The present invention relates generally to a warp knit pile fabric. While the present invention may be applied to a large variety of fabrics, it is more particularly adapted for use in the manufacture of rugs, mats and if desired, may be employed in the manufacture of bedspreads or any other like articles. The pile which is produced in the present fabric may be in the form of loops so that the fabric produced thereby may be said to imitate terry cloth or the loops may be slurred or cut, in which case the fabric produced may be said to imitate plush or similar materials or may generally be imitative of rug fabrics produced by other weaving and knitting processes.

In the manufacture of the present fabric, a series of separate warp extending parallel lines of chain stitches are formed, each knit of a separate yarn individual to each needle of the knitting machine, to hold together a plurality of weft yarns, each of which extend back and forth in nesting sinusous paths coursewise across the chain stitches of the finished fabric, the said weft yarns being incorporated unknit in the chain stitches and being locked in the fabric thereby. Certain of the weft yarns at the point of reversal of their back and forth path in the fabric are formed into pile loops which extend outwardly from the fabric and form the face thereof, while the other weft yarns, which are not so formed into pile loops, serve to keep the fabric from stretching and from becoming loose or sleazy when the finished fabric is washed or otherwise roughly pulled or handled.

It is an object of this invention to produce a warp knit fabric having a solid foundation or backing therefor lying substantially in a single plane and having pile-like loops extending outwardly therefrom on one face of the fabric, all of the weft yarns forming the said foundation or backing, with certain weft yarns also forming the pile-like loops, the remaining weft yarns, which are not formed into pile loops, serving to maintain said foundation or backing in the form of a solid compact structure.

The construction of the finished fabric, as well as the method of its manufacture, will be more clearly understood from the following description of the process as illustrated by the accompanying drawings.

In the drawings:

Figure 1 illustrates the front face of the warp knit fabric in enlarged diagrammatic detail showing the pile loops;

Figure 2 illustrates the rear face of the fabric shown in Figure 1;

Figure 3 is a sectional view of the fabric taken on lines 3—3 of Figure 1;

Figure 4 is an enlarged diagrammatic detail view of the path of travel of two adjacent weft threads in the finished fabric; and

Figure 5 is a diagrammatic line drawing of the paths of travel of the weft yarn during the knitting operation.

The fabric of the present invention is an improvement over the fabric disclosed in the United States patent to Milton Newman, No. 2,239,469, January 21, 1941. Referring more particularly to Figure 1, which illustrates a section of the fabric in enlarged diagrammatic detail, it will be observed that this fabric of my invention includes a series of separate parallel lines of chain stitches numbered, for example, 5 to 17, inclusive, extending warp-wise of the fabric, each of which is knitted of a separate textile yarn individual to each needle of the knitting machine making the fabric, the said lines of chain stitches incorporating therein in unknit relation a plurality of weft yarns 16, 18, 19, etc., respectively arranged alternately with respect to a plurality of weft yarns 19, 19', 19, etc., the total number of weft yarns being equal to the number of lines of chain stitches, there being a weft yarn for each needle of the knitting machine. The section of fabric here illustrated is shown as having eleven courses of knitting, numbered 20 to 30, inclusive, and it is obvious that the finished fabric may have any desired number of lines of chain stitches and that the number of courses will depend only upon the desired length of the fabric.

Each of the weft yarns extends in a back and forth sinusous path across four adjacent lines of the warp chain stitches. For example, referring to the lines of the chain stitches 5, 6, 7 and 8, as shown in Figure 4, it will be observed that the weft yarn 18 extends back and forth across these four chain stitches in a sinusous path from course to course, being at one limit of its transverse path of travel to the left of chain stitch line 5 in courses 21, 22; 25, 26; and 29, 30 and at the other limit of its transverse travel to the right of chain stitch line 8 in courses 20, 23, 24; and 27, 28. Thus, it will be seen that the weft yarn 18 extends across a pair of adjacent chain stitches in each course of knitting, and that in any two consecutive courses of knitting the weft yarn 18 extends across four adjacent chain
stitches in one direction, while in the adjacent two courses of knitting, the weft yarn 18 extends across the same four lines of chain stitches, but in the opposite direction. This reversal in direction of the path of travel of weft yarn 18 takes place after each two courses of knitting. It will be noted that the chain stitches are knit around the weft threads 18 and 19 and incorporate the latter in the fabric in an unknit condition.

Considering now the path of travel of the weft yarn 18, which alternates with the yarn 10 in the construction of the fabric as partially shown in Figure 4, it will be noted that the path of travel of this yarn 18, with respect to the chain stitches 6, 7, 8 and 9, is similar and parallel to the path of travel of the adjacent weft yarn 18. Thus, while each weft yarn 18, in any given course, extends across a pair of adjacent chain stitches, as for example, chain stitches 5 and 6 in course 21, each weft yarn 18 corresponds. In same course, across a pair of adjacent chain stitches which are laterally offset to the extent of one needle in the given course, the yarn 18, for example, extending across the chain stitches 6 and 7 in the course 21.

Accordingly, it will be noted that for the contiguous pair of weft yarns (e.g., 18 and 19) they are each commonly incorporated or in embroidered by a single chain stitch of the warp line 6 in each of the courses 21, 22, 25, 26, 29, 30, et seq. at the same time that said yarns are similarly commonly incorporated by a single chain stitch of the warp line 6 in each of the courses 20, 23, 24, 27, 28, et seq. Thus, it can be said that in each course of knitting, each weft yarn (e.g., yarn 18) extending across the chain stitches 6 and 7 in the course 21, each weft yarn 18 being commonly incorporated within one of said pairs of chain loops.

At the point where each weft yarn of the group 18, etc., reverses its path of travel, as to the left of chain stitch line 6 and to the right of chain stitch line 8 (see particularly Figure 4), the yarn travels in a short twist path, as for example, in chain stitch line 5, from the stitch 21 to the stitch 22. However, at the point where each weft yarn of the group 18, etc., reverses its path of travel, as to the left of chain stitch line 5 and to the right of chain stitch line 6, the yarn is drawn into pie-loops, as indicated by the numerals 31 and 32, by the knitting machine before resuming its path of travel in the opposite direction. This is most clearly shown in Figure 4 wherein, for example, the weft yarn 18, in reversing its direction at the chain stitch line 6 in course 21, is formed into loop 31 before returning to the next stitch in course 22. In a like manner, in chain stitch line 5 in course 21, the weft yarn 18 is drawn into the plie loop 32 after leaving the stitch in course 23 and before returning to the next stitch in course 24. It will be noted that every other weft yarn, both weftwise and warpswise of the fabric, forms loops which extend outwardly from the fabric, itself, which exhibit the upper face of the fabric. By providing the weft yarns 18 with a certain degree of twist, as is desirable, their free bending loops 31 and 32 will twist together and tend to project outwardly from the fabric's twisted plie loops.

Since each weft yarn 18 is incorporated unknit in the fabric, it will be seen that if the finished fabric could be stretched in a weftwise direction, as in rough handling or in washing, that then the loops 31 and 32 would be pulled out and would become weft yarns of the base fabric to the extent that the fabric would be stretcher the ends of the said loops. To prevent any such stretching of the fabric, in order to maintain the loops 31 and 32 in their fully extended lengths at all times, the weft yarns 18 have been incorporated in the fabric in such a way that at the point of reversal of their yarn path, the yarn is formed into the short bights previously described. Thus, if the fabric is subject to stretching of any kind in a weftwise direction, the force of the stretching will be exerted upon the weft yarns 18 which are laid down as described, so as not to be able to be moved weftwise relative to each set of four chain stitches and consequently the fabric and the loops thereof will resist any stretching. The series of vertically extending warp knit chain stitches will, of course, resist stretching of the fabric in a warpwise direction.

What is claimed as new and useful is:

1. A warp-knitted fabric comprising a series of spaced chain stitches each knit of a separate warp thread and a plurality of weft threads in number to said series of chain stitches and incorporated unknit, each of the weft yarns extending across the said chain stitches in like paths, each weft yarn respectively extending in given course across a pair of adjacent chain stitches with the contiguous weft yarns being interlocked by only one said pair of chain stitches, the weft yarns extending in the opposite direction for two consecutive courses of knitting and reversing their travel and extending in the opposite direction for the next two consecutive courses of knitting, alternate weft yarns at the point of reversal of their yarn travel between the second and third courses of knitting being formed into loops extending from the face of the fabric and the interwoven weft yarns at the point of reversal of their yarn travel being interlocked with the chain stitches between the second and third courses thereof.

2. A warp-knitted fabric comprising a series of spaced chain stitches each knit of a separate warp thread and a plurality of weft yarns in number of said series of chain stitches and incorporated unknit therein, each of the weft yarns extending back and forth across a plurality of said chain stitches throughout said fabric, alternating weft threads at each point of reversal thereof being formed into loops extending outwardly from the face of the fabric, the interwoven weft yarns being incorporated in the chain stitches to prevent movement thereto relative to the chain stitches in a weftwise direction.

3. A warp-knitted fabric comprising a series of spaced chain stitches each knit of a separate warp thread and a plurality of weft yarns in number of said series of chain stitches and incorporated unknit therein, each of the weft yarns extending back and forth across a plurality of said chain stitches in parallel paths, the reversely directed portions of each weft yarn respectively extending across a total of at least four chain stitches in two adjoining courses, each weft yarn in each course being embraced by two chain stitches in that course with the weft yarn immediately adjacent thereto embraced in a single chain stitch of that course, alternate weft yarns being formed into loops extending from the face of the fabric at each point of reversal of their yarn travel, and the interwoven weft yarns being interlocked with the warp chain stitches at each point of reversal of their yarn travel to prevent displacement.
thereof relative to the chain stitches in a weftwise direction.

4. A warp knitted fabric comprising a series of spaced chain stitches each knitted of a separate warp thread and a plurality of weft yarns incorporated unknit in said chain stitches and all of which form a fabric foundation or backing lying substantially in a single plane, certain only of the said weft yarns being formed into loops extending outwardly from the face of the fabric while the remaining weft yarns are incorporated in the fabric to prevent substantial movement thereof relative to the chain stitches in a weftwise direction.

MILTON NEWMAN.