

[54] **TEXTURED EMBROIDERED FABRIC**  
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[52] **U.S. Cl.** ..... 112/439  
 [51] **Int. Cl.** ..... D05c 17/00  
 [58] **Field of Search**..... 112/439, 440, 403, 112/410, 411, 412, 266; 2/244, 246; D3/6 R, 6 A, 6 C, 6 D, 6 E; 28/75 WT, 76 T, 77

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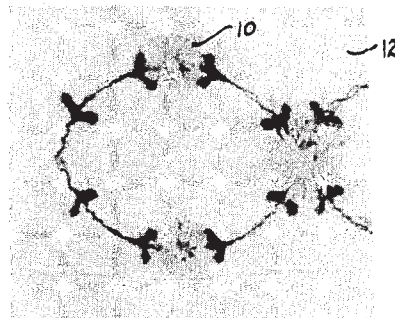
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[57] **ABSTRACT**

A textured embroidered fabric is produced by stitching a first face yarn to a ground fabric and tying said first stitches in place by a soluble bobbin yarn on the back of said fabric, stitching a second face yarn fabric in a pattern which at least in part overlies the stitches of said first face yarn and tying said second stitches in place by an insoluble bobbin yarn on the back of said fabric, and washing said fabric with a liquid which dissolves said soluble bobbin yarn while leaving said insoluble yarn intact, whereby said first stitches are freed from said fabric and form a textured mass held in place relative to the fabric by the stitches of the second face yarn where they overlay the first stitches. Preferably, the first face yarn comprises continuous filament polyester of low twist and high heat shrinkage and the soluble yarn is polyvinyl alcohol, its dissolution being effected by boiling water. The ground fabric preferably comprises a polyester-cotton blend and, after dissolution of the polyvinyl alcohol, is padded with a permanent-press finish and oven cured, the cure serving to set the finish, shrink the polyester and dry the fabric. The fabric may then be brushed to help raise loops of the first face yarns.

5 Claims, 10 Drawing Figures



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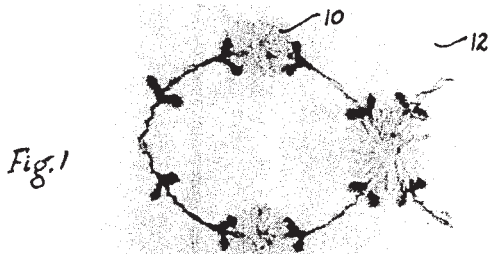


Fig. 1

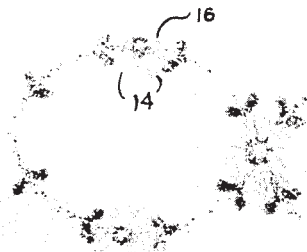


Fig. 2

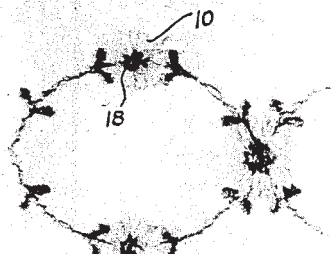


Fig. 3

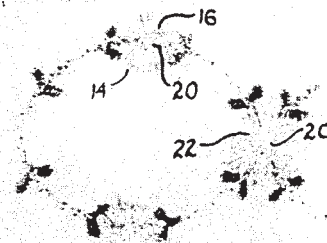


Fig. 4

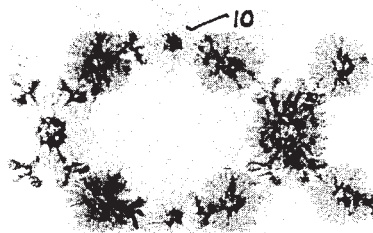


Fig. 5

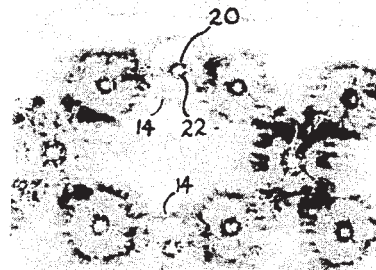


Fig. 6

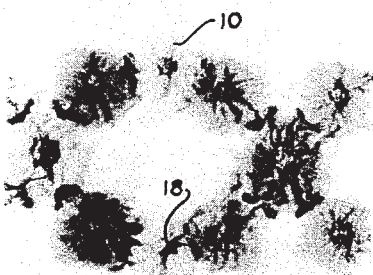


Fig. 7

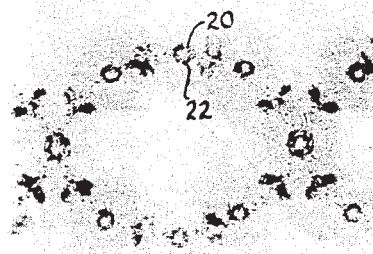


Fig. 8

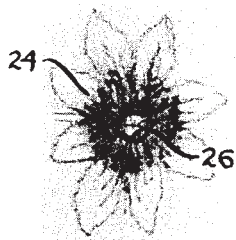


Fig. 9

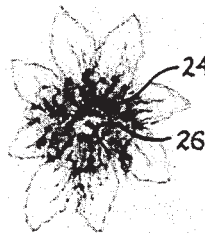


Fig. 10

## TEXTURED EMBROIDERED FABRIC

The present invention relates to textured embroidery and a novel process for its production.

In making embroidery one or more face or motif yarns are successively stitched to a ground base fabric using a bobbin yarn on the rear of the fabric to secure the stitches of each face yarn to the fabric. The colors and pattern of the various face yarns gives rise to designs having a desirable appearance. Such designs have depth only to the extent that the stitches of one or more face yarns overlie one another in layers, i.e. the depth of the embroidered design is the sum of the thicknesses of the several overlying face yarns.

It is an object of the present invention to provide novel embroidered fabrics characterized by texture and depth of designs far in excess of what was previously possible.

It is a further object of the invention to provide such textured embroidered fabrics without requiring excessively large amounts of face yarns.

Still another object of the invention is to provide a simple process for producing such textured embroidered fabrics.

These and other objects and advantages are realized in accordance with the present invention pursuant to which a textured embroidery on a ground fabric is produced by stitching a first face yarn to said fabric and tying said first stitches in place by a soluble bobbin yarn on the back of said fabric, stitching a second face yarn to said fabric in a pattern which at least in part overlies the stitches of said first face yarn and tying said second stitches in place by an insoluble bobbin yarn on the back of said fabric, and washing said fabric with a liquid which dissolves said soluble bobbin yarn while leaving said insoluble yarn intact, whereby said first stitches are freed from said fabric and form a textured mass held in place relative to the fabric by the stitches of the second face yarn where they overlay the first stitches. Depending upon the design, composition of the face yarns and conditions of processing, it may be advantageous thereafter to brush the face of said fabric to raise therefrom the stitches of said first yarn intermediate the points where it is held to the fabric by the stitches of the second face yarn.

The ground fabric may comprise any fabric whether woven, knit or non-woven although preferably it is woven and is reasonably inert to the successive treatments except as noted herein. It may comprise natural and/or synthetic yarns in whole or in part, although especially good results are achieved with blends containing cellulosic yarns since suitable treatments can eliminate the need for subsequent ironing after each washing, e.g. blends of cotton and polyester in about 0.5-2:1 by weight are especially suitable although 100 percent polyester can also sometimes be so fabricated as to eliminate the need for ironing. In addition to the foregoing, the fabrics may comprise in whole or in part other fibers such as rayon, nylon, acrylic, polyolefins, silk, protein, cellulose acetate or triacetate, saran, or the like, the terms being employed in accordance with the definitions of the Textile Fiber Identification Act. The yarns comprising the ground fabric may comprise continuous filaments or staple fibers ranging in denier from as little as about 1 denier up to 25 or 50 or more although the individual filaments or fibers are usually less than about 15 denier and generally less than about

10 denier. They may be highly twisted or flat and their tightness of weave may be varied as desired.

To the ground fabric there is stitched a first face or motif yarn ultimately intended to form the textured mass. Desirably this first face yarn is shrinkable and is shrunk in the course of the subsequent processing by heat and/or liquid, such shrinkage adding to the textured effect and facilitating producing the textured effect. The textured effect is also enhanced by low twist in the construction of such yarns to which end use of continuous filament yarns is desirable. The chemical composition of the yarns may also vary as widely as the ground fabric described hereinabove. A preferred face yarn comprises continuous filament polyester having less than about two turns per inch and preferably less than about one turn per inch and shrinking at least about 2 percent and preferably at least about 5 percent in the course of the subsequent treatments.

The first face yarns are stitched to the ground fabric in conventional fashion, being secured thereto by a bobbin yarn on the back of the fabric. In accordance with the present invention such bobbin yarn is soluble and in the course of later processing is subjected to a treatment whereby it is dissolved. The composition of the soluble yarn may vary and is obviously attuned to the nature of the subsequent dissolution solvent. The face yarns and the ground fabric should not be soluble under the same conditions as the soluble yarn so its subsequent dissolution will be selective. The subsequent dissolution can be effected in organic solvents, e.g. acetone will dissolve secondary cellulose acetate, methylene chloride-methanol will dissolve triacetate, gasoline will dissolve polyolefins, chloroform will dissolve saran, and the like. Obviously, however, water is the preferred solvent by virtue of cost, safety and availability. Consequently water-soluble bobbin yarns are preferred, although the pH of the water may be adjusted by addition of acid or alkali to achieve best results. Representative water-soluble yarns include alginate salts (or alginic acid in alkaline water) although polyvinyl alcohol is preferred. The alcohol groups thereof may be partially modified so long as the yarn as a whole retains its solubility. Such yarns are available commercially and any so sold are suitable. The precise construction is not critical so long as it serves adequately as conventional bobbin yarns.

After stitching of the first face yarn is completed, there is stitched to the fabric at least one second face yarn. The second face yarn can also be of any composition and construction as described with reference to the first face yarn, although preferably it does not shrink to a significant extent since it could so cause puckering of the fabric. The second face yarn is so stitched that at spaced points it overlies the first yarns for a reason hereinafter described. The second yarns are secured to the fabric by bobbin yarns which differ from the previously described bobbin yarns in that they are not dissolved in subsequent treatments. If desired, the face yarns held to the fabric by insoluble bobbin yarns can also be laid down prior to the face yarns secured by soluble bobbin yarns but, whether or not initially laid down, such second face yarns must be stitched to overlay first face yarns.

Thereafter, the fabric is subjected to a treatment to dissolve the soluble bobbin yarns. With polyvinyl alcohol bobbin yarns a suitable treatment involves immersion in boiling water for a long enough time to effect



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dissolution which, to some extent, will depend upon the identity and amount of the polyvinyl alcohol yarn, the pH of the water, and the like; alkali accelerates dissolution without unduly damaging the other fibers of the embroidered fabric. Detergents and surface active agents will also help wash away the attacked soluble yarns. Desirably the boil is followed by a hot rinse to remove polyvinyl alcohol residues, chemicals, and the like. Thereafter, the fabric is dried in conventional manner, preferably in full width using a tenter frame. Desirably, as well, the dissolution is effected in full width to prevent wrinkling.

In accordance with a preferred embodiment of the invention the fabric is treated prior to drying to restore the body lost in boiling. This can be accomplished by starch or a size such as polystyrene but, where the fabric comprises a cellulosic fiber, preferably the fabric is padded with a permanent-press finish, i.e. methylolated or similarly reactive compounds which attach themselves to the cellulosic hydroxyl groups. Where the insoluble bobbin yarns or face yarns contain cellulosic components, they too will be reacted; for just such reason preferably the first face yarn to be textured is cellulose-free. The act of drying thus also serves to set the finish.

During the previously mentioned boil, the soluble bobbin yarns are dissolved so that the first face yarns are secured to the fabric only by the second face yarn stitches. The heat of the boil and/or subsequent treatment will promote shrinkage of the first face yarns along with texturing or bulking thereof. The face yarns are lightly tacked through to the rear of the fabric at the ends of each stitch during embroidering and such stitch ends are held by the bobbin yarns; when the bobbin yarns are dissolved away such stitch ends frequently still project through to the back of the fabric but the use of shrinkable yarns will oftentimes impart sufficient contractile force to pull the stitch ends out from the back. If not, however, it may prove desirable to subject the finished fabric to a brushing to raise loops of the first face yarns.

The embroidering obviously could be practiced manually but advantageously it is effected on conventional embroidery equipment, except that some of the shuttles are provided with soluble thread or yarns. An especially desirable machine is one where different shuttles can be simultaneously accommodated without having to stop the machine for change-over, e.g. a Saurer Schiffli 2S Model.

The invention will be further described with reference to the accompanying drawing, wherein:

FIGS. 1, 3, 5 and 7 are photographs of the face of an embroidered fabric in accordance with the invention at successive stages in its production;

FIGS. 2, 4, 6 and 8 are photographs of the rear of the fabric at the corresponding stages;

FIG. 9 is a photograph of the face of another embroidered fabric prior to dissolution of the soluble bobbin yarn; and

FIG. 10 is a photograph of the face of the fabric of FIG. 9 after dissolution of the soluble bobbin yarn and brushing.

Referring now more particularly to the drawing, in FIG. 1 a face yarn 10 is stitched to a ground fabric 12; as seen in FIG. 2 the face yarn 10 stitch ends 14 are secured by a bobbin yarn 16 of soluble material, e.g. polyvinyl alcohol.

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In FIG. 3 a second face yarn 18 has in part been stitched over face yarn 10 and also forms a design such as the heart of the flower. FIG. 4 shows an insoluble bobbin yarn 20 which cooperates with the ends 22 of the stitches of yarn 18, although it is difficult to distinguish between bobbin yarns 16 and 20.

After the soluble bobbin yarns 16 have been dissolved away the face of the fabric has the appearance shown in FIG. 5 and the rear the appearance shown in FIG. 6. To give the full textured appearance the fabric is brushed whereupon the face has the appearance shown in FIG. 7 and the rear the appearance shown in FIG. 8.

FIG. 9 shows another embroidered pattern prior to removal of the soluble yarns. Face yarn 24 is first stitched into the illustrated pattern with a soluble bobbin yarn (not shown) and face yarn 25 is then stitched into its illustrated pattern with the lower ends of the stitches of yarn 24 generally being secured by yarn 26. Upon removal of the soluble bobbin yarn the embroidery takes on the textured appearance shown in FIG. 10.

The invention will be further described in the following illustrative example.

#### EXAMPLE

A blue polyester yarn comprising two ends of 100/40 Rotaset plied with one turn per inch is stitched into the pattern illustrated in FIG. 1, using a polyvinyl alcohol bobbin yarn. The polyester has a residual boiling water shrinkage of about 6 percent. The ground fabric is a 96 × 72 weave of combed cotton count 65/35 polyester staple-cotton blend. The second face yarns are green and comprise conventional cotton embroidery yarns of 40/2 count held in place by cotton bobbin yarns of 80/2 count. The embroidered fabric is passed in full width continuously from one roll to another and back for 60 minutes during which time it is immersed in boiling water containing softener and rendered alkaline by addition of sodium hydroxide. The boiling water is then dropped and the fabric is rinsed in the same manner for 15 minutes with water at 140°F. The rinse water is dropped and the beamed embroidered fabric is passed through a pad and then through an oven on a tenter frame. In the pad the fabric is refinished with Dur-o-set H-111 permanent finish sold by Charles S. Tanner Co. and continuously conveyed through an oven which is supplied with hot air at 320°F; the residence time in the oven is 1 minute. Thereafter, the fabric is brushed with light steel fingers taking on the appearance shown in FIG. 9.

It will be appreciated that the instant specification and example are set forth by way of illustration and not limitation, and that various modifications and changes may be made without departing from the spirit and scope of the present invention.

What is claimed is:

1. An embroidered fabric comprising a base fabric, a first face yarn, said first face yarn being of a heat shrinkable material, a second face yarn stitched to said fabric and securing said first face yarn thereto, a first bobbin yarn of insoluble material on the back of said fabric holding the stitches of said second face yarn in place, and a second bobbin yarn of soluble material on the back of said fabric additionally holding said first face yarn in place.

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2. An embroidered fabric according to claim 1, wherein said first face yarn comprises continuous filament polyester.

3. An embroidered fabric according to claim 1, wherein said soluble second bobbin yarn comprises polyvinyl alcohol.

4. An embroidered fabric comprising a base fabric, a first face yarn of heat shrinkable material said first face yarn having been shrunk and having a textured configuration, a second face yarn stitched to said fab-

ric, the stitches of said second face yarn partially overlying the first face yarn and thereby securing said first face yarn to said fabric, and a first bobbin yarn of insoluble material on the back of said fabric holding the stitches of said second face yarn in place.

5. An embroidered fabric according to claim 4, wherein said first face yarn comprises continuous filament polyester.

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