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2,834,703

TISSUE-FACED COTTON SQUARES

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Fig. 1.

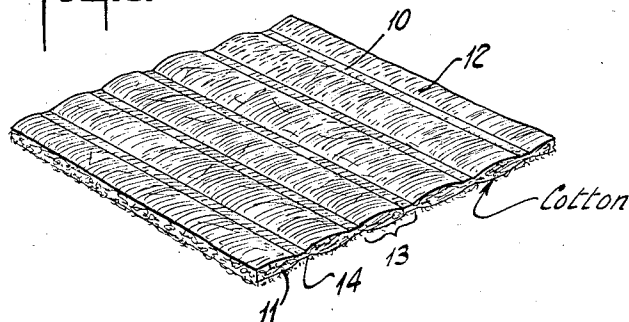


Fig. 2.

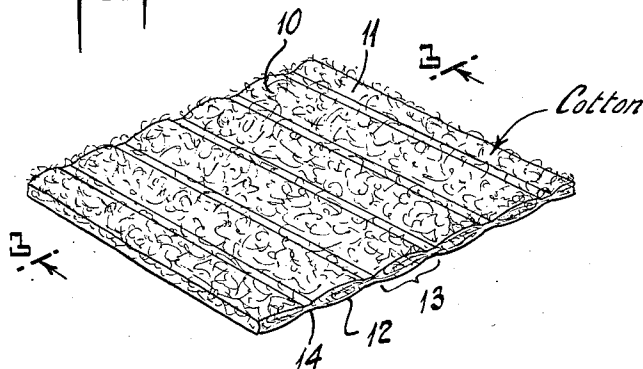
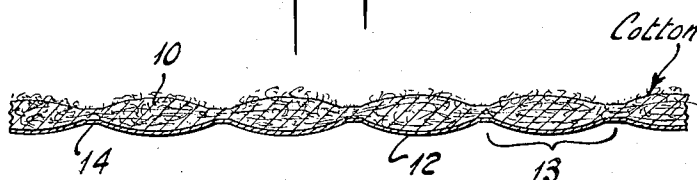


Fig. 3.



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TISSUE-FACED COTTON SQUARES

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3 Claims. (Cl. 154—46)

This invention relates to nonwoven fabrics and more particularly is concerned with composite nonwoven fabrics of the type used for cosmetic purposes, for toweling, as medical applicator pads and the like.

Heretofore, composite nonwoven fabrics for the purposes described normally consisted of a plurality of layers of various combinations of paper tissue, cellulosic wadding, wood pulp and the like, secured together by adhesive or other means such as embossing. Composite fabrics of this type have met with fair success as packing materials, handkerchiefs, and substitutes for woven fabrics since these products are more economical to manufacture and in many applications possess softness and better handling qualities. The disadvantages of such products, particularly when used for cosmetic or medicinal purposes, were the tendency of individual fibers separating and thus contaminating surfaces they contact, especially in the case of composite nonwoven fabrics that did not use adhesive binders; their stiffness; and lack of bulk and of absorbent properties.

Cotton alone has been widely utilized as an applicator for cosmetics and medicaments since it possesses the desirable physical characteristics of fluffiness, absorbency and wet strength. However, cotton also tends to separate into individual fibers. A nonwoven fabric incorporating cotton would therefore desirably possess the physical properties of cotton and at the same time eliminate its disadvantages.

I have found the high absorptive properties of cotton, its softness, smoothness, and high flexibility can be retained by nonadhesively uniting a relatively heavy cotton web to a thin flexible extensible backing such as thin paper tissue along narrow compression lines.

Composite nonwoven fabrics formed in accordance with my invention are economical to manufacture and retain an integrated structure, thereby eliminating separation of the individual fibers under normal conditions of use. The composite fabric so formed has relatively large areas in which the layers are substantially at their normal, uncompressed state and in cross section shows a "pillow effect" between the lines of bonding with the cotton between the lines expanding both up and down.

A cotton web when subjected to compression below that resulting in solidly compacting the fibers has a distinct and forceful tendency, due to the length and nature of the fibers, to return to its original bulk when the forces of compression are released. Accordingly, a composite nonwoven fabric incorporating a cotton web and paper tissue nonadhesively secured to each other by compression alone tends to separate since as the cotton expands, it forces the tissue away from the compressed areas of attachment, usually resulting in partial or complete detachment of the paper tissue from the cotton web. I have found that separation of the layers can be eliminated by using stretchable or extensible paper tissue which permits the cotton web to return to substantially its normal state in the desired manner.

To more clearly define the nature of the invention,

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reference is made to the preferred embodiments illustrated in the accompanying drawing wherein similar numerals refer to similar parts throughout the several views and wherein:

Fig. 1 is a perspective view of a composite nonwoven fabric incorporating cotton in accordance with the invention;

Fig. 2 is a perspective view of the same fabric viewing it in inverted position; and,

Fig. 3 is a horizontal sectional view through the line 3—3 of Fig. 2.

In accordance with the invention, a composite nonwoven fabric 10 is composed of a relatively heavy layer of a cotton fiber web 11 compressed at compression line 14 with a relatively light surface layer 12 of extensible paper tissue at frequently spaced intervals 13 less than the mean length of the individual fibers. The cotton fiber web 11 provides the desired absorbency and body for the fabric and supplies a substantial part of its tensile strength. The paper tissue cover 12 provides an effective shield against separation of cotton fibers during application of the nonwoven fabric to surfaces and provides more resistance to abrasion and deformation than may be expected from the cotton fabric alone. In combination they provide a flexible, resilient, soft, absorbent, and relatively strong unit which serves effectively as a cosmetic applicator in the shape well known as "cotton squares" which are about one to four inches square.

In accordance with a preferred form of the invention, cotton fibers, which may be from about one-quarter of an inch to about two inches in length, are formed into long slivers. The cotton may be used in convenient carded web form or in other web form, e. g. as matted randomly dispersed cotton web. If the web is oriented it should be applied so as to cause a substantial part of the fibers to be transversely by the compression lines. The term "web" herein includes both carded and random webs and the term cotton web includes not only webs composed entirely of cotton but also webs comprising other absorbent fibers, e. g. rayon, although for most purposes cotton is preferred. Rayon or other fibers may be substituted entirely for the cotton where desired for specialized applications.

The combined cotton slivers may weigh approximately twenty-two hundred grains per square yard. The cotton slivers are superimposed on paper tissue weighing approximately two hundred and fifty grains per square yard. The paper tissue is stretchable and I prefer to use tissue that can be stretched thirty-five to forty percent since tissue of this type does not hinder the cotton web from returning to substantially its uncompressed state after the compressive bonding forces are released. Tissue having fifteen to twenty percent stretchability has been found to be unsatisfactory because when the cotton web expands after the compressive forces are released, the expanding cotton causes the tissue to separate from the cotton web along the bonding lines.

The two webs are combined using a compression force of from about twelve hundred pounds per square inch to about fifteen thousand pounds per square inch at intervals of from a quarter of an inch to one inch, preferably one-half inch, and released after compression, thus forming the finished product. In preferred embodiments of the invention the compression is effected at temperatures of two hundred fifty to four hundred twenty-five degrees Fahrenheit at the lower limits of the compression force listed above. The time interval for application of heat and pressure may vary but good results were obtained using application times of approximately one two-hundredths of a second per stroke and line; in other words, almost instantaneously.

In general, and while a fairly large compression area

is possible, it is preferable to provide as large a bulk area as possible, i. e. to limit the width of the compression lines as much as possible. If the compression lines 14 are too narrow there is danger that the compression blades might shear the laminate or one of its layers. From a practical angle, compression lines having widths on the order of from one thirty-second of an inch to one eighth of an inch prove most useful. Preferably the cotton should have, prior to compression, a moisture content of from about seven percent to about eight and one-half percent by weight to aid in forming a satisfactory and permanent seal with the overlying paper surfaces.

The above disclosed treatment results in a uniform web having a paper tissue surface and a cotton web surface bonded at intervals by pressure. The resulting composite nonwoven fabric is bulky and stronger than the cotton web or paper tissue alone and may be used either by application of the cotton surface for maximum absorbency or application of the paper surface for protection against cotton separation and loss and cotton lint deposits on the surface to which it is applied.

The invention has been described in one of its preferred forms. This description is given, however, by way of illustration and not by way of limitation and the invention includes many equivalents which will readily occur to those skilled in the art and which are included within its spirit.

This application is a continuation-in-part of my U. S. patent application, Serial No. 185,275, filed September 16, 1950, now abandoned.

The claims are:

1. A nonwoven fabric consisting of a relatively heavy layer of a nonwoven cotton fiber web and a relatively light layer of an extensible paper tissue on one face thereof, the layers being united nonadhesively by strong pressure at frequent intervals along narrow lines of compression formed by high pressure so as to provide a substantially permanent bond between the layers along the lines of compression, the layers being in an uncompressed state at approximately their natural bulk in relatively wide areas between the lines, said paper tissue having

sufficient extensibility to permit said layers to remain at said natural bulk without the layers separating.

2. A nonwoven fabric consisting of a relatively heavy layer of a nonwoven cotton fiber web and a relatively light layer of extensible paper tissue on one face thereof, said paper tissue weighing approximately one-tenth of the weight of the cotton web, the layers being united nonadhesively by strong pressure at frequent intervals along narrow lines of compression formed by high pressure so as to provide a substantially permanent bond between the layers along the lines of compression, the layers being in an uncompressed state approximately at their natural bulk in relatively wide areas between the lines, said paper tissue having sufficient extensibility to permit said layers to remain at said natural bulk without the layers separating.

3. A nonwoven fabric consisting of a relatively heavy layer of a nonwoven cotton fiber web and a relatively light layer of paper tissue on one face thereof, said paper tissue being extensible at least twenty percent, the layers being united nonadhesively by strong pressure at frequent intervals along narrow lines of compression formed by high pressure so as to provide a substantially permanent bond between the layers along the lines of compression, the layers being in an uncompressed state at approximately their natural bulk in relatively wide areas between the lines.

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