Feb. 28, 1939. W. REYNOLDS ET AL 2,149,071

KNITTED FABRIC

Filed March 31, 1937 2 Sheets-Sheet 1

Fig. 1.

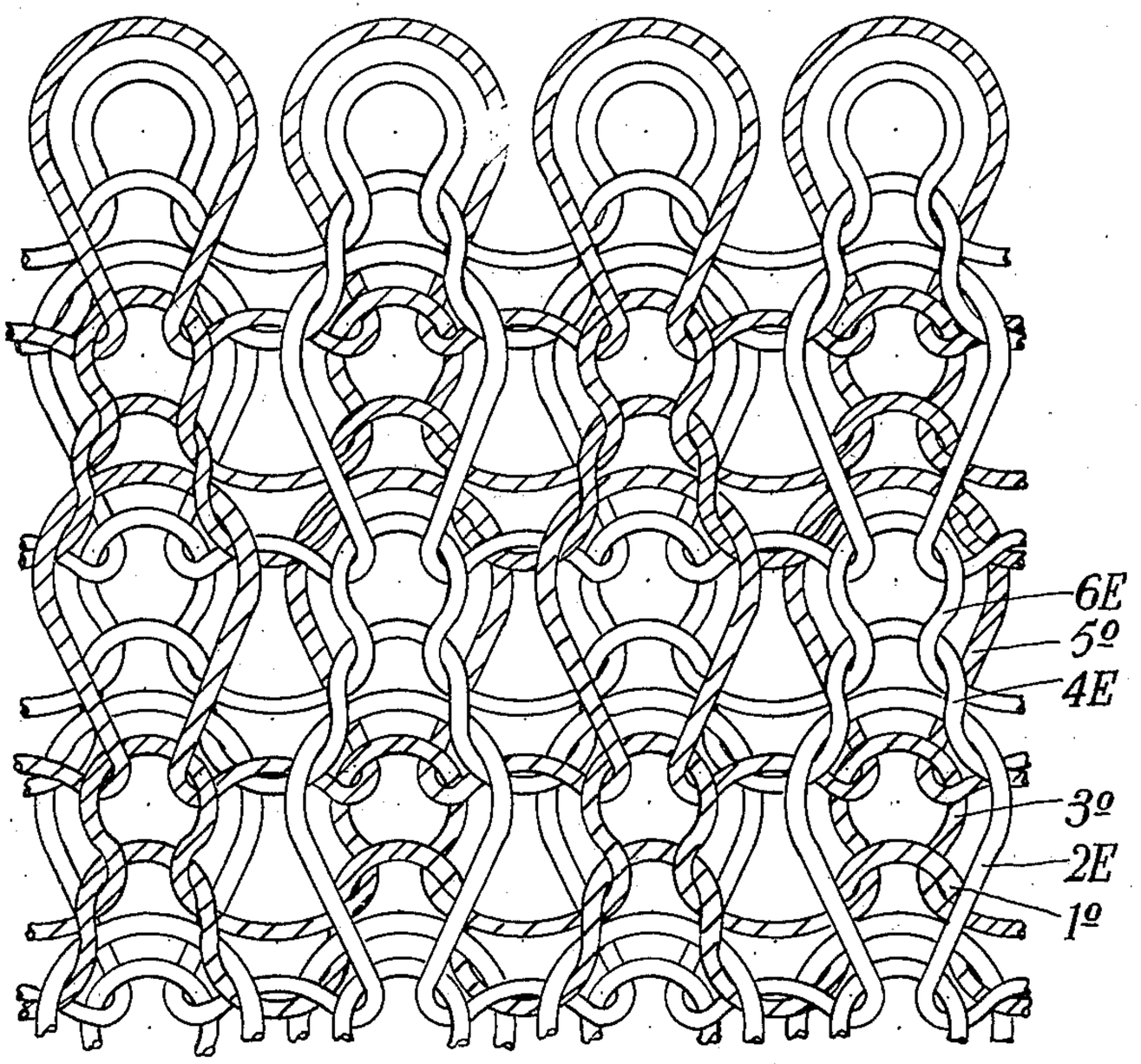
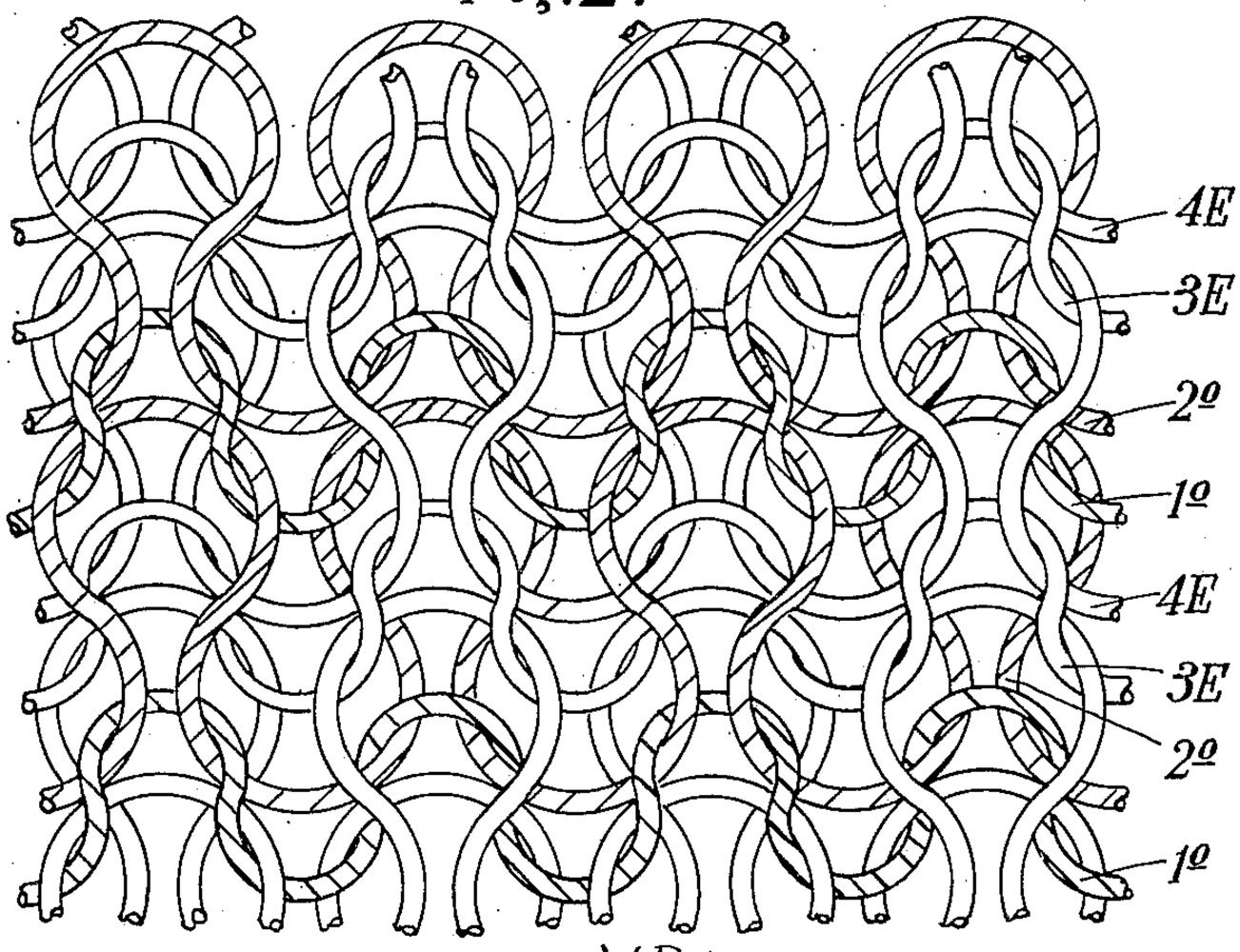


Fig. 2.



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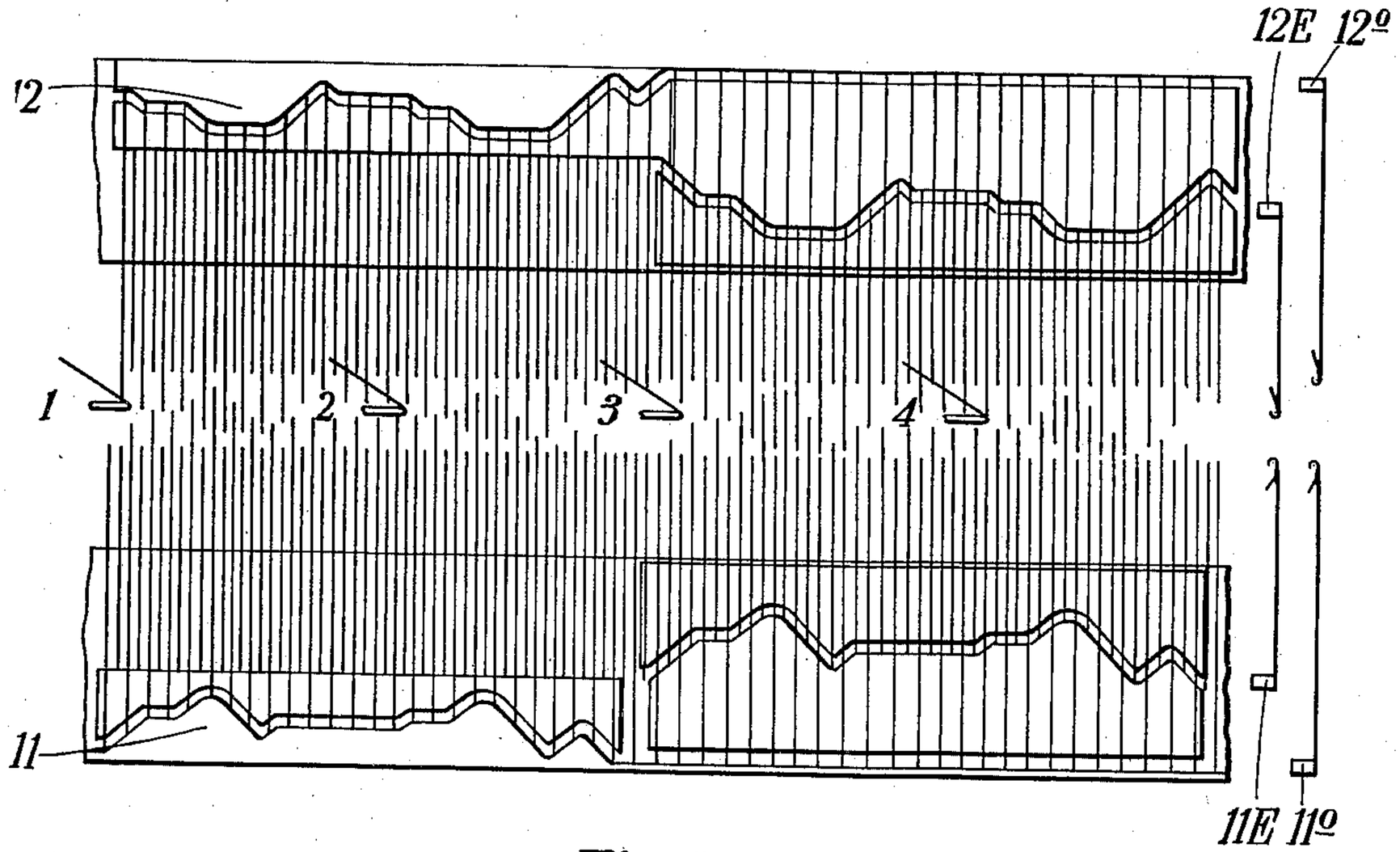

Fig. 3.

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2,149,071

UNITED STATES PATENT OFFICE

2,149,071

KNITTED FABRIC

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Application March 31, 1937, Serial No. 134,161
In Great Britain November 21, 1936

8 Claims. (Cl. 66—197)

This invention is for improvements in or relating to knitted fabric. One of its objects is to provide a knitted fabric that is less susceptible to laddering than are knitted fabrics of normal structure. The invention is especially applicable to interlock fabric, which fabric consists of two ribbed webs disposed with the ribs of one web in the spaces between the ribs of the other webs and having the sinker wales or bars of the two webs crossing each other in an alternating sequence. Such fabric is very prone to ladder and an object of this invention is to produce interlock fabric that is resistant to ladders. As applied to interlock fabric the invention, according to one aspect thereof, includes the incorporation therein of weft-like threads that while not inhibiting all stretch in the direction of the courses limit the stretch to such an extent that the ends of a broken loop do not pull out under treatment to which the fabric would ordinarily be subjected. The fabric is produced by a method of knitting, which comprises knitting, in alteration in the same spaced wales, courses of long loops and courses of short loops, and also knitting in the intervening wales, and in alternation with each other and with the aforesaid courses, further long loop and short loop courses.

Further features of the invention reside in the method of knitting and in the knitting machine upon which the fabric according to this invention is produced.

In order that the invention may be better understood reference will now be made to the accompanying drawings in which

Figures 1 and 2 show two forms of interlock fabric according to this invention,

Figure 3 shows the lay-out of the cams, needles and feeders for making the fabrics of Figure 2.

In the most usual form of interlock machine the needles in the two beds are arranged opposite one another, thus:—

O E O E O E O
. . . . . .
. . . . . .
E O E O E O E

(the needles being represented by the dots) and all the needles lettered O knit at one feed and those lettered E at the next. In applying the present invention to such an arrangement the needles of each kind (O or E) knit short-loop courses and long-loop courses in alternation, as is indicated in the following table:—

Course	Needles	Loop-length
1	O	Short.
2	E	Long.
3	O	Short.
4	E	Short.
5	O	Long.
6	E	Short.

This 6-course sequence is then repeated.

This fabric is illustrated in Figure 1. It will be seen that course 1*o* consists of comparatively short loops formed in one web by, for example the odd cylinder and dial needles. The next course consists of long loops 2E formed by the even cylinder and dial needles, the third course 3*o* again consists of short loops formed upon the odd cylinder and dial needles, said loops being drawn through the preceding short loops 1*o*. The fourth course consists of short loops 4E drawn through the long loops 2E by the even cylinder and dial needles. Through these short loops 4E another course of loops 6E is drawn by said needles while through the short loops 3*o* of the other web a course of long loops 5*o* is drawn by the odd cylinder and dial needles.

In this fabric one web is knitted upon the odd needles and consists of the courses 1*o*, 3*o*, and 5*o* while the other web is knitted on the even needles and consists of the courses 2E, 4E and 6E and, as is clearly shown in the drawing, the sinker bars of the two webs are arranged in an alternating sequence down each sinker wale. It is also to be noted that in each web two courses of short loops alternate with a single course of long loops.

In an ordinary interlock fabric at any given face of the fabric the loops appertaining to one web are slightly staggered in relation to the loops of the other web. This is because the two webs alternate in a 1 x 1 sequence (as in the example given). In the fabric illustrated in Figure 2 this disadvantage is obviated by causing a plurality of courses of one web to alternate with the plurality of courses of the other. In other words, considering a 2 x 2 arrangement, down any sinker wale, pairs of sinker bars extending in one direction from one face of the fabric to the other

alternate with pairs of sinker bars extending in the opposite direction.

Thus, taking the same needle arrangement as in the preceding example, viz:—

O E O E O E
. . . . . .
. . . . . .
E O E O E O

the knitting sequence is shown in the following table:—

Course	Needles	Loop-length
1	O	Short.
2	O	Long.
3	E	Short.
4	E	Long.

This 4-course sequence is then repeated.

Thus referring to Figure 2 in which the two webs are visually distinguished because the threads appertaining to one of them are shaded, one web consists of the stitch loop courses 1*o* and 2*o* while the other web courses of the other courses 3E and 4E. It will be seen that in any one wale, between the sinker bars of courses 2*o* and 1*o*, the sinker bars of courses 3E and 4E of the other web extend in the opposite direction and between the sinker bars of, for example, courses 4E and 3E of said other web the sinker bars of two successive courses 1*o* and 2*o* of the first-mentioned web extend in the reverse direction.

It is further to be observed that each web consists of alternating courses of long loops and short loops. Thus in one web short loop courses 3E alternate with long loop courses 4E and in the other web short loop courses 1*o* alternate with long loop courses 2*o*.

The lay-out of the cams, needles and feeders to produce this fabric is shown in Figure 3. In one needle bed 11 such as a cylinder there are short needles 11E alternating with long needles 11*o* in the opposed beds 12 such as a dial. There are short needles 12E alternating with long needles 12*o* in a 1 x 1 sequence, the arrangement being such that the short needles E in one bed are opposite the long needles O in the other. At feeder 1 the long needles 11*o* of one bed and the long needles 12*o* of the other bed are projected to take the thread fed thereat and to draw it into knitted loops. The stitch cams are, however, so arranged that these loops are short loops. The short needles 11E and 12E pass feeder 1 in a retracted inactive position; they also pass feeder 2. At feeder 2 the long needles 11*o* and 12*o* are again projected to take the thread fed thereat and to draw it into stitch loops, but the stitch cams are such that these loops are substantially longer than those drawn at the preceding feeder.

The long needles 10*o* and 12*o* that have been active at feeders 1 and 2 remain inactive at the next two feeders 3 and 4 whereas the short needles 11E and 12E that have been inactive at feeders 1 and 2 are active at feeders 3 and 4. At the feeder 3 the said needles 11E and 12E are projected to take the thread fed thereat and to draw it into a ribbed course of short loops, but at the feeder 4 at which they are also projected to take the fed thread they draw this thread into a course of long loops. Hence in each web not only do long and short courses alternate, but a plurality of courses of one web are interposed between a plurality of courses of the other.

As will readily be understood subsequent to the foregoing example the production of the fabric shown in Figure 1 will present no difficulties, it is merely necessary so to arrange the cams that the needles 10*o* and 12*o* draw short loops at feeders 1 and 3 and (six feeders and six sets of knitting cams being conveniently provided) long loops at feeder 5 while the short needles 11E and 12E draw long loops at feeder 2 and short loops at feeders 4 and 6. The knitting sequence may be modified as follows:—

Course	Needles	Loop-length
1	O	Short.
2	O	Long.
3	E	Long.
4	E	Short.

The invention is not restricted to the usual needle arrangement for interlock, for other arrangements may be adopted and some of them are indicated below.

O O E E O O
. . . . . .
. . . . . .
E E O O E E

O O E O O E
. . . . . .
. . . . . .
E E O E E O

In these arrangements, as in the previous ones, all the needles lettered E knit at one feed and all those lettered O at another and two or more successive feeds may be made to the same set of needles. Furthermore short and long loops may be produced in accordance with any of the previously described sequences or otherwise.

The invention is best carried into effect on a circular independent needle machine and while it may be practiced upon a single feeder machine of this type by providing mechanism for selecting the needles at successive courses and varying their draw to vary the size of the loops it is best carried into effect on a multi-feeder circular knitting machine.

While in this description certain of the loops are referred to as long loops they are desirably of two to three times the length of loops usually formed in similar fabric not incorporating the present invention.

We claim:—

1. A two-web fabric, having the needle wales of one web located in the spaces between the needle wales of the other web, and having alternating long and short loop courses in each web.

2. An interlock fabric, having long and short loops alternating down each wale of each web.

3. An interlock fabric, having regularly spaced short loops and having a plurality of courses of one web interposed between successive courses of the other web.

4. A knitting fabric comprising two plain webs having the stitch wales of one located in the spaces between the stitch wales of the other and united by course-wise threads extending behind at least one wale of one web between successive wales of the other webs, each of which webs includes regularly spaced short stitch loops.

5. An interlock fabric, in which a plurality of courses of one web alternate with a plurality of courses of the other and wherein each web in-

corporates sinuously disposed weft threads that, while not inhibiting all stretch in the direction of the courses, limit the stretch to such an extent that the ends of a broken loop do not pull out under treatment to which the fabric would ordinarily be subjected.

6. An interlock fabric in which a plurality of courses of one web alternate with at least one course of the other web and wherein each web incorporates spaced courses of short loops.

7. An interlock fabric in which two courses of one web alternate with two courses of the other web, and having long and short loops alternating down each wale of each web.

8. An interlock fabric in which two courses of one web alternate with two courses of the other web, and in which each web incorporates spaced courses of short loops.

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