Oct. 31, 1967 A. SCHWARTZ 3,349,575

WARP KNIT FABRIC WITH LOOPED YARN SURFACE
Original Filed Feb. 27, 1963

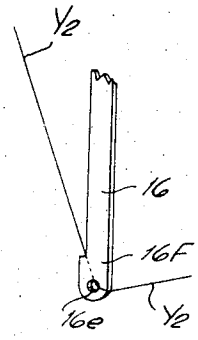


FIG. 3

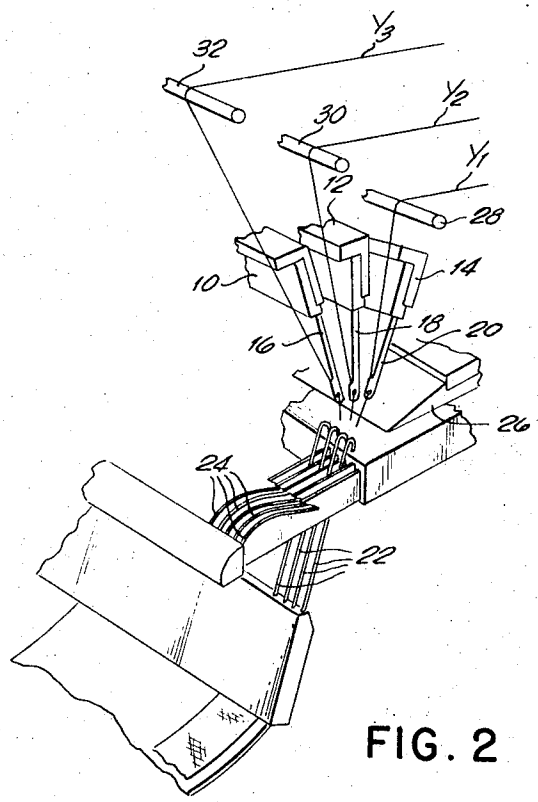
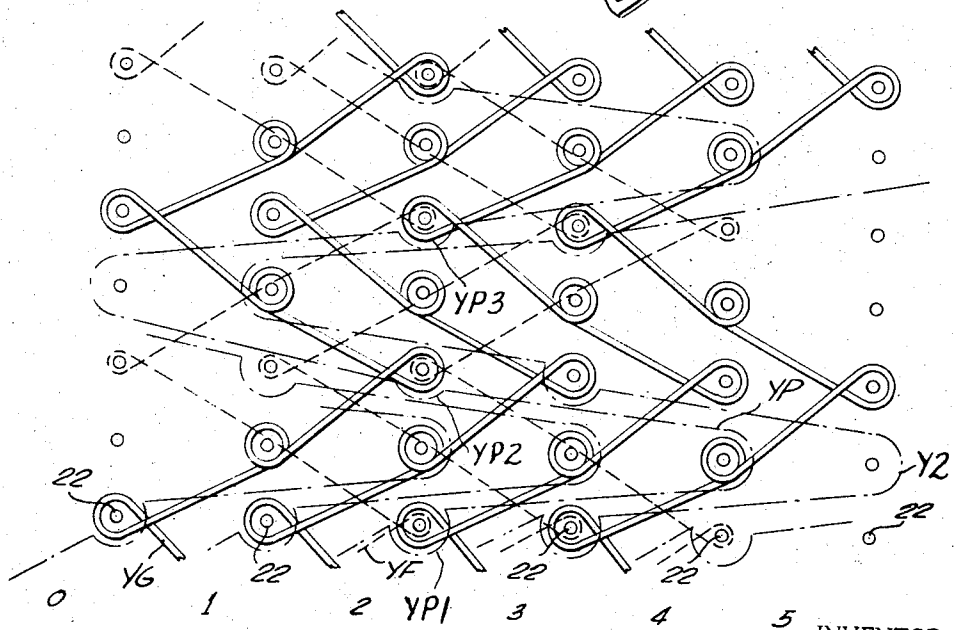


FIG. 1

FIG. 2



INVENTOR.
ALVIN SCHWARTZ

BY Harry Cohn

ATTORNEY

United States Patent Office 3,349,575 Patented Oct. 31, 1967

3,349,575

WARP KNIT FABRIC WITH LOOPED YARN SURFACE

Alvin Schwartz, 505 E. 79th St., New York, N.Y. 10022

Original application Feb. 27, 1963, Ser. No. 261,353, now Patent No. 3,255,615, dated June 14, 1966. Divided and this application Sept. 15, 1965, Ser. No. 487,536
3 Claims. (Cl. 66—86)

This application is a division of Ser. No. 261,353, filed Feb. 27, 1963, now U.S. Patent 3,255,615.

This invention relates to warp knitted pile fabrics. Although the fabrics of the present invention may be used for various purposes, it is especially well adapted for blouses, dresses and other articles of wearing apparel, especially as a light weight fabric of pleasing appearance.

The primary object of this invention is to provide a warp knitted pile fabric with the pile loops knitted in with the stitches of the ground fabric and with the ground fabric solidly knit, i.e., the stitches of the ground fabric being knit on each needle in every course.

Another object of the present invention is to produce a warp knitted pile fabric wherein the pile forming threads are interknit in certain courses with the threads which form the ground of the fabric and with threads which are also interknit on the face of the fabric with threads of the ground fabric in certain courses.

Another object is to provide a warp knit pile fabric in which the pile loops differ slightly in length in a more-or-less haphazard fashion resulting in a fabric having a pleasing appearance.

The above and other objects, features and advantages of this invention will be more fully understood from the following description of a presently preferred embodiment of the invention, considered in connection with the accompanying illustrative drawings.

In the drawings:

FIG. 1 is a diagrammatic illustration of the fabric showing its construction and the manner in which the knitting is performed;

FIG. 2 is a perspective view of part of a warp knitting machine for knitting the fabric; and

FIG. 3 is a detail view showing a portion of the side of one of the yarn guides of the middle yarn guide bar of the warp knitting machine.

Referring now to the drawings in detail and first to FIG. 2, the warp knitting machine is of conventional construction but is operated in the manner hereinafter described for producing the fabric illustrated by FIG. 1. More particularly, as here shown, the warp knitting machine comprises the front yarn guide bar **10**, a middle yarn guide bar **12** and a back yarn guide bar **14**. Each of said guide bars carries as many yarn guides **16**, **18** and **20**, respectively, as there are needles, although for simplicity of illustration only one yarn guide is shown on each of the three yarn guide bars. A few of the needles, all of which are spring-beard needles are indicated at **22**, and only some of the sinkers are shown, as indicated at **24**. The needle presser bar is indicated at **26**.

The yarn Y1 is supplied from a warp beam (not shown) to the yarn guide elements **20** of the back bar **14** for knitting the ground fabric indicated by the full lines YG in FIG. 1, said yarn Y1 being supplied under regulated tension by the conventional tension bar **28** of the warp knitting machine. The yarn for forming the pile loops is indicated at Y2 in FIG. 2 and is supplied from a warp beam (not shown) to the yarn guides under slight tension over the tension bar **30**, the pile loop yarn in the fabric being shown in FIG. 1 in dot and dash lines designated YP. The yarn designated Y3 is supplied from a warp beam (not shown) to the guides of the front guide bar **10** over

the tension bar **32** and is indicated by the dotted lines YF in FIG. 1.

As previously indicated, the ground fabric has a stitch formed on each needle (or in each wale) in every course. The yarn YP for forming the pile loops has a stitch on each needle (or in each wale) but only in certain courses, preferably alternate courses as in the preferred illustrative embodiment of the invention shown by FIG. 1. The yarn YF at the face of the fabric also has stitches on each needle (or in each wale) but in alternate courses which are preferably the same as the courses in which the pile stitches are formed.

It will be understood that the warp knitting machine is operated in a conventional way except that the yarn Y2 for forming the pile loops is fed to the needles under low tension, and it will be further understood that the yarn guide bars **10**, **12** and **14** are oscillated to move the yarn guides carried thereby back and forth in the spaces between the needles and that patterning wheels are employed for moving said yarn guide bars predetermined distances lengthwise of the row of needles.

In FIG. 1, only a few of the needles **22** are shown and the spaces between adjacent needles of the shown needles are indicated in FIG. 1 by the numerals 0, 1, 2, 3, 4 and 5. The pattern wheels for the yarn guide bars **10**, **12** and **14** are set up according to the following pattern wherein the numerals designate the spaces between the needles.

Pattern of back yarn guide bar **14**:
1,0–2,1–2,3–1,2—then repeat.
Pattern of middle yarn guide bar **12**:
2,3–5,5–3,2–0,0—then repeat.
Pattern of forward yarn guide bar **10**:
2,3–2,2–1,0–1,1—then repeat.

It will be noted that the ground fabric knit from the yarn YG has a stitch formed on each needle in every course as previously stated but said fabric is not an ordinary warp knit jersey fabric. This is evident from the above indicated pattern of the back guide bar **14** in comparison with the ordinary pattern, namely, 1,0–1,2—and repeat, of the usual jersey knit fabric. According to the pattern for the middle bar **12** for forming the pile loops one of which is indicated at YP in FIG. 1 extending from point YP1 to point YP2, the yarn guide bar **12** is moved lengthwise of the row of needles a distance of five spaces first to the right and then the same number of spaces to the left to form a loop of the desired length. An adjacent pile loop extends from point YP2 to point YP3. It will be noted that the stitches of the pile loops are open stitches as indicated in FIG. 1, i.e., the yarn for the pile loops YP is not wound completely around the needle but is fed below the beard and across the back of the needle on which the stitch is to be formed. On the other hand, the yarn YF which is knit in alternate courses together with the stitches of the ground fabric and the stitches of yarn YP for the pile loops is wound completely around the needle on which the stitch of said yarn YF is to be formed, according to the above indicated pattern of the forward guide bar **10**, and the knitting pattern is such that the yarn YF traverses the yarn YP in the loop forming portion thereof so that the friction due to said engagement of the yarns YF and YP prevent more than a slight recessive shortening of the loop by the tension of the tension bar **30** when the yarn guide bar **10** is moved from its limit of travel in one direction in an opposite direction. It will be understood that the low tension of bar **30** on yarn Y2 is regulated so that it is not substantially greater than is necessary for the stitch forming operation on said yarn to form the knit-in-pile loops. The effect of the engagement of the yarn YF with the yarn for the pile loops to prevent said receding move-

ment of the yarn of the pile loop is augmented due to the fact that the yarn of the pile loop is directed laterally against the face **16**F of the yarn guide **16** adjacent the yarn guide opening **16***e* as illustrated more-or-less diagrammatically in FIG. 3 so that the tension of the tension bar **30** on yarn **Y2** which might otherwise withdraw yarn from the loop is almost entirely, if not wholly, neutralized. These effects of the yarn YF on the loops of the pile yarn during the knitting operation need not necessarily be uniform and advantage may be taken of the fact, since the non-uniformity results in the pile loops varying somewhat in length and thereby enhancing the pleasing appearance of the face of the fabric.

The following is one example of yarns employed for producing a fabric of desirable characteristics. Each of the three yarns is in filament form, the yarn **Y1** for the ground fabric being, for example, 40 denier nylon filament yarn, the yarn **Y2** for the pile loops being, for example, 100 denier triacetate filament yarn, and the yarn **Y3** for the yarn YF of the fabric being, for example, 15 denier nylon filament yarn. It will be understood, however, that while the yarns just specified in the indicated deniers are preferred and provide a highly pleasing fabric, other yarns in various deniers, respectively, may be used depending upon the desired characteristic of the wanted fabric.

Also, it will be understood that the pile forming yarn may be knit on spaced needles in alternate courses or in otherwise spaced courses and for certain fabrics need not be knit on every needle in the course. Similarly, it will be understood that the yarn **Y3** may be knit on the same needles as the pile forming yarn and like the latter, need not be knit on each needle in the course. Further, it will be understood that the yarn-guide bar **12** may be moved lengthwise of the row of needles any suitable distance other than five spaces, depending upon the size of the desired pile loop.

While I have shown and described the preferred embodiment of the invention, it will be understood that the invention may be embodied otherwise than as herein specifically illustrated or described, and that certain changes in the form and arrangement of parts and in the specific manner of practicing the invention may be made without departing from the underlying idea or principles of this invention within the scope of the appended claims.

What is claimed is:

1. A method of knitting a pile fabric on a warp knitting machine provided with three yarn guide bars, comprising the steps: supplying a ground yarn under normal tension to the guides of a back guide bar, knitting said ground yarn on every needle in each course to form a ground fabric, supplying a pile yarn under relatively low tension to the guide bar, knitting said pile yarn on every needle in spaced courses only to form the pile, supplying a different yarn under normal tension to the guides of a front bar, knitting said different yarn on the same needles in the same courses only as said pile forming yarn and according to a pattern of movement of the front yarn guide bar which causes said different yarn to position itself on the front of said ground fabric at the base of the pile for opposing receding movement of the pile loop.

2. A method of knitting a pile fabric according to claim **1**, wherein the yarn for the ground fabric is knit according to the following pattern of movement of the back yarn-guide bar, namely, 1,0–2,1–2,3–1,2—and repeat, and wherein said numerals indicate the spaces between adjacent needles in a group of the row of needles of the knitting machine.

3. A method of knitting a pile fabric on a warp knitting machine comprising: knitting warp yarns on every needle in each course thereby forming a solid warp knit ground fabric; interknitting pile forming warp yarns under relatively low tension with the yarn of the ground fabric on every needle in spaced courses only thereby forming a pile on the solid warp knit ground fabric; and interknitting other yarns with the yarns of the ground and the pile on every needle in space courses on the front of the ground at the base of the pile.

References Cited

UNITED STATES PATENTS

2,019,258	10/1935	Holmes	66—194
2,267,578	12/1941	Schonfeld	66—86
2,379,852	7/1945	Nebel	66—194
3,063,272	11/1962	Bolton	66—86
3,109,302	11/1963	Vitek	66—193
3,111,829	11/1963	Artzt	66—194

FOREIGN PATENTS

883,111	11/1961	Great Britain.

MERVIN STEIN, *Primary Examiner.*

R. FELDBAUM, *Assistant Examiner.*