NON-WOVEN TEXTILE PRODUCTS


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ABSTRACT

This disclosure relates to composite textile constructions formed by needle punching non-woven fibers into a layer of plastic material. In one embodiment a batt of non-woven fibers is needle punched into a plastic sheet and the composite laminate then hot calendred to press the punched fibers into the plastic sheet thereby forming a smooth surface. In another embodiment a non-woven batt is needle punched into a heat-retractable plastic grid or shrinkable carrier. The grid is then caused to retract under dimensionally controlled conditions whereby the fibers in the unpunched portions of the batt will rise up in arch-like ridges or designs out of the plane of the batt thereby presenting a resilient textured surface.

17 Claims, 18 Drawing Figures
FIG. 1

PLASTIC SHEET WEB SUPPLY

NEEDLE LOOM

COLD ROLL

TAKE UP ROLL

FIG. 2

FIG. 3

FIG. 4

FIG. 5

PLASTIC GRID FABRIC

NON-WOVEN WEB

NEEDLE LOOM

DRAW THROUGH ROLLS

COMPOSITE TAKE-UP

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ATTORNEYS
NON-WOVEN TEXTILE PRODUCTS

This invention relates to non-woven textile constructions and, more particularly to textile constructions wherein a batt of non-woven fibers is needle punched into a layer of plastic material and thereafter subjected to heat, and in one case pressure, to effect various results.

In one embodiment of the invention the batt of non-woven fibers is needle punched to a heat-retractable plastic grid or shrinkable carrier which is thereafter caused to shrink under dimensionally controlled conditions whereby the fibers in the unpunched portions of the batt will rise up in archlike ridges or designs out of the plane of the batt thereby presenting a resilient textured surface.

In the conventional method of manufacturing needle punched fabrics, a loosely formed batt of fibers is superimposed upon and subsequently needle punched through a backing material, such as woven jute, which rely for resilience upon the addition to the bottom of the backing material a third component, such as an elastomeric spongy, resilient layer. These components thus combined are most often subjected to a saturation treatment using latex emulsions and the like to bind the entire assembly into a composite structure.

The very nature of the needle punching operation as it has been practiced virtually eliminates the possibility of utilizing the inherently advantageous properties of the face fibers. This is due primarily to the fact that the needle punched product as produced is of such high density, closely packed, and filled with and hardened by resin binders that any independent fiber motion, fiber interaction or mobility in general is precluded.

A further disadvantage in the prior art needle punched fabrics is the difficulty in achieving moldability. The term "moldability" here refers to that property in a sheet-like material, whether a textile product or not, which allows a deformation of the material out of its plane and into a plane normal to the face of the starting material all the while maintaining a smooth unbroken surface. This disadvantage is due, again, to the general lack of mobility or flexibility in the needle punched, fiber-fabric-adhesive combination.

It is, therefore, an object of this invention to provide a needle punched composite textile material exhibiting high resiliency, lightness in weight, moldability, flexibility, as well as other desirable properties suitable for automotive floor covering, domestic and commercial area carpeting, marine deck covering, upholstery and clothing such as coats, jackets and the like.

More particularly, it is an object of this invention, in one aspect thereof, to provide a textile product that is manufactured by bringing together a batt of non-woven fibers and a sheet of plastic material, needle spaced groups of fibers into the sheet, and applying heat and pressure to embed the needle fibers in the sheet and thereby secure the batt thereto.

Another object of this invention is to provide a method of manufacturing a non-woven textile product by bringing together a batt of non-woven fibers and a sheet of plastic material, needle punching spaced groups of the fibers into the sheet to form a composite structure, and then running the composite structure between a pair of rollers, the roller engaging the batt being cold and the roller engaging the sheet being hot whereby the plastic is fused or adheres to the needle punched fibers and the predominant portion of the fibers in the batt remain free of the plastic material.

A further object of this invention, in yet another aspect thereof, is to provide a novel, composite textile fabric having superior resiliency properties comprising, at least, one layer of heat shrinkable, filamentous, slit film, or woven heat-retractable thermoplastic grid fabric in combination with at least one layer of fibrous, synthetic, natural or otherwise blended non-woven batt materials wherein the fibrous batt is attached in a preferential pattern to the heat-retractable backing material and wherein the composite structure is subsequently shrunk, by heat or chemical action, under dimensionally controlled conditions so as to cause a rearrangement or repositioning of the pattern, thus causing the unattached portions of the batt to rise up and out of their plane forming a textured pattern which may include longitudinally disposed, continuous rows of archlike ridges which when deformed downward as if by foot pressure, exhibit extraordinary recovery properties.

Still another object of this invention is to provide a method of making a non-woven fabric exhibiting three dimensional effects and having high resiliency properties, comprising the steps of bringing together at least one batt of non-woven fibers and a retractable mesh or woven grid running the batt and grid through a needle loom and needle punching spaced groups of the fibers into the grid at predetermined points to form a composite structure, and running the composite structure through a shrink oven or heating zone under a predetermined time-temperature relationship and restraining the grid against shrinkage in a direction aligned with its path of movement through the heating zone while allowing controlled shrinkage in a direction transverse to its path of movement through the heating zone.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter and the several views illustrated in the accompanying drawings.

IN THE DRAWINGS

FIG. 1 is a schematic view of a method of manufacturing one type of non-woven fabric in accordance with one aspect of this invention, and illustrates a non-woven web being superimposed upon a plastic sheet and together therewith fed through a needle loom where spaced groups of the fibers in the non-woven web are needle punched into the plastic sheet to form a composite structure which is then fed through calender rolls for a purpose to be more fully described hereinafter.

FIG. 2 is a perspective view, taken partly in section along line 2—2 of FIG. 1, and illustrates a portion of the composite structure after it has passed from beneath the needle loom and shows spaced groups of fibers in the non-woven web being punched into and extending through the plastic sheet.

FIG. 3 is a perspective view, taken partly in section along line 3—3 of FIG. 1, and illustrates a portion of the composite structure after it has passed through the calender rolls and shows the punched fibers being fully embedded in the plastic sheet as a result of the heat and pressure applied by the calender rolls, while the pre-
dominant portion of the fibers in the web not extending into the plastic sheet is free of the plastic material.

FIG. 4 is a schematic view of a method of manufacturing a non-woven fabric exhibiting three-dimensional effects and having high resiliency properties formed in accordance with this invention, and illustrates a non-woven web being superimposed upon a heat-retractable plastic grid and being fed together therewith into a needle loom where the web is needle punched to the grid at spaced points defining a plurality of spaced rows or other predetermined pattern or design.

FIG. 5 is a plan view of a portion of the plastic grid illustrated in FIG. 4.

FIG. 6 is a vertical sectional view taken along line 6—6 of FIG. 4 and illustrates the non-woven web overlying the plastic grid prior to being needlel thereto and further illustrates a portion of the needles in the needle loom which are, for illustrative purposes, disposed in longitudinally extending rows.

FIG. 7 is a vertical sectional view taken along line 7—7 of FIG. 4 and illustrates a portion of the composite structure after passing out of the needle loom and shows spaced groups of the fibers in the web having been punched into and through the plastic grid.

FIG. 8 is a schematic view of the steps representing a continuation of the method illustrated in FIG. 4, and further illustrates the composite structure being subjected to a bath of acrylic or other coating material to effect fiber-to-fiber bonding and then run through a shrink oven where controlled shrinkage of the plastic grid is allowed to occur.

FIG. 9 is a horizontal sectional view taken along line 9—9 of FIG. 8 and illustrates the tapered pin tenter conveyor used to move the composite through the shrink oven and to facilitate the differential shrinking operation.

FIG. 10 is a perspective view, taken partly in section along line 10—10 of FIG. 8, and illustrates a portion of the composite structure prior to being subjected to the shrinking operation.

FIG. 11 is a perspective view, taken partly in section along line 11—11 of FIG. 8, and illustrates a portion of the composite structure after being subjected to the differential shrinking operation, and shows the unneedled portions of the non-woven web having risen up out of their plane thereby forming longitudinally disposed, continuous rows of arch-like ridges.

FIG. 12 is a perspective view of the composite structure illustrated in FIG. 11 after having been subjected to shrinking in a direction aligned with its needle punched rows, and shows the composite having acquired a more crowded zig-zag configuration and wherein the rows of arch-like ridges have further bunched-up thereby assuming a more resilient texture.

FIG. 13 is a schematic view of the initial steps in manufacturing a three-layer composite in accordance with this invention, and illustrates a plastic grid being sandwiched between two non-woven webs and together therewith being fed into a needle loom similar to that illustrated in FIG. 4.

FIG. 14 is a vertical sectional view taken through a portion of a composite three-layer construction, and illustrates a non-woven top web needle punched into a plastic grid after a non-woven backing or bottom web was first needle to the grid.

FIG. 15 is a vertical sectional view taken through a composite three-layer construction wherein a layer of foam is disposed between a non-woven web and a plastic grid backing, and illustrates spaced groups of fibers in the web having been needle punched through the foam and into the plastic grid.

FIG. 16 is a schematic view of another form of apparatus for treating the composite structure to produce fabrics in accordance with the present invention.

FIG. 17 is an enlarged fragmentary portion of the composite structure and illustrates a batt needlel to a woven, heat-shrinkable, thermoplastic web, the web being disposed between the non-woven batt and the heat source.

FIG. 18 is a fragmentary plan view, taken on line 18—18 of FIG. 16, and illustrates the tapered pin tenter conveyor used to move the material beneath the heat source and control the amount of shrinkage.

Referring now to the drawings in detail, there is seen in FIG. 1 a schematic illustration of an apparatus generally referred to by the numeral 10 for manufacturing a non-woven fabric in accordance with this invention. The apparatus 10 includes conventional means (not shown) for superimposing a non-woven web 11 of fibrous, synthetic, natural or otherwise blended batt materials onto a sheet 12 of thermoplastic material also supplied by conventional means (not shown) of the apparatus 10.

The web 11 and sheet 12 are guided by means such as rolls 13 into a conventional needle loom generally referred to by the numeral 14. The loom 14 includes a plurality of needles 15 of the type more clearly illustrated in FIG. 6. The loom 14 also includes a backing plate 16 for supporting and restraining the web 11 and sheet 12 while the needles 15 are punched therethrough.

The needle loom 14 serves to punch spaced groups of fibers 17 from the web 11 into the sheet 12. As seen most clearly in FIG. 2, the spaced groups of fibers 17 are punched into the sheet 12 and terminate in tufts 18 which extend therethrough thus forming a composite laminated structure 19 comprised of a first layer of non-woven fibers joined to a second layer of plastic material 12 by means of needle punched fibers 17.

Although the composite structure 19 has been herein described as being combined by needle punching equipment, this should in no way be construed to mean that other methods of attachment such as that provided by the "Malwatt" system — U.S. Pat. No. 3,030,786 — to H. Mauersberger or a multiple head sewing machine, for that matter, could not be used.

Referring again to the apparatus 10 illustrated in FIG. 1 for manufacturing a non-woven fabric in accordance with this invention, after the composite 19 passes from beneath the needle loom 14 it is run between calender rolls 20 for the application of heat and pressure thereto. The calender rolls 20 include a lower roller 21 which is heated by appropriate means 21a and which is applied to the plastic sheet side of the composite 19. A cold or rubber roll 22 is applied to the web side of the composite 19.

The composite 19 is run through the calender rolls 20 at a rate of approximately 15 to 25 feet per minute, at a temperature in the range of approximately 240° to 340° F, and under suitable pressure such that the web 11 is fixed or fused to the temporarily softened plastic sheet 12 and the tufts 18 which had previously ex-
tended therethrough are substantially completely embedded therein. As seen most clearly in FIG. 3, although random fibers may still extend through the sheet 12, the tufts 18 are effectively contained within the plane of the sheet 12 such that the sheet side of the composite 19 presents a smooth surface. It should be noted that the sheet 12 is merely fixed or fastened to the facing fibers in the web 11 and that the plastic material has not melted to the extent that it permeates the major portion of the web 11. The predominant portion of the fibers in the web 11 remain free of the plastic material and thus remain soft and pliable.

After the composite 19 passes from between the calender rolls 20 it may be guided by a roll 23 onto a take-up roll 24 for subsequent processing or storage.

Referring now to FIG. 4, there is schematically illustrated an apparatus 30 for manufacturing a non-woven fabric comprising at least one non-woven web and a heat-retractable plastic grid or carrier member. The apparatus 30 includes conventional means (not shown) for dispensing a roll 31 of a non-woven web 32 of fibrous, synthetic, natural or otherwise blended batt materials into a superimposed overlying relation to a thermoplastic grid 33 similarly dispensed by the apparatus 30 by conventional means (not shown) from a roll 34. The web 32 may be formed of an 80-20 blend of rayon and nylon fibers of 3 inch staple length and weighing 5.4 oz./sq. yard.

As seen most clearly in FIG. 5, the grid 33 may be comprised of a plurality of longitudinal strips 35 interwoven into a mesh-like structure with a plurality of transversely extending strips 36. The strips 35 and 36 are preferably formed of heat-retractable synthetic filaments or ribbon yarns such as Poly-Bac, a primary polypropylene carpet backing material as produced by Pachogue-Plymouth Corporation, or other thermoplastic materials. The strips 35 and 36 have been internally stressed so that they will shrink, upon application of an appropriate heat or chemical treatment, preferably of the grid 33, at a rate of 5 percent or more. In the preferred embodiment, the treatment will be the application of heat; however, the invention is not intended to be so limited and the strips 35, 36 may be formed of such materials that they will shrink upon application of chemical treatment.

The apparatus 30 may further include means such as guide rolls 37 for guiding the web 32 and grid 33 into a needle loom 38. The needle loom 38 is somewhat similar to the needle loom 14 illustrated in FIG. 1, includes a plurality of needles 39 which may be disposed, as seen most clearly in FIG. 6, in longitudinally extending rows, and a backing plate 40 having a plurality of holes 41 formed therein aligned with the needles 39. The needles 39 may also be disposed in other preset patterns to vary the final surface design of the material.

The needle loom 38, which may be of the conventional type such as the Model 6A "Fiber-Locker" as manufactured by the James Hunter Machine Company of North Adams, Massachusetts, causes the barbed needles 39 to punch spaced groups of fibers 42 of the web 32 into and through the grid 33 in longitudinally disposed rows having a center-to-center distance of approximately 0.5 inches or in patterns other than rows provided that some substantial distance is left between groups of fibers. As seen most clearly in FIG. 7, the spaced groups of fibers 42 extend through the grid 33 and terminate in tufts 43 thereby securing the web 32 to the grid 33 thus forming a composite laminated structure 44.

The apparatus 30 may further include means such as draw-through rolls 45 and 46 for moving the composite 44 from beneath the needle loom 38 and onto a take-up roll 47 for subsequent processing.

Referring now to FIG. 8, the composite 44 may be guided by a series of rollers 38 through a tank 49 having a bath 50 comprising a 5-10 percent acrylic solution. The acrylic bath 50 is an optional feature in this invention and is intended for the purpose of effecting fiber-to-fiber bonding in the non-woven web 32. The acrylic treatment is not intended to effect any bonding between the web 32 and the grid 33 as in the resin treated fabrics of the prior art and, therefore, the percentage of acrylic substances in the bath 50 need not be so great as to cause any stiffening of the fibers in the web 32. Fiber-to-fiber bonding may be accomplished by compounds other than acrylic and may be accomplished by spraying the fiber surface subsequent to shrinking.

After passing between the squeeze rollers 51 and 52, the composite 44 is fed into a shrink oven 53. The shrink oven 53 includes suitable heating means such as a hot air circulating device 54. Because the composite 44, due to the heat-retractable characteristics of the grid 33, will tend to shrink in both the longitudinal and transverse dimensions, the shrink oven is provided with a tapered pin tenter conveyor 55 which allows controlled shrinkage of the composite 44 in the transverse dimension, while restraining uncontrolled shrinkage in the longitudinal dimension.

The conveyor 55 includes two chains 56, having pins 57 disposed thereon, entrained over drive sprockets 58. In a preferred embodiment, the chains 56 at the entrance end 59 of the oven 53 are separated by a distance R, and at the exit end 60 are separated by a distance S. The distance R corresponds to the width or transverse dimension of the composite 44 prior to entry into the oven 53, and the distance S corresponds to the width to which the composite 44 is intended to be shrunk. The spacing between the chains 56 may be varied at either end of the oven 53 by moving the sprockets 58 in or out along screws 61. At the outlet end 60 each of the screws 61 may be attached to a pivot linkage 62 which permits the sprockets 58 at the outlet end 60 to be rotated about pivot pins 63 as they are moved inwardly thus maintaining an aligned relationship with the sprockets 58 at the inlet end 59 so that the chains 56 will not tend to become disengaged from the sprockets 58.

Referring specifically now to FIG. 9, there is illustrated a plurality of lines 64 which represent longitudinal rows defined by the points at which the web 32 is stitched to the grid 33 to form the composite 44. The dimension R' represents the distance between two of such rows prior to shrinkage in the transverse direction and the dimension S' represents the same distance subsequent to shrinkage.

In operation, the composite 44 is fed into the shrink oven 53 and fastened to the pins 57 of the conveyor 55 at the inlet end 59. The composite 44 is advanced into the oven 53, which has been heated to a temperature sufficient to shrink the grid 33 (approximately 330°-350°F), and at a forward speed of approximately 10 yards per minute. Of course, the speed is variable
depending upon the temperature, length of oven, desired amount of shrinkage etc. The pins 57 serve to restrain the composite 44 from shrinking in the length or longitudinal dimension, while the tapered disposition of the chains 56 from the inlet 59 to the outlet 60 permits controlled shrinkage in the width or transverse dimension.

A comparison of FIGS. 10 and 11, FIG. 10 being a portion of the composite 44 prior to shrinkage and FIG. 11 being a portion of the composite 44 subsequent to shrinkage, shows that the dimension $R'$ between adjacent stitch lines in the unshrunk sample has been reduced to the dimension $S'$ in the shrunk sample thereby causing the unsecured fibers in the web 32 disposed between adjacent stitch lines to rise up out of the plane of the web 32 thus forming arch-like ridges 65 leaving air pockets or spaces 66 therebeneath. The resulting structure is both eye pleasing, resembling a more expensive woven fabric, as well as highly cushion-like and resilient.

It should be noted that the above described differential shrinking operation, although preferably performed on a tapered pin tenter conveyor as herein disclosed, may also be suitably performed on a pin tenter frame having parallel chains. In such a construction the chains would be set apart a distance corresponding to the desired dimension after shrinkage. The composite 44 would be fed onto the chains overlapping at the sides and with a predetermined amount of slack therebetween. The composite 44 would then be permitted to shrink in width to a point where slack would no longer be evident between the pin chains of the tenter.

In another variation the chains could be initially set apart to a distance corresponding to the preshrunk dimension of the composite 44 and then moved inwardly by hand or other suitable automatic means as a selected length of the composite 44 is conveyed through the shrink oven 53.

In each of the above described methods of differential shrinkage the composite 44 is restrained by means of the pins 57 from uncontrolled shrinking in the length or longitudinal dimension. However, in each case a certain amount of longitudinal shrinking is desirable. This may be readily accomplished by overfeeding the composite 44 into the shrink oven 53 at a greater rate than the rate of movement of the conveyor 55. This will cause some slack to be evident between the pins 57 in the longitudinal dimension thus resulting in a small amount of longitudinal shrinkage. The amount of longitudinal shrinkage desirable may be as much as thirty percent, but this may be varied depending on the amount of overfeed.

A composite structure 44 that has been shrunk in the length as well as in the width is illustrated in FIG. 12. It is apparent that the longitudinal stitch lines, herein referred to by the numeral 67, have acquired a more crowded, zig-zag configuration and the ridges 65 have further branched up thereby presenting a more resilient surface.

As illustrated in FIG. 13, a multi-layered composite structure may be formed by bringing together two or more non-woven webs of varying qualities in combination with a plastic grid in accordance with the foregoing disclosure. A plastic grid 70 is schematically illustrated as being sandwiched between two non-woven webs 71 and 72.

A composite structure 73 is illustrated in FIG. 14 and may be constructed in accordance with the foregoing disclosure by first needle punching the non-woven bottom or backing web 72 to the grid 70 and thereafter needle punching the higher quality web 71 downwardly into the grid 70 and backing web 72. The composite 73 may then be differentially shrunk in the above described manner with the grid 70 serving as the shrinking vehicle or carrier. It is possible to have the higher quality web 71 on either side of the backing web 72 and the web 71 may or may not be pre-needled to the web 72.

The top web 71 may be of one color and the bottom web 72 may be of a second different color thus providing a reversibility feature to the product.

Still another advantage of the composite 73 could be obtained by making the web 71 of a more sophisticated type of fiber exhibiting high abrasion resistance, high resiliency, and making the bottom web 72 of a less expensive grade of fiber which could exhibit added bulk and resiliency to the over-all structure, as well as be made to provide anti-skill properties.

Yet another multi-layered composite 80 is illustrated in FIG. 15. The composite 80 is formed by sandwiching a layer of foam 81 between a top web of non-woven fibers 82 and a plastic grid 83. The manufacture of the composite 80 is identical to the manufacture of the composite 44; however, after shrinkage of the grid, the foam layer 81 serves to fill the spaces 66 left beneath the rising arch-like ridges 65 thus increasing the overall resiliency of the product.

FIG. 16 illustrates a modified method and apparatus for producing a textile product in accordance with the present invention. A composite sheet 90 is moved by cooperating feed rolls 92 and 94 from a supply roll 96 onto a pin tenter conveyor, generally indicated by the numeral 98, such that the composite is passed beneath a heat source, generally indicated by the numeral 100. After the composite 90 is shrunk in the manner heretofore described, the composite 90 can be passed over a spray station 102 wherein an acrylic spray, or the like, can be applied to the wear-surface of the composite. Draw through rolls 104 and 106 may be utilized to feed the treated composite onto a take-up roll 108 driven by a variable speed motor 110. The heat source 100 is comprised of a plurality of calrod 112 which are electrically connected to a suitable power source 114 and extend for the full transverse width of the composite 90. Preferably, the heat source 100 includes a reflector 116 and is supported above the composite 90 by adjustable supporting structure 120 whereby the distance between the heat source 100 and the composite 90 may be varied. While not essential, it is preferable that a fan 122, or other source of cooling air, is provided for reducing the temperature of the composite just after passage beneath the heat source 100.

As is shown in FIG. 17, the composite 90 is comprised of a batt 124, which is comprised of a non-woven material, needled to a web 126 of woven, heat-shrinkable, thermoplastic material. As the composite 90 is passed through the heat zone 100, it is preferable that the web 126 is located on the side thereof toward the heat source 100 while the non-woven batt slides across and is supported by a heat-resistant support surface 128 which may be formed of asbestos or other like material.
As is shown in FIG. 18, the composite 90 is reduced in transverse width as it is moved beneath the heat source 100 by the conveyor 98. The amount of transverse shrinkage may be controlled by adjustment of sprockets 130 along threaded shafts 132 and 134. As shown, sprockets 130 may be mounted upon internally threaded gimbals 136 for adjustment purposes.

The treated composite 90, as is shown at the right in FIG. 18, exhibits design portions 140 which provide a textured design to the non-woven web 124 in a manner similar to the ridges 65, as shown in FIG. 11.

The design formed by the raised portions 140 is directly dependent upon the needling operation of attaching the non-woven batt to the shrinkable carrier or web 33 and 126. By varying the spacing between the needles 39 (FIG. 6), and by varying the speed of the composite through the needle loom and varying the reciprocating speed of the needle loom, it is possible to obtain an infinite variety of raised, tuft-like, textured designs heretofore impossible to obtain except by such conventional methods as weaving or tufting.

It is apparent from the foregoing that the present invention provides novel non-woven fabric constructions and novel methods for making the same. The concept of attaching a non-woven batt to a thermoplastic sheet, or grid, provides textile materials having desirable characteristics absent from the prior art. The process of shrinking the grid, or woven web, subsequent to needling makes it possible to manufacture a textile material having raised design portions thereon, the design being readily reproducible.

Complete control over the amount of shrinkage is provided by the present invention wherein the pin tenter conveyors 55 and 98 control the amount of transverse shrinkage, while the amount of longitudinal shrinkage is readily controlled by the amount of overfeed governed by the speed of feed rolls 92 and 94, which are driven by variable speed motor 144.

While preferred forms and arrangement of parts have been shown in the illustration, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of the invention.

We claim:
1. An article of manufacture comprising a non-woven web of fibers disposed upon a substrate comprised of a woven grid of shrinkable material, wherein spaced groups of fibers have been forced from said web through the adjacent surface of said substrate, said web having an outer surface comprised of low portions and high portions with the lower portions being located where the spaced groups of fibers extend through the surface of said substrate and the high portions being located intermediate thereof, said substrate having been subjected to shrinkage subsequent to when said spaced groups of fibers were forced therethrough so that the substrate has closed upon said spaced groups of fibers and has caused said high portions to raise above said low portions.

2. An article as defined in claim 1 wherein said woven grid of shrinkable material is comprised of narrow flat strips of thermoplastic material extending transversely and longitudinally of said web.

3. An article as defined in claim 2 wherein said spaced groups of fibers define a series of spaced rows of tufts underlying said substrate directly below said low portions.

4. An article as defined in claim 1 wherein said spaced groups of fibers have been needled to said substrate in a predetermined repeatable pattern and said substrate has subsequently been subjected to a controlled shrinkage operation so that said high portions and said low portions provide said article with a textured repeating surface design.

5. An article as defined in claim 4 wherein said woven grid is comprised of strands of thin, flat, untwisted strips of heat-retractable thermoplastic material.

6. An article as defined in claim 4 including a backing web fixed to the underside of said substrate.

7. An article as defined in claim 6 wherein said spaced groups of fibers have been needled through said backing web.

8. An article as defined in claim 4 wherein said spaced groups of fibers define a series of spaced rows of tufts passing through said substrate directly below said low portions.

9. An article as defined in claim 4 wherein said textured repeating surface design is comprised of a plurality of resilient arch-like ridges extending away from said substrate at locations where said web has not been needled to said substrate.

10. A method of making a textile article comprising the steps of providing a web of non-woven fibers and a substrate comprised of a woven grid of shrinkable material, attaching said web to said grid at spaced locations, and shrinking said substrate to reduce the distance between said spaced locations for causing portions of said web between said spaced locations to increase in thickness and form raised surface portions between said spaced locations.

11. A method as in claim 10 wherein said step of attaching said web to said grid comprises the step of needling spaced groups of fibers to said grid.

12. A method as defined in claim 11 wherein said needling is performed discriminately and provides a repeatable pattern design of said raised surface portions.

13. A method as defined in claim 10 including the step of restraining said substrate during the shrinking step for limiting the amount of shrinkage.

14. A method as defined in claim 13 wherein said shrinking step is performed by passing said article past a heat source, and controlling shrinkage both longitudinally and transversely of said substrate.

15. A method as defined in claim 14 including the step of treating said non-woven fibers with a coating compound for effecting fiber-to-fiber bonding.

16. A method as defined in claim 10 including the step of feeding said article onto a pin tenter frame and providing slack along the longitudinal length of said substrate.

17. A method as defined in claim 16 including the step of providing slack along the transverse width of said substrate.

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