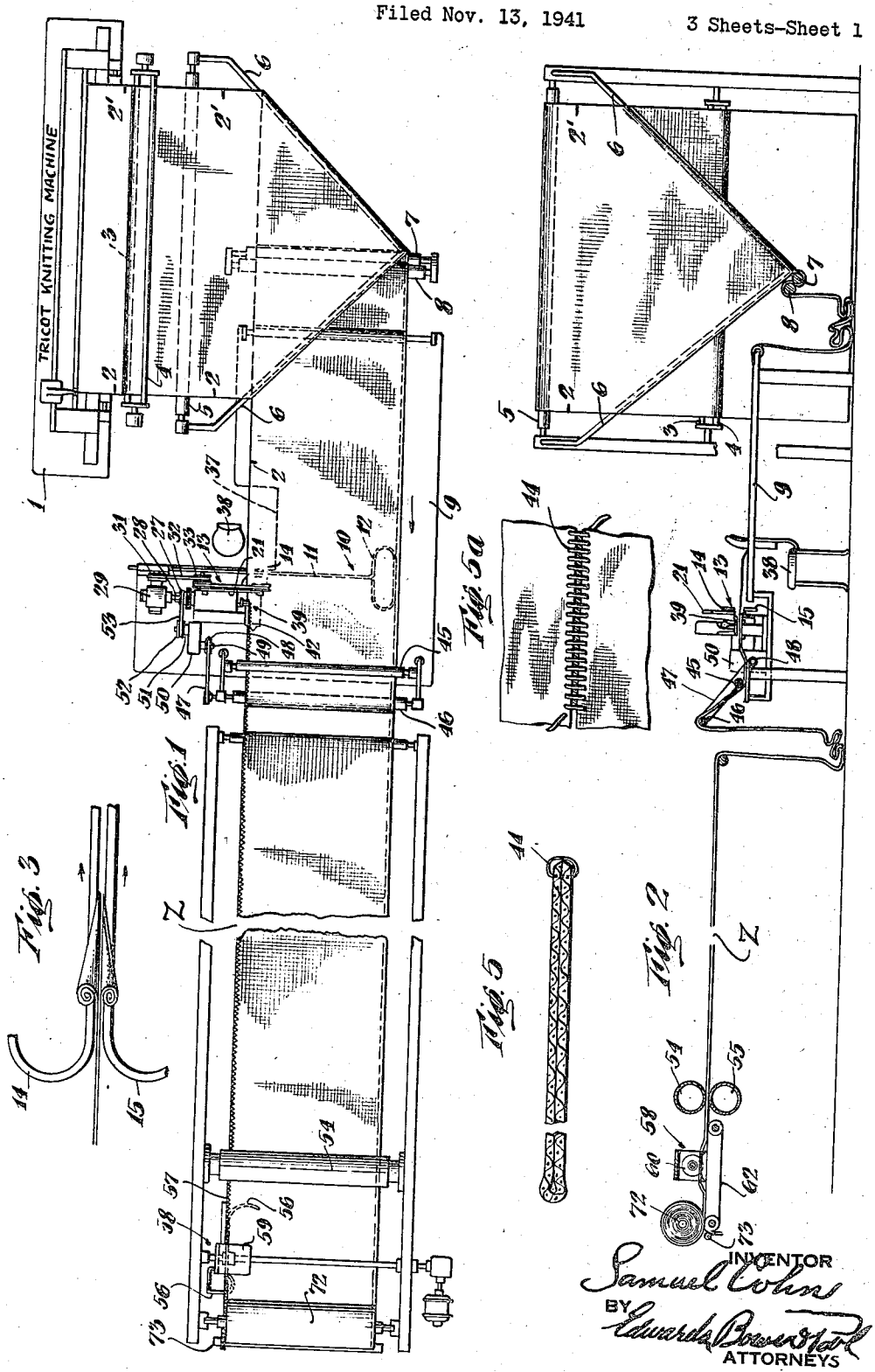
June 8, 1943. S. COHN 2,321,010

METHOD AND APPARATUS FOR TREATING FABRICS

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METHOD AND APPARATUS FOR TREATING FABRICS

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Fig. 6

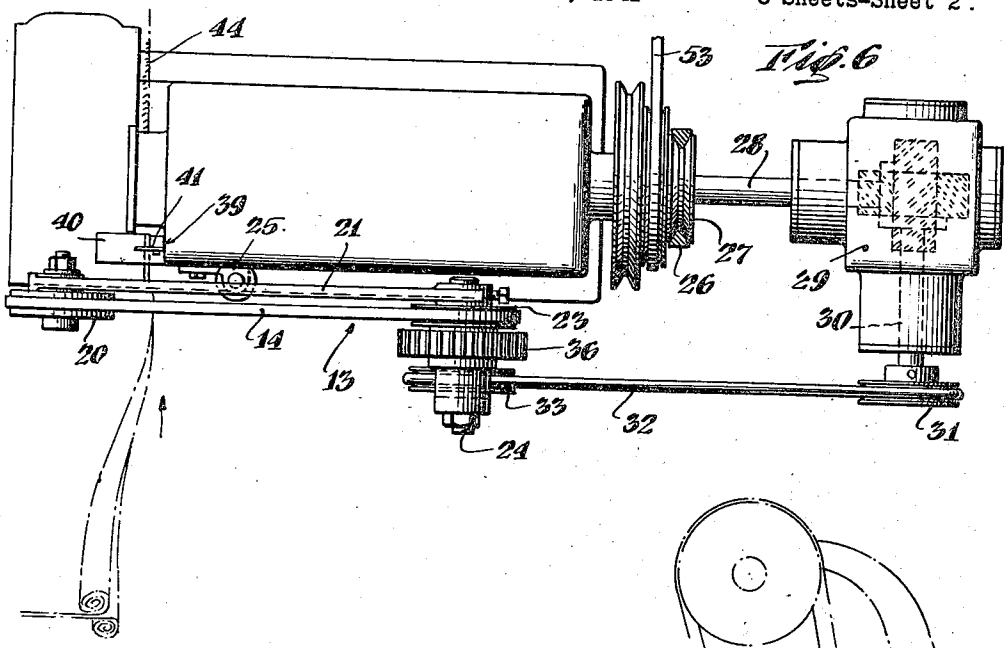


Fig. 7

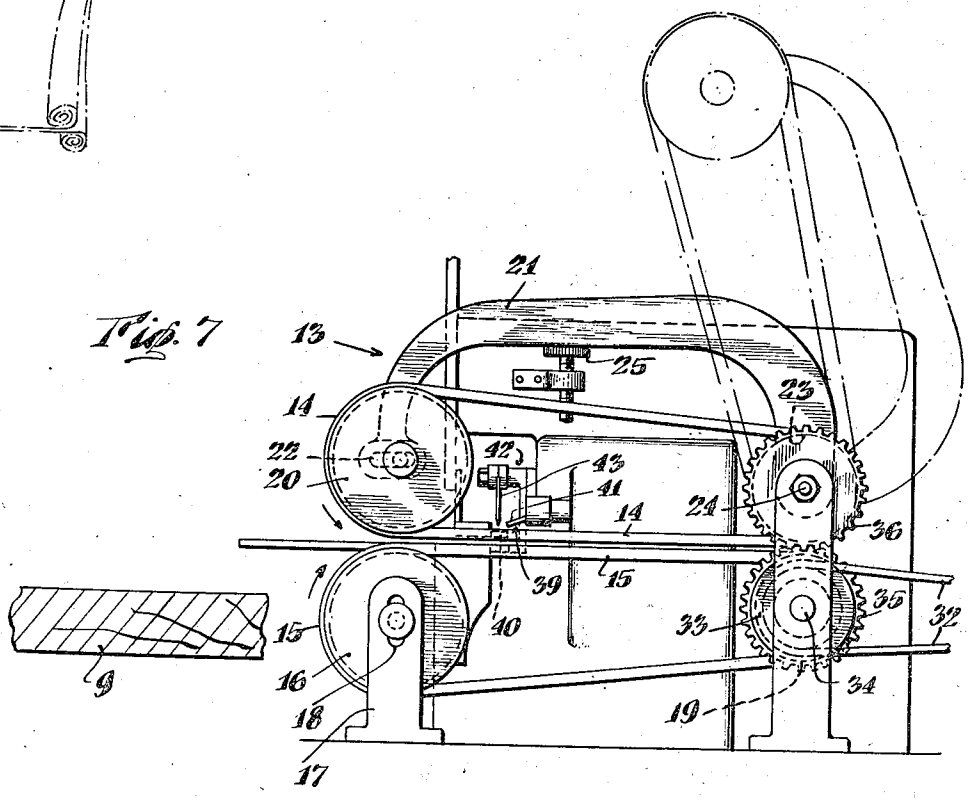
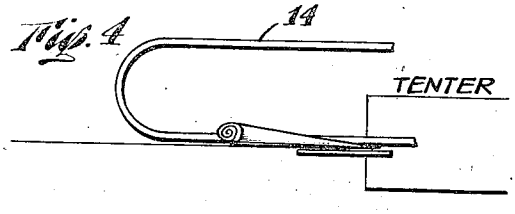


Fig. 4



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METHOD AND APPARATUS FOR TREATING FABRICS

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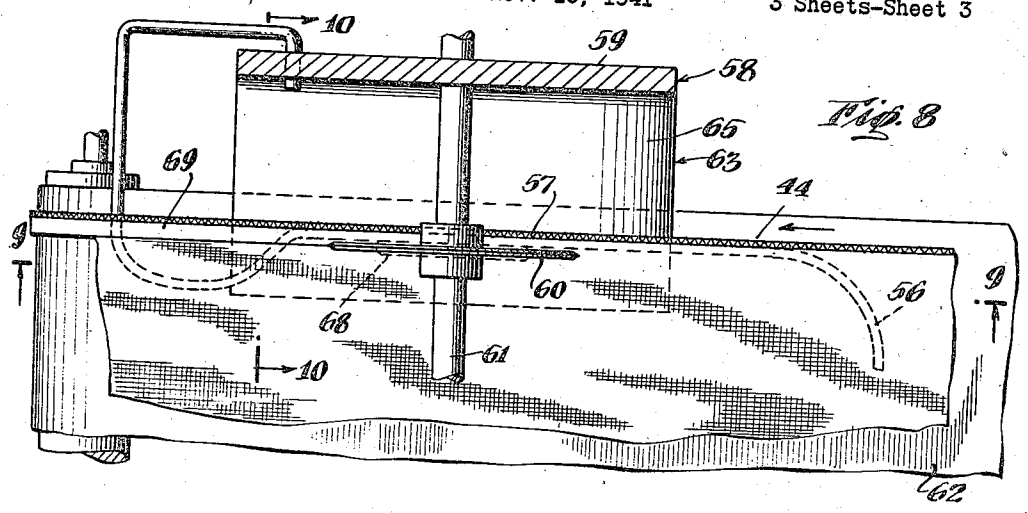


Fig. 8

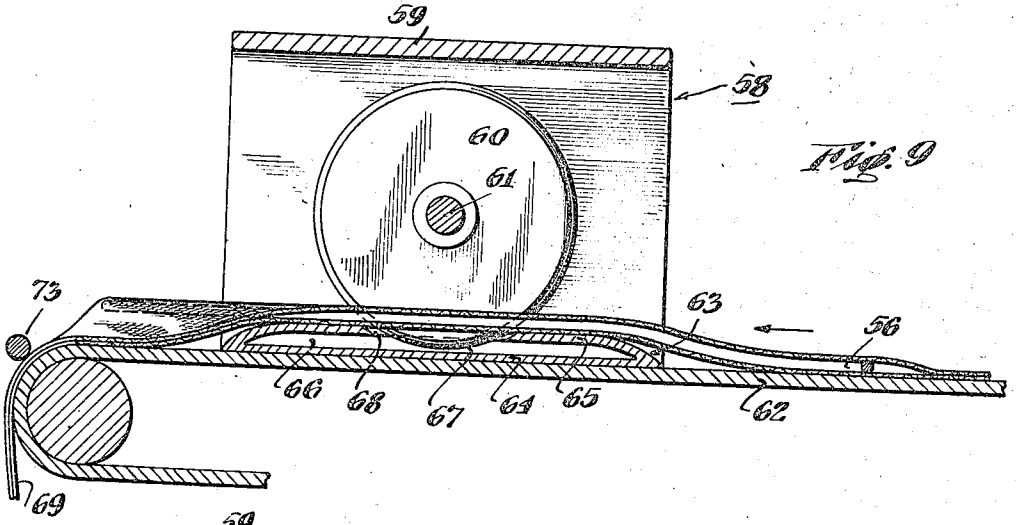


Fig. 9

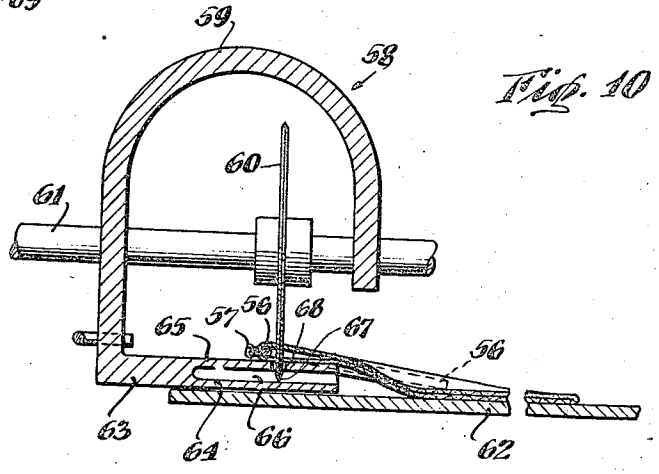


Fig. 10

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UNITED STATES PATENT OFFICE

2,321,010

METHOD AND APPARATUS FOR TREATING FABRICS

Samuel Cohn, New York, N. Y.

Application November 13, 1941, Serial No. 418,939

17 Claims. (Cl. 26—1)

My invention relates to machines for handling flat, open, woven or knitted fabrics before and after processing and finishing and is particularly useful in connection with flat knitted rayons which because of their structure are easily pulled out of shape and so require special care to prevent distortion.

Heretofore, in processing open goods of this type it has been customary to subject the fabric to tentering operations. This includes grasping the material by the edges and stretching it in width in the course of the finishing operations. Such treatment, particularly of wide flat knitted fabrics, tends to distribute the wales unevenly throughout the width of the fabric and causes excessive lengthwise stretching of the fabric because the grasping means of the tenter frames, which may be clips or pins, prevents the fabric from shrinking lengthwise when being pulled out to width.

I find that such flat knitted fabrics may be more uniformly treated if the cloth is in tubular form so that it may be uniformly spread to width while allowed to contract lengthwise. An object of this invention is to provide a method of handling open unfinished fabric which consists of doubling such fabric, securely seaming the edge to form a fabric tube with the transverse wales accurately in alinement, processing and finishing such fabric while in tubular form and then restoring the fabric to open form prior to final winding.

A further object of my invention is to provide apparatus for straightening and alining the edges of fabric after it comes from such machines so that the edges may be sewed together with the transverse wales in correct parallel alinement.

A further object is to provide means for accurately positioning, trimming and sewing the edges of the fabric so as to form a tube in preparation for processing operations.

A further object is to provide rotary cutting means adjacent and prior to the final rolling up of the fabric for removal of the sewn edge and thereby restoring the material to open form.

A further object of my invention is to provide a method of handling open knitted goods which consists of marking with alining marks doubling the fabric, unrolling the curled edges and stitching them together, processing the cloth while in tubular form after which the sewed edge is cut off and the finished fabric wound in open form upon a mandrel.

My invention is illustrated in the annexed drawings, in which

Fig. 1 is a top view of a knitting and finishing machine embodying my invention;

Fig. 2 is a side view thereof;

Figs. 3 ands 4 are side views of my improved means for uncurling the edges of the fabric as it comes from the knitting machines;

Fig. 5 is a cross section of the fabric after edges thereof have been trimmed and sewed together;

Fig. 5*a* is a top view of a portion of the fabric with the trimmed and sewed edges spread in the same plane;

Figs. 6 and 7 are respectively top and side views of my machine for uncurling, trimming and sewing together the edges of the fabric;

Fig. 8 is a top view of my improved rotary cutter, the top of the housing thereof being removed; and

Figs. 9 and 10 are sections taken along lines 9—9 and 10—10 of Fig. 8 respectively,

Referring to Fig. 1 fabric is knitted on a usual type machine 1 for making open goods, a Tricot knitting machine being illustrated at the right of the figure. As the material is being knitted the operator simultaneously marks opposite edges thereof with suitable markings 2, 2' to serve as guides for alining the fabric when the edges are subsequently sewn together.

The fabric next passes over idle guide roll 3 and under roll 4. Then the fabric is propelled vertically and over idler roller 5 (Fig. 2). Next the cloth is drawn over V-shaped doubler bars 6 and through driven creasing rolls 7, 8 which crease the flat fabric strip along its longitudinal axis.

The creased fabric accumulates from the rolls 7, 8 as indicated in Fig. 2 and is then drawn across a work table 9 and over loop spreader 10. This spreader consisting of a horizontal bar 11 terminating in a looped portion 12, guides and spreads the fabric as it travels towards the uncurler.

Since the fabric has not yet been processed and finished the stitches have not become set and the fabric tends to curl at the edges (Figs. 3, 6). The next step consists of uncurling these edges in preparation for trimming and stitching. This is achieved by means of my uncurling machine 13 (Figs. 6, 7).

My uncurling machine 13, shown in detail in Fig. 7, consists of two driven friction belts 14, 15 engaging the upper and lower plies of the fabric and unrolling the edges. The lower belt 15 is supported on the left (Fig. 7) by idle pulley 16 which in turn is held by support 17 and is ver-

tically adjustable by means of slot 18 in said support. This belt is driven by pulley 19 (right of Fig. 7) which rotates clockwise.

The upper belt 14 passes around idle pulley 20 at the left of Fig. 7. The pulley is held by a bow-shaped casting 21 and may be adjusted horizontally in slot 22 at the lower left end of casting 21. Belt 14 is driven by pulley 23 which rotates counterclockwise.

Bow support 21 is pivoted at its right end so that it may be raised to the position indicated by the dot and dash lines in Fig. 7 when not in use. When in operative position the bow is lowered as illustrated in full lines in Fig. 7 and rests upon an adjustable screw support 25. Proper vertical positioning of the bow is secured by raising or lowering this screw.

In operation, belt 26 (Fig. 6) driven from a source of power (not shown) rotates pulley 27 and shaft 28. Gearing in gear box 29 rotates shaft 30, pulley 31 (Fig. 6) and belt 32 (Figs. 6, 7). This in turn rotates pulley 33, shaft 34 and pulley 19, to drive the lower belt 15.

Rotation of shaft 34 turns gear wheel 35 which meshes with gear 36 driving shaft 24 and pulley 23 to drive the upper friction belt 14.

After leaving the spreader the open edge of the fabric passes between moving belts 14, 15 of the uncurler. These gently engage the upper and lower plies of the fabric respectively, unroll the curled edge portion of the material (Figs. 6, 3) and maintain it in flat form as it moves on to cutting and sewing machines. Such belts are driven at a high speed and in a direction transverse to the line of travel of the fabric. Preferably these belts are of rubber or other friction-creating surface.

For convenience in feeding the fabric to the uncurler the latter is positioned in a recess 37 in the top of work table 9 (Fig. 1) with the operable portion of the uncurler belts slightly above the plane of the work table top. By this arrangement the fabric edge is readily brought into operative relationship with the uncurler belts 14, 15 while the raised position of the belts flexes the material and assists in maintaining the edge in flat form for a short space after leaving the uncurler.

Where only one ply of fabric is being treated the lower belt of the uncurler is unnecessary and may be omitted. This situation is illustrated in Fig. 4 where the edge of a single thickness of material is shown being uncurled prior to tentering operations.

After the fabric leaves the uncurler an operator stationed at chair 38 (Figs. 1, 2) checks to see that edge marks 2 register with corresponding marks 2' on the opposite edge of the fabric. In this way the operator is assured that the fabric is being folded evenly and that when the open edge subsequently is sewn together the resulting tube will be in accurate transverse alinement.

Next the fabric proceeds to the cutting machine 39 (Figs. 2, 7). This consists of a stationary cutter bar 40 and a reciprocating blade 41 of usual construction. In place of the cutters shown other types may be used such as a rotating cutter wheel.

The cutter trims the edges of the fabric in preparation for sewing which follows at once. During both operations the edges are maintained against uncurling by the action of belts 14, 15 on the adjacent material.

The sewing machine 42 (Fig. 7) is equipped with a needle 42 for making an overedge stitch 44 illustrated in Figs. 5 and 5a. While other forms of stitching, such as chain stitching, may be employed I prefer to employ stitching of the sort shown in Figs. 5 and 5a since when the fabric is subsequently distended over stretchers a butt seam results, permitting the fabric to respond to treatment more nearly in the manner of seamless tubular material.

After stitching, the fabric travel beneath an idle roller 45 (Figs. 1, 2) and then over a driven roller 46. The latter is rotated by means of belt 47 (Figs. 1, 2) which in turn is driven by pulley 48 on shaft 49 (Fig. 1) through reduction gears in reduction gear box 50, shaft 51, pulley 52, belt 53 and finally, belt 26 (Fig. 6) which is itself attached to a source of power (not shown).

The fabric is now ready for the usual finishing operations such as dyeing, drying, shrinking, stretching, steaming and finally pressing. During these operations the material may be handled on the usual type of machine for finishing tubular fabrics such as that shown, for instance, in Cohn and Walter Letters Patent No. 2,109,469 granted March 1, 1938 and in Butterworth et al. Letters Patent No. 2,301,249 granted November 10, 1942.

Having passed through finishing and drying machinery, the fabric is drawn over spreaders (not shown), is flattened again and run in flattened condition and travels between calendering rollers 54, 55 (Fig. 2) and drops upon moving belt conveyor 62 which carries the material to cutting machine 58 (Figs. 8, 9, 10).

After traveling a short distance on belt 62 the seamed edge 57 of the fabric comes in contact with cutter guide 56 (Figs. 8, 9, 10). This guide leads the edge into operative position with cutter wheel 60 at a point slightly above the plane of the moving conveyor belt and acts to position and support the fabric while the seamed edge is trimmed off by the cutter.

The cutting machine 58 consists of a housing 59 containing a cutter wheel 60 mounted on a rotating shaft 61. The bottom 63 of said housing (Figs. 9, 10) consists of a hollow casting having a flat underpart 64 and a convex upper surface 65 with a recess 66 intermediate the upper and lower portions of the casting. In trimming off the seamed edge of the material the upper convex surface 65 acts as a cutting table, the edge 67 of wheel 60 being arranged to cut the material and rotate in slot 68 and recess 66 in the bottom 64 of housing 59 (Fig. 10). By this operation the fabric is restored to open form.

Next the material may drop back onto moving conveyor belt (Figs. 8, 9) which transports it to wind-up mandrel 72 (Figs. 1, 2) upon which the finished fabric is wound.

In disposing of the waste strip of goods 69 (Fig. 8) resulting from cutting away the seamed edge, it may be first passed beneath a guide associated with the cutter and then under a driven roll 73 positioned behind the wind-up mandrel 72 before permitting the strip to drop into an appropriate waste receptacle (not shown).

By means of my invention, flat fabrics, particularly of wide widths, are easily and economically doubled and the edges uncurled and seamed together so that the material may be treated and finished while in tubular form. In this manner and with my apparatus the difficulties inherent in treating and stretching delicate materials on tenters of the sort in use on flat goods are altogether avoided and the finishing processes are subject to more close and exact control. After

treatment and finishing the seamed edge is accurately severed, thus restoring the goods to open form prior to finally winding up the goods.

In the system of this invention the flat cloth is smoothly and accurately handled with its wales in precise alinement. It is first folded with maintenance of this alinement and then so alined is trimmed and sewed to secure it in this condition throughout the treating processes at the stages indicated at Z, Fig. 2 (not shown in the drawings). These stages as well as the operations of the mechanisms shown are automatic so that there is no manual manipulation of the fabric beyond the checking of the alinement of the marked edges by the operator just prior to trimming. The flat fabric is therefore automatically formed into tubular shape and treated in this shape and then restored to flat condition continuously and automatically with consequent speed, accuracy and uniformity of treatment and uniform quality in the product. The usual tentering operations are rendered unnecessary and the fabric during treatment is evenly tensioned in tubular form and so maintained against the distortions accumulating in the course of the usual sequences operating upon it in flat form.

The apparatus for severing the edge of a traveling fabric tube disclosed and not claimed herein is claimed in my copending application Serial No. 486,515, filed May 11, 1943.

I claim:

1. The method of handling fabric comprising providing a fabric strip in a continuous length with free edges, progressively feeding the fabric and folding it to bring the edges together in doubled formation, progressively uncurling said edges and sewing them together while maintaining them uncurled and in alinement so as to give the fabric a tubular formation, progressively treating the tubular fabric in a finishing operation, and then opening the edges of the tubular fabric to disconnect said edges from each other and leave them free.

2. The method of handling continuous lengths of flat fabric consisting of propelling the fabric, doubling the moving fabric along its longitudinal axis, drawing the doubled fabric over a spreader bar, progressively uncurling and alining the fabric edges, trimming and then stitching said edges together while uncurled and in alinement to give a tubular formation of the fabric, subjecting the fabric to finishing operations while maintaining it in tubular form, then severing the stitched edge of the fabric to disconnect said edges from each other and leave them free.

3. The method of handling continuous lengths of open unfinished fabric which consists of propelling the fabric, progressively uncurling the edges of the fabric, alining the edges while uncurled, trimming said uncurled edges of the fabric, stitching the edges together to form a tube while maintaining the edges uncurled and in alinement, processing and finishing the fabric while maintaining it in tubular form, and then opening the edges of the tubular fabric to disconnect said edges from each other and leave them free.

4. Apparatus for forming a tube of unfinished fabric which includes roll means for propelling a fabric strip, means doubling said strip along its longitudinal axis and forming two plies of fabric open at an edge thereof, means for uncurling and sewing said open edge consisting of a plurality of friction belts engaging said fabric above and below and moving in a direction transverse to the line of travel of said fabric to uncurl the upper and lower plies of said fabric at said open edge and temporarily to maintain said edge in flat form, and stitching mechanism adjacent said belts stitching said open edge together and forming a tube.

5. Apparatus as set forth in claim 4 in which the operative portion of said uncurling means is located above the plane of the remainder of the fabric, flexing the open edge of said fabric as the upper and lower plies thereof are uncurled.

6. Apparatus for forming a fabric tube consisting of a plurality of driven rolls propelling a fabric strip, doubler bars folding said strip along its longitudinal axis and forming two plies of fabric of equal width and having an open edge, spreading means including a transverse spreader bar having a looped spreader bar at an extremity thereof, said spreader being inserted between the upper and lower plies of said fabric and guiding said fabric, belt means uncurling the open edge of said fabric and stitching means adjacent said uncurling means stitching said open edge together and forming a tube.

7. Apparatus as set forth in claim 6 which includes means intermediate the uncurling and stitching means trimming the open edge of said fabric strip before said edge is stitched.

8. Apparatus for uncurling the edge of a traveling fabric strip including a belt having a substantially straight portion traveling outward at a side of said strip and engaging the curled portion of the fabric edge, said belt having a friction creating surface, and means driving said belt so that said straight portion engaging the fabric travels in a direction transverse to the path of the fabric strip.

9. Apparatus for uncurling the edges of a traveling strip of folded fabric consisting of equal superposed plies of fabric, said apparatus including upper and lower belts having substantially straight portions traveling outward and simultaneously engaging upper and lower plies of said fabric respectively, and means driving said belts so that said portions engaging the fabric travel in a direction transverse to that of the fabric strip.

10. Apparatus as set forth in claim 9 in which the operative surfaces of said belt means are above the plane of the remainder of said traveling strip, said belt means being driven at high speed and flexing the fabric edge passing therebetween.

11. The method of handling fabric comprising providing a fabric strip in a continuous length with free edges, progressively feeding the fabric and providing the fabric edges with alining marks and folding it to bring the edges together in doubled formation, and progressively uncurling said edges and sewing them together while maintaining them uncurled and in alinement so as to give the fabric a tubular formation, and treating the tubular fabric in flat spread condition in a finishing operation.

12. The method of handling fabric comprising providing a fabric strip in a continuous length with free edges, progressively feeding the fabric and providing the fabric edges with alining marks and folding it to bring the edges together in doubled formation, and progressively uncurling said edges and sewing them together while maintaining them uncurled and in alinement so as to give the fabric a tubular formation, and wet treating the tubular fabric and then drying

the fabric in flat spread condition in a finishing operation.

13. The method of handling continuous lengths of flat fabric consisting of propelling the fabric, doubling the moving fabric along its longitudinal axis, progressively uncurling and alining the fabric edges, trimming and then stitching said edges together while uncurled and in alinement to give a tubular formation of the fabric, subjecting the fabric to finishing operations while maintaining it in tubular form, then severing the stitched edge of the fabric to disconnect said edges from each other and leave them free.

14. The method of handling continuous lengths of flat fabric consisting of propelling the fabric, alining the fabric edges by periodic marking of the opposite fabric edges and progressively uncurling and alining the fabric edges, trimming and then stitching said edges together while uncurled and in alinement to give a tubular formation of the fabric and subjecting the fabric to finishing operations while maintaining it in tubular form.

15. The method of handling continuous lengths of flat fabric consisting of propelling the fabric, alining the fabric edges by periodic marking of the opposite fabric edges and progressively uncurling and alining the fabric edges, trimming and then stitching said edges together while uncurled and in alinement to give a tubular formation of the fabric, wet treating the fabric while maintaining it in tubular form and drying and calendering the fabric in flat spread condition, then severing the stitched edge of the fabric to disconnect said edges from each other and leave them free.

16. The method of handling fabric comprising providing a fabric strip in a continuous length with free edges, progressively feeding the fabric and folding it to bring the edges together in doubled formation, and progressively uncurling said edges and sewing them together while maintaining them uncurled and in alinement so as to give the fabric a tubular formation, and treating the tubular fabric in flat spread condition in a finishing operation.

17. The method of handling fabric comprising providing a fabric strip in a continuous length with free edges, progressively feeding the fabric and folding it to bring the edges together in doubled formation, progressively uncurling said edges and sewing them together while maintaining them uncurled and in alinement so as to give the fabric a tubular formation, progressively treating the tubular fabric in flat spread condition in a finishing operation, and then opening the edges of the tubular fabric to disconnect said edges from each other and leave them free.

SAMUEL COHN.