July 6, 1954 O. C. PERSONS 2,682,847

METHOD OF AND APPARATUS FOR TREATING FABRIC AFTER IT HAS BEEN PRODUCED

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FIG. 1.

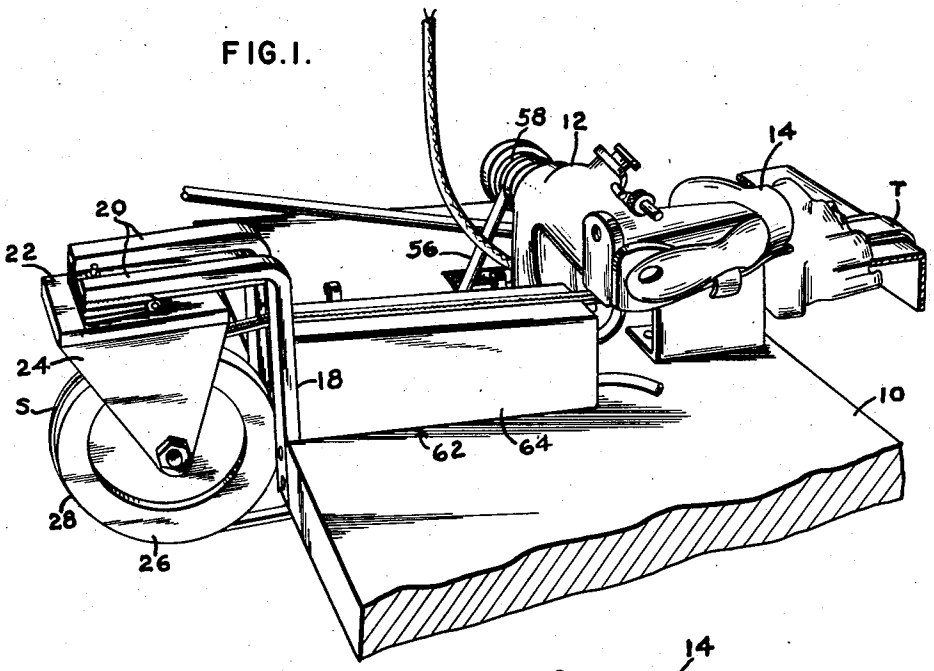


FIG. 4.

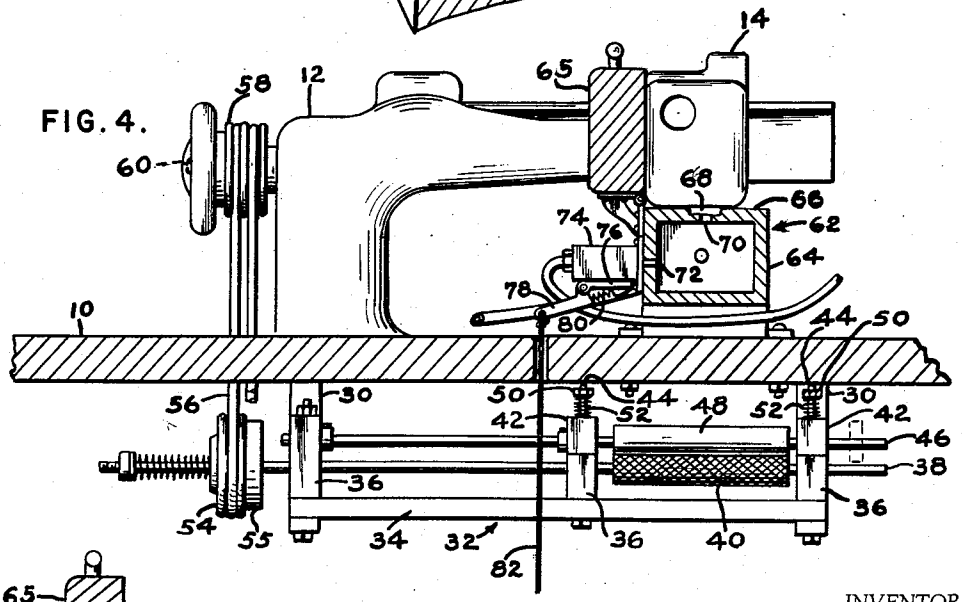
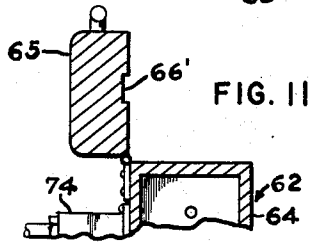


FIG. 11



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FIG. 2.

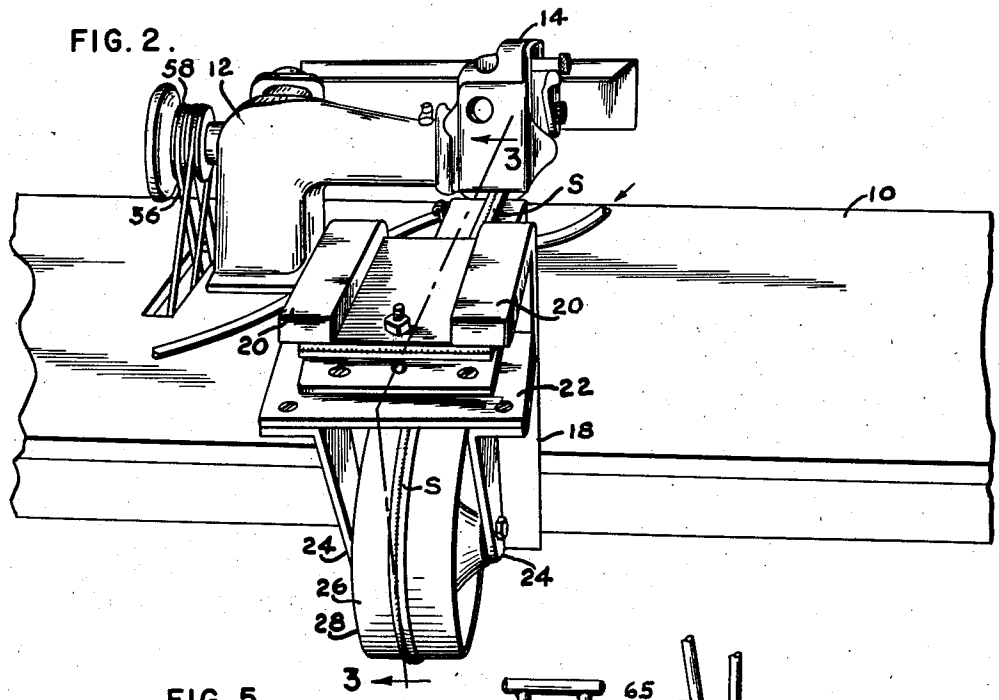
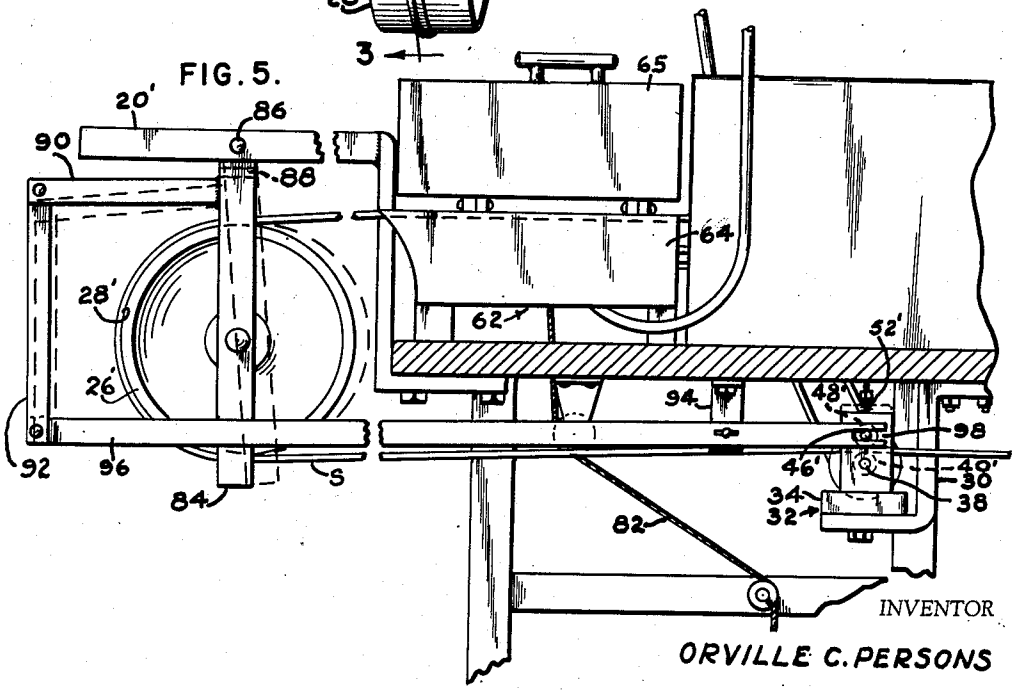


FIG. 5.



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FIG. 6.

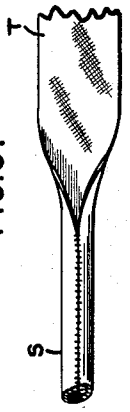


FIG. 3

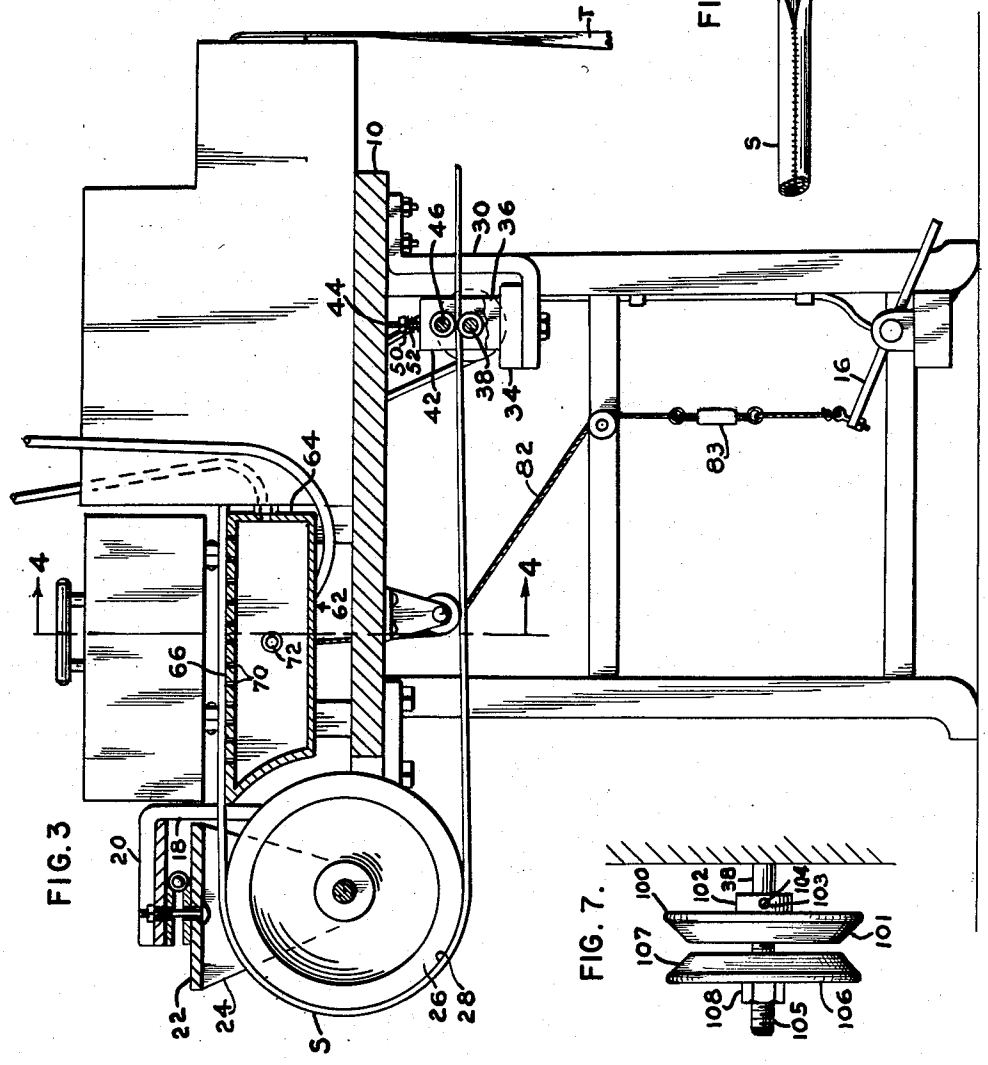


FIG. 7.

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FIG. 8.

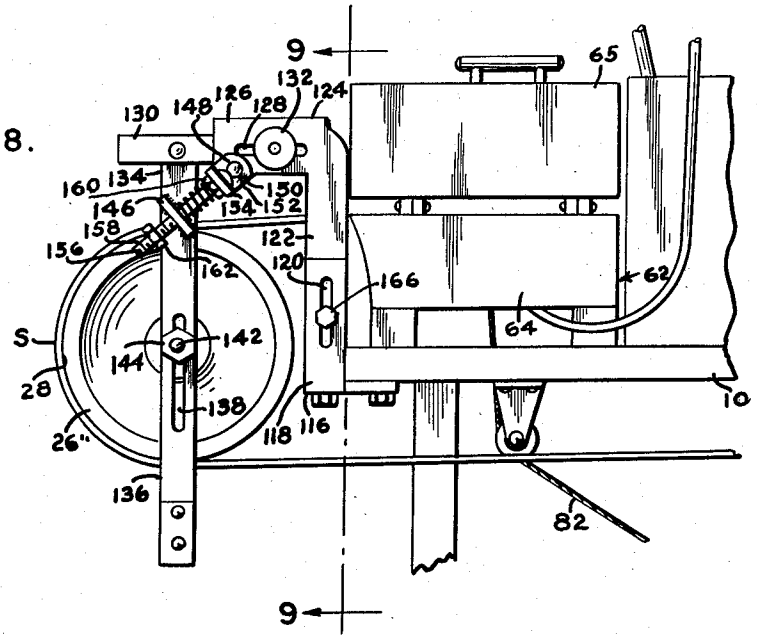


FIG. 10.

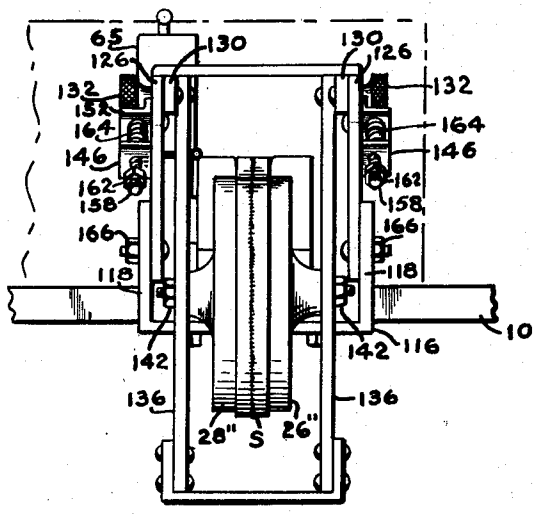
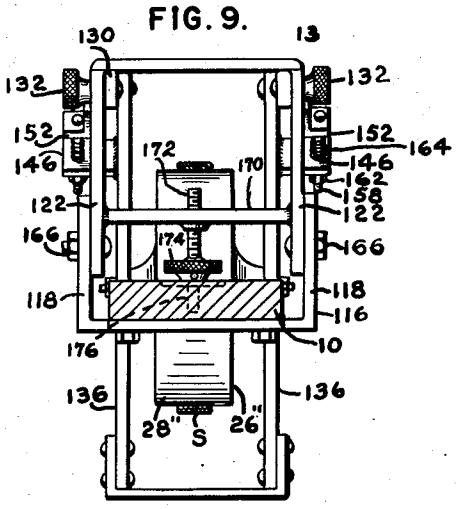


FIG. 9.



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2,682,847

METHOD OF AND APPARATUS FOR TREATING FABRIC AFTER IT HAS BEEN PRODUCED

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Application March 24, 1952, Serial No. 278,214

9 Claims. (Cl. 112—217)

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The present invention relates to tubular fabric and more particularly to the method of and apparatus for the treatment of the fabric after it has been produced.

In the production of tubular fabric of the type commonly employed for the production of belt loops it has heretofore been the custom to feed a flat tape to a sewing machine of the blind stitch type in which the tape after having its longitudinal side edges folded over is stitched along the adjacent side edges to produce a strip of tubular cross section, and then subject the tubular strip to a pressing operation by which the strip was flattened and the stitching located medially between opposite side edges of the strip. Such methods of production of strips of tubular fabric not only are time consuming but frequently produce a shiny surface on the finished product due to the frictional contact under pressure of the heated pressing surface with the tubular fabric.

The primary object of the present invention is to produce in a single operation and with but a single handling of the fabric tape a flattened tubular fabric strip which is ready for use and free from shine in an area.

The above and other objects may be attained by employing this invention which embodies among its features stitching together the longitudinal side edges of an elongated fabric tape to form a tubular strip, as said fabric strip is formed, saturating it with water vapor, and while said strip is so saturated flattening it by passing it over a surface which moves at the same lineal speed at which the tape is stitched.

Other features include a guide along which the strip moves as it leaves the stitching apparatus, means mounted adjacent the guide for directing steam onto the strip to saturate it with moisture while it moves along the guide, and a surface mounted adjacent the guide to move at the same lineal speed as the strip onto which the strip is directed from the guide and with which said strip moves as it leaves the guide.

The flat surface of the moving strip must lay level and nearly adjacent to the steam chamber without touching, so that the loop is flattened before the steam vapor is chilled into condensation. The cooling effect of the air must be nil before the tubular fabric reaches the flattened moving surface the vapor in the fabric must not condense until the tubular fabric reaches the flattened surface and is flattened.

In the drawings:

Figure 1 is a perspective view of a conventional blind stitch sewing machine showing the strip saturating apparatus and the moving strip flattening surface.

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Figure 2 is a perspective end view of the device illustrated in Figure 1.

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 2.

Figure 4 is a sectional view taken substantially on line 4—4 of Figure 3.

Figure 5 is a side elevational view of a modified form of the invention, parts being shown fragmentary and in section.

Figure 6 is a fragmentary view of a section of a study of material, showing a portion flat and a portion looped and stitched.

Figure 7 is another form of a driven pulley.

Figure 8 is a side elevational view of a modified form of supporting frame for the roller, parts being shown broken.

Figure 9 is a sectional view taken on line 9—9 of Figure 8.

Figure 10 is an end elevational view of the supporting frame and roller in Figure 8 looking in the direction from left to right.

Figure 11 is a fragmentary sectional view of the steam chest body and the hingedly mounted head and showing a groove in the head.

Referring to the drawing in detail a table 10 has mounted thereon adjacent one side a conventional sewing machine of the blind stitch type 12 having a head 14 so disposed as to feed the stitched work in a rectilinear path transversely across the table 10. The machine is provided with a conventional foot operated control treadle 16 by means of which the stitching is governed in a conventional manner.

Carried by the table 10 adjacent the side thereof remote from the sewing machine are spaced parallel upwardly extending standards 18 which are located equidistant from and on opposite sides of the rectiliner path along which the work travels upon leaving the head. Horizontally extending parallel supporting arms 20 are carried by the standards above the table 10 and extend from the side thereof in a direction opposite the sewing machine 12.

Secured to the supporting arms 20 on the under sides thereof is a bed plate 22 carrying a pair of depending spaced parallel arms 24 between which is mounted for rotation about a horizontal axis which is spaced from the adjoining edge of the table and lies perpendicular to the rectilinear path, a roller 26 having a transversely flat periphery 28 which lies tangent to the rectilinear path.

Carried by the table 10 and extending down-

wardly therefrom adjacent the side thereof adjacent the sewing machine are spaced brackets 30 upon which is mounted a traction device designated generally 32. This traction device comprises an elongated bed 34 carrying adjacent opposite ends upwardly extending pedestals 36 in which is mounted a drive shaft 38 carrying intermediate its ends a peripherally knurled traction drum 40, the axis of which lies below the periphery of the roller 26, and the periphery of which lies in a horizontal plane tangent to the periphery of the roller 26. Mounted for rotation in vertically movable bearing blocks 42 which are mounted for vertical movement above the shaft 38 on upwardly extending guide pins 44 carried by the pedestals 36 is a horizontally extending shaft 46 carrying intermediate its ends a tension drum 48 which when no fabric is on the traction drum 40 has peripheral contact therewith. Carried by the guide pins 44 above the bearing blocks 42 are heads 50, and encircling the pins 44 between the bearing blocks 42 and the heads 50 are compression coiled springs 52 which yieldingly urge the tension drum 48 toward the traction drum 40. Mounted on the drive shaft 38 for rotation therewith is a driven pulley 54 which is driven by an endless belt 56 which extends around the drive pulley 58 mounted for rotation on the drive shaft 60 of the sewing machine 12. Also mounted on the shaft 38 is a friction disk 55 that may be secured by a set screw (not shown).

Mounted on the table 10 between the head 14 of the sewing machine 12 and the roller 26 is a steam chest designated generally 62 comprising an elongated hollow body 64 of substantially rectangular cross section having in its upper surface 66 a longitudinally extending groove 68 which extends throughout the length of the body 64 and opens upwardly to form a guide for the tubular strip as it issues from the head 14 of the sewing machine 12 and advances along the rectilinear path, the body 64 being provided with a hingedly mounted cover 65, and this cover may be provided with a groove 66' similar to groove 68. The bottom wall of groove 68 lies substantially horizontal and tangent to the peripheral surface of the roller 26. Formed in the bottom wall of the groove 68 and communicating with the interior of the body 64 are longitudinally spaced openings 70 through which steam issues from the interior of the body 64 to saturate with moisture the sewn tubular strip as it moves in the rectilinear path in groove 68. Steam is introduced into the interior of the body through a duct 72 which is connected to a suitable steam generator 74 through a valve that is pivotally carried by a plate 76, the valve being opened and closed by a control lever 78. A retractile coiled spring 80 is provided having one end seated in plate 76, the opposite end seated in the control lever 78 to yieldingly hold the valve closed. A suitable linkage 82 connects the lever 78 to the treadle 16 so that when the latter is moved to start the operation of the sewing machine 12, the lever 78 will be moved against the effort of the spring 80 to open the valve 76. To provide for adjustment of the linkage 82 there is interposed in the linkage a turnbuckle 83.

In the modified form of the invention illustrated in Figure 5, the table 10, sewing machine 12, steam chest 62 and traction device 32 are all as previously described but in place of the bed plate 22 and depending arms 24 I employ a pair of spaced parallel depending arms 84 which are pivotally suspended as at 86 from a pair of supporting arms 20' which correspond in position on the table to the arms 20. A roller 26' is mounted in the arms 84 to rotate between them about a horizontal axis which lies parallel with the table and below the rectilinear path. The periphery 28' of the roller 26' is transversely flat and lies substantially tangent to the rectilinear path along which moves the tubular strip as it issues from the sewing machine 12. Fixed to a cross member 88 which is carried by and extends between the arms 84 above the roller 26' is a lever arm 90 which projects laterally from the arms 84 in a direction away from the table and pivotally connected to the lever arm 90 is a depending link 92. Mounted on the under side of the table intermediate opposite sides thereof for adjustment in parallel relation to the rectilinear path is a depending bracket arm 94 to which is mounted for rocking movement intermediate its ends an elongated tension release lever 96 and which is pivotally connected adjacent one end to the link 92. The end of the tension release lever 96 remote from the link 92 is provided with a notch 98 in which is received the shaft 46' which corresponds to the shaft 46 so that when said shaft 46' is moved upwardly against the effort of the spring 52' to move the tension drum 48' away from the traction drum 40', pull will be exerted on the lever arm 90 to rock the arms 84 about the pivot 86 and advance the roller 26' toward the head of the sewing machine. Thus it will be seen that the path taken by the tubular strip from the sewing machine head and the traction device 32 will be shortened so as to relieve the tension on the tubular strip during the threading of the strip through the machine.

As shown in Figure 7 a modified form of driven pulley may be provided for controlling the speed of the traction device 32, and it comprises a disk 100 having a tapering wall 101 and a shoulder 102 that is provided with a threaded bore 103 that receives a set screw 104, the disk 100 also being provided with a threaded shaft 105. Mounted on the shaft 105 is a disk 106 having a tapering wall 107 and a threaded bore for engagement with the shaft for adjustment toward and away from the disk 100, the disk 106 being locked on the shaft 105 by a lock-nut 108.

In Figures 8, 9, and 10 a modified form of supporting frame for the roller 26'' is provided, and it comprises an element 116 having in each side wall 118 a slot 120. Engageable with the inner face of the side walls 118 are arms 122 of element 124, arms 126 being disposed at right angles to the arms 122 and having a slot 128. The inner face of arms 126 are engaged by straps 130 that are secured to the arms by lock nuts 132. To the straps 130 there is pivotally mounted one end 134 of arms 136, each arm being provided with a vertical slot 138 that receives the ends of a wheel axle 142, the axle being locked to the arms 136 by nuts 144. In order that the arms 136 may be under spring tension, a flange 146 having a bore is carried by each of the arms 136 and disposed at an angle thereon.

To the arms 126 there is secured by a rivet 148 one arm 150 of a right angle bracket 152, the other arm 154 having a bore that receives the shank 156 of bolt 158 that passes through and is locked to the arm by a lock-nut 160. The shank 156 passes through the aperture in the flange 146 and carries adjacent its end an adjustment nut 162. Encompassing the shank 156 between the

flange 146 and the lock-nut 160 is a spring 164 that provides spring tension to the arms 136.

The arms 122 are adjustable with respect to the arms 118 and they are locked to the arms 118 by bolts 166. Likewise arms 130 are adjustable with respect to the arms 126 and they are locked to the arms 126 by bolts or locknuts 132.

The arms 122 are connected by a strap 170 having a central threaded aperture that receives the shank 172 of adjustment screw 174, the shank 176 engaging a bore in the table top 10, the screw 174 serving as an adjustment for the roller 26'' with reference to the end of the steam chest 62.

In the operation it will be understood that a tape T entering the sewing machine 12 will be folded longitudinally thereby and the adjacent edges of the tape will be sewn together to produce a tubular strip S. As the strip S issues from the head 14 of the sewing machine 12 it moves in a rectilinear path through the groove 68 in the steam chest 62. By reason of the linkage 82 extensing between the control treadle 16 of the sewing machine 12 and the lever 78 of the control valve in the steam duct 72, it will be evident that with the operation of the sewing machine 12, live steam from the steam generator 74 will pass through the openings 70 and moisten the tubular strip S while it moves in the rectilinear path defined by the walls of the groove 68. The tubular strip S is guided around the flat rim 28 of the roller 26 and then introduced between the traction drum 40 and tension drum 48 of the traction device 32, the traction drum of which is driven in unison with the sewing machine 12 through the medium of the endless V-belt 56 which travels over the driven pulley 54 of the traction device 32 and is driven by the pulley 58 of the sewing machine 12. The flat rim 28 of the moving roller 26 on its periphery lies level and tangent to the rectilinear path of the loop and adjacent to one end of the steam chamber 62 without touching the end of the chamber. It will thus be seen that the moistened tubular strip S will be flattened as it passes around the periphery of the roller 26 so that the side edges of the strip S will be permanently creased with the row of stitches located substantially midway between opposite side edges of the strip S. By reason of the fact that the periphery of the roller moves at the same lineal speed as the strip S, and that the roller 26 has only rolling contact with the strip, it is evident that no rubbing of the surface of the strip occurs and hence the strip will be pressed into the desired shape without the production of shiny areas such as are experienced when the strip is pressed and flattened in the conventional manner. It is also to be noted that the steam vapor in loop S is chilled by surface of the roller 26 into condensation after the loop is flattened and by air action is dried while the loop is travelling around roller 26. The cooling effect of the air on the steam vapor is nil while the loop leaves the groove 68 in the steam chest 62. It is not until after the loop is flattened on the roller 26 that condensation takes place and this action and the subsequent evaporation and expelling of moisture by air action while the loop is traveling around roller 26, sets the loop into a flattened shape.

In order to facilitate the rapid threading of strip S around the roller and through the traction device the structure disclosed in Figure 5 is employed. When the roller 26' is intensely drawn toward the steam chest by action of the traction device mechanism 32 by too great a tension on certain fabrics caused by greater adherence to the knurled roller of the traction device, then a downward movement is exerted in excess of the ordinary pull on arm 92 through the hinging of arm 84 at 86. By this action the traction end of arm 96 will move upward through fulcrum 94 which is adjustable to force a lesser or greater tension, the upward movement of the shaft 46 will separate the tension 48 from the traction drum 40, thus automatically releasing the traction, relieving the tension and pull on strip S. Thus it will be seen that the weight of the roller 26' tends to hinge arm 84 toward the perpendicular and again place strip S under tension.

In the modified form of the invention as shown in Figures 8, 9 and 10, the springs 164 act as the equalizing medium for the arms 136 to adjust for tension as previously described for Figure 5. The distance of the periphery of the roller 26'' from the end of the steam chest 62 is regulated by the adjustment screw 174.

By the use of the above described device it is evident that a fabric tape T may be automatically and rapidly converted into a flattened tubular fabric strip S from which the belt loops and the like may be cut as required. Obviously by attaching a meter to the sewing machine 12 or table 10 to engage the strip S in any selected area between the head 14 and the traction device 32 the production of the device may easily be measured.

While the invention has been disclosed in connection with certain specific embodiments thereof, it is to be noted that these are by way of example rather than by way of limitations and that the invention is to be defined by the claims which should be given a scope as broad as is consistent with the prior art.

What is claimed is:

1. The herein described method of producing a tubular flattened fabric strip which includes stitching together the longitudinal side edges of a fabric tape to produce a tubular fabric strip, moving said fabric strip in a rectilinear path, while so moving said strip impregnating it with moisture, moving said strip while it is so impregnated in an arcuate path in contact with a strip flattening surface which moves in unison with the strip, and delivering the flattened strip to a station adjacent its source of origin.

2. The herein described method of producing a tubular flattened fabric strip which includes stitching together the longitudinally side edges of a fabric tape to produce a tubular fabric strip, moving said fabric strip in a rectilinear path, while so moving said strip impregnating it with moisture, moving said strip while it is so impregnated in an arcuate path in contact with a strip flattening surface which moves in unison with the strip and while said strip moves in the arcuate path exerting tension thereon to expel moisture from the strip.

3. In apparatus for producing a flattened tubular fabric strip, a sewing machine of the type having means for joining opposite side edges of a length of fabric tape to produce a tubular fabric strip, a strip flattening surface mounted in spaced relation to the sewing machine for contacting the strip and being moved by it while guiding the strip in a rectilinear path and means operatively connected to said sewing machine and mounted in spaced relation to the strip flattening surface engaging

said strip and exerting tension on the strip while it is in contact with the flattening surface.

4. The structure defined in claim 3 in which the strip flattening surface comprises a roller mounted to rotate about a horizontal axis with its periphery lying tangent to the rectilinear path.

5. In apparatus for producing a flattened tubular fabric strip, a sewing machine of the type having means for joining opposite side edges of a length of fabric tape to produce a tubular fabric strip, a strip flattening surface mounted in spaced relation to the sewing machine for contacting the strip moving in unison with it while guiding the strip in a rectilinear path, means operatively connected to said machine and mounted in spaced relation to the strip flattening surface for engaging said strip and exerting tension on the strip while it is in contact with the flattening surface, and means mounted adjacent the rectilinear path between said machine and said flattening means for impregnating the strip with moisture prior to its contact with the strip flattening surface.

6. The structure defined in claim 5 in which the strip flattening surface comprises a roller mounted to rotate about a horizontal axis with its periphery lying tangent to the rectilinear path.

7. In apparatus for producing a flattened tubular fabric strip, a sewing machine of the type having means for joining opposite side edges of a length of fabric tape to produce a tubular fabric strip, guide means mounted adjacent the sewing machine for directing the strip as it is formed by said sewing machine along a rectilinear path, a strip flattening roller mounted adjacent the rectilinear path for contact with

the moving strip as it leaves the rectilinear path, and means mounted adjacent the rectilinear path between said machine and said roller for impregnating the strip with moisture prior to its contact with the roller.

8. In apparatus for producing a flattened tubular fabric strip, a sewing machine of the type having means for joining opposite side edges of a length of fabric tape to produce a tubular fabric strip, guide means mounted adjacent the sewing machine for directing the strip as it is formed by said sewing machine along a rectilinear path, a strip flattening roller mounted adjacent the rectilinear path for contact with the moving strip as it leaves the rectilinear path, means mounted adjacent the rectilinear path between said machine and said roller for impregnating the strip with moisture prior to its contact with the roller, means mounted in spaced relation to the roller and operatively connected to move in unison with said machine for engaging said strip and exerting tension thereon for expelling moisture from the strip as it moves in contact with the roller.

9. The structure defined in claim 7 in which the means for impregnating the strip with moisture includes an elongated steam chest mounted between the sewing machine and the roller and having openings extending through a wall thereof through which steam is directed toward the strip.

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