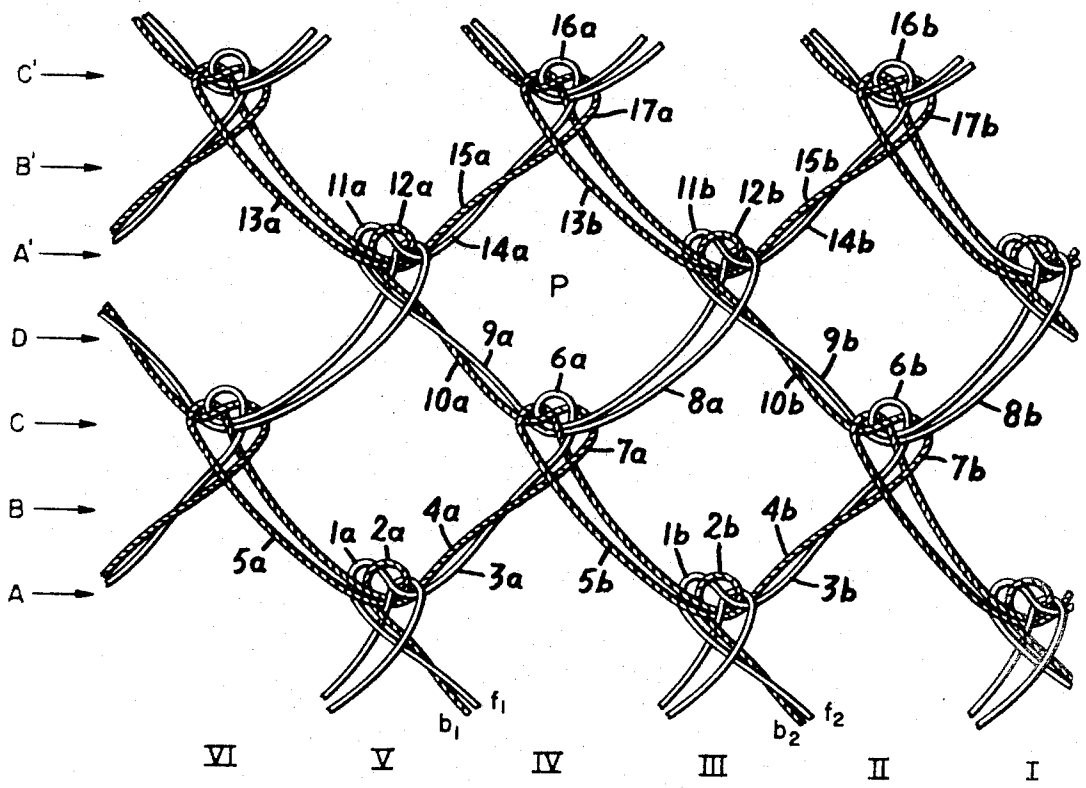
June 3, 1969 M. KURZ 3,447,345

KNITTED MESH FABRIC

Filed Oct. 21, 1966



INVENTOR.
MILTON KURZ
BY Brumbaugh, Graves, Donohue & Raymond
his ATTORNEYS

United States Patent Office 3,447,345
Patented June 3, 1969

3,447,345

KNITTED MESH FABRIC

Milton Kurz, 461 Barnard Ave., Cedarhurst, N.Y. 11516

Filed Oct. 21, 1966, Ser. No. 588,590
Int. Cl. D04b 21/12, 21/14
U.S. Cl. 66—195 3 Claims

ABSTRACT OF THE DISCLOSURE

A knitted mesh fabric containing diamond shaped polygons, useful as backing material or "scrim," which is produced on a conventional warp or Raschel knitting machine equipped with two guide bars and one needle bar, such fabric being knitted by having the threads from each guide bar form, in the four-course series set-up, two contracted loops and one elongated loop, thus utilizing substantially equal amounts of thread from each bar, and by having both guide bars form contracted loops in the same courses and on the same needles, thus locking all thread intersections into the fabric for a uniform mesh formation.

This invention relates to full gauge warp knitted fabrics and more particularly to fabrics which, upon the application of tension, form an open mesh appearance, each opening having a diamond shaped configuration.

The use of conventional warp or Raschel knitting machines for knitting full gauge mesh fabrics is well know. For knitting such fabrics the machines are equipped with a front and a rear thread guide bar and one needle bar. A pair of threads, one from each bar, is moved between or around two adjacent needles according to formula so as to form both contracted and elongated loops which interengage with each other and with adjacent loops to produce the mesh fabric.

In knitting mesh fabrics on conventional warp knitting machines, various formulas have heretofore been employed resulting in different constructions of the polygonal formations. With one such formula, all of the loops are formed by one guide bar while the other bar floats or lays-in the thread at every course. In another construction one bar forms all of the contracted loops and the other bar forms all of the elongated loops. In a third fabric, both bars form elongated loops, but only one bar forms contracted loops. Alternately, fabrics have been knitted by having both bars form contracted loops and one bar form elongated loops.

Mesh fabrics knitted in accordance with the foregoing methods have several disadvantages. Among the problems encountered with certain of such fabrics is the failure of intersections of yarn to be locked into the fabric during the knitting operation. Thus, when such fabrics are stretched and set during the finishing process, the threads slide, causing stresses to occur in concentrated areas which distort the appearance of the fabric. Another serious disadvantage of all such fabrics is that a different amount of thread is required by each bar. Thus, after the initial setup of the machine, there is a constant imbalance of the two beams supplying thread to the respective guide bars. This prematurely shortens the production run as first one thread supply and then the other must be replenished. The resultant slow-down of production and additional handling of the thread supply results in an increase in manufacturing costs.

The foregoing disadvantages of the prior knitted mesh fabrics are particularly acute if the fabric is to be used as backing material, known as "scrim," to strengthen fabric of woven fiber, platted fiber, cellulose papers and films and the like. Such scrim fabric is made from relatively coarse thread and knitted so as to form relatively

large mesh formations. It is therefore important that the stresses be evenly distributed throughout the fabric. Because of the nature and use of "scrim" fabric, it must be produced in relatively larger quantities and at relatively lower cost than knitted lace fabric for other uses.

It is, accordingly, an object of this invention to provide a suitable scrim mesh fabric having a unique stitch formation that may be made on a conventional warp or Raschel knitting machine in which all intersections of thread are locked into the fabric so that when such fabric is stretched and set during the finishing process, the stresses will be evenly distributed and the fabric will have a substantially uniform diamond mesh formation. It is a further object of the invention to provide a knitted mesh fabric containing equal amounts of thread from both front and rear bars so that greater yardage of the knitted fabric may be produced in a single run of the knitting machine to speed up production and reduce manufacturing costs.

The fabric of my invention contains substantially uniform diamond shaped polygons when finished and is made on the knitting machine in accordance with four course repeat formulas requiring each thread to knit an elongated loop followed by contracted loops of both bars on an adjacent needle. During the four courses two contracted loops and one elongated loop are formed by each thread, the contracted loops being knitted by both bars in the same courses and the elongated loops being knitted by both bars in different courses, each bar floating during the course in which the other bar knits an elongated loop. The resultant fabric is a locked-in construction which will not run and will not distort when stretched during the finishing process. Since each bar knits the same number and kinds of loops, production may continue until the thread supply of both beams is exhausted. Moreover, only one beam need be used at a time, the front and rear bars being supplied with ends from a single beam and this has not heretofore been accomplished in full gauge knitting of mesh fabrics.

A diagrammatic view of a portion of one form of fabric according to my invention is shown in the accompanying drawing. The vertical rows or wales are designated by Roman numerals I, II, III, IV, V and VI, and the horizontal rows or courses by the letters A, B, C, D, A′, B′ and C′. A plurality of pairs of threads one from each bar, are employed for forming these rows, each pair consisting of one thread from the front bar and one thread from the back bar. The front bar threads are designated *f*1 and *f*2 and the back bar threads *b*1 and *b*2. Although only two pairs of threads are designated on the drawing, it is to be understood that in commercial production of my fabric several hundreds pairs of threads may be employed, the maximum number being limited only upon the capacity of the knitting machine.

During a single sequence of the knitting operation, the front bar threads form contracted loops in courses A, C and A′ and elongated loops in course D, while the back bar threads form contracted loops in course A, C and A′ and elongated loops in course B. In one course of the series set up, each bar is unknitted, the front bar floating in course B and the back bar floating in course D. The threads of each bar knit on two adjacent needles and therefore form loops in adjacent wales. As a result, each polygon is formed by threads of adjacent bars. The construction of my fabric may be readily understood by following the knitting sequence of threads *f*1 and *b*1 and *f*2 and *b*2 to form the polygon P.

Threads *f*1 and *b*1, emerging from a previous knitting sequence, not shown, form contracted loops 1*a* and 2*a* respectively in course A, wale V. Simultaneously, threads *f*2 and *b*2 perform the identical movement on an adjacent

needle in wale III. In course B, the front bar threads float, as shown at **3***a* and **3***b*, while the back bar threads form elongated loops **5***a* and **5***b*. In course C, the threads knit on an adjacent needle. Thus, thread *f***1** forms contracted loop **6***a* in wale IV, while thread *f***2** forms contracted loop **6***b* in wale II. Simultaneously, threads *b***1** and *b***2** form loops **7***a* and **7***b* in the same respective wales. In course D, the front bar threads form elongated loops **8***a* and **8***b*, while the back bar threads float, as shown at **10***a* and **10***b*. Beginning with course A', the four course knitting sequence is repeated. Threads from both bars of adjacent pairs form contracted loops **11***a* and **12***a* in wale V and **11***b* and **12***b* in wale III. In course B' back bar thread *b***1** forms elongated loop **13***a* while back bar thread *b***2** forms elongated loop **13***b*. Simultaneously, the front bar threads float as shown at **14***a* and **14***b*. In course C' both bars again form contracted loops, threads *f***1** and *b***1** forming loops **16***a* and **17***a* in wale IV and threads *f***2** and *b***2** forming loops **16***b* and **17***b* in wale II.

From the foregoing, it will be seen that polygon P is made up of elongated loop **8***a* of the front bar thread *f***1**, contracted loops **11***b* and **12***b* of the front bar thread *f***2** and the back bar thread *b***2** respectively, elongated loop **13***b* of back bar thread *b***2**, contracted loops **16***a* and **17***a* of front bar thread *f***1** and back bar thread *b***1** respectively, thread sections **14***a* and **15***a* of front bar thread *f***1** and back bar thread *b***1** respectively, contracted loops **11***a* and **12***a* of front bar thread *f***1** and back bar thread *b***1** respectively, thread sections **9***a* and **10***a* of front bar thread *f***1** and back bar thread *b***1** respectively and contracted loops **6***a* and **7***a* of front bar thread *f***1** and back bar thread *b***1** respectively. It will be noted that thread sections **10***a* and **14***a* are floats, while thread sections **9***a* and **15***a* are laps of elongated loops **8***a* and **13***a* respectively. Thus, two adjacent sides of each polygon consist of elongated loops from each bar while the other two sides consist of thread sections from each bar, all four sides being tied together at the junction points by interengaged contracted loops from each bar. This construction results in the intersections of the threads being locked into the fabric so that upon finishing the stresses will be evenly distributed throughout the fabric.

For producing the fabric shown in the drawing on a Raschel machine, the following formula may be used:

Front bar	02 00 42 24
Back bar	02 20 42 44

In the fabric illustrated in the drawing, closed elongated loops are formed by the front bar and open elongated loops are formed by the back bar. Other forms of fabric embodying my invention may also be made. For example, four course repeat formulas resulting in various combinations of open and closed loops may be employed so long as each bar forms a single elongated loop in different courses and each such elongated loop is followed by contracted loops of both bars on an adjacent needle in the same courses. It is to be understood, therefore, that the invention is not limited to any specific form of fabric or the manner of practicing same, except insofar as such limitations are specified in the appended claims.

I claim:

1. In a knitted fabric of diamond shaped mesh formation, a plurality of pairs of warp threads formed into a plurality of wales and courses, both threads of each of said pairs forming contracted loops in wales in the same courses and elongated loops in wales in different courses, each thread of the pair being unknitted in the courses in which the other thread of the pair forms elongated loops.

2. A knitted fabric of diamond shaped mesh formation comprising pairs of front and back bar warp threads formed into a series of contracted and elongated loops, two adjacent sides of each diamond consisting of elongated loops, one from each bar, the other two sides each being formed by a pair of unknitted thread sections, one from each bar, and the junctures of adjacent sides each being formed by contracted loops of both bars interlocking with said sides.

3. A knitted fabric as claimed in claim **2** wherein the warp threads from one pair form three of the four sides and a warp thread from an adjacent pair forms the remaining side.

References Cited

UNITED STATES PATENTS

1,139,344	5/1915	Clewley	66—195
2,403,793	7/1946	Feinstein	66—195
2,667,775	2/1954	Aibel	66—195
3,071,951	1/1963	Kurz	66—195

WM. CARTER REYNOLDS, *Primary Examiner.*