Jan. 11, 1944. S. COHN ET AL. 2,339,151

METHOD AND APPARATUS FOR SPREADING TUBULAR FABRICS

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Fig. 1.

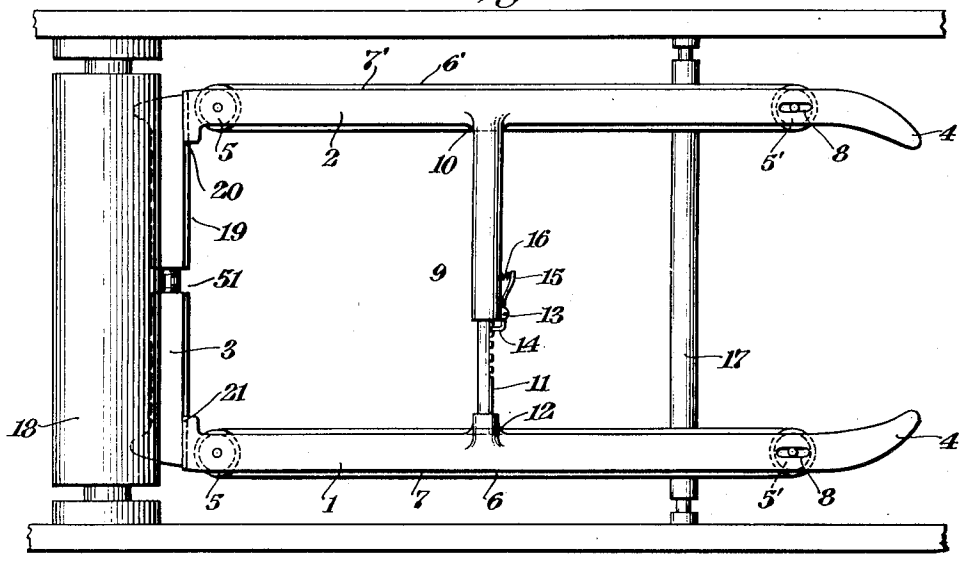


Fig. 2.

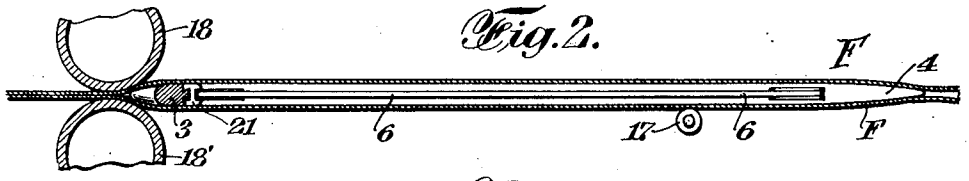


Fig. 3.

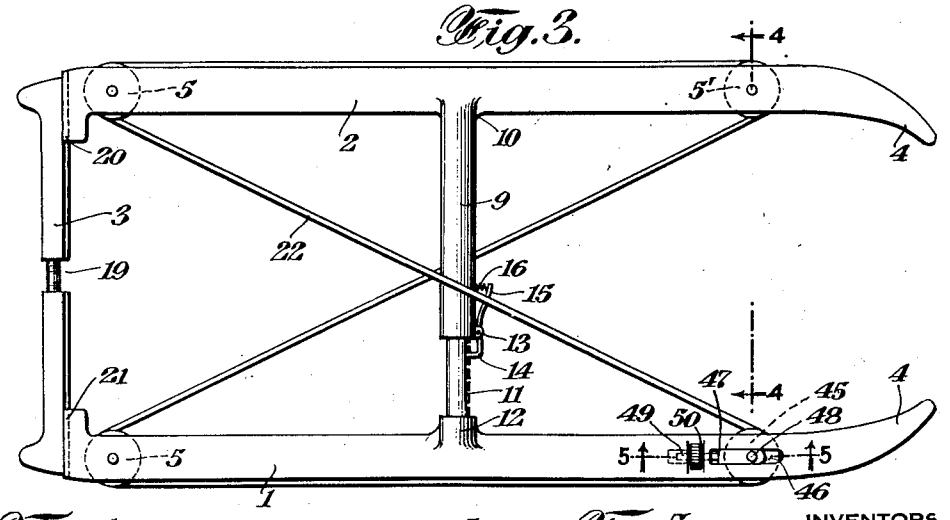


Fig. 4.

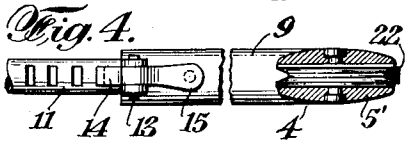
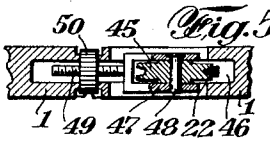


Fig. 5.



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Fig. 5a.



Fig. 6.

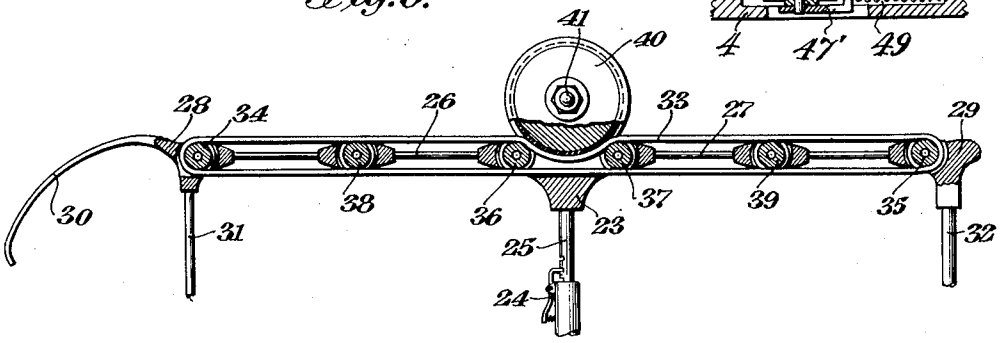
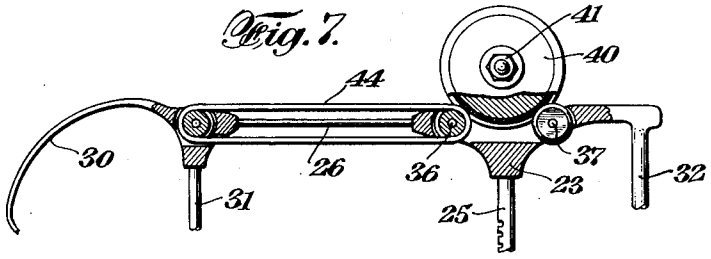


Fig. 7.



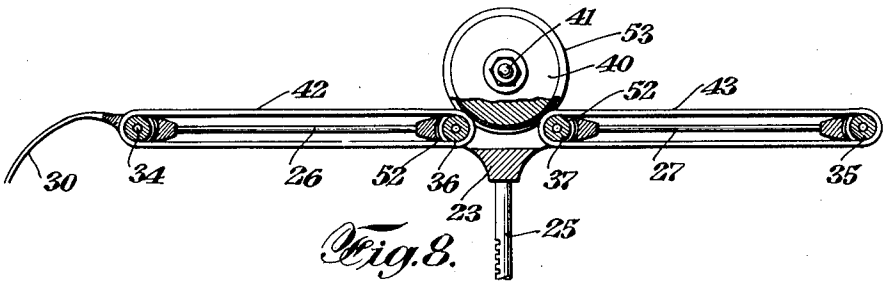
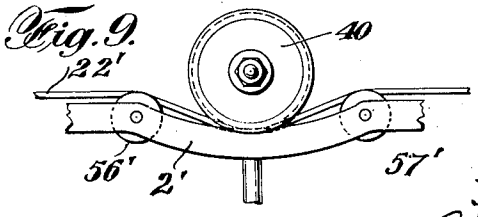


Fig. 8.

Fig. 9.



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METHOD AND APPARATUS FOR SPREADING TUBULAR FABRICS

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Application December 13, 1941, Serial No. 422,844

6 Claims. (Cl. 26—55)

This invention relates to a method and apparatus for spreading traveling tubular fabric and is particularly applicable for use with tubular knitted or woven fabrics which because of their structure are readily distorted.

An object of this invention is to provide a simple and efficient floating spreader structure. A further object is to provide a spreader designed to reduce transverse and longitudinal tensions in the traveling fabric to such an extent that the fabric may be drawn over the spreader without localized distortion at the edges.

A further object is to eliminate fabric propelling means such as edge propellers or driven rolls engaging the fabric intermediate the edges.

A further object is to provide a floating spreader capable of laterally distending tubular fabrics beyond their normal widths without longitudinal tension or deflection of the transverse courses of the material.

Our improved spreader is intended primarily for use at those stages in the finishing processes when it is desired to spread the fabric in flat form with only such lateral tension on the material as is incident to the spreading operation.

Our spreader may also be employed to distend, flatten and guide fabric preliminary to a pressing or wet or dry finishing operation.

By using belts at the marginal edges of the spreader longitudinal tension on the fabric is reduced, permitting shrinkage of the fabric and preserving the transverse alinement of the cloth as it travels over the spreader.

The fabric may be spread laterally to widths exceeding the normal width of the fabric, particularly when the fabric is wet. This is advantageous in increasing the spread of the fabric in that this normal width is not exceeded where there is a frictional drag at the edge portions such as exists on a conventional spreader. As the same time our improved spreader maintains the relationship between the center and edge portions of the fabric as it travels over the spreader, and whatever relationship this is at the entrance is maintained throughout the spreading action.

Our invention is illustrated in the appended drawings in which:

Fig. 1 is a plan view of a spreader embodying our invention;

Fig. 2 is a cross section of the spreader showing fabric F being drawn thereacross;

Fig. 3 illustrates an alternative arrangement of spreader belt;

Figs. 4 and 5 are sections along line 4—4 and 5—5 of Fig. 3 respectively;

Fig. 5a is a sectional view corresponding to Fig. 5 and illustrating a modified form of resilient tension permitting adjustment of the side frames;

Figs. 6, 7 and 8 are plan views of portions of spreaders embodying our invention and supported at opposite edges by idle rolls; and

Fig. 9 is a fragmentary view illustrating a modified form of engagement of the support rolls with the side frames.

The spreader illustrated in Fig. 1 comprises a pair of generally parallel side frames 1, 2 slidably mounted in grooved dead bar 3 and having tapered, inwardly bowed extremities 4 to facilitate drawing fabric onto the spreader. A pair of pulleys 5, 5' are rotatably mounted on each of said side frames, and belts 6, 6' pass around each pair of pulleys. The diameter of pulleys 5, 5' is such that the outer courses of belts 6, 6' project beyond the edges of the side frames so that the fabric in passing over the spreader is engaged at opposite edges by belts 6, 6' so as to be usually out of contact with the sides 7, 7' of the spreader frame.

Slots 8 for the shafts of pulleys 5', 5' are provided in the side frames by means of which the distance between axes of associated pulleys may be longitudinally adjusted to take up slack in the pulley belts.

The width of the spreader may be varied as desired to accommodate different widths of fabric. This is accomplished by means of an adjustable transverse support comprising a sleeve 9 mounted in head 10 of side frame 2 and notched rod 11 supported in head 12 of the opposite side frame 1. Pivot 13 on sleeve 9 carries latch 14 engaging notched rod 11 and provided with a finger piece 15 pressed by spring 16 and operable by pressure through the fabric to release latch 14 and permit a variation in the spacing of side frames 1.

Side frames 1, 2 rest upon and are supported by idle roller 17, and while they have been shown parallel, they may be set at an angle to give a tapered spreading action.

In the nip of pressing rolls 18, 18' is dead bar 3. This bar, which prevents the spreader from being drawn between the pressing rolls, consists of a sleeve 19 and an interfitting rod 51 providing a slidable telescopic support for the ends 20, 21 of side frames 2, 1. By this arrangement the frame is made transversely adjustable so that the sides of the frame are

maintained in proper relationship with each other. The opposite edge of rod 3 tapers slightly as it approaches the nip of the pressing rolls.

When the sides of the frame are tapered they give a gradual increase in the width distention while still minimizing the longitudinal tension permitting a very large width distention much above normal to be attained gradually by the tapering of the frame.

Fig. 3 illustrates an alternative form of spreader in which a single belt 22 is employed in place of separate belts 6,6' (Fig. 1). This form employing a single belt assures equal speed of the belt on both sides of the spreader. When the width of this spreader is varied, the desired degree of tautness may be maintained in belt 22 by adjustment of pulley 45 in slot 46 on side frame 1. This arrangement, which is more clearly shown in Fig. 5, consists of a yoke 47 supporting pulley shaft 48 and having a threaded stem 49. Rotation of screw 50 moves stem 49 and yoke 47 laterally in slot 46 so as to increase or lessen the tension in belt 22 as desired.

A number of the belt pulleys may be made adjustable at either end, or both, and as illustrated in Fig. 5a a spring 51 surrounding the stem 49' of a yoke 47' may be used in conjunction with or in place of the screw threaded adjustment to provide an automatic resilient tension on the cross belt regardless of the width setting. The spring adjustment of Fig. 5a is illustrated as applied to the pulleys 5 at the left end of Fig. 3 where the fabric leaves the spreader because at this point there is less load on the springs.

Fig. 6 illustrates one side of a spreader consisting of a pair of heads 23 disposed on opposite sides of the apparatus and adjustably connected by means of sleeve 24 and stud 25 to provide a unitary structure variable in width. Rods 26, 27 extend from heads 23 and support frame blocks 28, 29 at opposite ends of the spreader.

Feed bow 30 is attached to forward frame block 28 which also supports an adjustable cross rod 31 connected to a similar frame block on the opposite side of the spreader.

Rear frame blocks 29 support dead bar 32 which may be of similar construction to that shown and described in connection with Figs. 1 to 3, inclusive.

Belt 33 passes around pulleys 34, 35 mounted respectively in the forward and rear frame blocks and over a pair of pulleys 36, 37 supported on head 23. Intermediate pulleys 38, 39 are provided to prevent inward deflection of the belt when in use.

The side edges 52 (Fig. 8) of pulleys 36, 37 are convex and fit into a corresponding concave edge 53 of support roll 40. Shaft 41 of support roll 40 rests upon the floor or other suitable support (not shown) and serves through roll 40 both to support the spreader and maintain it against forward and lateral movement.

While we prefer to make the edges of rolls 36, 37 convex and that of the support roll 40 concave, the convexity and concavity may be reversed or any desired configuration may be employed to provide an interfitting of the roll edges sufficient to secure the desired support for the spreader.

Roll 40 is not driven but it is rotatably mounted on shaft 41 and will turn if sufficient pressure exists between the roll and belt 33 or overlying fabric.

Figs. 7 and 8 show further modifications of the spreader. In Fig. 7 the belt 44 is located at only one side of the support roll and passes around only one of the pair of pulleys 36, 37 mounted in head 23. Fig. 8 illustrates another arrangement in which two belts 42, 43 are employed in lieu of the single belt shown in Fig. 6.

With an edge support of the type illustrated in Figs. 6, 7 and 8 the spreader is held against longitudinal movement and does not tend to be drawn into the nip of succeeding pressing rolls (not shown). It is accordingly possible to dispense with the dead bar if desired.

As illustrated in Fig. 9 rolls 56', 57' may be positioned on the spreader frames 2' out of contact with the roll 40. In this case the edge of the spreader frame 2' is formed to fit into the contour of roll 40 with the belt 22' running in grooves in the frame and the roll. Similarly the rolls 36, 37 of Figs. 6, 7 and 8 may be separated from the roll 40 and the contour of the head 23 correspondingly modified to fit the periphery 53 of the roll 40 so as to be supported thereby.

The belts may be of various materials and contours, depending upon the design and conditions of use, and for instance, may be made of rubber or rubber with fiber core, leather, plain or impregnated fabric, chain or spiral wire spring; and may be round or V-shaped. They may be arranged in various ways, depending upon the nature of the fabric and the type of treatment desired. Where the spiral spring belt is used it is unnecessary to have pulleys for adjusting the length of the belt. For instance, the single belt shown in Fig. 3 would otherwise require an adjustment in length for each change in width.

While the embodiment of our spreader illustrated in the figures has parallel side frames, it should be understood that other forms are also suitable. For example, the spreader frames may be angularly disposed so that the fabric is gradually distended to the predetermined width as it travels over the spreader.

In operation the fabric is drawn by the pressing rolls (Fig. 2) and first passes over the inclined outer extremities 4 (Figs. 1, 2) which serve to expand the fabric gradually until it attains its desired or predetermined width. Once so expanded the fabric edges come into contact with the edge belts. Such belts, by tending to move with the fabric, reduce frictional drag at the edges thus tending to reduce and minimize the longitudinal tension and also maintain the material against distortion of the transverse wales as it passes over the spreader. Just prior to entering the nip of the pressing rolls the fabric moves across the dead bar 3 (Fig. 2) which serves to position and guide the fabric entering the rolls and also prevents the spreader from being drawn therebetween.

The side rolls 40 will have their supporting shafts transversely adjustable to position them to correspond to each transverse adjustment of the spreader and maintain the contours of the rolls and spreader accurately conforming to support the spreader while at the same time permitting easy passing of the fabric between the rolls and the spreader surfaces.

Our improved spreader is economical to manufacture because it is not necessary to provide means for driving the edge belts or support rolls. The freedom from edge friction reduces the drag and correspondingly minimizes the longitudinal pull required to move the fabric. This elimination of the longitudinal tension permits a wider lateral spreading of the fabric considerably be-

yond the width to which it could be spread otherwise.

We claim:

1. A method for spreading tubular fabric comprising exerting longitudinal horizontal tension along a transverse area by engagement with the upper and lower surfaces of the flattened fabric, simultaneously exerting equal and opposite interior pressures at another area of the fabric to spread the fabric laterally into flattened form without exterior pressure in either direction in the lateral plane of the spreading, and moving the interior engaging surfaces by the said longitudinal tension so as to draw said fabric and said surfaces together and spread the fabric without substantial frictional drag at the area of spreading.

2. A method of distending and advancing tubular textile fabric which comprises spreading the fabric horizontally and laterally into flat form beyond the normal width distention of the fabric by equal and opposite interior pressures, exerting a pulling force on the fabric beyond the zone of the spreading action, and advancing the areas of lateral pressure at the edge portions of the spreader by permitting said areas freely to move forward with said fabric so that the center portions of the fabric adjust themselves relatively to the side portions without interference and maintain said relative adjustment as the fabric progressively passes over the spreading means.

3. In a system for spreading and flattening traveling tubular fabric, the combination with transverse driven rolls engaging and drawing the fabric in flattened form between them, of a floating spreader within the tubular fabric and drawn thereby into the nip of said driven rolls, said spreader comprising a transverse dead bar at said rolls and side frames connected to said dead bar and carrying freely rotatable pulleys with idle belt means running lengthwise along said side frames and contacting the fabric at the edges and moving therewith to a point adjacent said driven rolls so as to spread the fabric and deliver it to said rolls without substantial frictional drag at the spread area .

4. A system as set forth in claim 3 in which the spreader is free to move longitudinally and laterally with the fabric.

5. A system as set forth in claim 3 in which the spreader is positioned horizontally and supporting idle roll means are provided for the spreader permitting it to have free movement longitudinally and laterally with the fabric.

6. A system as set forth in claim 3 in which supporting side rolls are provided at the edges of the spreader engaging the fabric at said edges and retaining said fabric in contact with said belt means at each side of the spreader.

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