

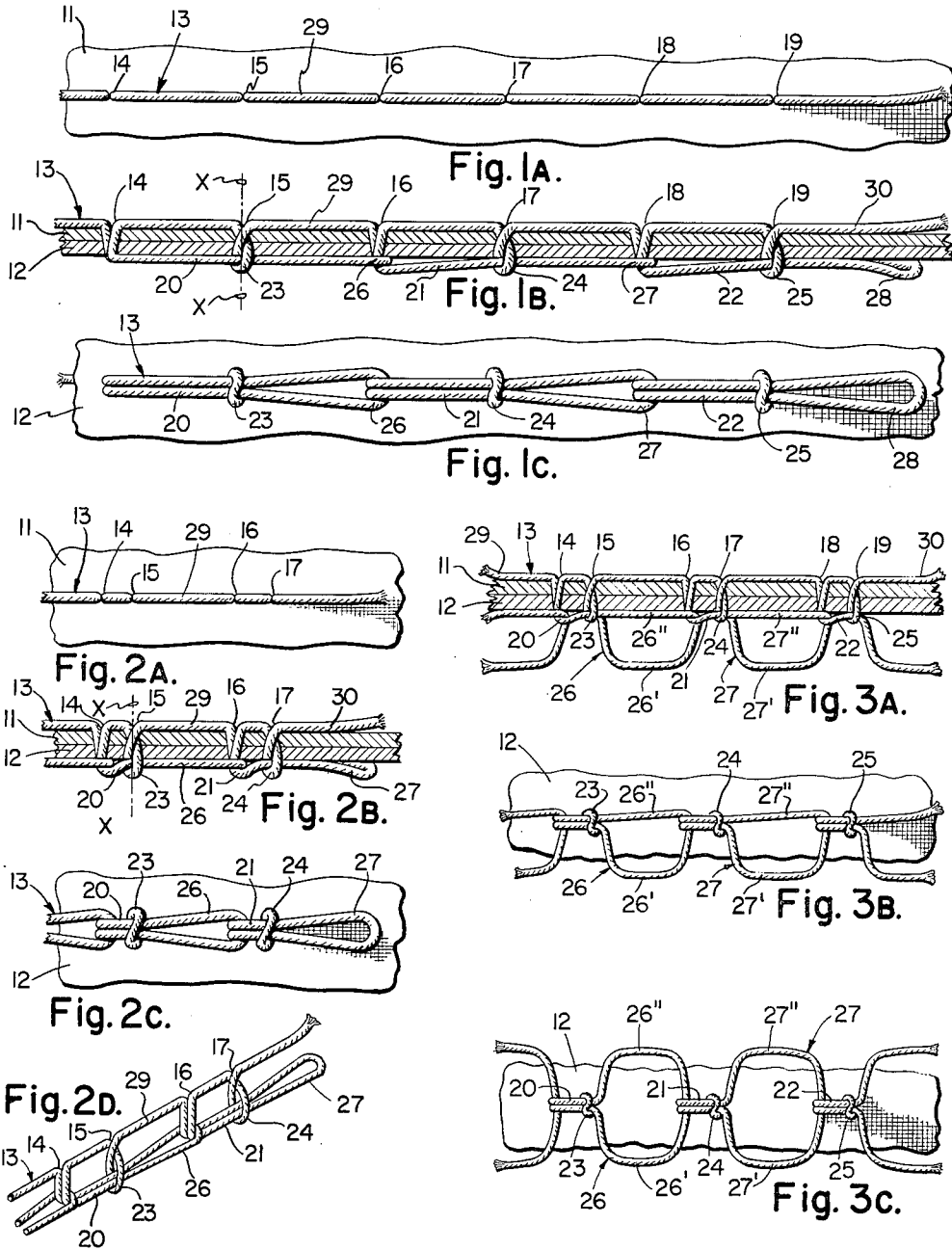
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SINGLE THREAD LOCKING SEAM

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## SINGLE THREAD LOCKING SEAM

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This invention relates to the art of chainstitch formation and more particularly to a novel and improved chainstitch seam.

Any chainstitch seam, in contrast with a lockstitch seam such as Federal Seam Type #301, may be taken apart from its terminus, from a skipped stitch, or from a point of thread breakage by a reversal of the chaining process by which the chainstitch was made. The term "ravel" as it will be used in this specification refers to such successive unchaining of a chainstitch seam as can occur purely as the result of a force or forces applied continuously along the length of the threads of a chainstitch seam.

The propensity of chainstitch seams to ravel can be a disadvantage and many chainstitch seams have been heretofore devised for reducing or eliminating the susceptibility to raveling. In some chainstitch seams a number of threads have been used in order to deter raveling and in others the complexity of thread concatenation has been increased so that the thread will literally knot at each stitch, thus to prevent the reeving of one thread limb relatively to another which is necessary for raveling.

It is pointed out, however, that reeving of the thread limbs relatively to one another is exceedingly desirable while each stitch is being formed. It is such reeving which makes possible a nicety of control over the tension in the various limbs of thread of the stitch, so that the stitches will not pucker the work piece nor be set too loosely therein.

It is an object of this invention to provide a novel chainstitch seam formed of a single thread by exceedingly simple loop concatenation therein through which the thread limbs may reeve readily during stitch formation but which serve, when the stitches have been set into the workpiece, to provide a substantially ravel-proof seam.

The above and additional objects and advantages of the present invention will be clear from the description which follows and the accompanying drawings of the stitched seam of this invention and several variants thereof in which:

FIG. 1A represents a top plan view of a stitched seam embodying stitches formed in accordance with this invention in which the successive stitches are of equal length,

FIG. 1B is a vertical cross-sectional view of the seam illustrated in FIG. 1A,

FIG. 1C represents a bottom view of the seam of FIG. 1A,

FIG. 2A represents a top plan view of a modified form of the stitched seam of FIG. 1A, embodying stitches formed in accordance with this invention in which the successive stitches are alternately formed of different lengths,

FIG. 2B is a vertical cross sectional view of the seam illustrated in FIG. 2A,

FIG. 2C represents a bottom plan view of the seam of FIG. 2A,

FIG. 2D represents a perspective view of the sewing thread concatenated as in the seam of FIG. 2A with the fabrics removed.

FIG. 3A is a vertical cross-sectional view of a modified form of the stitched seam illustrated in FIGS. 2A, 2B, 2C and 2D in which a loose limb of the thread loop is formed beneath the fabric on alternate stitches,

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FIG. 3B represents a bottom plan view of the seam of FIG. 3A,

FIG. 3C represents a bottom plan view of a modified form of the stitched seam illustrated in FIGS. 3A and 3B in which both limbs of the thread loop formed beneath the fabric on alternate stitches are made loose.

Referring to FIGS. 1A, 1B, and 1C, the stitched seam of this invention will now be described as applied to two superposed plies of work fabric 11 and 12. A single thread, indicated generally at 13, is used to form the seam. The thread 13 is directed to the work fabrics from one side thereof and preferably by an eye pointed instrumentality such as a conventional needle (not shown) by which the thread is formed into a succession of loops projected through the workpiece at evenly spaced intervals along the seam, as illustrated in FIG. 1A, the successive points at which the thread is projected through the work piece being indicated in FIG. 1A by the reference characters 14-19, inclusive.

As illustrated in FIGS. 1B and 1C the first loop projected through the workpiece at the point 14 is a chaining loop 20 and similar chaining loops 21, 22 are formed on alternate projections through the workpiece 16 and 18, respectively. Every other thread loop formed between the alternate chaining loops is a locking loop 23, 24 and 25. In FIGS. 1A, 1B, and 1C, i.e., at points of thread projection 15, 17 and 19, locking loops 23, 24 and 25, respectively, are illustrated. Each locking loop is twisted one-half turn about the axis of penetration of the locking loop through the workpiece, which axis is indicated by the line  $x-x$  in FIG. 1B.

In the seams illustrated in the drawings, the stitches are formed from left to right, and a recurring cycle includes two successive thread loop projections through the workpiece, i.e., a chaining loop 20 followed by a locking loop 23.

In the formation of the stitches illustrated in FIGS. 1A, 1B, and 1C, the chaining loop 20, upon being projected through the workpiece, is detained beneath the workpiece, as for instance, by a conventional loop taker (not shown). The succeeding locking loop 23 is then projected through the workpiece and after the locking loop 23 has been twisted one-half turn and detained beneath the workpiece, as for instance, by a conventional loop taker, spreader, or the like (not shown), the preceding chaining loop 20 is passed through the twisted locking loop 23.

A bight 26 of the chaining loop 20 is then positioned for penetration by the next succeeding chaining loop 21. As illustrated in FIGS. 1B and 1C, the chaining loop 21 includes a similar bight 27 which accommodates the next chaining loop 22 and a bight 28 of the chaining loop 22 is illustrated in a position of readiness to accommodate a succeeding loop should it be desired to continue the seam ad infinitum.

After penetration of the chaining loop bight 26 by the succeeding chaining loop 21 and while the preceding locking loop 23 continues to be detained beneath the work fabrics, as for instance by a loop taker, spreader, or the like (not shown), tension applied to the thread incident to the formation of the succeeding chaining loop 21 or tension applied to the thread limb 29 between the chaining loop 21 and the locking loop 23 can be transmitted back along the thread through the detained locking loop 23 and to the preceding chaining loop 20 so that any desired degree of tautness may be attained in the preceding chaining loop 20. Upon release of the locking loop 23, however, tension applied to the thread limb 29 will draw up and set the locking loop 23 which, because of its one half turn or twist will prevent further transmission of forces back along the thread. The twisted locking loop 23, when set into the workpiece 11, 12 will thus prevent

tension in the thread limb 29 from causing the chaining loop 20 to reeve through the locking loop. Similarly upon the formation of the last stitch in the seam, tension applied to a trailing end of the thread 30 extending from the last locking loop 25 cannot cause the last chaining loop 22 to reeve through the locking loop 25 and thus the seam of this invention is a ravel-proof seam.

The seam illustrated in FIGS. 2A, 2B, 2C, and 2D is formed in the same manner as that described above with reference to the seam illustrated in FIGS. 1A, 1B, and 1C, and like parts of the seams are indicated by like reference characters. The seam illustrated in FIGS. 2A, 2B, 2C and 2D differs only in that the points 15 and 17 at which the locking loops are projected through the work piece are each arranged nearer the point at which the respective preceding chaining loop is projected through the work-piece than to the point at which the respective succeeding chaining loop is projected through the workpiece; thus, the point 15 is nearer to the point 14 than to the point 16, etc.

The added advantage of the modified form of the seam illustrated in FIGS. 2A, 2B, 2C and 2D, is that the bights 26 and 27 of the chaining loops 20 and 21 comprise a greater proportion of the total length of the chaining loops in the finished seam. In the event, therefore, that an upward pull were to be exerted on the trailing end of the thread 30 of sufficient magnitude as to draw the last formed locking loop 24 upwardly and completely out of and above the workpiece, the bight 27 of the last formed chaining loop 21 would be sufficiently long as to remain doubled in the work piece thus continuing to chain with the preceding chaining loop 20 and preventing the seam from raveling.

The modified form of the seam illustrated in FIGS. 3A, 3B, and 3C is similar to that illustrated in FIGS. 2A, 2B, 2C and 2D, and like parts have been indicated by like reference characters. The seams of FIGS. 3A, 3B and 3C differ in that the bight portions 26, 27, respectively, each of the chaining loops 20, 21 and are extended to form loose thread loops beneath the workpiece. Such loose thread loops may be formed readily using the seam of this invention and the loose loops so formed will be extremely stable and well secured to the work fabric, since upon release of each successive twisted locking loop 23, 24, 25, reeving of the chaining loop passed therethrough is effectively prevented. In FIGS. 3A and 3B is illustrated a form of the seam in which the excess or loose thread in each chaining loop bight 26, 27, is drawn into one limb 26', 27', respectively of each of the bights 26, and 27. Fig. 3C illustrates a variant form of seam construction in which the excess or loose thread is provided in both limbs 26', 26'' and 27', 27'', respectively of each of the bights 26 and 27.

The loose thread loops as illustrated in FIGS. 3A, 3B, and 3C may be used to provide a tufted fabric. The loose thread loops 26', 27', 26'', 27'', may be controlled readily as to length since the twisted locking loops 23 and 24, when released and set into the workpiece, will thereafter effectively prevent reeving of the chaining loops there-through.

This invention thus provides an effectively ravel-proof seam which may be formed by a series of exceedingly simple thread concatenations and thus will not require costly and cumbersome stitching instrumentalities. The tautness of each limb of the thread in each recurring stitch may be controlled easily and with great nicety during stitch formation and yet when formed, the stitches will be ravel-proof. The seam of this invention, moreover is extremely versatile and may be varied readily to suit a wide variety of differing seam requirements.

Having set forth the nature of this invention what is claimed herein is:

1. A ravel-proof seam in a workpiece comprising a single thread formed into a succession of interconcatenated loops each loop projecting transversely through a workpiece, each alternate one of said succession of loops being a locking loop which is twisted only one-half turn about the axis of penetration of said locking loop through the workpiece, and each one of said loops which projects through the workpiece between said locking loops being passed through the next succeeding twisted locking loop.

2. A ravel-proof seam in a workpiece as set forth in claim 1 in which each one of said loops which project through the workpiece between said locking loops is a chaining loop which is first projected through the next preceding chaining loop and is then passed through the next succeeding twisted locking loop.

3. A ravel-proof seam as set forth in claim 1 in which each of said locking loops is projected through the work-piece at a point nearer to the point at which the next preceding loop is projected through the workpiece than to the point at which the next succeeding loop is projected through the workpiece.

4. A ravel-proof seam as set forth in claim 2 in which each chaining loop is extended and maintained extended to a length substantially greater than the distance between the points at which successive chaining loops are projected through the workpiece.

5. A ravel-proof seam as set forth in claim 4 in which one limb of each chaining loop is drawn taut between the points at which that chaining loop and the next succeeding chaining loop is projected through the workpiece so that slack thread provided by the said maintained extended chaining loops is confined to one limb of each chaining loop.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

10,597	3/1854	Johnson	112-262
13,687	10/1855	Singer	112-227
77,889	5/1868	Kerr	112-438 X
676,824	6/1901	Richardson	112-265 X
1,260,517	3/1918	Currier	112-265 X
2,706,460	4/1955	Grossman	112-235
2,980,044	4/1961	Parry	112-262

##### FOREIGN PATENTS

597,523 8/1925 France.

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