Feb. 15, 1938. M. M. KASANOF 2,108,127

FABRIC TREATMENT AND APPARATUS THEREFOR

Filed Oct. 25, 1935 2 Sheets-Sheet 1

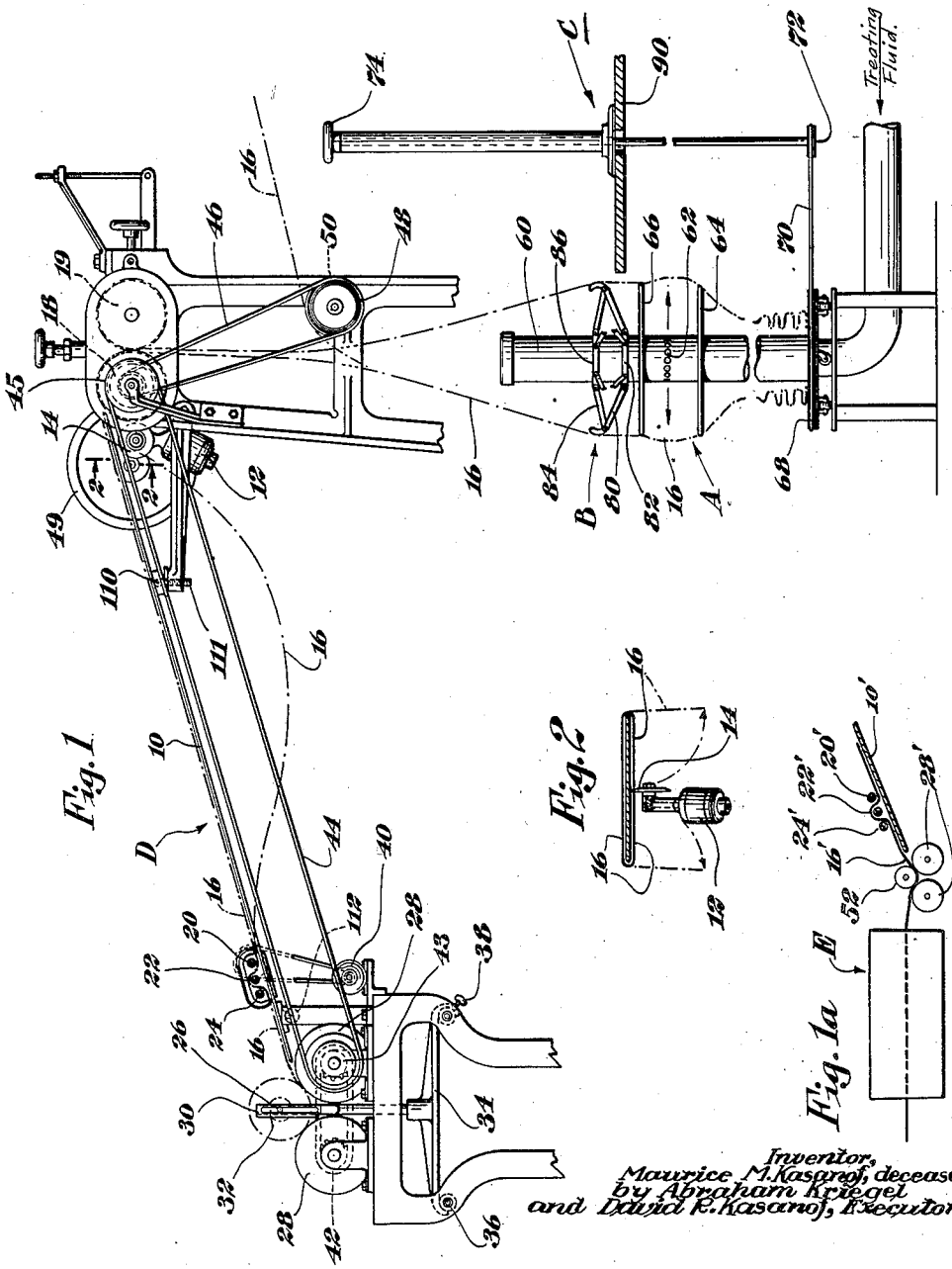


Fig. 1

Fig. 2

Fig. 1a

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and David K. Kasanof, Executors.

BY

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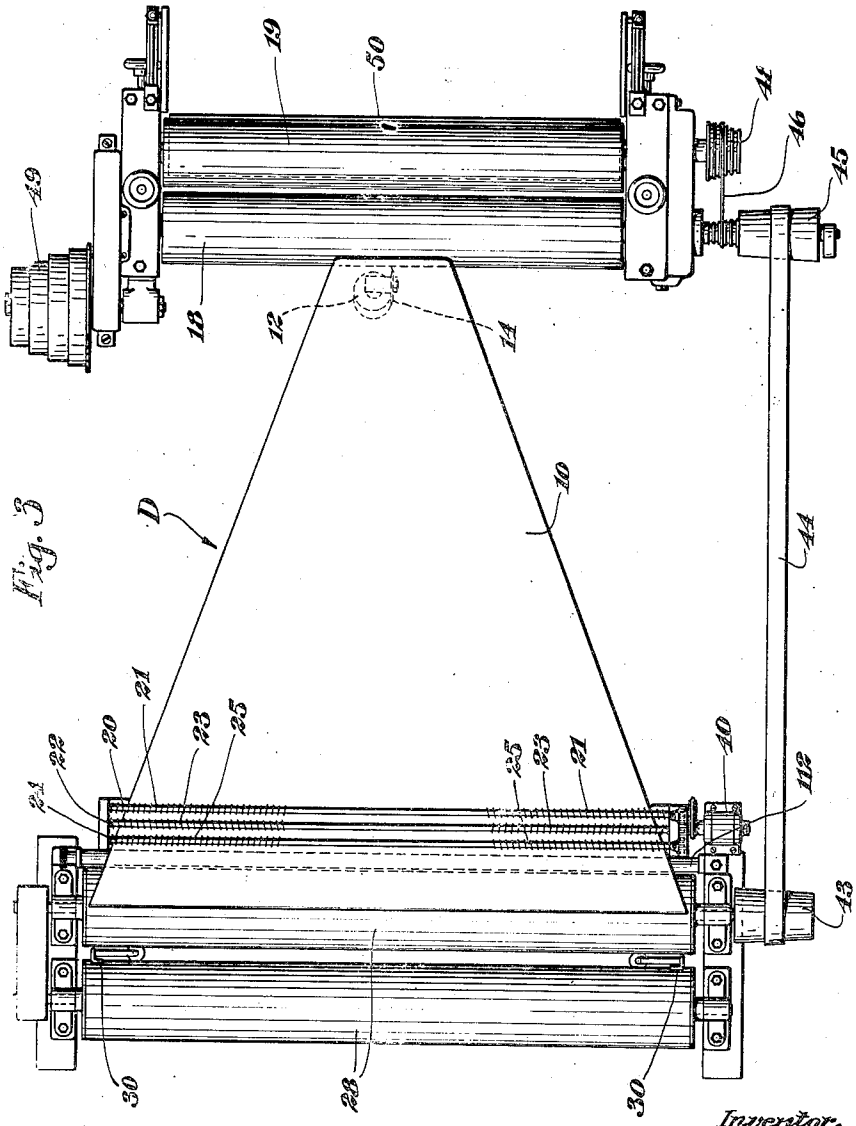


Fig. 3

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2,108,127

FABRIC TREATMENT AND APPARATUS THEREFOR

Maurice M. Kasanof, deceased, late of New York, N. Y., by Abraham Kriegel, Rockaway, Long Island, N. Y., and David R. Kasanof, Brookline, Mass., executors

Application October 25, 1935, Serial No. 46,736

5 Claims. (Cl. 26—55)

This invention relates in general to the treatment of fabrics and apparatus for effecting such treatment, and in the particular application thereof herein disclosed relates to the treatment of fabrics while in tubular form.

While the invention has been described in connection with tubular fabrics it is to be understood that as to certain phases thereof it may have other applications. It is further to be understood that, for certain purposes, only certain particular features of the invention may be utilized, and that the invention is not limited in the practice thereof or in the apparatus therefor to the disclosure in its entirety.

In the process of printing designs on fabrics it is very important that the fabrics subjected to the action of the printing machine have sufficient body and permanency of form so that they will not become distorted under the action of the printing machine, which would result in irregularity in the pattern due to distortion, both at the time of printing, and thereafter. To prevent such distortion requires proper treatment of the fabric involving shrinking, and stretching and proper tensioning thereof before it is fed into the printing machine. Such treatment is particularly necessary for loosely knitted fabrics. In the processes at present in use the needed tension is imparted to the fabric by an elaborate system of tensioning rollers that tension the fabric before it is subjected to the printing process.

It is among the general objects of the invention to impart the proper tension to a fabric without the need for the customary complicated system of tensioning rollers, and by means simpler and more effective than any heretofore employed.

When fabric tensioned in accordance with the invention or in any manner at present in use is allowed to stand, its condition is gradually changed because of moisture, heat and other influences which tend to gradually release the tension imparted to it, so that if an initially properly tensioned fabric is stored on mandrels or rollers and exposed for too great a length of time to the aforementioned deteriorating influences, after a time it will no longer be suitable for printing. It is therefore necessary to print the fabrics promptly after the tensioning operation, and in order to minimize the action of these deteriorating influences to the utmost it is further among the objects of the invention to eliminate the step of gathering the tensioned fabric on a roller or mandrel altogether and to have a printing machine as an element auxiliary to the apparatus, and to feed the fabric directly into the printing machine after it has been suitably tensioned by the tensioning device of the apparatus.

Where the fabric to be printed is in tubular form either because of having been so manufactured, or by reason of having been formed into a tube for convenience of treatment, it is obviously necessary, preparatory to the printing operation, to slit the tube and to spread the fabric.

When slitting the fabric it is further essential for the production of acceptable commercial products that the slit or cut in the tubular fabric follow a uniform course in relation to the pattern lines of the same, or to the seam thereof, where the tubular fabric is formed by securing together the edges of an initially flat fabric, and for this purpose adjustment of the fabric in relation to the point of action of the slitting means is necessary. It is further among the objects of the invention to provide means whereby the proper adjustment of the fabric in relation to the slitting means may be conveniently and effectively attained.

Among the further objects of the invention is the provision of a single assembly in which fabric in tubular form may be treated for the purpose of shrinking or otherwise treating it, and thereafter suitably guided into the slitting apparatus in proper alignment therewith, tensioned and printed; the provision of a unitary assembly comprising slitting, spreading and tensioning means; the provision of a unitary assembly comprising treating, aligning, slitting, stretching and tensioning means; and the provision of spreading and tensioning means in combination with means for adjusting the alignment of the fabric in relation to the means for removing the fabric from the treating machine.

For the attainment of these objects and such other objects as will hereinafter appear or be pointed out there is shown illustrative embodiments of the invention, in which:—

Figure 1 is a side elevation showing a complete assembly of my machine;

Figure 1*a* is a modified view of the extreme left hand portion of Figure 1, indicating how the tensioned fabric, delivered by the spreading and tensioning device may be led directly into the printing machine;

Figure 2 is a sectional view on the line 2—2 of Figure 1, looking in the direction of the arrows; and

Figure 3 is a plan view of the assembly of Figure 1.

Referring to Figure 1 in detail it will be observed that the machine may be divided into sections denoted respectively by A, B, C, and D, and where the modified treatment of Figure 1*a* is used, a further section E.

At A is shown a device for treating tubular knitted fabrics by blowing a treating fluid through the previously moistened fabric, this treatment resulting in a drying, and shrinking or stretching of the fabric. From the treating machine A the fabric is led over a guiding mechanism, B, and in conjunction with said guiding mechanism there is shown an adjusting mechanism, B, whereby the positioning of the fabric in relation to device B may be controlled. From the guiding structure B the fabric is led into a slitting, spreading and tensioning device D, in which the final operations are performed on the fabric, preparatory to the printing thereof.

If it is desired to print the fabric directly instead of storing it on a mandrel the device D will have associated therewith a cloth printing machine E, as indicated in Figure 1*a*.

Referring now to Figures 1 and 3, there follows a description of the details of the device D with the aid thereof. This device, as already mentioned has three functions, the first of which is to slit the tubular fabric, the second to spread it, and the third to tension it properly before it is wound on a mandrel or fed into the printing machine.

The body 10 of the device D, as shown in the drawings, may be described as a substantially triangular table or platform along which the fabric travels downward from the narrow end, which is raised, to the wide end, which constitutes the lowermost portion. The narrow end of the triangle is shown as blunted, although it is narrow enough to pass inside of the doubled-over tubular fabric, which at this point has not yet been slitted, and underneath the same is a slitting device 12 provided with a slitting wheel 14. The fabric 16, indicated by dot and dash lines, emerges in doubled-over tubular form from between the pair of rollers 18 and 19, serving to pull the fabric from the treating device A hereinafter described, and over the narrow end of the table 10, so that the table 10 is surrounded by the unslit tubular fabric at the point of entrance thereof, so that one portion passes over the upper surface of the table and another portion passes underneath the table 10. The latter portion is engaged by the slitting wheel 14 and is slit so that the severed edges thus produced drape themselves about the platform 10, as clearly indicated in Figure 1, and thereafter as the fabric passes along the table 10 it is gradually spread as the table widens, until at the lower wide end of the table the fabric is completely spread, with its edges on the table.

The platform 10 is shown as mounted for vertical adjustment. For this purpose it is shown as pivotally mounted at 110 near its upper or narrow end, on a threaded stud 111, whereby it is vertically adjustable, while near its wide or lower end it is shown as supported on an eccentric mounting, comprising a pivotally and eccentrically mounted shaft 112, by the angular adjustment of which the vertical position of the lower end of the table 10 may be adjusted to an extent limited by the throw of the eccentric. It will be observed that this construction makes possible the independent adjustment of either end of the table 10, and thereby either end of the table may be caused to present an elevated edge over which the fabric is drawn under tension to straighten it. The adjustments permit the extent of elevation to be controlled, thereby enabling variation thereof suitable for various conditions and various fabrics, and furthermore the table may thereby be adjusted in relation to the slitting cutter wheel 14.

In starting the operation of treating, slitting, spreading and tensioning, the end of the fabric which has been positioned on the platform 68 of the device A, as will be later described, is drawn through device A and over device B, between the rollers 18 and over the table 10, between the rollers 20, 22 and 24 and then wound about a mandrel 26, on which the fabric is gathered, all this being done manually, by an attendant. Thereafter power may be applied and the operation becomes automatic.

It will be observed that the mandrel 26 is shown as vertically slidable in a pair of guide bars 36 provided with slots 32, the purpose of the guide slot being to permit the mandrel to adjust itself in vertical height in relation to the power driven rollers 28, by gravity, as the diameter of the cloth wound on the mandrel increases. This is necessary because the rollers 28 serve to rotate the mandrel through contact thereof with the surface of the cloth wound on the mandrel. The guide bars 30 are further shown as each mounted on a cross bar 34, slidable along the guides 36, so that the spacing of the two guide bars may be adjusted and thereby mandrels of various lengths used. The set screw is indicated at 38 whereby the guide bars may be clamped in any desired position.

An important feature of the invention is constituted by the tensioning rollers 20, 22 and 24. These are shown as elongated cylinders of relatively small diameter and provided with pairs of spiral vanes 21, 23, 25 at both ends thereof, the purpose of which is to engage the fabric with sufficient grip to pull the marginal portions thereof laterally as the roller rotates, and for this purpose the vanes of each pair are oppositely pitched. These rollers are relatively small in diameter, an actual figure being for example a diameter of ⅝ of an inch as compared with a length of eight feet or more, and are driven at a relatively high speed by a motor shown at 40, such speed being for example 900 R. P. M. In view of this speed of the rollers 28 it is advisable to use a separate motor to drive the rollers 20, 22, and 24 although obviously, if desired, they may be interconnected with the rollers 28.

It will be observed that in Figure 1 the fabric is shown as passing underneath the roller 20, over the roller 22 and underneath the roller 24. It will be understood that the direction of rotation of the rollers must be so designed in relation to the pitch of the spiral vanes thereof that the action of the said vanes at all times tends to pull the marginal portions of the fabric away from the inner portions. In other words if the roller 20 is caused to move clockwise the spiral thereon will cause the cloth to spread out laterally since the cloth passes underneath the same. If now the spiral vanes on the roller 22 are pitched oppositely to those of the roller 20, remembering the fact that the cloth passes above the roller 22, it will be obvious that the roller 22 must be rotated counterclockwise, and similarly it will be seen that the roller 24 must rotate clockwise.

This effect may of course be obtained by having a gear on the end of each roller, and by interconnecting said gears directly.

Since the pairs of spiral vanes 21, 23, and 25 need be active only on the extreme marginal portions of the fabric, in order to perform their function properly, their longitudinal extent should not be great. In fact their action should be restricted as far as possible only to the marginal portions. However, since usually it is desired to treat various sizes of fabric in one machine, it is advisable to make the spiral vanes of such an extent, that their inner portions will serve to engage the marginal portions of the narrowest fabrics to be treated, while their outer portions will be adapted to engage the marginal portions of the widest fabrics to be treated.

For instance, if the greatest width of fabric that the machine will accommodate is ninety-six inches, the outer ends of the vanes should be spaced that distance apart, while on the other hand, if the narrowest fabric to be treated has a width of forty-eight inches the inner ends of the vanes must be spaced less than this distance. In other words, each vane must have a length of at least twenty-four inches, while the space between the vanes must be less than forty-eight inches.

It is further to be observed that since the rollers 18 and 19 are intended to accommodate the fabric while it is still unslitted, and therefore doubled-over, their length need only be one-half that of the rollers 20, 22, and 40, since these must accommodate the single thickness fabric in spread form. That is, where the spread fabric is ninety-six inches, the rollers 18 and 19 need only be, theoretically, forty-eight inches wide.

It will be obvious that the lateral tensioning effect of the system of rollers 20, 22, and 24 will give a permanent tensioned set to the fabric, tending to stiffen it, and that this effect, which is in reality not an actual tension will persist after the fabric is being wound on the mandrel 26, because of the relatively close adjacency of the mandrel 26 and the rollers.

It is to be observed that the rollers 28 are shown as interconnected by a belt 42, and that the right hand one of them is further driven by a belt 44 from one of the rollers 18, this belt being shown as passing over cone pulleys 43 and 45, whereby the relative speeds of rollers 28 in relation to rollers 18 and 19 may be varied if desired, although ordinarily their surface speeds will be the same, so that they cooperate to give to both ends of the fabric the same speed of travel. For certain purposes however they may have different surface speeds. The roller 18 is shown as intergeared with roller 19 and as geared to a power driven pulley 49. A belt 46 is further shown as connecting the roller 18 with a pulley 48 connected to a roller 50, which roller is used to feed fabric into the treating machine A, as will be further explained hereinafter.

If the tensioned cloth has been collected on a mandrel 26 it may then be taken to the cloth printing room and fed from the mandrel into the printing machine, without any intermediate tensioning operation being necessary. It may also be stored for a time before printing operation, provided that the length of storage is not so great as to destroy the tensioning due to the deteriorating influences heretofore pointed out.

At A is shown the treating machines for treating tubular fabrics preparatory to passing them through the spreading and slitting device D, and this may comprise a conduit 60 closed at the top and provided with apertures 62 adapted to discharge a treating fluid contained in the conduit. A pair of circular guide plates 64 and 66 are positioned so as to surround the conduit, and these serve at the same time to guide the fabric 16 while it is being exposed to the action of the fluid coming from the apertures 62, and to form in connection with said fabric a closed chamber from which the treating fluid can only escape by passing through the walls of the fabric 16, and thereby effecting its treatment. As it is subjected to the action of the fluid, the fabric which is introduced into device A in a moistened condition, is dried and stretched, and the amount of stretching may be controlled in various ways such as by using guides 64 and 66 of different diameters and by regulating the pressure of the treating fluid. In order to introduce the untreated fabric into the device A, it is fed over the conduit 60 and gathered on a platform 68, and this may be done by feeding the previously moistened fabric over the power driven roller 50, heretofore mentioned, and causing it to drop over the conduit 60 and to collect on the platform 68 from which it is pulled upward by the rollers 18 and 19 and during its upward travel subjected to the fluid treatment. Before doing so the guide plates 64 and 66 are removed and the device B may also be removed or collapsed, this being possible because of its peculiar construction, as will be explained presently.

It has been heretofore mentioned that the tubular fabric must be suitably aligned in relation to the slitting apparatus 14, so that the slitting occurs along a line properly related to the fabric, either as to location of the seam thereof or as to the design thereof, and for this purpose this platform 68 may be made rotatable by means of a belt 70 passing around a pulley groove in the periphery thereof, and also over a grooved pulley 72 controlled by an attendant by means of a hand wheel 74. The last-mentioned elements are included in the device heretofore referred to generally as C.

Also mounted on the conduit is the device B, already mentioned heretofore, comprising an umbrella-like arrangement having arms 80, sufficient in number so that when distended, as shown in Figure 1, they will hold the fabric in distended tubular form and for this purpose six of these ribs or arms 80 are indicated in Figure 1, and these arms are shown as pivotally mounted on a collar 82 surrounding the conduit. A second set of arms 84 pivotally mounted at their inner ends on a collar 86, also surrounding the conduit, and pivotally connected at their free ends to the arms 80, serve to determine the position of said arms 80. It will be seen that by separating the collars 82 and 86 the arms may be caused to collapse against the conduit, whereas by causing said collars to approach each other the arms 80 may be caused to expand into a substantially radial position in relation to the conduit.

It is to be understood that suitable clamping or adjusting means are provided on the collars whereby they may be held in any desired portion, and it will further be clear that a device constructed as just described is suitable for a variety of widths of fabric since the spread of the arms may be adjusted within wide limits.

It will now be clear that an attendant, standing on the platform 90, and manipulating the hand wheel 74, may so control the angular posi-

tion of the platform 68 that the fabric may be caused to feed in any desired relation over the arms 80 which are so positioned that the attendant on platform 90 may readily observe the feeding of the fabric thereover, and in case of an angular deviation of the fabric in relation to the said arms 80, may promptly rotate the platform 68, so that the feed of the fabric takes place in the desired manner.

At this point it may be emphasized that the function of the spreader rollers 20, 22, and 24 may be compared to the act of spreading the fabric as it would be done by hand so as to spread it laterally and to straighten the marginal edges thereof, whereby it is caused to lie flat, rather than the act of tensioning the fabric in the sense that it would increase its width above the normal.

In Figure 1a will be found an indication of a modification in structure by which the slit and spread fabric may be fed directly into a cloth printing machine, the latter being denoted by E. Spreading rollers 20', 22', and 24', corresponding to rollers 20, 22, and 24 of Figure 1 are associated with a spreading table 10', and the fabric 16' is guided and spread by these, as is the fabric 16 of Figure 1. The mandrel 26 is replaced by a roller 52 which cooperates with the power driven rollers 28' to draw the fabric 16' over the table 10', and to guide it into the printing machine E.

It is to be understood that the device is susceptible of many modifications. For example, the various parts thereof may be mounted integrally on a unitary frame, or again they may be made adjustably movable relatively to each other. For instance, the spreading table 10 need not of necessity be a single integral unit but the portion adjacent to the spreader rollers 20, 22 and 24 may be made longitudinally adjustable in relation to the portion of the table adjacent to the slitting arrangement 12, 14 as by making the table 10 extensible.

Without going into the details of the various possible modifications it will be obvious that many such modifications may be made, as will be obvious to those skilled in the art, and that the disclosure of the invention herein is by way of illustration merely, subject to all manner of variation, without departing from the spirit of the invention except as limited by the prior art.

Having thus described the invention and illustrated its use, what is claimed as new and desired to secure by Letters Patent, is:—

1. In a device for slitting a tubular fabric and then spreading it, a platform of a width at its forward portion so that it will pass within the unslitted tubular fabric and of a width at its exit portion so that it will accommodate the full width of the slitted fabric thereon, slitting means positioned underneath said platform adjacent the forward surfaces thereof for slitting said fabric while it is in tubular form, means on said exit portion for causing movement of the marginal portions of the spread fabric laterally outward from its mid portion, and feed rollers for causing movement of said unslitted tubular fabric on said platform, and means for adjusting the height of said platform in relation to said feed rollers, and said feed rollers being positioned at the opposite ends of said platform and being interconnected by variable speed means permitting them to have the same speed or to have relatively different speeds.

2. In a spreading and tensioning device for fabrics, a guiding surface for guiding said fabric, means for moving said fabric over said guiding surface, means for spreading said fabric over said guiding surface laterally and away from its mid portion, said means comprising a system of three rollers of relatively small diameter, means for rotating said rollers at a peripheral speed relatively high as compared to the speed of said fabric over said surface, and the intermediate roller of said set being rotated in a direction opposed to said other rollers, and said fabric being guided between said first roller and said guiding surface and over the outer side of the intermediate roller and between the third roller and the guiding surface, and each of said rollers being provided with helical vanes at their end portions but not at their intermediate portions, said vanes being adapted to frictionally engage the fabric and to tend to advance it laterally outwardly from its mid portion.

3. In a machine for treating fabrics, a vertical conduit provided with apertures arranged for the outward discharge of fluid therefrom, a platform rotatable in relation to said conduit adapted for gathering thereon the untreated fabric preparatory to treatment, means for guiding said fabric across the discharge of treating fluid so as to treat the same, means for receiving said treated fabric and for guiding it, said means being in the form of arms projecting outwardly from the conduit and serving to engage said treated fabric at spaced points on the circumference thereof, and thereby giving visible indication of angular displacements of said fabric, and manually operable means for rotating said platform positioned at a point removed from the platform from which angular displacement of the fabric may be viewed as the fabric leaves said guiding means, whereby an attendant observing the travel of said fabric over said guiding means, may, by rotating said platform, correct any angular deviations of said fabric in its travel.

4. In a machine for treating fabrics, a vertical conduit provided with apertures arranged for the outward discharge of fluid therefrom, a platform rotatable in relation to said conduit adapted for gathering thereon the untreated fabric preparatory to treatment, means for guiding said fabric across the discharge of treating fluid so as to treat the same, means for receiving said treated fabric and for guiding it, said means being in the form of arms projecting outwardly from the conduit and serving to engage said treated fabric at spaced points on the circumference thereof, and thereby giving visible indication of angular displacements of said fabric, and manually operable means for rotating said platform positioned at a point removed from the platform from which angular displacement of the fabric may be viewed as the fabric leaves said guiding means, whereby an attendant observing the travel of said fabric over said guiding means, may, by rotating said platform, correct any angular deviations of said fabric in its travel, said respective means being positioned in vertical alignment.

5. For use with apparatus for slitting and spreading a tubular fabric, mechanism for circumferential adjustment of the fabric as it is being fed into the spreading and slitting apparatus, said means comprising a rotatable platform adapted to receive the gathered fabric, upright means centrally positioned in relation to said platform, means for distending said fabric carried on said upright means, and means for guiding said fabric against circumferential dis-

placement carried by said upright means, and means for adjusting said platform angularly in relation to said guiding means, said adjusting means being adapted for control by an operator positioned so that he can view the fabric as it enters the spreading and slitting mechanism, said adjusting means comprising manually rotatable means and motion transmitting means connecting said rotatable means with said platform.

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