Jan. 6, 1948. W. T. STANFORD 2,434,128

WEB GUIDING APPARATUS

Filed April 11, 1945 2 Sheets-Sheet 1

Fig. 1

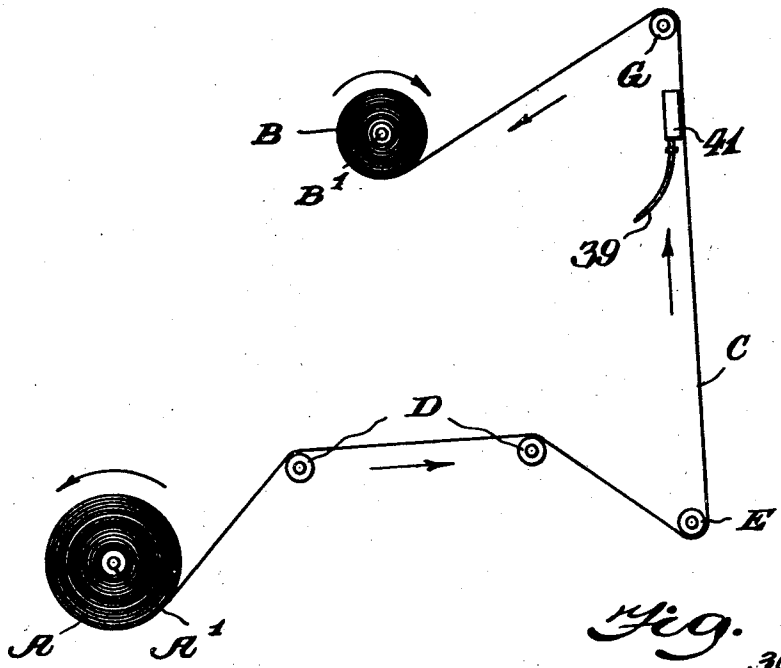


Fig. 3

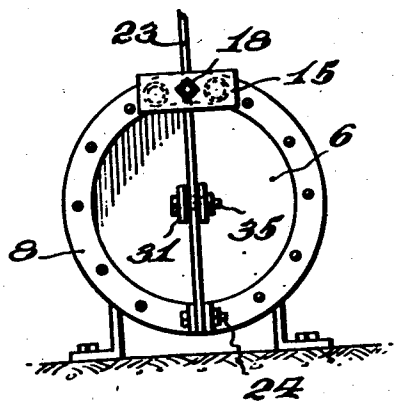
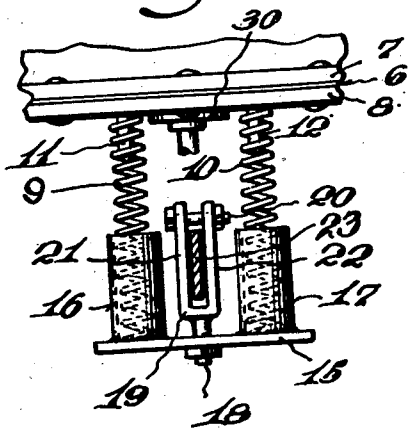


Fig. 4



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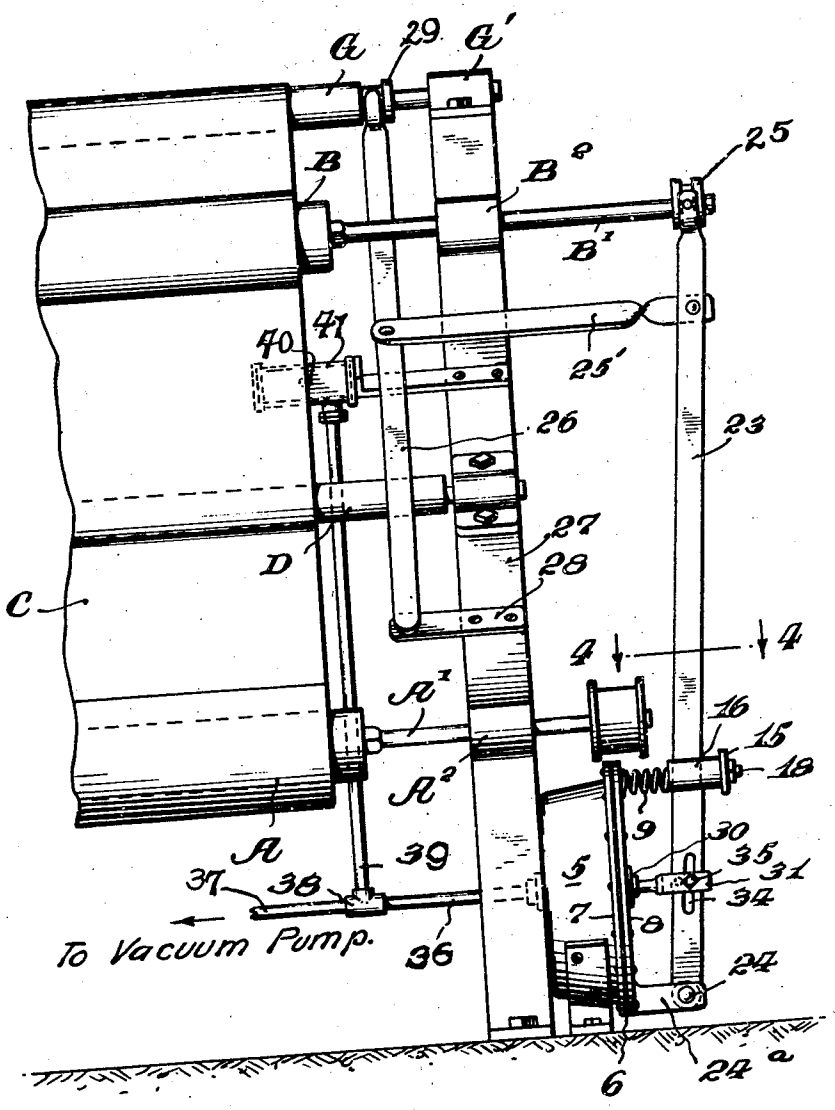
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WEB GUIDING APPARATUS

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Fig. 2



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WEB GUIDING APPARATUS

William T. Stanford, Salem, Ill.

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4 Claims. (Cl. 242—76)

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This invention relates to machinery for winding and rewinding paper, cloth, or like webs, and more particularly to novel improvements in regulator means for evenly winding the web from one roll to another.

In the prior art known to applicant, the pressure equalizing spring means for maintaining a normal or neutral position of the diaphragm and the connected shift lever is mounted on an extension from the center of the diaphragm. This arrangement, while producing fairly good results, nevertheless, causes undesirable extraneous deflections of the diaphragm when the shift levers are pivoted outwardly during operation. These deflections of the diaphragm are caused by the tensioning reactions of the equalizing spring means against the diaphragm supported center connection. Such deflections from the counter-force produced by the spring reactions impair the sensitivity of the diaphragm and increase the strain on the diaphragm.

Heretofore, also it was found that in such known devices the spring reactions increased the extraneous diaphragm deflections even more when greater loads were applied to the spring means by using more levers and links for shifting two or more shafts to control edge alinement of the winding web.

Accordingly, an object of the present invention is to mount the pressure equalizing spring means on a firm base adjacent the diaphragm, so as to overcome the above-mentioned disadvantages of mounting the spring means over the center of the diaphragm.

Another object is to make it practical to shift two or more shafts to provide for substantially instant control of the moving web during winding from one roll to another.

A further object is to provide for shifting the winding roll shaft simultaneously with an associated web tension shaft so as to provide for winding the webs with alined edges at greater speeds than heretofore practicable.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

One practical embodiment of the present invention is shown in the accompanying drawings in which:

Figure 1 is a diagrammatic illustration of the relative positions of the supply roll and the winding roll with their several associated guide and tension rollers.

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Figure 2 is a side elevation of the novel regulator means as it appears when applied tc a paper machine, such as diagrammatically illustrated in Figure 1.

Figure 3 is a front elevational view of the construction shown in Figure 2, below the line 4—4.

Figure 4 is a section taken through the shift lever along the line 4—4 of Figure 2 illustrating in plan a top view of the regulator spring means.

Similar reference characters designate corresponding parts throughout the several views of the drawings.

For example, with reference first to Figure 2, the invention broadly includes a supply roll A mounted on a shaft A' and journaled for rotation in suitable bearings A^2. This roll is adapted to carry the supply of paper which is to be unwound or unreeled onto another roll such, for example, as winding roll B. As is generally known, the winding roll B is mounted on a shaft B', which shaft is mounted and journaled in suitable bearings B^2 for rotation and in such a manner as to provide for axially shifting the shaft in its bearings B^2.

In Figure 1 there is shown, for example, a diagram of the relative positions of the hereinbefore referred to shafts and their associated guide rollers and tensioning rollers, wherein A is the supply roll, D are guide rollers, E is a tensioning roller, which may or may not be shiftable axially in the bearings, G is another web tensioning roller, which is herein described and illustrated as being shiftable in its bearings G', and B' is a winding roll shaft, which is shiftable simultaneously with the shiftable tensioning roller G.

Thus, as the web of paper C is unwound from roll A across guide rolls D around the web tensioning rolls E and G to the winding shaft B^1, it is essential that some means be provided for shifting some or all of the shafts and rollers promptly upon any disalignment of the edges of the web as it is wound on the shaft B^1.

Accordingly, to accomplish this alignment of the web edges efficiently at high speeds of roll rotation, it is desirable to develop highly sensitive means for automatically aligning the edges of the web; in other words, to provide an automatic means for shifting the roll shafts without lag so as to maintain alignment of the roll web edges.

I attain these improved results and the foregoing objects referred to by providing improved

novel means, whereby the winding shaft B^1 and one or more of its associated tensioning rollers E and G may all be shifted together axially to align the edges of the web as it is wound on the shaft B^1.

In Figures 2, 3, and 4 are shown the improved novel means for simultaneously shifting the aforementioned shaft B' and the web tensioning roller G. It comprises a casing or housing consisting of a rigid wall 5 which is shown as dish-shaped and a flexible wall or diaphragm 6 (see Fig. 3). The outer rim of the dish-shaped wall is provided with a flange 7. The diaphragm 6 is secured to the flange 7 of the wall 5 by an annulus or ring 8, so as to provide an effective seal and thus combined with the wall 5 makes an air-tight chamber. Mounted on the face of annulus 8 and in spaced apart relation are two coil springs 9 and 10. These springs are arranged so that their convolutions encircle a pair of spaced lugs 11 and 12 secured to the annulus 8 and at their other end the springs are secured to a transverse bar 15. This bar has, depending from it, a pair of tubular members 16 and 17 which extend half the length of the said coil springs 9 and 10 when they are in their natural positions so as to provide skirts around part of the springs. Also depending from the bar 15 is a bolt 18 and attached to the bolt 18 is a yoke 19. Transversely mounted between each arm of the yoke 19 is a pin 20 near the end extremities of the yoke arms 21 and 22. Interposed between the pin 20 and the top of the yoke is positioned a shift lever 23, which lever connects at its upper end with a collar 25 secured to the shaft B^1 of the winding roll B and at its lower end is pivoted on a pin 24 in a stud 24a secured to the face of the annulus 8. Extending from the lever 23 at a point below its connection with the shaft B^1 is an elongated link 25' which in turn is pivotally connected to a second shift lever 26 that connects with a collar 29 defined in the tensioning roller G. This lever 26 is pivoted at its lower end to a stud 28 secured to the main frame 27 of the paper machine.

Secured to the center of the diaphragm 6, as by soldering or the like, is a button 30. This button 30 may have a yoke 31 secured to it in any suitable manner. The yoke 31 is provided with arms between which is positioned an intermediate portion of the lever 23.

At this portion the lever 23 is provided with an elongated slot 34, through which extends a transverse pin 35 mounted between the arms of the yoke 31. Thus, there is provided a connection from the center of the diaphragm 6 to the shift lever 23 above the pivot 24 on the ring 8 and which connection is below the mounting for springs 9 and 10 on the upper part of the ring 8. By this arrangement the actuation of the lever 23 and corresponding compression or expansion of the springs 9 and 10 has no reactive effect on the diaphragm 6, as the springs are mounted on a solid base.

Leading into the chamber formed from the rigid dish-shaped wall 5 back of the diaphragm 6 is a pipe line 36. This pipe connection has a pipe or flexible tubing 37 leading from it to a vacuum pump, not shown, and interposed in the pipe line 36 is a T-coupling 38 from which leads a flexible tube or pipe section 39 to a regulating orifice 40 defined in a box-like head 41. The orifice in the head 41 is so positioned with respect to the edge of the web C that it is partially covered by the web and upon any deviation of the web edge during winding, this orifice becomes covered or uncovered to a lesser or greater degree, thereby causing variations in pressure in the pipe line 36, which leads through wall 5 to the back of the diaphragm 6.

When such pressure variations occur in the chamber formed by the wall 5 and diaphragm 6, the degree of partial vacuum maintained in the pressure chamber 5 is varied, thereby causing a proportional movement of the diaphragm 6 so as to force the diaphragm outwardly from the rigid wall of the chamber. This pushes on the shift lever 23 at its intermediate portion by displacing the pin 35 in slot 34 of the lever and swings it outwardly on its pivot 24, so that the longitudinal edge of the lever 23 strikes against the bottom of the yoke 19 between arms 21 and 22 shown in Fig. 4, and varies the tension of the equalizing springs 9 and 10. Thus through the upper connection of the shift lever 23 with the shaft B^1, the lever 23 causes the shaft B^1 to axially shift in its bearings B^2. Simultaneously with this movement of the lever 23 the connecting link 25' is moved and its pivotally connected lever 26, which at its upper end is connected to the tensioning roller G moves outwardly to thereby axially shift the said roller in its bearings G^1.

Thus, by shifting both the winding roll B^1 and the tension roller G there is an instant alignment effected of the wound edges of the web C, so that the paper machine may be operated at most any required winding speed.

The location of the boxlike head 41 in proximity to the tension roll and winding roll makes it possible to fix the head to the frame, and to dispense with the means of the prior art for repositioning such head. In other words, by controlling both the tensioning roller G and its associated winding roll B, through the linkage described with the vacuum controlled flexible wall or diaphragm 6, it is possible to keep the box 41 stationary and effect the necessary adjustment of the rolls through the linkage.

Without further description, it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will, of course, be understood that changes in form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

I claim:

1. In an apparatus for winding a web of material from one roll to another in edge to edge alignment, a supply roll, a winding roll, a tension roller, bearings for rotatably mounting said supply roll, bearings for rotatably and shiftably mounting the winding roll and the tension roller longitudinally along their axes, lever means connected with the said winding roll and tension roller, said lever means being connected together to provide joint operation, pressure responsive means adapted to actuate said first-named means, and pilot means having a conduit leading to one side of said second-named means and resting against the web having an orifice therein positioned to be partially or completely covered by the edge of the web to thereby vary the pressures adjacent a side of the second-named means so as to actuate the first-named means and simultaneously shift the winding roll and the tension roller longitudinally on their axes relative to the axis of the supply roll.

2. In an apparatus for winding a web of strip material from one roll to another in edge to edge alignment, a supply roll, a winding roll, a tension roller, bearings for rotatably mounting said

supply roll, bearings for rotatably and shiftably mounting the winding roll and the tension roller longitudinally along their axes, linkage means adapted to connect said winding roll and tension roller together, and a pilot member in contact with and traversed by said web having an elongated opening therein adapted to be variably exposed and closed by changes in position of the web for automatically and simultaneously actuating the linkage means and thus axially shift the winding roll and tension roller relative to the supply roll axis to thereby maintain the wound web edges in alignment on the winding roll.

3. In an apparatus for winding a web from one roll to another in edge to edge alignment, a supply roll, a winding roll, a tension roller, bearings for rotatably mounting said supply roll, bearings for rotatably and shiftably mounting the winding roll and the tension roller longitudinally along their axes, linkage means adapted to connect said winding roll and tension roller together, and means controlled by the web for automatically and simultaneously actuating the linkage means and thus axially shift the winding roll and tension roller relative to the supply roll axis to thereby maintain the wound web edges in alignment on the winding roll, said means comprising a control device including an air-tight housing connected with a vacuum pump, having a wall thereof defined by a flexible diaphragm, a lever connected with said linkage means and the center of said diaphragm, and spring means mounted on said housing adapted to provide equalizing tension for varying pressures in the housing as the diaphragm actuates the said lever.

4. In an apparatus for winding a web from one roll to another in edge to edge alignment, a supply roll, a winding roll, a web tension roller, means for rotatably mounting said supply roll, means for shiftably and rotatably mounting the winding roll and the tension roller on their axes relative to the axis of the supply roll during winding of the web on the winding roll, and means controlled by the web for simultaneously automatically shifting the winding roll and tension roller while unwinding the web from the supply roll, said means comprising a control device including a housing having a rigid dish-shaped wall and a flexible diaphragm adapted to define an air-tight chamber connected with a vacuum pump, a flange around the rim of said rigid wall for mounting said diaphragm thereon, an annulus adapted to seal said diaphragm to said flange, lugs projecting from said annulus, spring means around said lugs seated against said annulus, a lever extending between said springs, a yoke having arms straddling said lever, means extending across the ends of said yoke arms adapted to loosely confine the said lever between the yoke arms, a bar secured to the head of the yoke adapted to engage with the ends of said springs, a second yoke extending centrally from the diaphragm connected to said lever at a slotted intermediate point thereof, a pilot device positioned against the web having an orifice positioned to be covered in whole or in part by the edge portion of said web during winding thereof, a tube connecting said orifice with said chamber, means carried by said lever connected to the said winding roll and said tension roller adapted to axially shift the said winding roll and tension roller according to the fluctuations imparted to said diaphragm against the tension of said springs by variations of pressure developed in said chamber during the winding of the web over the orifice of said pilot device.

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