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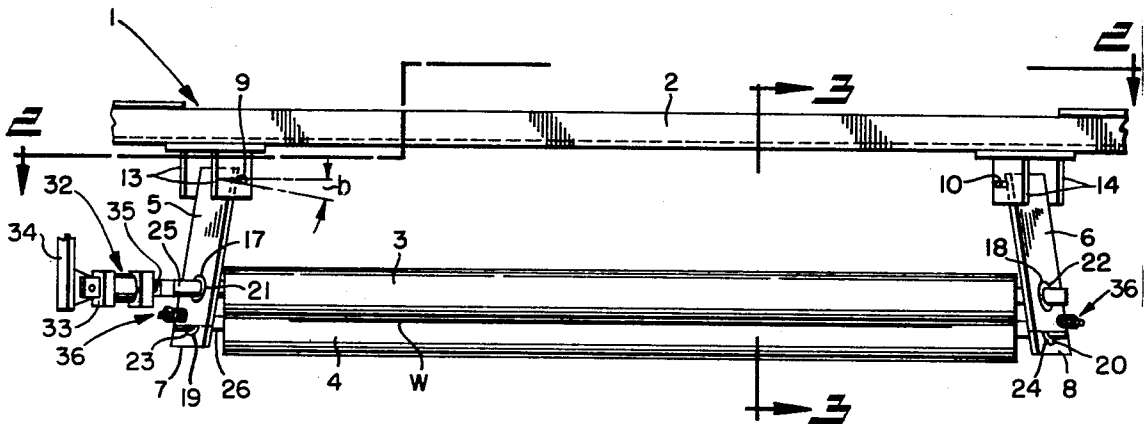
[54] WEB GUIDING APPARATUS
10 Claims, 7 Drawing Figs.

[52] U.S. Cl. 226/199,
226/19
[51] Int. Cl. B65h 23/02
[50] Field of Search 226/15, 16,
17, 18, 19, 20, 21, 22, 23, 199

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ABSTRACT: A web-guiding apparatus including plural guide rolls each independently supported by pivot links at opposite ends of the guide rolls whose pivotal axes are angularly disposed with respect to the centerline of the web material to achieve a desired canting and tilting of the rolls in a corrective direction during lateral movement back and forth. Adjacent rolls are connected together by spring links for balancing the rolls one against the other and permitting differential movements therebetween which will occur when the angular orientation of the pivots and support links of adjacent rolls is varied to vary the cant angle and wrap angle during lateral shifting of the rolls. The relative lengths of the support links may also be varied for varying the angle of wrap of the web material from side to side during such lateral shifting of the guide rolls.



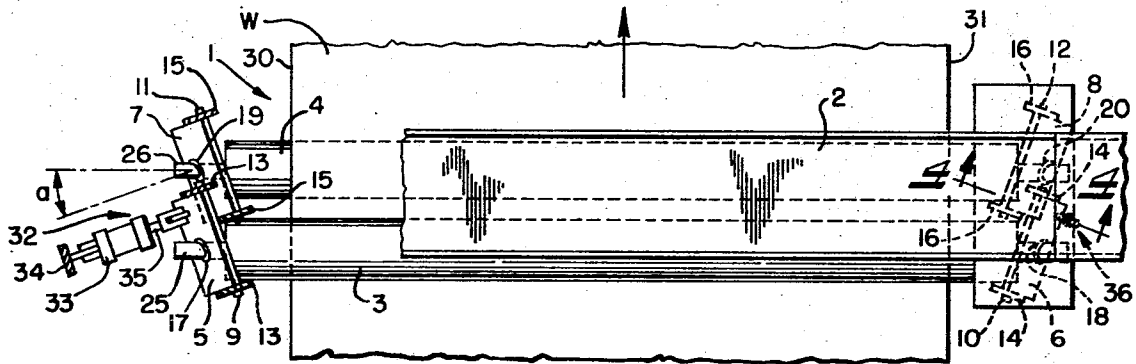


Fig. 2

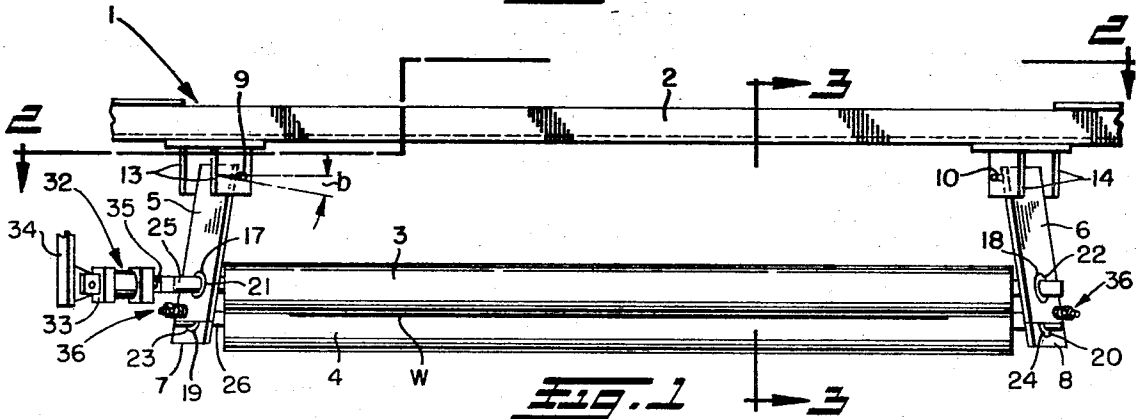


Fig. 1

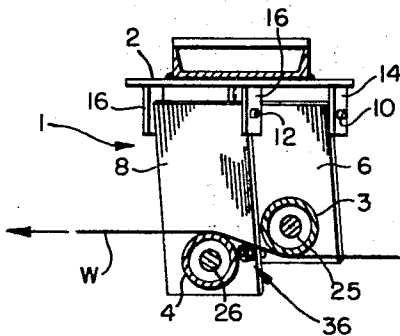


Fig. 3

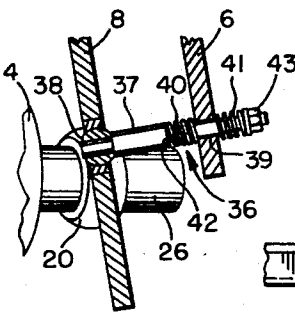


Fig. 4

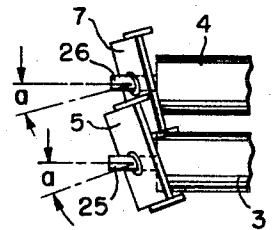


Fig. 5

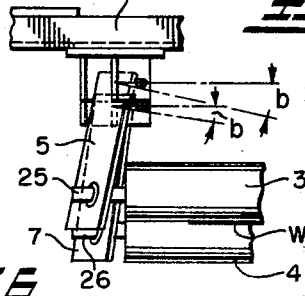


Fig. 6

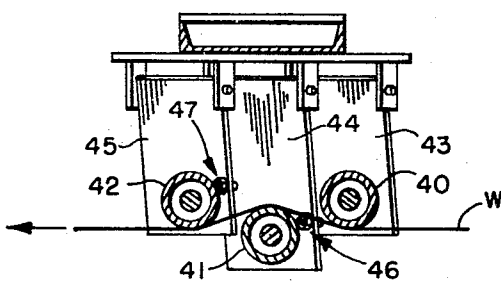


Fig. 7

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WEB GUIDING APPARATUS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to a web-guiding apparatus of a type generally similar to that shown and described in copending U.S. application of Alexander V. Alexeff and Harvey Snyder, Ser. No. 665,562, filed Sept. 5, 1967, now U.S. Pat. No. 3,467,292 in that it includes two or more guide rolls mounted for movement both laterally and angularly with respect to the web material for physically shifting and guiding the web material in the same general direction while reducing the looseness or tightness in opposite edges of the web material which ordinarily occurs during lateral displacement thereof. However, unlike the apparatus of such copending application, the apparatus of this invention may also be used for accurately maintaining the edge alignment of the web material and particularly tire fabric material by stretching the material adjacent the edges thereof, which is a principal object of this invention.

Another object is to provide such an apparatus which reduces the shearing effect of the guide rolls on the material being guided during lateral adjustments thereof.

Still another object is to provide such an apparatus in which the guide rolls are independently mounted and connected together in such a manner as to balance one guide roll against another for reducing the shearing effect on the material being guided.

A further object is to provide such an apparatus in which the angle of wrap of the web material against the guide rolls may be varied from side to side as the guide rolls are shifted back and forth.

Yet another object is to provide an apparatus of the type described in which the cant angle of adjacent guide rolls may also be varied during such shifting of the guide rolls back and forth.

These and other objects of the present invention may be achieved by providing separate support links for the ends of each of the guide rolls. The pivotal axes of each of the support links at opposite ends of the guide rolls are disposed at an angle with respect to the centerline of the web material being guided and intersect on the entry side of the web material, whereby lateral shifting of the rolls in opposite directions will cause a canting and tilting of the rolls in a corrective direction.

Adjacent rolls are connected together by spring links between the support links therefor at one or both ends of the guide rolls to balance the rolls one against the other for reducing the shearing effect on the material being guided, and also permit differential movements of the rolls which occurs when the angular orientation of the pivots and support links of adjacent rolls is varied to vary the cant angle and wrap angle during lateral shifting of the rolls back and forth. The relative lengths of the support links from their respective pivots to their respective guide rolls may also be varied to vary the angle of wrap of the web material from side to side during such lateral shifting of the guide rolls.

These and other objects of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of a few of the various ways in which the principles of the invention may be employed.

BRIEF DESCRIPTION OF THE DRAWINGS

In the annexed drawings:

FIG. 1 is a fragmentary end elevation view of a preferred form of web guiding apparatus in accordance with this invention;

FIG. 2 is a fragmentary horizontal section through the support frame for the apparatus of FIG. 1, taken on the plane of the line 2-2 thereof;

FIG. 3 is a vertical section through the guide rolls and support frame of FIG. 1, taken on the plane of the line 3-3;

FIG. 4 is a fragmentary vertical section through one of the connecting links between adjacent rolls, taken on the plane of the line 4-4 of FIG. 2;

FIG. 5 is a fragmentary top plan view of the left end of the guide rolls of FIG. 2 except that the angular orientation of the pivotal mounts for the adjacent rolls has been varied;

FIG. 6 is a fragmentary end elevation view of the left end of the apparatus of FIG. 1, except that the initial angular orientation of the support links for adjacent guide rolls has been varied; and

FIG. 7 is a vertical section similar to FIG. 3, except that three guide rolls and support links therefor are provided instead of two as in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to the drawings and first especially to FIGS. 1 through 3 thereof, a preferred form of web-guiding apparatus in accordance with this invention is generally indicated at 1 and comprises a support frame 2 from which are suspended two or more guide rolls 3 and 4 as by means of individual support links 5, 6 and 7, 8 at opposite ends of the guide rolls. Pivot pins 9 through 12 pivotally connect the upper ends of the support links 5 through 8, respectively, to the support frame 2 by inserting the pivot pins through aligned openings in pairs of ears 13 through 16 which project downwardly from the bottom side of the support frame. Spherical bearings 17 through 20 or the like secured in sockets 21 through 24 in the support links 5 through 8 receive the ends of roll shafts 25 and 26 on which the guide rolls 3 and 4 are rotatably journaled for providing universal joint connections between the support links and guide roll shafts to accommodate the various movements of the guide rolls as explained hereafter.

The axes of the pivot pins 9, 10 and 11, 12 for each of the guide rolls 3 and 4 are angularly oppositely disposed with respect to each other preferably in planes parallel to the general plane of web travel adjacent opposite sides of the apparatus and intersect each other on the entry side of the web material, as clearly shown in FIG. 2. Initially, the axes of the guide rolls 3 and 4 themselves are perpendicular to the edges 30 and 31 of the web material W and such axes are substantially parallel to each other so as not to disturb the general direction of movement of the web material passing therebetween. However, as perhaps best seen in FIG. 1, the support links 5, 6, and 7, 8 for each of the guide rolls 3 and 4 extend at an angle from their associated pivot pins 9, 10, and 11, 12 axially away from the edges of the web material when the guide rolls are in such neutral position, whereby swinging of the support links 5, 6 and 7, 8 toward the left as viewed in FIG. 1 will cause a raising of the left end of the guide rolls and a lowering of the right end for tilting of the guide rolls and web material W wrapped therearound. Such swinging movement of the support links also bodily shifts the guide rolls and web material W in a lateral direction and cants the guide rolls at an angle such that the higher ends of the rolls (in this case the left ends) are moved in the direction of the entry side of the web material and the lower or right ends of the guide rolls are moved in the direction of the exit side for guiding the web material toward the high side of the guide rolls. Swinging of the support links 5, 6 and 7, 8 in the reverse direction will cause a reversal in the movements of the guide rolls, and all of these movements are permitted because of the spherical bearing connections between the guide roll shafts 25 and 26 and associated support links 5, 6 and 7, 8.

Lateral shifting of one of the guide rolls 3 may be achieved as by actuation of a piston-cylinder assembly 32 in response to signals from edge sensors (not shown) which may be located adjacent one or both edges of the web material W, in a manner well known in the art. As illustrated in FIGS. 1 and 2, the head end 33 of the piston-cylinder assembly 32 may be pivotally

connected to one side 34 of the support frame 2 and the rod 35 pivotally connected to one of the support links 5 for the guide roll 3.

To effect movements of the other guide roll 4, there is provided a connecting link 36 between adjacent guide rolls 3, 4 which may be at one or both ends of the guide rolls. As illustrated in FIGS. 1 and 2 and more clearly shown in FIG. 4, each connecting link 36 comprises a rod 37 having one end journaled in a spherical bearing 38 in one of the support links 8 at one end of the guide rolls 3, 4 and the other end of the rod extending through an opening 39 in the other support link 6 at such one end, with centering springs 40, 41 engaging opposite sides of the other support link 6. The inner centering spring 40 is interposed and compressed between a shoulder 42 on the rod 37 and the inner surface of the other link 6, whereas the outer centering spring 41 is compressed between the outer face of the other support link 6 and a nut 43 threaded onto the outer end of the rod 37. Such connecting links 36 between adjacent rolls 3, 4 balance the rolls one against the other, and also reduce the shearing action of the rolls on the web material during lateral shifting of the rolls because of the differential movements permitted between the rolls by the connecting links.

Another advantage in using the connecting links 36 between adjacent rolls 3, 4 is that the relative lengths of the support links 5, 6 and 7, 8 of adjacent rolls from their respective pivots 9, 10 and 11, 12 to their respective rolls may be varied as by locating one roll 4 below the other with the pivotal axes of both rolls in the same general plane as shown in FIG. 3 or by locating the pivots 9, 10 and 11, 12 one above the other and/or varying the location of the rolls as shown in FIG. 6 thus to progressively increase the angle of wrap of the web material toward the edge of the web material in the direction of movement of the guide rolls for stretching or spreading of the web material adjacent the fabric edge where it is needed most, especially when it is desired to improve cord count. The longer the pivot arm for the guide roll, the greater the movement of the guide roll both vertically and laterally during lateral shifting thereof. Accordingly, if the guide roll 4 having the longer pivot arms 7, 8 engages the bottom side of the web material W, as shown in FIGS. 1, 3 and 6, the edge of the web material W toward which the rolls are laterally shifted will be pinched more than the other edge, and the shearing effect of the guide rolls on the material being guided will also be reduced because the guide roll 4 engaging the bottom side of the web material will travel at a faster rate than the guide roll 3 engaging the top side.

Moreover, since each of the guide rolls 3 and 4 are independently mounted on their own support links 5, 6 and 7, 8 and limited differential movements are permitted therebetween as aforesaid, both the angular orientation *a* of the pivot pins 9, 10 and 11, 12 for each guide roll and the initial angular disposition *b* of the support links 5, 6 and 7, 8 themselves may be independently varied, as shown, for example, in FIGS. 5 and 6, respectively, to obtain different angles of wrap of the web material around the guide rolls from end to end when the rolls are laterally shifted, as desired.

Although two such guide rolls 3 and 4 are shown in FIGS. 1 through 6, it will be apparent that more than two guide rolls may be used if desired without departing from the scope of the present invention. Thus, for example, three such guide rolls 40, 41, 42 may be used, each independently supported on their own pivotally mounted support links 43, 44, 45 with connecting links 46 and 47 between adjacent guide rolls 40, 41 and 41, 42 as shown, for example, in FIG. 7. The guide rolls themselves may be in line with each other or out of alignment as desired, depending upon the initial angle of wrap desired when the guide rolls are in the neutral positions shown in the various FIGS. of the drawings.

It will now be seen that the various forms of web-guiding apparatus disclosed herein provide for independent mounting of

each of the guide rolls at the same or different angles which guide rolls are nevertheless interconnected by connecting links which balance the rolls one against the other and also permit differential movements of the guide rolls during lateral adjustment thereof when the angular orientation of the pivots and supports for the guide rolls are different or when the relative lengths of the pivot arms for the guide rolls are different.

I claim:

1. Apparatus for guiding web material and the like comprising plural guide rolls adapted to be contacted by the web material passing therebetween, individual pivotally mounted support means for supporting the ends of each of said guide rolls for swinging movement of said guide rolls laterally of such web material, means for effecting such swinging movement of one of said guide rolls, and spring link means interconnecting adjacent guide rolls, whereby movement of one of said guide rolls will cause movement of all of said guide rolls.

2. The apparatus of claim 1 wherein there are two of said guide rolls interconnected by said spring link means as aforesaid.

3. The apparatus of claim 1 wherein there are three of said guide rolls interconnected by said spring link means as aforesaid.

4. The apparatus of claim 1 wherein the support means at opposite ends of said guide rolls have pivots which are angularly disposed with respect to each other with their axes intersecting each other on the entry side of said guide rolls, and there are universal connections between said guide rolls and support means therefor, whereby said guide rolls are canted in opposite directions during such lateral movement of said guide rolls in opposite directions, the angular orientation of the pivots of adjacent guide rolls being different to vary the amount of canting of adjacent guide rolls during such lateral movement.

5. The apparatus of claim 1 wherein the initial angular orientation of said support means of each of said guide rolls is such that said support means extend at an angle from their associated pivots away from the adjacent edges of the web material, and the relative lengths of said support means from their respective pivots to the ends of said guide rolls are different, whereby swinging movement of said guide rolls in opposite directions will cause a raising and lowering of opposite ends of said guide rolls at different rates thus to vary the angle of wrap of the web material around said guide rolls from side to side.

6. The apparatus of claim 5 wherein the pivots for adjacent guide rolls are located one above the other for varying the relative lengths of said support means for each of said guide rolls.

7. The apparatus of claim 5 wherein the connections between adjacent guide rolls and their associated support means are located one above the other for varying the relative lengths of said support means for each of said guide rolls.

8. The apparatus of claim 1 wherein each of said spring link means comprises a rod, a spherical bearing in the support means at one end of one of said guide rolls in which one end of said rod is journaled, the support means of the adjacent guide roll at said one end having an opening through which the other end of said rod extends, and a pair of centering springs engaging opposite sides of said support means of said adjacent guide roll.

9. The apparatus of claim 8 wherein one of said centering springs is interposed between a shoulder on said rod and the inner face of said support means of said adjacent guide roll, and there is a nut on the outer end of said rod, the other of said centering springs being interposed between the outer face of said support means of said adjacent guide roll and said nut.

10. The apparatus of claim 1 wherein said spring link means interconnect the support means of adjacent guide rolls at both ends of said guide rolls.