

[54] **DOUBLE FACED WARP KNIT FABRIC AND APPARATUS AND METHOD FOR MAKING SAME**

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[51] Int. Cl. **D04b 23/08**

[58] Field of Search..... 66/190, 192, 193, 66/195, 196, 198, 87

[56] **References Cited**

UNITED STATES PATENTS

628,818 7/1899 Koch..... 66/196

OTHER PUBLICATIONS

Rotenstein, "Manufacture of Raschel Wool & Cotton

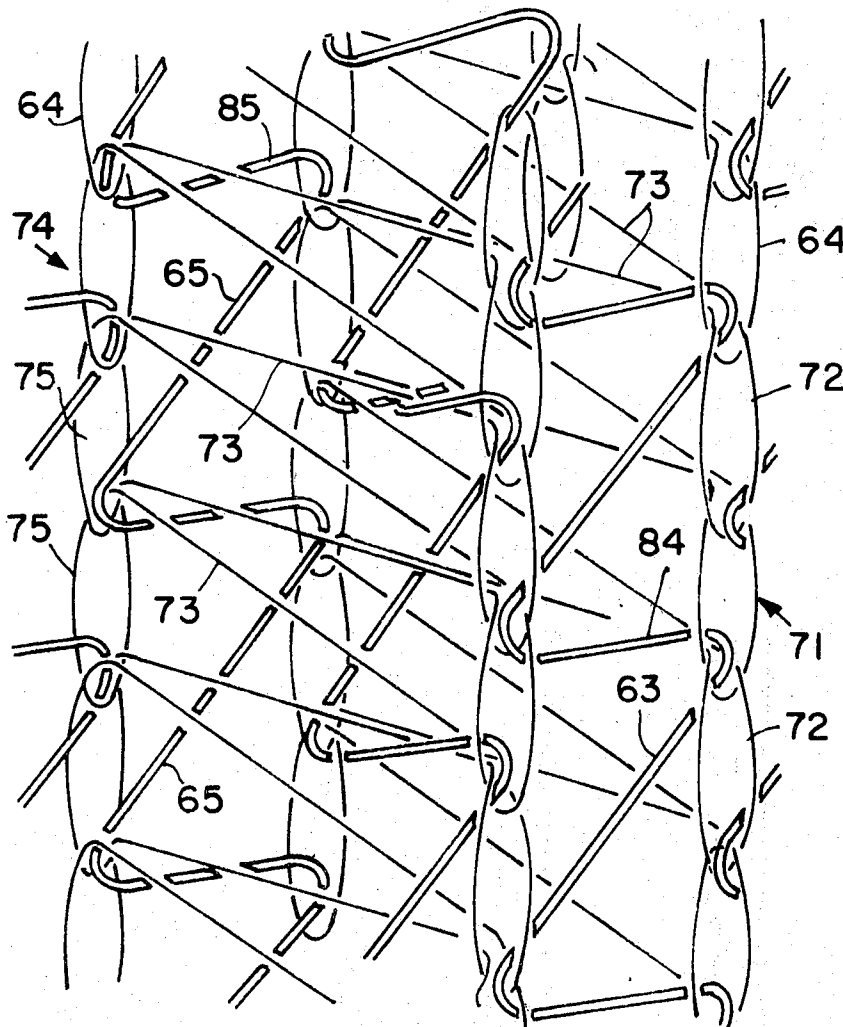
Outerwear," 1955, Nat. Knitted Outerwear Assoc., Page 81.

Primary Examiner—Ronald Feldbaum
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[57] **ABSTRACT**

A double faced warp knit fabric is made on a double needle bar warp knitting machine having a common guide bar and common chain stitch thread forming chain stitches on one needle bar and then on the other needle bar in each successive course of each pair of opposite wales of each opposite face to bind and unite the two knit structures into a unitary double faced fabric. The common chain stitch thread may also be looped coursewise around adjacent chain stitches in adjacent wales to not only serve as the body yarn for both faces but to also serve as the weft portions of a simulated weave, in cooperation with a pair of inlaid warp yarns in each knit structure.

7 Claims, 6 Drawing Figures



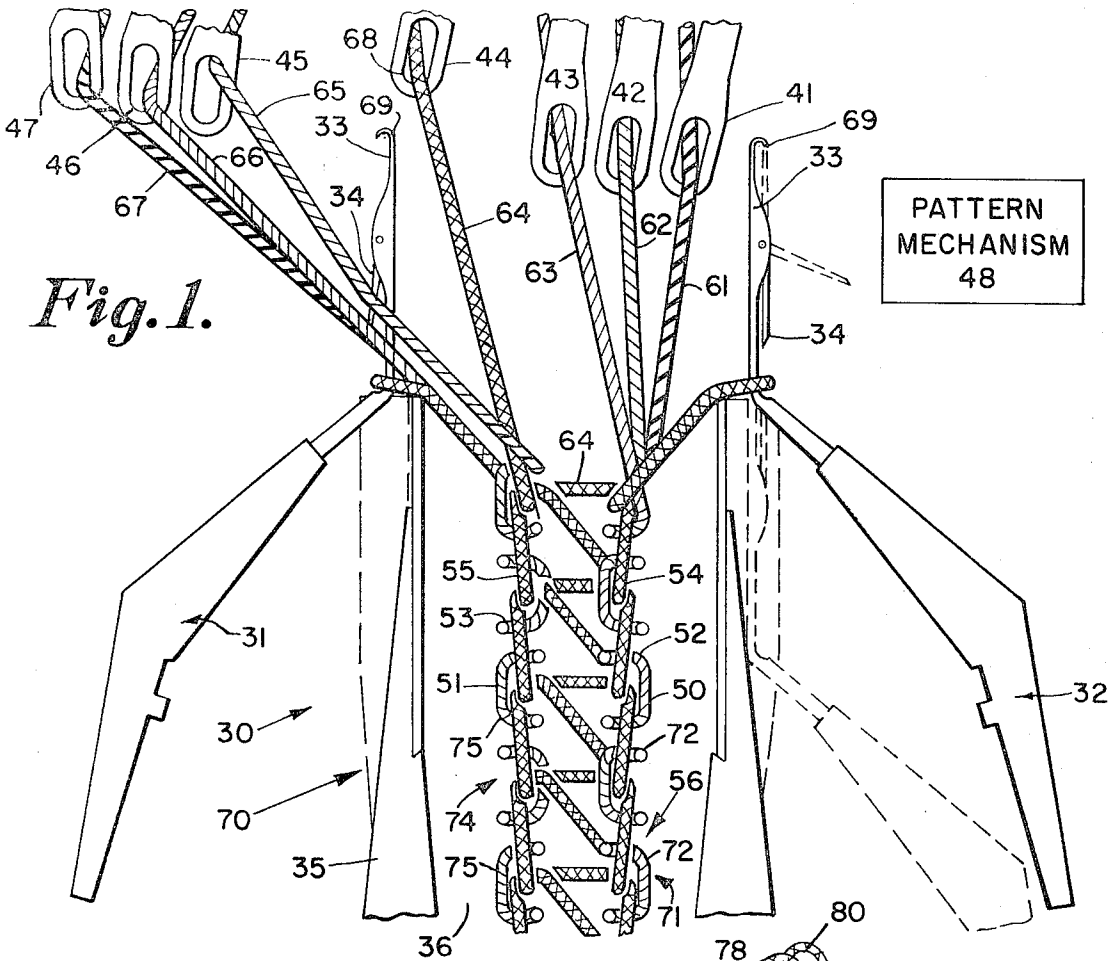


Fig. 1.

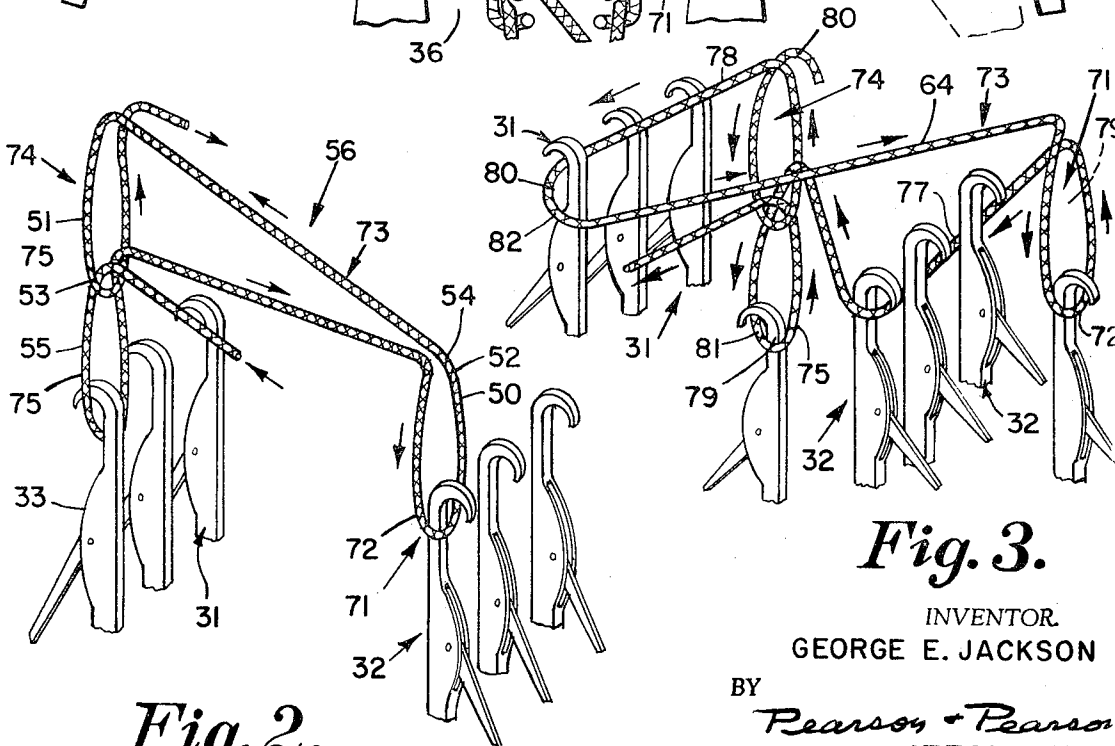


Fig. 2.

Fig. 3.

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Fig. 4.



Fig. 5.

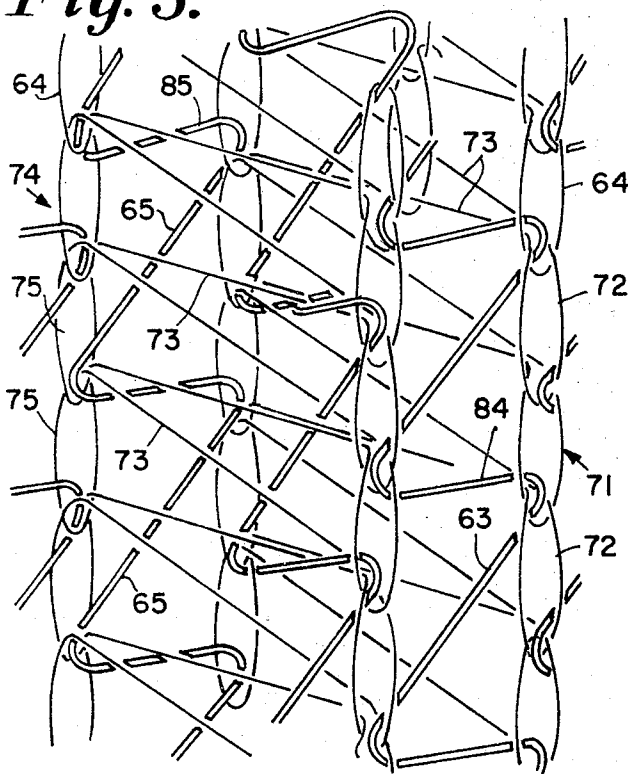
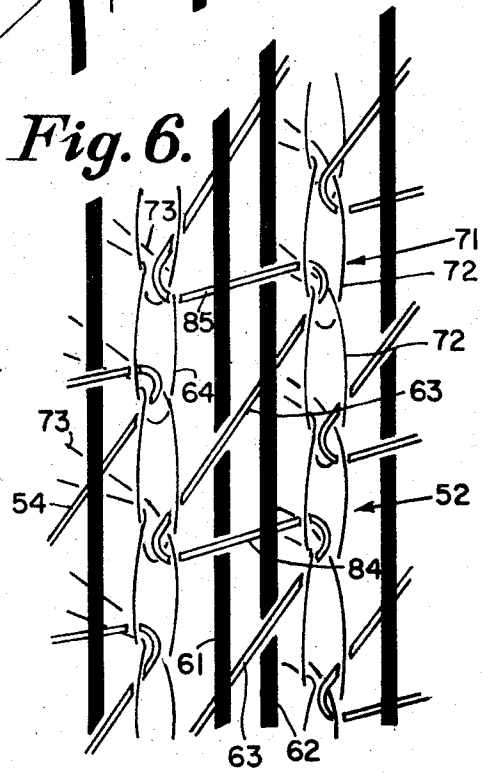


Fig. 6.



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CROSS REFERENCE

This application is related to my application Ser. No. 55,490 filed July 16, 1970 entitled, Apparatus and Method for Warp Knitting a Simulated Woven Fabric now U.S. Pat. No. 3,635,733, my application Ser. No. 50,234 filed June 26, 1970 entitled, Simulated Weave Warp Knit Fabric and Method for Making Same now U.S. Pat. No. 3,675,447, and to my application Ser. No. 74,995 filed Sept. 24, 1970 entitled, Foundation Garment and Method for Making Same now U.S. Pat. No. 3,703,820.

BACKGROUND OF THE INVENTION

This invention relates to a novel double faced warp knit product made on a double needle bar machine with much less time consumed in threading up the machine for the reason that the chain stitch knit body structures of both faces are made with common chain stitch strands, or threads. Preferably the double faced fabric is of the warp knit simulated weave type and the common chain stitch strands are not only used for the chain stitches and to bind the structures together back to back, but also to form the coursewise-extending "weft" portions in each of the faces to produce a simulated weave pattern.

PRIOR ART

In my above mentioned patent applications, it has been proposed to make two back to back fabrics simultaneously on a double needle bar warp knitting machine to double production of a simulated weave fabric, and it has been proposed to use the chain stitch yarns to form the weft portions of the simulated weave pattern on each separate fabric.

SUMMARY OF THE INVENTION

In this invention, however, the two knitted structures being chain stitched on the two needle bars are united back to back by chain stitch yarns common to both structures, so that a double faced fabric results with the chain stitch threads locked into each face and therefore unable to run in the event of breakage. When the common chain stitch yarns are also looped around adjacent stitches to form weft portions, they are additionally locked against running. A typical double needle bar warp knitting machine may have twelve thousand threads to be threaded up prior to starting the machine. By using common chain stitch guide bars and threads for both needle bars, to not only make chain stitch motions but also to make "weft" looping motions of a simulated weave pattern, the number of threads required to be threaded into guide bars can be reduced by about one third to about eight thousand, thus effecting a substantial saving in time and cost of production. Preferably every chain stitch of each knitted structure is connected to a chain stitch of the same structure and also to a chain stitch of the other structure, thereby producing a double thick fabric useful as blanket or thermal underwear material.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic end elevation of a typical double needle bar warp knitting machine, showing a single chain stitch guide bar and a single chain stitch

thread common to the knitted structures of both needle bars, and forming each successive stitch of each opposite wale on each opposite face.

FIG. 2 is a diagrammatic perspective view showing the path of each common chain stitch strand in forming chain stitches on each needle bar back and forth therebetween, in each successive course of each opposite wale of each opposite face.

FIG. 3 is a diagrammatic perspective view similar to FIG. 2, showing the path of each common chain stitch strand in not only uniting the two knitted structures back to back, in each successive course, but also forming "weft" portions coursewise of each structure.

FIG. 4 is a diagrammatic, view similar to FIG. 3 but showing the two needle bars of a Raschel warp knitting machine, the common chain stitch strands, extending between the needle bars and forming chain stitches and weft portions on each face and showing laid-in warp yarns to form the simulated weave.

FIG. 5 is a diagrammatic view similar to FIG. 4 but with the inlaid warp yarns deleted for clarity, and

FIG. 6 is a front view of one face of the double faced fabric to show the interlacing of the warp yarns across the weft portions of "weft" warp yarns rather than across weft portions of the common chain stitch yarns as in FIG. 5.

DESCRIPTION OF PREFERRED EMBODIMENT

In FIG. 1 a double needle bar Raschel warp knitting machine 30 is shown diagrammatically, such machines being well known and commercially available. Machine 30 includes a front needle bar 31 rear needle bar 32, needles 33 having latches 34, trick plates 35, the space 36 between the needle bars being exaggerated for clarity.

Guide bars 41, 42, 43, 44, 45, 46 and 47 are provided, all being oscillatable as a unit relative to the needle bars, and each being longitudinally reciprocable relative to the others, in a known manner, the movement of the needle bars and guide bars being controlled by pattern mechanism 48 of the machine. The guide bars of FIG. 1 are set up to make superposed single fabrics 50 and 51, each a simulated weave pattern on its face 52 or 53 of each back to back chain knitted body structure 54 or 55 of the double faced warp knit fabric 56 in space 36 of machine 70.

Guide bars 41 and 42 are threaded with warp threads, or strands 61 and 62 which are inlaid into the chain knit body structure 54, to form the warp yarns of a simulated weave on rear needle bar 32 and guide bars 46 and 47 are threaded with warp threads or strands 66 and 67 to form the inlaid warp yarns of the simulated weave of chain knit body structure 55 on the front needle bar 31. The warp yarns 61, 62, 66 and 67 are cross hatched for illustrative purposes.

Guide bars 43 and 45 are threaded with warp threads 63 and 65, respectively to form the coursewise extending "weft" portions of the simulated weave patterns on each face 52 or 53 of each chain knit body structure 54 or 55, (FIG. 6) in a known manner or described in my above mentioned patent application, Ser. No. 55,490 and as known in the trade as the Co-We-Nit process of Karl Mayer & Co. Germany. Warp yarns 63 and 65 are also cross hatched for clarity.

The single guide bar 44, is preferably located centrally between the two weft guide bars 43 and 45 with the eye 68 at a higher level than the eyes of the other

guide bars and well above the upper level of the bills 69 of the needles 33. The single chain stitch guide bar 44 is threaded with a single chain stitch thread, or strand, 64 which is common to both chain stitch knitted body structures 54 and 55. The pattern mechanism 48 is arranged to cause guide bar 44 to make chain stitch motions on one needle bar 32, to form a walewise pillar 71 of successive chain stitches 72 thereon, and to enter between and through both needle bars to guide the strand 64 across the space 36 between the needle bars, thereby forming the binding, or uniting connecting portions 73, and to make chain stitch motions on the other needle bar 31 to form an opposite walewise pillar 74 of successive chain stitches 75 on that needle bar.

As shown in FIGS. 3 and 4 the pattern mechanism 48, in addition to causing guide bar 44 to make chain stitch motions on each needle bar, may be arranged to guide the common chain stitch strand 64 to make a coursewise extending loop 77 or 78 around a stitch 79 or 80 in an adjacent pillar 81 or 82 of each knit structure 54 or 55, as disclosed in my above specified patent application, Ser. No. 50,234. The warp threads 63 and 65, which form the weft portions 84 and 85 of the simulated weave pattern of FIG. 6, and their guide bars 43 and 45 may thus be eliminated and the common chain stitch yarn used for forming the chain stitch pillars of both structures, the weft portions of a simulated weave in both structures and the connection binding every stitch of every course and wale back to back to the corresponding stitches of the other structure.

It will be seen that the common chain stitch strand 64, will be used up at a considerably greater rate than the warp strands, and the warp beam carrying the set of chain stitch strands 64, is thus arranged to feed at the necessary rate, which will be higher than the rate of rotation of the other warp beams. It will also be understood that, while not shown in some of the schematic drawings herein, the chain stitch pillars 71, 74, 80 or 81 of each structure 54 and 55 are always connected coursewise by yarn means such as the weft portions 84 or 85 of a warp yarn, or otherwise and it will be further understood that the sets of guide bars and threads shown in FIG. 1 are repeated for the full length of the machine 20. The warp yarns 61, 62, 65 and 66 are normally of a color or texture contrasting with the weft portions of the simulated weave pattern although this is not essential so long as a weave pattern is visible.

The common chain stitch strands 64 of this invention are not only held tightly, or locked against running upon breakage of the strand by being chain stitch looped in the pillars of both the front and rear knit structures 54 and 55, but are also held tightly, or locked, in the chain stitches of adjacent pillars of the same structure 54 or 55 thereby producing a relatively thick, unitary, double faced fabric 56 of considerable integrity.

The common chain stitch yarn 64 is double cross hatched, for clarity, in FIGS. 1 to 3. In FIGS. 4 to 6 yarn 64 is shown in single lines to distinguish from the blacked lines of the warp yarns 66 and 67. The "weft" warp yarns 61, 62, 66 and 67 do not appear in FIG. 4 because the yarns 64 include the coursewise-extending "weft" loops 77 and 78 of the simulated weave.

In FIGS. 5 and 6 the common chain stitch yarns 64 are shown in single lines to distinguish from the double lines of the "weft" yarns 63 and 65 and their coursewise-extending weft portions 85. The warp yarns 61

and 62 are blacked as in FIG. 4, and illustrate the over and under interlocking thereof with the weft portions 85, which prevents sagging or pouching of the fabric.

What is claimed is:

1. A double faced warp knit fabric comprising a pair of chain stitched, warp knit structures, back to back, said knit structures having a plurality of common chain stitch yarns extending therebetween to bind said structures together and forming the chain stitch pillars of each said structure, each said common chain stitch yarn forming each successive chain stitch in each pair of opposite wales in each said opposite face and yarn means extending coursewise of said fabric and interconnecting said pillars to provide strength and stability thereto in both warpwise and coursewise directions and to bind and unite said pair of warp knit structures into a unitary double faced fabric.

2. A double faced warp knit fabric as specified in claim 1, wherein:

all of the walewise extending chain stitches of each pillar of each said structure are connected by said common chain stitch yarns to all of the walewise extending chain stitches of an opposite pillar of the other structure,

each chain stitch yarn is locked in each successive course of each opposite wale of each said structure to prevent running thereof upon breakage, and said yarn means comprises integral portions of said chain stitches locked in the chain stitches of adjacent pillars of the same structure.

3. A double faced warp knit fabric as specified in claim 1 wherein:

each said chain stitch yarn, common to both said structures, and binding the same into said double faced fabric constitutes said yarn means and includes portions extending coursewise on each opposite face thereof to extend from one said pillar in a loop around the chain stitch of another chain stitch yarn in another pillar in the same course and then back to said one pillar to form a simulated weft portion thereon and thereby present a simulated weave appearance on each said face.

4. A double faced, warp knit fabric comprising: a pair of warp knit structures, back to back, each formed of a set of chain stitch yarns common to both structures, said common chain stitch yarns forming chain stitch pillars in each structure and extending therebetween, at each course, and each common chain stitch yarn forming opposite chain stitches in each successive course of each wale of each opposite face to bind and unite said structures into said fabric,

and yarn means, including chain stitch portions, extending coursewise of said fabric for interconnecting the said chain stitch pillars of each said warp knit structure to provide strength and stability thereto in both warpwise and coursewise directions and form a unitary double faced warp knit fabric.

5. A fabric as specified in claim 4, wherein: said common chain stitch yarns each include a coursewise extending "weft" portion on each said structure forming said yarn means, and extending from one said wale in a loop around the chain stitch of another chain stitch yarn in another wale in the same course and then back to said one wale, and

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said fabric includes a plurality of inlaid warp yarns, of color contrasting with said "weft" portions to simulate a weave on each face of said fabric.

6. A double faced, warp knit fabric formed of two back to back chain stitch knitted structures, characterized by having a common chain stitch strand for the chain stitches of each pair of opposite pillars of said structures which common strand extends between said structures at each course to form each successive chain stitch in each said pillar while binding said structures into said fabric and which includes an integral portion of each chain stitch extending coursewise and locked in the chain stitch of an adjacent pillar of the same structure to bind and unite the two structures.

7. A double faced warp knit fabric comprising: 15

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a pair of superposed single fabrics, each of simulated weave warp knit structure;

each single fabric including repeats thereacross of two inlaid warp strands, a warp strand having portions at each course extending from one wale in a loop around a stitch in another wale and then back to said one wale to simulate a "weft" and a chain stitch strand,

said chain stitch strand of each single fabric being common to both and extending between said single fabrics at each stitch of each course to form successive chain stitches in each opposite wale and to bind and unite the same into said fabric.

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