April 24, 1956 J. D. ROBERTSON 2,742,685

WEFT-STRAIGHTENING APPARATUS

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Fig. 1.

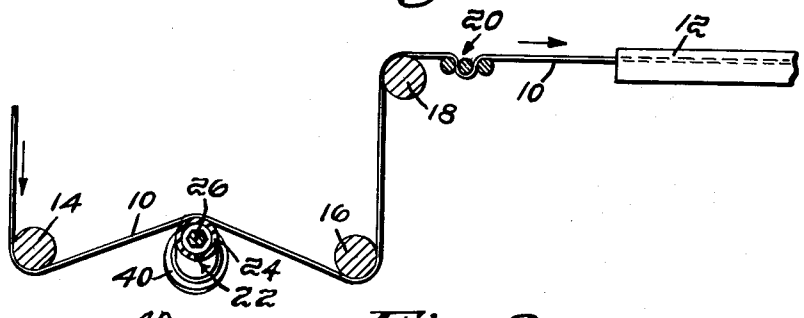


Fig. 2.

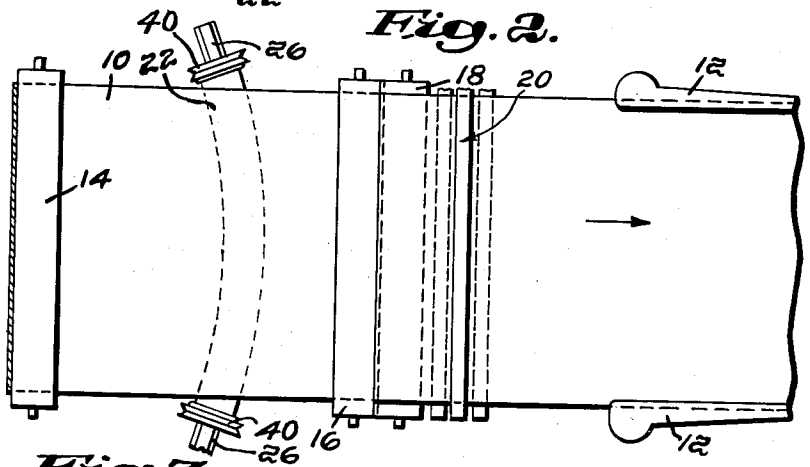


Fig. 3.

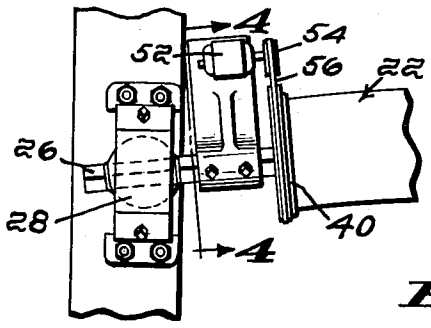


Fig. 4.

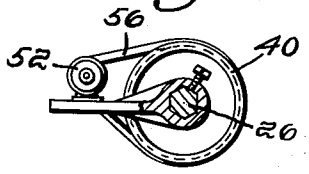
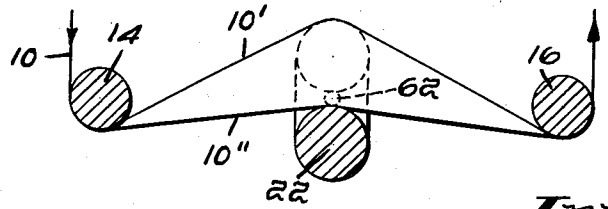


Fig. 10.



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WEFT-STRAIGHTENING APPARATUS

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Fig. 5.

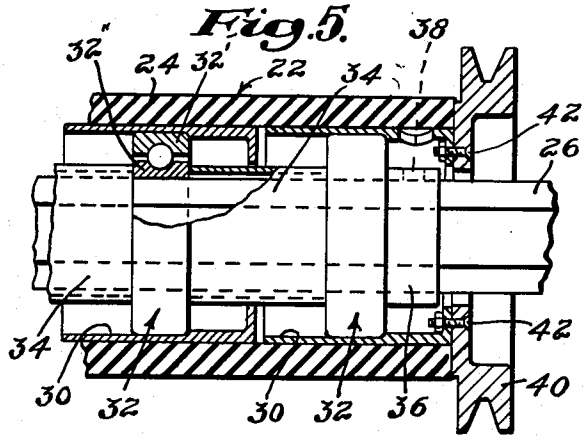


Fig. 6.

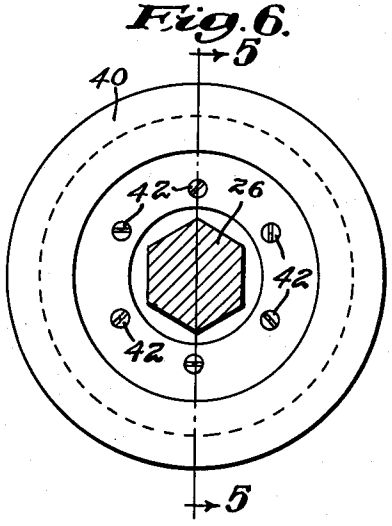
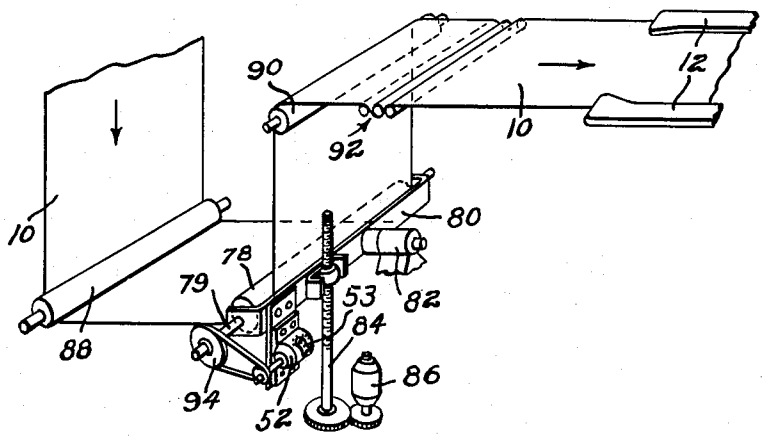


Fig. 11.



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WEFT-STRAIGHTENING APPARATUS

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Fig. 7.

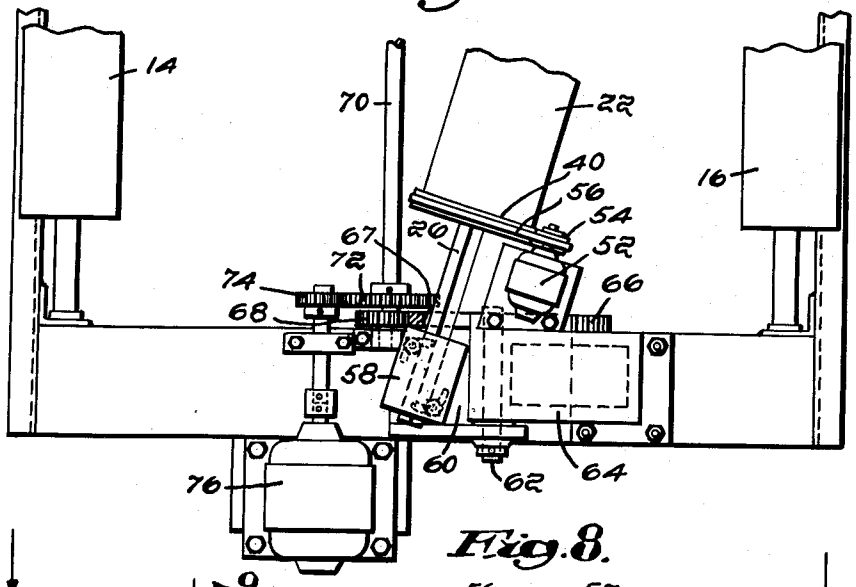


Fig. 8.

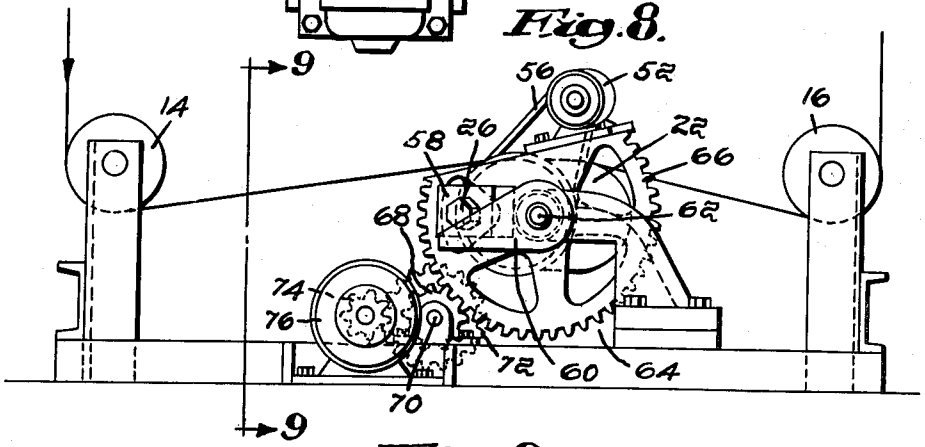
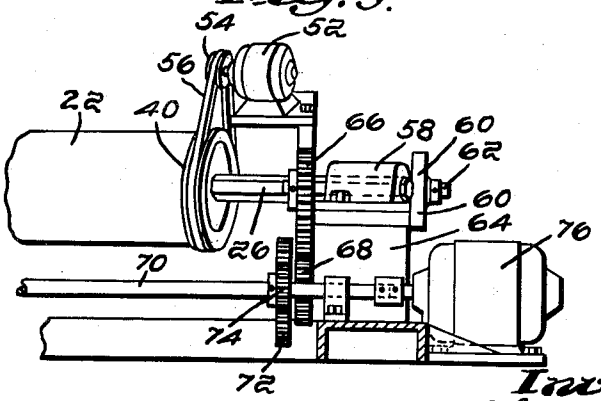


Fig. 9.



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United States Patent Office 2,742,685 Patented Apr. 24, 1956

2,742,685

WEFT-STRAIGHTENING APPARATUS

John D. Robertson, Taunton, Mass.

Application February 8, 1952, Serial No. 270,569

11 Claims. (Cl. 26—63)

This invention relates to improvements in weft-straightening apparatus of the general type wherein skewed and/or bowed weft or filler elements of a travelling web of woven cloth, or the like, may be restored to their proper right angular relation to the warp elements of the web by requiring some of the warp elements to travel through longer paths than others in going from one transverse guide member to another generally parallel transverse guide member. The invention provides improvements in such weft-straighteners whereby the weft-straightening action of a weft-straightening roll on a travelling web is such that the tension in the portion of the web being drawn from the weft-straightening apparatus into a tenter frame, for example, is not substantially increased due to the weft-straightening process and is more uniformly distributed among the warp elements of the web as compared with webs acted upon by the prior weft-straightening devices.

In the textile industry, woven fabrics are subjected to various treatments after being woven. Initially the weft or filler elements are perpendicular to the warp elements. However, in the course of subsequent processing, the weft or filler elements frequently become skewed and/or bowed relative to the warp elements. They may become displaced into a skewed condition in which their ends at one selvage of the web may lead or lag behind their ends at the other selvage, or they may become bowed with their central portions either leading or lagging behind their ends at the two selvages of the web. Sometimes the weft or filler elements acquire a combination bow and skew. Regardless of what particular displaced relationship the weft or filler elements may have in a travelling web, it becomes necessary or desirable to restore the weft or filler elements to proper perpendicularity to the warp elements before the web passes from a weft-straightening apparatus into a tenter frame or other processing mechanism. Straightening of the weft or filler elements of a web preferably will be accomplished while the web is in a moist condition, and the web then is dried to set its weft and warp elements in their proper right-angular relationships. Customarily, a web passes from a weft-straightening apparatus to a tenter frame which grips the opposite selvages and holds the web to a desired width during the drying process.

Various devices have been proposed heretofore for correcting skew and bow of the weft or filler elements of travelling webs. The more satisfactory varieties have employed tiltable and/or curved rolls which engage the travelling web and which have been capable, when properly positioned, of increasing or decreasing the length of the paths of travel, between two spaced and parallel transverse guide elements, of particular warp elements of a travelling web relative to the length of the paths of travel of other warp elements of the web. Of course, the object has been to enable portions of weft or filler elements of the web which may be lagging behind other portions of the same weft or filler elements to move abreast of the leading portions while the latter portions

are travelling through the longer paths. Actually, however, the prior tiltable and curved weft-straightening rolls, in conjunction with the tener frame, or other web-drawing means, have had the effect of introducing distorting tension in the portion of the web leaving the weft-straightening apparatus, and the distorting tension frequently counteracts and nullifies the intended weft-straightening action of the rolls, or the rolls may produce an uncontrollable over-correction. For example, assuming that a web is being drawn through a bow correcting weft-straightener by a tenter frame whose clips grip the opposite selvages of the web, both selvages will be advanced at a substantially uniform rate. Inasmuch as the draft of the web has been relied upon to rotate the prior weft-straightening rolls, any weft-straightening action of a roll on the web necessarily introduces substantially increased tension in those warp elements of the web which are made to travel longer paths than other warp elements. In the assumed case of a curved roll weft-straightener, and assuming bow of the weft or filler threads with their central portions leading their ends, the central warp threads will be made to travel longer paths than the warp elements at and near the opposite selvages of the web. These central elements are required to travel over the elevated crest of the curved expander roll and are subjected to substantially increased tension while warp elements at and near the selvages have less tension. Hence, these tensioned central warp elements initially assume the major portion of the burden of rotating the curved roll, and warp elements outward from the center toward the selvages have varying degrees of slackness around the roll. In other words, the friction between the web and the roll, necessary for rotating the roll, is concentrated at the central portion of the web and the resistance offered by the roll to being rotated has the effect of holding back the tensioned central warp elements while selvage regions of the web are relatively free to be drawn forward. The ends of the weft or filler elements quickly overtake the previously leading central portions of those elements and the elements may become bowed in the opposite direction before the action of the roll on the web can be changed. In any event, the concentration of increased tension on a relatively few warp elements tends to upset the intended corrective action of the weft-straightening roll on the web.

Generally similar effects have resulted from use of prior tiltable roll weft-straighteners in that the warp elements at that selvage region of a travelling web which is made to travel a longer path than the other selvage region, are subjected to substantially increased tension and assume the major portion of the burden of rotating the tilted roll.

I have discovered that the mentioned disturbing and uncontrollable effects of the prior weft-straightening devices may be avoided by relieving the travelling web of the strain of rotating the weft-straightening roll or rolls. I have found that, by driving the roll or rolls with a controllable torque, a tiltable and/or curved roll may act on a web to effect straightening of skewed and/or bowed weft or filler elements without subjecting any of the warp elements to substantially increased tension and, as compared to the prior devices, with a more uniform distribution of the web tension across the full width of the web at that area of the web between the weft-straightening apparatus and the tenter frame, or other web-drawing mechanism.

It is, therefore, an object of my present invention to provide a weft-straightening apparatus wherein a weft-straightening roll is operable to straighten skewed and/or bowed weft or filler elements of a travelling web without substantially increasing tension in that area of the web

between the weft-straightening roll and a tenter frame, or other web-drawing mechanism. According to the invention, the weft-straightening roll is power driven and its torque is selectively variable to avoid imposition of substantially increased tension on the web due to the action of the roll on the web.

It is, moreover, my purpose and object generally to improve the structure and effectiveness of apparatus for correcting skew and/or bow of the weft or filler elements of travelling webs without introducing disturbing inequalities of tension distribution across the width of the web at that portion thereof which is leaving the weft-straightening apparatus.

In the accompanying drawings:

Fig. 1 is a diagrammatic representation of a travelling woven web engaging over a longitudinally curved roll from which the web is advancing, in the direction of the arrows, to a tenter frame, or other processing machine, which draws the web over the curved roll;

Fig. 2 is a top plan view of the apparatus of Fig. 1 but showing the curved roll in its neutral position;

Fig. 3 is a top plan view of one end portion of the curved roll of Figs. 1 and 2, on a larger scale, illustrating the roll as having a non-round axle on which a flexible surface sleeve is rotatably mounted, the end of the axle being secured adjustably in a clamp, and an electric motor being mounted on the axle with drive connection to the rotatable surface sleeve of the roll;

Fig. 4 is a cross-sectional view on line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view, on a still larger scale, showing the interior structure of a so-called "dry" type of curved roll;

Fig. 6 is an end view of the roll of Fig. 5, the axle being in cross-section;

Fig. 7 illustrates one end portion of a curved roll whose longitudinally curved axle has its end clamped to a pivoted bracket which may be adjusted about its pivot to set the curved axis of the axle in different planes, an electric motor having gear connection to the pivoted bracket for effecting the said adjustments, and an electric motor being shown mounted on one of the gears, with drive connection to the rotatable surface sleeve of the roll;

Fig. 8 is an end elevation of the apparatus of Fig. 7.

Fig. 9 is a cross-sectional view on line 9—9 of Fig. 8.

Fig. 10 is a diagrammatic showing of the effect on the web of adjusting the curved roll axle to set its axis in different planes, the illustrated roll having a fixed axis of swinging, as in the embodiment of Figs. 7–9; and

Fig. 11 is a diagrammatic representation of a tiltable skew-correcting roll in operative relation to a traveling web and having means for driving the roll and for selectively varying the driving torque.

Referring to the drawings, Figs. 1 and 2 illustrate, diagrammatically, a woven web **10** travelling in the direction of the arrows on a course leading to a tenter frame **12**, or the like, the tenter frame drawing the web on its course in guided engagement with guide rolls **14**, **16** and **18**, with a conventional tension means indicated generally at **20**. Between the guide rolls **14**, **16**, a conventional longitudinally curved roll **22** is shown engaging the web **10**, and roll **22** ordinarily will be adjustably mounted so that its curved axis may be set in any of a variety of planes, thereby to vary its effect on the web **10** in a well known manner. It is represented in Fig. 1 in the position wherein it has maximum bow-correcting effect on weft or filler elements of the web whose central portions are in advance of their end portions. Fig. 2 shows roll **22** swung clockwise through 90° from its position of Fig. 1, to better show its longitudinal curvature.

As best seen in Fig. 5, the curved roll **22** may be of a known type wherein a flexible surface sleeve **24** of rubber, or the like, is rotatable about a longitudinally curved axle **26** whose opposite ends are adjustably secured in suitable clamps, such as the one represented at **28** in Fig. 3.

Heretofore, the travelling web **10** has been required

to rotate the flexible surface sleeve **24** of the curved roll **22** and this has had the effect of introducing objectionable and uncontrollable amounts of tension in the web **10** between the roll **22** and the tenter frame **12**, or other web-drawing means.

According to my present invention, the flexible surface sleeve **24** of roll **22** is power driven independently of the pull or draft of the travelling web **10**. Fig. 5 shows an end portion of a curved roll **22** of a so-called dry type wherein the flexible surface sleeve **24** is directly mounted on a mutiplicity of generally cylindrical metallic roll sections or spools **30** which are arranged in spaced relation along the curved axle **26**, each roll section or spool **30** being mounted on and rotatable with the outer ball race **32'** of a ball-bearing unit **32** whose inner race **32''** is keyed against rotation on the axle **26**. Spacing elements **34** loosely surround the axle and are clamped endwise between the inner races of adjacent ball-bearing units **32**, whereby the roll sections or spools **30** and the ball-bearing units **32** are maintained in their said spaced relation.

At each end portion of the roll of Figs. 5 and 6, a collar **36** is secured to axle **26** as by one or more set screws **38**, these collars **36** engaging the endmost ball-bearing units and maintaining the interior elements of the roll in their proper relationships.

A pulley **40** is secured directly to the flange of the endmost roll section or spool **30**, as by the bolts **42**, each end of the roll preferably being equipped with a pulley **40**, so that the flexible surface sleeve **24** of the roll may be belt-driven by any suitable power means such as two electric motors, one of which is shown at **52** in Figs. 3 and 4 supported on the axle **26** of a roll **22**. In some cases, a single motor **52** at only one end of the roll may be found sufficient but I presently prefer to provide a power drive for each end of the surface sleeve **24**. A relatively small pulley **54** on each motor shaft has a belt **56** trained over it and over a pulley **40** on roll **22**. Hence, as the axle **26** is adjusted to set its curved axis in different planes, the motor **52** moves with it to maintain the belt **56** always in driving connection with roll **22**.

When a roll **22** of the Figs. 5 and 6 form has the opposite ends of its axle **26** mounted in clamps, such as the clamp **28** of Fig. 3, any adjustment of the roll must be effected manually by loosening the clamps and setting the roll in a desired position, followed by tightening of the clamps to maintain the roll in the selected position. It may be set in a neutral position in which all portions of the web across its width will have equal lengths of paths of travel between the guide rolls **14**, **16**, or it may be set in various positions to variously increase or decrease the paths of travel of the selvages of the web relative to the path of travel of the central portion of the web. And, in any or all of its said positions, the flexible surface sleeve **24** of the roll may be rotated by associated power means which relieves the web of the need for rotating it and of the disturbing tension effects which, heretofore, have resulted when the web was relied upon to rotate the flexible sleeve.

The electric motors **52** which drive the surface sleeve **24** of the roll preferably will be of an available type having the characteristic that its torque does not increase appreciably when it is slowed down by an increase of load. In other words, the motor torque preferably will increase with increase of motor speed only enough to compenstate for frictional losses within the roll, and may be controlled by any suitable rheostat, variable choke or transformer, of which a simple rheostat is represented at **53** in Fig. 11. The control means may be manually operable or automatically responsive to changes in the motor speed, and motors at the opposite ends of a roll will be controlled for synchronized operation.

When it may be desired to automatically adjust a roll **22** in response to bow detecting means, one or more of the rolls may be mounted with the opposite ends of the roll axle or axles clamped to pivoted members which may

be swung on their pivots to vary the position or positions of the roll or rolls. Figs. 7–9 illustrate such a mounting for one end of a single roll **22**, it being assumed that the opposite end of the roll will be similarly mounted. The end of axle **26** is secured in a clamp **58** which in turn is secured to a bracket **60** which is pivotally mounted at **62** on a support **64**. The pivot shaft **62** has fixed to its inner end the large gear segment **66** through a hole **67** in which the axle extends. Segment **66** meshes with a pinion **68** on a shaft **70** which has another gear **72** fixed thereon meshing with a pinion gear **74** on the shaft of a reversible motor **76**. The shaft **70** extends to the other end of the roll where a pinion gear **68** (not shown) on the shaft meshes with a segment **66** (not shown) on a pivot shaft **62** (not shown). In other words, the mechanism shown in Fig. 7 is reproduced at the other end of the roll excepting the reversible motor and its gear connection to shaft **70**, so that operation of motor **76** in one direction rocks roll **22** in clockwise direction about the axis of pivot shaft **62**, and operation of motor **76** in the opposite direction rocks roll **22** in counterclockwise direction about the axis of pivot shaft **62**. This mounting for a roll **22** and the automatic adjustment of the roll is more particularly described in my Patent No. 2,496,312, issued February 7, 1950, wherein two of the longitudinally curved rolls are shown.

The roll **22** of the Figs. 7–9 embodiment is belt driven by a variable speed geared motor **52**, at each end of the roll, which is shown mounted on the gear segment **66**. If desired, the motor may be mounted on the axle **26** as in the Figs. 3 and 4 embodiment. In either case, the motor moves with the axle during adjustments of the roll.

Curved rolls **22** are suitable for laterally expanding or contracting a web **10**, as well as for correcting bow of the transverse elements of the web.

Apparatus for correcting skew of the transverse elements of a travelling woven web ordinarily includes a roll pivotally supported and adapted to be tilted to increase the path of travel of one edge of the web relative to the path of travel of the other edge. Fig. 11 illustrates a skew-correcting mechanism whose tiltable roll **78** is rotatably mounted in a frame **80** which frame **80** is pivotally mounted at **82** centrally between its ends so that the frame may be tilted in either direction about its pivot **82** to correct skew in a manner which is more particularly described in Patent No. 2,343,328, granted March 7, 1944, to the present applicant jointly with Joseph L. Dube. The tilting may be effected automatically by the means indicated generally at **84** which is operated by the reversible motor **86** in response to any suitable skew-detecting means. In Fig. 11, the web **10** passes around guide roll **88** and around tiltable roll **78** whence it passes vertically upward around guide roll **90** and through tension means **92** to the tenter frame **12**, or the like. One end of the tiltable roll shaft **79** projects beyond the frame **80** and it is essential that the roll and shaft rotate in unison. A pulley **94** is fixed on the projecting end of shaft **79**, and a motor **52**, similar to that of Figs. 3 and 4, is mounted on the frame **80** with belt-drive connection to the pulley **94**. A single motor **52** with belt-drive connection to one end of the roll shaft **79** ordinarily will be sufficient. However, if desired, two synchronized motors may drive opposite ends of shaft **79**, or a single motor at one end may have a suitable drive means extended to the opposite end, with belt-drive connection to a pulley **94** at each end of shaft **79**.

The tiltable roll **78** may be an ordinary straight roll, and the described projecting ends of shaft **79** obviously may be mere trunnions at the opposite ends of the roll.

It will be apparent from the foregoing description, that either a longitudinally curved roll or a tiltable roll may be acting on the travelling web **10** in a manner to correct skew and/or bow of the weft or filler elements of the web, and that the invention provides means for selectively driving the weft-straightening roll so as to control the tension of the web between the roll and the tenter frame, thus ensuring a proper drawing and processing effect on the web by the combined action of the roll and the tenter frame, or other drawing and processing mechanism.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

I claim as my invention:

1. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a roll disposed transversely of the web between said guide elements and rotatably mounted with its surface engaging the full width of the web, means on an end portion of said roll operable for moving the said roll about an axis different from the axis of its said rotation thereby to change the length of the path of travel between said guide elements of one edge of said web relative to a laterally different portion of the web, and web-tension-controlling power means connected to said roll for driving said roll at a selected uniform speed in its different positions with a selectively variable torque.

2. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a roll disposed transversely of the web between said guide elements and rotatably mounted with its surface engaging the full width of the web, means for shifting said roll between a neutral position, in which all portions across the width of the web have equal length of paths of travel between said guide elements, and positions in which an edge portion of the web has a length of path of travel between said guide elements different from the length of path of travel of a laterally different portion of the web, means engaging an end portion of said roll for driving said roll in its different positions, and means for selectively varying the torque applied to said roll by the said driving means thereby to control the tension increasing effect of said roll on the web.

3. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a longitudinally curved roll disposed transversely of the web between said guide elements, said roll having a longitudinally curved axle and a flexible web-engaging surface sleeve rotatable about said curved axle, means supporting the opposite end portions of said axle for movements of the axle and the roll thereon about a straight transverse axis common to said supporting means at the opposite end portions of the axle, whereby the position of the roll may be adjusted about said straight axis to change the length of the path of travel between said guide elements of one portion of the web relative to a laterally different portion of the web, and power means having drive connection with said rotatable sleeve of the roll for rotating the sleeve about the curved axis of said curved axle in each position to which the roll may be moved about said transverse straight axis.

4. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a longitudinally curved roll disposed transversely of the web between said guide elements, said roll having a longitudinally curved axle and a flexible web-engaging surface sleeve rotatable about said curved axle, means including end clamps supporting the opposite ends of said axle for movements of the axle and roll about a straight transverse axis which is common to said supporting means at the opposite ends of the axle thereby to adjust said curved axis to any of various positions angularly around said straight axis,

a motor supported in driving relation to said flexible surface sleeve of the roll, and a drive connection between said motor and said surface sleeve and operative for rotating said surface sleeve about said curved axis in each angular position to which said curved axis may be adjusted around said straight axis.

5. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a longitudinally curved roll disposed transversely of the web between said guide elements, said roll having a longitudinally curved axle and a flexible web-engaging surface sleeve rotatable about said curved axle, end clamps for said axle having provision for adjusting the curved axis of the axle about a second axis into any of a variety of planes and adapted to maintain the axle against rotation when its curved axis is in any one of said planes, a motor supported in driving relation to said flexible surface sleeve of the roll, a drive connection between said motor and said surface sleeve whereby the web-engaging surface sleeve may be rotated by said motor, and means for varying the torque applied to said surface sleeve by said drive connection.

6. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a longitudinally curved roll disposed transversely of the web between said guide elements, said roll having a longitudinally curved axle and a flexible web-engaging surface sleeve rotatable about said curved axle, means adjustably supporting the opposite ends of the roll axle whereby the said flexible surface sleeve may be shifted about a second axis between different web-engaging positions thereby to change the length of the path of travel between said guide elements of one portion of the web relative to a laterally different portion of the web, power means for driving the surface sleeve in each of its said web-engaging positions, and means operative at said power means for varying the torque with which said surface sleeve is driven thereby to materially reduce the tension-increasing effect of the surface sleeve on the web in the said different web-engaging positions of the surface sleeve.

7. In a web-handling apparatus having a pair of spaced and parallel guide elements and web-drawing means for drawing the web in guided engagement with said guide elements, the combination therewith of a longitudinally curved roll disposed transversely of the web between said guide elements, said roll having a longitudinally curved axle and a flexible web-engaging surface sleeve rotatable about said curved axle, means adjustably supporting the opposite ends of the roll axle for movements of the axle and roll about a straight transverse axis common to said supporting means at the opposite ends of the axle whereby the said flexible surface sleeve may be shifted about said straight axis between different web-engaging positions thereby to change the length of the path of travel of a laterally different portion of the web, power means for driving the surface sleeve in each of its said web-engaging positions, thereby to materially reduce the tension-increasing effect on the web due to the engagement of the surface sleeve therewith.

8. Apparatus for acting on a travelling web during the progress of the web to a processing mechanism which mechanism positively grips the edges of the web to advance the edges of the web at a predetermined rate of travel, said apparatus comprising a roll rotatably mounted in position to be engaged and rotated by the web as the web approaches the processing mechanism, means for shifting the position of the roll to change the length of the path of travel of one edge portion of the web relative to the length of the path of travel of a laterally different portion of the web, the web having a predetermined amount of tension between said roll and said processing mechanism when the roll is in a neutral position, and the resistance of said shifted roll to rotation by the web being such that if the roll were to be rotated by the web the web tension would be increased between said apparatus and said processing mechanism substantially above said predetermined amount of tension and would be concentrated at portions of the web which have increased length of paths of travel and, in combination therewith, adjustable means for applying driving torque to the roll in its said shifted positions in selective amounts to maintain the tension in the web between said apparatus and said processing mechanism substantially the same when the roll is in its neutral position and when it is in said shifted position.

9. Apparatus for acting on a travelling web during the progress of the web to a processing mechanism which mechanism positively grips the edges of the web to advance the edges of the web at a predetermined rate of travel, said apparatus comprising a longitudinally curved roll having a longitudinally curved axle and a flexible surface sleeve rotatable about the axis of the curved axle, said curved roll being mounted in position to be engaged and its surface sleeve rotated by the web as the web approaches the processing mechanism, means adjustably supporting the ends of said curved shaft whereby the roll may be set in a neutral position in which all portions across the width of the web have substantially equal paths of travel in reaching the processing mechanism and in which the web between the roll and the processing mechanism has a predetermined amount of tension therein, and may be set in any of various other positions in each of which the central portion of the web will have a different length of path of travel than the length of the paths of travel of the edge portions of the web and in each of which the web between the roll and the processing mechanism will have increased tension therein above said predetermined amount of tension and will have the increased tension concentrated at the portion or portions of the web having the longer paths of travel, and, in combination therewith, adjustable means for applying driving torque to the roll in selective amounts to maintain the tension in the web between the roll and the processing mechanism substantially the same when the roll is in its neutral position and when it is in any of its said various other positions.

10. Apparatus for correcting a displaced condition of the transverse elements of a travelling woven web, comprising a pair of spaced and parallel guide elements, means beyond the guide elements in the direction of travel of the web for drawing the web in guided engagement with the guide elements on a course leading to said drawing means with a predetermined amount of tension in the portion of the web which is entering the drawing means, a roll rotatably mounted between said guide elements in position to be engaged and rotated by the travelling web, means for shifting said roll between a neutral position and selective correcting positions, all portions across the width of the web having equal length of paths of travel between the guide elements when the roll is in its neutral position but different portions across the width of the web having unequal lengths of paths of travel between the guide elements when the roll is shifted to any of its said correcting positions, and the tension in said portion of the web which is entering the drawing means being increased above said predetermined amount of tension and concentrated at the portion or portions of the web having the longer paths of travel when said roll is shifted to any of its said correcting portions, and, in combination therewith, adjustable means for driving said roll with an applied torque conducive to maintenance of average tension across the width of said portion of the web which is entering the drawing means substantially the same when the roll is in its neutral position and when it is in any of its said correcting positions.

11. Apparatus for handling woven webs, comprising, in

combination, a pair of spaced apart and parallel guide elements, means for drawing a woven web in guided engagement with said guide elements, a web engaging roll rotatably mounted between said guide elements and disposed transversely of the web, said roll having a neutral position in which all portions across the width of the web have equal length of paths of travel between said guide elements, means for adjusting the roll between its said neutral position and positions in which an edge portion of the web has a length of path of travel between said guide elements substantially different from the length of the path of travel of a laterally different portion of the web, and means for controlling the increase of tension on

the web due to the presence of said roll, comprising a motor having drive connection to the roll in all of its said positions, and means for selectively varying the driving torque applied to the roll by said motor.

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