Sept. 5, 1939. M. HANNIG 2,171,551

DEVICE FOR THE LATERAL STRETCHING OF FABRIC WEBS

Filed July 28, 1937 2 Sheets-Sheet 1

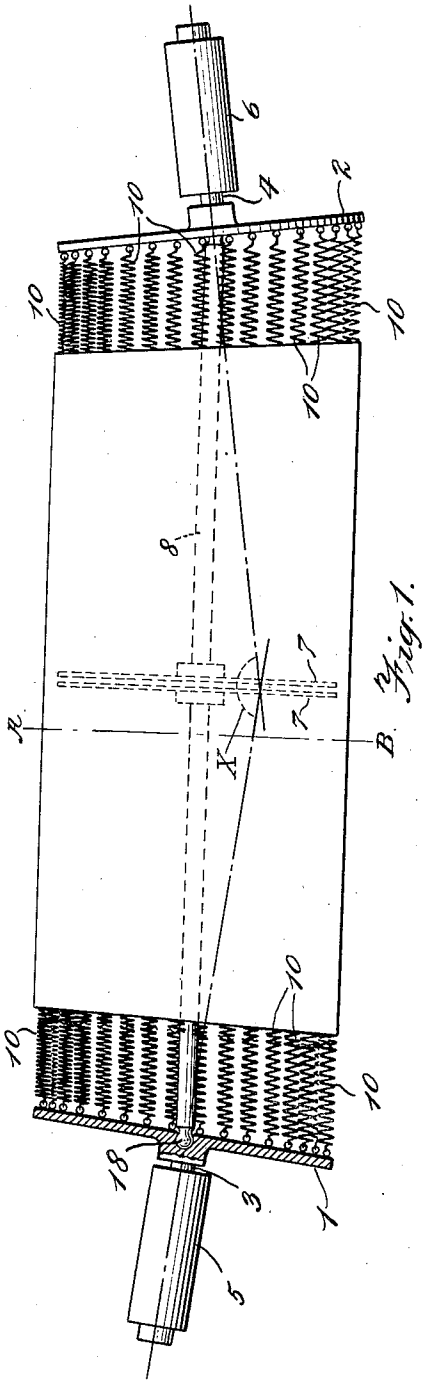

Fig. 1.

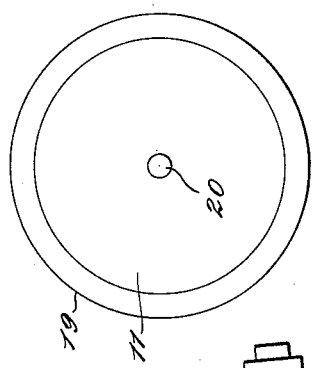

Fig. 4.

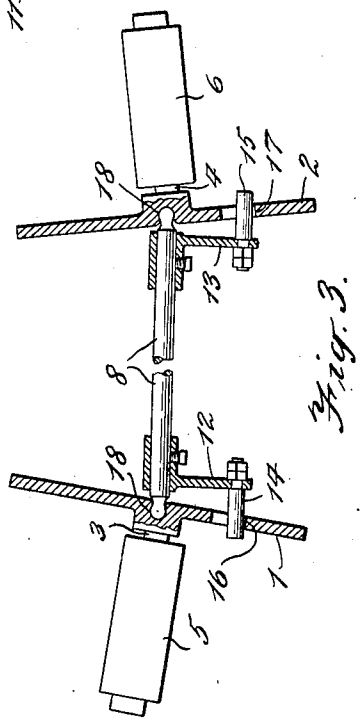

Fig. 3.

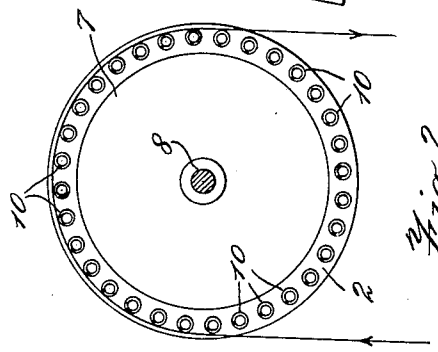

Fig. 2.

INVENTOR.
Max Hannig

BY Louis Burgess

ATTORNEY.

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DEVICE FOR THE LATERAL STRETCHING OF FABRIC WEBS

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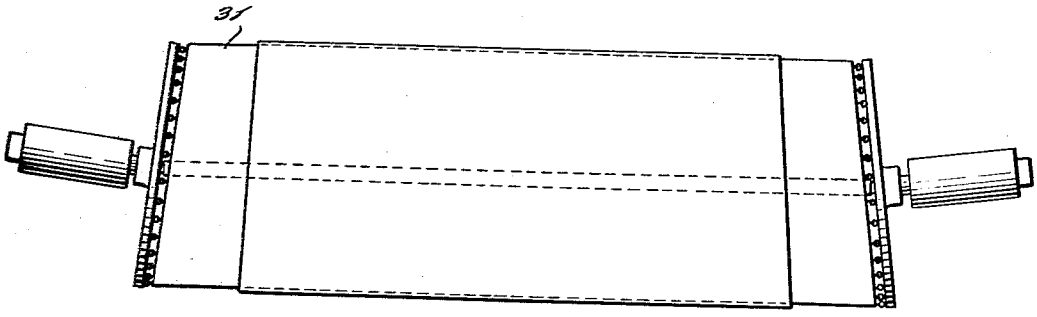

Fig. 6.

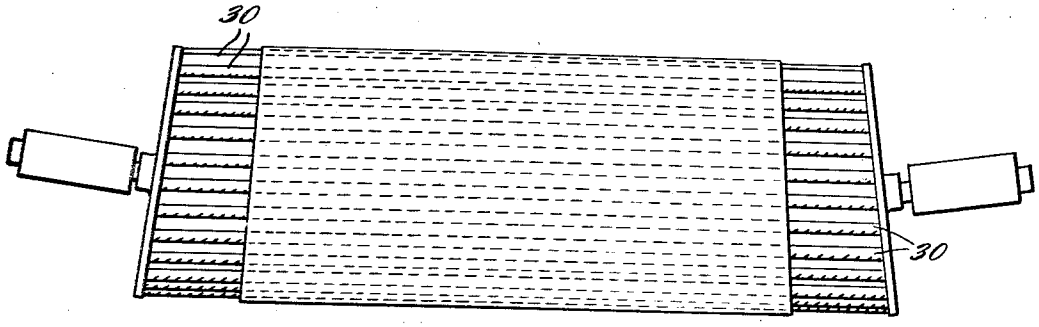

Fig. 5.

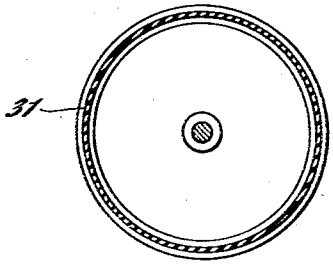

Fig. 7.

BY

INVENTOR.
Mat Hannig

Louis Burgess
ATTORNEY.

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2,171,551

UNITED STATES PATENT OFFICE

2,171,551

DEVICE FOR THE LATERAL STRETCHING OF FABRIC WEBS

Max Hannig, Thalwil, Switzerland, assignor to Vereinigte Faerbereien und Appretur Aktien-Gesellschaft, a corporation of Switzerland

Application July 28, 1937, Serial No. 156,063
In Germany August 28, 1936

16 Claims. (Cl. 26—54)

This invention relates to a new device for the lateral stretching of fabric webs.

The devices hitherto used for the lateral stretching of fabric webs are as a rule of a comparatively complicated and costly construction and encumbered with a series of disadvantages and drawbacks, foremost among which is the considerable longitudinal tension exerted upon the fabric web as it passes over or through these devices and the resultant longitudinal stretching and deformation of the web structure. The conventional devices in general are furthermore limited in their range of application to the treatment of dry fabrics and it is usually not possible to obtain therewith satisfactory results when treating a substantially wetted web of textile material.

My invention substantially eliminates the aforementioned disadvantages and drawbacks and has for its object inter alia a device of simple construction permitting the lateral stretching of a web of textile material whether the same be in a wetted or dry condition with a minimum of longitudinal tension.

The device in accordance with my invention consists of a cylindrical wheel comprising an elastic cylindrical surface bound on either end by a disc or end plate; both end discs or end plates are set at an angle with respect to each other so that the width of the cylindrical wheel varies with the variation in distance between the discs.

The invention will be fully understood and still further objects thereof will appear as the following description is read in conjunction with the drawings in which

Fig. 1 is a top view of a construction in accordance with the invention with parts in cross section,

Fig. 2 is a cross section through the construction shown in Fig. 1 in the plane A—B,

Fig. 3 is a cross section through the device with the elastic cross members removed and showing an illustrative embodiment of driving connections and

Fig. 4 is a side view of an alternative embodiment of the invention.

Figs. 5, 6 and 7 represent illustrations of further alternative embodiments of the invention.

In the preferred embodiment of my invention as shown in the drawings the device includes discs 1 and 2 rotatably mounted respectively on axles 3 and 4 resting in bearings 5 and 6. Springs 10 are carried in parallel arrangement circumferentially by the discs 1 and 2. Shaft 8 resting in ball joints 18 carried by discs 1 and 2 and holding them in proper position carries supporting disc 7.

Discs 1 and 2 set at an angle with respect to each other are so positioned that their respective axles 3 and 4 form an obtuse angle X. In this manner discs 1 and 2 together with the springs 10 circumferentially carried thereby and extending between the discs form a cylindrical wheel in which, due to the angular positioning of the discs, the distance between corresponding points on the circumference of the discs will vary from a minimum between points of minimum distance to a diametrically opposed maximum between points of maximum distance so that the cylindrical wheel formed by the discs and springs will correspondingly vary in widths.

Discs 1 and 2 are preferably symetrically arranged with respect to each other, that is to say, the angles formed by their respective axes with the common shaft 8 should be preferably the same. For the purpose of maintaining at all times a true cylindrical surface on the cylindrical wheel formed by the springs and the discs, I have found it of advantage and prefer to connect both discs synchronously with one another by a suitable arrangement so that the turning of the one will simultaneously and to the same extent turn the other, thereby at all times preserving the alignment of corresponding points on the circumference of the discs. Such an arrangement for instance is illustrated in Fig. 3. As there shown slots 16 and 17 are congruously carried by discs 1 and 2. The common shaft 8 carries cranks 12 and 13 which in turn carry arms 14 and 15 extending through slots 16 and 17. In this manner when rotating either disc or rotating their common shaft both discs will simultaneously and synchronously revolve.

The rotation of the cylindrical wheel may be effectuated by either pulling a web of textile material over the same or by connecting either or both discs or their common shaft to suitable driving means. It is of course understood that the synchronous rotation of the discs may be also accomplished by connecting each disc independently to suitable synchronized driving means in which case the crank and arm connections illustrated in Fig. 3 could be dispensed with though as a matter of structural and practical convenience I prefer the synchronous alignment of the discs in a manner there illustrated or its structural equivalent. Wherever the synchronous rotation of the discs is accomplished by means other than a transmission utilizing the

common shaft, it is possible and may be sometimes of advantage to dispense with the shaft. Under such circumstances it is naturally requisite that the discs be fixed and kept in position by other suitable means as for instance by means of the bearings in which the respective axes of the discs rest.

When rotating the wheel each two corresponding points on the discs will pass through a position of minimum distance and when the rotation has gone through an angle substantially equal to 180° through a position of maximum distance, thereafter returning to the minimum distance position, the wheel having now made one complete revolution. The distance between each two corresponding points on the discs will thus progressively increase while these points move from the minimum to the maximum distance position and will progressively decrease with the continued rotation of the wheel while these points move from the maximum to the minimum distance position thereby progressively expanding the springs or other suitable elastic material extending between such points from a minimum expansion at the minimum distance position to a maximum expansion at the maximum distance position and thereafter progressively contracting these springs from their maximum expansion at the maximum distance position to their minimum expansion at the minimum distance position.

In the practical application of my invention a web of textile material is passed over the cylindrical wheel which is rotated either by the passage of the web, that is by drawing the web over the same or by suitable driving means. As the wheel rotates each spring will progressively expand and the expansion, being caused by a pull from both ends of the spring as the result of the distending action of the discs will proceed from a center point outwardly in both directions. The fabric rests on the upper portions of the springs and establishes thereby with each spring multiple points of contact. As each spring progressively expands in this manner the friction between the fabric web and the spring at each such point of contact will cause a lateral tension thereby effectuating a lateral stretching of the web. For maximum efficiency it is of advantage and I prefer to lead the web on to the cylindrical wheel at the point of minimum distance between the discs and to take the same off the wheel not later than and preferably at the point of maximum distance between the discs. When for instance the web passes over the wheel in such fashion that it is fed to and discharged from the wheel in a substantially vertical direction I have found that best results are obtained by arranging the minimum and maximum distance between the discs in a substantially horizontal plane that is to say in a plane substantially at right angles to the web as it travels to and from the wheel.

Though I prefer springs for the formation of the elastic circumference of the cylindrical wheel, I may use within the scope and purview of my invention any other elastic material such as rubber rope, rubber strands, etc. I have sometimes found it of advantage and particularly with finer and more delicate materials to use one continuous piece of elastic material instead of a plurality of separate elastic cross members. When using such a construction a piece of rubber, rubber sheet or rubber cloth sufficiently elastic to permit expansion between points of minimum distance as well as between points of maximum distance between the discs is fastened to the discs thus forming an elastic continuous surface for the cylindrical wheel. Such modifications are for example illustrated in Figs. 5, 6 and 7. Fig. 5 shows the use of elastic ropes **30** of suitable material such as rubber or the like secured to the discs. Fig. 6 shows a replacement of the individual elastic cross members by one continuous piece of elastic material **31** such as a rubber sheet. It is of course possible to also use in any of these modifications the structural arrangement of the stationary inner disc surrounded by a rotatable outer disc as shown in Fig. 7 in connection with the use of a rubber sheet **31** which in this instance is secured to the rotatable outer ring.

When using springs in the construction in accordance with the preferred embodiment of my invention care should be taken that the material of which the spring consists is not subject to the corroding influences of the treating liquid and is not attacked thereby as such a corrosion, as for instance the rusting of ordinary steel springs, will not only give rise to objectionable spotting on the goods treated but will also have deteriorating influences upon the fiber itself. I prefer therefore non-corroding springs such as springs made from suitable non-corroding alloys, stainless steel, brass etc.

It is of course possible by varying the angular positioning of the discs to increase the lateral stretching effect of the cylindrical wheel since such adjustment will increase the maximum expansion of the springs or other elastic material between points of maximum distance between the discs.

Instead of using rotatably mounted discs or such similar means as illustrated in the preferred embodiment of my invention I have found it sometimes of advantage and particularly when effecting the rotation of the wheel by the mere passage of the fabric web over the same to use a construction as shown in Fig. 4 or its structural equivalent. As there illustrated the discs comprise an outer ring **19** adapted to rotate around a stationary central or inner disc **11** mounted on an axial support **20**. When using such construction the springs or other elastic material are fastened to the freely rotatable ring which possesses the advantage of requiring less power for the rotation since in this case there is but a minimum of parts and weight to be moved.

The term "end plate" or "end plates" or such similar expression as used in the specification and claims is intended to include such means as are substantially capable of serving as end members for an elastic cylindrical wheel surface substantially in accordance with this invention and regardless of their circumferential or surface shape or form and of course embraces within such meaning a disc or discs hereinbefore referred to in the description of the preferred structure of the invention.

Wherever in the specification and claims reference is made to the term "disc" or "discs" as connoting a specific type of end plate, it is used in its broadest sense and not limited to particular discs but is intended to include any shape or form disc as well as discs from which portions have been cut out so as to leave the discs substantially in the form of a spoked wheel; and embraces equally such discs, including discs with cut out portions, as have a more or less curved surface, it being in every case immaterial whether the disc or discs extend in whole or in part beyond the cylindrical wheel surface secured thereto, always provided of course that the disc

will at all times permit an elastic cylindrical wheel surface to be attached thereto.

The foregoing is by way of illustration and not of limitation and I am not to be limited by any of the details but only by the appended claims in which I have endeavored to claim broadly all inherent novelty.

I claim:

1. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two end members, said roll being secured to said end members, one on either end of said roll, said end members being set at an angle with respect to each other, each of said end members being rotatable about the axis of said roll.

2. Device in accordance with claim 1 in which said end members are synchronously rotatable with respect to each other.

3. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll, adapted to receive a web of textile material and two end plates, said roll being secured to said end plates, one on either end of said roll, said end plates being symmetrically disposed with respect to said roll and set at an angle with respect to each other each of said end plates being concentrically rotatable about the axis of said roll and mounted on an independent axis, each end plate being set at right angles to its axis and the axes of both end plates being set at an obtuse angle with regard to each other.

4. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two discs symmetrically disposed with respect to said roll and set at an angle with respect to each other, each of said discs comprising a stationary inner disc and surrounding said inner disc a ring concentrically rotatable about the axis of said roll, said roll being secured to said ring, one on either end of said roll.

5. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two end members, said roll being composed of a plurality of spaced apart elastic cross members secured to said end members, one on either end of said roll, said end members being set at an angle with respect to each other, each of said end members being rotatable about the axis of said roll.

6. Device in accordance with claim 5 in which said end members are synchronously rotatable with respect to each other.

7. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two end plates, said roll being composed of a plurality of spaced apart parallel elastic cross members secured to said end plates, one on either end of said roll, said end plates being symmetrically disposed with respect to said roll and set at an angle with respect to each other, each of said end plates being concentrically rotatable about the axis of said roll and mounted on an independent axle, each end plate being set at right angles to its axis and the axes of both end plates being set at an obtuse angle with regard to each other.

8. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material said roll being composed of a plurality of spaced apart parallel elastic cross members and two discs symmetrically disposed with respect to said roll and set at an angle with respect to each other, each of said discs comprising a stationary inner disc and surrounding said inner disc a ring concentrically rotatable about the axis of said roll, said roll being secured to said rings, one on either end of said roll.

9. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two end members, said roll being composed of a plurality of spaced apart parallel springs secured to said end members, one on either end of said roll, said end members being set at an angle with respect to each other, each of said end members being rotatable about the axis of said roll.

10. Device in accordance with claim 9 in which said end members are synchronously rotatable with respect to each other.

11. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material and two end plates, said roll being composed of a plurality of spaced apart parallel springs secured to said end plates, one on either end of said roll, said end plates being symmetrically disposed with respect to said roll and set at an angle with respect to each other, each of said end plates being concentrically rotatable about the axis of said roll and mounted on an independent axis, each end plate being set at right angles to its axis and the axes of both end plates being set at an obtuse angle with regard to each other.

12. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material said roll being composed of a plurality of spaced apart parallel springs and two discs, symmetrically disposed with respect to said roll and set at an angle with respect to each other, each of said discs comprising a stationary inner disc and surrounding said inner disc a ring concentrically rotatable about the axis of said roll, said roll being secured to said rings one on either end of said roll.

13. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material, two discs, said roll being composed of a plurality of spaced apart parallel springs circumferentially carried by and extending between said discs, said discs being set at an angle with respect to each other and concentrically rotatable about the axis of said roll, and means for synchronizing the rotation of said discs, said discs being each mounted on an independent axle, each disc being set at right angles to its axle and the axles of both discs being set at an obtuse angle with regard to each other.

14. Device for the lateral stretching of webs of textile material comprising an elastic longitudinally stretchable roll adapted to receive a web of textile material, two discs, said roll being composed of a plurality of spaced apart parallel springs circumferentially carried by and extending between said discs said discs being set at an angle with respect to each other and concentrically mounted on a common shaft and means for synchronizing the rotation of said discs and said shaft, each of said discs being concentrically ro-

tatable about the axis of said roll and being each mounted on an independent axle, each disc being set at right angles to its axle and the axles of both discs being set at an obtuse angle with regard to each other.

15. Device in accordance with claim 14 in which said discs together with their respective axles are mounted adjustably on said shaft so as to permit adjustment of the angle with which said discs are set with respect to each other.

16. Method for the lateral stretching of webs of textile material which comprises contacting a textile material in web form with a plurality of parallel springs so as to establish multiple points of contact between said springs and said textile material in a plurality of lateral parallel lines, thereafter successively and progressively expanding said springs thereby moving said points of contact from the center of said web outwardly along said lateral lines and finally removing said web from said springs in laterally stretched condition.

MAX HANNIG.