April 9, 1968 R. E. BELLMORE 3,376,904

NARROW FABRIC WITH LATERAL DIMENSIONAL STABILITY

Filed May 23, 1966 2 Sheets-Sheet 1

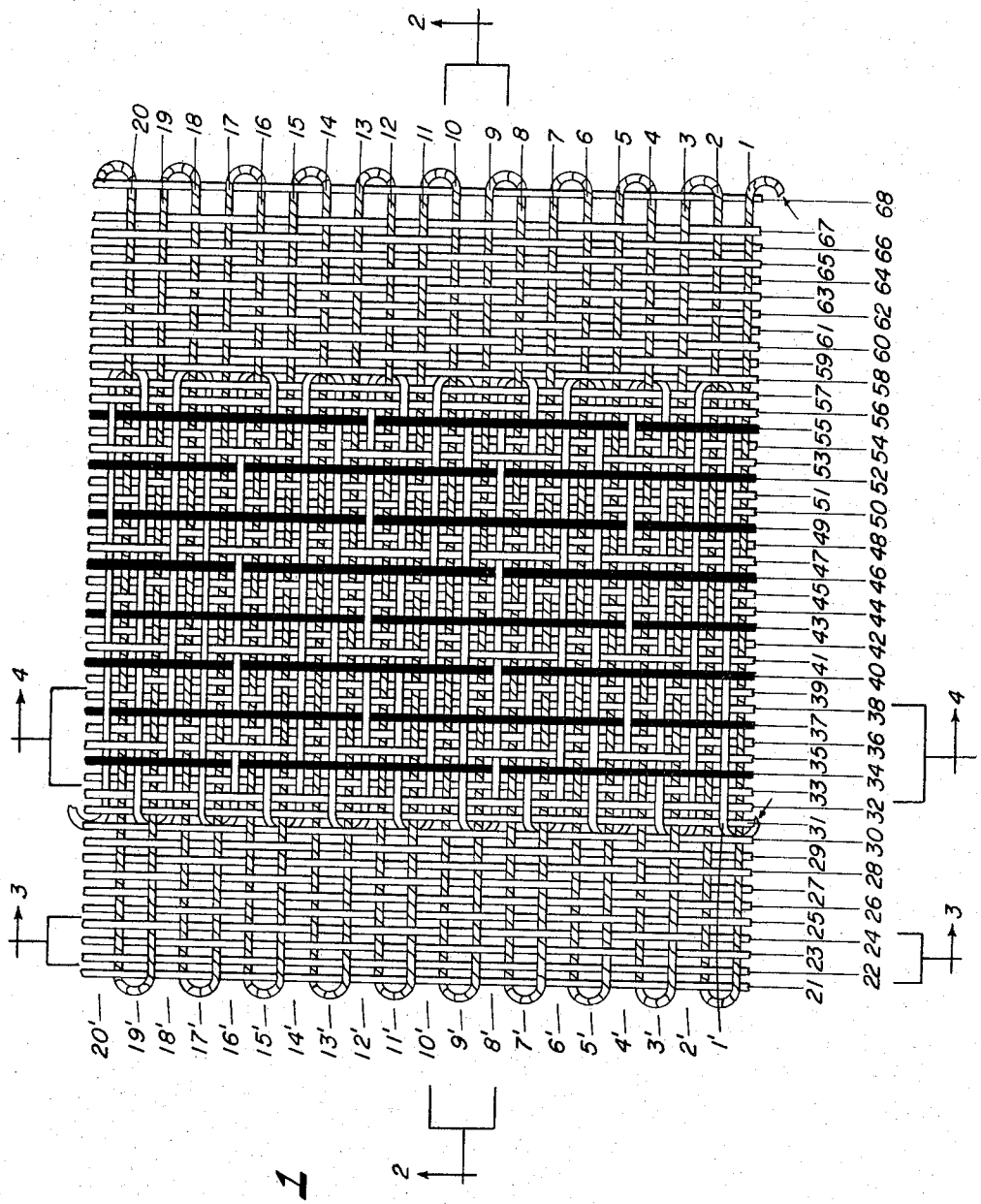

FIG. 1

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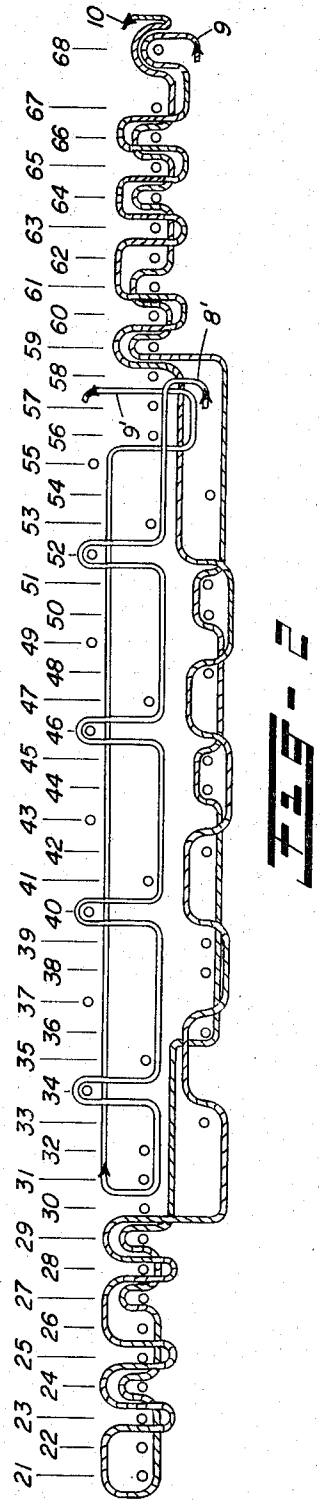

FIG. 2

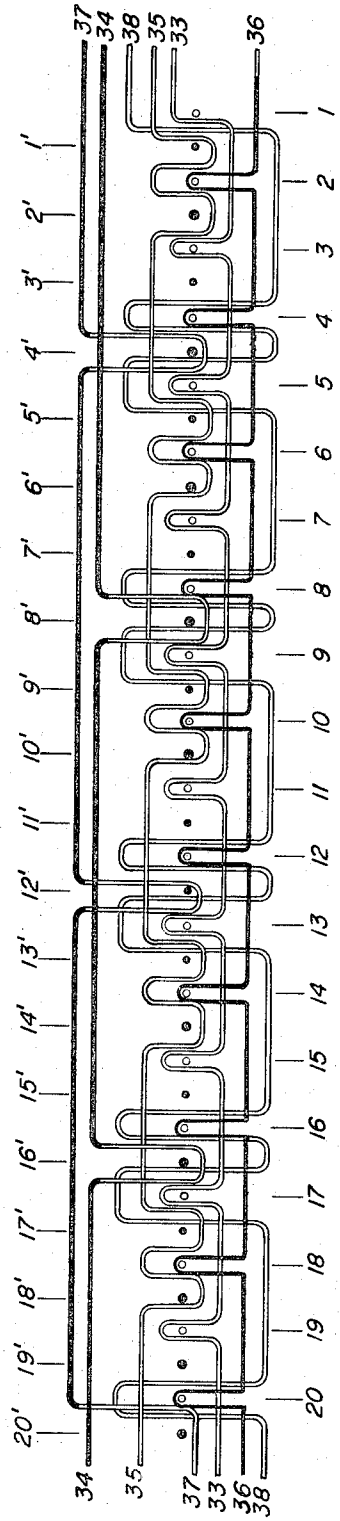

FIG. 4

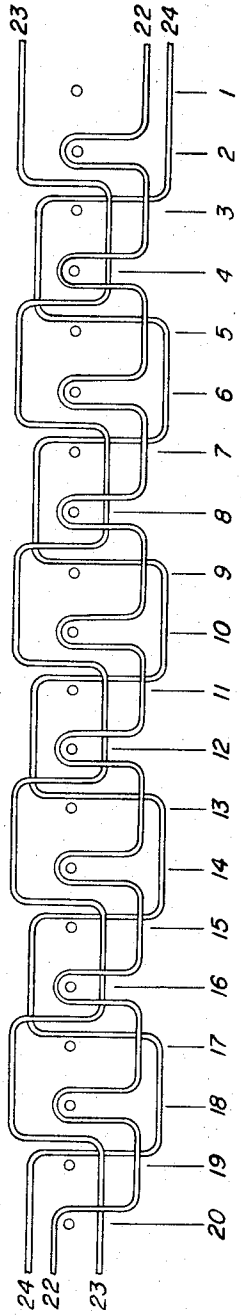

FIG. 3

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NARROW FABRIC WITH LATERAL DIMENSIONAL STABILITY

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3 Claims. (Cl. 139—423)

ABSTRACT OF THE DISCLOSURE

A dimensionally stable elastic fabric is woven with paired weft threads, one soft and one stiff, springy, such as monofilament polypropylene. There is provided warps for a back surface and warps for a front surface, the back warps being soft and the front warps including elastic warps. The soft wefts weave through the back warps and the stiff wefts weave through the front. Essentially the weave can be considered as a tubular weave with stitching threads holding the front and back surfaces together. At each edge there is a single series of warps which are woven only with soft wefts. The stiff, springy wefts for the front surface are woven only in a central zone. As a result, the front surface provides for dimensional stability and beautiful pattern, whereas the back surface is soft, both its warps and its wefts, and thus when applied to a garment worn next to the skin has no harsh feel.

Background of the invention

The problem of elastic fabrics, and particularly the narrow fabrics, such as the toppings for girdles, bottoms of brassieres, and the like, is that these fabrics should not roll over at the edge. This has not hitherto been solved satisfactorily, particularly when combined with another requirement, namely that the fabric should not have a harsh feel, as it is often worn next to the skin.

Summary of the invention

Essentially the present invention accomplishes its result by weaving simultaneously two kinds of weft threads, preferably using cross shot shuttles through the same sheds, one weft thread being hard, stiff, springy continuous filament thread, such as for example polypropylene, and the other soft multifilament or spun thread. While the weaving is simultaneous, there are, of course, produced two picks. The weft thread picks must be in pairs but not necessarily a single pair, although this presents some advantages, makes a beautiful fabric, and will be more specifically described in the more specific description of the fabric which will follow below.

While the weaving of each pair of picks, or more than one pair if multiple pair weaves are used, is through the same sheds, it will be understood that certain of the warp ends form the back face of the fabric and certain form the front face. One might consider that the fabric resembles a tubular fabric, but as is common in many such cases, there are periodic stitching ends in the warp so that the back face and front face and the two edges of the fabric, though actually separate weaves, are stitched together and give the appearance of a single fabric.

The back of the fabric, which is normally next to the skin, is woven only with the soft alternate weft threads, and the stiff, continuous filament weft threads weave only in the front face. The warp threads, which form the back of the fabric, are preferably all soft and usually there are also some soft threads in warps which weave the front face of the fabric. In fact the back warp threads may advantageously be extremely soft and can be considered as plush ends for a purpose which will become more

evident from the specific description below. The rubber or other elastic warp ends, which give the elasticity to the fabric, for the most part form part of the front of the fabric, although it is of course possible to weave fabrics having the advantages of the present invention in which some elastic threads appear on the back.

While the present invention in its broader aspects is not limited to the width through which both kinds of weft threads are woven, for many purposes it is desirable to weave the fabric in sections, looking across the warps, with the stiff continuous filament wefts weaving only the center section and leaving edge sections, which are woven only with the soft weft. This avoids the problem of harsh edges which would be encountered if the continuous filament wefts were woven across the whole width of the fabric. The production of soft edges, which is quite desirable in many uses, is a preferred embodiment and will be specifically described in the specific portion of this specification, it being understood, of course, that in its broader aspects the invention is not limited to such a multi-zone weave.

Of course, when multi-zones are woven it is customary to provide wires in the loom around which the shorter continuous filament picks turn. These wires, which do not remain in the fabric, are typical for edge weaving and will be shown in one of the figures of the drawings which illustrates a top view. Of course they are also present at the extreme edges where only the soft weft picks are woven. This is common practice in many looms and is an illustration of a practical advantage of the present invention in that it does not require special or peculiarly sophisticated equipment and can be used, with suitable choice of pattern design, on standard equipment. It will be obvious, of course, that the exact weaving pattern can change so long as the essentials of the present invention are retained, namely the pairs of wefts in alternate picks, one stiff monofilament and the other soft. Therefore, in the more specific description which will follow only a typical pattern will be illustrated, it being understood that the invention is not limited thereto.

Because of the fact that there are a very large number of warp ends, particularly in the soft, closely woven back of the fabric, the specific description and illustration in the drawings will only illustrate a few of the particular types of warp ends, many others which weave the same being omitted for clarity of illustration. Also, the weave will be shown much looser than it is, with a considerable spacing between picks so as not to confuse the illustration. In an actual fabric, of course, picks will be beaten up to the customary or desired degree of closeness.

Brief description of the drawings

FIG. 1 is a plan view of the back surface of the fabric;

FIG. 2 is a section through the fabric showing two double picks and indicated by the section lines **2—2** of FIG. 1;

FIG. 3 is a section through one edge showing three warp ends as indicated by the section lines **3——3** of FIG. 1, and

FIG. 4 is a section through the center portion showing six warp ends as indicated by the section lines **4—4** in FIG. 1.

Description of the preferred embodiments

In FIG. 1 only certain warp ends are shown which are typical, there being others which weave the same way but which have been omitted in order not to confuse the drawing. The warp ends are numbered **21** to **68** inclusive and include the loom wires. In other words, the figure is a plan view of the fabric while still on the loom and not after it has been removed. Warp ends **21**, **31**, **32**, **56**, **57**, **67** and **68** are wires, one for the left hand edge, two pairs

for the central section, and one pair for the right hand edge, in order to produce a decorative scallop design on this edge. Ends **22**, **26**, **38**, **44**, **50** and **62** are covered elastic ends with a rubber core. Ends **23**, **24**, **25**, **27**, **28**, **29**, **30**, **58**, **59**, **60** and **61** are edge ends. Ends **33**, **36**, **39**, **42**, **45**, **48**, **51** and **54** are front face soft ends. In the actual fabric there are a very large number of these ends, but only a few are shown as the others weave the same. Ends **34**, **37**, **40**, **43**, **46**, **49**, **52**, and **55** are textured, soft, plush ends. It will be seen that these ends float on the back for considerable distances. This makes the back have a relatively softer surface, which is shown on FIG. 1 by a darkening of these particular types of end.

The stitching ends are **35**, **41**, **47** and **53**. As will be seen in connection with FIGS. 2 and 4, these ends serve to stitch the two sides of the fabric together. In the weaving the two sheds for the back surface and the front surface are produced by the harnesses moving the warp ends of the respective sheds through only a portion, preferably one-half, of the normal maximum of travel of harnesses. However, the stitching ends, which are also of textured synthetic yarn as are the plush ends, such as end **34**, are moved through a full harness travel. It will be noted from FIG. 1 that the stitching ends also float considerably on the back, which aids in preventing an unnecessary harsh feeling.

The right hand edge also has some special ends **63**, **64**, **65** and **66** which weave an attractive picot pattern for this edge together with the scallops of the soft weft fillings produced by the double wires **67** and **68** of this edge.

As the pairs of weft threads, one continuous filament and one soft multi-filament, weave the same, although in opposite directions as the shuttles cross, this has been represented on FIG. 1 by plain numbers **1** to **20** for the various picks of the soft multi-filament weft and the same numbers, but primed, for the stiff, continuous filament wefts which are woven at the same time but in opposite directions to form the characteristic double pick or paired picks of the present invention. Also, on the drawing the soft, multi-filament wefts are shown with curved hatchings while the continuous filament are shown plain. It should be noted in FIG. 2 that the continuous filament weaves only across the center section bounded by the wires **31** and **32** and **56** and **57**.

It will be seen from FIG. 1 that the long floats of the plush ends **34**, **37**, **40**, **43**, **46**, **49**, **52**, and **55** are only tied down at intervals by the continuous filament weft in the picks represented by **4'**, **8'**, **12'**, **16'**, and **20'**. This also can be seen in FIGS. 2 and 4, in the latter figure the alternating soft multi-filament wefts being shown as open circles and the continuous filament dark circles. No attempt is made to number the individual picks in either FIGURE 3 or FIGURE 4 in order not to confuse the drawing. Also, in FIG. 2 the numbering of the warps is along the top instead of directly on the warps themselves. It should be noted that while the different picks of the two weft yarns are separately numbered, actually of course in the weave shown there are only two weft yarns which are woven back and forth. For descriptive purposes in connection with FIG. 1, however, separate numbering of the picks is used.

Reference has been made in the specific description of the invention to the continuous filament weft as being typically illustrated by monofilament polypropylene. This is merely an illustration, though a very practical one, and any other weft which is stiff and springy may be used. In a simiar manner, the soft multifilament synthetic yarn described in the drawings is only typical of a soft weft and other yarns, such as soft cotton and rayon, may be used. The essential feature of the present invention is not the particular chemical composition of the two different kinds of weft but their physical nature.

I claim:

1. A multi-zonal, roll resistant elastic fabric comprising in combination warp ends, including elastic warp ends, and soft thread warp ends, paired wefts, one weft being of stiff, springy thread and the other of soft thread, the fabric having a back and front face composed of a central zone with two edges, the back face being woven with soft weft threads and the central zone of the front face being woven with the relatively stiff springy weft threads, the weaving of each pair being through the same sheds, the warps also including stitch ends which stitch together front and back faces, the soft wefts being woven across the full width of the fabric and so weaving through the central zone and both edges, whereby the stiff springy weft threads prevent rolling and the soft weft threads with the soft warp threads produce a back face and two edges of the fabric which are relatively soft, flexible and non-irritating to the human skin.

2. A fabric according to claim 1 in which the stiff springy weft is monofilament polypropylene and the soft weft is multi-filament synthetic yarn.

3. A method of weaving a fabric which comprises forming a back shed extending across the full width of the fabric with part of the warp ends and a front shed extending across a central zone of the fabric only with the remainder of the warp threads, the two sheds being formed with half harness travel and stitching ends moved by full harness travel, the weaving being by simultaneous cross shuttles with stiff springy weft weaving through the front shed and soft flexible weft weaving through the back shed whereby a fabric is produced having a soft back face and two soft edges and a front face extending only across the central zone.

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