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(54) Elasticated lingerie trimmings

(57) A patterned elasticated lingerie trimming, suitable for the elastic waistbands of lingerie and underwear, can be knitted on a warp knitting machine by knitting covered or naked elastomer yarn as the sole warp yarn on every needle of the knitting machine, and laying-in one or more pattern yarns as weft yarns. The elastomer yarn is knitted at very carefully controlled tension, and on relaxation of that tension after knitting, the fabric contracts in width and develops the pattern which is provided by the weft pattern yarns. The problem of run-back of the elastomer yarn is substantially or completely removed.

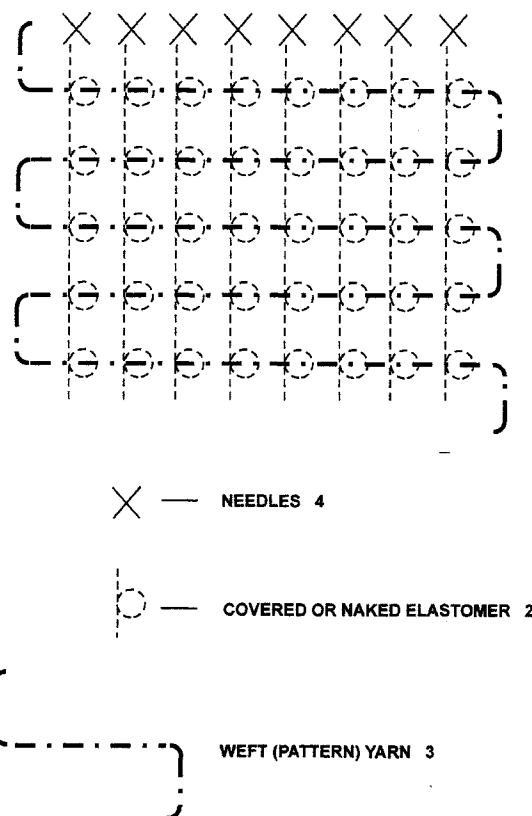


FIG.3

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Description

Field of the Invention

[0001] The invention relates to the manufacture of patterned elasticated lingerie trimmings on a warp knitting machine with weft insertion, such as a crochet knitting machine. Such trimmings are of use, for example, in the manufacture of lingerie, underwear and leisurewear, where they combine a decorative appearance with an important elasticated function.

Background Art

[0002] The method of warp-knitting has become an established method of creating elasticated patterned fabric. Warp yarns are knitted in straight wales along the length of the fabric, and a rubber or elastomeric yarn (naked or covered) is inserted using an elastomer inlay bar under tension in an 0-1-0-1-0-1 sequence. Simultaneously a weft yarn is inserted accordance with a patterning sequence across the fabric, and finally the tension in the rubber or elastomeric yarn is relaxed. This causes contraction of the fabric, and closes up the weft yarns to develop the pattern in the final fabric.

[0003] Throughout this Specification the term 'elastomer' or 'elastomer yarn' is used as a generic term to include rubber or elastomeric yarns, whether naked or covered.

[0004] All elasticated trimmings made by the above method suffer to some extent from the problem of run-back of the elastomer. The elastomer is introduced into the fabric under tension at the same time as the warp yarns and pattern yarns are knitted. That tension is relieved when the elasticated fabric is allowed to contract, but even so in use the elastomer will still try to return to its natural state by slipping through the "tunnel" provided by the warp threads. The problem is exacerbated when the elasticated fabric is sewn, if the sewing needle ruptures one or more elastomer yarns; or if the elasticated fabric is cut. The elastomer has a tendency to run-back within the warp threads and is encouraged to do so as the elasticated fabric is stretched and contracted in use and during washing. The run-back problem is amply demonstrated if one considers a pair of briefs which has an elasticated narrow fabric placed around both legs and around the waist to ensure that they fit correctly. The elasticated trimming is cut to size and then joined through the side seams to form the legs and waist. The raw ends of the elastomer yarns are held by the side seams. However, through use and washing the elasticated trimming is stretched, and the elastomer yarns begin to run-back. The side seam threads and warp threads are unable to hold the elastomer yarns, and in time the run-back leads to a portion of the elasticated trimming which has no elastomer in it. This is apparent to the user as a fully stretched and inelastic portion of the once fully elasticated trimming. The run-back there-

fore affects both the fit and the look of the pair of briefs.

[0005] There has for some time been a demand for a knitted elasticated lingerie trimming which does not run-back. One partial solution has been to replace the naked elastomer with a covered elastomer. This is similar to the principle of construction used in woven elasticated narrow fabrics. In a covered elastomer the rubber or elastomeric yarn is covered with a thread similar to that used as the warp thread. The covering provides a greater grip on the warp thread, and hence reduces the likelihood of run-back. Unfortunately the above solution is not always acceptable because of cost. Covered elastomer is more expensive than its naked equivalent, and to date the major garment manufacturers and retailers have been unwilling to absorb the price increase required by the substitution of covered elastomer for naked elastomer.

[0006] Another prior art elasticated narrow fabric which is of relevance is an elasticated crochet warp knitted bandage which is commercially available. Bandages are generally knitted at 3 to 6.5 picks per inch, as compared with upwards of 20 picks per inch for lingerie trimmings. Such bandages were developed with a loose-knitted look, primarily because the use of a conventional knitted construction would have led to a significant run-back problem when the bandage was cut. To avoid that run-back problem, the elastomer has been knitted into the bandage at the same time as the warp threads. Weft threads are inserted into the warp, in a conventional construction, to provide the pattern. A typical pattern has been a simple 0-3-0-3 pattern used to form the faces of the bandage. It has been found that knitting in the elastomer together with the warp threads helps considerably to lock it into the bandage construction. Cutting the bandage shows limited run-back, with the best results being seen when the elastomer yarn used is a covered elastomer. The knitted construction is, however, suitable only for the creation of extremely loose knitted bandages, and it becomes impossible to use it on finer lingerie type fabrics such as trimmings. This is due to the bulk created when knitting a fabric with a high number of courses per unit length, which would in turn severely restrict the extension and modulus of the fabric. The appearance of the fabric would also be poor.

[0007] It is an object of the invention to provide an elasticated lingerie trimming in which the run-back problem is substantially or totally eliminated.

The Invention

[0008] Surprisingly, it has been found that a modification of the above described knitted bandage construction permits tightly/ knit patterned elasticated lingerie trimmings to be created using a conventional warp knitting machine with weft insertion bars.

[0009] The invention provides a method of knitting patterned elasticated lingerie trimming with a high resistance to elastomer run-back on a crochet warp knit-

ting machine, comprising using the main feed bar to knit elastomer yarn as the sole warp yarn on every active needle of the knitting machine, while inserting one or more non-elastomer weft yarns as pattern yarns and varying that weft insertion to build up a desired repeating pattern.

[0010] The use of the elastomer as the sole warp yarn means that the elastomer is effectively locked into the construction, rendering it unable to run-back, even when cut. Tests have shown that even after an elasticated trimming according to the invention has been flexed for 50,000 times, the run-back is negligible. In contrast, conventional commercial elasticated would provide a run-back of between 2mm and 30mm under the same tests, dependent on the design and source of the elasticated trimmings.

[0011] The method of knitting according to the invention has a further advantage, in that knitting speeds are substantially increased. That is because the elastomer bar can be eliminated, because the elastomer is fed instead through the main feed bar. Elimination of the elastomer bar permits the speed of manufacturing to be increased by up to 33%.

[0012] The elastomer yarn used in the method of the invention may be naked or covered. A covered elastomer gives the most satisfactory results, but at a very high premium of additional cost. Naked elastomer will be acceptable for some specifications. The warp yarn of a covered elastomer is generally a single multi-filament crimped yarn, although for optimum results the elastomer would be covered with two multi-filament crimped yarns wrapped in the S and Z directions.

[0013] It was found that the removal of conventional inelastic warp threads in the knitted construction caused a potential destabilization of the final elasticated fabric. At first it was thought that this problem destroyed the viability of the invention, but prolonged experimentation showed that careful and accurate control of the tension of the elastomer overcame this problem totally, resulting in reliable and consistent patterned elasticated fabrics knitted according to the invention.

[0014] The method of the invention can be carried out on any conventional warp knitting machine with weft insertion bars, using either bearded needles or compound needles. The best results are provided using machines with compound needles, which permit left/right and right/left knitting with consequent improvement of the balance of the knitted fabric. Without that improved balance, the fabric did have a greater tendency to "pig-tail".

[0015] The elastomer yarns used are preferably those with a elongation of 300% or more. In the case of a covered elastomer, the elastomer could typically have a yarn count of 78 up to 310 decitex, preferably 235 to 310 decitex, when naked, but covered with any of a range of conventional covering yarns, typically a single multi-filament crimped yarn. The yarn count of that covering yarn would typically be 44 decitex or less, with a preferred lower limit of 11 decitex.

[0016] Although a patterned elasticated warp-knitted trimming knitted according to the invention is suitable for use without any further treatment, it would still be within the scope of this invention to apply a heat-setting treatment within a couple of metres of the knitting station, with the fabric as relaxed as possible. Such a heat treatment would further increase the stability of the product and reduce the possibility of pig-tailing. The heat set treatment does, however, reduce the elasticated trimming in length, width and strength. Typical heat set temperatures would be from 110°C to 180°C.

[0017] Uses for pattern elasticated trimmings according to this invention are in the manufacture of lingerie, underwear and leisurewear, and in the manufacture of trouser waistbands and bandages. They would typically be knitted at from 21 to 27 or even 21 to 35 picks per inch.

DRAWINGS

[0018]

Figure 1 is a stitch diagram of a conventional closed stitch warp knitted elasticated narrow fabric incorporating elastomer yarns;

Figure 2 is a stitch diagram of a typical warp knitted bandage, knitted as a very open structured narrow fabric incorporating knitted-in elastomer yarns and inserted weft yarns;

Figure 3 is a stitch diagram of a patterned elasticated lingerie trimming knitted according to the invention;

Figure 4 is a loop diagram showing the knitted structure of the fabric knitted according to Figure 3;

Figure 5 is a stitch diagram of an alternative patterned elasticated lingerie trimming knitted according to the invention, using an open stitch warp knitted elastomer yarn as opposed to the closed stitch warp knitted elastomer yarn of Figures 3 and 4;

Figure 6 is a loop diagram of the fabric of Figure 5; and

Figure 7 is a schematic partial side view of a crochet warp knitting machine set up to knit fabric according to the invention.

[0019] Referring first to Figure 1, it will be seen that the conventional knitted construction of a patterned elasticated narrow fabric comprises warp yarns 1 knitted in conventional manner on the knitting needles; a covered or naked elastomer yarn 2 inserted in a 0-1-0-1 sequence along the length of the warp yarns 1; and weft pattern yarns 3 inserted around groups of needles 4 in a desired pattern. Figure 1 shows the pattern yarn traversing all eight illustrated needles 4 at each course.

[0020] In Figure 2, it will be seen that in the very open knitted bandage construction, a similar knitted structure is followed except that the elastomer yarn 2 is knitted around all needles 4 alongside the warp yarn 1. In con-

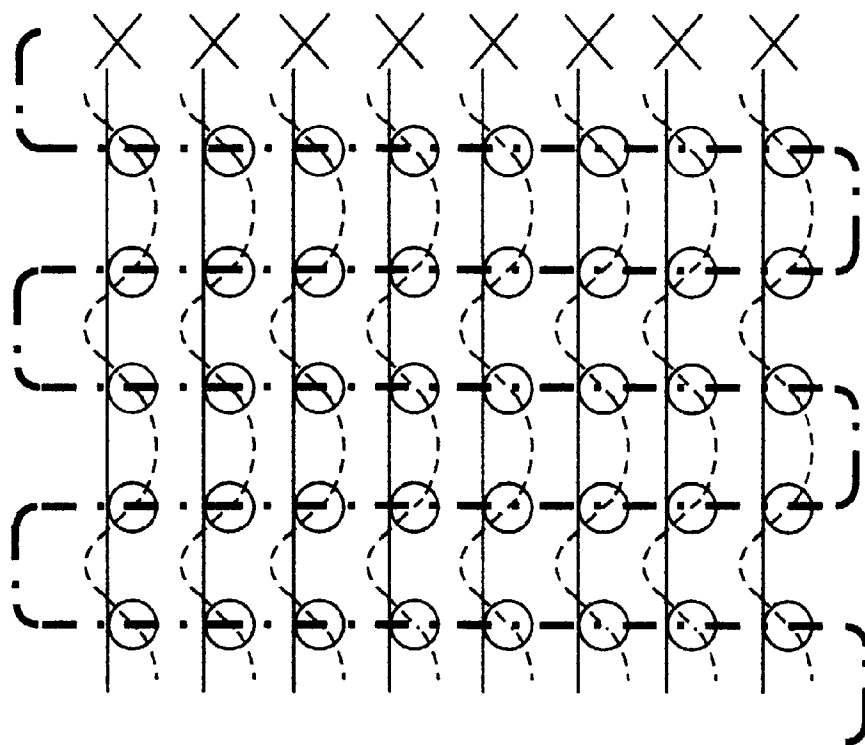
trast, in Figure 3, it will be seen that the method of the invention involves the use of only two yarns, the elastomer yarn 2 which is knitted using the main feed bar of the knitting machine in place of the warp yarns 1 of Figure 1; and the weft pattern yarn 3. That produces the knitted structure of Figure 4. If desired, the elastomer yarns could be knitted in a more open stitch arrangement, with each wale of elastomer yarn stitches spanning two adjacent needles 4. The weft pattern yarn is inserted as before, producing the knitted structure illustrated in Figure 6.

[0021] Figure 7 illustrates how the knitting method of the invention permits the very substantial increase in efficiency of the crochet warp knitting machine. The elastomer yarn is supplied from a beam 5 and goes from the main feed bar of the machine directly to the warp needles. The weft yarn goes directly to the weft inlay tubes. The elastomer feed bars of the machine are not used and the entire elastomer bars can be removed, and that in itself produces the substantial increase in the rate of knitting.

[0022] The patterns illustrated in Figures 3 to 6 are only the most basic repeating patterns, but that is for ease of illustration only. It will be understood that the pattern designs available in a lingerie trimming knitted according to the invention can vary from those most simple patterns to very complicated arrangements of different yarn types and different weft insertion positions. The resulting trimming may be parallel-sided or may have fancy edges. It may be of closed construction or lace-like. The patterning possibilities are infinite, and Figures 3 to 6 are intended to illustrate not those patterning possibilities but the basic structure to resist run-back.

Claims

1. A method of knitting patterned elasticated lingerie trimming with a high resistance to elastomer run-back on a warp knitting machine, comprising using the main feed bar of the knitting machine to knit elastomer yarn as the sole warp yarn on every active needle of the knitting machine, while inserting one or more non-elastomer weft yarns as pattern yarns and varying that weft insertion to build up a desired repeating pattern.
2. A method according to claim 1, wherein the trimming is knitted as a narrow fabric.
3. A method according to claim 1 or claim 2, wherein the elastomer yarn is a covered elastomer yarn.
4. A method according to claim 12 or claim 2, wherein the elastomer yarn is a naked elastomer yarn.
5. A method according to any preceding claim, wherein the knitting needles are compound needles.
6. A patterned elasticated warp-knitted lingerie trimming having a high resistance to run-back, in which the warp yarns are elastomer yarns knitted through the main feed bar of a warp knitting machine and the inserted weft yarns are non-elastomer pattern yarns, the final pattern of the fabric being established by relaxation and contraction of the warp yarns after knitting them at a controlled tension.
7. A trimming according to claim 6, knitted as a narrow fabric.
8. A trimming according to claim 6 or claim 7, wherein the elastomer yarn is a naked elastomer yarn.
9. A trimming according to claim 6 or claim 7, wherein the elastomer yarn is a covered elastomer yarn.
10. A trimming according to claim 9, wherein the elastomer yarn is covered with a multi-filament yarn.
11. A trimming according to claim 9, wherein the elastomer yarn is covered with two multi-filament yarns wrapped in the S and Z directions.



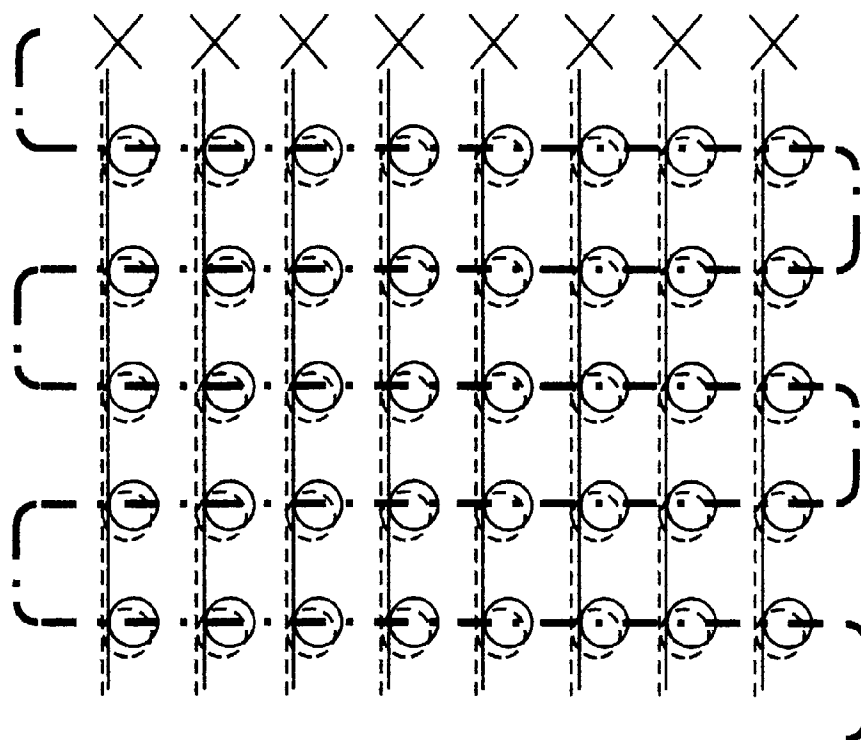
X — NEEDLES 4

○ — WARP YARN 1

— COVERED OR NAKED ELASTOMER 2

— WEFT (PATTERN) YARN 3

FIG.1



X — NEEDLES 4

○ — WARP YARN 1

○ — COVERED OR NAKED ELASTOMER 2

— WEFT (PATTERN) YARN 3

FIG.2

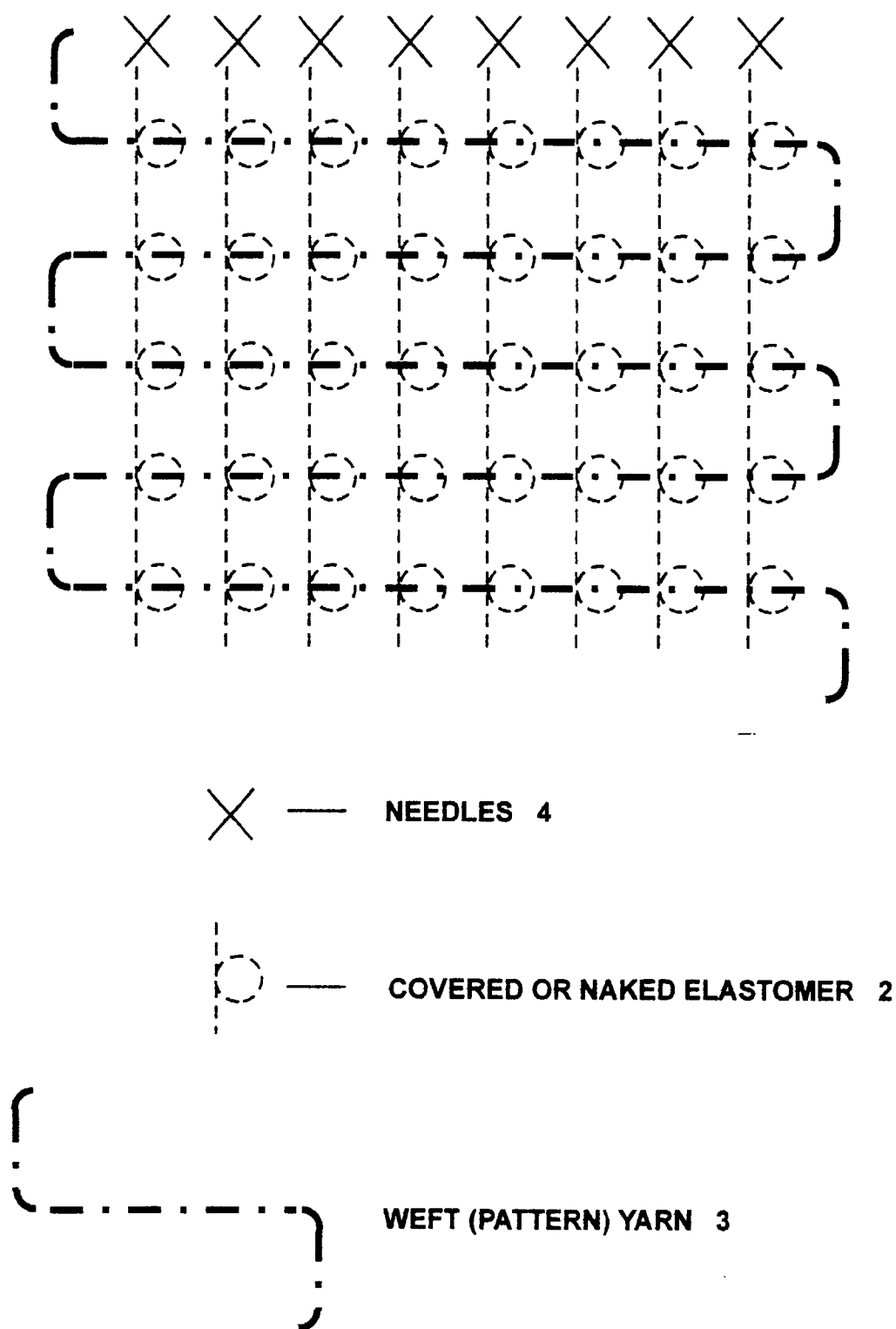


FIG.3

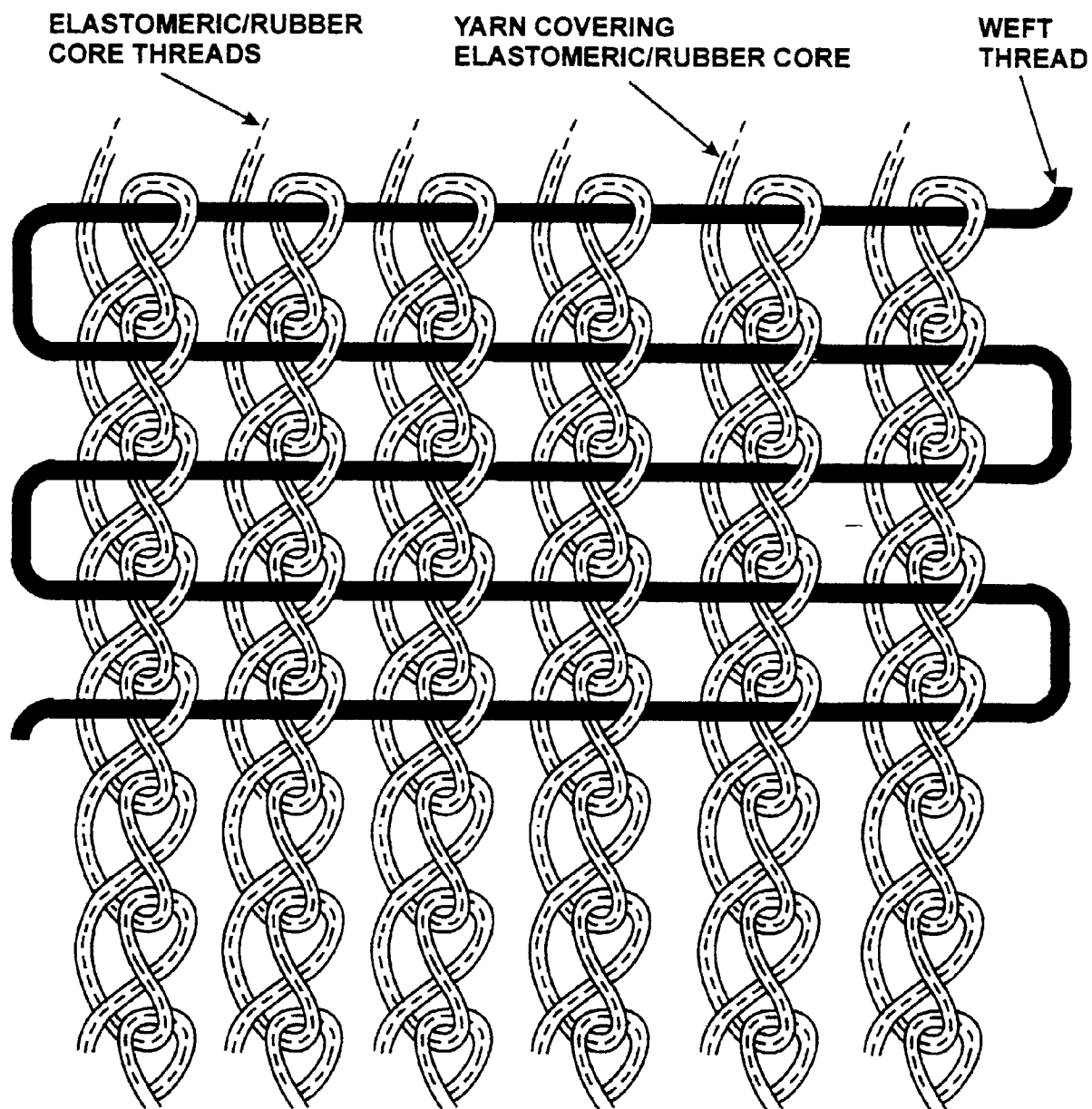


FIG.4

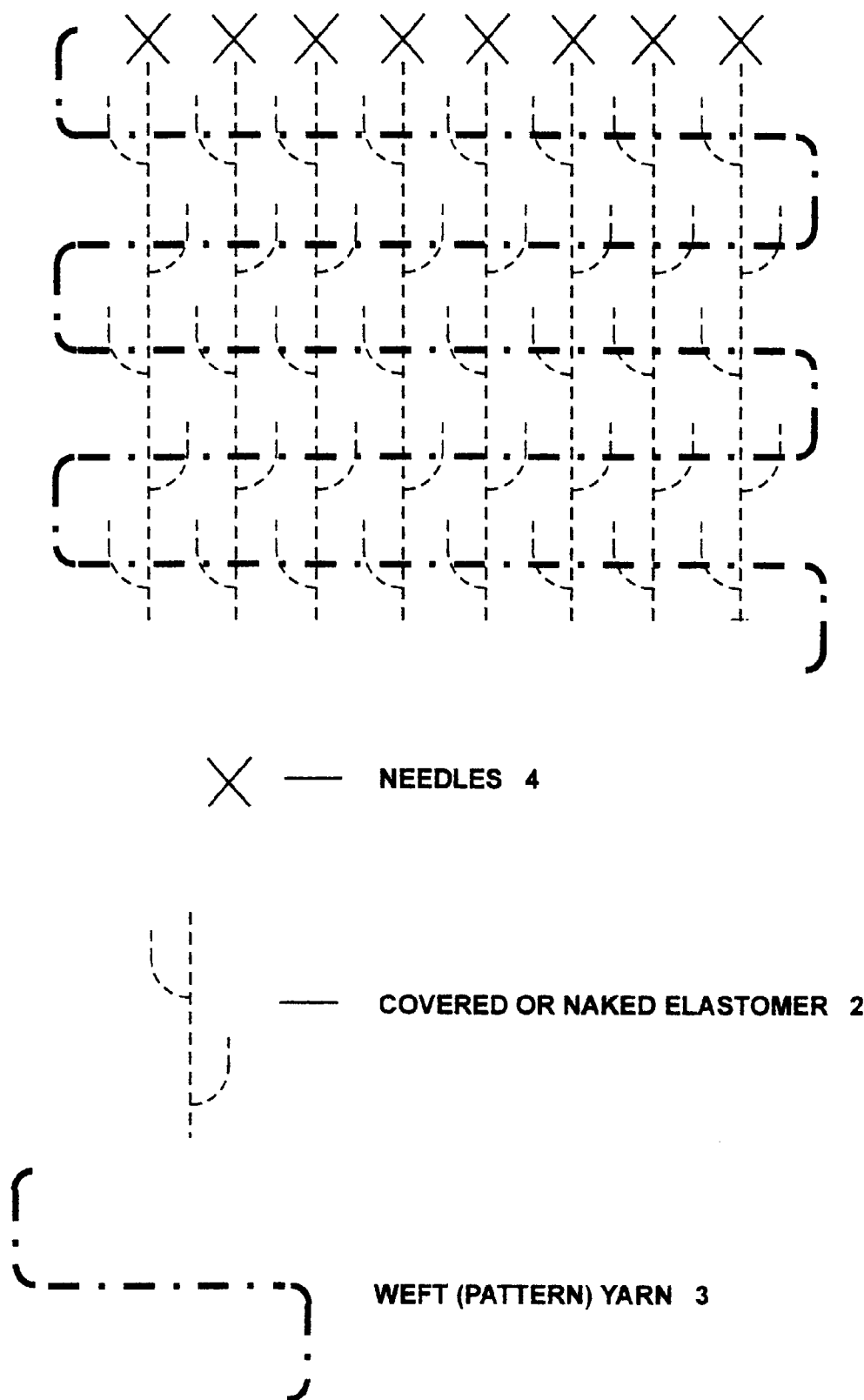


FIG.5

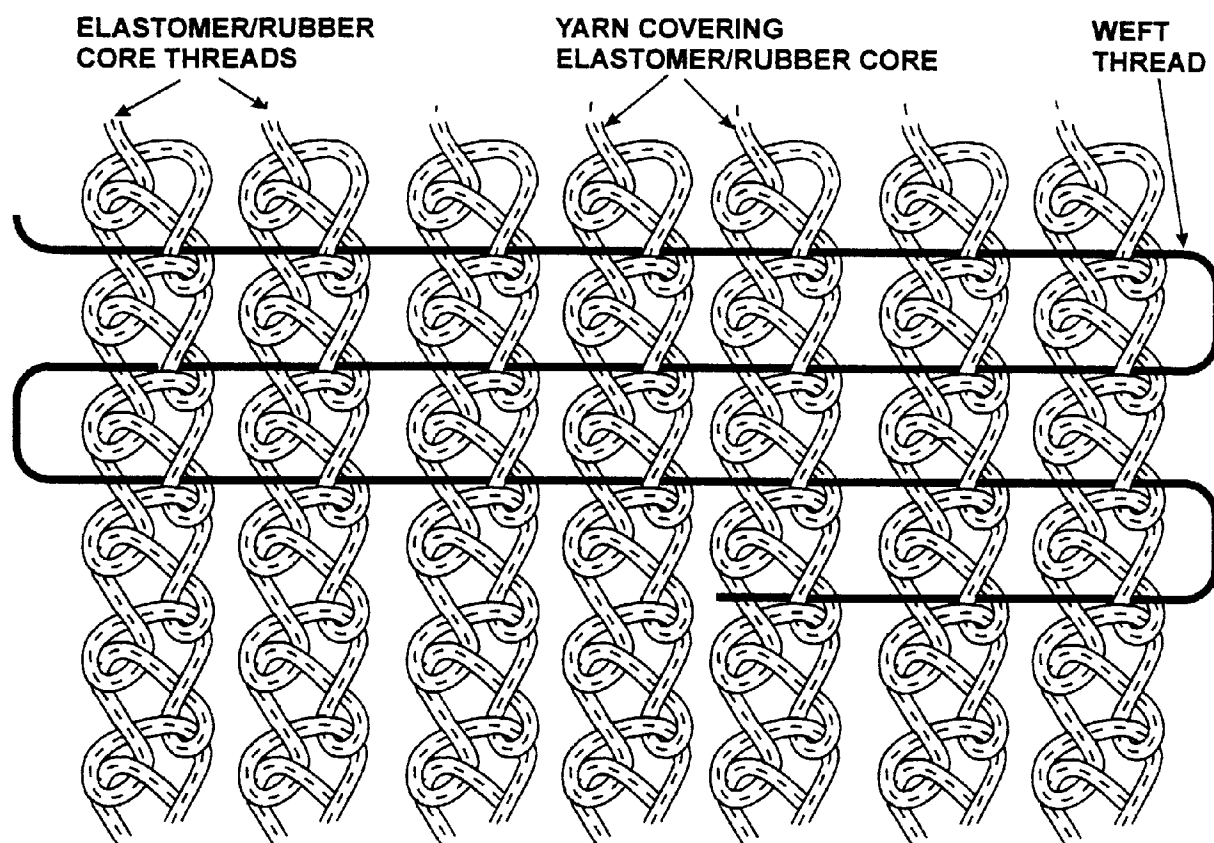


FIG.6

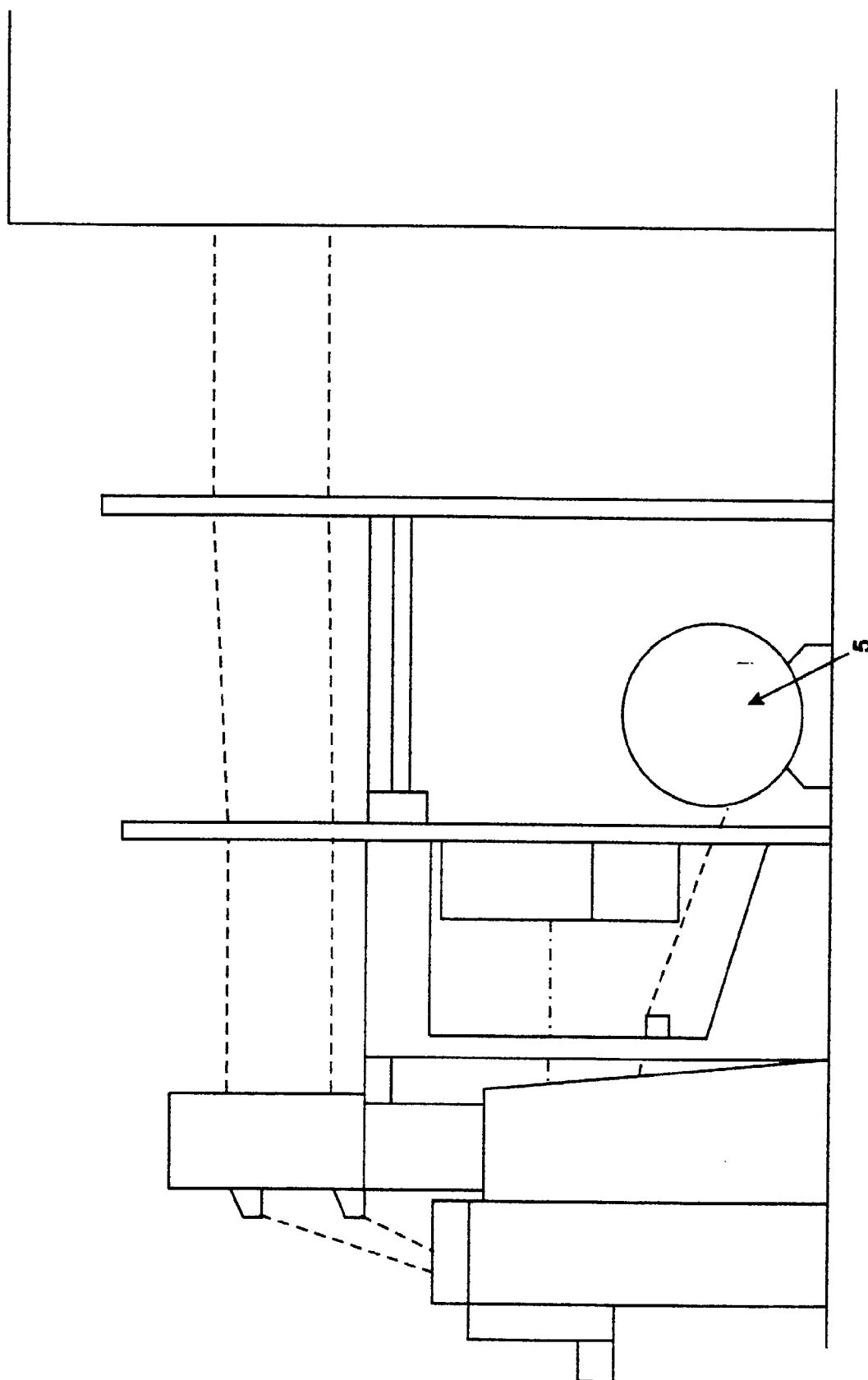


FIG. 7