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METHOD OF TREATING TUBULAR TEXTILE FABRIC

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FIG. 1

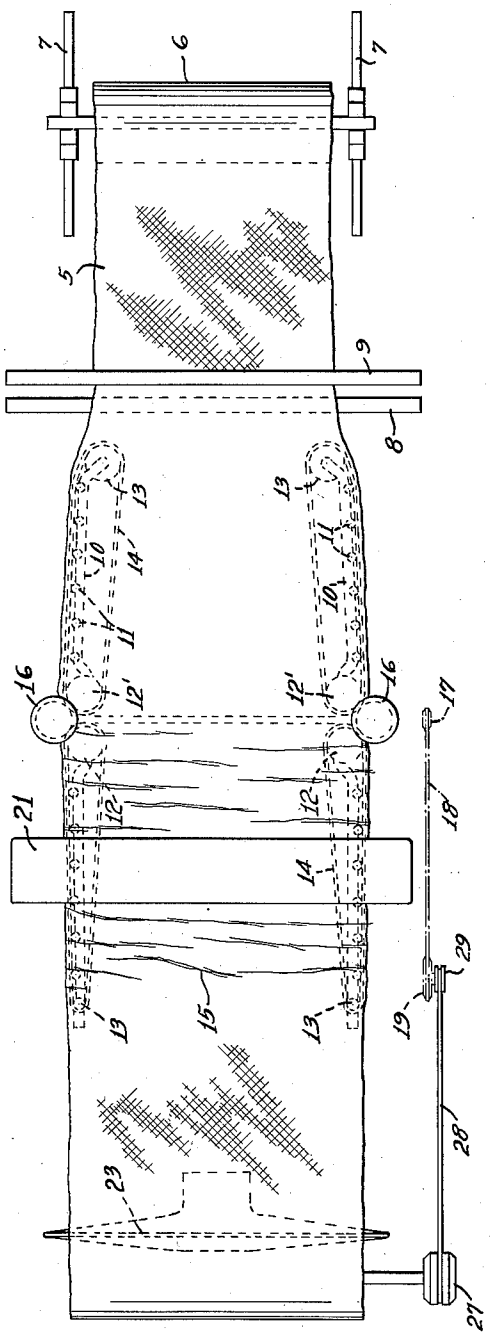
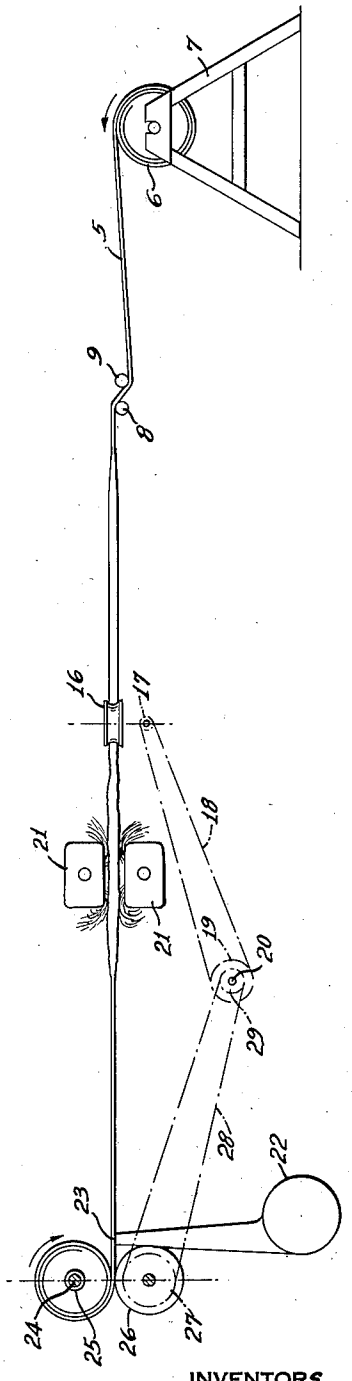


FIG. 2



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METHOD OF TREATING TUBULAR TEXTILE FABRIC

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9 Claims. (Cl. 26—18.5)

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This invention relates to a simple method of treating tubular textile fabrics and particularly to a novel method and apparatus for steaming or finishing such fabrics in a loosely fed condition.

In finishing tubular textile fabrics as heretofore practiced, the fabric is first stretched or distended, both longitudinally and laterally, steamed while under tension, then subjected to rolling pressure while the longitudinal tension is maintained and in most cases, wound into a roll. This procedure stretches, presses and prevents any shrinkage of the fabric during the operation. Consequently, when a garment cut from the fabric is laundered, shrinkage occurs with resulting distortion of the garment. It has not been possible heretofore to over feed, then riffle or loosely feed, steam and immediately to roll the fabric in finished form.

It is the object of the present invention to provide a simplified method of and apparatus for finishing tubular textile fabric whereby the fabric is spread, propelled, steamed and wound upon a roll and whereby the fabric is longitudinally compressed during the finishing operation and is not therefore subject to further substantial shrinkage. This object has been needed in the industry but never heretofore obtainable.

Another object of the invention is to provide a simple and effective method of finishing tubular textile fabric and apparatus therefor which causes the stitches of the fabric to assume their normal form and relationship to each other without internal stress, inherent shrinkage being effected during the operation so that the fabric is not thereafter subject to substantial further shrinkage after it is embodied in a garment.

Another object of the invention is to provide a method of an apparatus for finishing tubular textile fabric which causes the fabric previously stretched to become heavier, shorter, compacted and puffed, desired characteristics different from those heretofore obtainable.

Other objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and the accompanying drawing, in which

Fig. 1 is a plan view of an apparatus suitable for the practice of the invention; and

Fig. 2 is a vertical section through the apparatus.

We have discovered that, contrary to expectation, a tubular textile fabric may be finished satisfactorily by the relatively simple operation of steaming and winding the fabric about a mandrel,

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it being unnecessary to employ calendering rolls or equivalent means. We have also discovered that by steaming the fabric in a relaxed condition, free from any longitudinal tension, the fabric becomes longitudinally compressed and will not, thereafter, shrink to any substantial amount in laundering operations after the fabric has been embodied in garments. Thus, several advantages result from the simplified operation.

In carrying out the invention, we preferably feed the cloth under a uniform (slack) condition obtainable by using any method of proper automatic control of speeds and then we advance the material by means of a propeller which is constructed and operated so that the fabric is spread laterally to the desired width. Although any spreader may be used, for example the device disclosed in our Patent No. 2,228,001, issued January 7, 1941, or any similar device, we prefer to employ a propeller in which the rearward portion of the fabric is delivered at a speed in excess of that of the forward portion so that the forward portion is completely free from longitudinal tension, as evidenced by the formation of riffles in the surface of the fabric. Such a propeller is described in our co-pending application Ser. No. 132,374, filed December 10, 1949. It is also made clear in our co-pending application that by "steaming" we mean to include the application to the fabric of any aqueous medium such as steam or water as a finely divided spray.

The fabric, while it is spread in flattened form and relaxed, is steamed, the steam being applied to the upper and lower sides of the fabric by jets which are opposed so that the fabric is not subjected to any distortion. A suitable device for applying the steam is disclosed in our co-pending application Ser. No. 118,086, filed September 27, 1949, and the details thereof form no part of the present invention. Other steaming means may be utilized, although the steam chests as disclosed in said application are most effective for the purpose, since distortion of the fabric due to the pressure of the steam is avoided, the pressure of the opposed jets being neutralized.

If the fabric, when subjected to steam, is relaxed and longitudinally riffled during the steaming operation, the fabric shrinks, becomes heavier, and becomes puffed due to the stitches of the fabric taking their natural form and contour without internal stress. Thereafter no substantial shrinkage will occur when a garment made from the fabric is laundered.

Immediately after the steaming operation, the fabric is delivered to a winding mandrel which

is operated so that it merely takes up the fabric as it is fed thereto without exerting longitudinal tension in the fabric. A variable speed mechanism may be used on the windup mechanism to control the degree of tension or slackness of the fabric as it is wound up on the roll. The fabric thus wound is usually smooth and free from wrinkles, compacted and puffed and desirably finished, in addition to being free from subsequent shrinkage.

The invention, therefore, depends upon the two simple steps of steaming the fabric while it advances and immediately rolling the fabric on a mandrel without any intermediate calendering or other treatment. If the fabric is advanced in a relaxed condition, free from longitudinal tension and riffled or loosely fed, a further advantage is obtained as hereinbefore indicated.

In carrying out the invention, as indicated in the accompanying drawing, the fabric **5** is withdrawn from any suitable source, such as the roll **6**, supported on a frame **7**, and is directed between the idler rollers **8** and **9**. It then engages the propeller and is spread laterally in flattened form.

The propeller may be of any suitable construction, for example that described in Patent No. 2,228,001, issued January 7, 1941. We prefer, however, to employ a propeller which is described in detail in our application Ser. No. 132,374, filed December 10, 1949, which is designed to feed the fabric without friction in the flattened form and to reduce the speed of feeding of the forward portion thereof so that the fabric forms riffles as indicated in Fig. 1 of the drawing and is free from longitudinal tension. Such a propeller, as indicated in Fig. 1, may consist of frames **10** carrying rollers **11** and pulleys **12** and **12'** disposed at the intermediate portion of the propeller with pulleys **13** and **13'** at the ends thereof. Belts **14** and **14'** are disposed over the pulleys **12** and **12'** and **13** and **13'**. The pulleys **12**, at the left of Fig. 1, have a smaller effective radius than the pulleys **12'** at the right, so that the belts **14** at the left travel at a slower speed than the belts and **14'** at the right. Thus, as the fabric travels over the propeller, its speed is reduced at the forward end and the fabric forms uniform transverse riffles **15**, indicating that all longitudinal tension in the fabric has been eliminated and the fabric is longitudinally compressed. Wheels **16** engage pulleys **12** through the fabric and pulleys **12** drive the belts **14** which belts carry the fabric. Consequently, the fabric is advanced without friction and positively at the desired differential speeds to accomplish the purpose indicated. The wheels **16** may be driven through any suitable gearing (not shown) from a shaft **17** (Fig. 2), extending transversely of the machine, which is connected through a belt **18** to a pulley **19** on a shaft **20**. The latter is driven from any suitable source of power.

During the passage of the fabric and preferably while it is in a relaxed condition as shown at the left of Fig. 1, steam is applied to the fabric from steam chests **21** disposed above and below the fabric. The particular structure of the steam chests forms no part of the present invention, suitable means being disclosed in a co-pending application Ser. No. 118,086, filed September 27, 1949. Other steaming means may be employed and, if desired, the steam may be applied only to the under side of the fabric. The effect of the steam on the relaxed fabric is to relieve internal yarn and stitch stress and to permit shrinkage of the fabric which, in its relaxed condition, assumes the natural form with respect to the contour of the stitches. The fabric becomes somewhat thicker and shorter. It continues to advance and may, if desired, be subjected to a blast of air, cold or heated, supplied by a blower **22** which delivers the air to a nozzle **23** extending transversely of the fabric. The effect of the air is to remove excess moisture from the fabric, but the use of air is not essential to the invention and may be eliminated.

The fabric is then wound immediately, and without the application of rolling pressure or calendering, upon a suitable mandrel **24** (Fig. 2). A cardboard tube **25** is placed on the mandrel, and the end of the fabric is wrapped around the cardboard tube and permitted to rest upon a roller **26**, which is driven through a pulley **27** and belt **28** from a pulley **29** on the shaft **20**. Thus, the fabric is wound at uniform speed, regardless of the size of the roll. Variable speed mechanism of any suitable type may be utilized to drive the shaft **26** at the required speed to take up the fabric **5** without exerting longitudinal tension thereon. Suitable mechanism for this purpose is shown in detail in application Ser. No. 634,701, filed December 13, 1945, and this or any other suitable winding mechanism may be employed. Preferably, mechanism as shown in application Serial No. 634,701 is employed to insure continuous advance of the fabric through the machine. If such mechanism is employed, the fabric before entering the machine may be sewn piece to piece and is continuously advanced through the machine, thus maintaining the uniform condition of the fabric through its various stages of entry into the machine, its advance therethrough and its windup into roll form.

The characteristic of the present invention is the steaming of tubular textile fabric, preferably while in relaxed condition and free from longitudinal tension, or, in other words longitudinally compressed, and the immediate winding of the fabric without calendering or pressing. It has never been considered possible heretofore to so treat tubular textile fabrics, since it has been considered necessary always to subject the fabric to a calendering or roll pressure operation. We have found that the fabric as treated in accordance with the present method is improved in quality and dimensional stability and is not subject to further substantial shrinkage. Garments made from such fabrics have the same characteristics. Such garments are ever increasing in universal demand.

The method is extremely simple, requires simple and inexpensive mechanism, and hence it facilitates and reduces the cost of treating tubular textile fabrics.

By "transversely riffled" is meant that wrinkles, creases, folds or rumples are formed in the fabric each extending transversely across the fabric.

Various changes may be made in the details of the apparatus and in the operation thereof without departing from the invention or sacrificing the advantages thereof.

We claim:

1. The method of finishing tubular textile fabrics which comprises advancing the fabric in a flattened form, relaxed and transversely riffled, applying steam to the relaxed and riffled fabric, and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

2. The method of continuously finishing tubular textile fabrics which comprises initially feeding the fabric under uniform conditions, ad-

vancing the fabric in a flattened form, relaxed and transversely riffled, applying steam to the relaxed and riffled fabric and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

3. The method of finishing tubular textile fabrics which comprises advancing the fabric in a flattened form, relaxed and transversely riffled, applying steam simultaneously to the upper and lower faces of the relaxed and riffled fabric and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

4. The method of finishing tubular textile fabrics which comprises initially feeding the fabric under uniform conditions, advancing the fabric in the flattened form, relaxed and transversely riffled, applying steam to the relaxed and riffled fabric and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

5. The method of finishing tubular textile fabrics which comprises advancing the flattened fabric at differential speeds so that the forward portion is relaxed and transversely riffled, applying steam to the relaxed and riffled fabric and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

6. The method of finishing tubular textile fabrics which comprises advancing the flattened fabric at differential speeds so that the forward portion is relaxed and transversely riffled, applying steam simultaneously to the upper and lower faces of the relaxed and riffled fabric, and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

7. The method of finishing tubular textile fabrics which comprises initially feeding the fabric under uniform conditions, advancing the flattened fabric at differential speeds so that the forward portion is relaxed and transversely riffled, applying steam to the relaxed and riffled fabric and immediately thereafter winding the fabric while it is relaxed and longitudinally compressed.

8. The method of finishing tubular textile fabrics which comprises advancing the fabric in a flattened form, longitudinally completely relaxed, applying steam to the relaxed fabric, and immediately thereafter winding the fabric while it is longitudinally completely relaxed.

9. The method of finishing tubular textile fabrics which comprises initially feeding the fabric under uniform conditions, advancing the fabric in a flattened longitudinally completely relaxed form, applying steam to the relaxed fabric and immediately thereafter winding the fabric while it is longitudinally completely relaxed.

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