July 26, 1927. 1,636,683

S. COHN

MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 1

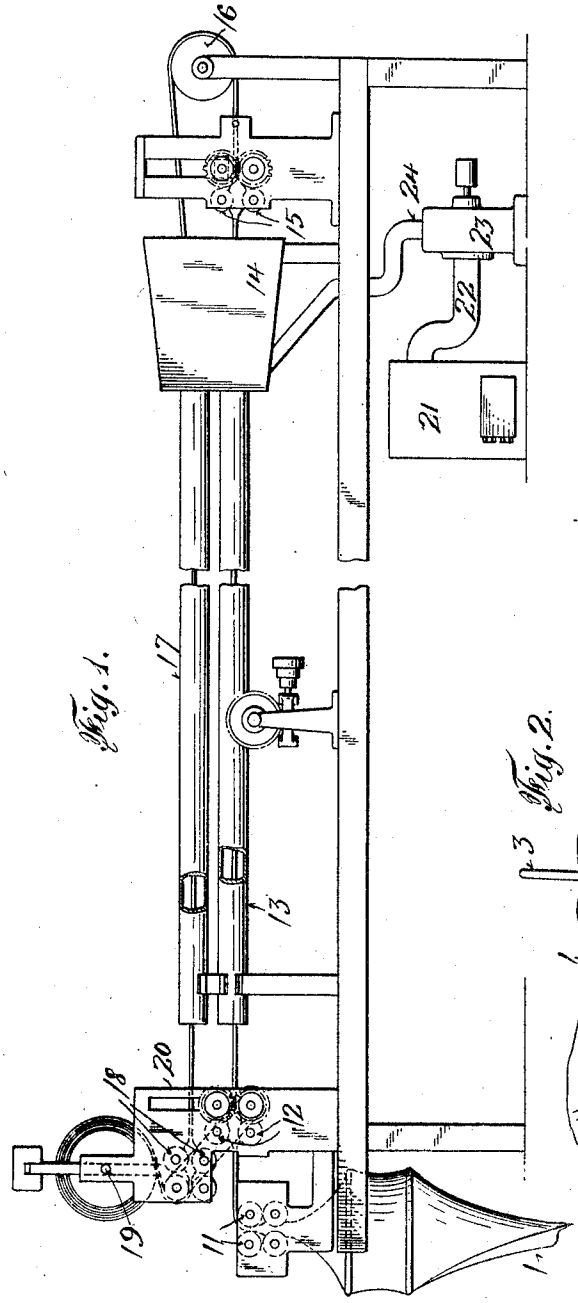


Fig. 1.

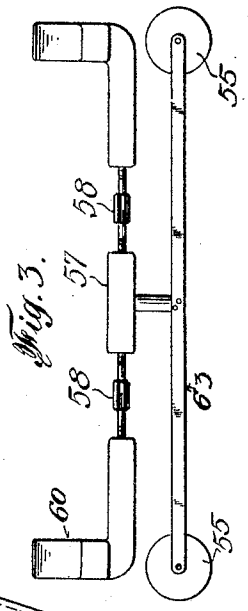


Fig. 3.

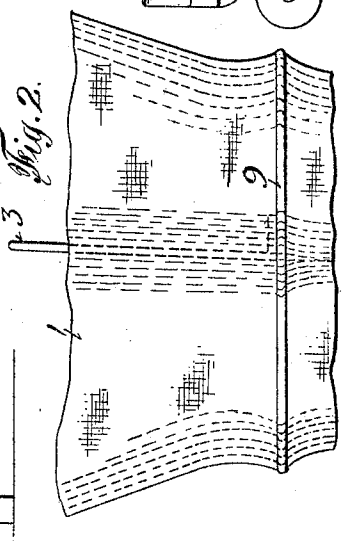


Fig. 2.

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MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 2

Fig. 4.

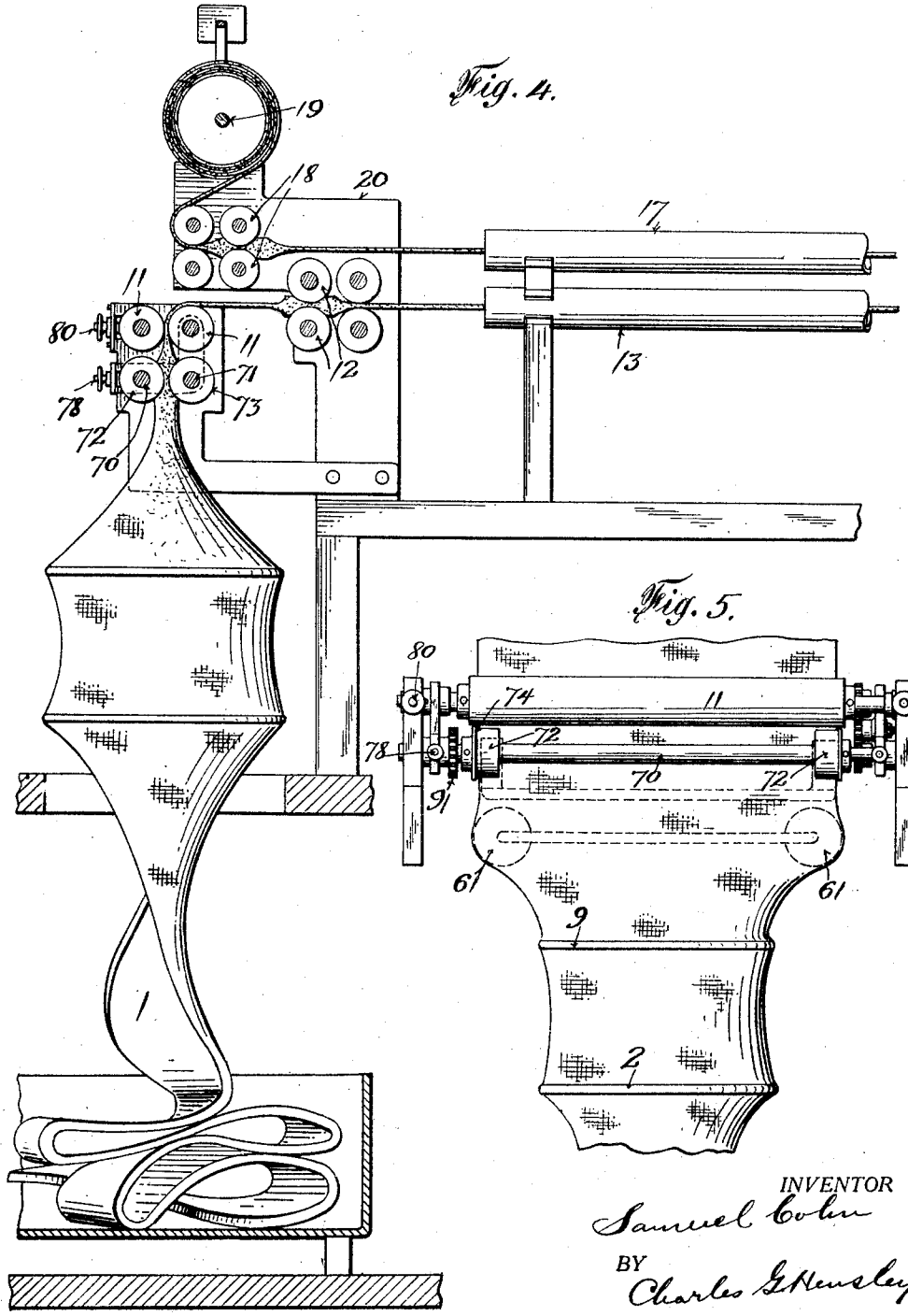


Fig. 5.

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MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 3

Fig. 6.

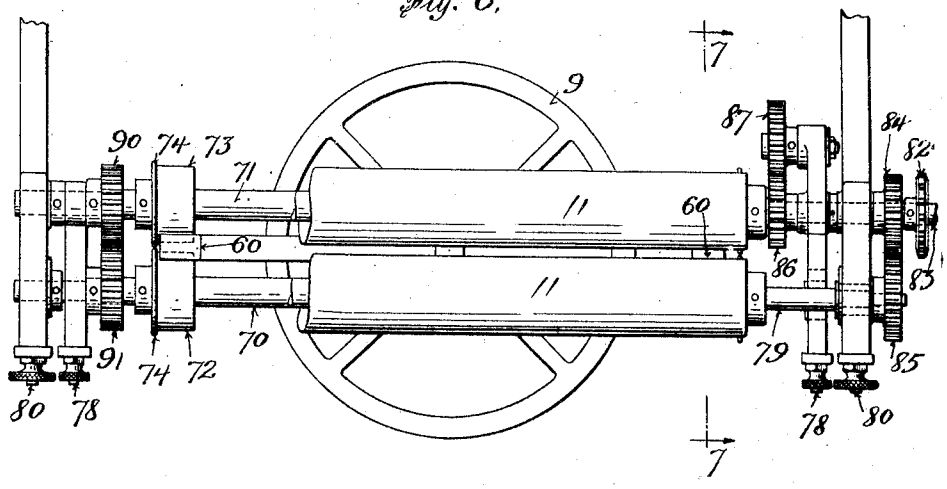
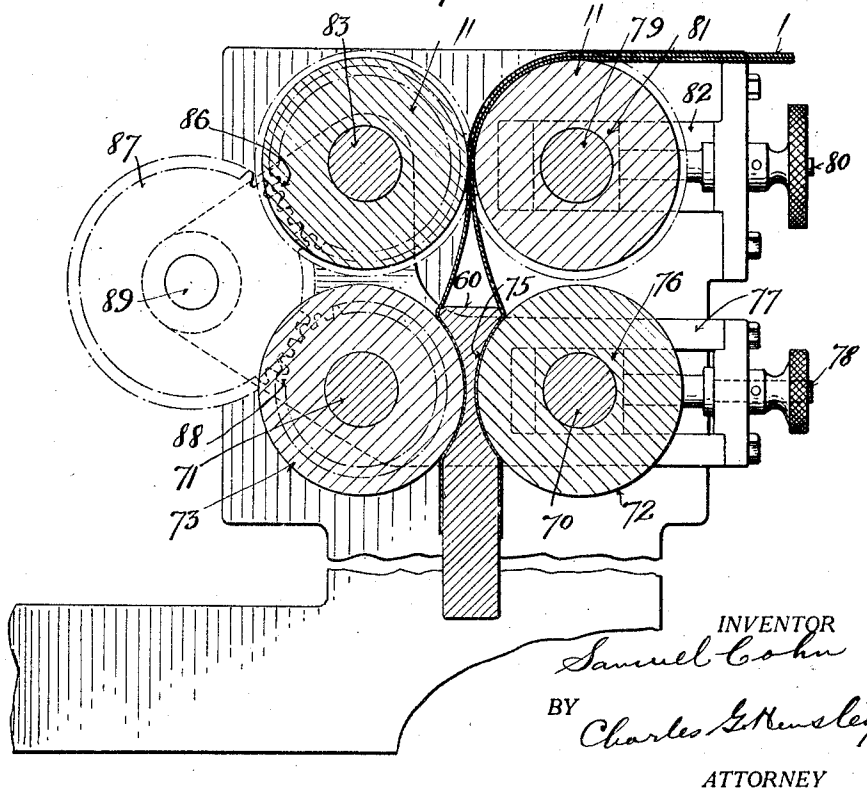


Fig. 7.



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MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 4

Fig. 7a

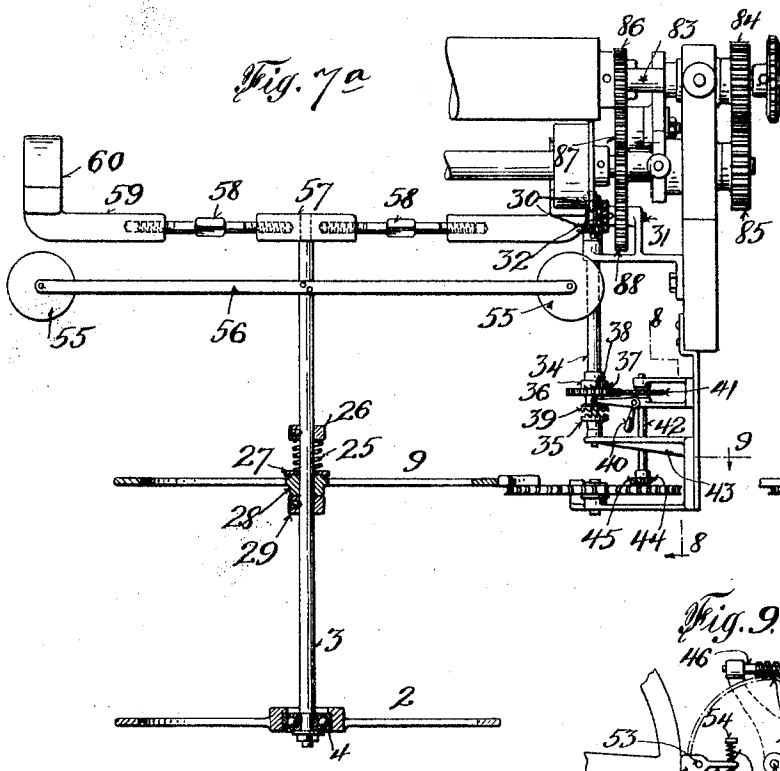


Fig. 8.

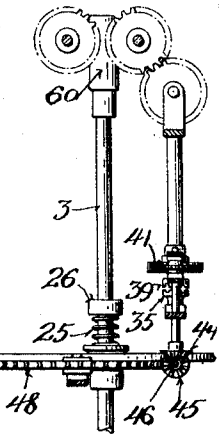


Fig. 9.

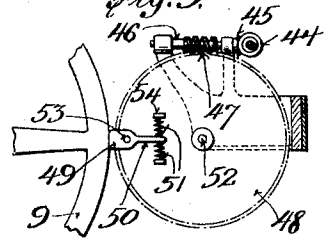
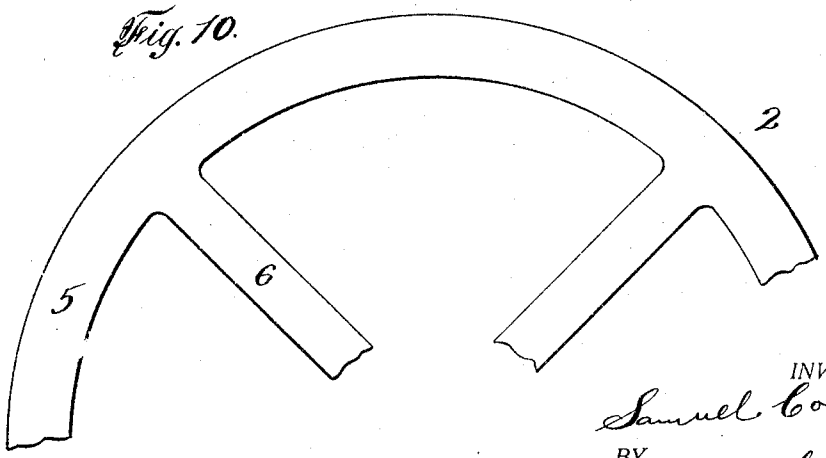


Fig. 10.



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MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 5

Fig. 11.

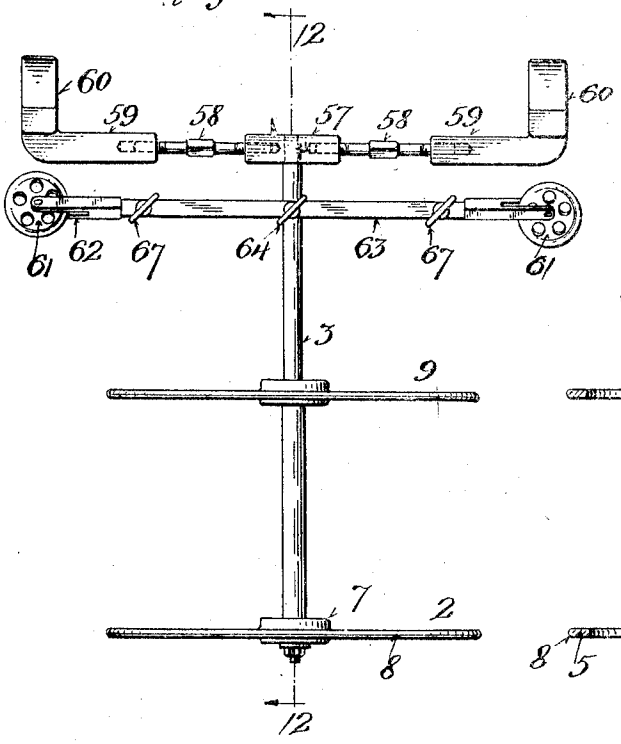


Fig. 12.

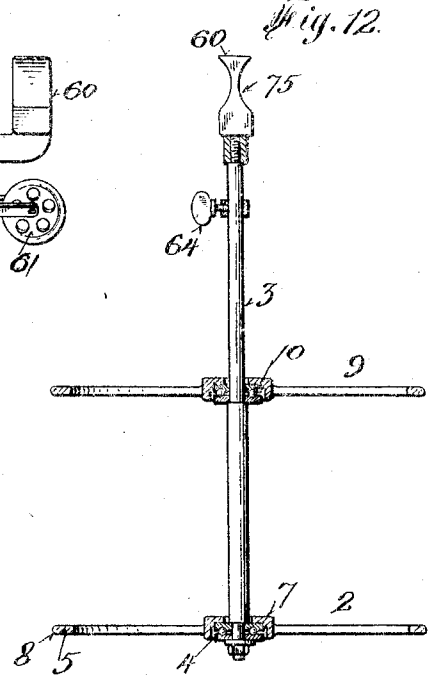


Fig. 13.

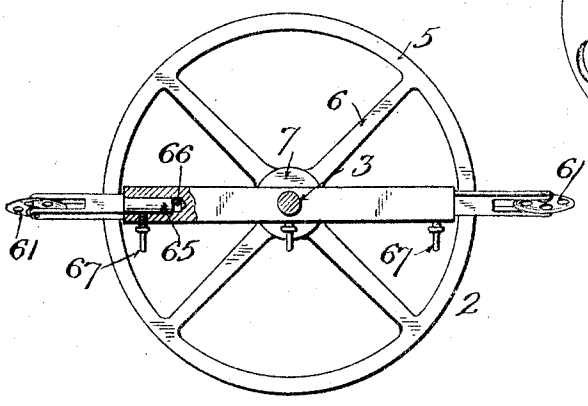
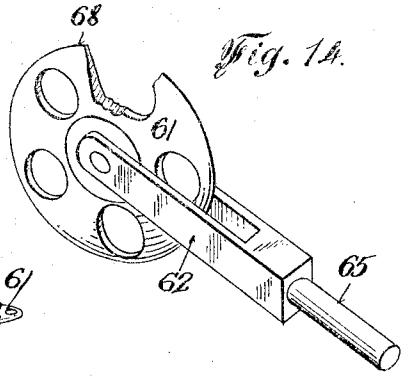


Fig. 14.



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MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC

Filed June 17, 1924 6 Sheets-Sheet 6

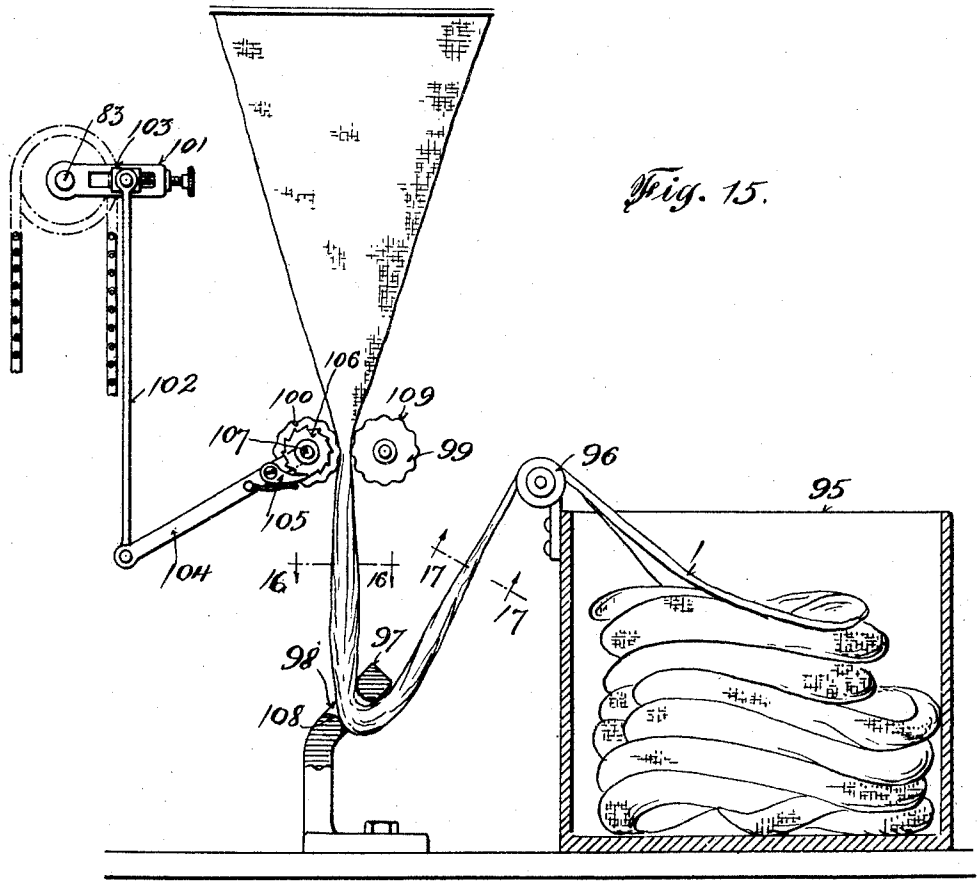


Fig. 15.

Fig. 16.



Fig. 17.



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Patented July 26, 1927. 1,636,683

UNITED STATES PATENT OFFICE.

SAMUEL COHN, OF NEW YORK, N. Y.

MACHINE FOR STRETCHING, DRYING, AND WINDING UP TUBULAR FABRIC.

Application filed June 17, 1924. Serial No. 720,547.

My invention relates to a machine for stretching, drying and winding up tubular fabric. The invention may be used for various industries but I believe that it is the first apparatus for stretching and drying tubular fabric of large diameter, such as knitted fabric from which garments are to be made, which will handle the tubular fabric in such a manner as to maintain the wale of the fabric in a straight line, automatically, notwithstanding the irregular position of the fabric prior to its passage into the machine. The present machine embodies means for stretching the fabric to uniform diameter and it is adapted to handle knitted fabric for the purpose of stretching it to the predetermined uniform size. The machine also embodies means for rapidly drying fabric evenly to maintain uniformity of size. It also includes means for winding the fabric into a roll with the wale in a uniform straight line. Heretofore, in handling knitted fabric, where the fabric was passed over a stretching member and afterwards wound into a roll there was a tendency for the knitted fabric to turn in relation to the stretching device so that when the fabric was wound into a roll the wale was disposed diagonally and not always at the same angle unless an operator were set at the winding machine to regulate its action in order to keep the fabric straight while being wound up. In the present case I provide a simple arrangement whereby the operator may adjust one of the members over which the fabric travels to correct the tendency of the fabric to move spirally. In the fullest embodiment of my invention, however, I provide means which automatically controls the direction of the fabric so that the wale continues in a straight line, even though the fabric is disposed irregularly before it reaches the machine.

Another object of my invention is to wind the fabric smoothly in flat form and to eliminate the tendency of the strip of fabric to curl at the side edges. Heretofore, where knitted fabric has been passed between rollers for winding the strip into a roll the fabric has been distorted in the winding action with the result that it had a tendency to curl at the edges. In the present machine I provide means for eliminating the tendency to curl so that distortion of the fabric in relation to its original structure is avoided. Other objects and advantages will appear in the detailed description hereinafter.

In the drawings forming part of this application,

Figure 1 is a side elevation of a machine embodying my invention,

Figure 2 is an elevation, on a larger scale, of part of the fabric stretching device,

Figure 3 is an elevation of the device for guiding the fabric just before it passes between the propelling rollers,

Figure 4 is a sectional view showing the relation of the stretching means to the drying means and also the final rolling-up device,

Figure 5 is an end elevation of part of the mechanism shown in Figure 4,

Figure 6 is a plan view of the same,

Figure 7 is a sectional view taken on the line 7—7 of Figure 6,

Figure 7ª is an elevation partly in section of mechanical means for imparting a movement to one of the fabric stretching members to cause a diagonal lead in the fabric.

Figure 8 is a sectional view taken on the line 8—8 of Figure 7ª,

Figure 9 is a sectional view taken on the line 9—9 of Figure 7ª,

Figure 10 is a plan view of one of the stretching members shown in Figure 7ª,

Figure 11 is an elevation of the stretching and guiding means in a modified form,

Figure 12 is a sectional view taken on the line 12—12 of Figure 11,

Figure 13 is a plan view of the same parts with portions broken away,

Figure 14 is a perspective view of one of the guide wheels with a portion broken away to show the shape of it,

Figure 15 is an elevation with parts in section showing the take-off and piling device,

Figure 16 is a sectional view taken on the line 16—16 of Figure 15, and

Figure 17 is a sectional view taken on the line 17—17 of Figure 15.

The present invention embodies means for engaging inside of the long tube of fabric, the fabric passing thereover and being stretched or distended in circular form; and from the stretching device the fabric passes between the guide rollers which roll it into flat form. After that the fabric passes through chambers where it is heated and dried, again stretched, and finally wound on

a suitable arbor in the form of a roll with the wale of the fabric extending parallel with the length of the tubular body. In Figure 1 I have shown part of the stretching and winding mechanism and also the drying device.

In Figure 1 I have shown a tubular body of fabric 1 which may be received into the machine from a body or bulk of fabric arranged in a box or it may come from a lower floor of the building in which the machine is arranged. It is assumed that the fabric arrives at the present device irregular, or with the wale of the tube of fabric twisted in various ways especially if the fabric has been passed through dyeing, bleaching or other liquid baths. Referring to the construction shown in Figures 11 to 14 the fabric, so far as the present machine is concerned, first passes over a circular disc or wheel 2 which is mounted on the lower end of a shaft 3 and it is adapted to turn very easily thereon due to the ball bearing 4 through which the wheel is mounted on this shaft. This wheel preferably consists of an annular rim 5 connected with the central hub 7 by means of spokes 6 and the wheel may be made of aluminum to reduce its weight and thereby permit it to be turned without material resistance. It is preferable that this member have a smooth and circular periphery 8 for the fabric to go easily over it. Spaced from the member 2 there is another circular disc or wheel 9 similar to the lower one and it is also mounted by means of a ball bearing 10 upon the shaft 3. Detailed description of the stretching device will be set forth hereinafter. After passing over the stretching members 2, 9, the fabric passes between a series of rollers 11 in Figure 1 and it then passes between a series of propelling rollers 12, which may be operated in the same manner as the corresponding rollers in my said co-pending application. From there the fabric, in the form of a flat strip, passes through the tubular heating chamber 13, in which a current of heated air is moving in the opposite direction to the travel of the fabric. The fabric emerges through a slot in the rear wall of the hood 14 and then passes between the propelling rollers 15 and partly around an idler 16 and the fabric returns through another slot in the rear wall of the hood 14 and travels through the tubular drying chamber 17 and after passing out of the left hand end of this chamber the fabric again passes between propelling rollers 18 and is then wound in the form of a roll upon an arbor 19 which is guided in the frame 20 of the machine in such manner that the roll of fabric rests on the propelling roller 18 and is driven by surface contact therewith. I have shown in the drawing the oven 21 in which the air is heated and from this oven the heated air is drawn through a pipe 22 by means of a blower 23 and is then forced through the pipe 24 into the hood 14 from which it passes through the heating chambers 13, 17 to act on the fabric to dry it while it is being propelled through these chambers.

Referring to the construction shown in Figures 7 to 10 it will be seen that the upper circular stretching member 9 is put under slight resistance by means of a coiled spring 25 surrounding the shaft 3 and compressed between the collar 26 which is fixed to the shaft 3 and between a washer 27 which presses on the hub 28 of the wheel member 9, forcing the latter against the collar 29 which is fixed to the shaft 3 below the wheel 9. The spring 25 places a slight frictional resistance upon the wheel member 9 so that the latter will remain in any position in which it is placed but it can be turned by very light pressure such as by the hand of the operator, in order to correct the lead of the fabric to keep the wale in a straight line. In addition to such adjustment or positioning as may be done by hand from time to time I have shown in these figures automatic and mechanical means for causing a definite diagonal lead of the tubular fabric to counteract the natural tendency of the fabric to move diagonally. The mechanical means shown in these views consist partly of a mitre gear 30 arranged on the shaft 31 which operates the mitre gears 32 meshing therewith. One of the mitre gears 32 is mounted on the end of the shaft 33 on the lower end of which is a clutch member 35 and the other mitre gear 32 is mounted on a sleeve 34 which surrounds and revolves independently of, the shaft 33; and this sleeve is provided with a clutch member 36, the teeth of which are pitched in the opposite direction to the teeth of the clutch member 35. There is a gear 37 which slides on the shaft 33 and on one side it carries a clutch member 38 which is adapted to engage with the teeth of the clutch member 36 and on the lower side it has a clutch member 39 adapted to engage with the clutch member 35 carried by the shaft 33. The gear 37 with its clutch members is adapted to be shifted up and down on the shaft 33 by means of a hand lever 40 for the purpose of having the gear wheel 37 turned clockwise or counterclockwise according to which of the clutch members are thrown into engagement. The gear wheel 37 drives a gear 41 mounted on a vertical shaft 42 which has its bearings in the brackets 43; and on the lower end of this shaft there is a mitre gear 44 which meshes with and drives a mitre gear 45 on the shaft 46. On this same shaft 46 there is a worm 47 which operates the worm gear 48 journaled on the stud 52; and this worm gear is provided with a shoe 49

pivoted at the point 53 the shoe having an extended arm 50 which is held in an intermediate position by means of compression springs 51 acting in opposite directions between the abutments 54. As the worm gear 48 revolves, the shoe 49 at each revolution engages with the wheel 9 and causes the latter to be turned a slight extent, after which the wheel 9 remains stationary under the action of the tension spring 25, until the gear 48 makes another revolution. In this manner a slow step-by-step movement is imparted to the wheel 9 for the purpose of causing a diagonal lead to the fabric.

The tube of fabric, which may be received from a box as shown in Figure 4, passes first over the freely revolvable wheel 2 and then over the wheel 9, engaging against the peripheries of these revolvable wheels and the fabric then passes over the idle rollers or wheels 55 fulcrumed on opposite ends of a spreader arm 56 which is mounted on the vertical shaft 3. The wheels 55 are spaced apart greater than the diameter of the wheel members, 2, 9, but they do not necessarily increase the diameter of the fabric to a corresponding extent because from the time the fabric leaves the wheel 9 it commences to be elongated to approach a flat condition so that when it passes over the wheels 55 it is almost in the form of a collapsed tube.

On the upper end of the shaft 3 I have shown a block 57 from which extend in opposite directions turnbuckles 58 which carry on their outer ends the arms 59 which may be adjusted in their width by means of the turnbuckles. At the outer ends of these arms and extending upwardly, there are grooved members 60 which are adapted to lie between certain propelling rollers to support the shaft 3 and the various parts mounted on it.

The tubular fabric is threaded into the machine by carrying the end over the wheel 2 and then over the wheel 9, after which it is passed over the spreading wheels 55 and over the supporting members 60 and from there it is passed through the feeding rollers, drying apparatus, etc. As the fabric is propelled by the feeding rollers it travels continuously over the wheel 2 and over the wheel 9 and between these two wheels there is some tension created in the fabric due to the stretching action of these wheels and to the propelling action upon the fabric. As the lower wheel 2 is free to turn with almost inappreciable resistance the tension has a tendency to cause this lower wheel 2 to turn right or left to partly conform to the direction of the wale of the fabric. Assuming that the fabric is in an irregular condition before it reaches the lower wheel 2 that is to say, the wale may be twisted in various directions, the tension referred to, together with the revolvability of the wheel 2 causes the latter to turn right or left to bring the wale of the fabric approximately in a straight line. It is found, however, that this is not entirely sufficient to bring the wale straight but that there is a tendency for the fabric to take a diagonal lead, the direction of which is determined by the construction of the fabric and this tendency is very often uniform and it may be counteracted by a contrary lead produced by the wheel 9 so that the wale is maintained in a perfectly straight line. If it is found after the fabric begins to move over the stretching members that the wheel 9 requires a movement clockwise or counterclockwise to produce the diagonal lead necessary to counteract the natural lead, the clutch lever 40 will be operated to throw the clutch member 38 into engagement with the clutch member 36 or else the clutch member 39 will be thrown into engagement with the lower clutch member 35. In one case the gear 37 will be revolved in one direction and in the other case it will be revolved in the other direction. The motion is transmitted through the gear 41 the shaft 42 and the mitre gears 44 and through the worm 46 to the worm gear 48 and at each revolution of the latter the shoe 49 will engage the wheel 2 and turn the latter slightly clockwise or counterclockwise, according to the position of the clutch lever 40. The slow step-by-step motion produced by the shoe 49 acting on the wheel 2 will produce a diagonal lead in the fabric sufficient to offset the natural lead of the fabric and thus keep the wale in a straight line. If at any time the operator should find that the automatic device is producing too great or too slight a lead the wheel 9 may be adjusted in either direction to straighten the wale.

The fabric passes over the spreader rollers 55 after it leaves the wheel 9 and it is spread out by these rollers to a width slightly greater than the width of the supporting members 60 in order to reduce the friction of the fabric upon the latter. Where the fabric engages over the spreader wheels 55 it assumes a different shape corresponding approximately to a flattened tube.

In Figures 11 to 14 I have shown a modified form of device for producing an automatic diagonal lead of the fabric to counteract the natural lead; and in this construction no operating mechanism is required other than that used to propel the fabric; and this form of mechanism is much simpler and is very effective. In this form I have shown the wheels 2, 9 mounted by means of ball bearings upon the vertical shaft 3 in spaced relation and the fabric travels over these wheels similar to its passage over the wheels 2, 9, in the construction first described; and to a certain extent the wheels 2, 9, are revolved right or left by the tension of the fabric to partially straighten the

wale. From the wheel 9 the fabric passes over the spreading rollers 61 which revolve freely in the ends of the forks 62 which are adjustably mounted on the cross arm 63 which latter is adjustably secured upon the vertical shaft 3 by means of the wing screws 64. Usually the wheels 61 are spaced apart wider than the distance between the supporting members 60 the same as the wheels 55 in the first described form. Each wheel 61 is journaled in a fork 62 which has a rounded stud 65 fitting into the bore 66 on one end of the spreading arm 63 and the fork is adapted to be turned on its axis and held in adjusted position by means of the thumb screw 67. This construction is the same for both spreading wheels 61. The spreading wheels preferably have very narrow or sharp peripheral edges 68. In setting up the device for operation the spreading wheel at one side or at one end of the arm 63 is set in a position which places the spreading wheel diagonally of the direction of movement of the fabric and the spreading wheel at the opposite side is also placed in a diagonal position as is shown in Figure 13. The extent of the pitch of these spreading wheels will depend upon the requirements of the fabric and the required pitch will be determined by observing the operation upon the fabric and adjusting them until the lead produced by these wheels exactly counteracts the natural lead of the fabric, and once this adjustment has been determined no further adjustment of these wheels is required unless different fabric is fed to the machine. As the fabric passes from the wheel 9, it travels over the spreading wheels 61 and due to their angular pitch the latter cause a diagonal lead in the fabric and by proper adjustment this lead may exactly counteract or offset the natural lead of the fabric so that as the latter travels between the propelling rollers the wale of the fabric will travel in a straight line parallel with the line of the tube of fabric. The wheels 61 may be set to cause a right or left hand diagonal lead in the fabric according to whichever is found necessary to offset the natural lead and this will depend upon the structure of the fabric as applied to the machine.

There is an upper pair of parallel rollers 11 between which the flattened tube passes and by which rollers the fabric is partially propelled, the fabric being engaged in the bight of these two rollers. Below and parallel with the rollers 11 there are parallel shafts 70, 71 at opposite ends of which are mounted rollers 72, 73 which may be adjusted along these shafts according to the width of the fabric which is being handled, but these rollers 72, 73 are of such width as to engage only the portion of the fabric at or adjacent the side edges, whereas the rollers 11 engage the full width of the fabric. I have shown flanges 74 on the ends of these small rollers which serve to guide the edges of the fabric. The supporting members 60 which carry the vertical shaft 3 and the associated parts are each placed between one of the pairs of rollers 72, 73 so that the latter press into the grooves 75. It is understood that the fabric is traveling over these supporting members 60 and therefore it passes between the rollers 72, 73 and the surface of the members 60. Owing to the engagement of the rollers 72, 73, within the grooves 75 of these supporting members, the latter cannot move upwardly nor downwardly and therefore the spreading device as a whole is supported from the rollers 72, 73. In order to adjust these rollers I have shown one of the shafts, 70, mounted in bearing blocks 76 which slide in the brackets 77 of the frame and these bearing blocks are adapted to be moved by means of the screws 78 to increase or decrease the distance between the pairs of rollers 72, 73. When the shaft 70 is moved to the right in Figure 7 the supporting members 60 may be inserted or removed and when they are in position the shaft 70 may be adjusted by means of the screws 78 to create the required pressure of the rollers 72, 73 upon the supporting member 60. In the same manner the shaft 79 which carries one of the upper rollers 11 is adapted to be adjusted by means of the screw 80 which moves the bearing block 81 of this shaft in the brackets 82 for the purpose of creating the required pressure between the upper pair of feed rollers 11.

The operating force for the several rollers is applied to the sprocket wheel 82′ from any suitable source and this acts directly on the shaft 83 of one of the upper feed rollers and the operation of this roller causes the movement of the roller 11 on the shaft 79 through the meshing gears 84, 85 on shafts 79, 83. The gear 86 fixed to the shaft 83 operates an intermediate gear 87 mounted on a stud 89. This intermediate gear operates the gear 88 arranged upon the shaft 31 and the ratio of these several gears is such that the peripheral speed of the rollers 72, 73 on the shafts 70, 71 is slightly greater than the peripheral speed of the upper feed rollers 11. On the shaft 71 there is a gear 90 which meshes with and drives a gear 91 fixed on the shaft 70 and through this connection the shafts 70, 71 are caused to revolve at the same speed in opposite directions.

Where tubular knitted fabric has been passed over the spreading members and is then propelled between rollers such as the upper rollers 11 there is a tendency for the fabric to curl at the edges due to the fact that the fabric is not propelled the same

at the edges that it is nearer the central portion. In the present device the several rollers 72, 73 which engage only the edge portion of the fabric move at a slightly greater speed than the rollers 11 and they therefore cause the edges of the fabric to move at the speed necessary to make the edges of the fabric travel the same as the remaining portion and as a result the fabric is propelled uniformly in all parts. This action, in addition to the stretching and justifying or wale-straightening operation referred to, enables me to introduce the fabric into the drying chamber with the wale lying straight in the direction of the length of the fabric and with the fabric lying flat or uncurled. From the first stretching and propelling device just described the fabric passes between propelling rollers 12 and it then passes into the drying chamber 13. Preferably, I provide a secondary stretching device as shown in Figure 3 which has supporting members 60 adapted to be held between the propelling rollers 12 in the same manner that the supporting members 60 are held between the rollers 72, 73. This spreading device has a spreading arm 63 on the ends of which are mounted idler spreading wheels 55 which do not have to be set in a diagonal position because the fabric will have been straightened before it arrives at this spreading device. Where the fabric emerges from the drying chamber 13 I prefer to propel it by means of another pair of propelling rollers 15 with which there is associated a spreading device similar to that shown in Figure 3. From there the fabric passes around the idler 16 and travels to the left in Figure 1 through the second drying chamber 17, and it is then propelled by means of another pair of rollers 18 with which there is preferably associated another spreading device like that shown in Figure 3. From there the fabric is wound in the form of a roll upon a suitable drum arranged on the arbor 19.

In order to feed the tube of fabric toward the ring 2 to prevent excessive strain on the subsequent feeding means and in order to prevent distorting the fabric in moving it up to the wheel or ring 2 I have provided novel propelling means. If the supply of fabric is placed in a receptacle such as the box 95 ready to be fed to the machine there is an idler roller 96 extending across one edge of this box, over which roller the fabric may pass easily. After passing over this roller the fabric passes through a guide 97. This guide has a bushing 108 of smooth material such as glazed porcelain and the opening 98 in it is circular and of such diameter that the knitted tubular fabric in passing through it will be bunched together so that it will appear ropelike in form. After passing through the guide 97 the fabric in the bunched condition passes between the feed rollers 99, 100. These rollers have corrugations 109 on their periphery and they act on the bunched fabric to propel it, drawing on the fabric to withdraw it from the box 95 and through the guide 97. From the propelling rollers 99, 100 the fabric travels onto and over the wheel 2 and the subsequent propelling means is relieved of the necessity of propelling the fabric to the wheel 2. By bunching the fabric in ropelike form before it passes between the propelling rollers 99, 100 the fabric is not distorted by these rollers as it would be if it remained in the flat form, with greater propelling stresses being exerted first on one side and then another. The rollers 99, 100 may be propelled from the shaft 83 by means of the following: There is a crank arm 101 fixed to the end of the shaft 83 and turning with it. There is a pitman 102 having one end pivoted to the crank arm 101 by a block 103 which is adjustable along the crank arm to increase or decrease the extent of movement of the pitman. The lower end of the pitman is pivoted to an arm 104 which is loosely journaled on the shaft 107 of one of the propelling rollers. This arm carries a pawl 105 which engages with the teeth of a ratchet wheel 106 fixed to the shaft 107. As the shaft 83 and crank arm 101 revolve, the pitman 102 is moved up and down and this rocks the arm 104 which carries the pawl.

The pawl 105 engages the teeth of the ratchet wheel 106 and turns the propelling rollers step by step, the extent of the turning movement being determined by the adjustment of the pivotal connection between the crank 101 and the end of the pitman 102.

As the tubular fabric is bunched together when passing through the guide 97 it is handled by the rollers 99, 100 very much like a rope rather than a flattened tube and sufficient pull may be exerted upon the fabric without distorting it.

From the above it will be apparent that I have provided means for spreading or stretching and drying tubular fabric and for winding it in the form of a flattened tube with the wale running straight in the direction of the length of the tube and that the tube is regular and even and will not curl at the edges. Whenever the machine is to be used for a fabric of different diameter suitable adjustment will be made in the positions of the rollers 55 or 61 upon the arms 56 or 63 and the spacing of the several supporting members 60 will be adjusted to correspond with the different diameter of the fabric.

Having described my invention, what I claim is:

1. A device of the character described comprising means over which tubular fabric is adapted to be propelled, and means includ-

ing stretching members, having surfaces directed diagonally of the movement of the fabric, for producing a diagonal lead in the fabric as it is propelled for the purpose set forth.

2. A device of the character described comprising means over which tubular fabric is adapted to be propelled, and means, including revolving members disposed with their peripheries diagonally of the travel of the fabric, for producing a diagonal lead in the fabric as it is propelled, for the purpose set forth.

3. A device of the character described, comprising means over which tubular fabric is adapted to be propelled, and means including revolving members lying inside the tubular fabric and serving to stretch the same and including revolving members disposed with their peripheries diagonally of the travel of the fabric, for producing a diagonal lead in the fabric as it is propelled, for the purpose set forth.

4. A device of the character described, comprising means over which tubular fabric is adapted to be propelled, and means, including revolving idlers lying inside the tubular fabric, disposed with their peripheries diagonally of the travel of the fabric, for producing a diagonal lead in the fabric as it is propelled, for the purpose set forth.

5. A device of the character described, comprising means over which tubular fabric is adapted to be propelled, and means, including revolving idlers lying inside the tubular fabric, disposed with their peripheries diagonally of the travel of the fabric, for producing a diagonal lead in the fabric as it is propelled, for the purpose set forth and means inside the tubular fabric and acting in advance of said idlers, for stretching the fabric into circular form.

6. A device of the character described, comprising means over which tubular fabric is adapted to be propelled, and means including revolving idlers lying inside the tubular fabric, disposed with their peripheries diagonally of the travel of the fabric, for producing a diagonal lead in the fabric as it is propelled, for the purpose set forth and means inside the tubular fabric and acting in advance of said idlers, for stretching the fabric into circular form and rollers for rolling the tubular fabric in flat form as it leaves said idlers.

7. A device of the character described, comprising means over which tubular fabric is adapted to be propelled, revolving idlers lying inside the tubular fabric, and means for adjusting said idlers to arrange their peripheries in various diagonal positions relatively to the path of travel of the fabric, said idlers causing a diagonal lead in the fabric as it is propelled, for the purpose set forth.

8. A device of the class described, comprising circular means over which tubular fabric is adapted to be propelled, a spreader in the tubular fabric, rollers spaced apart on said spreader and adapted to spread the tubular fabric to oval shape as it leaves said circular means, said rollers being diagonally disposed relatively to the path of travel of the tubular fabric to cause a diagonal lead therein, for the purpose set forth.

9. A device of the class described, including a spreader and means for supporting it whereby a tubular fabric may be propelled over it with the spreader lying within the tubular fabric, revolvable members mounted on forks which are pivotally connected with said spreader, whereby said revolvable members may be placed in various diagonal positions relatively to the path of travel of the tubular fabric.

10. A device of the class described including a spreader and means for supporting it whereby a tubular fabric may be propelled over it with the spreader lying within the tubular fabric, and revolvable members having narrow peripheral edges and mounted on said spreader to lie at an angle to the path of travel of the fabric, for the purpose set forth.

11. A device of the class described, including a spreader and means for supporting it whereby a tubular fabric may be propelled over it with the spreader lying within the tubular fabric, said spreader comprising members spaced apart in the direction of travel of the fabric, the member over which the fabric first travels being freely revolvable by the fabric, means for propelling the fabric, and means disposed in the tubular fabric for causing a diagonal lead in the fabric as it is propelled.

12. A device of the class described, including a spreader and means for supporting it whereby a tubular fabric may be propelled over it with the spreader lying within the tubular fabric, said spreader comprising members spaced apart in the direction of travel of the fabric, the member over which the fabric first travels being freely revolvable by the fabric, means for propelling the fabric, and means disposed in the tubular fabric for causing a diagonal lead in the fabric as it is propelled, comprising idler rollers disposed diagonally of the direction of travel of the fabric.

13. A device of the class described comprising rollers for propelling a tubular fabric, grooved supports engaged between said rollers whereby the supports are held by said rollers while the latter propel the fabric over said supports, and revolving members held by said supports within the tubular fabric, said revolving member being disposed at an angle to the direction of travel of the fabric to produce a diagonal lead therein

14. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, and rollers engaging the side edges of the fabric to propel it, and means for operating the rollers whereby said latter rollers will have a greater peripheral speed than said first mentioned rollers.

15. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, and other rollers engaging only the side edges of the fabric to propel it, said latter rollers acting on the fabric in advance of said first mentioned rollers, and means for operating said rollers whereby said second mentioned rollers will have a greater peripheral speed than said first mentioned rollers.

16. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, and other rollers engaging only the side edges of the fabric to propel it, said latter rollers acting on the fabric in advance of said first rollers, and means for operating said rollers whereby said second mentioned rollers will have a greater peripheral speed than said first mentioned rollers, and means arranged within the tubular fabric for spreading it prior to its passage between said rollers.

17. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, and other rollers engaging only the side edges of the fabric to propel it, said latter rollers acting on the fabric in advance of said first rollers, and means for operating said rollers whereby said second mentioned rollers will have a greater peripheral speed than said first mentioned rollers, and means arranged within the tubular fabric for spreading it prior to its passage between said rollers, and means held by said second mentioned rollers for supporting said spreading means.

18. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, and other rollers engaging only the side edges of the fabric to propel it, said latter rollers acting on the fabric in advance of said first mentioned rollers, and means for operating said rollers whereby said second mentioned rollers will have a greater peripheral speed than said first mentioned rollers, and means inside the tubular fabric for causing a diagonal lead therein as the fabric is propelled.

19. A device of the class described comprising cooperating rollers for propelling a collapsed tubular fabric and engaging substantially the full width of the fabric, other rollers engaging only the side portions of the fabric to propel it, means for operating said rollers whereby said second mentioned rollers will have a greater peripheral speed than said first mentioned rollers, and spreading rollers arranged inside the tubular fabric and adapted to spread the same as it is about to be engaged by said second mentioned rollers.

20. A device of the character described having stretching means over which the tubular fabric is adapted to be propelled with said means disposed within the tubular fabric, and means for feeding the fabric to said stretching means, comprising a guide having an aperture through which the fabric passes, said guide being adapted to bunch the tubular fabric in ropelike form, and feeding rollers acting on the bunched fabric as it passes through said guide, for advancing the fabric toward said stretching means.

Signed at the city, county of Bronx and State of New York this 24 day of May, 1924.

SAMUEL COHN.