Nov. 5, 1929. S. L. CLUETT 1,734,896

ART OF MAKING TEXTILES AND TEXTILE ARTICLES

Filed Aug. 2, 1928

Fig. 1

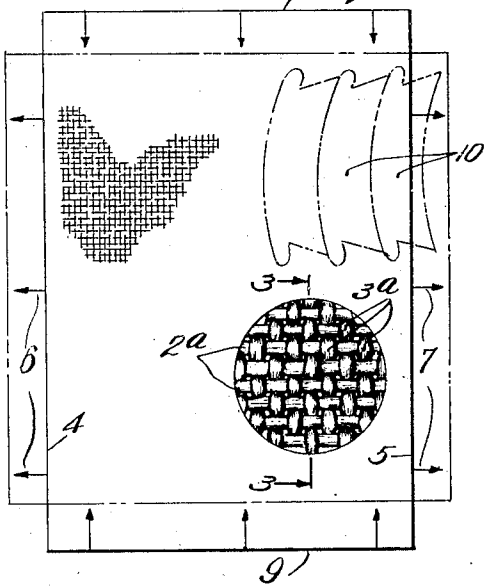


Fig. 2

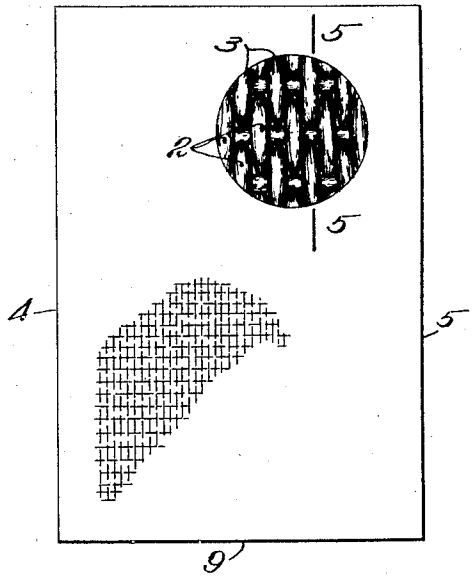


Fig. 3

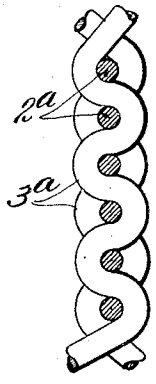


Fig. 4

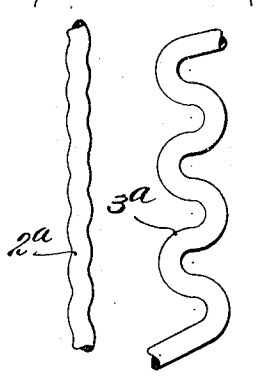


Fig. 5

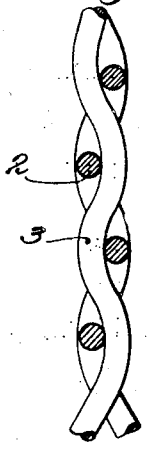


Fig. 6

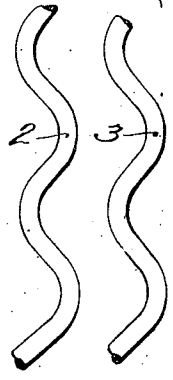


Fig. 6a

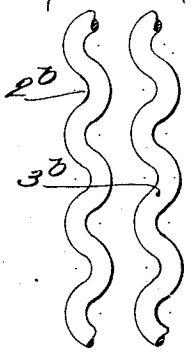
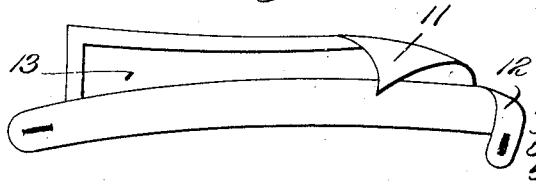


Fig. 7



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UNITED STATES PATENT OFFICE

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ART OF MAKING TEXTILES AND TEXTILE ARTICLES

Application filed August 2, 1928. Serial No. 296,976.

This invention pertains to the treatment of textile fabrics, to a fabric so treated, and to articles made therefrom, and has for its principal object the production of a fabric or article which is substantially non-shrinkable in one direction at least, for example in the direction of its constituent weft threads, but which at the same time possesses the lustrous and pleasing appearance resulting from usual cloth finishing operations.

A preferred method of obtaining the desired results comprises stretching the fabric under heavy tension in the direction of one set of its constituent yarns (for example the wefts), being careful during said stretching not to confine the fabric lengthwise (that is, not to interfere with its freedom to contract in the direction of the warp yarns), the operation, in the latter respect, being fundamentally unlike ordinary cloth stretching or tentering. Concomitantly with the stretching, I may moisten or steam the material, and subsequently dry it and/or iron it to set the yarns. The net result of this operation is to produce a fabric whose weft yarns are substantially straight while its warp yarns have a maximum crinkle. Consequently, the fabric is substantially non-shrinkable in a warpwise direction when subjected to subsequent laundering.

From this material, garment or other blanks (for example collar blanks) may be cut, preferably laying out the blank on the fabric so that the dimension which it is important to preserve unchanged extends in a warpwise direction. Collars or other articles made from such blanks may be laundered repeatedly without substantial decrease in length or "size".

In the accompanying drawings:

Fig. 1 is a plan view of a piece of my improved fabric showing a small portion thereof greatly magnified to indicate its structure, said view also illustrating one mode of laying out collar blanks upon this improved fabric;

Fig. 2 is a plan view of a piece of woven fabric before treatment in accordance with my novel method, also showing a small portion thereof greatly magnified;

Fig. 3 is a fragmentary section to large scale on the line 3—3 of Fig. 1;

Fig. 4 is a composite view showing in elevation, to large scale, one of the filling threads and one of the warp threads removed from my improved fabric;

Fig. 5 is a section to large scale on the line 5—5 of Fig. 2;

Fig. 6 is a view similar to Fig. 4 but illustrating the appearance of filling and warp threads removed from ordinary one-and-one fabric before treatment;

Fig. 6^b is a composite view, showing to large scale the appearance of a filling and warp thread from such ordinary fabric after it has undergone a laundering or fulling process; and

Fig. 7 is a rear view, partly in perspective, showing a collar made of my improved fabric and by the method herein disclosed.

For the manufacture of shirts, collars, etc. it is usual to employ a fabric of a comparatively simple weave, such as a plain one-and-one, a two-and-two, a three-and-one twill, etc. As an illustrative example of such material, plain one-and-one piece goods, as received by the garment maker, possesses the typical cross-sectional structure indicated in Fig. 5 and has a trade finish, (which, in cotton, linen, and similar materials, imparts a lustrous glossy appearance) resulting from such usual cloth finishing processes as calendering, dressing, braking, ironing, etc. A weft yarn 2 and a warp yarn 3 raveled out from such a fabric will be found to possess more or less the appearance shown in Fig. 6, each of said yarns being wavy to approximately the same degree.

If such a piece of material be subjected to full laundering or fulling, each set of its component yarns tends to decrease in length so that the opposite edges of the fabric approach and the area of the fabric is reduced. After such shrinkage of the material, the weft and warp yarns, when unraveled, have more or less the appearance indicated at 2^b and 3^b respectively in Fig. 6^b, the yarns of both sets being more abruptly crinkled than in the original fabric. If the laundering or fulling operation be carried to a sufficient

extent, the crinkling of the yarns becomes so pronounced that little further shortening of the fabric in either direction can take place by reason of the close packing of the yarns and the elimination of interstices at the crossing points, but laundering or fulling substantially destroys the lustrous and pleasing appearance produced in the finishing operation so that materials thus shrunken are not desirable for use in juxtaposition to unshrunken materials in garments or the like.

In accordance with my present process I preferably select finished fabric of the desired character, for example a one-and-one fabric of the cotton broadcloth type having its weft yarns (Fig. 2) spaced somewhat further apart than the warp yarns and having substantially the relative crinkle produced in the weaving operation. I now stretch this fabric under heavy tension in the direction of one of its constituent sets of yarns, for example in the direction of the filling or weft yarns, as indicated by the arrows 6 and 7 in Fig. 1, preferably moistening the fabric, as for example by steaming, prior to or concomitantly with this stretching operation.

An essential feature of my improved process resides in permitting the material, while thus being stretched weftwise, to move warpwise freely and without substantial restraint.

Since this stretching involves the application of transverse stress of sufficient intensity to shift one set of yarns relative to the other (as distinguished from the slight transverse tensioning commonly applied by hand in feeding cloth to a mangle or the like), I prefer to employ appropriate power driven mechanism for the purpose. Doubtless various machines may be devised for accomplishing the result. For example, a special tentering frame might possibly be used in which adjacent clamps or pins of each tentering chain are free to approach longitudinally of the fabric as the transverse stretching proceeds, but I find means such as illustrated in my copending application for Letters Patent Serial No. 332,919, filed January 16, 1929, particularly desirable. In this latter device there is provided means for applying the fabric to the holding pins of a tentering chain in such a manner that between adjacent pins the material is initially slack so that longitudinal shrinkage is not interfered with.

As a result of this stretching process, the weft yarns are pulled out nearly straight so that they substantially lose their normal crinkle, but in thus straightening, the weft yarns impose a strain upon the warp yarns, causing the later to creep or crawl lengthwise and to become deeply crinkled as indicated at 3^a in Figs. 3 and 4 so that the fabric shrinks in length and the ends 8 and 9 approach. If this transverse stretching be sufficiently intense or prolonged, each bend of the warp yarn will become of substantially semicircular extent, having as a center of curvature the center of the weft yarn over or under which it passes and when the warp yarns have assumed this position, little further decrease in length can take place. This purely transverse tensioning stress to which the cloth is subjected in this stretching operation results in a permanent change in the character of the material, and is not to be confused with such combined lateral and longitudinal tensioning as is incidental to tentering, mangling, folding, etc. whose primary object is merely to remove wrinkles and which produces no substantial or permanent change in the cloth structure. The original trade finish of the material is substantially unimpaired by this mechanical shrinkage and the shrunken fabric may be used in juxtaposition to unshrunken fabric without showing any appreciable difference in appearance.

The material takes a set in its new condition, particularly if moistened before stretching and allowed to dry thereafter, but to make the set more pronounced, I may subject the material to heat. I find that subjecting the shrunken material to the action of warm dry air while under slight tension, imparts the desired set, but I may subject it to an ironing operation as by passing it between heated rolls, or to any other desired treatment whereby to cause it to retain with certainty the qualities imparted by the aforedescribed stretching operation.

Having thus prepared fabric possessing the surface appearance of goods as finished in the piece but whose constituent yarns are so disposed as to oppose decrease in length in the direction of one set of yarns, I lay out on this material the blanks which are to be used in the making of the selected garment. Thus, as indicated in Fig. 1, I have shown collar blanks 10 laid out longitudinally of the fabric since the length of a collar is the important dimension. Prior to shrinking the fabric as above described, it is preferable experimentally to determine the shrinkage of the normal fabric under the conditions of use, for example in laundering, dyeing, stitching, etc., and then to pre-shrink it in accordance with this process to an amount approximating such shrinkage of the normal fabric. If this procedure be followed, the blank may be cut to substantially the exact desired size, since subsequent operations do not affect its length. If on the other hand the material be pre-shrunken in accordance with my process to a maximum possible extent, it may show a slight increase in length rather than a decrease when laundered.

I next assemble the blanks in usual manner and seam them together to form a collar. I have shown (Fig. 7) a collar having a top comprising a face ply 11 which is formed of the material treated as above described and

a neck-band 12 whose face ply is also preferably of this material. The lining 13 or other elements of the collar, not exposed to view may, if desired, be made of fabric shrunken by laundering or fulling, since the preservation of the trade finish upon such parts is immaterial. Those parts, for example the face ply of the top and neck-band, which are exposed to view, being made of the fabric shrunken mechanically as above described, are substantially indistinguishable in surface appearance from the original fabric as finished in the piece, and thus although the collar produced by this method may be made of substantially the exact desired size and will not shrink longitudinally even after repeated washings, it initially exhibits its original trade finish so as to match other parts of the shirt, or other garment with which it may be associated or incorporated.

Although I have made specific reference to a collar and neck-band as the garment or part of a garment to be made from my improved material, I wish it to be understood that other portions of garments, for example shirt fronts and backs, sleeves, cuffs and the like, as well as any other garments, parts of garments, or in fact any article where unchanging length is desired when subjected to laundering or like operations, may well be made from the improved material.

While I prefer to proceed as above described in preparing my improved fabric, I contemplate that fabric having the desired characteristics, that is to say, having one set of yarns disposed in substantially straight extended condition and the other with a substantially maximum crinkle so that it can not shrink to a substantial degree in the direction of the latter set, and having its original trade finish substantially undisturbed, may be made by other means or processes than the exemplary method specifically described above, and that fabric having such characteristic, however made, falls within the scope and purview of the invention.

I claim:

1. That method of treating textile fabric of a type suitable for collars, shirts, and the like and whose constituent yarns possess substantially the normal amount of crinkle resulting from the weaving operation, which comprises stretching the material in the direction of one of its constituent sets of yarns, while leaving the other set substantially free from longitudinal tension, with sufficient force to cause the sets of yarns by rearrangement to assume a mutual relationship such as substantially to prevent subsequent shrinking in the direction of said second set of yarns.

2. That method of treating woven textile fabric suitable for garments having its original trade finish substantially unimpaired, which comprises stretching the material in the direction of the weft yarns while allowing substantially complete freedom of movement to the warp yarns until as a result of such stretching the warps assume substantially the maximum possible amount of crinkle while the wefts become substantially straight.

3. That method of treating textile fabric which comprises determining the amount of shrinkage which such a fabric undergoes when subjected to laundering, and mechanically rearranging the constituent yarns in the fabric whereby to contract it in one direction to an amount substantially equal to said shrinkage, while stretching it in the other direction.

4. That method of making textile fabric having its original trade finish substantially unimpaired and which is substantially unshrinkable lengthwise, which comprises as steps stretching the previously unshrunken but moist fabric in the direction of its weft yarns while giving the warp yarns freedom of movement until the fabric has decreased in length to a predetermined amount, and drying the fabric under tension to give it a permanent set.

5. That method of mechanically preshrinking textile fabric without substantial impairment of its original trade finish, which comprises as steps stretching it transversely while giving it substantially complete freedom of movement longitudinally until by rearrangement of its constituent yarns it has been reduced in length to a predetermined amount, and subjecting the fabric to heat to cause the yarns to take a permanent set in their new arrangement.

6. That method of treating textile piece goods having its original trade finish substantially unimpaired, which comprises mechanically contracting it to predetermined dimensions in one direction only by stretching and fixing the stretched condition in another dimension whereby to prevent shrinkage of the fabric in said direction when subjected to subsequent laundering while substantially preserving said original trade finish.

7. That method of making an elongate garment blank, substantially unshrinkable in the direction of its length, which comprises as steps preparing woven textile fabric preserving substantially unimpaired its original trade finish and having one of its sets of constituent yarns crinkled to an abnormal degree and the yarns of the other set relatively straight, and cutting the blank from said material with the longer dimension of the blank extending in the direction of the yarns of the crinkled set.

8. That method of making elongate articles from textile fabric having its original trade finish substantially unimpaired, which comprises as steps mechanically pre-shrinking a

piece of the fabric by stretching it under heavy tension transversely while giving it substantially complete freedom of movement longitudinally until its constituent yarns so rearrange themselves that the fabric is substantially non-shrinkable longitudinally when subjected to subsequent laundering, and cutting an article blank from the shrunken fabric with the larger dimensions of the blank in the direction of the length of the fabric.

9. Woven textile fabric substantially non-shrinkable, by laundering, in one direction and having its original trade finish substantially unimpaired, said fabric having that set of its constituent yarns which extends in the direction in which the fabric is to be non-shrinkable, crinkled to a substantially maximum extent and the other set substantially straight.

10. Textile fabric, having its original trade finish substantially unimpaired and which is substantially non-shrinkable in one direction, such as results from mechanically rearranging the constitutent yarns of a previously woven fabric so that one set of yarns becomes substantially straight while the opposite set acquires a substantially maximum crinkle.

11. Textile fabric substantially non-shrinkable in one direction such as results from a mechanical treatment of woven fabric whose constituent yarns possess substantially the relative crinkle resulting from the weaving operation, such treatment comprising tensioning the material substantially at right angles to the direction in which it is to be non-shrinkable while allowing the material substantial freedom of movement in the latter direction during the stretching operation, the stretching being continued until that set of yarns extending in the direction in which the fabric is to be non-shrinkable assumes a substantially maximum crinkle while the tensioned yarns become substantially straight.

12. Textile fabric substantially non-shrinkable in one direction prepared by mechanically stretching woven fabric, having its original trade finish substantially unimpaired, in the direction of its weft yarns while permitting the fabric to decrease in length in the direction of its warps until, as a result of such stretching, the warps assume an abnormal crinkle while the wefts become substantially straight.

13. An elongate garment blank of woven textile material having the original trade finish of the fabric substantially unimpaired, said blank being substantially non-shrinkable lengthwise by laundering, the blank comprising longitudinal yarns which are crinkled to substantially a maximum degree and transverse yarns which are substantially straight.

14. A collar blank of woven textile fabric preserving its original trade finish substantially unimpaired and having its constituent yarns so arranged that the blank is substantially unshrinkable longitudinally when subjected to laundry treatment, the transverse yarns being substantially straight.

15. An elongate collar blank of one-ply textile fabric having the original trade finish of the material substantially unimpaired, said blank being substantially non-shrinkable lengthwise by laundering, the transverse yarns of said fabric being substantially straight and so packed together as to prevent contraction of the blank longitudinally beyond a predetermined amount.

16. A collar having its neck band, at least, comprising woven material having those constituent yarns which extend lengthwise thereof deeply crinkled so as substantially to prevent shrinkage in said direction and the yarns which extend transversely of the band relatively straight, the material of said band preserving its original trade finish substantially unimpaired.

17. A collar comprising a top and neckband, the outer ply at least of the top and neck band consisting of woven material substantially incapable of shrinkage by subsequent laundering, in the direction in the length of the collar and preserving substantially unimpaired its original trade finish.

Signed by me at Troy, N. Y., this 31st day of July, 1928.

SANFORD L. CLUETT.