March 3, 1964 S. J. JAMISON 3,123,035

SELF-STABILIZING, NON-RAVELING SEAMS

Filed Oct. 17, 1961 2 Sheets-Sheet 1

Fig. 1.

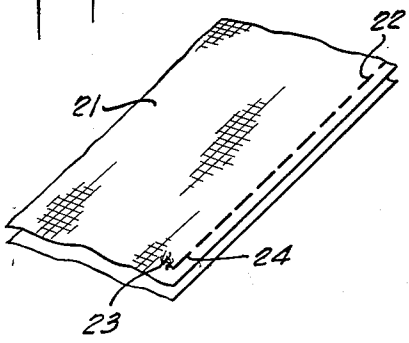


Fig. 2.

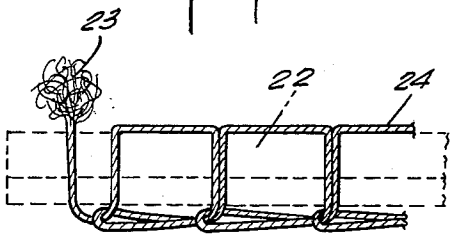


Fig. 3.

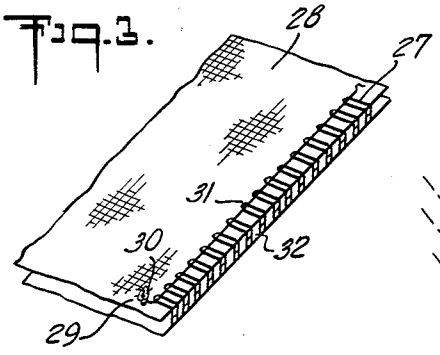


Fig. 4.

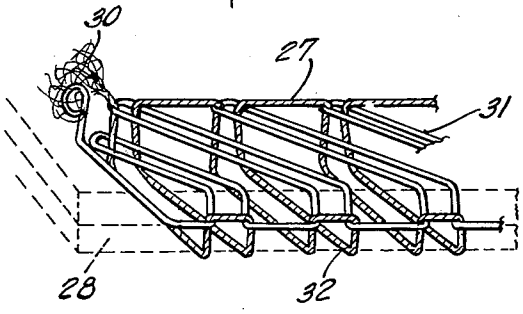
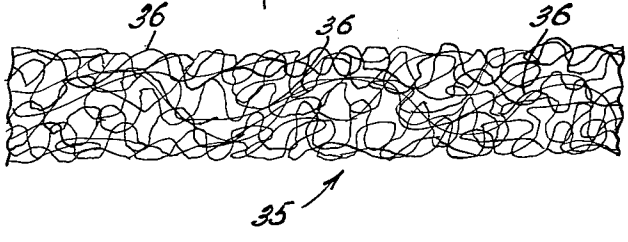


Fig. 5



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March 3, 1964 S. J. JAMISON 3,123,035

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Filed Oct. 17, 1961 2 Sheets-Sheet 2

Fig. 6.

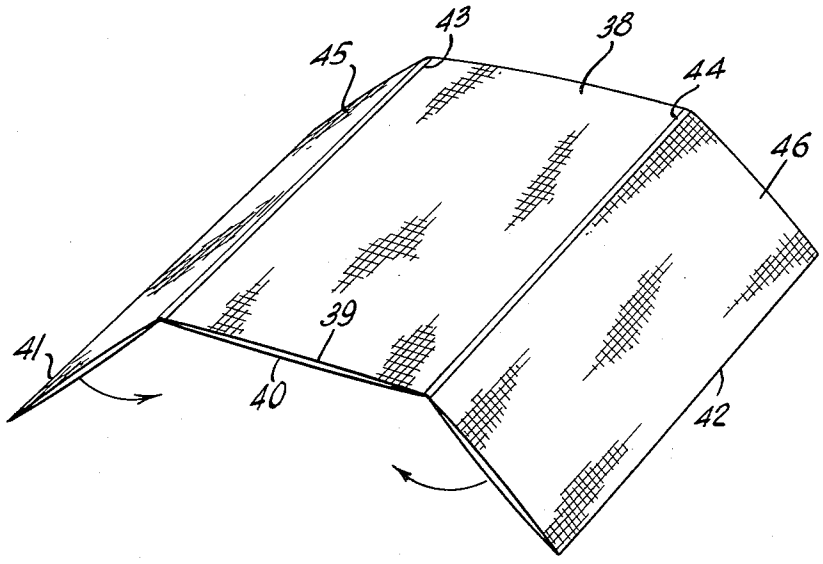
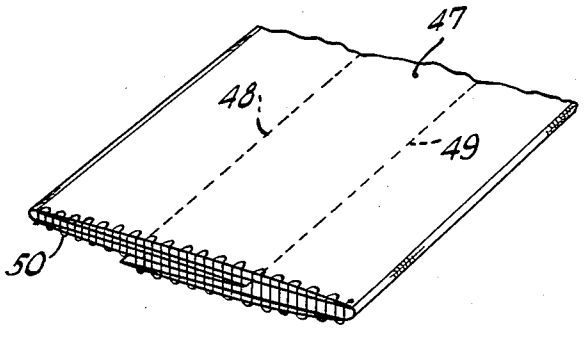


Fig. 7.



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SELF-STABILIZING, NON-RAVELING SEAMS

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The present invention relates to seams in fabrics. More particularly, it relates to fabric seams which are stable and will not ravel during subsequent use of the fabric.

Seams are formed by known sewing techniques, in which at least one thread is stitched through superimposed fabric layers along the line in which it is desired to form a seam joining the fabric layers. Seams may be used to finish the edge of a garment by hemming, i.e., turning the garment edge over and sewing along the turned over edge. Another type of a seam is formed by overedging, i.e., sewing along the cut edge of a fabric and allowing every other stitch to overlap the cut edge. Seams are also used to join two pieces of fabric together in order to form a garment.

The sewing of seams is normally carried out with the aid of a sewing machine in which the stitches uniting the fabric are formed by threads from each side of the seam, one of the threads (the needle or top thread) being continuously forwarded through the eye of the needle during the sewing operation, and the other thread (the bobbin or bottom thread) being fed from the other side of the fabric layers, usually from a bobbin.

At the beginning and at the end of a seam there are thread ends which are free and loose and, if pulled, may pull out the entire seam. Depending on what type of seam is used and how the threads are united to form a stitch, the seam may ravel by pulling any one of the free ends or by pulling just one particular thread end.

In order to insure against raveling of the seam during subsequent use it is desirable to stabilize or tie down the free thread ends. This may be done by tying a knot in the free ends, by sewing a multiplicity of stitches at the free end, or by applying adhesive binder to the free ends of the thread. All of these known techniques require some further operation after the seam is sewn and all of these techniques leave some length of dangling thread ends which are unsightly in the finished product. These unsightly ends may be cut off in order to improve the appearance of the seam but this increases the possibility that the seam may ravel during subsequent use.

It is an object of the present invention to provide a seam which will not ravel during normal subsequent use.

It is a further object of this invention to provide a seam which does not require the knotting or tying of its free ends.

It is yet a further object of this invention to provide a seam that does not have unsightly dangling thread ends.

In accordance with the present invention, at least one of the threads in the seam is a synthetic polymer, multistrand, continuous filament, extensible thread. The thread is in an extended state throughout the body of the seam whereby it is relatively thin and smooth. The free ends of the thread are in a relaxed state whereby the free ends are fluffy and highly crimped and form a balloon at the end of the seam to stabilize the seam and prevent it from raveling during subsequent use.

Other features and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a seam joining the ends of two fabrics together.

FIGURE 2 is an enlarged cros-sectional view of the seam of FIGURE 1.

FIGURE 3 is a perspective view of an overedge seam finishing the cut edges of a plurality of fabric layers.

FIGURE 4 is an enlarged cross-sectional view in perspective of the seam of FIGURE 3.

FIGURE 5 is an enlarged view of a synthetic polymer, multi-strand, continuous filament, extensible thread used in the seams of this invention. The thread is shown in its unextended state but with sufficient tension to keep it relatively straight rather than curling to form a ball or balloon.

FIGURE 6 is a perspective view of a diaper fabric as its ends are being folded under the center of the diaper.

FIGURE 7 is an enlarged view in perspective of the diaper fabric of FIGURE 6 which is folded and sewn with an overedged seam along one edge of the diaper in accordance with the present invention.

In FIGURE 1, there is shown a portion of a seam at the juncture of two pieces of fabric 21. The seam 22 extends throughout the length of the juncture and at the end of the seam there is a free end 23 of the thread 24 used to form the seam. As seen more clearly in FIGURE 2, the seam 22 comprises a thread 24 which is interlocked with itself at each stitch of the seam to form what is commonly termed a chain stitch. The thread is smooth and taut at each stitch in the body of the fabric but the free end 23 is in a relaxed, unextended state and curls and fluffs up to form a balloon at the end of the seam.

In FIGURE 3, there is shown a portion of a seam 27 finishing the edge of two superimposed pieces of fabric 28. The seam extends along the entire edge of the fabric layers and at the end of the seam there are free ends 29 and 30 of the threads 31 and 32 used to form the seam.

As can be seen more clearly in FIGURE 4, each stitch of the seam 27 actually overlaps the cut edges of the fabrics. The seam comprises two threads 31 and 32 which are interlocked with each other at each stitch formed in the seam. The threads are smooth and taut at each stitch along the body of the fabrics and overlie the cut edges of the fabrics. One thread 31 of the seam is a conventional mercerized cotton thread, while the other thread 32 is a textured yarn. The free end 30 of the textured yarn is relaxed and in an unextended state at the end of the seam and forms a fluffy ball or balloon at the end of the seam which entangles and entwines the free end 29 of the conventional cotton thread to stabilize the seam.

In FIGURE 5, there is shown an enlargement of a textured yarn 35 which is under just enough tension so that the yarn lies substantially straight. The yarn is composed of a number of continuous, highly crimped filaments 36. If the yarn is allowed to relax completely, i.e., all tension is removed, it curls upon itself and forms a ball. When the tension is increased the yarn extends and the filaments straighten so that they lie relatively parallel to one another to form a thin, smooth thread.

In FIGURES 6 and 7 of the drawings there is shown a folded and sewn diaper overedged in accordance with the present invention. The diaper 38 is woven in two layers 39 and 40 which are united at their edges to form selvages 41 and 42. Parallel to the selvages and spaced inwardly therefrom are folding bars 43 and 44 about which the marginal portions 45 and 46 of the fabric are folded. The fabric is folded inwardly from the selvage edges so that the marginal portions of the fabric adjacent the selvages overlap to form a center panel 47 of 6 plies of cloth. The fabric is held in its folded position by the sewn seams 48 and 49 along the selvage edges. The end of the folded and sewn diaper is overedged with an overedged seam 50 in accordance wtih the present in-

vention. The stitch and threads used for the overedged seam are more clearly depicted in FIGURE 4 previously described.

The threads used to form the seams of this invention are composed of a number of permanently crimped, continuous filaments and are generically termed textured yarns. Most such textured yarns are made from nylon though they may be made from other synthetic polymers, such as polyesters, i.e., "Dacron," and polyacrylics, i.e., "Orlon." The yarns are made by taking a number of continuous filaments, twisting them, heat-setting the filaments to set this twist and then untwisting the filaments to form the final yarn.

Another technique for producing textured yarns is to pass a continuous multifilament yarn through a false twist spindle, heat set the false twist and wind up the yarn allowing the false twist to remove itself. Still another method of producing textured yarns is to run a continuous multifilament yarn through a heating zone and then around a knife edge to produce spirals and helices in the final yarn. Examples of yarns produced by these different techniques and which are suitable for use in accordance with this invention are "Agilon," "Fluflon," "Helanca," "Softex," "Superloft," etc. In all instances the final yarn is smooth when under tension but fluffs up and takes its permanently crimped shape when in a relaxed condition.

At least one of the threads which make up the seams of this invention must be such an above-described textured yarn. The remaining threads of the seam may be textured yarns but they may also be conventional sewing threads such as cotton, mercerized cotton, silk, synthetic fibers, etc. If these conventional threads are used in seams along with a textured yarn, when the textured yarn is in a relaxed state, (as it is at the end of the seam), it entwines and entangles the free ends of the conventional threads so that they also form a part of the ball or balloon along with the textured yarn rather than leaving these conventional threads dangling and forming unsightlly thread ends in the finished product.

As previously discussed, there are many different types of seams for joining fabrics, overedging fabrics, hemming fabrics, etc. Most of these seams fall into four basic classes of seams which have been given standard identifications as follows:

SS for superimposed plies of material joined with one or more rows of stitches;

LS for overlapping to form a number of plies of material which are then held together by one or more rows of stitches;

BS for seams which are made from one or more plies of material and a binding strip which are joined together by one or more rows of stitches; and

FS, wherein two or more plies of material are united at their edges so that the stitches extend across and cover the edge or edges of the material.

The above-mentioned seams may be formed from a number of different stitches or combinations of stitches made using from one to nine threads. The different stitches have also been standardized by the Federal Specifications Board of the United States Government and are identified as stitch types 100, 200, 300, 400, 500, and 600. The seams of this invention may be formed from any of the above-described types of seams using any of the above-described stitches or combination of stitches.

As previously mentioned, seaming generically denotes the joining together in some manner two layers of fabric material. When a similar technique is used with a single layer of fabric, it is called stitching and is usually used to produce decorative effects in the fabric. The term "seam" as used in this specification is meant to cover not only those seams used to join fabric layers but also stitching such as is used to produce decorative effects in fabrics and which is generally classed as follows:

OS, i.e., a series of stitches embodied in material either in a straight line, curve or following a design;

EF, i.e., a series of stitches formed at or over the edge of a material.

Any of the previously described stitch types may be used in forming such decorative stitching.

The invention will be further illustrated in greater detail by the following specific examples. It should be understood, however, that although all of these examples may describe in particular detail some of the more specific features of the invention, they are given primarily for purposes of illustration and the invention in its broader aspects is not to be construed as limited thereto.

Example 1

Diaper cloth with plain one over one weave is woven in two layers, 35 inches wide. The warp yarns are 25's cotton yarns woven 40 ends to the inch and the filling yarns are 34.3's cotton yarns woven 38 ends to the inch. The two layer fabric is united along its edges to form selvages. Diapers are made by cutting 21-inch lengths of the 35-inch wide material, and folding the 21-inch by 35-inch blank to form a 21-inch by 14-inch diaper. The blank is folded inwardly from the selvage edges so that the marginal portions of the blank adjacent the selvages overlap to form a center panel 6 inches wide of 6-ply diaper cloth. The two side panels are each approximately 4 inches wide and contain 4 plies of diaper cloth. The panels are held in their relative positions by sewing along the selvage edges. The 14-inch ends of the diaper present a plurality of layers of cut fabric. One of the ends is overedged with standard seam types SS*a*–1 using stitch type 503. One of the threads used to form the seam is a conventional 50/3 mercerized cotton thread while the other thread is a textured nylon yarn, 140 denier and 22% elongated, sold by Belding Hemingway Co., Inc., under the trademark "Softex Thread."

The other cut end of the diaper is overedged with the same standard seam and stitch type as previously described. Both of the threads used to form this seam are textured nylon yarns, 140 denier and 22% elongation, sold by Belding Hemingway Co., Inc., under the trademark "Softex Thread."

The bodies of both seams are smooth and flat. At the free ends of both seams there is a small, fluffy ball or balloon of thread holding the thread ends in position at the end of the last stitch.

The final diaper is washed and dried in automatic equipment fifty consecutive times. On examining the diaper after the fifty washings and dryings the seams are unchanged and have not raveled. The thread ends of both seams are still in the form of small, fluffy balls holding the last stitch of the seam in the same position as it was prior to washing.

Example 2

One edge of a 20-inch by 20-inch piece of rayon "taffeta" fabric is hemmed by turning approximately ¾ of an inch of the fabric, along an edge, upon itself and then sewing along this folded edge with standard stitching type EF using stitch 101. The fabric contains 92 ends per inch of 100 denier multifilament warp yarns and 68 ends per inch of 150 denier multifilament filling yarns. The thread used to stitch the hem is a 150 denier, multifilament, textured polyester yarn. The stitching is smooth and taut throughout the body of the hem and the free ends of the yarn at each end of the hem are in the form of small fluffy balls or balloons.

The hemmed fabric is washed and dried in automatic equipment fifty consecutive times. On examining the hem after the fifty washings and dryings there is no evidence of raveling of the stitching.

It will be apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof and therefore it is not

intended to be limited except as indicated in the appended claims.

I claim:

1. An article of manufacture comprising a fabric layer with continuous stitching therealong in the form of a seam, said stitching comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread which, in its normal relaxed condition, is fluffy and highly crimped, and said thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition, whereby the seam is stabilized against raveling during normal use.

2. An article of manufacture comprising a fabric layer with continuous stitching therealong in the form of a seam, said stitching comprising a continuous filament, low-twist, multi-strand nylon thread which, in its normal relaxed condition is fluffy and highly crimped, and said thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition, whereby the seam is stabilized against raveling during normal use.

3. An article of manufacture comprising a plurality of superimposed fabric layers with continuous stitching therealong in the form of a seam, said stitching comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread which, in its normal relaxed condition, is fluffy and highly crimped, and said thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition whereby the seam is stabilized against raveling during normal use.

4. An article of manufacture comprising a fabric layer with continuous stitching therealong in the form of a seam, said stitching consisting of, synthetic polymer, continuous filament, low-twist, multi-strand thread which, in its normal relaxed condition, is fluffy and highly crimped, and said thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition, whereby the seam is stabilized against raveling during normal use.

5. An article of manufacture comprising a fabric layer with continuous stitching therealong in the form of a seam, said stitching comprising a plurality of interlocking threads, each following a separate course in the seam, and at least one of said threads comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread, which, in its normal relaxed condition, is fluffy and highly crimped, said multi-strand thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition whereby all of the courses of interlocking threads in the seam are stabilized against raveling during normal use.

6. An article of manufacture comprising a fabric layer with continuous stitching therealong in the form of a seam, said stitching comprising a plurality of interlocking threads, each following a separate course in the seam, at least one of said threads being a conventional sewing thread and at least another of said threads comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread which, in its normal relaxed condition, is fluffy and high crimped, and said multi-strand thread in the portion thereof presented by the stitching in the seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof at the end of the seam beyond the stitching therein, being in its fluffy, highly crimped, relaxed condition whereby all of the courses of interlocking threads in the seam are stabilized against raveling during normal use.

7. An article of manufacture as defined in claim 1 wherein the fabric layer is a woven fabric.

8. An article of manufacture as defined in claim 5 wherein the fabric layer is a woven fabric.

9. An article of manufacture as defined in claim 6 wherein the fabric layer is a woven fabric.

10. A folded and sewn diaper comprising a plurality of layers of woven fabric having an overedged seam along at least one edge of said plural layers, said overedge seam comprising a plurality of interlocking threads, each following a separate course in the overedge seam, and at least one of said threads comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread, which, in its normal relaxed condition, is fluffy and highly crimped, said multi-strand thread in the portion thereof presented by the overedge seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof beyond the end of the overedge seam, being in its fluffy, highly crimped, relaxed condition whereby all of the courses of interlocking threads in the overedge seam are stabilized against raveling during normal use.

11. A folded and sewn diaper comprising a plurality of layers of woven fabric having an overedge seam along at least one edge of said plural layers, said overedge seam comprising a plurality of interlocking threads, each following a separate course in the overedge seam, at least one of said threads being a conventional sewing thread and at least another of said threads comprising a synthetic polymer, continuous filament, low-twist, multi-strand thread which, in its normal relaxed condition, is fluffy and highly crimped, and said multi-strand thread in the portion thereof presented by the overedge seam, being extended substantially beyond its length in normal relaxed condition and, in the portion thereof beyond the end of the overedge seam, being in its fluffy, highly crimped, relaxed condition whereby all of the courses of interlocking threads in the overedge seam are stabilized against raveling during normal use.

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