

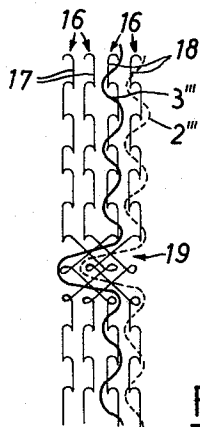
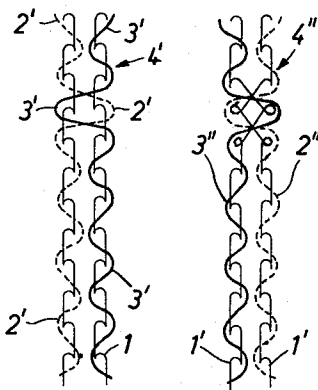
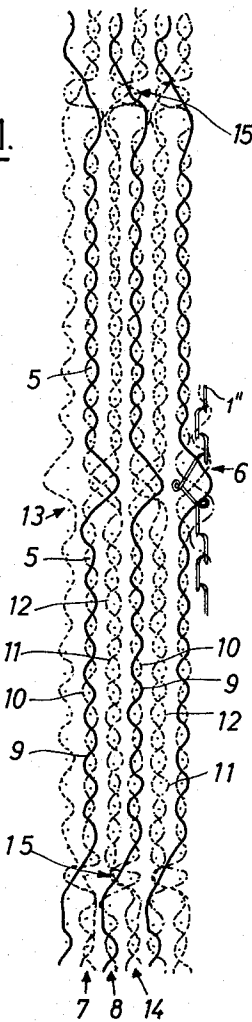
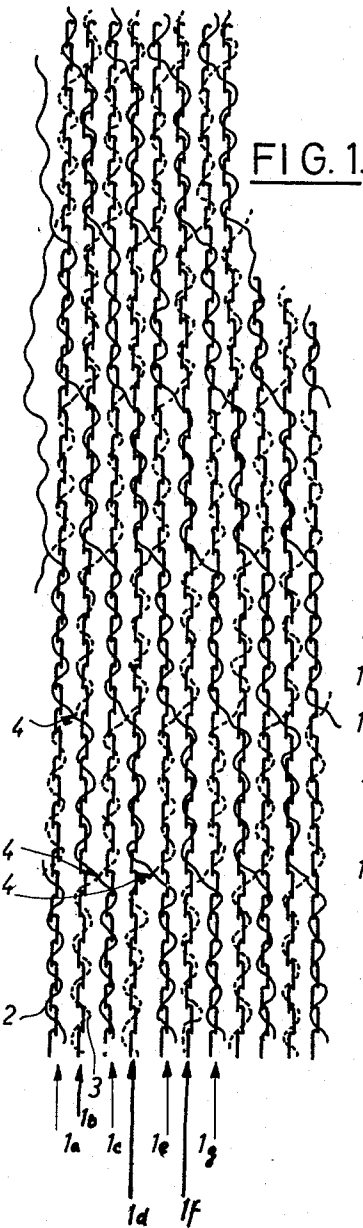
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NET WITHOUT KNOTS

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2,996,905

NET WITHOUT KNOTS

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The present invention relates to nets without knots, which are produced on a warp knitting machine and which may be used as fishing nets, camouflage covers, shopping bags or for any other purpose.

Heretofore, fishing nets have been produced almost exclusively by knotting the net cords together. However, the knots offer considerable resistance to water flow. Furthermore, the yarns are compressed in the areas of the knots so that the knots often break or tear under a sudden load, causing damage to the net and loss of fish caught in the net and slipping through its broken parts.

More recently, nets without knots have been manufactured, wherein the multi-ply yarns of the net are intertwined where the net loops cross. This net structure has the disadvantage that it is impossible to maintain the size of the loops because a unilateral load on the loops tends to move the crossing points of the yarns so that some of the loops will become big enough to let some fish slip through.

Certain curtain and lace goods have been produced with tied-in warp threads which diagonally cross over between two adjacent stitches. Such goods have parallel rows of square or rectangular openings which are aligned coursewise, the sides of the openings in the direction of the filling being formed by the stitch yarns and the sides of the openings in the direction of the warp being formed by the warp threads. The warp threads are held loosely, i.e. practically without tension, in the fabric to form the desired openings therein and they cannot be used to support or transmit any force, which is not needed in such goods. Furthermore, the spacing of the stitch yarns must be set on the knitting machine so that the fabric width cannot exceed the width of the machine.

In the knitted structure of the present invention, the weft threads are interlaced under tension with the warp chain threads with which they form the sides or cords of the net meshes or openings. At regular intervals, the weft threads are crossed over from one warp chain thread to the adjacent thread, the cross-over points between net cords being staggered in the direction of the weft. When the net is extended, the cords of the net form meshes in the form of diamonds, each cord bounding a net mesh containing a warp chain thread and a tensioned weft thread interlaced therewith. Contrary to the tensioned condition of the weft threads, the loops of the warp chain threads are loose. In this manner, a load is carried by the practically straight weft threads in any direction of the net without requiring any knots or loops, which considerably increases the load which the net may carry. The cross-over points have no knots, yet they cannot be displaced which is particularly important for fish nets. Finally, a warp chain thread, i.e. a net cord, can be worked on each needle, for instance of a raschel machine, so that the width of the net may be several times the width of the machine.

If it is desired to produce a particularly strong net adapted for heavy loads, at least two weft threads may be carried along on each warp chain thread, the one being crossed over diagonally to a loop of the next course of the adjacent warp chain while the other is led over to the adjacent stitch or loop in the same course. Alternatively, both weft threads associated with two adjacent warp chains may be crossed over diagonally at one

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crossing point, and passed coursewise to the adjoining loop at the next crossing point. Any variation of this pattern is also possible. Finally, the net may be reinforced by crossing over two adjacent warp chain threads over two courses, for instance, the crossing of the weft threads being effected in one or the other of the indicated manners.

The above and other objects and features of this invention will be more fully explained in conjunction with the following detailed description of certain embodiments thereof, taken with the accompanying drawing wherein

FIG. 1 illustrates a diagrammatic fragmentary view of a net according to one embodiment;

FIG. 2 shows another embodiment;

FIG. 3 illustrates yet another embodiment;

FIG. 4 is a fragmentary view of a fishing net according to another embodiment of the invention; and

FIG. 5 illustrates still another embodiment.

In the embodiments of FIGS. 1 to 4, the yarns which bound the net meshes or openings are single-needle warp chain threads. In the embodiments of FIGS. 1 to 3, one weft thread or connecting thread is interlaced with each warp chain thread.

Referring now to FIG. 1, weft thread 2 is shown to be first associated with a warp chain thread 1a while weft thread 3 is associated with another warp chain thread 1b. In this embodiment, the "knots" of the net are formed by diagonally leading the weft threads 2 and 3 from their original warp chain threads in the opposite coursewise direction to a loop in the next course of an adjacent warp chain thread, as shown at 4 where the diagonally led weft threads cross each other to form the "knots" of the net. The crossing points 4 between adjacent net cords are staggered weftwise from warp chain thread to warp chain thread 1a to 1g.

In the embodiment of FIG. 2, the weft thread 2' of two warp chains 1 are shown. The left warp chain is led to the adjacent stitch of the right warp chain in the same course, and looped thereover, whereupon it is returned in the next course to its original warp chain. The same procedure is followed with weft thread 3' so that the two weft threads cross at 4'.

To reinforce the net "knots," the embodiment of FIG. 3 provides for the warp chain threads 1' themselves to be crossed over at 4'', two adjacent loops of the same course being crossed in the manner of a two-ply cord or a double tricot knot. The crossing of the weft threads 2'' and 3'' is shown to be fashioned after that of FIG. 2. Obviously, it could also follow the pattern of FIG. 1 or, if desired alternately the patterns of FIGS. 1 and 2.

While FIGS. 1-3 diagrammatically illustrate the "knot" formation according to certain embodiments of the invention FIG. 4 is a fragmentary view of a fishing net constructed in accordance with one embodiment of the invention. To simplify the drawing, the warp chain threads are indicated only by points 5, 7, 8, 14 which illustrate the needles, only one portion of the figure (at the right) showing a warp chain thread 1'' so that the crossing of two warp chain threads according to the embodiment of FIG. 3 may be illustrated at 6.

Each warp chain thread 7 and 8 has two weft threads 9, 10 and 11, 12 interlaced therewith. The threads 7 and 8 cross at 13 whereat the weft threads 10 and 11 are diagonally led over to the adjacent warp chain thread while the weft threads 9 and 12 are led over coursewise to the adjacent stitch, as in the embodiment of FIG. 2. The crossover points 15 of the threads 8 and 14 are staggered weftwise in relation to the cross-over point 13 of the threads 7 and 8. The weft threads 9 and 12 are led diagonally at points 15 while the threads 10 and 11 are led over coursewise to the adjacent stitch, i.e. the reverse of the arrangement at point 13. If, desired, the

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warp chain threads may also be crossed over at all or some of the weft thread cross-over points, as shown at 6. The described rhythm of the cross-over points may be indefinitely repeated or it can be changed in any desired manner.

In the embodiment of FIG. 5, each net cord 16 consists of two warp chain threads 17, 18, of which each is interlaced with a weft thread 2'', 3''. In the illustrated embodiment, the weft threads are led over in the same course to the adjacent loops of the next cord at 19, and the pairs of the warp chain threads are also crossed over in the manner of FIG. 3.

What is claimed is:

1. A warp knitted open mesh net, comprising a plurality of elongated juxtaposed chains of warp thread loops, the loops of adjacent chains being transversely aligned to form successive courses of loops, two adjacent ones of said chains constituting a pair of chains, whereby each chain is a member of two adjacent pairs, each chain including at least one warp thread and at least one connecting thread interlaced under tension with said warp thread, the respective connecting threads of each member of a pair passing to the respective other member of the pair at a cross-over point intermediate the members so as to connect the members at said point, a plurality of cross-over points between the members of each pair being successively spaced from each other by a plurality of courses, and the cross-over points between adjacent pairs being staggered by a plurality of courses.

2. A net as set forth in claim 1, wherein the respective warp threads of the members of one of said pairs pass from one to the respective other member of the pair at one of said cross-over points.

3. A net as set forth in claim 2, wherein the last

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mentioned warp threads pass to the respective other member in the same course, and pass back to the one member in the next course.

4. A net as set forth in claim 1, wherein the connecting threads pass diagonally from one course in one of said members to the next course in the other member.

5. A net as set forth in claim 1, wherein the connecting threads pass from one to the other member in the same course.

6. A net as set forth in claim 1, wherein two connecting threads are interlaced with said warp thread, one of the connecting threads passing diagonally from one course in one of said members to the next course in the other member, and, at the same crossover point, the other one of the connecting threads passing from one to the other member in the same course.

7. A net as set forth in claim 1, wherein two connecting threads are interlaced with said warp thread, one of the connecting threads passing diagonally from one course in one of said members to the next course in the other member at one cross-over point, and the other one of the connecting threads passing from one to the other member in the same course at another cross-over point spaced from said one cross-over point.

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