March 18, 1969 H. G. SASS 3,432,894

FABRIC STRETCHING DEVICE

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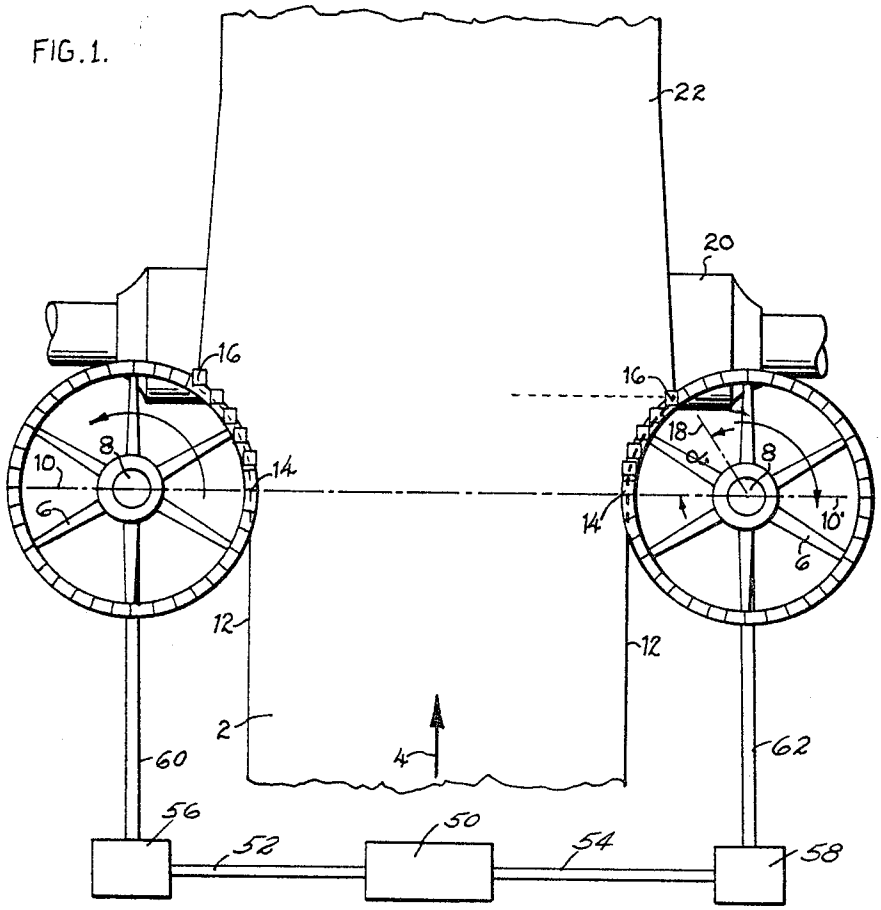
FIG. 1.



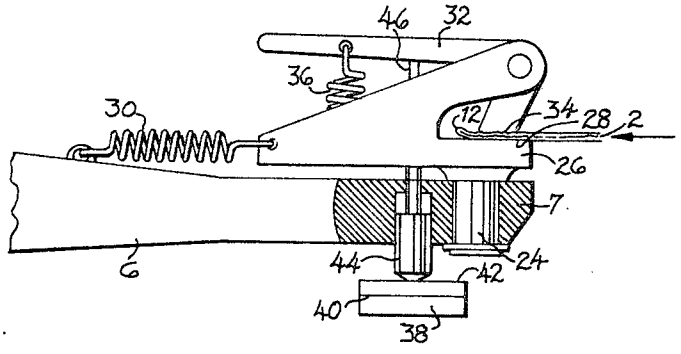


FIG. 2.

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FABRIC STRETCHING DEVICE

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ABSTRACT OF THE DISCLOSURE

A machine suitable for latitudinally stretching woven fabric webs including a pair of rotatable wheels which engage the web at its edge and stretch the fabric web by rotation of the wheels. The clamps used to engage the web automatically release the web at a predetermined point.

The present invention relates to an installation for the latitudinal stretching of woven fabric webs. Particularly, the invention relates to installations wherein the web is seized by clamps or other vises and stretched by the vises to a predetermined dimension. The purpose for stretching the fabric in this manner is to bring the goods to a desired dimension either before or after any shrinkage during the wet treatment of the fabric.

One feature of this invention which is important in the overall efficiency thereof is the ability of the present invention to effect a shrinkage of the warp threads during the stretching, which accomplishment ordinarily may only be attained on a separate piece of equipment. This is important since the goods, upon further processing, will shrink less and greater control is thertefore attainable. Moreover, it has been found that fabrics treated by the present invention which are thereafter calendered immediately following the operation of the present invention attain a surface effect which is unobtainable with prior shrinking installations. Prior art devices are not adapted to permit calendering immediately after treatment because these devices create substantial longitudinal stretching which must be allowed to subside, and during this time the latitudinal stretch subsidies as well.

The effect of the present invention on woven fabric webs is accomplished by overstretching the fabric beyond its normal dimension in such a short distance that the warp threads shrink by a considerable amount. This short path or distance wherein the overstretching is done is made possible by having the ends of the fabric web travel a circular path whereby the length of the feed path is from about 20% to 100% of the stretch dimension.

Basically, the invention comprises an apparatus for latitudinally stretching woven fabrics. The apparatus contains a pair of rotatable wheels positioned in a spaced apart relationship such that an imaginary line may be drawn through the axis of each wheel in such a manner that this line is perpendicular to the direction of travel of the web passing through the apparatus. The two wheels are also positioned so that they are tangent to the edges of the fabric web at a point where the web intersects the imaginary line drawn between the axes of the wheels. Positioned on the wheels are a plurality of clamp means, attached to the periphery of the wheels and adapted to clamp the edges of the web at the above mentioned tangent point. The clamp means are further adapted to pivot in a manner whereby the edge of the fabric is continually maintained in a position substantially perpendicular to the imaginary line drawn between the two axes of the wheels. The clamps are actuated by an engagement means which causes the clamp means to clamp the edges of the web at the tangent point described above. The engagement means is further adapted to cause the clamps to release the edges of the fabric at a second point. This second point may be defined as that point whereby a second imaginary line drawn through the clamp at this point and the axis of the wheel makes an angle, conveniently referred to as alpha, with the first imaginary line between the two axes. Normally, the angle alpha ranges from about 10° to about 90°, with a preferred range being 15° to 45°. Finally, the invention contains drive means which are adapted to rotate each of the wheels at a synchronized speed to permit engagement of and release of the web by the clamp means in the direction of travel of the web.

In a preferred embodiment, the clamp means may contain a pivot located at the periphery of the wheel, a base member having its lower jaw on the outer end and being attached to the pivot, an upper member pivotally mounted on the lower member and having its upper jaw positioned above the lower jaw of the base member, spring means between the upper member and the base member to maintain a gap between the upper and lower jaws during a non-clamping condition, and finally, a lever means mounted on the wheel and adapted to engage the upper member to close the gap between the upper jaw and the lower jaw to thereby engage the fabric. The lever means is actuated by an engagement means. In a preferred embodiment of the presently described clamp means, a spring may be attached to the inner end of the base member and further attached to the wheel at a point nearer to the axis of the wheel. The effect of this spring is to maintain the base member in a radial position with respect to the wheel under non-clamping conditions.

Still another embodiment of the present invention consists of the use of a calender device positioned immediately past the point of release of or disengagement of the web after shrinking.

For a better understanding of the invention, reference is hereby made to the drawings, in which:

FIGURE 1 shows a plan view of the present invention; and

FIGURE 2 shows a partial cross section through the center of a wheel.

As shown in FIGURE 1, the fabric **2** is traveling in the direction shown by arrow **4**. Positioned on either side of the web **2** are wheels **6**, having an axis **8**. The two wheels **6** are placed in a spaced apart relationship such that the imaginary line **10** drawn through the axis **8** of the wheel **6** is perpendicular to the edges **12** of the web **2**. The wheels **6** are further positioned such that they are tangent to the web **2** at a point where the edges **12** of the web **2** intersect the imaginary line **10** at a point **14**. After engagement of the web at point **14**, the rotation of the wheel brings the web to a second point **16**, whereby the web **2** has been stretched in a latitudinal direction. Engagement means, hereinafter described, cause the clamps positioned on the wheel **6** to engage the edge **12** of the web **2** at point **14** and release the same at point **16**.

The dimensions of the wheels will vary, depending upon the width of the fabric, the particular nature of the woven fabric web, and the degree of stretching desirable. In a preferred embodiment, it has been found that the diameter of the wheel should be approximately three times the amount of stretching being done. Thus, if the width of the goods is approximately 1500 millimeters, and if a maximum stretching of 15% is desirable, the wheel would thus have a diameter of approximately 680 millimeters.

The precise position where the edge **12** of the web **2** is released at point **16** will also vary. However the point **16** may be defined as being that point whereby a second imaginary line **18** drawn through the point **16** and the axis **8** of the wheel **6** makes an angle alpha with the first imaginary line **10**. Alpha, in most instances, will range from approximately 10° to 90°, with a preferred range being 15° to 45°.

After the edges **12** of the web **2** have been released, further treatment of the fabric may be accomplished by passing the stretched product through a calender **20** (top calender roll not being shown) whereupon a further modification of the fabric is effected. Whether the calender **20** is employed or not, the web **2** will shrink after being stretched so that the width of the web will be less than a distance between the two points **16** but will still be greater than the width of the web **2** prior to stretching. The stretched web **22** is now ready for further processing.

Shown in FIGURE 2 is a preferred design of the clamps employed in the present invention. These clamps are mounted on the periphery **7** of the wheel **6** by a pivot **24**. Attached to the pivot **24** is a base member **26** which has a lower jaw **28** or other gripping surface. At the other end of the base member **26**, a spring **30** is attached at one end. The other end of the spring **30** is attached to the wheel **6**. The spring **30** may be attached to the hub of the wheel if the position of the clamp is not adjacent any one spoke. The function of this spring is to maintain the base member in a radial position with respect to the wheel to insure that the lower jaw **28** properly engages the edge **12** of the fabric **2** at the proper point as illustrated in FIGURE 1. Of course, it is possible to fixedly mount the base **26** on the periphery **7** of the wheel **6**, thereby avoiding the necessity of spring **30** and pivot **24**. While such may be done, the preferred embodiment, employing the spring **30** as described, permits the base member **26** to pivot about the pivot **24** so as to maintain a constant position with respect to the edge **12** of the fabric **2**, thereby avoiding shearing, tearing or other adverse effects.

Also mounted on the base **26** is an upper member **32** having an upper jaw **34** positioned directly above the lower jaw **28**. A spring **36** is attached to the upper member **32** and the base member **26** to maintain a gap between the upper jaw **34** and the lower jaw **28** when the clamp means is in an unclamped position.

At the point where the clamp engages the web, engagement means are provided to cause the clamp means to clamp the edges of the web at the first point **14** as shown in FIGURE 1 and further release the web at the second point **16** of FIGURE 1. This engagement means may be positioned above or below the clamp and is shown in FIGURE 2 by the track **38** positioned below the wheel **6**. The track **38** is circular in shape and is positioned below the entire wheel **6** so that the member **44** rides on the track **38**. In this embodiment, the engagement means **38** has a lower position **40** for most of the space below the periphery **7**. At the point where the clamp is to engage the fabric, the engagement means **38** has a high level track **42** which may be conveniently machined into the track. When the rotation of the wheel causes the clamp to reach the high level track **42** of the engagement means **38**, a rider **44** contacts the high part of the track **42** and is forced upward, thereby causing lever **46** to engage upper arm **32**. Engagement of the upper arm **32** by the lever **46** causes the upper jaw **34** to approach the lower jaw **28** of base member **26**, thereby engaging the edge **12** of the web **2**. Further rotation of the wheel **6** to the point whereby the edge **12** of the web **2** is released by the clamp causes the rider engagement means **38** to release the edge **12** of the web **2** by permitting rider **44** to descend to the lower track **40**. This effect causes the lever **46** to withdraw from the arm **32**, thereby permitting spring **36** to create a gap between the upper jaw **34** and the lower jaw **28**. Once the fabric web **2** is released, it functions as described above and may be conveniently passed through a calender or other treating device.

Conventional drive means are employed to rotate the pair of wheels to permit engagement and release of the web, whereby the drive means is adapted to synchronize the rotation of each of the wheels to maintain uniform travel of the web. As shown in FIGURE 1, a drive motor **50** rotates two shafts **52** and **54**, which in turn operate gear boxes **56** and **58** to rotate axles or shafts **60** and **62** to rotate the hubs **8** of the two wheels, thereby causing the wheels to turn in the directions of the arrows shown.

The present invention was employed to stretch the textile 10% of its width. The goods were 1,000 millimeters in width and the diameter of the wheels were 500 millimeters. The angle alpha was 36° in this experiment. The textile recoiled after stretching so that the premanent width of the goods was then 1050 millimeters.

It is desirable to have a certain amount of recoil or rebound so that the final width of the fabric will be less than the maximum amount of stretch but greater than the original width. This is important since the stretching at the peripheral areas is oftentimes greater than in the middle of the web and the recoil permits a more even distribution of fabric density across the entire width of the fabric.

Other modifications and variations of the present invention will become apparent upon a reading of the instant disclosure.

Having thus described the invention, what is claimed is:

1. An apparatus for latitudinally stretching woven fabric webs comprising:

a pair of rotating wheels positioned in spaced apart relationship such that an imaginary line drawn through the axes of said wheels is perpendicular to the direction of travel of said web and said wheels are tangent to the edges of said web at a first point where said web intersects said imaginary line;

a plurality of clamp means attached to the periphery of said wheels and adapted to clamp the edges of said web at said first each point, said clamp means comprising a pivot located at the periphery of said wheel, a base member attached to said pivot and having a lower jaw positioned on the outer end thereof, an upper member pivotally mounted on said base member and having an upper jaw positioned above said lower jaw, spring means between said upper member and said base member to maintain a gap between said upper jaw and said lower jaw during non-clamping conditions, and lever means mounted on said wheel and adapted to engage said upper member to thereby close said gap between said upper jaw and said lower jaw, said base member being pivotally mounted on said wheel and further containing a spring means attached to the base member and further attached to said wheel, whereby said spring is adapted to maintain said base member in a radial position with respect to said wheel during non-clamping conditions;

engagement means adapted to cause said clamp means to clamp said edges of said web at said point and further adapted to cause said clamp to release said edges at a second point, said second point being defined as that point where a second imaginary line drawn through said clamp and said axis of said wheel makes an angle alpha with said first imaginary line, where said angle alpha ranges from 10° to 90°; and,

drive means adapted to rotate each of said wheels to permit engagement and release of said web by said clamp means in the direction of travel of said web, said drive means being adapted to synchronize the rotation of each of said wheels to maintain uniform travel of said web.

2. The apparatus of claim **1** which further contains a

calender positioned in spaced apart relationship at a point immediately after said second point.

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U.S. Cl. X.R.

18—1; 26—57, 58