

June 22, 1971

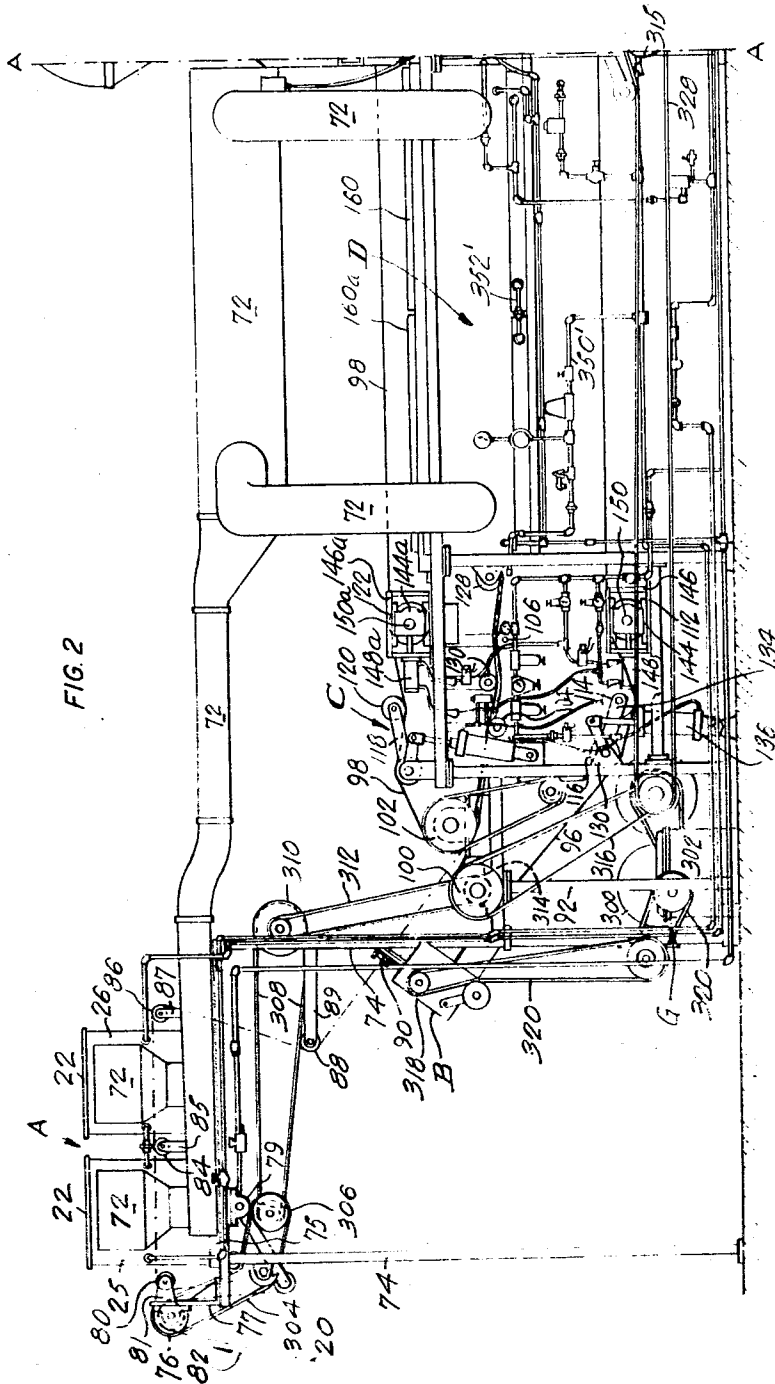
E. I. ARONOFF

3,585,696

APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

Original Filed May 22, 1967

6 Sheets-Sheet 2



INVENTOR
Edward I. ARONOFF

Alan Sweeney
ATTORNEY

June 22, 1971

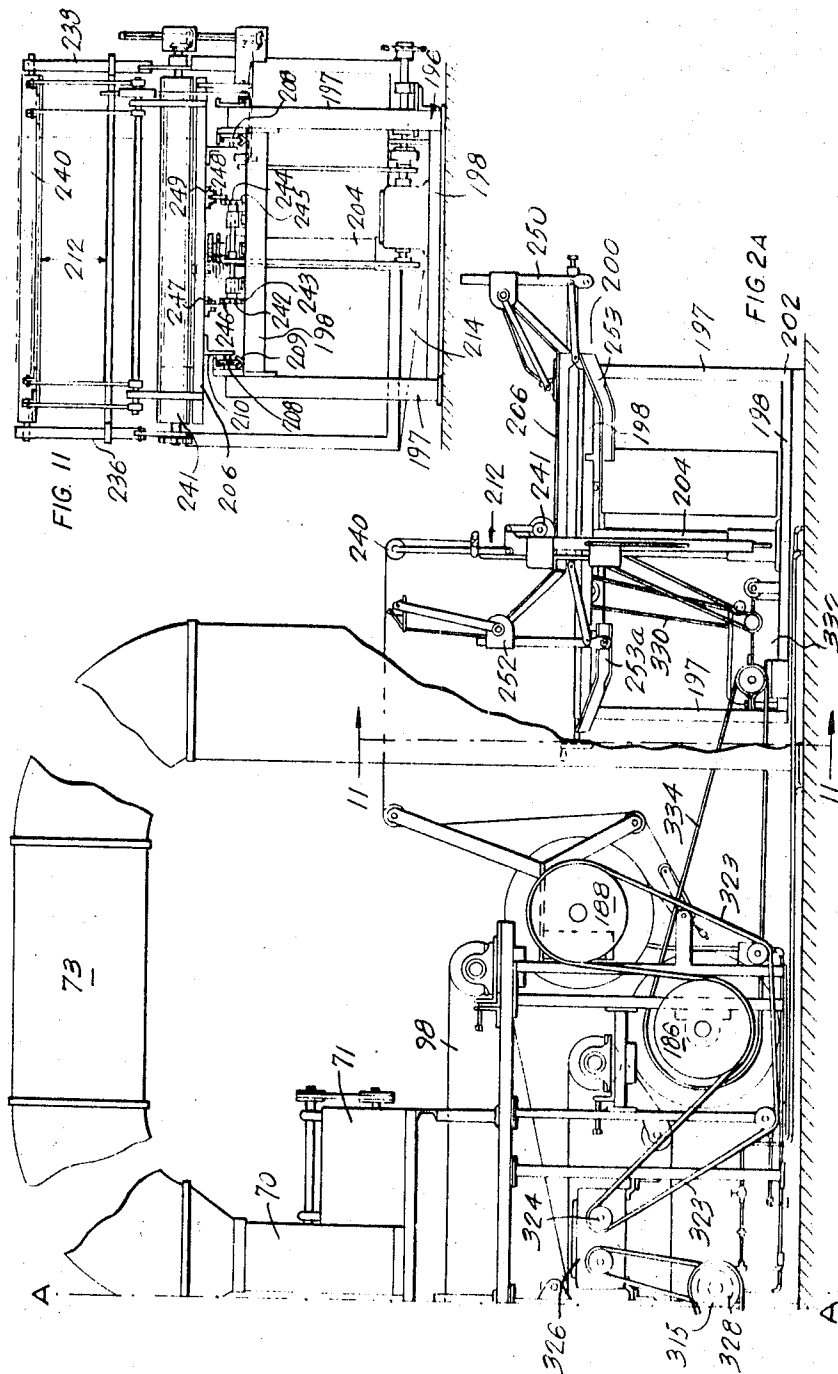
E. I. ARONOFF

3,585,696

APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

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INVENTOR
Edward I. ARONOFF

Alan Sussberg
ATTORNEY

June 22, 1971

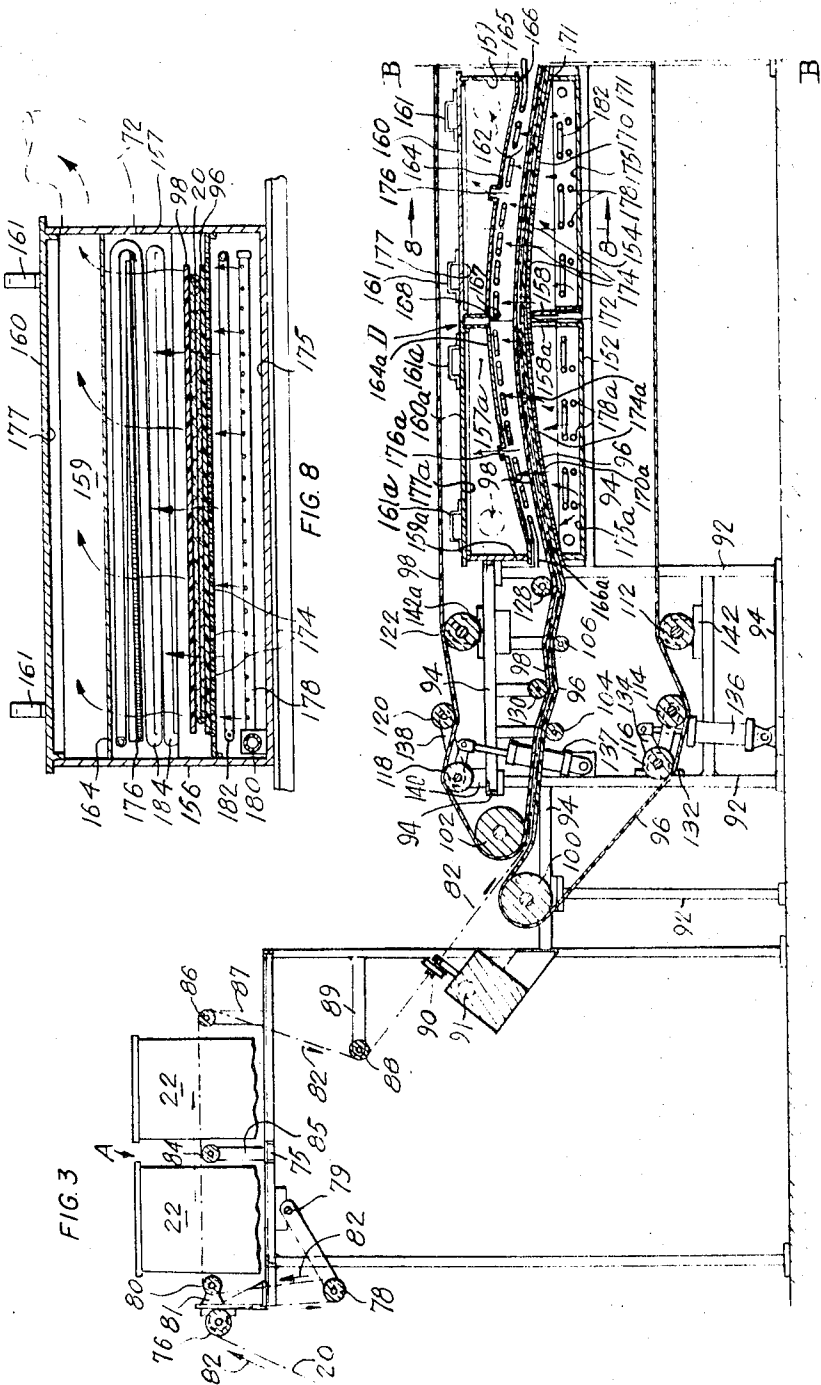
E. I. ARONOFF

3,585,696

APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

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INVENTOR
Edward I. ARONOFF

Alan Surbey
ATTORNEY

June 22, 1971

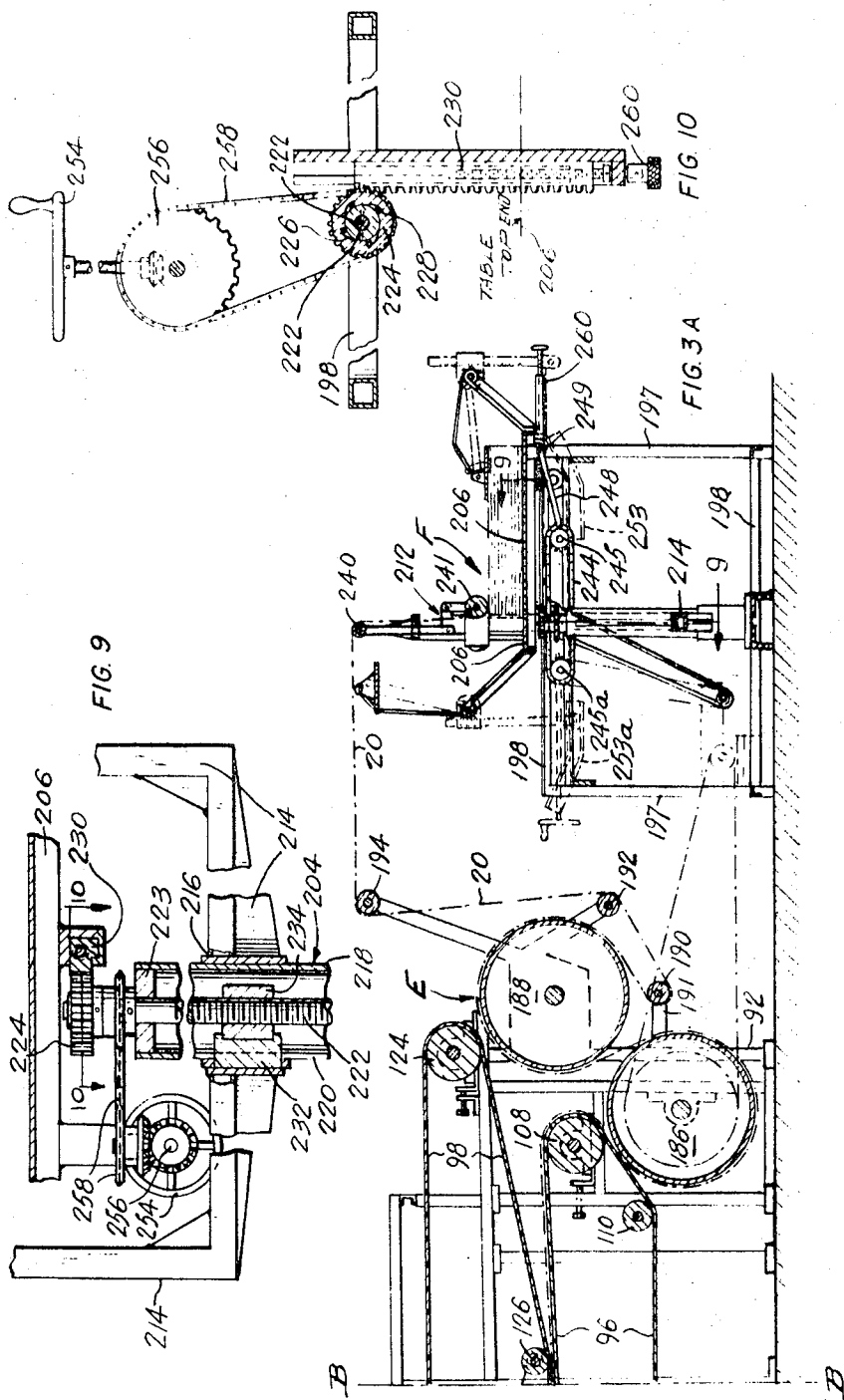
E. I. ARONOFF

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APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

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INVENTOR
Edward I. ARONOFF

Alan Swabey
ATTORNEY

June 22, 1971

E. I. ARONOFF

3,585,696

APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

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6 Sheets-Sheet 6

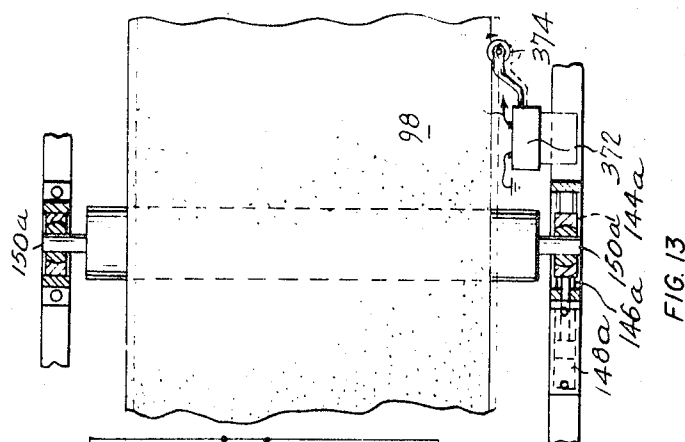


FIG. 13

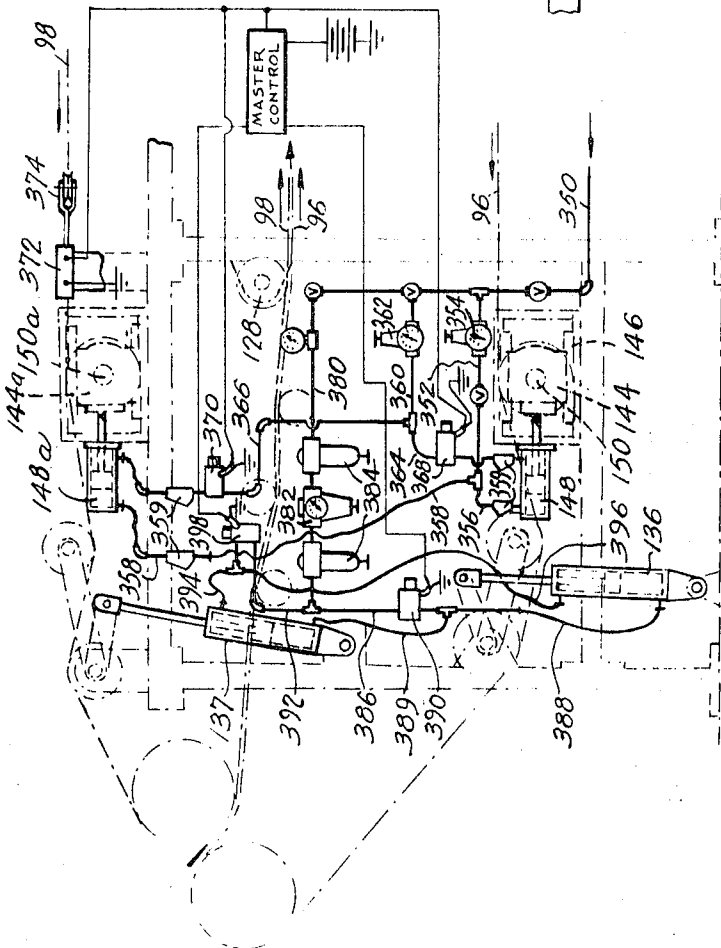


FIG. 12

INVENTOR
Edward I. ARONOFF

Alan Swabey
ATTORNEY

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3,585,696

APPARATUS FOR STABILIZING KNITTED TUBULAR FABRICS

Edward I. Aronoff, 605 Dorais St., St. Laurent, Quebec, Canada

Original application May 22, 1967, Ser. No. 640,317, now Patent No. 3,484,949, dated Dec. 23, 1969. Divided and this application Nov. 3, 1969, Ser. No. 873,616

Int. Cl. D06c 5/00

U.S. Cl. 26—18.5

7 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for fixing tubular fabrics including a steam box through which the tubular fabric is passed for moistening the fabric, a floating stretcher on which the tubular fabric is passed after it comes out of the steam box for stretching the fabric laterally, a pair of cooperating blankets passing over rolls adapted to receive the fabric as it comes off the floating stretcher so as to carry the tubular fabric with a minimum of lateral and longitudinal tension, passing the fabric between the blankets through a further steam chamber which includes a perforated convexly curved wall opposite an enclosed suction chamber having a concavely curved wall for fixing the fabric and heating means for drying the fabric as it is delivered from the cooperating blankets.

This application is a divisional of application Ser. No. 640,317, filed May 22, 1967, now U.S. Pat. 3,484,949 granted Dec. 23, 1969.

BACKGROUND OF THE INVENTION

(1) Field of invention

The present invention relates to the treatment of fabrics and more particularly to apparatus for providing a finished tubular knitted fabric with predetermined dimensions.

(2) Description of prior art

The present application relates to and is an improvement on the apparatus shown in U.S. Pat. 3,098,279 to Brunner, which includes a suitable stretching form located in the tube of knitted fabric and along which the fabric is moved by a suitable moving means, the tube of fabric being expanded transversely by the form. The loops of the knitted fabric are therefore caused to contract longitudinally, and immediately following the stretching form are located a pair of bands which cooperate with each other to receive the tube of fabric from the form, the pair of bands holding the fabric so that the loops thereof cannot change their longitudinal dimensions. A gap of predetermined thickness is provided through which the tube of fabric moves. In this gap the tube of fabric is capable of transversely contracting in a manner controlled by the adjusted thickness of the gap, and the control of the size of this gap is such that the tube contracts due to its own resiliency until the width of the loops of the knitted fabric is of a predetermined size. Thereafter the fabric is fixed and finished.

SUMMARY OF INVENTION

The present invention aims to provide an improved apparatus for so stretching the fabric and laterally controlling the dimensions thereof while the fabric is under minimum longitudinal tension, whereby the speed and efficiency of the fabric travelling through the apparatus can be increased considerably yet maintenance of the apparatus is reduced, thereby reducing the cost of treating the fabric.

Generally, a construction in accordance with the present invention comprises the combination of a frame, a satu-

rated steam conditioning box mounted at one end of the frame, a driven stretching form mounted longitudinally adjacent the conditioning box and within the tubular fabric coming from the conditioning box, a pair of cooperating continuous bands adapted to receive the fabric as it leaves the stretching form, a saturated steam box for fixing the fabric as it is held between the continuous belts, a pair of heating rolls for drying the fabric and finally means for collecting the dried stabilized fabric as it comes from the heated rolls.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus generally described the nature of the invention, particular reference will be made to the accompanying drawings, showing by way of illustration preferred embodiments thereof and in which:

FIG. 1 is a top plan view of the apparatus in accordance with the present invention;

FIG. 2 is a vertical side view illustrating one end of the apparatus shown in FIG. 1;

FIG. 2A is a vertical side view showing the other end of the apparatus shown in FIG. 1 and is the continuation of FIG. 2 from line A—A;

FIG. 3 is a vertical cross section taken along lines 3—3 of FIG. 1 showing one end of the apparatus;

FIG. 3A is a vertical cross section taken along line 3—3 of FIG. 1 and showing the other end of the apparatus continued from line B—B;

FIG. 4, which is on the same sheet as FIG. 1, is a vertical cross section taken along either of lines 4—4 of FIG. 1;

FIG. 5, which is on the same sheet as FIG. 1, is an exploded view showing an element of the conditioning box shown in FIG. 4;

FIG. 6 is an enlarged fragmentary view of one of the elements shown in the conditioning box of FIG. 4;

FIG. 7 is a fragmentary vertical cross section taken along line 7—7 in FIG. 4;

FIG. 8, which is on the same sheet of drawings as FIG. 3, is a vertical cross section taken along line 8—8 of FIG. 3;

FIG. 9, which is on the same sheet as FIG. 3A, is a fragmentary cross section taken along line 9—9 of FIG. 3A;

FIG. 10 is a horizontal cross section taken along line 10—10 of FIG. 9;

FIG. 11, which is on the same sheet as FIG. 2A, is a vertical cross section taken along line 11—11 of FIG. 2A;

FIG. 12 is a schematic diagram of the pneumatic system of the apparatus;

FIG. 13 is a top plan view partly in cross section of a detail of the apparatus showing the positional roller.

Referring now to the drawings, and more specifically to FIGS. 1, 3 and 3A, the tubular fabric 20 passes through the pair of conditioning boxes A in a flat form in the direction of the arrow 82. The fabric is then driven over the stretching frame B where it is stretched laterally and contracted longitudinally. The fabric is received from the stretching frame B by the continuous belt assembly C which carries the tubular fabric 20 through the fixing steam box assembly D: The tubular fabric 20 is then carried over the heated drum rollers E and is finally deposited on the folding table F. The complete apparatus is driven by a single electric motor and gear train assembly.

Referring now to FIGS. 4, 5, 6 and 7, a typical conditioning box A is shown including a rectangular enclosed housing 22 having side walls 23 and 24, end walls 25 and 26, top cover 27 and bottom wall 28, respectively.

Opposed side walls 23 and 24 are provided with longitudinal slots 29 and 30, respectively. Tubular fabric 20 enters the housing 22 through slot 29 of the side wall 23 and exits through the opposite slot 30 of side wall 24.

The housing 22 comprises a steam chamber 32, a suction chamber 34 and identical steam units 36 and 38 in the steam chamber 32 provided to impinge steam on both sides of the fabric 20. A longitudinal partition 40 separates the steam chamber 32 from the suction chamber 34.

Elongated tapered slots 41 and 43 are provided in the partition 40 separating the suction chamber 34 from the steam chamber 32 whereby the spent steam can be withdrawn equally.

Baffle plates 45 and 47 are provided on the partition 40 along slots 41 and 43 in order to prevent unwanted recirculation of the steam in the steam chamber 32.

Heater tubes 42 containing radial fins 42a are provided in the proximity of slots 29 and 30 in order to heat the incoming external air to prevent condensation of the steam so as to prevent dripping on the fabric 20. Heater tubes 42 are heated by live steam continually passing through them.

The steam units 36 and 38 are independently mounted in the housing 22 and may be easily replaced. They are located close to, but spaced on either side of the path of the moving fabric 20. They can be easily removed because of the access provided by removable top cover 27 and partition 40, which rests on ledges 39.

For descriptive purposes, only steam unit 36 will be referred to but the related parts of unit 38 will have identical reference numbers supplemented by the subscript *a*. Steam unit 36 comprises a semi-cylindrical tube 44 closed at both ends by end plates 46 and 48, and having corrugated face 50. In FIG. 5 of the drawings, the letter *c* represents the crest of one corrugation of face 50 and letter *r* designates the root. A series of perforations 52 are provided between the crest *c* and the root *r* on the slope of the corrugations of face 50.

Longitudinal perforated steam pipes 54 and 56 are located longitudinally within the steam unit 36 for distributing steam therein. A suitable conduit 58 is connected to a steam source, not shown, and feeds steam to distributor 60 which in turn distributes the steam to the perforated pipes 54 and 56. A pair of perforated tubes 62 and 64 which are concentric with the steam pipes 54 and 56 respectively provide a first steam trap.

The perforations in the tubes 62a and 64a of steam unit 38 are directed away from the corrugated face 50a so that the steam will reach it indirectly. Thus, most of the condensate formed is collected in the tubes 62a and 64a before it reaches the corrugated face 50a. Drain holes 66a are provided in the end walls to drain the condensate from the tubes 62a and 64a.

The condensate which escapes the first steam trap formed by tubes 62a and 64a collects in the root *r* of the corrugations and is drained off through drains 68a, provided in the end plates. Holes 68a are located below the line of perforations 52a in each corrugation. Thus, the condensation is drained from the steam unit 38. The bottom inverted steam unit 36 is provided with drain hole 68 in the bottom of the semi-cylindrical tube 44. The drained condensed water is also collected in the bottom of the housing 22 whereby it is removed by a suitable drain pipe 69.

The steam forced into the steam units 36 and 38 is released through perforations 52 and 52a in the slopes of the corrugations of the faces 50 and 50a, respectively. The dry steam from the units 36 and 38 impinges upon respective layers of the fabric 20. The condensation which occurs in the upper steam unit 38 is collected in the corrugations and is prevented from dripping onto the fabric 20.

A suitable vacuum pump, not shown, is connected to the suction chamber 34 by an exhaust duct 72. The pump creates a negative pressure in the suction chamber thereby withdrawing the spent steam from the steam chamber 32 after it has impinged upon the fabric 20.

In operation, the conditioning box assembly A is mounted on the frame at one end thereof. The condition-

ing box assembly A comprises two steam boxes represented in FIGS. 2 and 3 by housings 22. Part of the frame 15 which mounts the steam box assembly A is constituted by uprights 74 and horizontal members 75. The housings 22 are mounted on the members 75 in a parallel spaced relation, but laterally with respect to the path of the tubular fabric 20. In order to properly support the tubular fabric 20 as it enters and passes through the steam box assembly A, a suitable roller assembly is provided including driven roller 76, mounted on a bracket 77 which is in turn fixed to the members 75; a tensioning roller 78 which is freely mounted on pivoting bracket 79 on the underside of the members 75, and a positioning roller 80 which is rotatably supported by bracket 81 mounted on bracket 77. Briefly, the tubular fabric follows a path in the direction of arrow 82, over the driven roller 76, down around the tensioning roller 78 and over the positioning roller 80 into the steam box assembly A. A support roller 84 is also freely mounted on a bracket 85 positioned between the spaced-apart parallel steam box housings 22.

The tubular fabric 20 then travels over a free roller 86 freely mounted by a bracket 87 on platforms 75, and down around a positioning roller 88 freely mounted by a bracket 89 to the uprights 74.

A stretching frame B which serves as an expansion means for transversely expanding the tubular fabric 20 includes a form (not shown) which is well known in this art. A specific example of such a form is shown in U.S. Pat. 3,098,279 to Brunner. The form which is within the tubular fabric 20 is driven by cooperating driven rollers 90 which are transversely adjustable on a screw shaft 91, as is also well known in the art.

The continuous belt assembly C is mounted on that part of the frame adjacent the steam box assembly A and includes uprights 92 and beam members 94. The belt assembly C comprises a pair of endless belts called blankets, 96 and 98 driven by rolls 100 and 102. The lower endless blanket 96 passes over laterally mounted freely rotating rolls 104, 106, 108, 110, 112, 114 and 116, while the upper blanket 98 passes over the laterally mounted, freely rotating rolls 118, 120, 122, 124, 126, 128 and 130. Rolls 100, 104, 106, and rolls 102, 130, 128 of the blankets 96 and 98, respectively, are positioned in a slightly staggered fashion so as to force the upper run of blanket 96 against the lower run of blanket 98.

Blankets 96 and 98 must be permeable to allow steam to pass through them as will be further described. In one embodiment it was found that the use of a single-ply material having multi-filament warp threads of Terylene material and monofilament nylon weft threads was most effective.

A tensioning apparatus is also provided to control the tension of the blanket 96 and/or 98. The tensioning device for blanket 96 comprises rolls 114 and 116, whereby roll 116 is mounted on a bracket 132. Roll 114 is mounted to one arm of a bell crank 134 which is pivoted to bracket 132. The other arm of bell crank 134 is connected to the piston rod of hydraulic cylinder 136.

The other end of cylinder 136 is pivotally-mounted to a beam 94 on the frame. Similarly a cylinder 137 is pivoted at one end to an upright 92 of the frame and is operatively connected to one arm of a bell crank 138. The bell crank is in turn pivoted to bracket 140, supporting roll 118, on the beam 94, and its other arm mounts the roll 120.

Roll 112 is pivoted at one end to a bracket 142 for movement about a vertical axis. The other end of roll 112, as is shown in FIG. 2, is mounted in a bearing block 144 which is adapted for relative sliding movement in the pillow block 146. A cylinder 148 is fixedly mounted to the pillow block 146 and its piston rod is connected to the bearing block 144 for effecting the sliding movement thereof. It can be seen that by sliding the bearing block 144 one way or another the axis of the shaft 150 of roll 112 will diverge from its normal perpendicular position

with respect to the blanket 96 thereby forcing the blanket to shift either to the left or right of the longitudinal axis of the path of travel.

Similarly roll 122 is provided with an identical device, to adjust blanket 98, and for reference purposes the same numerals have been used but the subscript *a* has been added.

The blankets, under controlled tension, receive the tubular fabric 20 from the stretching frame assembly B. By controlling the tension of the blankets 96 and 98 the gap formed thereby, between rolls 100 and 102, can be controlled in order to provide controlled transverse contraction of the tubular fabric 20 as it come off stretching form B. The blankets 96 and 98 carry the tubular fabric 20 through the fixing steam boxes D, without exacting any longitudinal tension thereto.

The pneumatic system which operates cylinders 148 and 148a and tensioning cylinders 136 and 137 includes a main air feed line 350 which branches into a secondary feed line 352. In the secondary feed line 352 a pressure regulator 354 is provided. Normally a pressure of about 30 to 50 pounds is set on the pressure regulator 354. The air is then branched off into the feed line 356 which leads into one side of the cylinder 148, and feed line 358 which leads into a similar side of cylinder 148a. Suitable flow controls 359 are provided in lines 356 and 358. This air line 352, communicating with air lines 356 and 358 to the cylinders 148, 148a, is normally open and the pistons in the cylinders 148 and 148a are normally projecting outward of the cylinders at their full extent.

Another secondary line 360 which receives air from line 350 is provided, and includes a pressure regulator 362 (which is set at a pressure higher than pressure regulator 354) and branches off into lines 364 and 366 to the other side of cylinders 148 and 148a, respectively. This line is normally shut by solenoid valves 368 and 370 in lines 364 and 366, respectively. A limit switch 372 which includes a wheel 374 is mounted so that the wheel 374 is in constant contact with the side edge of the blanket 98. As the blankets 96 and 98 deviate from their longitudinal axis, the wheel 374 will actuate limit switch 372 in such a way as to activate the solenoid valves 368 and 370 so as to proportionally open the air lines 364 and 366. When air of higher pressure than in the line 352 is applied to the opposite side of the cylinder, the piston will be forced to move against the air pressure provided by line 352. The cylinder operation by means of such differential pressure provides for smooth operation of the cylinders.

Air coming in on the main air line 350 is also fed to a secondary line 380. Line 380 is also provided with a pressure regulator 382 and oil feed valves 384. The air is then branched into line 386 to one end of cylinder 136 by means of the line 388 which is connected to line 386 and to a similar end of cylinder 137 by means of line 389 which is also connected to the common air line 386. A solenoid valve 390 is provided on line 386 for opening and closing this air line. Normally, when the belts are in a relaxed position, the solenoid valve is open which allows air to push the piston to its full extent. Air is also branched off from the line 380 to a line 392 which feeds air to the opposite side of cylinders 136 and 137 by means of lines 394 and 396. A solenoid valve 398 is also provided on the line 392 to open and shut the air going into that end of the cylinders. When tension is required on the blankets 96 and 98, the solenoid valve 390 is normally closed and the solenoid valve 398 would be open, thereby forcing the piston arms to retract within the cylinders.

The fixing steam box assembly D as shown in FIGS. 2, 3 and 8 comprises a pair of rectangular enclosures 152 and 154. Each enclosure is a mirror image of the other and together form the steam fixing assembly. Only one of the enclosures will be described for the purposes of simplicity while related elements in the other enclosure will be characterized by a subscript *a* added to the reference numeral. Enclosure 154 includes end walls 156, 157 and

side walls 158 and 159. A removable top cover 160 having handles 161 is provided for easy access.

A passage 162 is defined in the enclosure 154 by a top concave wall 164 extending in an upwardly sloping direction from the upper edge 165 of opening 166 in wall 159 to the upper edge 167 of opening 168 in wall 158. A bottom convex wall 170 forms the floor of the passage 162 and extends from the lower edge 171 of opening 166 to the lower edge 172 of opening 168.

The bottom wall 170 is perforated extensively as at 174 communicating with the steam chamber 175. The top concave wall 164 is provided with a longitudinal tapered slot 176 as shown best in FIG. 8, whereby the negative pressure in suction chamber 177 is equally applied along the width of the tubular fabric 20 passing through passage 162.

Referring to the drawings both enclosures 152 and 154 will now be referred to wherein perforated steam pipes 178, 178a extending from a steam header 180 are provided in the steam chambers 175 and 175a. Heating pipes 182 which conduct live steam but do not discharge it, are placed near the steam pipes 178, 178a to keep condensation to a minimum so that only dry steam reaches the tubular fabric 20 between the blankets 96 and 98. Similar heating pipes 184 are also provided in the passage 162 just below the top concave wall 164 and 164a to keep the spent steam from condensing and to heat the incoming fresh air as it is forced through slots 176 and 176a into the suction chambers 177 and 177a.

In operation, blankets 96 and 98 carry the tubular fabric 20 through the passage 162 and over the convex wall 170 and 170a. Steam is fed through the header of 180 and is distributed in the steam chambers by means of the perforated pipes 178, 178a and is drawn upwardly through the perforations 174 and 174a in convex plates 170 and 170a. The heating pipes 182 keep the temperature within the steam chamber 175 and 175a from lowering thus keeping the steam dry. The steam after it passes through the perforations 174 and 174a seeps through the permeable blanket 96 and fixes the loops of the tubular fabric 20. A zone of negative pressure is built in the suction chambers 177 and 177a by means of the vacuum pump 70 which communicates with the suction chambers 177 and 177a by vacuum duct 72. This suction causes outside air to enter through the openings 166 and 166a which is in turn heated as it comes near the heating pipes 184. The spent steam which finds itself trapped within the passage 162 exhausts into suction chambers 177, 177a through the tapered slots 176, 176a. The steam is then drawn through the exhaust duct 72.

A suitable drainage is provided both in the steam chambers and the suction chambers to drain any unwanted condensation which is formed.

The combination of the blankets 96 and 98 and the tubular fabric 20 comes out of opening 166. Blanket 98 diverges from blanket 96 as it passes roll 126, thus relieving the pressure on the tubular fabric 20. As the blanket 96 proceeds about the roll 108, the tubular fabric 20 diverges from the blanket 96 and travels about driven heater roll 186, which is part of the heater roll assembly E. The tubular fabric 20 is taken off the heater roll 186 and passes over a similar driven heating roll 188 and then passes through the rotating roll 190 which is mounted on bracket 191 to an upright 92. The tubular fabric then proceeds about roll 192 and positioning roll 194 to the folding table F. Heating rolls 186 and 188 are of similar diameter and are driven at exactly the same speed in order to prevent any unnecessary longitudinal tension thereto.

The folding table F is similar to conventional tables already developed and it is obvious that these other folding tables can be substituted in place of the embodiment which will now be described.

Folding table F comprises a frame 196 including up-rights 197 and horizontal beams 198 arranged to form

an upper level 200 and a lower level 202. Fixed to the horizontal beams 198 of the lower level 202 is an upstanding cylindrical lift member 204. At the upper level 200, a sliding table 206 is adapted for horizontal sliding movement by means of wheels 208 freely mounted to angle beams 210 fixed in parallel relation to the underside of sliding table 206. The wheels 208 travel in guideways 209 mounted at level 200 to the horizontal beams 198. A vertically extending feeding arrangement 212 is provided centrally of the folding table F, over the sliding table 206 and transverse to the direction of movement of the sliding table 206.

Feeding arrangement 212 is adapted for up and down movement towards and away from the plane of said sliding table 206 by a yoke bracket 214 which is journaled to lift member 204 at 216.

Lift member 204 includes a cylindrical casing 218 having a longitudinal slot 220 extending in an axial direction. A rotatable screw 222 is journaled in bushing 223 concentrically within the casing 218. A gear wheel 224 is attached in a ratchet engagement at the top end of the screw as shown in FIGS. 9 and 10. When wheel 224 is turned in a clockwise direction, the cam surfaces 226 engage the balls 228 tightening them against the end of screw 222 forcing it to rotate in a similar direction. However, when the wheel 224 is turned in a counterclockwise direction the balls 228 are disengaged and the wheel 224 rotates freely about the end of screw 222. A rack gear 230 is provided on the underside of sliding table 206 and engages the gear wheel 224 with every pass, forcing the screw 222 to rotate clockwise intermittently.

Yoke bracket 214 includes a key portion 232 which protrudes within the casing 218 through slot 220 and subtends an internally threaded bushing 234 engaged on the screw 222. As the screw 222 rotates clockwise, the bushing 234 moves upwardly forcing the yoke 214 and the feeding arrangement 212 to move upwardly.

The feeding arrangement 212 includes a pair of upstanding bracket members 236 and 238 subtending a lead roll 240 which receives the tubular fabric 20 from positioning roll 194. A pair of cooperating, freely rotating rolls 241 deliver the tubular fabric 20 to the sliding table 206 as it passes below them.

The sliding table 206 as was previously described is adapted for sliding movement by means of wheels 208 riding in guideways 209. A pair of parallel endless chains 242 and 244 are engaged on driven sprocket components 243, 245 and 245a, respectively. (This arrangement is shown in FIGS. 3A and 11.) A connecting rod 246 is pivoted at one end to chain 242 and at the other end to a bracket 247 on the underside of sliding table 206. Similarly a connecting rod 248 is attached to chain 244 and bracket 249. As the connecting rods 246 and 248 follow the endless chains 242 and 244 along one run between sprockets 243, 245 and 245a, respectively, the sliding table 206 is pulled in one direction and as it follows the chains 242 and 244 in the other run, is pulled in the opposite direction. Conventional cam operated lever gripping arms 250 and 252 are also provided at opposite ends of the table 206 and are operated by cam ways 253 and 253a.

In operation, the tubular fabric is received from the heating rolls assembly E by the intermediary of freely rotating rolls 190, 192, 194. The tubular fabric 20 passes over the lead roll 240 and down through the pair of feeding rolls 241. The sliding table 206, which reciprocates below the feeding rolls 241, receives the tubular fabric and the reciprocation of the sliding table 206 causes the fabric to be piled in a folded orderly fashion as shown (in FIG. 3A) the rack gear 230 engages the ratchet fold and press downwardly on each fold of the fabric as it is being fed.

Anytime the sliding table 206 moves toward the left (in FIG. 3A) the rack gear 230 engages the ratchet gear 224 and causes it to rotate counterclockwise. As was described previously, when the gear wheel 224 rotates

counterclockwise, the balls 228 are loose and no force is exerted on the screw 222. However, once the sliding table 206 reaches the end of its path, and returns towards the right of the frame in FIG. 3A, the rack gear 230 causes the gear wheel 224 to rotate in a clockwise direction whereby the balls 228 will be tightened against the screw 222 and forces the screw 222 to rotate clockwise slightly. Each time the screw turns clockwise, the threaded bushing 234 creeps slightly up the screw forcing the yoke 214 and the feeding arrangement 212, which it carries to move upwardly, a small distance. This small distance corresponds to approximately the thickness of one layer, that is each time the sliding table 206 completes a circuit, the feeding apparatus has moved upwardly to compensate for the increased thickness of the resulting folded pile of tubular fabric 20. As the complete pile is formed, and it is cleared away from the sliding table, the feeding apparatus 212 can be returned to a starting position by rotating the screw counterclockwise. This is done manually by rotating the handle 254 which activates gear train 256 connected to the screw 222 by chain 258. Incidentally the gear rack 230 can also be adjusted by means of an adjustment screw 260.

The driven components of the complete assembly are all driven by a single electric motor 300. Electric motor 300 drives an electrically-controlled automatic gear box 302. Driven roll 76 is driven by a V belt 304 which passes about pulley 306 which is in turn connected to pulley 310 by the V belt 308. Strap 312 drives pulley 310 and is in turn connected to the shaft of roll 100. Roll 100 is in turn connected to a pulley 314 by means of V belt 316 which is in turn connected to a gear box 302. Similarly, the driven rolls 90 are connected to a pulley 318 through gear box 302. The pulley 318 is connected to the gear box 302 by means of V belt train 320.

The heater rolls 186 and 188 are driven by means of V belt 323 which is driven by pulley 324 of gear reducing box 326. Gear reducing box 326 is operated by the belt 328 which passes around pulley 314 and 315. Driven sprocket wheels 242 and 244 on the folding table apparatus are driven by V belt 330 from a gear reducing box 322 which is in turn driven by V belt 334 which passes over roll 186.

The evacuation system is operated mainly by a vacuum pump 70 which is driven by a separate electric motor 71. Various ducts 72 lead from the steam chambers as previously explained, which are all connected to a main duct leading to the vacuum pump 70. The discharge duct 73 from the vacuum pump 70 leads to a central exhaust system which in this case is shown as being underground.

Suitable dry steam pipes 350' conducting steam from a steam source to the heating pipes within the various steam boxes are provided. Steam conduits 352' are also provided for furnishing dry steam to the distributors 60 and 180 of the various steam boxes.

I claim:

1. An apparatus for treating tubular fabric comprising a conditioning chamber, stretching means adjacent said conditioning chamber adapted to be located within said tubular fabric for transversely expanding the same; moving means cooperating with said stretching means for moving said fabric longitudinally while the same is being expanded transversely; a pair of permeable, driven band means engaging each other and gripping the tubular fabric therebetween as it moves off the stretching means to prevent longitudinal tension of the fabric and for controlling the transverse contraction thereof, said band means including a pair of continuous blankets passing over a series of laterally extending rolls and one of said rolls is driven, arranged so that one run of each blanket engages the similar run of the other blanket, and a pair of said rolls hydraulically controlled for movement which tends to lengthen the path of at least one of the continuous blankets thereby applying tension to said blanket.

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2. An apparatus as defined in claim 1, wherein said conditioning chamber comprises a rectangular housing having opposed side walls, longitudinal slots defined in said opposed side walls for passing the flattened tubular fabric, steam-applying means in said housing on each side of the path of said tubular fabric adapted to distribute dry steam evenly across the fabric, heating means within the housing for minimizing the amount of steam condensing in the housing, and evacuation means for exhausting excess steam from said housing.

3. An apparatus as defined in claim 2 including means for trapping dry steam which comprises a first enclosed steam chamber on one side of one of said permeable band means and a second enclosed exhaust chamber on the other side of said other band means opposite from said steam chamber, the enclosed steam chamber presenting a convex wall on one side of said one band means and said exhaust chamber presenting a concave wall opposed from said convex wall defining a path of travel for said band means passing with the fabric, said convex wall being perforated to allow the steam in said steam chamber to pass into the passage defined by said convex and said concave exchange position whereby said steam is trapped, through said band means and said tubular fabric, slot means in said concave wall communicating with said exhaust chamber for permitting excess steam from said trapped steam chamber to be exhausted and evacuation means communicating with said exhaust chamber for exhausting said steam from said exhaust chamber.

4. In an apparatus as defined in claim 2, wherein said conditioning chamber comprises elongated heating members located in said chamber for keeping said steam above its condensation point, said heating members being located near said slots in said side walls wherein air from the exterior of said housing is heated to the predetermined temperature of said chamber.

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5. An apparatus as defined in claim 1, wherein a motor and cooperating drive means are provided for driving said moving means and said band means.

6. An apparatus as defined in claim 1, wherein at least one of said rolls is adapted for diverging movement relative to the normal axis of the roll with respect to the continuous blanket associated therewith whereby said blanket can be adjusted along its longitudinal axis by proportional diverging movement of said roll.

7. An apparatus as defined in claim 1, wherein said continuous blankets are made of a woven material including multifilament warp threads of Terylene and monofilament weft threads of nylon.

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