Sept. 16, 1924. 1,508,501

S. BIRCH

CLOTH OR SHEET STRETCHING MECHANISM AND PROCESS

Filed June 15, 1922 2 Sheets-Sheet 1

Fig. 1.

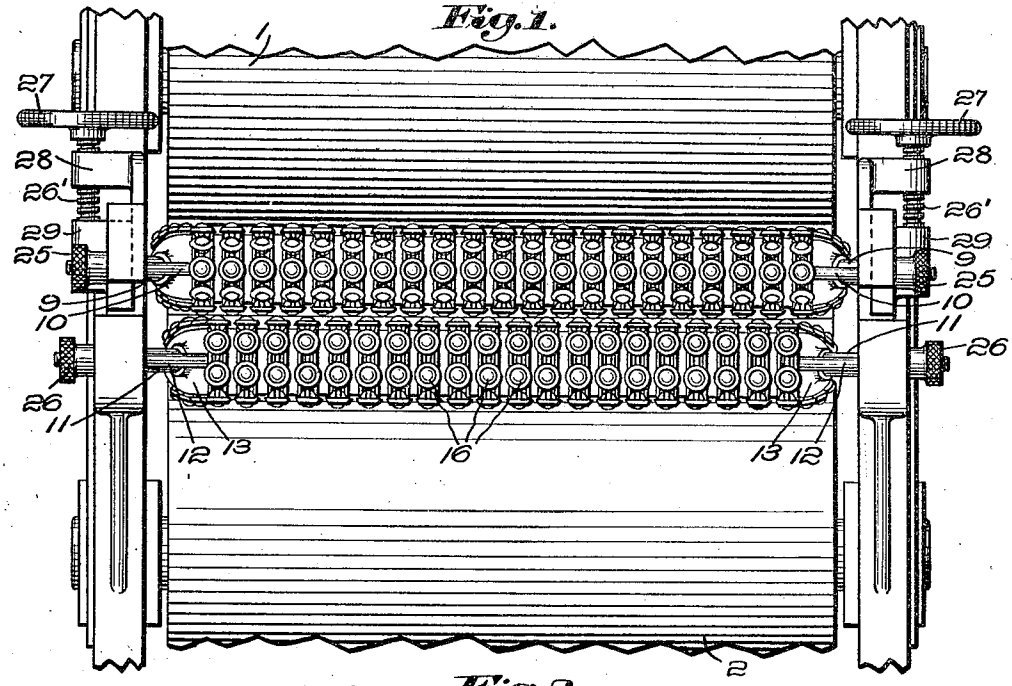
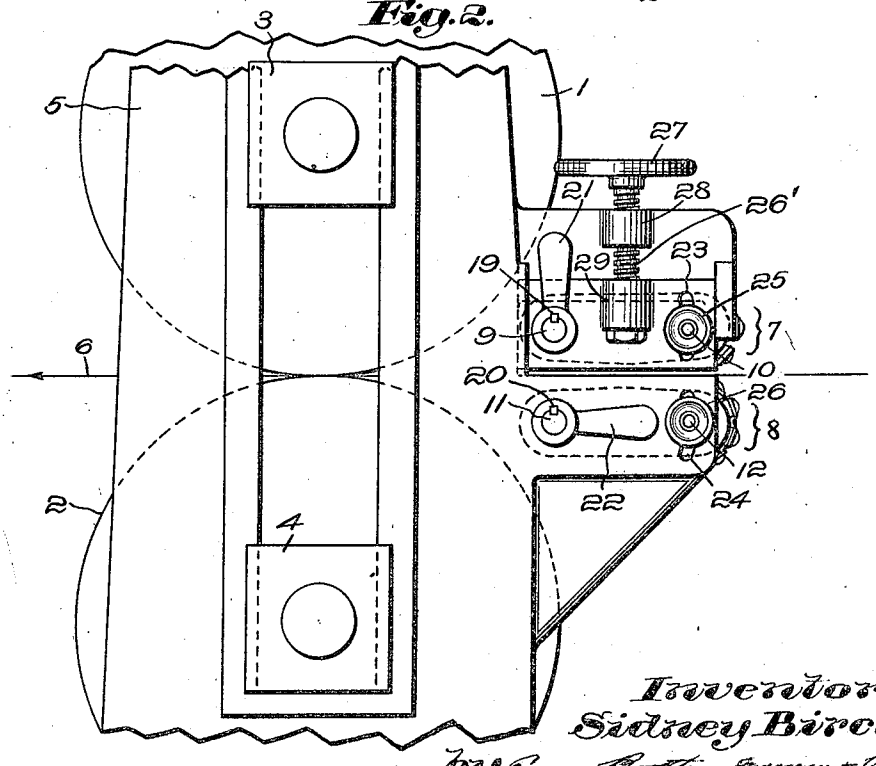


Fig. 2.



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Fig. 3.

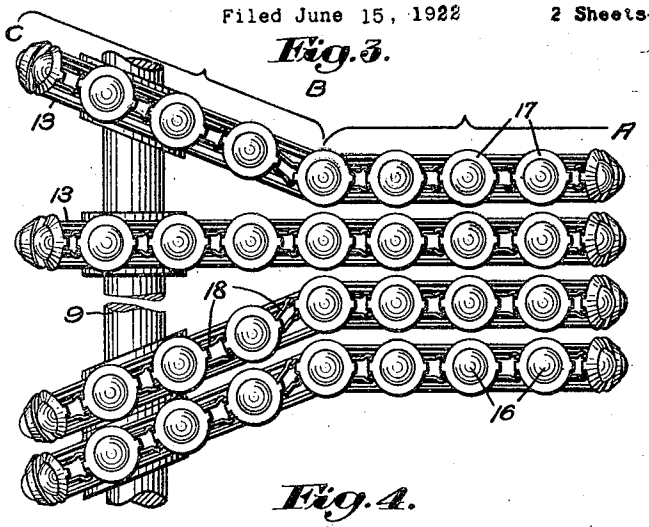


Fig. 4.

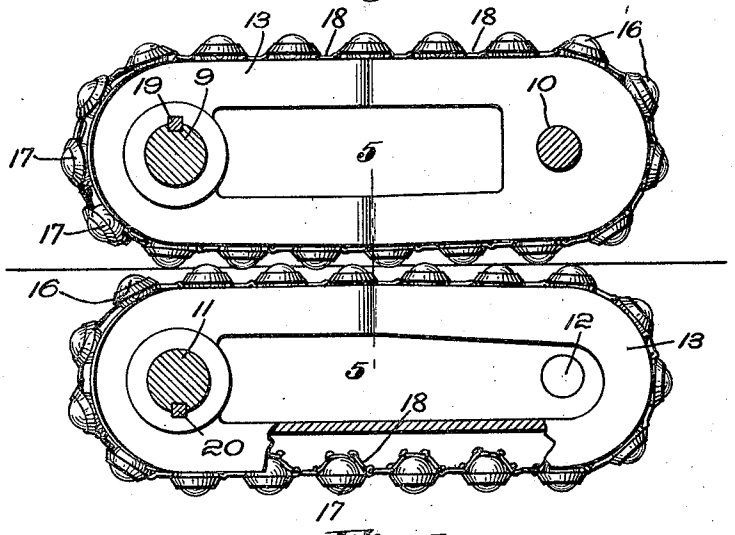
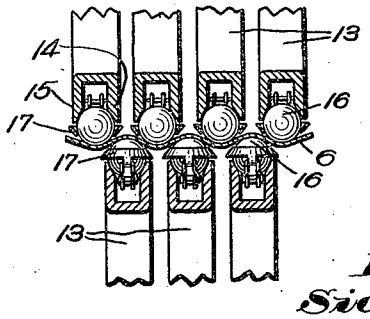


Fig. 5.



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UNITED STATES PATENT OFFICE.

SYDNEY BIRCH, OF MANSFIELD, MASSACHUSETTS.

CLOTH OR SHEET STRETCHING MECHANISM AND PROCESS.

Application filed June 15, 1922. Serial No. 568,638.

To all whom it may concern:

Be it known that I, SYDNEY BIRCH, a citizen of the United States, and a resident of Mansfield, in the county of Bristol and State of Massachusetts, have invented an Improvement in Cloth or Sheet Stretching Mechanism and Processes, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a process of and means for stretching sheets of material, such, for example, as cloth which has been washed and hence shrunk, and is to be restored to its original width.

In order that the principle of the invention may be readily understood, I have disclosed a single embodiment thereof in the accompanying drawings, wherein—

Fig. 1 is an end elevation of a cloth or sheet stretching mechanism embodying my invention and by which my process may be practised;

Fig. 2 is a side elevation of the mechanism shown in Fig. 1;

Fig. 3 is a plan view of a part of the cloth stretching mechanism shown in Figs. 1 and 2;

Fig. 4 is a vertical longitudinal section taken through the cloth corrugating, crimping or undulating mechanism constituting the more important feature of the cloth stretching mechanism; and

Fig. 5 is a vertical section upon the line 5—5 of Fig. 4.

The mechanism of my invention may be employed for various purposes, but is particularly intended to stretch cloth and hence to restore it to its original width from which it has shrunk by reason of washing. The important feature of the invention, both as mechanism and as process, resides in stretching the sheet by imposing corrugations, crimps, undulations or the like upon the fabric, in the act of effecting which the fabric is laterally stretched, being restrained from lateral yielding, said corrugations, crimps or undulations being desirably removed from the cloth subsequent to the stretching operation. In carrying out or practising my invention, various mechanisms may be employed, and while I shall describe the disclosed embodiment thereof, it is to be understood that my invention in no wise is limited to the mechanism shown, the latter being selected merely as a convenient embodiment of the broad principle of my invention both as a process and as mechanism.

Referring more particularly to the drawings and to the selected embodiment of the mechanism, I have in Figs. 1 and 2 represented a pair of rolls 1, 2 suitably mounted in bearings 3, 4 in a frame 5, and positively driven in any suitable manner so as to draw the fabric 6 between or past the nip of the rolls in the direction of the arrow in Fig. 2.

Suitably mounted in the framing 5 or if desired in a separate framing but in proximity to the intake side of the rolls 1, 2, I mount an upper series 7 and a lower series 8 of endless members traveling with the cloth merely because of their impingement upon opposite faces thereof and carrying the corrugating, crimping or undulating devices proper which may be spheres or balls, rolls or rollers, members with curved surfaces, or other means adapted to engage the sheet or cloth between them and so positioned as shown most clearly in Figs. 4 and 5, as to crimp, corrugate, undulate or impart a wavy condition to the sheet or cloth 6. Herein for the purpose the framing 5 is provided with upper and lower portions offset from the intake side of the rolls and provided with four rods 9, 10, 11, 12, shown in Figs. 2 and 4, and upon or with relation to which a series of yoke-like members 13 is mounted, as most clearly shown in Fig. 4. As shown therein and also as indicated in Figs. 1 and 5, the yokes constituting the upper series are placed side by side and the yokes constituting the lower series are placed side by side, but in staggered relation with the yokes of the upper series so that the sheet will receive the corrugated or wavy like effect when passing through the rolling or moving members of the yoke.

In the disclosed embodiment of my invention I have represented each yoke as shaped to provide a raceway or track-like formation at 14, 15, where are shown opposite continuous walls extending entirely about the perimeter or outer surface of the yoke and suitably supporting a series of balls or like members 16, here shown as each supported in a suitable ring 17 wherein each ball is confined by links of a chain 18, the links constituting each so-called ball cage being connected as clearly indicated

in Fig. 4, so as to form a continuous chain. It will be observed that the upper and lower yokes are placed in staggered relation and desirably and as shown in Fig. 4, the balls of adjacent upper and lower yokes are positioned in staggered relation with each other so as effectively to crimp the sheet.

The endless members carried by the said yoke are driven or moved only by reason of their engagement with the opposite faces of the sheet and hence are drawn forward by the sheet itself, but in being so drawn forward they nip and undulate, as heretofore stated, the fabric or sheet between them and so as to stretch the same inasmuch as the sheet cannot be displaced or yield laterally or even longitudinally when so engaged by the balls and must therefore stretch in the act of assuming the corrugated, crimped or undulatory condition referred to. Since the fabric or sheet while so engaged is held against longitudinal yielding, it need not be longitudinally tensioned when fed to said members as usual with previous stretching devices, but may, if desired, be comparatively limp. Obviously the yokes 13 may be shaped in any suitable manner but desirably they are inclined to the direction of feed of the cloth at both the intake and the exit ends of the cloth, being inclined toward the cloth at the intake end as shown in Fig. 4, and inclined away from the cloth at the exit end as shown. In this way the balls, rolls or like members are brought gradually into effective engagement with the sheet or cloth and when the same is firmly gripped, the resulting action is laterally to stretch the cloth or sheet as stated.

It is desirable to remove the undulations or corrugations from the sheet after the stretching has been effected, and before the sheet is removed from the mechanism. This may be effected in different ways, but desirably it is accomplished by inclining laterally in opposite directions portions of the yokes both above and below the sheet, certain of said yokes being represented as so inclined in Fig. 3. Obviously the sheet passing longitudinally between the yokes is first laterally stretched in the manner stated as between the points A and B in Fig. 3, and is thereafter relieved of the creases and restored to a flat, uncorrugated or uncreased condition between the points B, C, or at the point C.

It is desirable at times to tilt one or both of the series of yokes as for providing access to the sheet or by varying the degree of the corrugating, crimping or undulating action. For that purpose, I have provided the rods 9, 11 with keys 19, 20 engaging the yokes and upon said rods have fixedly mounted handles 21, 22, by which the entire series of yokes may be swung either upwardly or downwardly for adjustment or other purpose. In order to hold the yokes in adjusted position if desired, I have provided the framing with curved slots 23, 24, receiving the rods 10, 12, which at their ends are provided with set screws 25, 26 that may be tightened after the yokes have been moved into the desired position.

The upper series of yokes may be moved bodily vertically by any suitable means, as, for example, by a screw 26′ at each side of the mechanism, said screws being provided with hand wheels 27 and passing through nuts 28 formed in the framing and secured in bosses 29 formed upon a block at each side of the mechanism and which is thus adapted to be vertically adjusted and moving with them the entire upper series of yokes.

The sheet, such, for example, as a washed and hence shrunken cloth is introduced between the rolls 1, 2 which are so rotated as positively to move the cloth toward the left viewing Fig. 2. In such movement the endless sets of balls or like members are caused to engage the sheet and stretch it laterally as stated, after which and desirably prior to the passage of the sheet between the rolls 1, 2, the corrugations or crimpings or the like are removed from the sheet.

While I have represented balls or spheres 16 and have referred to rolls or rollers, it is not essential to the broad purpose of my invention that the elements typified by the balls 6 actually be free to roll or move upon their centres or axes, since within the broad purpose of my invention a curved surface may be employed, as, for example, by providing a series of partial balls or spheres incapable of movement upon their axes or individually but movable only because connected in series. The crimping or corrugating action is effected by reason of the overlapping relation of the peripheries or surfaces of the balls, and such rolling or rotating action thereof as occurs may be incidental and not essential to the securing of the corrugating or crimping effect. The disclosed construction is, however, peculiarly effective for the purpose.

Having thus described one illustrative embodiment of my invention and the best mode known to me for practising the process of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims:

1. That process of stretching sheet like material comprising imparting relative travel in one direction and in substantially a straight path to said material and during such travel crimping the same while preventing inward movement of the material

from the lateral edges and also preventing longitudinal slippage, thereby causing stretching of said material between said edges.

2. That process of stretching sheet like material which consists in imparting travel in one direction and in substantially a straight path thereto but without necessary longitudinal tensioning of the unstretched portion of the material and during such travel crimping the material between the edges, thereby stretching the same and thereafter removing the crimp.

3. That process of stretching sheet like material comprising imparting travel in one direction thereto, and during such travel imparting a wave like condition thereto along a series of substantially parallel flat zones of substantial extent longitudinally of the material while preventing inward yielding of the material from its edges, thereby stretching the material between its edges.

4. Mechanism for stretching sheet like material comprising means to impart travel to the material and coacting series of members at opposite sides of the material and having material engaging units free to turn in all directions to crimp or corrugate the material while preventing inward movement thereof from the lateral edges, thereby causing stretching of said material.

5. Mechanism for stretching sheet like material comprising means for simultaneously imparting onward movement of the material, and laterally and longitudinally spaced members arranged in endless series movable longitudinally of the material adapted to engage opposite faces of the sheet, and to crimp the same in a series of zones while preventing slippage and thereby causing stretching of the fibres.

6. Mechanism for stretching sheet like material comprising rolls for imparting travel to the material and upper and lower series of spheres or ball like members adapted to engage opposite faces of the sheet with an overlapping relation, thereby crimping the same and preventing inward slippage.

7. Mechanism for stretching sheet like material comprising means to impart travel to the material, series of members having curved faces to engage in staggered relation the opposite faces of the material, and crimp the same, means to support said members in groups for movement longitudinally of the material and means to remove said crimps from the material subsequent to stretching.

8. Mechanism for stretching sheet-like material comprising means to impart travel to the material, series of members arranged in groups extending longitudinally of the material, said members having curved faces to engage opposite surfaces of the material, said curved faces being staggered both laterally and longitudinally of the material whereby material in limp condition and without necessary longitudinal tension before engaging said members may be crimped while prevented for moving inwardly from its lateral edges, thereby causing stretching of said material.

9. Mechanism for stretching sheet-like material comprising means to impart travel to the material, a plurality of substantially parallel elongated guide members at opposite faces of the material, each such member movably supporting a series of material engaging units, one or more similar guide members having material engaging units, and outwardly directed near each lateral edge of the material whereby material may be crimped while preventing it from moving inwardly from its lateral edges thereby to stretch the same.

10. Mechanism for stretching sheet-like material comprising means to impart travel to the material, opposed series of independently movable endless members each having a plurality of spaced curved faces, said members being adapted to engage with their said faces the opposite surfaces of the sheet with an overlapping relation thereby crimping the same and preventing inward slippage.

11. Mechanism for stretching sheet like material comprising means to impart travel to the material, upper and lower series of supporting members each having a peripheral track-like formation, an endless member movable in said track-like formation of each of said supporting members, and a plurality of elements having curved faces carried by each endless member and adapted to engage the material to stretch the same.

12. Mechanism for stretching sheet like material comprising means to impart travel to the material, upper and lower series of supporting members each having a peripheral track-like formation and a multiplicity of members having curved faces to engage the material, said members being confined in but movable along the respective track-like formations.

13. Mechanism for stretching sheet like material comprising means to impart travel to the material, opposed series of members provided with guide formations along at least their opposed surfaces and members having curved faces to engage the material and supported in endless series for movement in the respective guide formations.

14. Mechanism for stretching sheet like material comprising means to impart travel to the material, opposed series of members 13, 14 between which the material passes, and a plurality of curved faced members 16 to engage the material and supported for movement in a continuous path about said members 13, 14.

15. Mechanism for stretching sheet like

material comprising means to impart travel to the material, opposed series of members 13, 14 between which the material passes, and a plurality of curved faced members 16 to engage the material and supported for movement in a continuous path about said members 13, 14, said series of members 13, 14 being relatively adjustable toward and away from each other to control the extent of stretching.

In testimony whereof, I have signed my name to this specification.

SYDNEY BIRCH.