mechanism having the two swingable rolls 10, 12, it should be understood that comparable results may be attained with a single swingable roll as shown diagrammatically in Fig. 9, where a single roll 58 is mounted, similar to the rolls 10, 12 of the other views, for swinging about the axis 60. Roll 58 is illustrated in its position for maximum increase of the path of travel of the selvage W'' and for maximum reduction of the path of travel of the central portion of the web W'. As in the previously described two roll mechanism, roll 58 may be adjusted about pivot 60 to any setting between its neutral position and positions for maximum increase of the path of travel of the selvages or of the central portion of the web, thereby to eliminate bows of varying magnitudes and regardless of the direction of the bow.

The invention primarily is concerned with the provision of an effective mechanism for correcting bow of the filler threads of woven fabric webs, and accomplishes bow elimination by a simple swinging of one or a plurailty of longitudinally curved web-engaging rolls. However, the curved roll or rolls additionally accomplish a desired lateral spreading of the engaged web the same as has been well known in the prior art uses of such longitudinally curved rolls which heretofore have not been mounted for swinging bodily about a straight axis but were only adjustable in the end clamps which have gripped the ends of the curved axles of the rolls.

I claim as my invention:

1. Bow correcting apparatus comprising means at spaced locations for guiding a travelling web to and from a region of bow correction, a plurality of longitudinally curved web engaging elements extending across said region with the web engaging under one of said elements and over a next adjacent one of said elements, pivoted means supporting the opposite ends of each of said elements, and means for rotating said pivoted means of said web-engaged elements in opposite directions about their pivots thereby to move said elements from neutral positions, in which the central and edge portions of the web engaging therewith have equal travel in said region, to positions in which the central portion of the web engaging therewith has a length of path of travel in said region substantially different from the length of the path of travel it has in said neutral position, and the edges of the web have a length of paths of travel in said region substantially different from the length of their paths of travel in said neutral position with the difference in one case an increase and in the other case a decrease.

2. Bow correcting apparatus comprising means at spaced locations for guiding a travelling web to and from a region of bow correction, a plurality of longitudinally curved axles extending in spaced relation across said region, a flexible roll on each said axle, each roll being rotatable about approximately the curved axis of its axle, and said web engaging under one of said rolls and over a next adjacent one of said rolls, pivoted means supporting the opposite ends of each of the axles, and means for rotating said pivoted means of said web-engaged rolls simultaneously in opposite directions about their pivots from neutral positions thereof in which all portions of the web have equal travel, thereby to increase and decrease simultaneously the length of the paths of travel of two different portions of the width of the web in said region.

3. Bow correcting apparatus comprising means at spaced locations for guiding a travelling web to and from a region of bow correction, a plurality of longitudinally curved web engaging rolls extending in spaced relation across said region with the web engaging under one of said rolls and over a next adjacent one of the rolls, a pivoted member adjacent each end of each of said rolls, means on each said member for clamping the adjacent end of a roll to the pivoted members, and means for rotating the pivoted members at opposite ends of said web-engaged rolls in opposite directions about their pivots, thereby to move said rolls from neutral positions, in which the central and edge portions of the web in said region have equal extent between said guiding means, to positions in which the central portion of the web in said region has extent between said guiding means substantially different from what it has in said neutral positions of the rolls and said edges of the web in said region have extent between said guiding means substantially different from what they have in said neutral positions of the rolls, with the difference in one case an increase and in the other case a decrease.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
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1,660,224	Farrell	Feb. 21, 1928