Nov. 28, 1950 W. A. RICE 2,531,718

KNITTED PILE FABRIC

Filed Dec. 22, 1949 2 Sheets-Sheet 1

Fig. 1,

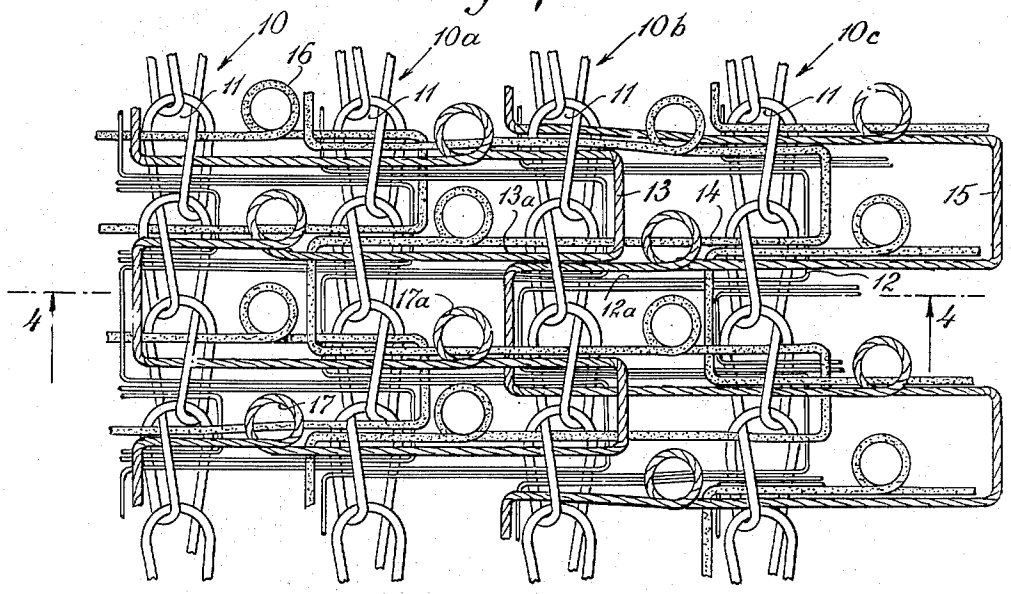

Fig. 2,

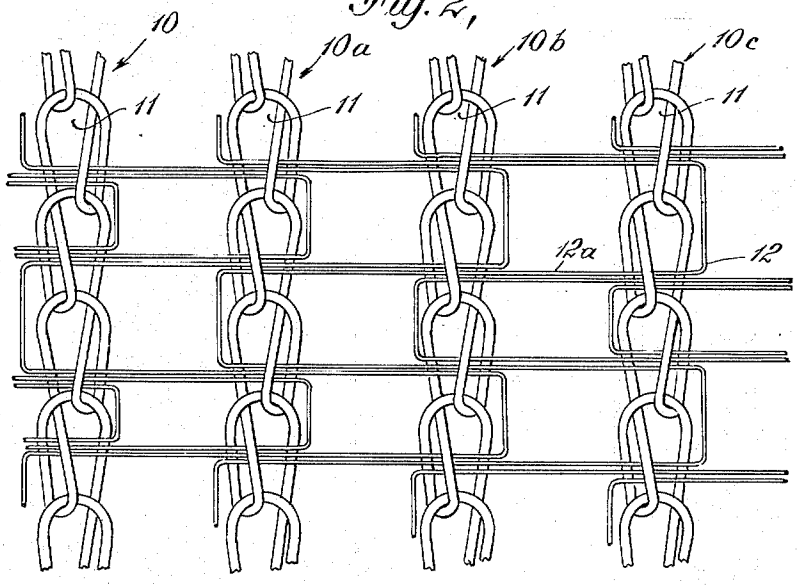

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Fig. 3,

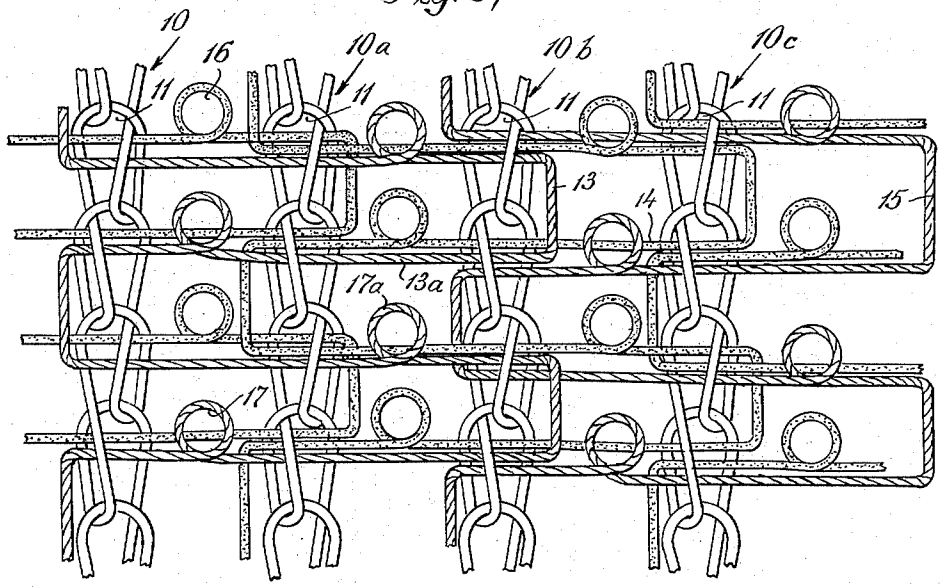
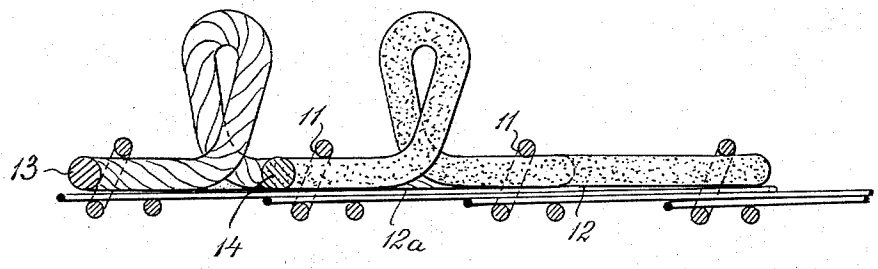


Fig. 4.



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KNITTED PILE FABRIC

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3 Claims. (Cl. 66—191)

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This invention relates to knitted pile fabrics and is concerned more particularly with a novel knitted fabric, which has a heavy dense pile and is suitable for use as a carpet or similar floor covering. The new fabric is superior to prior similar knitted pile fabrics for floor covering purposes, in that the pile is uniform in appearance and devoid of streaks, which frequently occur in the pile of the prior fabrics.

The new fabric is of the warp knitted type and it includes a plurality of warp chains made up of a series of chain stitches aligned in courses extending transversely of the fabric. The warp chains are connected and held in proper spaced relation by stiff weft threads having a regular sinuous form, with each weft thread passing through a plurality of warp chain stitches in each of successive courses and each thread tightly engaging a chain stitch at each point of reversal of the thread. The pile surface of the new fabric is formed of elements made of heavy pile yarns, each of which is of regular sinuous form and connects at least three adjacent warp chains. Each pile yarn passes through stitches in the same course in at least three adjacent warp chains, after which the yarn again reverses direction and returns through the chain stitches in the same warp chains in the next following course. The pile yarns are arranged in overlapping relation with one another as are also the weft threads, so that at least three pile yarns and a plurality of weft threads pass through each warp chain stitch. Between two adjacent warp chains crossed by a stretch of each pile yarn, the yarn is raised out of the backing of the fabric to form an element of the pile surface, and the remainder of the stretch of the yarn lies buried in the backing of the fabric. The pile elements lie in longitudinal rows and the arrangement is such that successive pile elements in each row are made of different yarns. With this construction, streaks in the pile surface, which would be likely to occur, if all of the pile elements in a row were made of the same yarn, are avoided.

For a better understanding of the invention, reference may be made to the accompanying drawings, in which

Fig. 1 is an expanded plan view of the new fabric:

Fig. 2 is a view similar to Fig. 1 with the pile yarns omitted;

Fig. 3 is a view similar to Fig. 1 with the weft threads omitted; and

Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

The fabric in the form illustrated comprises a plurality of warp chains 10, 10*a*, 10*b*, 10*c*, each made up of a series of chain stitches 11. The warp chains, which are preferably made of cotton yarns, lie close together and the stitches of the several warp chains are aligned in courses running transversely of the fabric.

The warp chains are connected and held in

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proper spaced relation by weft threads 12, which are preferably stiff and made of jute or paper. Each weft thread is of regular sinuous form and is thus made up of a succession of loops opening alternately toward opposite sides of the fabric. Each weft thread is laid in the fabric to connect together a plurality of warp chains and, in the construction shown, each lateral stretch 12*a* of a weft thread passes through stitches in three warp chains, the stitches lying in the same course, then reverses direction and passes through stitches in three warp chains, the stitches lying in the next course, after which the weft thread again reverses direction. At each point of reversal of a weft thread, it tightly engages a chain stitch and is tightly engaged thereby. The loops of laterally adjacent weft threads overlap, so that each warp chain is connected in each course to the next adjacent warp chains at either side thereof by two weft threads and three weft threads pass through each chain stitch. If desired, each stretch of each weft thread may cross more than three warp chains, in which event each warp chain will be connected to those on either side of it by more than two weft threads and more than three weft threads will pass through each chain stitch.

The pile of the fabric is provided by heavy multiply yarns 13, 14, 15, and 16, which are preferably of wool and ordinarily of at least 3-ply construction. Each pile yarn is of regular sinuous form and is made up of a series of loops opening alternately toward opposite sides of the fabric. Each pile yarn crosses and connects at least three warp chains and, in the construction shown, each pile yarn passes through three warp chain stitches in the same course, reverses direction and passes through three warp chain stitches in the next course, and then again reverses direction. At each point of reversal of a pile yarn, the yarn tightly engages and is tightly held by a warp chain stitch. The loops of laterally adjacent pile yarns overlap, so that stretches of at least three different pile yarns pass through each warp chain stitch.

In each lateral stretch of each pile yarn, for example, yarn 13, a portion of the yarn is raised out of the fabric to form a pile element, here shown as a loop 17, and the remainder 13*a* of the pile yarn in that stretch lies buried within the backing of the fabric. The portions of the pile yarns raised to form pile elements in successive stretches of the yarn are offset, so that, the pile yarn 13, for example, is raised in one stretch thereof to form the pile element 17 between warp chains 10 and 10*a*, while, in the next stretch of the yarn, the raised portion of the yarn forms the pile element 17*a* lying between warp chains 10*a* and 10*b*.

With the pile arrangement described, the pile elements lie in longitudinal rows opposite the spaces between adjacent warp chains and succes-

sive elements in a row are made of different yarns. In prior knitted pile fabrics, in which each pile yarn connects only a pair of adjacent warp chains and has a portion raised in each stretch thereof to form a pile element between the two warp chains, all the pile elements in each row lengthwise of the fabric are made of a single yarn only. The pile yarns used in the production of the fabric are likely to vary slightly in shade, with a result that the pile elements in one row may differ slightly in appearance from those in adjacent rows. This produces visible streaks in the pile, which are objectionable. In the present fabric, in which successive pile elements in a given row are made of different yarns, variations in shade of the different yarns blend together in the pile surface and a streaked appearance is avoided.

In all forms of the fabric, the weft threads are inserted under tension and at least three weft threads pass through each warp chain stitch. At least three pile yarns also pass through each warp chain stitch and the threads and yarns are tightly gripped and bound in place by the stitches. The warp chains lie close together and are held against transverse shifting by the weft threads. As the spacing between the weft chains is small and the pile yarns used are bulky, the portions of the pile yarns, which are raised between adjacent chains, are tightly held in position.

The new fabric can be produced on a knitting machine equipped with pile forming members, about which the pile yarns are passed during the knitting operation to form loops, and, if the fabric is to have a loop pile, the pile forming members are withdrawn from the loops without action thereon. If the fabric is to be made with a tufted pile, the pile forming members may be provided with knives, which sever the loops and convert them into tufts. By forming the pile in the manner described, the pile loops or tufts are of uniform height. The fabric can be produced with a heavy dense pile comparable in all respects to that of woven pile fabrics and, since the knitting operation can be carried on more rapidly than weaving, the fabric can be produced at lower cost than similar woven pile fabrics.

When the fabric is to be employed for floor covering use, the back may be stiffened by sizing it with starch compositions, resins, latex, etc., or by securing such materials as burlap, sponge or foam rubber, etc., to the back surface by an adhesive.

I claim:

1. A knitted pile fabric which comprises a plurality of spaced parallel warp chains, each made up of a series of chain stitches with the stitches of the several chains lying transversely aligned in courses, a plurality of weft threads, each thread being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of a plurality of adjacent warp chains, each thread tightly engaging a chain stitch at each point of reversal of the thread and each warp chain being connected to chains on either side thereof by a plurality of weft threads in each course, and a plurality of heavy pile yarns, each yarn being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of at least three adjacent warp chains and tightly engaging a stitch at each point of reversal of the yarn, each warp chain being connected to chains on either side thereof by at least two pile yarns in each course and each yarn having a single portion in each stretch thereof raised out of the fabric between a pair of adjacent warp chains to form a pile element, the remainder of each yarn in each stretch being embedded in the body of the fabric, the pile elements lying in longitudinal rows with successive elements in each row formed of different yarns.

2. A knitted pile fabric which comprises a plurality of spaced parallel warp chains, each made up of a series of chain stitches with the stitches of the several chains lying transversely aligned in courses, a plurality of weft threads, each thread being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of at least three adjacent warp chains, each thread tightly engaging a chain stitch at each point of reversal of the thread and each warp chain being connected to chains on either side thereof by at least two weft threads in each course, and a plurality of heavy pile yarns, each yarn being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of at least three adjacent warp chains and tightly engaging a stitch at each point of reversal of the yarn, each warp chain being connected to chains on either side thereof by at least two pile yarns in each course and each yarn having a single portion in each stretch thereof raised out of the fabric between a pair of adjacent warp chains to form a pile element, the remainder of each yarn in each stretch being embedded in the body of the fabric, the pile elements lying in longitudinal rows with successive elements in each row formed of different yarns.

3. A knitted pile fabric which comprises a plurality of spaced parallel warp chains, each made up of a series of chain stitches with the stitches of the several chains lying transversely aligned in courses, a plurality of stiff weft threads, each thread being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of three adjacent warp chains, each thread tightly engaging a chain stitch at each point of reversal of the thread and each warp chain being connected to chains on either side thereof by at least two weft threads in each course, and a plurality of heavy multiply wool pile yarns, each yarn being of regular sinuous form with successive stretches thereof passing in successive courses through chain stitches of at least three adjacent warp chains and tightly engaging a stitch at each point of reversal of the yarn, each warp chain being connected to chains on either side thereof by at least two pile yarns in each course and each yarn having a single portion in each stretch thereof raised out of the fabric between a pair of adjacent warp chains to form a pile element, the raised portions of each pile yarn in successive stretches being offset laterally from one another and the remainder of each pile yarn in each stretch lying embedded in the fabric, the pile elements lying in longitudinal rows with successive elements in each row formed of different yarns.

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The following references are of record in the file of this patent:

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