

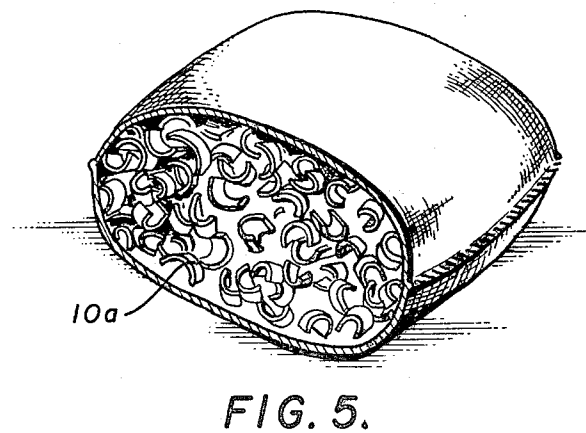
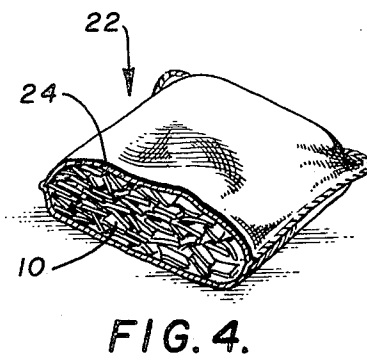
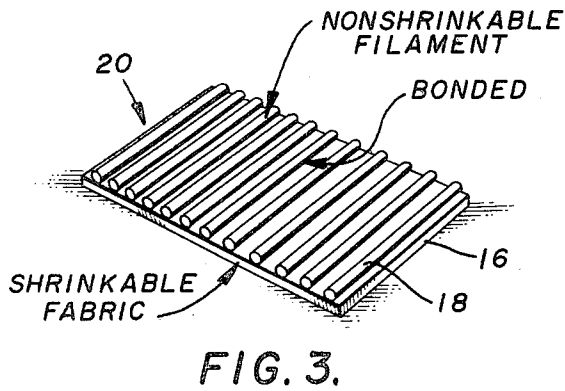
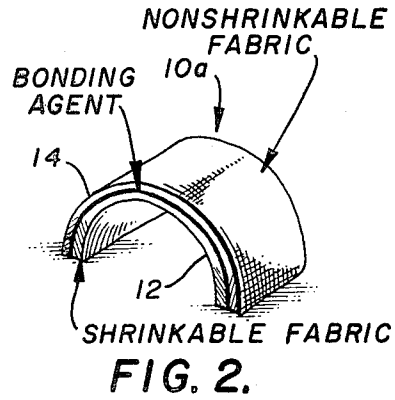
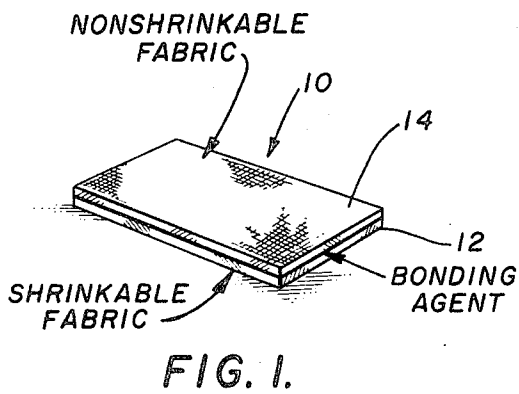
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FIBERFILL FOR PILLOWS AND METHOD OF MAKING SAME

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FIBERFILL FOR PILLOWS AND METHOD OF MAKING SAME

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ABSTRACT OF THE DISCLOSURE

Small rectangular shaped articles useful to replace natural feathers in pillows and the like are comprised of a two-ply fabric wherein the fabric is made from two contiguous layers of synthetic fibers having differential shrinkage so that upon exposure to a hot, moist atmosphere, the two-ply fabric curls into a three-dimensional shape having bulk.

This invention relates to an improved fiberfill or stuffing material suited for use in pillows and similar articles in which high bulkiness and resilience are desired. More particularly, this invention relates to an article of manufacture comprising two bonded sheets of textile fabrics or spaced filaments having significantly different shrinkage capabilities which cause the fabric to form an arched or other non-planar surface when subjected to heat.

Synthetic fibers, and notably the acrylic and polyester fibers, have found wide acceptance as a filler material for pillows, sleeping bags, comforters, and the like. These fibers are commonly employed in the form of staple which may be processed on a Garnett or Rando-Webber to form a batting. In the manufacture of pillows utilizing the processed staple fiber, a batt the approximate width of a pillow is folded or rolled and then stuffed into a pillow casing. Pillows produced in this manner are light in weight and initially soft and resilient. It is an accepted fact, however, that the batting in these pillows tends to mat down during use and in such cases loses much of its initial softness and resilience. Also, the batting often cracks or separates and cannot be reformed by the user. Thus, the batting cannot be fluffed up and plumped as can pillows stuffed with loose natural feathers or goose down. Therefore, it is highly desirable to provide a fiberfill comprised of synthetic fibers which exhibits characteristics similar to those exhibited by natural feathers or down. With the foregoing in mind it is an object of this invention to produce an improved fiberfill material having excellent resiliency from synthetic fibers.

Another object of this invention is to produce a fiberfill material which will not mat down and which can be fluffed in a casing much like natural feathers or goose down.

A further object of this invention is to provide an article of manufacture from synthetic fibers which may be used as a sanitary and nonallergic stuffing material for pillows and the like.

A still further object of this invention is to provide a fiberfill material which may be shipped to the manufacturer of stuffed articles in the form of a two-ply fabric and subsequently converted into rectangular sections and bulked to attain the configuration of feathers.

Another object of this invention is to provide a fiberfill material in sheet form having potential bulkiness which may be reduced into small sections and stuffed into a pillow, etc., prior to developing the bulk.

These and other objects and advantages of this invention will become apparent from the following detailed description.

The objects of this invention are accomplished by bonding together two fabrics comprised of synthetic fibers having different shrinkage characteristics, cutting the two-

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ply fabric into small rectangular sections and exposing the said sections to a hot, moist atmosphere to effectively shrink the shrinkable component whereby the fabric sections attain an arched or curved condition somewhat similar to feathers. The term "fabric" as used herein denotes any relatively thin flat sheet comprised of synthetic fibers and may be either woven or non-woven, and formed from either staple length or continuous filament fibers. By synthetic "feathers" is meant rectangular sections of fabric formed into concave or non-planar configurations. The differential shrinkage of the two bonded fabrics causes the fabric sections to arch and form a concave or other non-planar surface when subjected to a hot, moist atmosphere, thereby increasing the effective bulk of the sections. Since the fabric sections are loose and separate from one another, they may be fluffed and shifted within a pillow ticking much like feathers or down.

Fibers useful in this invention may be any of the man-made fibers, but preferably the common acrylics or modacrylics, the only requirement being that the fiber pairs be selected so that the bonded fabric sections have a significant difference in shrinkage when exposed to a hot, moist atmosphere.

Examples of useful acrylic fiber compositions are those which contain at least 85% acrylonitrile and up to 15% of one or more other olefinically unsaturated monomers copolymerizable with acrylonitrile such as the acrylic and methacrylic acids and their esters, including butyl methacrylate, ethyl acrylate, acrylamide, methacrylamide, methacrylonitrile, methyl vinyl ketone, styrene, vinyl acetate, vinyl methacrylate, vinyl chloride, vinylidene chloride, alkyl vinyl ethers, and other mono-olefinic polymerizable materials.

Modacrylic polymers suitable for use in this invention are those which contain at least 60% acrylonitrile and up to 40% of one or more of the mono-olefinic copolymerizable monomers enumerated above.

In accordance with the present invention, one fiber having little or no shrinkage is selected from the above compositions, and a second fiber having from 10 to 40% or more shrinkage, with at least 10% and preferably 20% or more shrinkage than the first fiber is selected. The second fiber may be of different composition than the first fiber, or may be of the same composition, but subjected to special treatment to impart thereto the desired high shrinkage characteristics. Separate fabrics are then prepared from each of the two fibers selected.

Fabrics prepared from the first fiber which has little or no shrinkage may be produced by any conventional woven or non-woven method, and may be in the form of cloth, felt, film, or a light batting. Generally a light batting produced on a Garnett or Rando-Webber is preferred because of the lower manufacturing cost per yarn and the extra bulk imparted to the finished article.

Fabrics prepared from the second fiber may also be woven or non-woven provided that the fiber filaments within the fabric are substantially oriented in a single direction so that the resulting fabric has the capability to shrink predominantly in one direction during later heat treatment. Substantially oriented fabric of the nature is obtained in the form of a batting from the Garnett or Rando-Webber, or in the form of a web from a staple card. Alternatively the second oriented "fabric" may take the form of a multitude of separate and parallel continuous filaments which are not interconnected among themselves but which, when bonded to the first fabric, form an essentially continuous sheet. Also webs or sheets of fibers produced by cone spinning processes are suitable provided substantially unshrinkable filaments are spaced apart on the surface thereof transverse to the longitudinal direction of the webs or sheets.

The two fabrics are affixed together either by solvent cementing or latex bonding. Fabrics containing acrylonitrile may be cemented by padding, spraying, or immersing the fabrics in a solution of any of the common solvents for acrylonitrile fibers, such as ethylene carbonate, zinc fluoroborate, or dimethyl formamide. The wetted fabrics are pressed together by means of a squeeze roll or similar device and dried while in intimate contact. The drying temperature must be kept below that at which fabric shrinkage would occur. The fabrics may also be joined by padding, spraying, or immersing in a latex solution and drying in a similar manner. One such acceptable latex solution is a 15 percent solids solution of Hycar 1571, a butadiene-acrylonitrile resin.

The double bonded fabric is then cut by any convenient means into approximately rectangular sections which are 0.5 to 3 inches wide and 1.5 to 5 inches long, the preferred dimensions being such that the length is approximately 1.5 to 2.5 times the width. The length extends in the direction of orientation of the shrinkable fiber components.

Thereafter, the fabric sections are exposed to a hot, moist atmosphere in order to develop the non-planar configuration by shrinking the shrinkable fabric component. This is conveniently done by placing the sections into an autoclave and introducing steam under sufficient pressure to attain the temperature required to shrink the fiber. The effect of the steam treatment and resulting shrinkage of one fabric on the configuration of the rectangular sections is illustrated by the accompanying drawing, in which:

FIGURE 1 shows a flat rectangular fabric section composed of two fabrics having differential shrinkage characteristics prior to exposure to a hot, moist atmosphere;

FIGURE 2 shows an arched, non-planar section after exposure to a hot, moist atmosphere;

FIGURE 3 shows a flat rectangular fabric section comprised of a thin non-woven having high shrinkage longitudinally thereof and substantially unshrinkable continuous filaments bonded to the non-woven;

FIGURE 4 is a sectional view of a casing filled with unbulked synthetic fiberfill material of this invention; and

FIGURE 5 is the sectional view of FIGURE 4 illustrating the "feathers" after bulking.

Referring to FIGURE 1, there is shown a fabric section 10 comprised of a high shrinkable fabric component 12 bonded to a substantially nonshrinkable fabric component 14. In FIGURE 2 the fabric section 10 is shown after having been subjected to an elevated temperature whereupon shrinkage of the component 12 contracts and the section 10 becomes arched or curled to form a feather-like member 10a. This can be accomplished by subjecting the sections to steam or some other source of heat. The fabric sections may be bulked by tumbling in a heated oven or may be bulked after their enclosure in a casing.

There is shown in FIGURE 3 a non-woven highly shrinkable fabric 16 having superposed and bonded thereon substantially unshrinkable filaments 18 to form a fabric section 20. The sections can be formed into synthetic "feathers" in the manner described above for fabric sections 10.

To facilitate stuffing of the fiberfill material in pillow casings, etc., the fabric sections may be introduced in their unbulked condition. In FIGURE 4, a portion 22 of a casing 24 is shown partially stuffed with unbulked fabric sections. Thereafter, the open end of the casing is secured by any well known method and the stuffed article is placed in an autoclave or other heated environment to bulk the filler material. The voluminousness of the feathers is illustrated in FIGURE 5. Since the bulk of the pillow, comforter, or the like depends on the ratio of airspace within the concave surface of the filler material versus the weight thereof, it is readily apparent that the products made in accordance with the invention have exceptional bulkiness. Moreover, the feathers are substan-

tial to the extent that they provide excellent resilience.

The following examples are cited to illustrate the invention and are not intended to limit it in any way. Unless otherwise specified, all parts are by weight.

Example I

A 3.0 denier acrylic fiber comprised of 90 percent acrylonitrile and 10 percent vinylidene chloride and having a fiber shrinkage of less than 2 percent in steam at 280° F. was cut to 2-inch staple and processed on a Rando-Webber to form a first batt weighting about 2 ounces per yard.

A second 2.0 denier acrylic fiber comprised of 93 percent acrylonitrile and 7 percent vinyl acetate and having a fiber shrinkage of 33 percent in steam at 280° F. was cut to 2-inch staple and processed on the Rando-Webber to form a second batt weighting about 2 ounces per yard.

The bottom surface of the first batt and the upper surface of the second batt were sprayed with a 15% aqueous solution of Hycar 1571 latex, and the two batts brought together and pressed into intimate contact in a squeeze roll. The two batts were dried together at 175° F. for 10 minutes.

The two-ply bonded fabric was cut into rectangular sections 2 by 3 inches, and placed into an autoclave where steam was introduced at 35 p.s.i.g. and 280° F. The steam pressure was applied and released seven times to assure complete penetration into the fabric mass. A vacuum was then applied to the autoclave in order to remove the moisture and allow the fabric sections to cool.

When removed from the autoclave, the fabric sections were non-planar and bulky in nature, and suitable for use as a pillow stuffing material or the like.

Example II

A first and second fabric batting described in Example I were sprayed with a 15% aqueous solution of ethylene carbonate, combined in a squeeze roll, and dried at 175° F. while in intimate contact.

The bonded fabric was cut into rectangular sections 2 by 3 inches and thereafter steamed in an autoclave to develop non-planar configurations as described in Example I.

Example III

A 3.0 denier presteamed acrylic fiber comprised of 93 percent acrylonitrile and 7 percent vinyl acetate, having a fiber shrinkage of 5 percent in steam at 280° F., was cut to 2-inch staple and processed on a Rando-Webber to form a batt weighing 2 ounces per yard. The batt was sprayed with a 15 percent aqueous solution of ethylene carbonate, and overlaid with 10 parallel continuous filaments per inch of a second fiber comprised of 93 percent acrylonitrile and 7 percent vinyl acetate which had been prestretched to obtain a filament shrinkage of 33 percent in steam at 280° F. The two-ply fabric thus produced was dried at 200° F., and cut into 1 by 2.5 inch rectangular sections.

Fabric sections treated in a autoclave according to the aforementioned procedure in Example I were non-planar and bulky, and thus suitable for use as a fiberfill material.

Example IV

A 3.0 denier modacrylic fiber comprised of 80 percent acrylonitrile and 20 percent vinylidene chloride and having a fiber shrinkage of less than 2 percent in steam at 280° F. was cut to 2 inch staple and processed on a Rando-Webber to form a first batt weighing 2.5 ounces per yard.

A second 3.0 denier acrylic fiber comprised of 93 percent acrylonitrile and 7 percent vinyl acetate and having a fiber shrinkage of 33 percent in steam at 280° F. was cut to 3 inch staple and processed on the Rando-Webber to form a second batt weighing about 4 ounces per yard.

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The bottom surface of the first batt and the upper surface of the second batt were sprayed with a 15% aqueous solution of Hycar 1571 latex, and the two batts brought together and passed through a squeeze roll prior to drying at 200° F. for 10 minutes.

The two-ply bonded fabric was cut into rectangular sections 2 by 3 inches, placed into a pillow casing which was then enclosed, and thereafter the pillow was steamed in an autoclave at 35 p.s.i.g. to shrink the acrylic component of the fabric sections. When removed from the autoclave, the pillow was light and bulky. The pillow exhibited good resilience and the synthetic feathers could be redistributed within the casing.

It will be apparent to the trade that the present invention suggests many other advantages. For example, pillows, comforters, etc., are bulky products and are expensive to ship from the manufacturer to the retailers. Heretofore, high shipping costs have been reduced by locating small manufacturers approximate to the retailers. It will be appreciated that by practicing this invention, basic manufacturing of the unbulked product can be centralized in a single, larger and more efficient manufacturing facility. The pillow, etc., may be shipped to small secondary processing plants located in the particular marketing areas where they are bulked and packaged for local distribution.

A further important benefit suggested by the invention is that the unbulked filler material may be introduced into the article casing more readily. In this way more fiberfill can be introduced and thereafter, the stuffed article may be subjected to steaming or heating to bulk the synthetic "feathers" to product a bulkier product.

Since it is apparent that many changes and modifications can be made in the above-described detailed specification without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited except as set forth in the claims.

I claim:

1. As an article of manufacture, a two-ply, normally flat fabric curled into a three-dimensional shape, said fabric comprised of two coextensive and continuously contiguous layers of synthetic fibers superposed one on the other and bonded together along the contiguous portions of said layers to form a sheet-like structure with each of said layers having substantially differential shrinkage capabilities, said shrinkage capabilities being developed

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by subjecting said two-ply fabric to heat whereupon the layer of synthetic fibers having the greater shrinkage contracts to bulk said flat fabric into a three-dimensional curl.

2. An article of manufacture as set forth in claim 1 in which the layers are woven fabrics.

3. An article of manufacture as set forth in claim 1 in which one layer of fibers is a woven fabric and the other layer is a non-woven fabric.

4. An article of manufacture as set forth in claim 1 in which one layer is a woven fabric and the other layer is comprised of a plurality of spaced continuous filaments.

5. An article of manufacture as set forth in claim 1 in which one layer is a non-woven and the other layer is a plurality of continuous filaments spaced apart and extending transversely across the non-woven layer.

6. An article of manufacture as set forth in claim 5 in which the non-woven layer is characterized by a shrinkage of 15 to 40 percent and the filaments are substantially non-shrinkable.

7. An article of manufacture as set forth in claim 6 in which the sheet-like structure is shrinkable essentially in one direction only.

8. A method of making pillows comprising, introducing a synthetic fiberfill material of a two-ply construction with each ply having substantially different shrinkage capabilities into a casing through an opening therein, closing said opening, and subjecting said casing to a hot, moist atmosphere to bulk said fiberfill material.

9. A method of making a pillow comprising, introducing into a pillow casing a fiberfill material of a two-ply construction with each ply having substantially different shrinkage capabilities, enclosing the material in the casing by sewing the marginal edges together, placing the pillow in an autoclave and steaming the fiberfill at about 35 p.s.i.g. until the fiberfill is bulked, and removing the pillow from the autoclave.

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