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WOVEN ELASTIC FABRIC

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Fig. 1

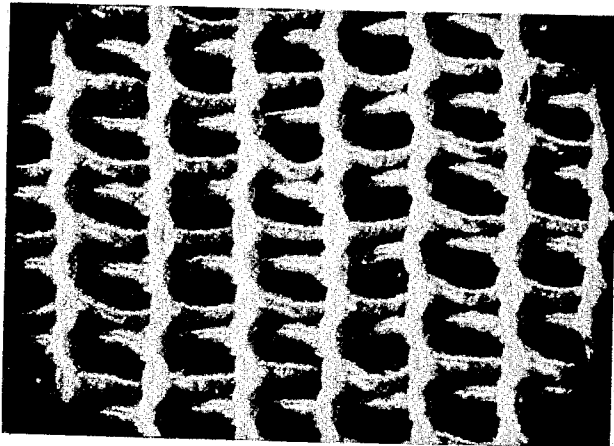
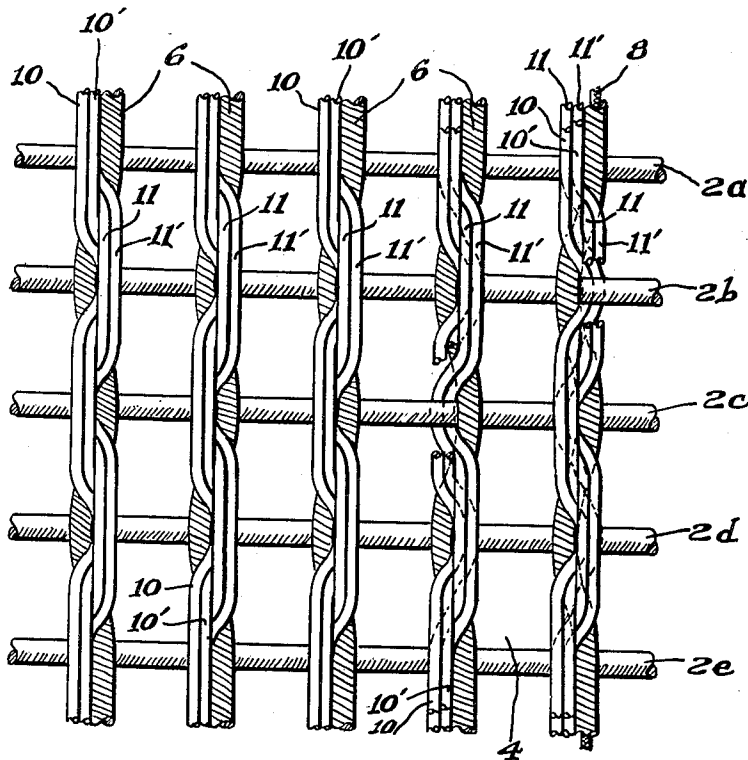


Fig. 2

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WOVEN ELASTIC FABRIC

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The present invention relates to elastic fabrics and more particularly to a woven elastic fabric of open mesh construction characterized by its permeability and its resistance to snagging.

Woven elastic fabrics of many different kinds of weaves are well known in the art but a common failing of all such fabrics is that they are either so densely woven and hence so impermeable to moisture as to be uncomfortable to the wearer when fabricated into garments or, if they are of open weave, are so subject to shifting and sliding of the warp and weft threads with respect to each other that their durability is excessively poor.

It is accordingly an object of the present invention to provide an elastic fabric construction which is relatively free from the foregoing objection. A further object is to provide a woven elastic fabric combination which may be so woven as to have relatively large open meshes when free of tension and yet maintain its structural integrity under conditions of severe usage.

In accordance with the invention my fabric is comprised of elastic or non-elastic spaced weft strands, a series of spaced elastic warp strands overlying the weft strands on one face thereof and not interwoven therewith, and a pair of binder warps associated with each of the elastic warps to bind it to the wefts.

It is a feature of my invention that the elastic warp strands in the completed fabric are secured at each weft crossing by the binding action between the elastic warps, the wefts and the associated pair of binder warps. Another feature of my invention is that each warp of the said pair of binder warps overlies the elastic warp strand on its face opposite the wefts and that one warp of the pair is caught under alternate wefts on the same side of the elastic warp and crosses its associated elastic warp strand twice between said alternate wefts, and the other warp of the pair is caught under the wefts intermediate the alternate wefts under which the other warp of the pair is caught, and at the opposite side of the elastic warp, and, like the other binder warp, crosses its associated elastic warp strand twice between said alternate wefts. The two warps of the pair of binder warps cross each other between successive picks and the elastic warp strand crosses both the warps of the associated pair between successive picks.

An illustrative embodiment of the invention is shown in the accompanying drawing, wherein,

Fig. 1 is a schematic plan view of the fabric, partly broken away; and,

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Fig. 2 is a view on an enlarged scale of the fabric when free from tension.

Referring to Fig. 1 of the drawing, the weft strands are shown at 2a, 2b, 2c, 2d and 2e and in the completed fabric are disposed in spaced relationship to provide relatively large openings 4 between them. The wefts 2 may be elastic strands or threads of any conventional kind or may be ordinary non-elastic textile yarns or threads, depending upon whether it is desired that the fabric be a one-way stretch fabric or a two-way stretch fabric, as is well known in the art. Overlying the weft strands 2 are the elastic warp strands 6, disposed entirely on one face of the weft strands and not interwoven therewith. These elastic warp strands may be of any usual construction, for example, they may be formed in the customary way from a core 8 of solid rubber provided with a helical wrapping of silk, rayon, cotton or other suitable textile material. The particular construction of the warp and weft strands themselves forms no part of my invention and accordingly will not be described in detail.

The elastic warp strands 6 are bound down to the weft strands 2 by binder warps arranged in pairs, with one pair associated with each elastic warp strand. The binder warps of a pair are cross-woven with each other and with their associated elastic warp strand and are interwoven with the weft strands. In the particular fabric of Fig. 1, one binder warp is made up from two strands 10, 10' and the other is made up of two strands 11, 11'. Each binder warp may comprise a single strand or more than two strands but I prefer that each consist of either one or two strands. As used herein, the term "pair of binder warps" includes warps composed of one or more individual strands.

As is shown particularly in Fig. 1, the binder warps are symmetrically disposed with respect to each other and with respect to the associated elastic warp strand 6. One binder warp is woven under alternate weft strands on one side of the elastic warp strand and over the intermediate weft strands, and the other binder warp is woven under these intermediate weft strands on the other side of the elastic warp strand and over the alternate weft strands. Thus the binder warp comprising the threads 10, 10' passes over the weft 2a, crosses over the elastic warp strand between wefts 2a and 2b, is caught under weft 2b on the right side of the elastic warp strand 6, crosses over the elastic warp strand between wefts 2b and 2c, passes over weft 2c, again crosses the

elastic warp strand, passes under weft 2d and after crossing the warp strand again, passes over weft 2e. Similarly, the binder warp composed of strands 11, 11' passes under weft 2a on the left side of the elastic warp, crosses over the elastic warp, passes over weft 2b, crosses the elastic warp, passes under weft 2c, crosses the elastic warp, passes over weft 2d, crosses the elastic warp and passes under weft 2e. The elastic warp strand 6 crosses with both warps of the pair of binder warps between successive picks. Between the wefts the binder warps 10, 10' and 11, 11' cross each other so that the interweaving of one of them with a weft constrains the other to lie on the same side of the elastic warp strand at that weft.

In the fabric of Fig. 1 the binder warps are positioned on the same side of all of the elastic warp strands along a given weft. Thus, for example, the binder warps 10, 10' and 11, 11' are always to the left of the elastic warp strands along weft 2c. However, it is within the invention to position the binder warps on one side of alternate elastic warp strands and on the opposite side of the intermediate elastic warp strands.

I prefer that the binder warps be of a diameter substantially less than the diameter of the associated elastic warp strand so that the binder warps entwine about the elastic warp strand to provide a relatively long extent of frictional engagement between them at the points of intersection with the wefts. The weft strands and the elastic warp strands may be of about the same size or the weft strands may be somewhat smaller than the elastic warp strands, desirably so if the weft strands are non-elastic.

The spacing between adjacent elastic warp strands 6 is such, with respect to the diameter of these strands, as to leave relatively large open spaces between each elastic warp strand and the next adjacent elastic warp strand, as is indicated at 4 in Fig. 1.

My elastic fabric may be woven by procedures well known in the art, for example, each elastic warp strand 6 may pass through the same dent with its two or more associated binder warps. I prefer to perform the weaving by use of a doup heddle and to pass the elastic warp strand 6 through the eye of the doup. A slotted doup conveniently may be used.

I carry out the weaving with the elastic warp strand 6 under enough tension to stretch it beyond its normal, relaxed, length but not under sufficient tension, with respect to the other adjustments of the loom, as to cause the wefts to be drawn closely together when the finished fabric is relieved of weaving tension. The binder warps during weaving are under only a normal warp tension, insufficient to extend them significantly beyond their normal relaxed length.

As the finished fabric comes from the loom and is relieved of the tension in the elastic warp strands 6, these strands contract, causing the associated binder warps to "lock" the elastic warp strand to the weft strand at each crossing, as appears in Fig. 2, thereby securing the warps against sidewise displacement with respect to the wefts.

Fabrics of excellent durability and snag resistance have been made in accordance with my invention with the areas of the open spaces constituting 50% or more of the area of the fabric.

I claim:

1. A woven elastic fabric woven under warp tension comprising spaced weft strands, spaced

sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between successive picks, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over the intermediate weft strands on the other side of the associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand and over said alternate weft strands on said one side, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent weft strands, and said binder warps crossing each other between every two adjacent weft strands, whereby the elastic warp strands when relaxed of weaving tension contract and coact with their associated binder warps at the weft crossings to lock the elastic warp strands against displacement with respect to the weft strands.

2. A woven elastic fabric woven under warp tension comprising spaced weft strands, spaced sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between successive picks, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over the intermediate weft strands on the other side of the associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand, and over said alternate weft strands on said one side, each of said binder warps comprising a plurality of strands, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent weft strands, and said binder warps crossing each other between every two adjacent weft strands, whereby the elastic warp strands when contracted upon relaxation of weaving tension coact with their associated binder warps at the weft crossings to lock the elastic warp strands against displacement with respect to the weft strands.

3. A woven elastic fabric woven under warp tension comprising spaced elastic weft strands, spaced sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between every two adjacent weft strands, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over the intermediate weft strands on the other side of the

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associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand and over said alternate weft strands on said one side, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent weft strands, and said binder warps crossing each other between every two adjacent weft strands, whereby the elastic warp strands when contracted upon relaxation of weaving tension coact with their associated binder warps at the weft crossings to secure the elastic warp strands against displacement with respect to the weft strands.

4. A woven elastic fabric woven under warp tension comprising spaced weft strands, spaced sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of elastic binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between every two adjacent wefts, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over the intermediate weft strands on the other side of the associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand and over said alternate weft strands on said one side, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent successive weft strands, and said binder warps crossing each other between every two adjacent successive weft strands, whereby the elastic warp strands when contracted upon relaxation of weaving tension coact with their associated binder warps at the weft crossings to secure the elastic warp strands against displacement with respect to the weft strands.

5. A woven elastic fabric woven under warp tension comprising spaced elastic weft strands, spaced sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of elastic binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between every two adjacent wefts, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over

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the intermediate weft strands on the other side of the associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand and over said alternate weft strands on said one side, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent weft strands, and said binder warps crossing each other between every two adjacent weft strands, whereby the elastic warp strands when contracted upon relaxation of weaving tension coact with their associated binder warps at the weft crossings to lock the elastic warp strands against displacement with respect to the weft strands.

6. A woven elastic fabric woven under warp tension comprising spaced weft strands, spaced sinuous elastic warp strands crossing said weft strands entirely on one face of the weft strands without interweaving therewith, and a pair of binder warps associated with each elastic warp strand and binding it to the weft strands, the binder warps of a pair being of smaller diameter than said elastic warp strands, being symmetrically disposed with respect to each other and to the associated elastic warp strand, and crossing their associated elastic warp strand on its face opposite said weft strands between every two adjacent wefts, one binder warp of a pair passing under alternate weft strands on one side of the associated elastic warp strand and over the intermediate weft strands on the other side of the associated elastic warp strand, and the other binder warp of the pair passing under said intermediate weft strands on said other side of the associated elastic warp strand and over said alternate weft strands on said one side, said elastic warp strand thus crossing both of its associated binder warps between every two adjacent weft strands, and said binder warps crossing each other between every two adjacent weft strands, whereby the elastic warp strands when contracted upon relaxation of weaving tension coact with their associated binder warps at the weft crossings to lock the elastic warp strands against sidewise displacement with respect to the weft strands.

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