March 9, 1965 F. WEIDHAAS 3,172,430

ELASTIC FABRIC DESIGN

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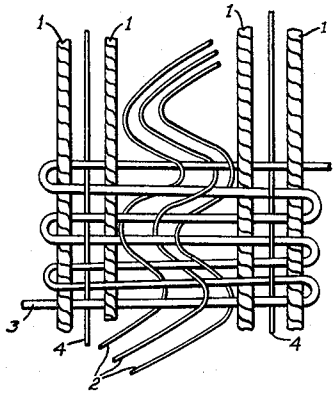

FIG. 3

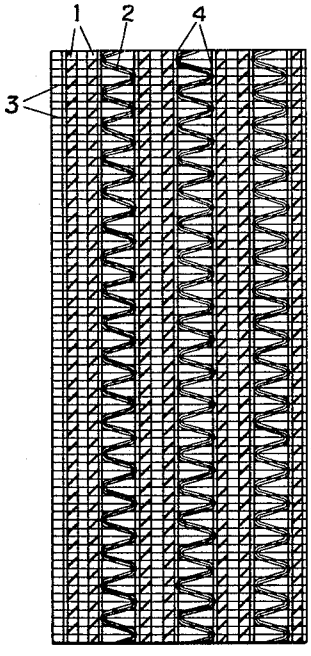

FIG. 1

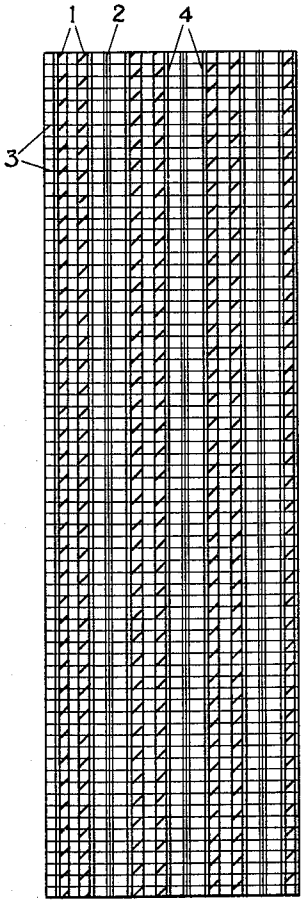

FIG. 2

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ELASTIC FABRIC DESIGN

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This invention relates to a decorative webbing of elastic material and to a process of weaving it.

In the past various webbings of elastic material, in which the elastic threads are normally part of the warp threads, have been used extensively for providing elastic inserts for garments or whole garments. It is known that a striped effect can be obtained by arranging a number of covered elastic warp threads bunched together passing through a single reed or dent with spaces between these bunches so that a corded or striped fabric results when the fabric is woven in the usual manner with relatively fine textile threads in the filling. Such a fabric has a number of advantages, notably, porosity between the multiple elastic webbing thread bunches and also to some extent produces a fabric of enhanced appearance. It is with an improved fabric of this type that the present invention deals.

If the spacing between the bunched covered elastic warped threads is occupied only by fine filling threads the physical properties of porosity are obtained but the appearance is not of the best and since there are no warp threads in the spaces they constitute points of weakness as they have only fine filling threads. It has been proposed in the past to stretch the elastic warp threads and the others are kept taut. One or more textile threads of much smaller width than the bunches of elastic threads are introduced into the spaces. When the fabric is woven and is allowed to come back to its unstretched length the textile threads between the elastic threads do, in fact, reinforce the filling threads in the spaces without destroying porosity. But they bunch at random and can produce an unattractive hand and appearance. Since the textile threads can bend easily in all directions, many of them bunch up above the surface of the fabric as a whole and these of course not only produce an undesired hand but can be caught for example by hooks or other fastenings and result in tearing or runs.

The present invention utilizes warp threads of spaced bunches of elastic threads separated from each other by considerable distance, just as in the fabrics produced before. However, instead of warp threads of ordinary textile fibers between the successive elastic thread portions of the warp there is provided a plurality of very stiff and springy but fine monofilament threads particularly of polyolefins such as polypropylene, nylon and the like. These warp threads are usually multiple, that is to say a number of individual monofilament threads arranged side by side and close together passing through a single space in the reed. The fabric is woven as before with the elastic threads in a stretched condition. The polypropylene threads are attached first to elastic threads on one side and then in another pick to the threads on the other side. Now however, when the fabric is permitted to return to its unstretched length, the springy but fine monofilament warp threads form a sinuous thread which curves from side to side but does not project in loops above or below the surface of the fabric. Four important advantages result. First, all of the support given to the filling threads in the spaces between elastic threads is retained with full porosity, second there are no projecting loops above or below the surface, thirdly the sinuous curve produces a very pleasing appearance. Finally, the fabric has high transverse stability even after repeated washings. All of these advantages are obtained

at the same time with the same operation. As a result there is no increase in weaving costs and the improved and more attractive fabric is produced without any disadvantages.

The nature of the filling thread is less limited by it preferably should be monofilament or at least a thread which has a very smooth and slippery surface so that when the fabric, after having been woven in its stretched condition is allowed to relax, the polypropylene or other warp threads in the spaces between elastic threads can be slipped easily sideways over the smooth and slippery filling threads. Any smooth, stiff filling threads may be used but threads having a very rough surface such as wool threads are in general not suitable. It is also desirable, although not absolutely essential, that the filling threads be comparatively coarse, at least compared to the monofilament warp threads in each space. It should not be thought however that the filling threads are extremely critical. They can vary in their nature and in their diameter over considerable ranges. The above statements are made merely to point out that if sufficiently extreme thread sizes are chosen the present invention will not produce its best results. This invention is directed to a practical art and a practical product and the skilled weaver is given a very wide range of choice in filling threads and monofilament warp threads. No extremely critical control is needed but when a fabric is planned reasonably skilled intelligence should be used to proportion the thread diameters so that the improved sinuous monofilament warped thread pattern results when the fabric is relaxed.

Reference has been made above to polypropylene as the preferred monofilament yarn for the warp. This does in fact constitute the most desirable material however the invention is not limited thereto and other monofilament materials of similar characteristics may be used. For example, polyethylene. It is also possible in some cases to use monofilament nylon or other monofilament yarns which have the desired stiffness. However the polyolefins and particularly polypropylene, are moderate in cost, have a very desirable sheen which produces an attractive fabric and coil themselves easily and uniformly into the desired sinuous curves when the fabric relaxes.

The elastic warp threads of the present invention may be of any suitable type. For example, covered rubber or spandex threads may be used, multifilament stretch nylon and the like. These are all common materials, their properties in elastic fabric are known and it is an advantage of the present invention that any of the known forms of elastic warp threads may be used.

The invention will be described in greater detail in conjunction with the following examples which describe typical elastic fabrics and in the drawings in which:

FIG. 1 is an elevation of a narrow elastic woven fabric in relaxed condition;

FIG. 2 is a similar view of elastic in the stretched condition;

FIG. 3 is a detailed view showing the position of the filling thread in the fabric.

Example 1

A web is prepared on a loom with 22 dents in the reed to form 21 spaces, 9 spaces contain the elastic warp threads of covered rubber or spandex together with some ordinary textile warp threads such as cotton, rayon, etc. and 12 spaces in between contain one or more monofilament polypropylene threads parallel to the warp threads. The warp is shown in FIG. 2 with elastic warp threads stretched to a predetermined, but substantial, limit and the polypropylene monofilament threads, which are substantially smooth, are under sufficient tension to keep them straight. The webbing is then woven con-

ventionally, preferably using fine polypropylene monofilament filling threads. It will be noted that 90% of the mass of the warp material is in 43% of the reed spaces and the monofilament polypropylene which constitutes only 10% of the warp is contained in 57% of the reed spaces. The monofilament polypropylene threads are therefore spaced a very substantial distance from the successive elastic threads.

After weaving is complete the fabric appears as shown in FIG. 2 of the drawings in which the elastic threads are shown at 1 the straight polypropylene warp threads at 2 and the polypropylene filling threads at 3.

In addition to the polypropylene warp threads there are also a few ordinary textile threads immediately adjacent the elastic threads. These are shown at 4. Only two are shown in order to keep the drawings clear but more than two may sometimes be present. These textile threads are, of course, the same length as the polypropylene warp threads that is to say when the weaving takes place they too are taut.

After weaving the fabric is allowed to relax and now assumes the form shown in FIG. 1. The same elements being designated by the same reference numerals. It will be noted that a polypropylene warp thread 2 is now distributed in a sinuous path which is parallel to the plane of the fabric and does not protrude above its surface.

Example 2

A narrow web is prepared with relatively wide zones of elastic threads and only two spaces in which polypropylene threads are present. In this case 92.2% of the warp material is contained in 60% of the reed spaces and 7.8% of the material, the monofilament polypropylene warp threads, in 40% of the reed spaces.

After the fabric is relaxed a pattern is produced in which spaces between the elastic threads are wider and the sinuous curve of the polypropylene warp threads is also wider.

I claim:

1. An elastic fabric comprising,
   (*a*) relatively widely spaced elastic warp thread elements having at least one elastic thread each,
   (*b*) a warp element of at least one springy, smooth monofilament warp thread which is substantially straight before weaving, the monofilament thread being between the elastic threads, said thread in the relaxed fabric condition following a sinuous path substantially in the plane of the fabric,
   (*c*) smooth surfaced filling threads.

2. A fabric according to claim 1 in which the sinuous monofilament threads are polypropylene and the filling threads of the fabric are monofilament threads.

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