Jan. 7, 1947. T. G. HAWLEY, JR 2,413,970

FABRIC AND METHOD OF MAKING SAME

Filed July 3, 1943

Fig. 1

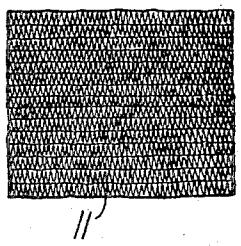


Fig. 2

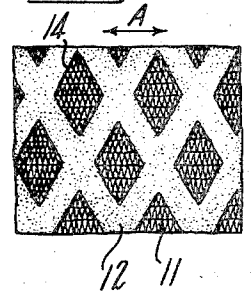


Fig. 3

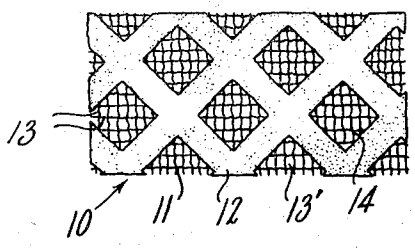
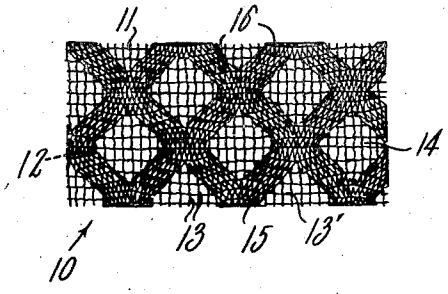


Fig. 4



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FABRIC AND METHOD OF MAKING SAME

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Application July 3, 1943, Serial No. 493,411

11 Claims. (Cl. 154—48)

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This invention relates to an improved composite fabric containing a textile fabric having its yarns retained in a greater spaced relation in respect to each other in some areas than in others by a composition network adhered thereto, thereby increasing the porosity of the textile fabric opposite the openings in the composition network and/or producing ornamental designs therein. The invention also relates to the method of making such composite fabric.

Heretofore it has been the practice to arrange the threads in a textile fabric during the construction of the fabric so as to form lace work designs therein, wherein the threads in certain areas are spaced farther apart than in other areas. In accordance with the present method an extendible textile fabric may be woven, or knitted or otherwise constructed without worked in designs and with a uniform surface appearance throughout, and the spacings of the threads may be thereafter changed by adhering a plastic composition network to the fabric, then stretching the network in the plastic state with the fabric, and setting the composition network on the textile fabric in the stretched position.

In the resulting composite fabric the yarns opposite the openings in the composition network are spaced farther apart than the yarns of the textile fabric opposite to the composition of the network. The face of the composite fabric, that is, the surface of the side not in contact with the network, has a lace work design formed thereon, in which relatively large openings are formed between the yarns opposite the openings in the network, and the yarns are retained in a relatively closely compact relation opposite the composition to which they are adhered.

Pronounced high and low light reflecting effects are produced on the face side of the composite fabric, particularly when the textile fabric has a high gloss, such as is found in silk, or silk-like fabrics, for example, rayon and similar fabrics. The high lights emanate from the areas of the textile fabric opposite the composition network in which the threads are retained relatively close together, and the low lights emanate from the areas of the textile fabric opposite the openings in the network in which the threads are not retained in such close relation and may be spaced so as to produce openings between the threads.

Fabrics made in accordance with this invention are useful for their ornamental appearance and as porous fabrics. The fabric may be made elastic by applying an elastic composition network to

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the textile fabric, and such elastic porous fabrics containing knitted rayon or silk-like textile fabric are particularly useful for bathing suit and other wearing apparel material.

The invention is described in further detail in reference to the accompanying drawing, in which:

Fig. 1 is a plan view of an extendible piece of textile fabric having no designs formed therein during its construction by the interlacing of the yarns;

Fig. 2 is a plan view of the fabric shown in Fig. 1 having a net work of plastic composition applied thereto;

Fig. 3 is a plan view of the composition network side of the finished composite fabric embodying this invention, which results from stretching the fabric from the position shown in Fig. 2, and setting the plastic composition network; and

Fig. 4 is a plan view of the face, or textile side of the finished fabric, which is the reverse side of the composite fabric shown in Fig. 3.

The finished relaxed composite textile and composition fabric 10 embodying this invention is shown in Figs. 3 and 4 of the drawing. Fig. 3 illustrates the side of the textile fabric 11 having the composition network 12 adhered thereto, and Fig. 4 illustrates the face of the textile fabric 11 with the composition network 12 applied to the back side. Referring to Fig. 4, the yarns 13 of the textile fabric 11 are spaced farther apart opposite the openings 14 in the composition network 12 than the yarns in the textile fabric in the bands 15 which are adhered to the composition. Such a construction produces a lace work effect in the fabric, and increases the porosity of the textile fabric opposite the openings 14.

The composite textile and composition fabric is made by applying an open network 12 of plastic composition as shown in Fig. 2 to an unfigured stretchable textile fabric 11, such as shown in Fig. 1. After the plastic network 12 has been applied, the textile fabric 11 with the network thereon is stretched transversely, that is, in the direction of the double arrow A. When so stretched the composition network 12 retains the yarns of the textile fabric 11 in the bands 15 substantially in the position they occupied at the time the composition 12 was adhered thereto, excepting that some of the lines 16 of the textile fabric in the bands 15 are caused to assume a curved arrangement. The yarns are spread farther apart in the openings 14 of the network, thereby making larger openings 13' between the yarns 13.

As shown in Fig. 2 the openings 14 are originally formed in a diamond shape, and when the composition network is stretched laterally in the direction of the double arrow A, the vertically opposite corners of the diamonds are drawn closer together, as the horizontally opposite corners of the diamonds recede from one another. As shown in Fig. 3 the diamonds assume substantially the shape of a square. In this transformation, the composite fabric as shown in Fig. 2 becomes narrower in the direction transverse to the stretch and more elongated in the direction of stretch, as shown in its final position in Fig. 3. However, if the textile fabric 11 is extendable in both the horizontal and vertical directions (having reference to Fig. 2), the textile fabric with the plastic composition thereon may be stretched in both directions, and the general diamond shape of the openings 14 may be retained. In the latter case, the appearance, or arrangement of the yarns 13 may be slightly different, but the spreading of the yarns or lace work effect of the textile fabric opposite the openings 14 in the network may be produced. Of course other shapes of openings in the network 12 may be used to produce various designs on the finished fabric.

After the textile fabric 11 with the composition network 12 thereon has been stretched a suitable amount, for example in the proportion as shown by Figs. 2 and 3, the composition network 12 is set in its finished or final condition. When the composition is set or cured, it retains the relative positions of the yarns 13 of the textile fabric 11 as shown in Figs. 3 and 4.

The composition network may be deposited directly on the textile fabric from coating materials which are capable of being applied in the liquid or plastic state, and thereafter stretched and set without losing their adhesion and strength required to retain the textile fabric in its final adjusted position. Depending upon the degree of elasticity desired in the network, nitrocellulose, vinyl resin, and rubber containing coatings are suitable. For the purpose of making an elastic fabric, it is preferred to make the composite fabric from a textile fabric provided with considerable initial stretch and having a network of rubber deposited thereon from a rubber containing fluid, preferably a latex composition.

The plastic composition network may be applied and adhered to the textile fabric by transferring it from interconnected grooves in the surface of an applicator roll as it is rolled in contact with the fabric in accordance with the known practice. The plastic network may be extruded onto and adhered to the fabric from suitably arranged nozzles as described in co-pending Hawley and Dorazio patent application Serial No. 425,572, filed January 3, 1942, for Method of depositing liquid rubber in an open network, of which I am one of the joint inventors.

The elastic composite fabric is preferably made from a knitted textile fabric having a network of rubber composition deposited thereon. The plastic rubber composition is preferably deposited on the fabric from an extruded rubber latex composition in accordance with the process described in said application. The knitted fabric is then stretched in at least one direction and the deposit of rubber is set and cured in the usual manner to produce an elastic network. In stretching the knitted fabric prior to setting the rubber thereon, all of the original stretch is not removed but considerable stretch is left in the fabric, so that it can be stretched further after the rubber has been cured, and when the fabric is in a relaxed or unstretched condition.

If desired the knitted fabric may be stretched in two directions transverse to one another prior to setting the rubber, but if elasticity is desired in the relaxed finished fabric in both directions, some further stretch must be left in the fabric in each such direction.

It has been found that relatively fine gauge knitted fabrics, such for example as those knitted on a spring beard circular knitting machine having about 28 needles to the inch of the circumference, give excellent results when treated in accordance with this process. Very pleasing, or attractive design effects are produced on such fine gauge knitted fabrics having a high gloss, such as rayon, silk or the like. In such fabrics the high and low light effects are very attractive.

As shown herein the composite fabric is made from a single ply of textile fabric 11 having a composition network 12 adhered thereto. If desired, however, a second ply of textile fabric may be adhered to the composition network 12 after it has been adhered to the first ply 11 in Fig. 2 so as to sandwich the network between the fabric plies and produce an all textile surface composite fabric by thereafter treating the fabric as described herein.

While the preferred form of this invention has been described herein, the details may be changed without departing from the spirit of this invention or the scope of the claims, and it is desired to claim the invention as broadly as permitted by the prior art.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. A relaxed composite fabric comprising a layer of textile fabric having interconnected threads, a composition network adhered to said textile fabric, and said threads of the textile fabric opposite said composition being retained in closer proximity to one another by said composition than the threads opposite the openings in said network.

2. A relaxed composite fabric comprising a layer of textile fabric having interconnected threads, and a network of flexible composition adhered to said textile fabric, and said threads of the textile fabric opposite the openings in said network of composition being in a greater extended condition than in the area of the fabric to which said composition is adhered.

3. A relaxed composite fabric comprising a layer of textile fabric having interconnected threads, a layer of flexible composition having spaced openings formed therein and adhered to said textile fabric, and the opening between the threads of the textile fabric opposite said openings in said layer of composition being larger than the openings between the threads of the fabric which are adhered to said layer of composition.

4. A relaxed composite fabric comprising a layer of textile fabric having interconnected threads, a network of rubber-like composition adhered to said textile fabric, and the openings between the threads of the textile fabric opposite the openings in said network being larger than the openings between the threads of the fabric when adhered to said rubber-like composition.

5. A relaxed composite elastic fabric comprising a layer of knitted textile fabric having interconnected threads, a network of flexible elastic rubber composition adhered to said textile fabric, and said threads of the knitted fabric oppo-

site the openings in said network being retained in a greater spaced relation in at least one direction than the spaced relation of the threads of said knitted fabric opposite said rubber composition network.

6. A relaxed high and low light surfaced composite fabric comprising a layer of glossy surfaced textile fabric having interconnected threads, a network of flexible composition adhered to said textile fabric, and said threads of the textile fabric opposite said composition being retained in closer proximity to one another by said composition than the threads opposite the openings in said network so as to retain the high lights in the surface areas of said textile fabric opposite said composition and produce low lights in the surface areas of said textile fabric opposite said openings in said network.

7. Method of forming designs on a textile fabric comprising the steps in sequence of adhering a plastic network of a composition to a layer of extendible textile fabric, stretching said fabric with the plastic network thereon in at least one direction so as to enlarge the dimension of the openings of said network and diminish the number of threads per unit length in said textile fabric opposite said openings as measured in the direction of stretch, and setting said composition network while in said stretched condition.

8. Method of making a porous composite fabric comprising the steps in sequence of adhering a plastic network of a composition to a layer of extendible textile fabric, stretching said fabric with the plastic network thereon in at least one direction so as to enlarge the dimension of the openings of said network and diminish the number of threads per unit length in said textile fabric opposite said openings as measured in the direction of stretch, and setting said network of composition while in said stretched condition.

9. Method of forming designs on a textile fabric comprising the steps in sequence of adhering

a plastic network of the composition to a layer of extendible textile fabric, stretching said fabric with the plastic network thereon in at least one direction so as to enlarge the dimension of the openings of said network, and produce larger openings between the threads of the textile fabric opposite the openings in said network while substantially retaining the normal spacing of the threads of the textile fabric opposite said network, and setting said composition network while in said stretched condition.

10. Method of forming an elastic designed textile fabric comprising the steps in sequence of adhering a plastic network of a rubber-like composition to a layer of extendible textile fabric, stretching said fabric with the plastic network thereon in at least one direction to a point considerably below the extendibility of the textile fabric, whereby the openings in said network are enlarged in the direction of stretch and the spacing between the threads of the textile fabric is increased in the areas opposite said openings, and the spacing between said threads of said textile fabric opposite said network is retained in substantially the same condition as when said fabric is adhered to said network, and then setting said network of rubber-like composition while in said stretched condition.

11. Method of producing porous knitted fabrics with designs thereon comprising the steps in sequence of adhering a plastic rubber composition having openings formed therein to a knitted textile fabric, stretching said textile fabric with the plastic network thereon in at least one direction so as to enlarge the dimension of the openings in said network and to increase the openings between the threads of said knitted fabric opposite said openings in said rubber composition as measured in the direction of stretch, and vulcanizing said rubber composition while in said stretched condition.

THOMAS G. HAWLEY, JR.