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PROCESS FOR PRODUCING KNITTED ARTICLES HAVING LOOP FORMATIONS

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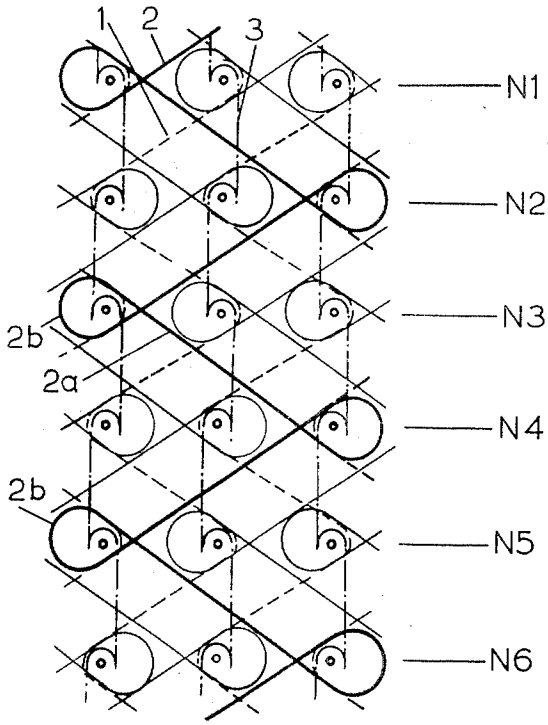


FIG. 1

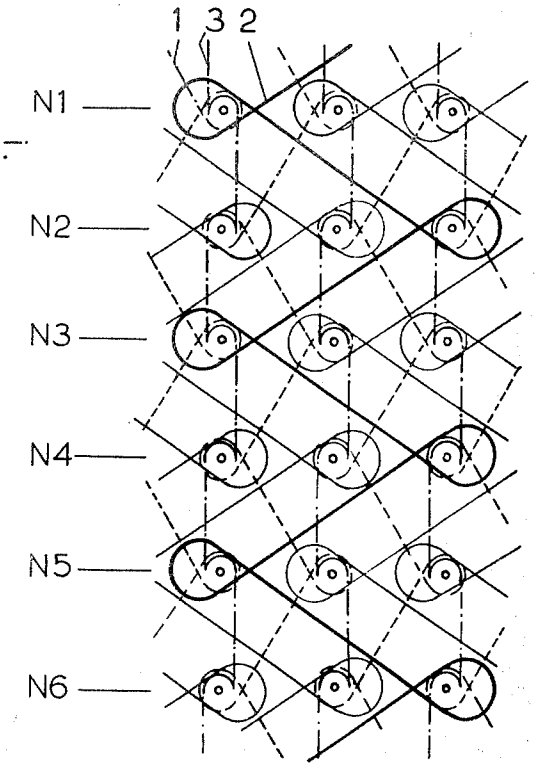


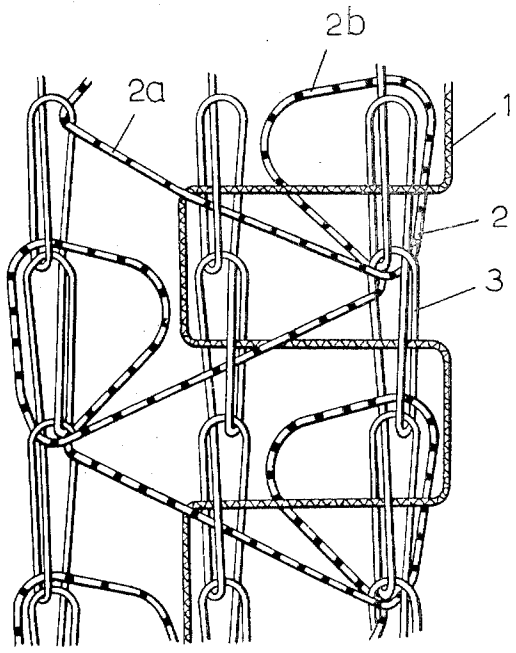
FIG. 2

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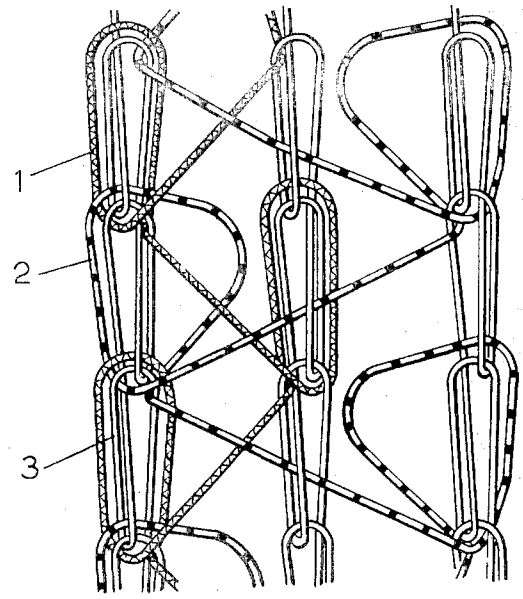
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- FIG. 3. -

- FIG. 4. -



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PROCESS FOR PRODUCING KNITTED ARTICLES HAVING LOOP FORMATIONS

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ABSTRACT OF THE DISCLOSURE

This invention relates to a warp knitted fabric and method of forming the same in which two sets of threads are knitted or laid into the fabric with a normal tension to form a firm ground structure while a third set of threads positioned between the former two sets is being knitted with a lap over two or more needles while overfeeding the threads so that the loops of the actual stitch are forced out on the surface of the fabric.

This invention relates to knitted fabrics and their manufacture, and in particular to warp knitted fabrics.

Warp knitted fabrics made from continuous filament yarns are generally known to have a smooth and cold surface and handle.

The object of the invention is to produce a fabric with warmer handle, greater bulk, and with a less smooth surface.

It has been suggested before by various methods to let the yarn form small loops on the surface of the fabric by knitting or laying in one set of warp threads with very loose tension, that is: overfeeding the threads.

The weakness generally of such fabrics, is a tendency to have a streaky and uneven surface and also that the small and loose loops are easily caught and pulled out of the fabric by sharp objects, or by wear giving a pilling effect.

The warp knitted fabric according to the invention does not suffer from these drawbacks.

When facing the warp loom we number the sets of warp threads 1, 2, 3, 4, etc. The nearest set has the highest number, descending to No. 1 which lies farthest away to the back of the machine and nearest to the presser bar.

According to the invention two sets of threads are knitted or laid into the fabric with normal tension to form a firm ground structure, while a third set of threads which is positioned between the former two sets are being knitted with a lap over two or more needles while overfeeding the threads so that the loops of the actual stitch are forced out on the surface of the fabric.

It is required that the set of warp threads with the highest number, usually No. 3, is knitted with a lap only over one needle to form a so-called "pillar stitch" or in German "Franse," and that a set of warp threads with a lower number, usually No. 1, is being knitted or laid in with a lap over two or more needles.

Preferably, the knitted articles are formed from filament yarn.

In order that the invention can be more readily understood, convenient embodiments will now be described in the following examples with reference to the accompanying drawings:

FIG. 1 illsutrates a knitting pattern, for example, for producing shirt fabric.

FIG. 2 illustrates a knitting pattern for producing, for example, a sheet fabric.

FIG. 3 illustrates details of the knitting pattern in FIG. 1.

FIG. 4 illustrates details of the knitting pattern in FIG. 2.

Generally, the knitted fabric is produced according to the invention on a warp knitting machine of arbitrary construction, for example, a warp loom, a Raschel machine or the like. In the following description, reference is made to articles which are produced on a warp loom supplied by Karl Meyer Textil-Maschinen Fabrik GmbH.

EXAMPLE I

A three bar shirt fabric was produced. Referring to FIGS. 1 and 3 the fabric was produced with three sets of threads 1 to 3.

Set of threads No. 1 is indicated by dotted lines in FIG. 1.

Set of threads No. 2 is indicated by full lines in FIG. 1.

Set of threads No. 3 is indicated by chain lines in FIG. 1.

In order not to confuse the pattern of FIG. 3, set No. 3 is drawn with all threads while sets No. 1 and 2 are represented each by one single thread.

The first set is being laid in (without stitch formation) with a two needle lap with normal thread tension.

The third set is being knitted with a one needle lap with normal thread tension.

By the means of these two sets of threads a firm ground structure is made.

Set of threads No. 2 is knitted with a three needle lap with supply of yarn in excess relative to normal stitch formation, that is to say with an overfeeding of about 60 percent.

The figures show clearly floats **2***a* and how the excess yarn is forced out at the loop **2***b*.

In the Table 1 below there is shown some data for the knitting pattern according to Example 1.

TABLE 1

Guide bar	Pattern	Feeding (m.)	Yarn type	Overfeeding, percent
L1	00-22	35	20 den. nylon	0
L2	23-10	129	40 den. nylon	60
L3	10-01	51	40 den. nylon	0

EXAMPLE 2

A three bar sheet fabric was produced.

Referring to FIGS. 2 and 4, the knitting was effected in the same manner as in Example 1 for the sets of threads **2** and **3**. In the present example set No. **1** was knitted with a two needle lap instead of the laying in (without stitch formation) in Example 1. Reference is made to Table 2 below for the knitting pattern according to Example 2.

TABLE 2

Guide bar	Pattern	Feeding (m.)	Yarn type	Overfeeding, percent
L1	10-12	62	20 den. nylon	0
L2	23-10	129	40 den. nylon	60
L3	10-01	51	40 den. nylon	0

In the above-mentioned examples, an overfeeding of 60% is specified, but the overfeeding can be varied somewhat all according to the effect one desires to achieve. Even if an overfeeding of 50–60% for the tests carried out has given certain desired results for a shirt material and a sheet material respectively, it is within the scope of the invention to increase or decrease the overfeeding beyond that which is stated above. The overfeeding is, in these examples, only specified for a stitch with three needle lap (Tuch-knit). It is also possible to change the overfeeded stitch, for example, to a two needle lap (Trikot knit) or a four needle lap (Satin knit) or to stitches with laps over more needles. For example, for a four needle lap, a 40 percent overfeeding (compared with the 60% overfeeding

for a three needle lap) is suitable and for a five needle lap about 30%. As the loop formation only occurs in the said stitch loop in the overfed yarn system, it is apparent that the percentage magnitude of the overfeeding decreases when one increases the lap, for example, from a three needle lap to a four needle lap. In this connection, it must be observed that it is only the laps length between the stitch loops which is changed on changing from the one lap to the other and that the size of the stitch loop is substantially constant.

Regarding a three bar fabric, it is important that the third set of threads is knitted with a one needle lap. The remaining two sets can be knitted as required with laps over two, or more than two, needles, all depending on the fabric's weight and the remaining desired properties. The two above-mentioned constructions which are knitted, or knitted and layed in, with the sets one and two, result in articles of little weight. By increasing the number of needles of the laps there is obtained correspondingly a certain increase in weight in the article.

In the above, only three bar articles are described, but it will be readily appreciated that the invention can also be employed for producing, for example, four bar articles or additional combined articles so as to obtain further added effects in the article or so as to obtain greater weight, greater strength or the like. With, for example, a four bar article, the fourth set of threads can be located either between two of the three above-mentioned sets or in front of the first set or behind the third set.

What I claim is:

1. A process of producing warp knitted fabrics having loop formations on a warp knitting machine having at least three sets of warp threads of which two sets are fed with a normal thread tension to form a firm structure in the knitted fabric while a third set of warp threads is knitted into the fabric with a stitch formation and is constantly overfed relative to a feeding for normal stitch formation, the overfed set of threads being located between the two sets of threads forming the firm structure, said sets of warp threads forcing out the excess of the overfed set of threads in a loop formation entirely at the stitch loop in the overfed set of warp threads.

2. A process according to claim **1**, in which the yarn employed is a filament yarn.

3. A process according to claim **1**, in which one of the said two sets of threads is knitted with a single needle pillar stitch.

4. A process according to claim **1**, in which the said third set of overfed warp threads is fed in an excess of the order of 60 percent in two needle underlap which corresponds to an excess of the order of 40 percent in three needle underlaps and of the order of 30 percent in four needle underlaps.

5. A process according to claim **3**, in which the other of said two sets of warp threads is laid in, without stitch formation, with an underlap over two needles or more while the said third overfed set of warp threads is knitted with a one needle overlap and an underlap of one needle or more.

6. A process for producing warp knitted fabrics on a warp knitting machine having at least three sets of warp threads comprising the steps of: feeding two sets of warp threads with a normal thread tension to form a firm structure in the knitted fabric, knitting a third set of warp threads into the fabric with a stitch formation, using one needle overlaps and underlaps over a least one needle, constantly overfeeding said third set relative to the feeding for normal stitch formation whereby one of said two firm structure forming sets of warp threads being knitted with a single needle pillar stitch, and locating the overfed set of warp threads between the two sets of warp threads forming the firm structure whereby said two sets force out the slack of the overfed set of threads in a loop formation entirely at the stitch loop thereof.

7. A process according to claim **6** and including the step of overfeeding said third set of warp threads in excess of 60 percent relative to the feeding of said two sets with a normal thread tension in two needle underlap which corresponds to an excess of the order of 40 percent in three needle underlaps and of the order of 30 percent in four needle underlaps.

8. A process according to claim **6** in which the other of said two firm structure forming sets of warp threads being laid in without stitch formation with a lapover of at least two needles.

9. A process according to claim **6** in which the other of said two firm structure forming sets of warp threads being laid in with an underlap of at least one needle.

10. A process according to claim **1**, in which the said third set of overfed warp threads is fed in an excess of the order of 30–60 percent.

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WM. CARTER REYNOLDS, Primary Examiner

U.S. Cl. X.R.

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