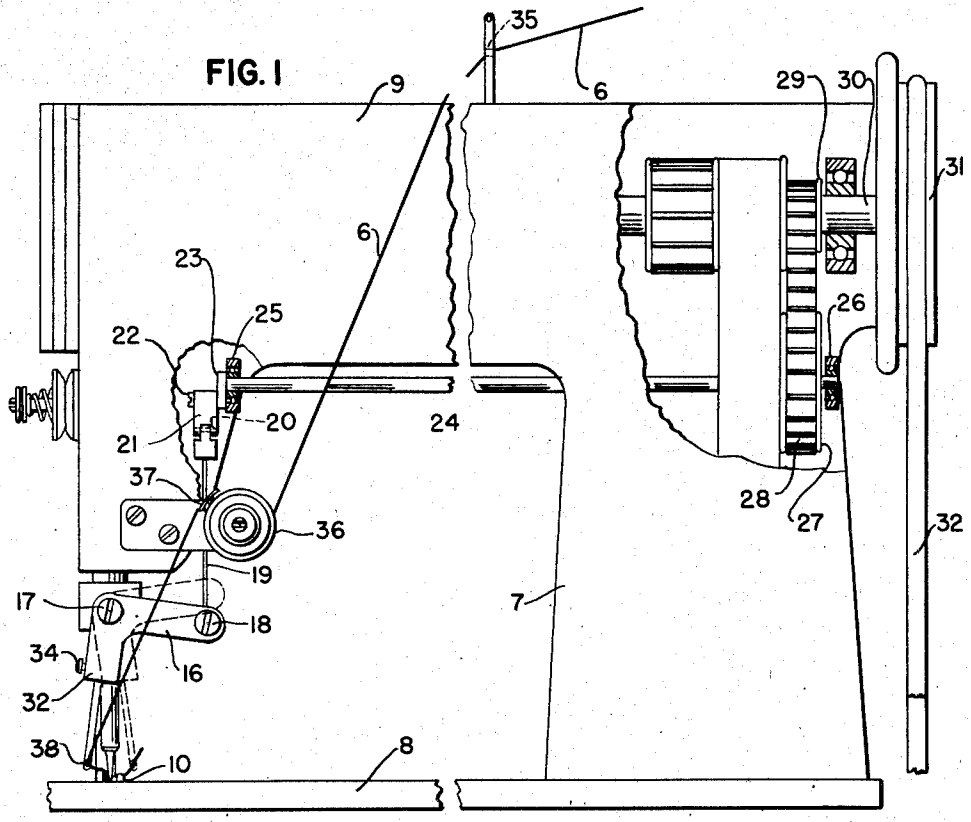
Jan. 14, 1958 H. C. DONALDSON, JR., ET AL 2,819,696

SHRINKLESS SEAM AND METHOD OF MAKING SAME

Filed April 27, 1955

FIG. 1



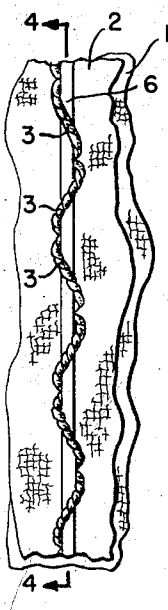


FIG. 3

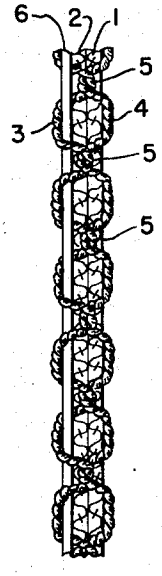


FIG. 4

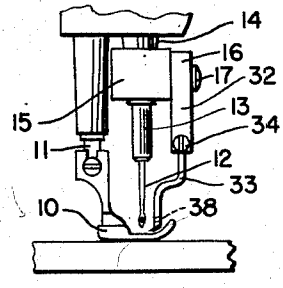


FIG. 2

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2,819,696

SHRINKLESS SEAM AND METHOD OF MAKING SAME

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3 Claims. (Cl. 112—262)

This invention concerns a method of manufacturing a seam which obviates or at least alleviates the problem of seam shrinkage. When two or more fabrics which are perfectly stable, that is which show no tendency to shrink, are sewn together, and then laundered, they heretofore would inevitably shrink and shorten along the seam. Seam shrinkage is the pucker or contraction which occurs upon laundering at seams, especially at those seams in which several plies of fabric are joined. It is a well-known and much studied problem in the textile industry. The pucker is unsightly and unattractive and seriously detracts from the appearance of a garment, but more than that and perhaps more important, it represents a dimensional change which causes fitted garments to become too tight or too short.

It is self-evident that in a seam the several plies are squeezed tightly together and will, when conditions permit, tend to resume their normal plump equilibrium condition. The swelling effects of water on cellulosic fabrics permit this readjustment, and the swelling plasticizing and lubricating effects of water and heat promote similar release for the more hydrophobic fabrics. The small quantity of fabric yarns encircled by the threads of a single stitch when swelled by water become thicker and the vertical (normal to the seam) diameter of the stitch must become greater, which it can only do at the expense of the horizontal diameter, that is, the length of the stitch. Obviously as each stitch becomes shorter, the seam becomes shorter. The theoretical cure is also obvious, excess thread in each stitch is necessary. If there is excess thread, the stitch and the seam can become thicker without becoming shorter. A loose seam would, therefore, be an answer but it is impossible to form a loose seam in machine sewing. There are some indirect approaches to the loose seam, such as sewing a piece of cardboard or heavy paper into the seam and then tearing it out. That method adequately prevents seam shrinkage, but is not efficient for high speed mass production efforts. In addition, a loose seam is less attractive and less reliable than a tight seam.

A better answer is to sew a tight seam with a thread which will become longer when laundered. One such thread suggested is a composite of a water soluble yarn and the normal sewing thread twisted together. When the water soluble component is removed as by laundering, there is excess thread in the seam by reason of the now unnecessary spirality. This is a reasonable answer to the problem, but the water soluble component must have a yield point and stress strain behavior approximately that of the permanent component or the spirality and effectiveness of the composite will change under the tension of sewing. This property of high yield point and high strength, equivalent to a typical sewing thread, is difficult to realize in a water soluble yarn, which yarns are for the most part very elastic. In addition, the aforementioned equivalency of stress strain behavior, when realized, is almost inevitably lost by the plasticizing influence of water vapor at high humidities upon the water soluble component. The bulky composite thread is difficult to pull through the fabric and causes excessive needle heat. The composite thread therefore, although it offers a theoretical cure for seam shrinkage is not commercially attractive.

We have discovered a means of producing a seam which does not shrink appreciably and which avoids the difficulties attendant upon the use of the composite thread mentioned above. Our seam makes use of a temporary or removable yarn which is water soluble, water dispersible or otherwise destructible or removable by water or laundering solutions. For the sake of brevity, we may refer to this yarn as the removable or temporary yarn and it is to be understood that we are not restricting ourselves to only those yarns which are soluble in pure water. The water may, for instance, contain soaps, alkalies, detergents and other typical laundering assistants which assist in the removal of the temporary yarns. In addition, the so-called "water soluble yarn" need not be truly soluble in the laundry solution, for seam shrinkage is adequately minimized if the yarn is merely dispersed or otherwise destroyed or removed by the laundering solution without actually being dissolved therein. Therefore, "water soluble" or "water destructible" yarn is to be understood as meaning and including in its scope as equivalents a yarn which is dissolved, dispersed or otherwise destroyed or removed by a laundering solution.

The water destructible component of our seam is not a part of, or used as, a true sewing thread or part thereof. It does not need the high yield point and high tensile strength of a sewing thread, does not need the premium flexibility of a sewing thread, and changes wrought by humidity which might render the aforementioned composite thread useless can be tolerated in the destructible component of our seam. This means that a wide range of materials are operable as the destructible component. Any natural or synthetic material which is obtainable in the form of thread-like filaments and which filaments are soluble, dispersible, or otherwise destructible or removable by a laundering solution is useful and operable in the seam of our discovery.

The following water destructible yarns are among those currently available and which have been evaluated and found operable and useful:

Polyacrylic acid
Sodium polyacrylate
Polyvinyl alcohol
Sodium carboxymethyl ether of cotton
Sodium carboxymethyl ether of regenerated cellulose
Calcium alginate
Sodium alginate

In our invention the destructible yarn is not pulled through the fabric and therefore does not contribute to needle heat and other operating difficulties.

This seam can be made quite tight and firm and of good appearance, and when it is laundered, which process removes the water destructible yarn, the excess sewing thread is available to compensate for the swelling and readjusting of the fabrics within the seam and seam shrinkage will be largely avoided. The water destructible yarn is not used as a sewing thread and does not need the special and difficult-to-realize qualities of a sewing thread. Sodium alginate which is a very feeble yarn and weak to the point of uselessness as a sewing thread, is quite satisfactory as the expendible, water destructible element of our seam. A yarn of carboxymethylated, high tenacity viscose is a very stiff, wiry yarn and completely unsatisfactory for machine sewing. It is satisfactory as the temporary or expendible element of our seam in which the temporary thread needs very little flexibility and in which a degree of rigidity against flattening is desirable.

Monofilaments which are obviously poor for sewing are in fact particularly advantageous as the water destructible element of our seam.

The preparation of our seam presents no great problem. The actual sewing is done in the normal manner at usual speeds and tensions, and at the same time the destructible yarn is fed across the line of sittching, where a stitch is being formed, by any of several back and forth motions timed with the needle. Although the destructible yarn in the completed seam lies along the seam in an almost perfectly straight line, it must be fed in alternately from each side so that the sewing thread will be forced to cross over it. An appreciation of the seam and its production can be obtained by a study of the drawings.

In the accompanying drawing:

Fig. 1 is a front elevation of a common commercial sewing machine, modified in accordance with this invention, and illustrating one manner of applying the removable yarn to the fabric, parts being broken away to show interior details;

Fig. 2 is a side elevation of a part only of the same to illustrate the location of the guide for the temporary thread relatively to the needle and presser foot;

Fig. 3 is a plan of a seam formed in accordance with this invention; and

Fig. 4 is a longitudinal sectional elevation along the seam, with the section taken approximately along the line 4—4 of Fig. 3.

This invention comprises the formation of a seam by laying a temporary yarn or thread along the line of stitching, with the sewing thread proper in each stitch passing over the temporary thread or yarn and confining the latter to a face of the fabric in each stitch. In such a seam, an excess of sewing thread is used by reason of the fact that the sewing thread is held, between the ends of each stitch, somewhat away from the fabric, by the interposed temporary or removable yarn. In addition, the temporary yarn preferably is held under a small or moderate tension while it is being sewed to the fabric during the formation of the seam, and because of this, it lies in an almost straight line along the seam, and the sewing thread which confines it to the fabric takes a somewhat circuitous path back and forth from side to side across the temporary or removable yarn.

A seam so made contains considerable excess length of sewing thread in each stitch, and when the temporary or removable yarn is removed as in laundering, the permanent sewing thread is then free to straighten out and lay along and in contact with the exposed face of the fabric layers between the ends of the stitch, and this shorter path provides the excess length that accommodates the laundry-swelled yarns that are enclosed in the loop of each stitch. The path of the sewing thread back and forth, from side to side, over the temporary or removable yarn or thread, also creates a circuitous path for the permanent sewing thread and then when the temporary yarn is removed, the travel of the permanent thread from side to side is no longer necessary and this also creates additional slack to accommodate the yarns enclosed in the stitch loops that are swelled when the united fabrics are subsequently laundered. This serves to reduce or eliminate shrinkage and stitch pucker.

It should be understood of course, that the amount of slack to be created can be controlled by varying the size of the temporary yarn or thread; the larger the temporary yarn, the greater the amount of slack which is created in each stitch when the temporary yarn is removed. This temporary yarn may be provided on the top face of the united fabrics, as illustrated in the drawings, or it can be applied against the under face of the united fabrics, or against both faces of the united fabrics if one should desire to create a rather large amount of slackness in the permanent sewing thread.

One embodiment of the new seam is illustrated in Figs. 3 and 4 of the drawing, wherein a plurality of layers of

fabric **1** and **2** are disposed face to face in superposed relation, and sewn together in a seam by a needle sewing thread **3** and a bobbin sewing thread **4**. This is a simple standard seam such as may be formed with any sewing machine, and it will be noted that these two sewing threads **3** and **4** are interengaged at **5** within the space between the faces of the superposed fabrics at the ends of each stitch. Between the interengaged parts **5** of the sewing threads, the loops formed by the sewing threads **3** and **4** enclose a number of yarns of the fabric layers, and it is the swelling of the yarns, in these closed loops, which causes the seam to contract in length and create seam shrinkage and pucker as explained earlier herein.

A temporary or removable yarn or thread **6** is confined against one face of the superposed fabrics by one of the threads, such as the needle thread **3**, and between the ends of each of the stitches, this temporary yarn or thread **6** holds the needle thread **3** away from the fabric. It is usually desirable to apply a little tension to this temporary or removable yarn or thread **6** during the sewing operation, so that it will lie in a somewhat straight path along the seam as shown in Fig. 3. Because of this slight tension, it has been found that the needle thread **3** passes alternately across the temporary or removable yarn **6** in alternate directions with successive stitches as shown clearly in Fig. 3.

Thus this temporary or removable yarn **6** causes the needle thread **3** to pass back and forth from side to side as well as being held away from the fabric faces between the ends of the stitches. Hence when this temporary yarn or thread **6** is removed, the needle thread **3** can straighten out and lie in a straight line in full contact with the face of the fabric it abuts, between the ends of the stitches, instead of from side to side, which gives the substantial slackness in the needle thread in each stitch that is necessary to accommodate the swelled yarns of the fabric layers which are enclosed in the loop of each stitch.

There are numerous mechanisms which can be adapted to apply the temporary or removable thread or yarn to the fabrics during the formation of the stitches. One relatively simple mechanism which we have used successfully for this purpose is illustrated in Figs. 1 and 2 of the drawings, but a few other mechanisms which can be adapted for this purpose are disclosed in the following U. S. patents:

773,653—November 1, 1904
875,601—December 31, 1907
1,046,401—December 3, 1912
2,010,574—August 6, 1935
2,533,293—December 12, 1950
2,573,614—October 30, 1951
2,615,409—October 28, 1952

These could be used as illustrated, or with only minor modifications that would be obvious to persons skilled in the art, to introduce the temporary or removable yarn into the seam and produce a non-shrinking seam. In most cases, the only modification necessary would be the introduction of the tensioning device for the temporary or removable yarn. We prefer to apply a small amount of tension to the temporary or removable yarn during the sewing operation so that the temporary or removable yarn will lie fairly straight along the seam.

In the illustrated embodiment of a machine for performing this operation, and referring particularly to Figs. 1 and 2, the sewing machine is a common commercial sewing machine such as is widely used in garment factories. These machines usually operate at a high speed in order to obtain maximum output per machine, and because of the high speed, the sewing threads are usually under quite a substantial tension and produce very tight stitches.

In this illustrated machine, the usual upright arm **7** is

provided on a platform or base 8 at one end of the latter, and from the upper end of this upright arm 7, there is a horizontally extending arm 9. At the free end of the horizontal arm 9 is mounted the usual presser foot 10 which is carried by a holder 11 that is guided vertically at the free end portion of the horizontal arm 9. The sewing needle 12 is detachably mounted in a needle holder 13, which is also mounted to reciprocate vertically in a bearing sleeve 14 provided in the free end portion of the arm 9, as is usual in sewing machines. A member 15 is mounted upon the lower end of sleeve 14, and a bell crank lever 16 is mounted by a pivot 17 on a side of member 15. One arm of this bell crank lever extends generally horizontally toward the upright arm 7, and its free end is pivoted at 18 to one end of a link 19 that extends upwardly therefrom.

The upper end of this link 19 is pivoted by a pin 20 to the free end of a connecting rod 21. The other end of this connecting rod is pivoted to the crank pin 22 which is mounted eccentrically on a crank member 23 that is fixed on one end of a shaft 24. This shaft 24 extends horizontally and is rotatably mounted by a ball bearing in a bearing member 25 in the free end part of the horizontal arm 9. The other end of shaft 24 is rotatably mounted in a ball bearing of bearing member 26 provided in the upright arm 7. Fixed on the shaft 24, at the end within the upright arm 7, is a pulley 27 and a flexible endless belt 28 runs around this pulley 27 and passes over a related pulley 29 which is fixed on the main shaft 30 of the sewing machine which transmits motion in a manner usual in these sewing machines to the needle holder 13. The pulleys 27 and 29 and the belt 28 are preferably what is known in the trade as a positive drive arrangement, which connects the two shafts 24 and 30 so that there will always be the proper drive of 1:2 ratio between their speeds. The pulleys 27 and 29 are so chosen that shaft 24 rotates one half as fast as the main shaft 30. The main shaft 30 carries a pulley 31 fixed thereon, which is driven by a belt 32 from a motor or other suitable source of power.

The bell crank lever 16 has a depending arm 32 with a recess in its lower end which receives and holds a yarn guide member 33. A set screw 34 in the lower end portion of the depending arm 32 is adjustable into the recess into which the guide member 32 is received and serves to detachably hold the member 33 in the recess. This guide member 33 extends downwardly and then toward the needle and terminates in close proximity to the presser foot 10, as shown in Fig. 2. The lower end of this guide member 33 is provided with an aperture or eye 38 serving as a thread guide through which the temporary thread or yarn 6 is passed. This temporary yarn or thread 6 is passed from a source of supply (not shown) through a guide eye 35 provided on the top of the horizontal arm 9, and then passes around a standard thread tensioning device 36 which is mounted on the front face of the lower part of the free end of the arm 9, and then it passes through a guide 37 and thence through the eye 38 adjacent to the needle.

The shaft 24 operates at one-half the speed of the main shaft 30 so that it makes one revolution for each two revolutions of the main shaft. The bell crank lever 16 thus makes one complete oscillation for each two complete reciprocations of the needle. The timing of the shaft 24 is such that the eye 38 in the guide member 33 will be at one side or the other of the needle as shown in Fig. 1 when the needle is in its lowermost sewing position, as shown in Fig. 1.

When the needle rises and clears the presser foot, the bell crank lever is rocked by the shaft 24 from the full line position to the dash line position, as shown in Fig. 1, and then after the next descent and rise of the needle, the bell crank lever will be rocked back to the full line position of Fig. 1. In this manner, the eye 38 is moved back and forth from side to side across the line of stitching, and since the fabric layers are moved to the rear the distance of one stitch after each descent of the needle, the guide eye 38 will move the temporary yarn or thread across the line of stitching immediately following each newly formed stitch, so that when the needle next descends, it will stitch the temporary yarn or thread to the fabric; that is, confine the temporary yarn to the fabrics being sewn together. This arrangement is shown in Fig. 3 where the needle thread 3 passes alternately in opposite directions across the temporary yarn or thread 6 in successive stitches.

It will be observed from Fig. 1 that the guide eye 38 will be at one side or the other of the presser foot when the needle is raised, so that it will be possible to raise the presser foot at any time when the needle is not being operated, and the pressure foot will clear this guide member 33. To start a stitching operation, the temporary yarn or thread is placed across the line of stitching and in the first stitch is confined to the fabric. After that, some tension can be applied to the temporary yarn or thread 6 by the tensioning device 36, which is a standard tensioning device used on many sewing machines. When the fabrics are sewn together by the regular needle and bobbin threads 3 and 4, the temporary thread 6 is moved from side to side so that the needle thread passes alternately across thread 6 in opposite directions in successive stitches as shown clearly in Figs. 3 and 4.

If the machine is operated slowly, one could move the temporary thread alternately across the line of stitching between the needle and the last formed stitch manually, and obtain the seam shown in Figs. 3 and 4. However, the temporary yarn or thread 6 can be guided into sewing position and moved across the line of stitching in the manner illustrated in Figs. 1 and 3 and also by the mechanism of any of the other patents listed above.

A few examples are offered to show the utility and principle of our discovery. Seams were prepared on the modified sewing machine shown in the drawings. This machine is a standard, modern industrial sewing machine manufactured by a large producer of such equipment. The machine was operated at 3500 to 4000 stitches per minute. The seams were made with 18 stitches per inch and the tension on the sewing thread was about 100 g. The speed and tension used approximate the speeds and tensions used commercially. Stitch frequency of 18 per inch is popularly used and gives a presentable and useful seam. The sewing threads were a 70–3 cord on top and 80–2 cotton thread in the bobbin. In all the examples seam shrinkage plaques were prepared by sewing together 4 plies of fabric with two parallel seams about one quarter inch apart. The plies were about 6 inches wide and two feet long.

Example 1

Four plies of cotton broadcloth shirting 136 x 60, 4.0 yards per pound and showing zero shrinkage were sewn together under the conditions described above to form the control plaque; three other plaques were prepared in the same way except that a removable spacer yarn was sewn into the seam in the manner described in this disclosure and shown in the drawings. The destructible yarn of this example was a polyvinyl alcohol yarn. It was a 40/3 cord on the cotton yarn system. This yarn was a commercial product spun from 95% hydrolyzed, medium viscosity, polyvinyl alcohol and obtained from the Celanese Corporation of Charlotte, N. C. The destructible spacer yarn was under a tension of about 30 grams. This is a stress of less than about .1 g. per denier and even very weak yarns will tolerate such a mild tension. In contrast, the sewing thread, is normally subject to ten times as much stress.

Eighteen inch marks were placed on the seams on all four plaques and the four plaques together were subjected to one CCC–T–191*a* laundering cycle. They were press dried without stretching and measured for shrinkage.

Sample	Spacer Yarn	Shrinkage, percent
1-A	Polyvinyl Alcohol	1.4
1-B	do	0.4
1-C	do	0.6
1-D	None—Control	4.2

Example 2

The same broadcloth shirting fabric was used in this second test. The water destructible temporary spacer yarn in this instance was a calcium alginate yarn. This was a commercial product widely used as a scaffolding yarn in lace-making and supplied by Courtaulds, Ltd. of London, England. On the cotton yarn numbering system this yarn would be a 30/2. Three test plaques and a control were made and marked as in Example 1. They were laundered by being agitated in a small washer for a half hour at 160° F. in a 1% solution of "All" a commercial detergent supplied by the Monsanto Chemical Co. of St. Louis, Mo. They were press-dried and measured for shrinkage.

Sample	Spacer Yarn	Shrinkage, percent
2-A	Calcium Alginate	1.1
2-B	do	1.8
2-C	do	0.7
2-D	None—Control	4.7

Example 3

The removable yarn for this set of plaques was carboxymethylated cotton. A 70 cotton singles yarn was carboxymethylated by treatment with chloroacetic acid and sodium hydroxide according to the directions given by Reid et al. in the Textile Research Journal, vol. 23, p. 719, 1953. The product showed substitution averaging one sodium carboxymethyl ether group per 2.5 anhydroglucose units and was quite soluble in water. Four of these solubilized singles were plied together with 15 turns of ply twist per inch. Because of the shrinkage in treatment and the contraction in plying the final yarn was a 55/4 on the cotton system. Four plaques of the cotton broadcloth, three with the soluble cotton as the removable yarn, and one control without the spacer yarn, were prepared on the modified commercial sewing machine exactly as in the other examples. They were marked, subjected to one CCC–T–191*a* laundering, dried and measured for shrinkage.

Sample	Spacer Yarn	Shrinkage, percent
3-A	Soluble Cotton	0.4
3-B	do	0.4
3-C	do	0.9
3-D	None—Control	3.8

Example 4

A direct spun viscose rayon yarn was made water soluble by carboxymethylation exactly as was the cotton yarn of Example 3. The solubilized rayon showed a sodium carboxymethyl ether content of one substituent per 2.8 anhydroglucose rings. Four solubilized rayon singles were plied together with 15 turns of ply twist to give a yarn equivalent to a 35/4 cotton yarn. As in the other examples, three test plaques were prepared from the cotton shirting using the water soluble rayon yarn as the removable yarn. A similar fourth plaque without a spacer yarn was prepared as a control. The eighteen inch marks were placed on the seams, the plaques were subjected to one CCC–T–191*a* wash, press dried without stretching and the shrinkage was measured.

Sample	Spacer Yarn	Shrinkage, percent
4-A	Soluble Rayon	0.5
4-B	do	0.8
4-C	do	0.2
4-D	None—Control	4.7

Example 5

A polyvinyl alcohol monofilament was spun from 95% hydrolyzed, medium viscosity, polyvinyl alcohol. The dried monofilament was .008 inch in diameter. A seam shrinkage plaque was prepared from four ply of the cotton broadcloth using the polyvinyl alcohol monofilament as the spacer yarn. A similar control plaque was prepared without a spacer yarn. The two plaques were then marked, subjected to one CCC–T–191*a* laundering, press dried and measured.

Sample	Spacer Yarn	Shrinkage, percent
5-A	Polyvinyl Alcohol Monofilament	0.8
5-B	None—Control	3.2

Example 6

Seam shrinkage plaques were made using well stabilized rayon gabardine, 132 x 64, 3.0 yds./lb. One control plaque with no spacer yarn was compared with a similar plaque in which the solubilized rayon yarn of Example 4 was used as the removable spacer yarn. They were subjected to one CCC–T–191*a* laundering, dried and measured for shrinkage.

Sample	Spacer Yarn	Shrinkage, percent
6-A	Soluble Rayon	0.2
6-B	None—Control	3.9

Example 7

Plain weave "Dacron" shirting 144 x 72, 7.3 yards per pound was washed several times to preshrink it thoroughly. The final stable material was sewn into two seam shrinkage plaques of four ply each. They were alike except that in one the soluble cotton yarn of Example 3 was used as a removable spacing yarn, in the seams. No spacer yarn was used in the seams of the second plaque. Eighteen inch marks were placed on the seams and the two plaques were then washed according to the American Institute of Laundering, White Family Wash cycle. They were then dried and measured for shrinkage.

Sample	Spacer Yarn	Shrinkage, percent
7-A	Soluble Cotton	0.0
7-B	None—Control	3.0

Example 8

Four plies of cotton twill fabric 96 x 56, 1.9 yards per pound were sewn together to make the usual seam shrinkage test pieces. In this instance, however, the stitch size was increased to twelve per inch which is about normal and usual for this heavy material. One seam shrinkage plaque was prepared using the soluble rayon spacer yarn of Example 4, a second control plaque with no spacer yarn was also prepared. They were marked with the eighteen inch marks and subjected to one CCC–T–191*a* laundering. Then, after press drying they were measured for shrinkage along the seams.

Sample	Spacer Yarn	Shrinkage, percent
8-A	Soluble Rayon	0.0
8-B	None—Control	2.6

The examples show only a few of the water destructible yarns which will function adequately. The destructible yarn does not need appreciable strength. It can be quite feeble. Our trials indicated that a tension of about 25 to 30 grams is adequate to keep the destructible yarn reasonably straight in the seam, but one can use as much tension as the strength of the yarn will permit. The destructible yarn, since it acts as a spacer holding the sewing thread away from the fabric, should be relatively large. We prefer yarns equivalent to viscose rayon yarns ranging from 100 to 1500 denier. This means that the maximum load on the destructible yarn would be of the order of .3 gram per denier. Any yarn will tolerate such a mild tension. The stresses in spinning a yarn undoubtedly greatly exceeds .3 gram per denier. The spacer yarn should be reasonably large to be effective. We prefer that the water destructible yarn be from .004 to .015 inch in diameter. This is equivalent to about 100 to 1500 denier figured on the density of rayon. In the examples, the deniers of the destructible yarns ranged from 354 for the 30/2 calcium alginate yarn to 590 for the soluble rayon yarn.

The water destructible yarn, therefore, preferably should be from about .004 to about .015 inch in diameter and needs very little strength.

The nature of the sewing thread and of the fabric has no bearing on the utility of our discovery. All seams produced at the tensions and speeds of commercial machine sewing show seam shrinking when laundered and all will be improved by the introduction of the water destructible spacer yarn as we have described.

The term "yarn" as used herein and in the claims to identify the spacer between the fabric layers and the sewing thread, is intended to include within its scope as legal equivalents, a monofilament or an assembly of filaments or fibers, because a monofilament of proper size will function as a spacer satisfactorily, as will assemblies of filaments or fibers.

It will be understood that various changes in the details, materials and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

We claim:

1. The method of producing a longitudinally extending seam joining together a plurality of superposed plies of fabric along a line and having minimum seam shrinkage and stitch pucker which comprises, stitching the plies together with regular sewing thread, and during the formation of said seam placing a physically separate, temporary and removable spacer yarn between an exterior face of the superposed plies and the adjacent sewing thread of the stitches, whereby the temporary yarn will be confined to said exterior face by the sewing thread and will space the sewing thread somewhat from said exterior face, said spacer yarn being composed essentially of polyvinyl alcohol and being removable, by the subsequent action of a laundry washing solution, from its position in the said stitches.

2. A textile article comprising a plurality of layers of textile fabric superposed face to face, and sewed together in a longitudinally extending seam with regular sewing thread, and a physically separate spacing yarn of a water soluble material removable by the action of a laundering solution which will not remove said regular thread, said spacing yarn being in the loop of each stitch of the sewing thread between an exterior face of the layers and the sewing thread lying along that face.

3. A textile article comprising, a plurality of layers of textile fabric superposed face to face, and sewed together by a seam of sewing thread, and a temporary and removable water destructible spacer yarn, said spacer yarn being physically separate from said sewing thread and being confined in the stitches thereof between an exterior face of the superposed layers and the sewing thread, said spacer yarn partially spacing the part of the sewing thread that is between the ends of each said stitch from said exterior face of the superposed layers, said spacer yarn lying along the seam in an approximately straight line, and the sewing thread which confines it to the fabric layers passing over the spacer yarn alternately from side to side in successive stitches.

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