Jan. 28, 1969 S. C. SCHEIER 3,424,161

SEWN DIAPER WITH NON-RAVELING STITCHING

Filed Feb. 25, 1966

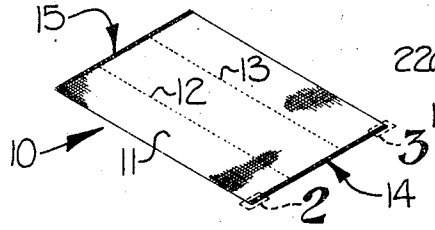


Fig-1

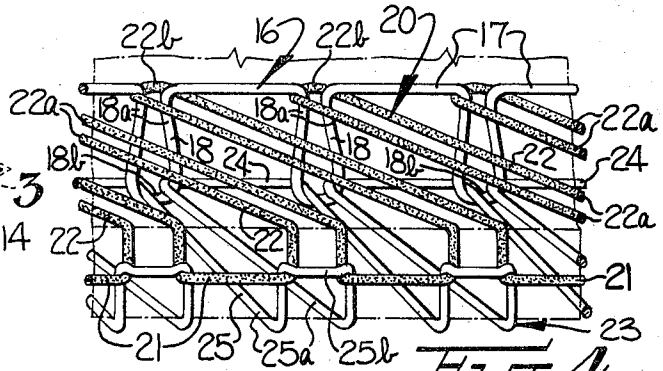


Fig-4

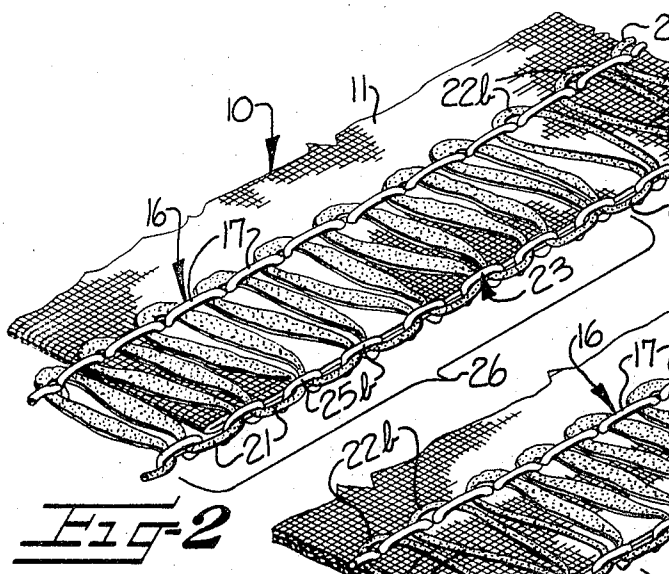


Fig-2

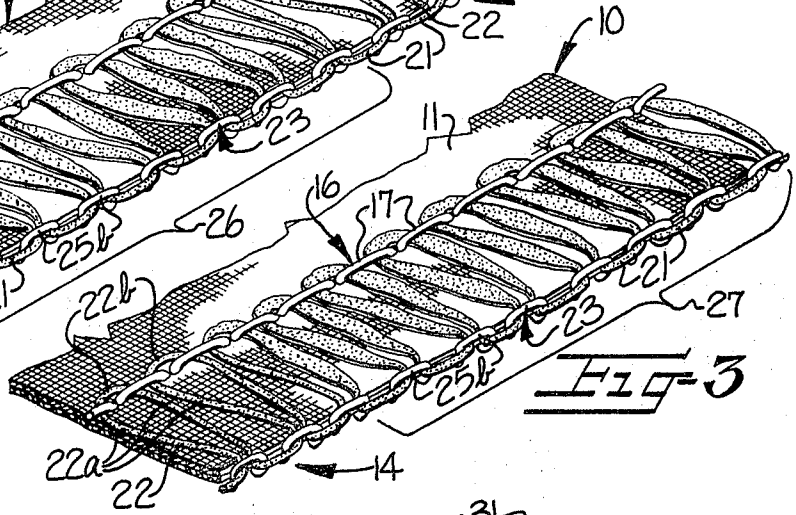


Fig-3

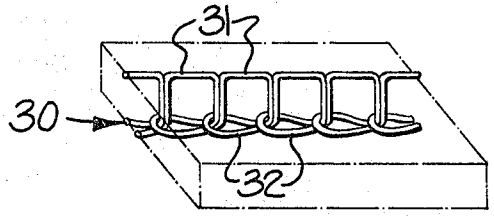


Fig-6

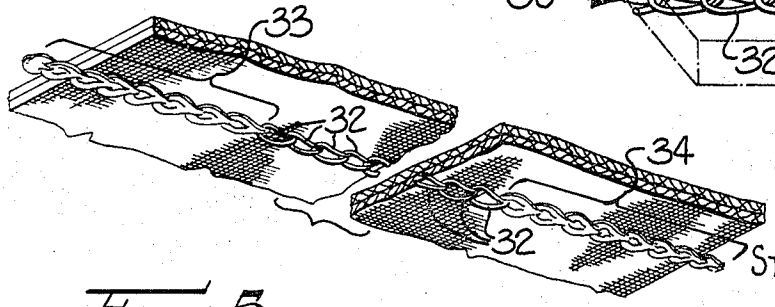


Fig-5

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SEWN DIAPER WITH NON-RAVELING STITCHING

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Int. Cl. A61f *13/18;* D05b *17/00;* B32b *7/08*

ABSTRACT OF THE DISCLOSURE

A prefold diaper formed of cut and folded woven fabric and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of the lines of stitching including a plurality of interlocking threads, one of which consists essentially of thermoplastic material and at least one other of which is formed of non-thermoplastic material. The thermoplastic thread of each line of stitching has portions extending along one face of the fabric generally perpendicular to the edge and these portions are fused to the fabric and also to the interlocking portions of the non-thermoplastic thread to anchor the stitching and prevent raveling thereof during normal use of the diaper.

The present invention relates to sewn articles, such as prefold diapers, and more particularly to non-raveling stitching for such articles.

In the formation of certain articles from sheet material, the stitching thereof is well known for various and sundry purposes, including joining several layers of sheet material together, the hemming of pieces of sheet material and the finishing of cut edges by overedging. This stitching is usually formed by a sewing machine and has portions penetrating through the sheet material and interlocking with other portions thereof on at least one side or face of the sheet material.

Such stitching is subject to raveling during use of the sewn article, particularly at the terminal end portions thereof, and this raveling problem becomes acute with articles, such as prefold diapers, which are subjected to frequent and repeated laundering. As is well known, prefold diapers are formed by folding a section of diaper fabric into a size and shape adapted to fit an infant without additional folding. The folded diaper has at least one line of stitching penetrating therethrough to secure the same in this folded condition and frequently the cut edges of the diaper fabric are finished by overedge stitching.

Various attempts have been made to stabilize this stitching to prevent raveling thereof, and such attempts have included an operation usually referred to as "tailing" wherein the stitching is continued for some distance outwardly from opposite extremities of the sewn article to form a tail of interlocked threads. Such tails, however, ravel after only a few launderings and, therefore, have not effectively stabilized the stitching.

A procedure commonly referred to as "backtacking" has also been extensively used to reduce the raveling of stitching and is accomplished by reversing the sewing machine feed means adjacent each edge of the article to form a short line of reverse stitching adjacent each end of the stitching. While being moderately successful at reducing the raveling problem, such backtacking is very time consuming and laborious and adds considerably to the cost of manufacture of sewn articles.

Recently, another attempt at a solution to this raveling problem has been proposed. This proposed solution necessitates a special type of thread in the stitching, which thread is formed of a multiplicity of highly crimped filaments. During the sewing operation, this thread is under tension so that the crimp is temporarily removed from the filaments. However, when the thread is cut at the edges of the article, the filaments relax to restore the crimp and the thread "blossoms out" and intertwines to form an enlarged portion or fluffy ball at the end thereof, which prevents the thread from being pulled back through the fabric to prevent raveling of the stitching.

It is, therefore, an object of the present invention to provide a sewn article having one or more lines of stitching which may be of any desired type and which are anchored against raveling even after repeated laundering.

A more specific object of the present invention is to provide a sewn article of the character described wherein the stitching includes an essentially thermoplastic thread which is fused to the article at selected areas of the article including terminal end portions of the stitching to anchor the stitching and prevent raveling thereof.

A further more specific object of the invention is to provide, in a sewn article, a line of stitching anchored against raveling by having a thermoplastic sewing thread thereof fused to interlocking portions of itself or another cooperating sewing thread of the line of stitching.

A still more specific object of the invention is to provide, in a sewn article, a line of stitching anchored against raveling by a thermoplastic sewing thread thereof being fused to the sewn article and to interlocking portions of itself or another cooperating sewing thread.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a prefold diaper incorporating the features of the present invention;

FIGURE 2 is a fragmentary, enlarged perspective view of the corner of the diaper enclosed within the rectangle **2** in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 2 of the opposite corner enclosed within the rectangle **3** in FIGURE 1;

FIGURE 4 is an enlarged, fragmentary, somewhat schematic perspective detail of the stitching extending along opposite ends of the diaper of FIGURE 1;

FIGURE 5 is an enlarged, fragmentary, perspective view of a sewn article including another type of seam incorporating the features of the present invention; and

FIGURE 6 is a fragmentary, enlarged, somewhat schematic perspective view of a portion of the seam shown in FIGURE 5.

Referring now more specifically to the drawings, there is shown in FIGURE 1 a diaper **10** of the type commonly referred to as prefold diapers, and which is representative of sewn fabrics or articles which may be produced in accordance with this invention. This diaper is formed of fabric **11** which is folded into a size and shape, usually rectangular, adapted to fit an infant.

Diaper **10** has a pair of spaced apart lines of stitching **12, 13** each being preferably continuous and penetrating through the folded fabric **11** and extending longitudinally of the diaper **10** to secure the fabric **11** in folded condition. Lines of stitching **12, 13** may be of any type of straight seam conventionally formed by sewing machines.

Opposite end edges of diaper **10** have suitable lines of preferably continuous stitching **14, 15** of the conventional overedge type extending therealong and thereover to finish these edges and prevent raveling of the fabric therealong and to aid in holding the fabric in the folded condition. This overedge stitching is more particularly shown in FIGURES 2, 3 and 4, which are enlarged details of the line of overedge stitching **14.**

This stitching is illustrated as being formed by three (3)

threads, each of which follows a separate course in the stitching, but it should be understood that the same may be formed of any desired number of threads in any desired arrangement without departing from the scope of this invention. In the illustrated form, stitching **14** includes a needle thread **16** which is disposed inwardly from the end edge of fabric **11** and has first portions **17** extending along one face of fabric **11** and second portions **18** penetrating through the fabric to the opposite face thereof. Portions **18** are in the form of loops having legs **18***a* extending through the fabric and bights **18***b* disposed on the opposite face thereof.

Stitching **14** also includes a first looper thread **20** having first portions **21** extending along and parallel to the end edge of fabric **11** and second portions **22** extending along the aforesaid one face of the fabric **11** and inwardly from and generally perpendicular to the end edge thereof. Second portions **22** are in the form of loops having legs **22***a* and bights **22***b* connecting the inner ends of the legs of each loop. The loop portions **18** of the needle thread **16** penetrate through the loop portions **22** of first looper thread **20** to interlock the two threads.

A second looper thread **23** cooperates with needle thread **16** and first looper thread **20** to form the stitching **14**. Thread **23** includes first portions **24** extending along the aforesaid opposite face of the fabric **11** and inwardly from and parallel to the end edge thereof, and second portions **25** extending outwardly from the portions **24** to the end edge. Portions **25** are in the form of loops having legs **25***a* penetrating through the loop portions **18** of the needle thread **16** to interlock the needle thread and second looper thread, with bights **25***b* connecting the outer ends of the legs **25***a* outwardly of the end edge of the fabric **11**. The legs **22***a* of the loop portions **22** of first looper thread **20** penetrate through the loop portions **25** of second looper thread **23** to interlock the two looper threads.

In accordance with the present invention, lines of overedge stitching **14** and **15** are each formed of at least one thread consisting essentially of a material, such as a thermoplastic material, capable of being fused to the fabric **11** to anchor the thread to the fabric and to prevent raveling of the stitching. An example of a thermoplastic thread which has been used successfully in accordance with this invention is polypropylene, but it should be understood that other thermoplastic threads, including blends or combinations of thermoplastic and non-thermoplastic fibers, may be used. Also, it is preferred that the thermoplastic thread be multi-filament rather than mono-filament because of the increased pliability thereof and therefore increased handling ease in sewing.

While more than one of the threads in the stitching may be thermoplastic, it has been determined that a single thermoplastic thread is usually sufficient, and the remainder of the threads preferably are formed of non-thermoplastic material to avoid any undue stiffening in the stitching and to maintain suppleness in the line of stitching. In most instances, this thermoplastic thread is preferably a looper thread since the looper thread usually has a greater portion thereof exposed on the surface of the fabric than the needle thread, to thus have a greater area for being anchored to the fabric by fusing. Also, due to the looper thread usually being disposed substantially on one side or face of the fabric, the same is more readily subjected to heat for fusing. Further, the looper thread usually engages the needle thread and other threads, if any, on the same side of the fabric to thus be fused to these threads as well as the fabric to provide a more secure anchor for the stitching.

While it has been determined that the thermoplastic thread in the stitching may be fused to the other cooperating sewing threads or to interlocking portions of itself without being fused to the fabric to sufficiently anchor the stitching and prevent raveling thereof with articles requiring infrequent or gentle laundering, it is generally preferred that the thermoplastic thread be fused to the fabric to provide a broader and greater area of anchorage to the line of stitching. For maximum anchorage of the line of stitching in accordance with the invention, the thermoplastic thread should be fused to both the fabric and other sewing threads or itself, which is preferred for many types of sewn articles requiring repeated and frequent launderings.

As illustrated in FIGURES 2–4, first looper thread **20** of each of the lines of stitching **14**, **15** is formed of thermoplastic material, such as polypropylene, and needle thread **16** and second looper thread **23** are formed of non-thermoplastic material, such as cotton. First looper thread **20** is fused to the fabric **11**, and preferably also to the needle thread **16** and second looper thread **23**, at selected areas of the fabric including the terminal end portions of the stitching at all four corners of diaper **10**, two of which are indicated at **26**, **27** in FIGURES 2 and 3. The fused portions **26**, **27** of the thermoplastic thread extend inwardly from the ends of the stitching for a predetermined distance sufficient to encompass a plurality of stitches for a plurality of the loop portions **22** of looper thread **20** to be fused to the fabric **11**.

The fusion of the thermoplastic thread to the fabric is preferably accomplished by the application of heat thereto sufficient to soften the thermoplastic thread and cause the same to become tacky and to fixedly adhere to the fabric and preferably also to adhere to the other threads of the stitching.

Referring now to FIGURES 5 and 6, there is illustrated therein another type of stitching incorporating the features of the present invention. This stitching is commonly referred to as chain stitching and has perhaps the greatest propensity to ravel of all standard types of stitching.

This chain stitching usually is formed of a single thread **30** which has portions **31** extending along and in engagement with one side or face of the fabric and loop portions **32** penetrating through the fabric and interlocking with each other on the opposite side or face of the fabric.

In accordance with the present invention, thread **30** consists essentially of a thermoplastic material, such as polypropylene, and is fused to the fabric on the side or face thereof having the interlocking loop portions **32** thereon and at selected areas of the fabric including terminal end portions of the stitching, as is indicated at **33**, **34**. The fused portions **33**, **34** of thread **30** preferably extend for a predetermined distance inwardly from opposite ends of the stitching sufficient to encompass a plurality of stitches. As indicated above, the loop portions **32** are also preferably fused to each other to further anchor the stitching and prevent raveling thereof.

The lines of stitching **12** and **13** in diaper **10** may be of this chain stitch type and may be anchored by fusing, as illustrated in FIGURES 5 and 6, or may be anchored by the overedge stitching **14**, **15** without fusing. However, these lines of stitching **12**, **13** are usually of the lock stitch type and the overedge stitching **14**, **15** is sufficient to anchor the same against raveling, although such lock stitching may include a thermoplastic thread and be fused to prevent raveling in accordance with the present invention if desired. In this latter respect, there are many prefold diapers, such as the diaper shown in U.S. Patent No. 3,150,693, which are folded and stitched with lines of stitching similar to the lines of stitching **12**, **13** without any overedge stitching. In such cases, the lines of stitching securing the diapers in folded condition should include a thermoplastic thread fused in accordance with the present invention.

Further, while the present invention has been described in connection with and has particular utility with prefold diapers due to the frequent and repeated laundering to which diapers are subjected, it should be understood that the present invention is not limited thereto but has application to a wide variety of garments and other sewn articles.

It is, therefore, believed apparent that a novel non-raveling stitching for sewn articles is provided by the

present invention wherein the stitching is anchored against raveling by a thread thereof being fused to the article at selected areas thereof and preferably additionally fused to interlocking portions of itself or other cooperating sewing threads.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A prefold diaper formed of woven fabric cut and folded into a size and shape adapted to fit an infant and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of said lines of stitching comprising a thread consisting essentially of thermoplastic material and at least one additional thread of non-thermoplastic material interlocking with said thermoplastic thread, said thermoplastic thread having portions extending along one face of the fabric generally perpendicular to the edge of the fabric, and said portions being fused to the fabric and also to the interlocking portions of the non-thermoplastic thread only at the corners of the diaper to anchor the stitching and prevent raveling thereof during normal use of the diaper without undue stiffening of the edges of the diaper.

2. A prefold diaper according to claim 1 wherein there are two non-thermoplastic threads in each line of stitching and said thermoplastic thread is a looper thread.

3. A prefold diaper formed of woven fabric cut and folded into a seize and shape adapted to fit an infant and having lines of overedge stitching extending along and over the cut edges of the folded fabric to finish these edges and impart anti-ravel characteristics thereto, each of said lines of stitching comprising a needle thread penetrating through said fabric in spaced relation to the edge thereof and a pair of looper threads which interlock with each other at the edge of the fabric and also interlock with said needle thread on opposite sides of the fabric, one of said looper threads and said needle thread being formed of non-thermoplastic material, and the other looper thread consisting essentially of thermoplastic material and being fused to the fabric and also to the interlocking portions of said non-thermoplastic needle and looper threads to anchor the stitching and prevent raveling thereof during normal use of the diaper.

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CHARLES F. ROSENBAUM, *Primary Examiner.*

U.S. Cl. X.R.

28—77; 112—262, 441; 156—93; 161—50