March 19, 1968 J. KAPLAN 3,373,455

FILLING MATERIAL FOR PILLOWS

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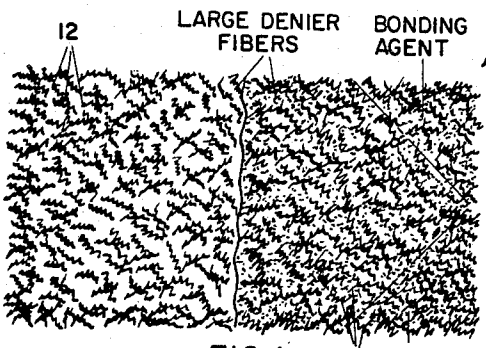

FIG. 1.

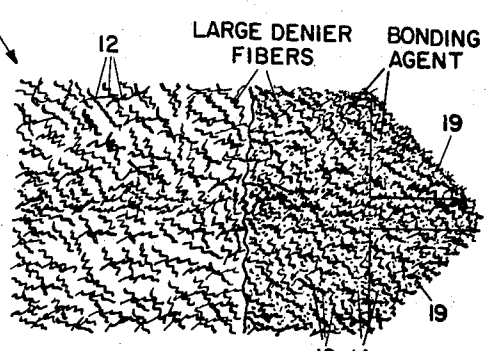

FIG. 2.

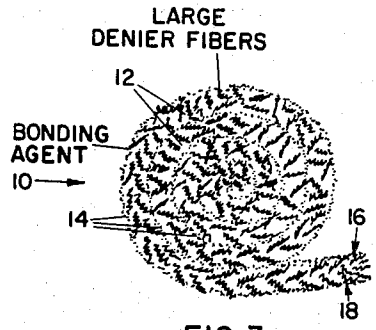

FIG. 3.

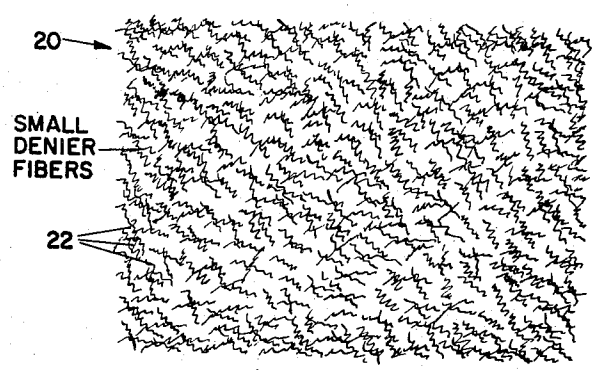

FIG. 4.

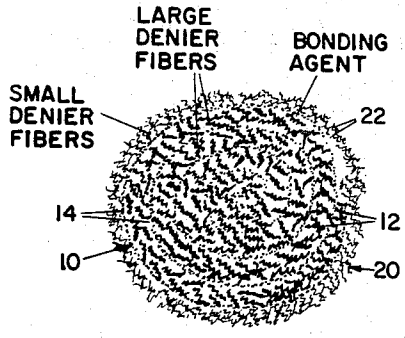

FIG. 5.

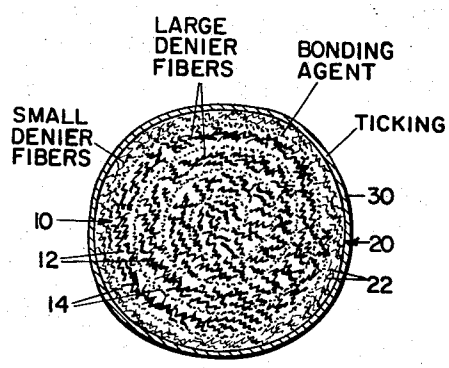

FIG. 6.

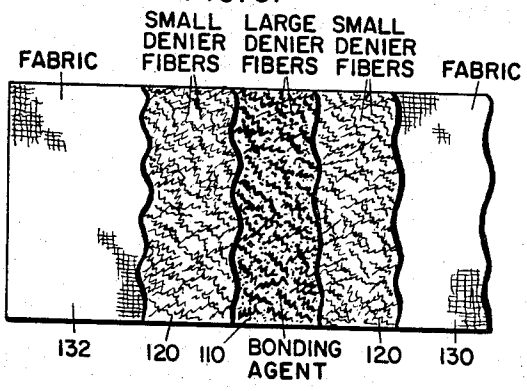

FIG. 7.

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FILLING MATERIAL FOR PILLOWS

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ABSTRACT OF THE DISCLOSURE

A filling material for pillows comprising a package formed of an inner core of a batt of randomly oriented large denier fibers, bonded at the outer surfaces of the batt, the batt being rolled upon itself to form a jelly-roll core having high resiliency, and an outer sleeve-like wrap of a batt of randomly oriented small denier fibers enwrapping the jelly-roll core, the fibers in the batt of small denier fibers being unbonded to form a soft fluffy outer wrap.

This invention relates to composite arrangements of fibers useful as filling materials and characterized by dual qualities of resiliency and softness, features especially desired in filling materials adapted for pillows, mattresses, sleeping bags, clothing, and like devices where cushioning and quilting qualities are requisite.

The desiderata in filling materials for cushioning and quilting applications, additionally to resiliency and softness, are high bulk per unit weight, capacity for restoring to the original high bulk condition after sustaining the normal distortions and compressions of service, freedom from agglomeration or lumping, and freedom from leaking or penetrating through the interstices of the covering or enveloping fabric.

Down and selected feathers of waterfowl had long been accepted as the best filling materials for cushioning and quilting purposes, when kapok came into common use. All have lacked the desirable characteristic of resiliency for optimum cushioning effect and have exhibited the alarming tendency to pack or become lumpy.

In more recent times, synthetic organic polymer fibers have come into popular use as filling materials, staples of synthetic rayon, polyvinyl chloride acetate, vinyl chloride acrylonitrile, polyvinylidene chloride, polyethylene, nylon and zein being illustrative. Prepared in staple length, they are known to be processable into unsupported nonwoven matts or batts as by the usual carding or garnetting equipment and the usual apparatus for cross-plying so as to give random orientation to the fibers.

It is a primary object of this invention to produce composite arrangements of the so-called man-made fibers for use as filling materials in pillows, cushions, mattresses, sleeping bags, clothing and the like, and it is in the general fields of cushioning and/or quilting that the invention is particularly useful.

Another object is to provide composite structures of filling materials of man-made fibers arranged in manner best to adjust to the distinctive forces to which fibers are exposed as an incidence to normal use in applications of the described types and without any impairment of the desired elastic recovery or flexibility and/or of the essential softness of the structure.

The invention is further aimed to teach improved cushioning means constituted in each case by a composite filler structure made up of different fibrous components strategically related with respect to each other, thereby to insure against displacement of the fibrous elements of one component with respect to the fibrous elements of the other as the result of the forces of distortion normally sustained in use and also to assure long life under rigorous operational use.

These and other objects and advantages will hereinafter appear in the illustrative embodiments here described and shown in the accompanying drawing in which:

FIG. 1 is a view, in top plan, of a matt or batt of loosely-assembled, non-woven, relatively large denier fibers, characterizing one of the components of the invention;

FIG. 2 is a view, similar to FIG. 1, with corners of the matt or batt being folded preparatory to rolling;

FIG. 3 is a view, in side elevation, of the FIGS. 1 and 2 matt or batt following partial rolling thereof into a jelly-roll formation;

FIG. 4 is a view, in top plan, of a matt or batt of loosely-assembled, non-woven, relatively small denier fibers, characterizing the other of the components of the invention;

FIG. 5 is a view, in side elevation, of the FIG. 4 matt or batt enwrapped about the FIG. 3 jelly-roll formation;

FIG. 6 is a view, in cross section, of the FIG. 5 jelly-roll formation enwrapped by a ticking or fabric covering, to produce a fluffy, resilient cushioning article of high bulk per unit weight; and

FIG. 7 is a broken view, in plan, showing a non-rolled flattened or planar structure of the components of FIGS. 1 and 4 prepared for use in such as mattresses, sleeping bags, clothing and the like.

Masses of man-made fibers of relatively large denier are able to withstand substantial compressive forces, having high tensile and flexural strength, but are notoriously harsh or hard, when touched or rubbed against.

Masses of man-made fibers of relatively small denier are notoriously without capacity to withstand substantial compressive forces, being weak in ultimate strength, but are particularly soft, when touched or rubbed against.

Advantageously, large or heavy denier fibers offer the maximum in resilience or high degree of resistance to bending and torsion, their greatest utility value being in their compressive strength, represented by a continuous ability to recover or return to their initial high-bulk condition after the usual distortions sustained during a given period of service.

Further, they possess in high degree all of the different physical properties embodied in the quality known as toughness, important for cushioning articles, and they likewise possess outstanding properties of strength, dimensional stability in washing with small residual shrinkage or elongation, suppleness and pliability, thermal insulating quality, and receptiveness to crimping.

With respect to crimping, same gives to the staple that mass cohesion so essential to good processing properties and fundamental for the development of loft in the spun or extruded mass, said loftiness being permanent in the respect that it is not affected by washing or cleaning. Crimping aids in preventing matting and gives soft nap, greater bulk and loft without increase in weight, and the feelings of liveliness and crispiness.

On the adverse side of the ledger, there is the fact that larger denier fibers do not give the desired service life in a cushion due to their brittleness, they breaking or shearing easily during flexure. Too, they exhibit tendencies to be noisy, resultant from their shifting movements as experienced with compression. Worse, they have a strong tendency toward leakage through any casing fabric serving as a covering thereover, thereby to make the outer casing surfaces rough and bristled and hence less than pleasant for the cushioning function. To minimize this leakage problem, expensive closely-woven or specially-finished fabrics have been heretofore used for casings, but such for the most part have been stiff, uncomfortable, and not entirely successful in preventing the leakage.

On the other hand, small or light denier fibers advantageously offer the maximum in softness and fluffiness. However, such in and by themselves do not give the desired service life as they lack springiness and tend to pack whereby the formed article in which used is not automatically returned to its original dimensions after use and loses its capacity for being manually refluffed to a high-bulk condition. Too, they are found especially wanting, when subjected to cleaning and washing operations, because of the lumping tendency.

Hitherto, in given applications, compromises have had to be made between uses of large and small denier fibers. Exploitation of large denier fibers has meant sacrifices in softness; conversely, exploitation of small denier fibers has meant sacrifices in resiliency.

The present invention stems from the theory that an outer shield or veil or envelope of loosely-arranged carded small denier fibers enwrapped or sleeved about a core of loosely-arranged carded large denier fibers will allow a composite structure which will militate against the admittedly unsuccessful use of a batt of large denier fibers alone or a batt of small denier fibers alone in such as a pillow.

Combinations of fibers of both types, I have determined, exhibit the desirable characteristics of greater resiliency and softness, the characteristics so desirable in filling materials and in pillows and cushions and the like incorporating same, and further offer high bulk per unit weight, may be easily refluffed by simple manipulation, even after washing, and exhibit no leakage through the casing, therefore permitting the use of inexpensive, loosely-woven casing materials.

The first or inner or interior filling component is the first-to-be-defined element of the two-part arrangement.

A batt **10** of synthetic organic fibers **12**, having a generally rectangular configuration, is formed, preferentially though not obligatorily, from a synthetic organic linear polymer, such as nylon, the fibers most suitable therefor being those having dimensions of between 30 and 40 denier.

The batt, in the form of a non-woven felting, is produced by any of the various known techniques, such as by collecting the fibers on a moving belt travelling at a rate selected to give a build-up of criss-crossed fibers of a predetermined thickness which, for the defined purposes, will preferably range from about ½ inch to 3 inches.

The fibers will contain a sufficient crimp density to provide a matt or batt which, when unloaded, will offer a bulk of between 8 to 16 oz. per square yard, the thickness thereof of course being determined by the weight.

Synthetic fibers with a crimp of waviness process more readily and the crimping effect serves to build lasting resilience, crush resistance, and sag resistance. The greater the number of crimps, the greater the bulk and resiliency of the mass. Perferentially, the individual fibers should each contain at least 9 crimps per inch.

The jackstraw-arranged fibers of the matt or batt are next constrained to their relative positions in the formation by a bonding agent **14** in the form of a synthetic resin applied to the opposite surfaces **16** and **18** as by spraying, flow coating, or equivalent process, the applied bonding being such that at least 90% of the fiber lengths are free from the bonding agents so as to be free from bonding to each other, the adhesive effect causing fusing to take place only at and adjacent surfaces **16** and **18**.

Preferentially, at least 10%, but no more than 15%, by weight of the bonding material relative to the weight of the fibers is employed. To apply less is to fail to obtain the bonding or fusing function. To apply more is to cause undue stiffness to the mass.

The synthetic resin sets so as to secure the fibers to one another at their junctions or crossing points at the said opposite surfaces, the treatment being aimed to condition the fibers in the respect of fusing same into a permanent network structure of desired shape but not of

otherwise modifying same as respects elasticity, elongation or the like.

The thermoplastics for such use have been the acrylics with no curing or after treatment being dictated for the reason that the resins are fully polymerized in the original dispersion.

The resin acts as an adhesive or cement, depositing as minute islands on the fibers adjacent the respective surfaces to reduce slippage by setting the fibers in place and providing added body to the mass. So fused, the criss crossed fibers interiorly of the mass, intermediate the two said surfaces, being interlocked with respect to each other in a heterogeneous manner, are secure from disengagement from the mass and/or from parallelization or flattening out, wherefore the resiliency of the mass would be impaired.

Matt or batt **10**, following bonding, is rolled into a jelly-roll arrangement so as to allow the fibers of the superposed or adjacent layers to interlock because of the generally rough or non-polished confronting surfaces of the layers.

In the rolling process, the opposite corners **19** of the batt, at the end where the rolling is initiated, preferentially are turned inwardly upon themselves so as to afford opportunity to place a greater mass of fibers at the center of the formed core.

In the rolling program, the tightness of the package will be according to the degree of stiffness desired in the end product; the tighter the roll, the stiffer the end product; the looser the roll, the more resilient the end product.

The second or outer or exterior filling component is the next to-be-described element of the two-part arrangement.

A matt or batt **20** of non-woven synthetic organic fibers **22**, having a generally rectangular configuration, is similarly formed, preferentially though not obligatorily, from a synthetic organic linear polymer, such as nylon, to allow a buld-up of criss-crossed fibers of predetermined thickness which preferably will range from about ½ inch to 3 inches.

Fibers found most suitable for such outside filling material component are those having dimensions of between 4 and 7 denier.

The fibers must contain a sufficient crimp density to provide the batt, when unloaded, with a bulk of between 4 to 8 oz. per square yard, the thickness of the batt being determined by the weight.

Batt **20** is of a width at least ⅓ wider than batt **10**, for purposes presently to appear.

The unbonded batt of small denier fibers is enwrapped around the jelly-roll arrangement of the large denier compenent and defines an outer wall of the composite structure with an overhang at the opposite sides thereof, allowed by the wider batt **20** so as to provide a covering over the edges of the batt **10** at the said sides for better sustaining edgewise or endwise impact.

The enclosing of the core defined by the bonded batt **10** thus allows an outer layer of unbonded batt to absorb all of the sidewise strain, which otherwise might cause deterioration of the fibers in the bonded batt of the jelly-roll.

The inner component offers the desired resiliency to the structure and the outer component offers the desired softness to the structure.

By structure delineated, the cushioning or resiliency effect is retained longer with less fiber material being required.

Herewith, air within the mass is retained therewithin so that upon the release of any pressurizing force, the structure comes back to its original form. Too, the enwrapment of small denier fibers serves to muffle the noises of the large denier fibers therewithin.

The composite structure is then fitted into a suitable ticking **30** to form a completed pillow or cushion represented by P.

In cases requiring a flat product, an unbonded batt **120** may be superposed upon a bonded batt **110**, as shown in FIG. 7. The large denier fiber batt **110** is disposed in a plane and small denier fiber batts **120** placed thereover and thereunder with a covering fabric **130** thereunder and a covering fabric **132** thereunder.

Cushioned or quilted articles embodying features of the invention are able to withstand repeated compressions under load without noticeable effect on the fibers or on the resiliency of the structure.

The advantage of the articles of the invention over those produced by conventional methods and employing fillers or large denier fibers or fills of small filaments result from the use of the combination of filiments.

The enwrapping of the small denier batt around the large denier batt prevents migration and aggregation of filaments to form lumps.

If, in the distortions which occur in use, some tangling should occur, this can be alleviated by manipulating the filaments through applying tension and vibration to the article. Such action temporarily removes the crimp from the filaments to relieve entanglement.

Cushioning articles made in accordance with this invention are substantially free from filament leakage and retain through service and washing an extraordinary ability to be refluffed to a high bulk condition, significant properties in determining service life and satisfaction.

In addition to the advantages in service, the invention provides important advantages in materials. With filament leakage eliminated, a wide choice in the fabrics used for coverings is available, a feature particularly advantageous in articles of clothing where softness, drape, and aesthetic qualities are of importance. Too, cheap and loosely woven fabrics will be satisfactory for coverings.

I claim:

1. A filling material for pillows comprising, a package formed of an inner core of a batt of randomly oriented large denier fibers bonded at the outer surfaces only of the batt, the batt being rolled upon itself to form a jelly-roll core having high resiliency, and an outer sleeve-like wrap of a batt of randomly oriented small denier fibers enwrapping the jelly-roll core, the fibers in the batt of small denier fibers being unbonded to form a soft fluffy outer wrap.

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