In the depicted composite depression 34, cells 34a have the largest diameter and are formed to the greatest depth into the surface 32. Further, the cells 34a may be formed first as seen in FIG. 3A. Alternatively, the smaller cells may be formed first with the larger cells formed later. The cells 34b may be formed next as depicted in FIG. 3B. Cells 34b are, in the depicted embodiment, formed to a shallower depth in the transfer roll 30 than cell 34a. It can be seen there that the cells 34b overlap the larger cell 34a, such that not all of the outline of the smaller cells 34b is actually formed into the transfer roll 30.

The final step depicted in FIG. 3C is the formation of smaller cells 34c farther outward from the central cell 34a than cells 34b. In the depicted embodiment, these outer cells 34c are formed to a shallower depth than cells 34b, thereby contributing to the general thinning at the edges of a reinforcing discrete polymeric region as seen in, e.g., FIG. 1.

Although not wishing to be bound by any theory, it is hypothesized that the features (e.g., edges, ridges, etc.) formed at the boundaries between the various cells in the composite structure of depression 34 may enhance its ability to retain molten thermoplastic composition during the transfer process as discussed below.

The depressions on transfer rolls used in connection with the present invention may be characterized in terms of the area occupied by their footprint on the exterior surface of the forming tool, a maximum dimension of the footprint (in any direction on the surface of the roll), the volume of the depression, the shape of the footprint, etc.

When characterized in terms of the area occupied by the footprint of the depressions, each of the depressions 34 may have a footprint with an area of about 4 square millimeters (mm^2) or more. In other situations, each of the depressions 34 may have footprints with an area of about 8 mm^2 or more.

Another manner in which the depressions may be characterized is in terms of the largest footprint dimension as measured on the surface 32 of the transfer roll 30. When characterized in terms of the largest footprint dimension of the footprint, it may be that the depressions have a largest footprint dimension of about 2 mm or more, in some instances about 5 mm or more.

Yet another manner in which the depressions used in connection with the present invention may be characterized is in terms of depression volume. For example, the depressions may have a depression volume of at least about three (3) cubic millimeters (mm^3) or more, or alternatively a depression volume of about five (5) cubic millimeters or more. Volume may be important because at least some of the molten thermoplastic composition may be retained within the depression during the transfer process, i.e., the depression volume may preferably be oversized relative to the preferred volume of the discrete polymeric regions to be formed by the depressions to compensate for retention of thermoplastic composition within the depressions.

The orientation of the depression 34 on a transfer roll 30 may be selected based on a variety of factors. The elongated depression 34 may be aligned in the machine direction (i.e., the direction of travel of a substrate), in the cross-web direction (i.e., transverse to the direction of travel of the substrate), or any other orientation between machine direction or cross-web direction.

FIGS. 4 and 5 depict yet another variation in the shape of depressions formed in transfer tools used to provide reinforcing discrete polymeric regions on substrates in connection with the methods of the present invention. The depression 134 is located in the surface 132 of a transfer tool in the shape of a circular trough with an island 133 located in the center of depression 134 formed in the exterior surface 132.

Depressions that include islands such as that depicted in FIG. 4 can be used to provide reinforcing discrete polymeric regions on a substrate in which a portion of the substrate is exposed within a surrounding ring of polymer. The resulting construction may, for example, be used to reinforce the substrate in the area of, e.g., a buttonhole, slot, perforation, or other opening formed on in the substrate. Other uses for similar structures may also be envisioned.

The island 133 formed in the center of depression 134 is preferably the same height as the exterior surface 132 of the transfer roll that surrounds the depression 134. Although the depression 134 is depicted with only a single island 133 formed therein, depressions used in connection with the methods of the present invention may include two or more islands located within each depression if so desired. Furthermore, the shape of the island and surrounding

depression may also vary, e.g., a depression that has a circular outermost perimeter may be paired with an island having a different shape. In another variation, the island may not be centered within the depression as depicted in FIG. 4.

Another variation depicted in FIG. 5 is the variation in depth of the depression 134, with the depression being deepest proximate the island and rising to a shallower depth at the outermost perimeter of the depression 134. Such a construction may provide a reinforcing discrete polymeric region with more flexible edges due to thinning of the polymeric region as discussed above in connection with FIG. 1. Further, although the depression 134 is not depicted as having a composite construction as does depression 34 in FIG. 2, the depression 134 including island 133 may advantageously be formed as a composite depression of multiple cells.

FIG. 6 depicts another depression 234 formed in the surface 232 of a transfer tool, with the depression 234 also including an island 233 in a manner similar to the depression 134 of FIGS. 4 and 5. Unlike depression 134, the depression 234 is elongated in a generally oval shape that may be more conducive to the formation of a buttonhole or similar structure. Again, although the depression 234 is not depicted as having a composite construction as does depression 34 in FIG. 2, it may advantageously be formed as a composite depression of multiple cells.

FIGS. 7 and 8 depict yet another variation in a composite web manufactured according to the methods of the present invention. The composite web of FIG. 7 is a laminated structure including a first substrate 310a laminated to a second substrate 310b to form a laminated substrate 310. A number of discrete polymeric regions 314 are located between the two substrates 310a and 310b. A number of smaller discrete polymeric regions 380 are depicted as being located between the larger discrete polymeric regions 314. The smaller discrete polymeric regions 380 are optional, i.e., they may not be required in addition to the larger discrete polymeric regions 314. These smaller features may be helpful to attach the two substrates 310a and 310b together between the larger discrete polymeric regions 314.

In some instances, attachment of the two substrates 310a and 310b may be accomplished using the discrete polymeric regions 314 and 380 alone when the lamination is performed while the polymer regions 314 and 380 are still in a somewhat molten state such that they can bond with counterpart discrete polymeric regions on the opposing substrate or to the opposing substrate itself. One advantage of this construction is that the lamination may be accomplished without the need for additional materials and/or process steps. The lamination between substrates 310a and 310b may alternatively be assisted by a variety of materials and/or techniques known to those skilled in the art, e.g., thermal bonding, adhesives, resins, tie films/webs, etc. See, e.g., U.S. Patent Nos. 2,787,244 (Hickin); 3,694,867 (Stumpf); 4,906,492 (Groshens); 5,685,758 (Paul et al.); and 6,093,665 (Sayovitz et al.).

The laminated construction of FIG. 7 may be useful, for example, to provide a cloth-like or softer feel or appearance, breathability, porosity, etc. on both sides of the composite web. This is in contrast to the composite webs in which the discrete polymeric regions are located on an exposed surface of the composite web. A laminated composite web structure such as that seen in FIG. 7 may also be used to provide different properties on opposite sides of the composite web structure. For example, the porosity or other properties may differ between the different substrates 310a and 310b.

FIG. 8 depicts lamination of the substrates 310a and 310b by forces operating in the directions of the arrows located at both sides of the figure. One of the aspects depicted in FIG. 8 is the combination of discrete polymeric regions 314a on substrate 310a with discrete polymeric regions 314b located on the opposing surface of substrate 310b to form the discrete polymeric regions 314 in the composite web as depicted in FIG. 7.

Another aspect depicted in FIG. 8 is that the smaller polymeric regions 380 seen in FIG. 7 may be constructed from the combination of a polymeric region 380a on substrate 310a and a polymeric region 380b on substrate 310b. In other instances, the smaller polymeric region is located on only one of the substrates 310a or 310b and preferably bonds directly to the opposing substrate during lamination. Similarly, in some instances the larger discrete polymeric

regions 314 may be formed by depositing polymer on only one of the substrates 310a or 310b before attaching the opposing substrate.

Another potential advantage of the laminated construction of the composite web seen in FIGS. 7 and 8 is that the reinforcing discrete polymeric regions 314 formed by laminating two separate polymeric regions 314a and 314b together may provide a combined reinforcing discrete polymeric region 314 that contains more polymer than could be effectively deposited as a single reinforcing discrete polymeric region using the methods of the present invention. That additional polymer may provide reinforcing discrete polymeric regions that are stiffer, thicker, or have other advantageous features.

FIG. 9 is a plan view of a composite web that may be used to form the composite web depicted in FIG. 7 in which two portions 310a and 310b of a single, unitary substrate 310 can be folded along a fold line 302 to provide the laminated structure of FIGS. 7 and 8. Alternatively, the substrates 310a and 310b as seen in, e.g., FIG. 8, may be separate from each other before lamination. The substrate 310 includes opposing reinforcing discrete polymeric regions 314a and 314b on portions 310a and 310b that are combined when the substrate 310 is folded along fold line 302.

The substrate 310 also includes a number of opposing smaller discrete polymeric regions 380a and 380b on portions 310a and 310b that are combined when the substrate 310 is folded along fold line 302. Further, the substrate 310 includes some smaller discrete polymeric regions 380a and 380b that do not oppose any similar deposits on the opposite side of the fold line 302.

Although the discrete polymeric regions 314a and 314b are shown as being uniformly spaced over the surface of the substrate 310 in a regular, repeating pattern (in both the x and y directions), it should be understood that spacing between the reinforcing discrete polymeric regions 314a and 314b may be non-uniform if so desired. Furthermore, the pattern in which the reinforcing discrete polymeric regions are arranged, may be irregular and/or non-repeating.

In other variations, portions of the composite webs manufactured in accordance with the present invention may include uniformly-spaced discrete polymeric regions as depicted in FIG. 9 while other portions of the same composite web may be free of any discrete polymeric regions. In yet another

alternative, portions of the composite web manufactured in accordance with the present invention may include uniformly spaced discrete polymeric regions as seen in FIG. 9, while other portions of the same composite web may include discrete polymeric regions that are arranged in a non-uniform and/or non-repeating patterns. Further, different portions of a composite web manufactured according to the present invention may include different sets of discrete polymeric regions that are both uniformly spaced in repeating patterns that are different from each other.

The discrete polymeric regions could be provided in any desired shape, e.g., squares, rectangles, hexagons, etc. The shapes may or may not be in the form of recognized geometric shapes, but may be randomly formed with irregular perimeters. In addition, the shapes may not necessarily be solid figures, but may include islands formed within the shape in which none of the thermoplastic composition is transferred. In yet another alternative, some or all of the discrete polymeric regions may be in the form of indicia, i.e., letters, numbers, or other graphic symbols.

FIG. 10 illustrates yet another embodiment of a composite web manufactured in accordance with the present invention. The composite web includes a substrate 410 with opposing major surfaces 418 and 419. One feature illustrated in FIG. 10 is the two-sided nature of the reinforcing discrete polymeric regions located on the opposing major surfaces 418 and 419, respectively. Reinforcing discrete polymeric region 414 is provided on major surface 418 and reinforcing discrete polymeric region 424 is provided on opposing major surface 419. Both discrete polymeric region 414 and discrete polymeric region 424 are exposed on opposite sides of the composite web.

The discrete polymeric regions on opposing major surfaces are depicted as being in registration through the substrate 410. In other words, the discrete polymeric region 414 is aligned with the discrete polymeric region 424 on the opposite side of the substrate 410. Further, the discrete polymeric region 414 is depicted as being substantially the same size as the discrete polymeric region 424 located on the opposite side of the substrate 410. It should, however, be understood that when a composite web having discrete polymeric regions on both major surfaces is desired, the discrete polymeric regions on the opposing

surfaces may or may not be the same size as seen in FIG. 10. Also, it should be understood that the discrete polymeric regions may or may not be in registration with each other through the substrate 410 as seen in FIG. 10.

The reinforcing discrete polymeric regions 414 and 424 may be envisioned as forming a grommet structure on the substrate 410. As a result, it may be desired to provide an optional opening 404 through the substrate 410 as seen in FIG. 10. The opening may be formed by any suitable technique, e.g., mechanical perforation with a tool, laser ablation, water or gas-jet cutting, etc. It will be understood that similar openings could be provided in, e.g., the laminated composite web seen in FIG. 7 as well.

FIG. 11 is a perspective view of one system and method of providing discrete polymeric regions on one surface of a substrate 10 in accordance with the principles of the present invention. The system depicted in FIG. 11 includes a substrate 10 that defines a web path through the system. The substrate 10 moves through the system in a downstream direction indicated by the rotation arrows on the various rolls. After being unwound or otherwise provided from a supply (e.g., the substrate 10 may be manufactured in-line with the system depicted in FIG. 11), the substrate 10 is directed into a transfer nip formed between a backup roll 20 and a transfer roll 30.

The process of providing discrete polymeric regions on the substrate 10 includes delivering a supply of a molten thermoplastic composition to the exterior surface 32 of transfer roll 30 that includes a one or more depressions 34 formed in its exterior surface 32. The molten thermoplastic composition 41 is supplied to the exterior surface 32 of the transfer roll 30 by a delivery apparatus in the form of a trough 40 (or other supply apparatus, e.g., extruder, gear pump, etc.).

The excess molten thermoplastic composition is wiped or removed from the exterior surface 32 by a doctor blade 42 acting against the exterior surface 32 of the transfer roll 30. Although it may be ideal to remove all of the thermoplastic composition from the exterior surface 32 of the transfer roll 30, some of the thermoplastic composition may remain on the exterior surface 32 after wiping by the doctor blade 42.

The depressions 34 formed in the exterior surface 32 of the transfer roll 30 preferably receive a portion of the molten thermoplastic composition when the molten thermoplastic composition is deposited on the exterior surface 32 of the transfer roll 30. If the depressions 34 are not completely filled during or by the deposition of molten thermoplastic composition, the wiping action of the doctor blade 42 on the exterior surface 32 of the transfer roll 30 may assist in substantially filling the depressions with molten thermoplastic composition.

Control over the temperatures of the various rolls in the system depicted in FIG. 11 may be useful in obtaining the desired products. It may be preferred, e.g., that the exterior surface 32 of the transfer roll 30 be heated to a selected temperature that is at or above the melt temperature of the thermoplastic composition to be transferred to the substrate 10. Heating the transfer roll 30 may also enhance filling of the depressions 34 by the molten thermoplastic composition.

Because the molten thermoplastic composition 41 is itself heated within the trough 40, the doctor blade 42 will typically be heated by the molten thermoplastic composition. It may alternatively be desirable to control the temperature of the doctor blade 42 separately from the trough 40 containing the molten thermoplastic composition 41. For example, it may be desirable to heat the doctor blade 42 to a temperature above the melt temperature of the molten thermoplastic composition.

FIG. 11A is an enlarged partial cross-sectional view depicting one relationship between a doctor blade 42 and depression 34 in a transfer roll 30. Another characteristic of the doctor blade 42 that may be controlled is its thickness or length 43 along the exterior surface of the transfer roll 30 (as measured in the machine direction or the direction of rotation of the transfer roll). For example, a thicker or longer doctor blade 42 may help by allowing the molten thermoplastic composition more time to relax within the depressions 34, thereby improving filling of the depressions. In addition to varying the length of the doctor blade 42, the pressure or force exerted on the transfer roll 30 by the doctor blade 42 may also be adjusted based on a variety of factors including, e.g., the characteristics of the molten thermoplastic composition, the transfer roll characteristics, etc.

With the depressions 34 at least partially filled with the desired molten thermoplastic composition, the transfer roll 30 continues to rotate until the depressions 34 and the molten thermoplastic composition they contain are forced into contact with the substrate 10 against backup roll 20 at the transfer nip (i.e., the nip formed by the transfer roll 30 and the backup roll 20. It is at this point that transfer of the molten thermoplastic composition in the depressions 34 to the substrate 10 begins. It should be understood that under certain conditions, only a portion of the thermoplastic composition in the depressions 34 may transfer to the substrate 10.

When a substrate 10 that includes one or more porous major surfaces on which the molten thermoplastic composition is deposited is used in connection with the methods of the present invention, a mechanical bond is preferably formed by infiltration of the molten thermoplastic composition into the porous surface of the substrate 10. As used in connection with the present invention, the term "porous" includes both structures that include voids formed therein, as well as structures formed of a collection of fibers (e.g., woven, nonwoven or knit) that allow for the penetration of molten thermoplastic compositions.

The nip pressure between the transfer roll 30 and the backup roll 20 is preferably sufficient such that a portion of the thermoplastic composition in the discrete polymeric regions infiltrates and/or encapsulates a portion of the porous substrate 10 to improve attachment of the discrete polymeric regions to the substrate 10. Where the surface of the substrate 10 includes fibers (e.g., where the substrate 10 includes woven, nonwoven, or knit materials on its major surfaces), it may be preferred that the thermoplastic composition encapsulate all or a portion of at least some of the fibers on the surface of the substrate 10 to improve attachment of the discrete polymeric regions to the substrate 10.

Under some conditions the molten thermoplastic composition in the depressions 34 may completely permeate the substrate 10 if, e.g., the substrate 10 is porous throughout its thickness. In other instances, penetration of the molten thermoplastic composition may be limited to the outer layer or layers of the substrate 10.

It should, however, be understood that although the outer surfaces of the substrate 10 may exhibit some porosity, that porosity may not necessarily extend

through the entire thickness of the substrate 10. For example, the substrate 10 may have a variety of different layers, with one of the layers being substantially non-porous. In another alternative, the overall thickness of the substrate 10 may render it non-porous as a whole, even though the outer surfaces of the substrate 10 exhibit some porosity as discussed above.

The backup roll 20 may possess a variety of different characteristics depending on the types of substrate materials and/or molten thermoplastic compositions being processed. In some instances, the exterior of the backup roll 20 may be a rubber or other conformable material that conforms to the shape of the transfer roll 30. If a conformable material such as rubber is used, it may, e.g., have a durometer of, e.g., about 10-90 Shore A.

One such variation at the transfer nip is depicted in FIG. 11B, in which a conformable backup roll 130 is depicted as forcing a portion of the substrate 110 into the depression 134 (and the thermoplastic composition 141 contained therein). If the surface of the substrate 110 facing the depression 134 is porous, a portion of the molten thermoplastic composition 141 may be forced in the porous surface of the substrate 110. Forcing the substrate 110 into the depression may be particularly beneficial if the depression 134 is not completely filled with the molten thermoplastic composition 141 to improve the likelihood of contact between the substrate 10 and the molten thermoplastic composition 141.

Alternatively, the surface of the substrate may be forced into the depressions on the transfer roll using a mating backup roll. This variation at the transfer nip is depicted in FIG. 11C in which the backup roll 220 includes protrusions 222 that are complementary to or mate with the depressions 234 on the transfer roll 230. The protrusions 222 would preferably force a substrate into the depressions with the same results and benefits described above with respect to FIG. 11B. A mating backup roll 220 could be formed of any conformable material, nonconformable material, or combination of conformable or nonconformable materials.

Heating or otherwise controlling the temperature of the transfer roll is discussed above. It should also be appreciated that the temperature of the exterior surface of the backup roll may be controlled. For example, it may be

desirable to cool the surface of the backup roll to a selected temperature below the temperature of the transfer roll. Cooling of the backup roll may be beneficial in maintaining the integrity of the substrate, particularly if the substrate integrity can be degraded from the heat of the transfer roll (if the transfer roll is heated) and/or the molten thermoplastic composition in the depressions of the transfer roll.

The substrate 10 continues around the backup roll 20 as seen in FIG. 11. In some instances, a portion of the molten thermoplastic composition in the depressions may remain in the depressions 34 while the substrate 10 is pulled away from the transfer roll 30. As a result, the molten thermoplastic composition in the depressions 34 may tend to elongate or string between the depressions in transfer roll 30 and the substrate 10.

A device, such as a hot wire 44 seen in FIG. 11, may be used to sever any strands of thermoplastic composition that may be formed as the substrate 10 separates from the transfer roll 30. Other devices and/or techniques may be used to accomplish the desired severing of any molten thermoplastic composition strands. Examples may include, but are not limited to hot air knives, lasers, etc. Furthermore, under certain conditions, stringing of the thermoplastic composition may not be encountered during manufacturing.

The tendency of the molten thermoplastic composition in the depressions 34 to string as the substrate exits the transfer nip also raises another issue that should be considered when developing processes according to the present invention. That issue is the internal cohesive strength of the substrate 10 and/or the tensile strength of the substrate 10. This issue may be of more concern if the substrate 10 includes a fibrous construction (e.g., woven, nonwoven, or knit fibers) that could be separated from the remainder of the substrate by the forces exerted when the substrate 10 is pulled away from the transfer roll 30. These considerations may be more important if the molten thermoplastic composition has properties (e.g., tackiness, tensile strength, etc.) such that strands of the molten thermoplastic composition can exert forces on the substrate 10 that exceed the internal cohesive strength and/or tensile strength of the substrate 10.

For example, if the substrate 10 includes a resin-bonded nonwoven portion, the temperature of the transfer roll 30 and/or molten thermoplastic

composition may rise above the melting temperature of the resin, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate 10. Alternatively, a nonwoven substrate may include fibers that have a melting temperature similar to the temperature of the transfer roll 30 and/or molten thermoplastic composition, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate 10.

In either instance, the roll temperatures and/or molten thermoplastic composition temperature may need to be controlled to maintain the integrity of the substrate while transferring the molten thermoplastic composition. For example, the backup roll 20 may be cooled to, in turn, cool the substrate 10 to maintain its internal cohesive strength.

In another alternative, heating of the transfer roll 30 and/or backup roll 20 may be used to enhance the internal cohesive strength and/or tensile strength of the substrate 10. For example, if the substrate 10 includes multi-component fibers or fibers having different compositions, some consolidation of the fibers or other components in the substrate 10 may be caused by heating the substrate 10 while transferring the molten thermoplastic composition from the transfer roll 30 to the substrate 10. That consolidation may improve the integrity of the substrate by forming a skin layer or other strength-enhancing structure on or within the substrate 10. Some exemplary processes may be described in, e.g., U.S. Patent No. 5,470,424 (Isaac et al.).

Although the system and method depicted in FIG. 11 produces composite webs with reinforcing discrete polymeric regions on only one major side thereof, those of skill in the art will recognize the modifications required to provide discrete polymeric regions on both major surfaces of the substrate in accordance with the principles of the present invention. One example may include, e.g., forming discrete polymeric regions on one surface of each of two separate substrates, with the two substrates then being laminated together to form a single substrate with discrete polymeric regions on both major surfaces (see, e.g., FIG. 10). Alternatively, a single substrate may be directed into a nip formed by two transfer rolls, with each of the transfer rolls depositing discrete polymeric regions on both sides of the web essentially simultaneously.

Although FIG. 11 depicts the application of only one thermoplastic composition using the transfer roll 30, it will be understood that two or more different thermoplastic compositions may be applied to the exterior surface of the transfer roll 30. FIG. 12 depicts a portion of one system in which a trough 340 is used to deliver three molten thermoplastic compositions (in zones A, B, & C) to the surface of a transfer roll 330 that rotates about an axis 331. The trough 340 may, for example, include barriers 342 such that molten thermoplastic compositions in the different zones of the trough 340 do not mix during processing. In another alternative, separate and distinct troughs could be used for each different thermoplastic composition to be applied to the transfer roll 330.

The transfer roll 330 also includes different sets of depressions 334a, 334b, and 334c over which the different molten thermoplastic compositions may be applied. The depressions in the different zones on transfer roll 330 are differently shaped, have different sizes, and have different spacings. For example, the triangular depressions in zone C are arranged in an irregular, non-repeating pattern while the depressions in zones A & B are arranged in regular, repeating patterns.

With the system of FIG. 12, different sets of discrete polymeric regions may be formed on a single substrate using different thermoplastic compositions. As a result, the thermoplastic compositions may be selected for any of a number of different properties related to manufacturing or end-use performance of the finished articles made using the composite webs.

FIGS. 13 and 14 depict an article that may be manufactured from a composite web according to the methods of the present invention, with FIG. 13 being a plan view of the article and FIG. 14 being a cross-sectional view of the article taken along line 14-14 in FIG. 13. The article includes a frame 560 formed by a reinforcing discrete polymeric region on a substrate 510. The article may be, e.g., a filter in which the frame 560 provides an integral support for substrate 510 which functions as filter media. The frame 560, when deposited as a reinforcing discrete polymeric region, preferably does not require the use of bonding agents (e.g., adhesives, etc.) to secure the frame 560 to the filtration substrate 510.

The depicted article also includes one or more optional reinforcement strips 562 that extend across the central area of substrate 510 defined by the frame 560. The reinforcement strips 562 may also preferably be formed by discrete polymeric regions deposited on the substrate 510 according to the methods of the present invention. The reinforcement strips 562 may be formed of the same or different polymeric compositions as the frame 560.

FIGS. 15 & 16 depict another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. 15 depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate 610 on which two discrete polymeric regions 614 and 615 are located. The substrate 610 includes two opposing edges 611 that extend over the length of the composite web and, together, define the longitudinal length of the composite web.

Discrete polymeric region 614 is provided in the shape of a line of the thermoplastic composition material deposited on the substrate 610 along the general direction of the longitudinal length of the composite web. The discrete polymeric region 614 may be continuous along the longitudinal length of the composite web as shown in FIG. 15.

Discrete polymeric region 615 is a variation of discrete polymeric region 614 in that it is provided in an undulating shape as compared to the relative straight linear shape of the discrete polymeric region 614. The undulating shape of the discrete polymeric region 615 also, however, extends along the direction of the longitudinal length of the composite web. Further, the discrete polymeric region 615 may be continuous along the longitudinal length of the composite web as shown in FIG. 15.

FIG. 16 is a perspective view of one transfer roll 630 that may be used to transfer molten thermoplastic compositions to a substrate in the shapes seen in FIG. 15 according to the methods of the present invention. The transfer roll 630 includes a depression 634 that preferably extends continuously around the outer circumference of the transfer roll 630 to form the discrete polymeric region 614 as depicted in FIG. 15. The transfer roll 630 also includes a depression 635 that also extends around the outer circumference of the roll 630 to form the discrete polymeric region 615 as depicted in FIG. 15.

FIG. 17 depicts another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. 17 depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate 710 on which discrete polymeric regions 714a, 714b, and 714c are located, with the discrete polymeric regions extending across the width of the substrate. The substrate 710 includes two opposing edges 711 that extend over the length of the composite web and, together, define the width and the longitudinal length of the composite web.

Each of the discrete polymeric regions 714a, 714b, and 714c is provided in the shape of a line of the thermoplastic composition material deposited on the substrate 710 in a generally cross-web direction, i.e., extending between the opposing edges 711 of the substrate 710. The discrete polymeric regions 714a, 714b, and 714c present variations from straight lines 714a and 714b to undulating line 714c. Many other variations in placement, shape and/or orientation of reinforcing discrete polymeric regions may be envisioned in connection with methods according to the present invention.

In addition to the deposition of nonelastic thermoplastic polymer in discrete regions, it is also contemplated that additional materials can be coated onto a major surface of the substrate using known methods. Such materials could be, for example adhesives, as described in, e.g., U.S. Patent Nos. 5,019,071 (Bany et al.); 5,028,646 (Miller et al.); and 5,300,057 (Miller et al.); or cohesives as described in, e.g. U.S. Patent Nos. 5,389,438 (Miller et al.) and 6,261,278 (Chen et al.).

EXAMPLES

The following examples are provided to enhance understanding of the present invention. They are not intended to limit the scope of the invention.

Example 1

A web of the present invention was produced using a system similar to that shown in Fig. 11. A 40 mm diameter twin screw extruder fitted with a gear pump was used to deliver a molten polypropylene polymer (SC-917, Basell

Olefins) at a melt temperature of approximately 227°C to a neck tube. The neck tube was positioned such that a thick strand of molten polymer was extruded vertically downward onto the exterior surface 32 of an oil-heated steel transfer roll 30 having a diameter of 23 cm. The exterior surface of the transfer roll was machined using a computer controlled milling machine to have a circle of 8 depressions around the periphery of the roll near the center of the roll. The depressions were elliptical in shape 7.6 cm long and 1.9 cm in width at the widest point of the ellipse. The long axis of each ellipse was parallel to the machine direction (downweb). The ellipses were arranged with a center-to-center spacing of 8.9 cm. The elliptical depressions were machined in a seven step process.

Step 1 consisted of milling 0.333 mm depth cells using a 2 mm tool in a 7.6 cm by 1.9 cm elliptical pattern. Step 2 consisted of milling 0.500 mm depth cells using a 3 mm tool. Step 3 consisted of milling 0.666 mm depth cells using a 4 mm tool. Step 4 consisted of milling 0.833 mm depth cells using a 5 mm tool. Step 5 consisted of milling 0.999 mm depth cells using a 6 mm tool. Step 6 consisted of milling 1.165 mm depth cells using a 7 mm tool. Step 7 consisted of milling 1.332 mm depth cells using a 8 mm tool. The cells were positioned such that the deeper cells were in the middle of the ellipse with progressively shallower cells tapering outwards towards the perimeter of the ellipse.

After the depressions were filled or partially filled with the molten polymer, any excess molten polymer was removed from the exterior surface of the transfer roll by a brass doctor blade 42 having a thickness of 1.5 mm at the contact point with the roll, acting against and normal to the exterior surface of the transfer roll. The excess molten polymer formed a small rolling bank of polymer contained in a trough formed by the doctor blade and two side walls pressed firmly against the transfer roll using a pressure of 123 N/lineal cm. The transfer roll was at approximately 227°C. After the wiping action of the doctor blade, the transfer roll continued to rotate until the depressions and the molten polymer they contain were forced into contact with a nonwoven substrate (SONTARA 8001 spunlaced polyester, 40 grams/m^2, Dupont) against a rubber backup roll 20 (23°C) using a nip pressure of 25 N/lineal cm.

Transfer of some of the molten polymer from the depressions to the nonwoven substrate occurred. A portion of the molten polymer in the depressions remained in the depressions while the substrate pulled away from the transfer roll. As a result, the molten polymer tended to elongate or string between the depressions in the transfer roll and the substrate. A hot wire 44 was used to sever any strands of molten polymer formed as the substrate separated from the transfer roll. The weight of each transferred reinforcing polymer region was 0.28 grams.

Example 2

To demonstrate that two or more discrete reinforcing polymer regions can be transferred to two substrates followed by lamination of the substrates, a web was prepared as in Example 1 using the apparatus shown in Fig. 11 except a second transfer roll, identical to the transfer roll 30, a second rubber backup roll, similar to the rubber backup roll 20, a second doctor blade, similar to the doctor blade 42, and a second hot wire, similar to the hot wire 44, were used to transfer a discrete reinforcing polymer region to a second nonwoven substrate (SONTARA 8001 spunlaced polyester, Dupont). Molten polypropylene polymer (SC-917, Basell Olefins) was delivered to the second transfer roll at a melt temperature of approximately 227^{O}C. The second transfer roll was at approximately 227^{O}C, and the second rubber backup roll was at approximately 23^{O}C. A nip pressure of 25 N/lineal cm was used. The doctor blade pressure against the second transfer roll was approximately 123 N/lineal cm. The second transfer roll was adjusted so that it was in registration with the first transfer roll with respect to the depressions in each of the rolls. The rubber roll 20 and the second rubber roll formed a nip where the two nonwoven substrates containing the transferred reinforcing polymer regions were laminated such that the reinforcing regions on one of the substrates coincided with the reinforcing regions on the other substrate. This resulted in approximately double the mass of polymer that could be transferred as compared to Example 1.

The preceding specific embodiments are illustrative of the practice of the invention. This invention may be suitably practiced in the absence of any element or item not specifically described in this document. The complete disclosures of all patents, patent applications, and publications are incorporated into this document by reference as if individually incorporated. Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope of this invention. It should be understood that this invention is not to be unduly limited to illustrative embodiments set forth herein.

CLAIMS:

1. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein, wherein the one or more depressions comprise at least one depression that comprises a composite depression formed by a plurality of cells;

delivering a molten nonelastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten nonelastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten nonelastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll; and

transferring at least a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions to a first major surface of a substrate by contacting the first major surface of the substrate to the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions, followed by separating the substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the nonelastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

2. A method according to claim 1, wherein the plurality of cells forming the composite depression overlap with each other.

3. A method according to claim 1, wherein the transferring further comprises forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions.

4. A method according to claim 1, wherein the first major surface of the substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the substrate into the one or more depressions, wherein a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

5. A method according to claim 4, wherein the porous surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition.

6. A method according to claim 1, wherein the first major surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition by forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions.

7. A method according to claim 1, wherein substantially all of the one or more depressions are substantially filled with the molten nonelastomeric thermoplastic composition after the wiping and before the transferring.

8. A method according to claim 1, wherein the one or more depressions comprise at least one depression that comprises an island located therein.

9. A method according to claim 8, wherein the at least one depression of the one or more depressions forms a discrete polymeric region on the first major surface of the substrate in which a portion of the first major surface of the substrate is located within a surrounding ring of the nonelastomeric thermoplastic composition, and wherein the method further comprises providing an opening through the substrate within the surrounding ring of the nonelastomeric thermoplastic composition.

10. A method according to claim 1, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously along a length of the substrate.

11. A method according to claim 1, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously across a width of the substrate.

12. A method according to claim 1, wherein the one or more depressions comprise a plurality of depressions comprising depressions having at least two different shapes.

13. A method according to claim 1, wherein each depression of the one or more depressions comprise a volume of about 3 cubic millimeters or more.

14. A method according to claim 1, wherein each depression of the one or more depressions defines a depression volume, and further wherein the one or more depressions comprises at least two depressions that define different depression volumes.

15. A method according to claim 1, wherein a footprint of each depression of the one or more depressions comprises an area of about 4 square millimeters or more.

16. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein, wherein the one or more depressions comprise at least one depression that comprises a composite depression formed by a plurality of overlapping cells;

delivering a molten nonelastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten nonelastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten nonelastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll;

forcing a portion of a first major surface of a substrate into the one or more depressions, wherein the first major surface comprises a porous surface comprising fibers, and wherein a portion of the nonelastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface, and still further wherein the molten nonelastomeric thermoplastic composition encapsulates at least a portion of at least some of the fibers; and

separating the substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the nonelastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

17. A method according to claim 16, wherein each depression of the one or more depressions defines a depression volume, and further wherein the one or more depressions comprises at least two depressions that define different depression volumes.

18. A method according to claim 16, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously along a length of the substrate.

19. A method according to claim 16, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously across a width of the substrate.

20. A method according to claim 16, wherein the one or more depressions comprise a plurality of depressions comprising depressions having at least two different shapes.

21. A method according to claim 16, wherein each depression of the one or more depressions comprise a depression volume of about 3 cubic millimeters or more.

22. A method according to claim 16, wherein a footprint of each depression of the one or more depressions comprises an area of about 4 square millimeters or more.

23. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten nonelastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten nonelastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten nonelastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll;

transferring at least a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions to a first major surface of a first substrate by contacting the first major surface of the first substrate to the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions, followed by separating the first substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the nonelastomeric thermoplastic composition are located on the first major surface of the first substrate after separating the first substrate from the transfer roll; and

laminating a second substrate to the first major surface of the first substrate, wherein the one or more discrete polymeric regions on the first substrate are located between the first substrate and the second substrate after laminating the second substrate to the first substrate.

24. A method according to claim 23, wherein the second substrate comprises one or more discrete polymeric regions located on a first major surface of the second substrate, and wherein the one or more discrete polymeric regions on the second substrate are located between the first substrate and the second substrate after laminating the second substrate to the first substrate.

25. A method according to claim 23, wherein the transferring further comprises forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions.

26. A method according to claim 23, wherein the first major surface of the substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the substrate into the one or more depressions, wherein a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

27. A method according to claim 26, wherein the porous surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition.

28. A method according to claim 23, wherein the first major surface of the first substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition by forcing the first major surface of the first substrate against the exterior surface of the transfer roll and

the molten nonelastomeric thermoplastic composition in the one or more depressions.

29. A method according to claim 23, wherein the one or more depressions in the transfer roll comprise at least one depression that comprises a composite depression formed by a plurality of cells.

30. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten nonelastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten nonelastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten nonelastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten nonelastomeric thermoplastic composition from the exterior surface of the transfer roll;

transferring at least a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions to a first major surface of a first substrate by contacting the first major surface of the first substrate to the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions, followed by separating the first substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the nonelastomeric thermoplastic composition are located on the first major surface of the first substrate after separating the first substrate from the transfer roll; and

laminating a second substrate to a second major surface of the first substrate, wherein the second major surface of the first substrate is located on the opposite side of the first substrate from the first major surface of the first substrate, wherein the one or more discrete polymeric regions on the first substrate are exposed on the first substrate.

31. A method according to claim 30, wherein the second substrate comprises one or more discrete polymeric regions located on a first major surface of the second substrate, and wherein the one or more discrete polymeric regions on the second substrate are exposed on the second substrate after laminating the second substrate to the first substrate.

32. A method according to claim 30, wherein the transferring further comprises forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions.

33. A method according to claim 30, wherein the first major surface of the substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the substrate into the one or more depressions, wherein a portion of the molten nonelastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

34. A method according to claim 33, wherein the porous surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition.

35. A method according to claim 30, wherein the first major surface of the first substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten nonelastomeric thermoplastic composition by forcing the first major surface of the first substrate against the exterior surface of the transfer roll and the molten nonelastomeric thermoplastic composition in the one or more depressions.

36. A method according to claim 30, wherein the one or more depressions in the transfer roll comprise at least one depression that comprises a composite depression formed by a plurality of cells.

37. A transfer roll device for transferring molten thermoplastic compositions to a substrate, the device comprising:

a roll comprising an exterior surface;

one or more depressions formed in the exterior surface of the roll,

wherein each depression of the one or more depressions comprises a composite depression formed by a plurality of cells.

38. A method according to claim 1, wherein the plurality of cells forming the composite depression overlap with each other.

Docket No. 57191US002

METHODS FOR PRODUCING COMPOSITE WEBS WITH REINFORCING DISCRETE POLYMERIC REGIONS

ABSTRACT OF THE DISCLOSURE

Methods of manufacturing composite webs including a substrate with one or more reinforcing discrete polymeric regions located on or within the composite web are disclosed. Molten nonelastomeric thermoplastic material of the discrete polymeric region is forced against the substrate by a transfer roll. If the substrate is porous, fibrous, etc., a portion of the nonelastomeric thermoplastic composition may infiltrate the substrate and/or encapsulate fibers of the substrate.

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PRINTED NAME Rachel Cagliardi-Graham

SIGNATURE Rachel Cagliardi Graham

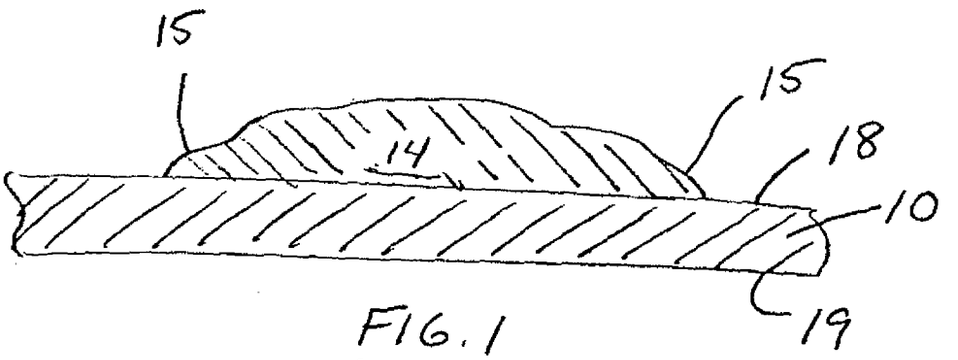

FIG. 1

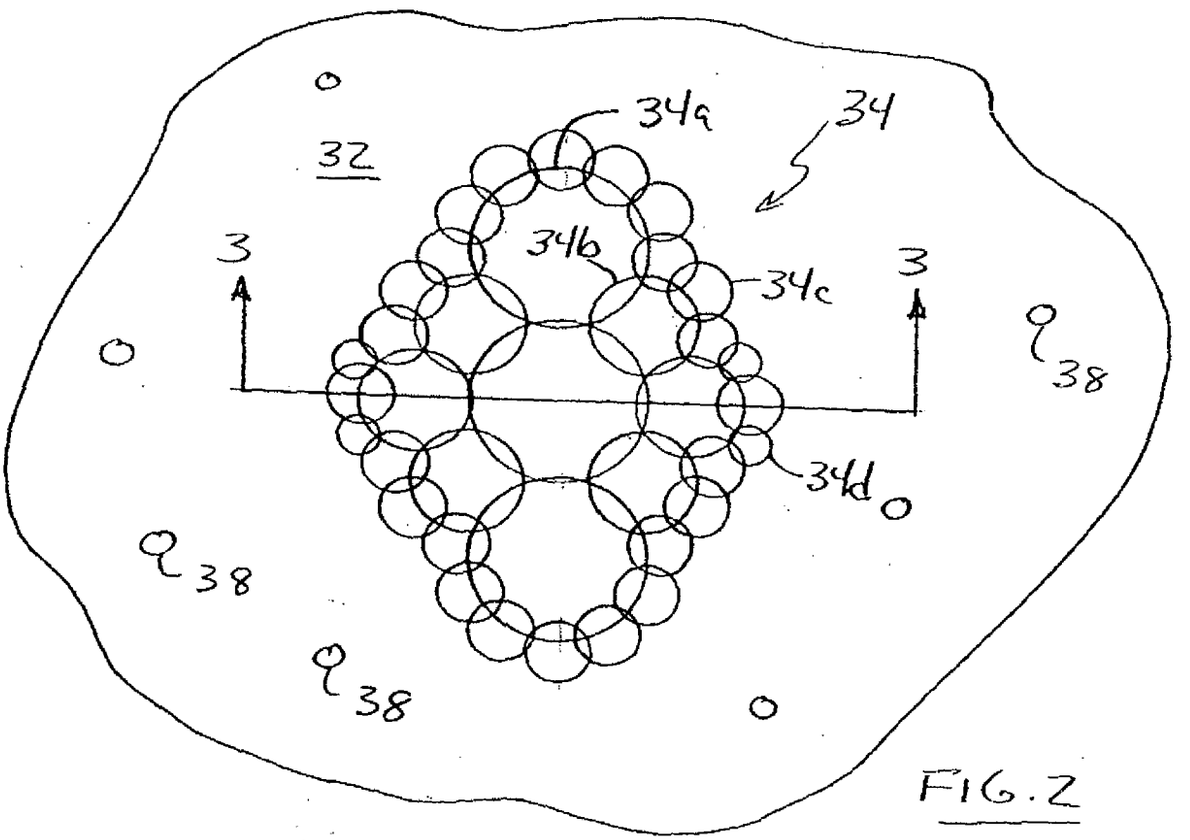

FIG. 2

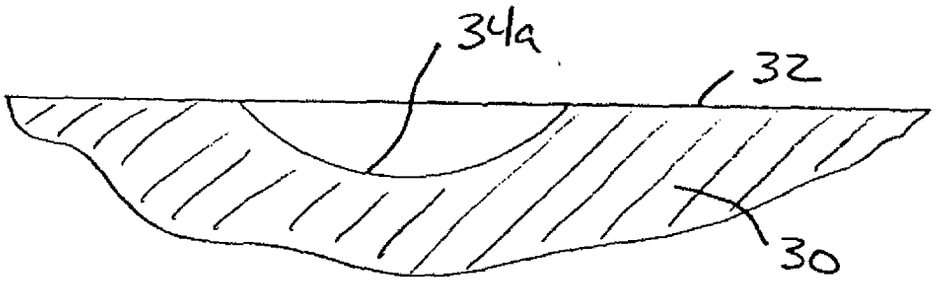

FIG. 3A

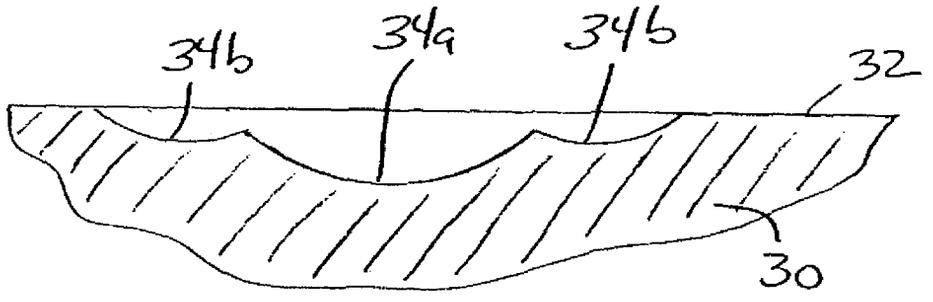

FIG. 3B

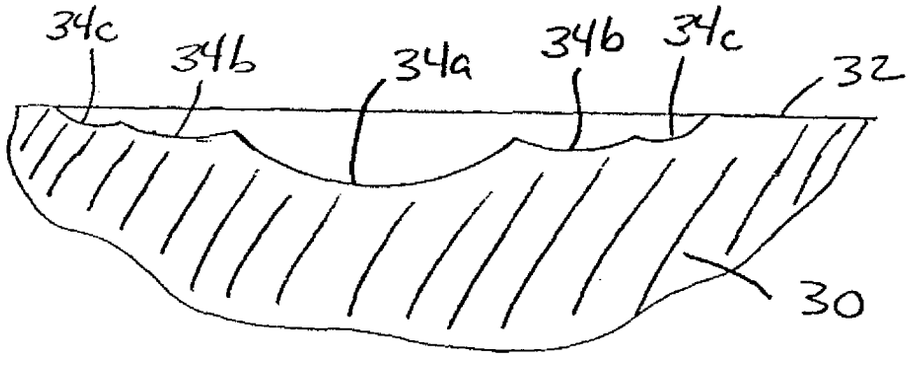

FIG. 3C

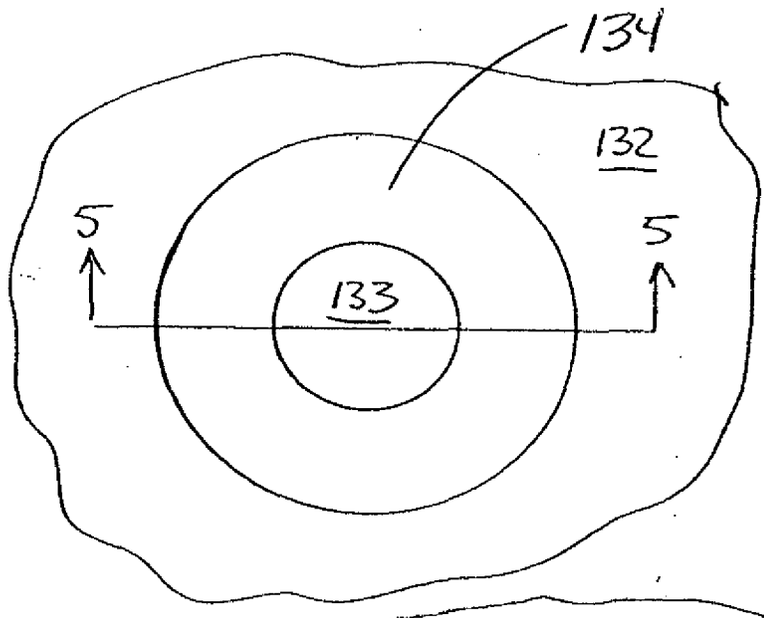

FIG. 4

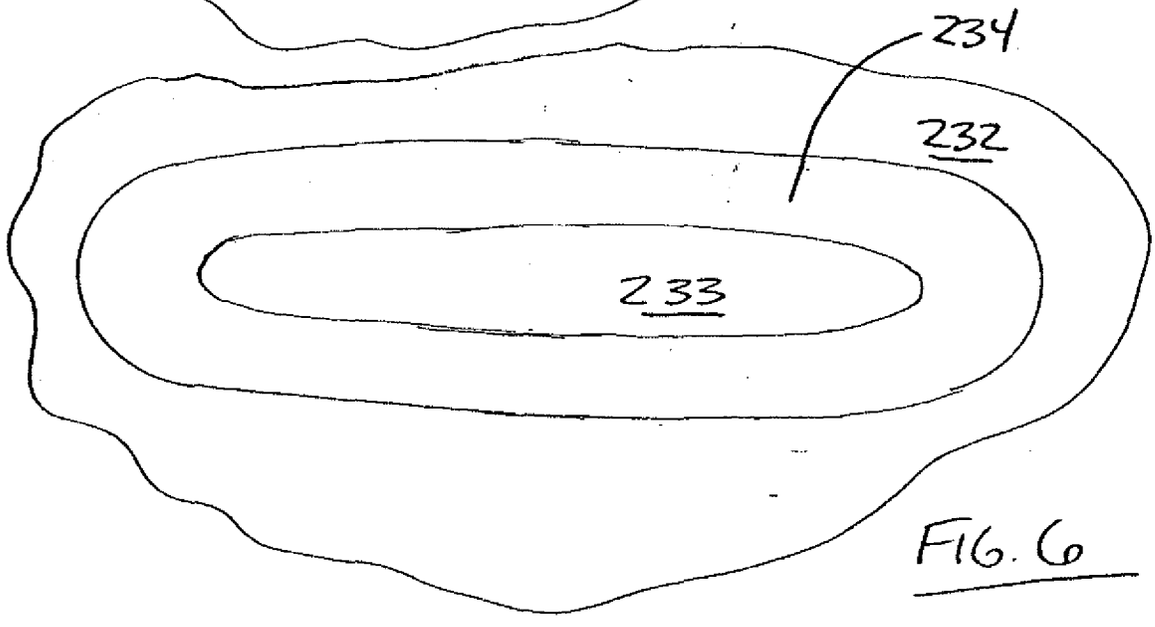

FIG. 6

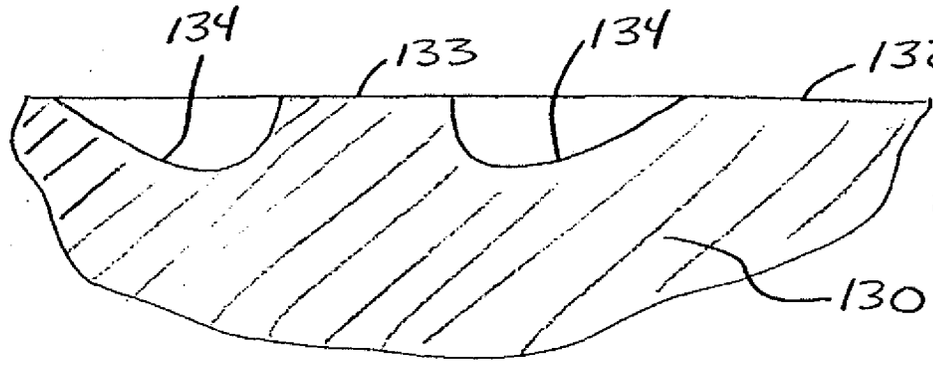

FIG. 5

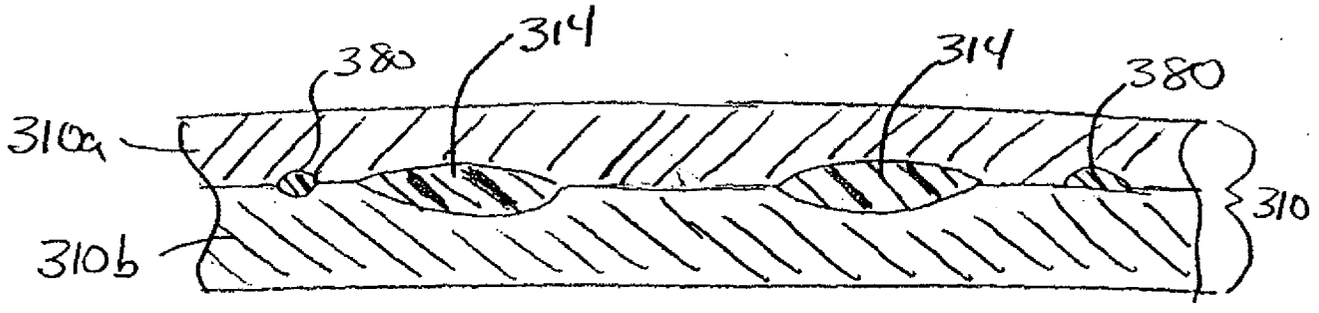

FIG. 7

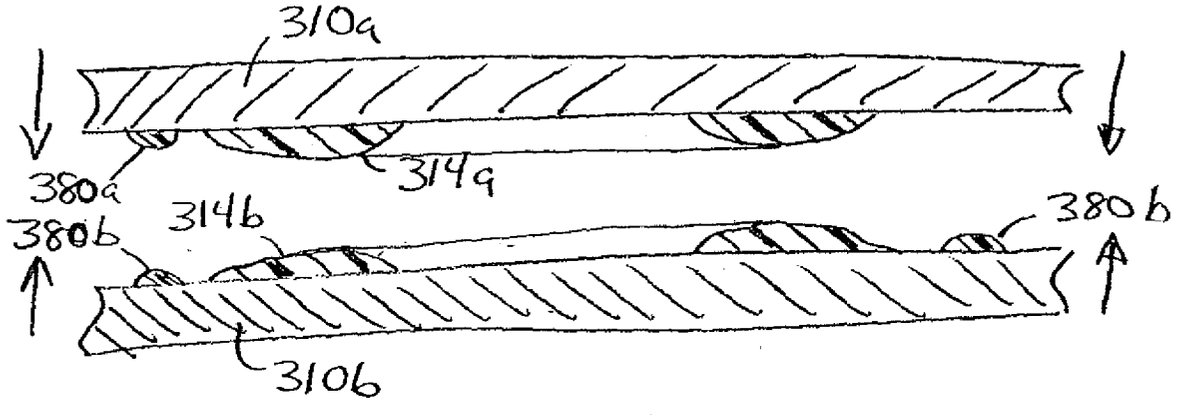

FIG. 8

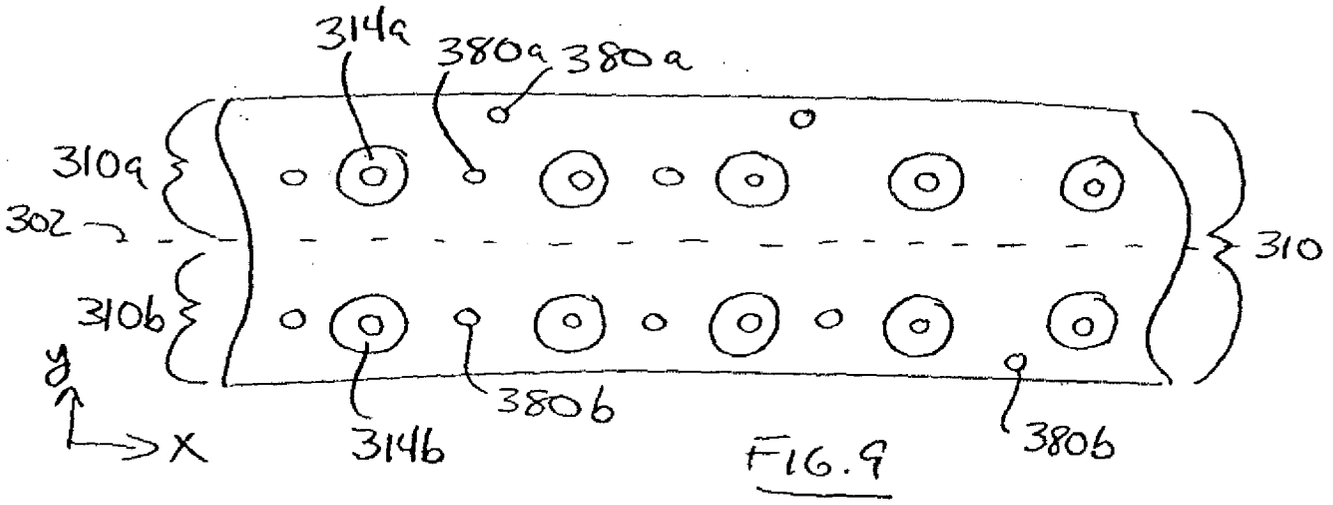

FIG. 9

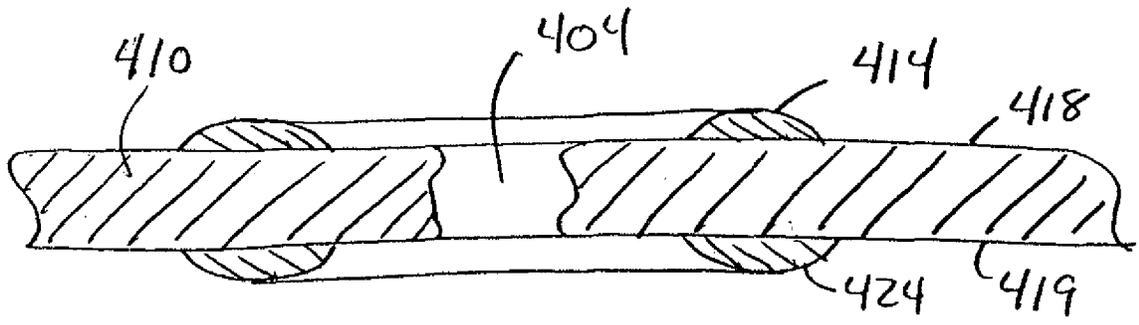

FIG. 10

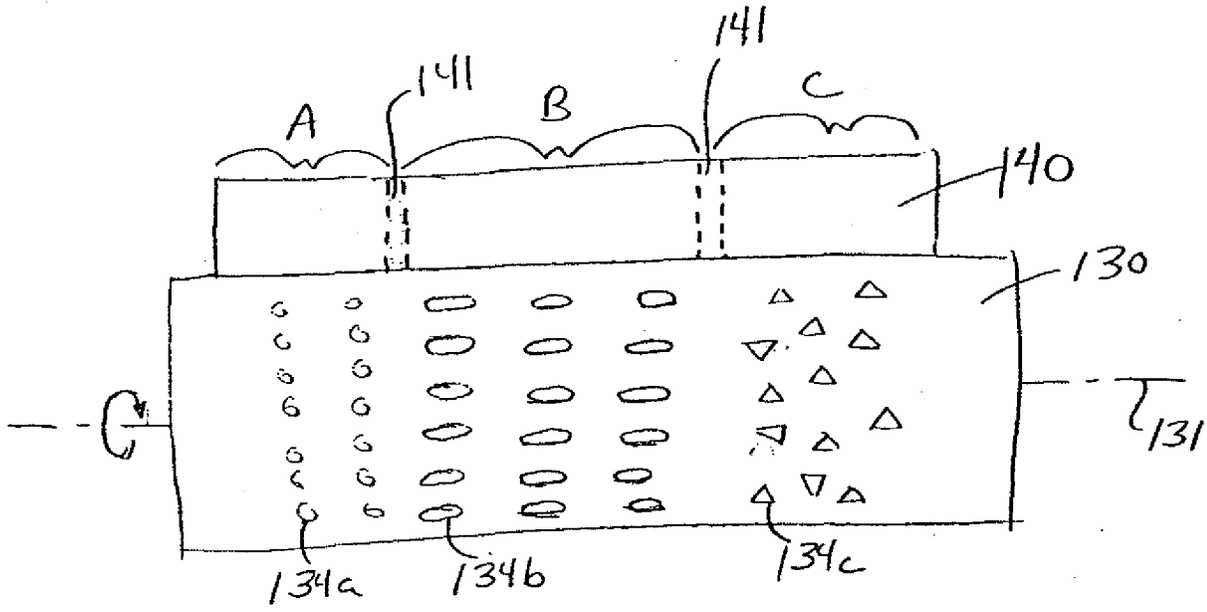

FIG. 12

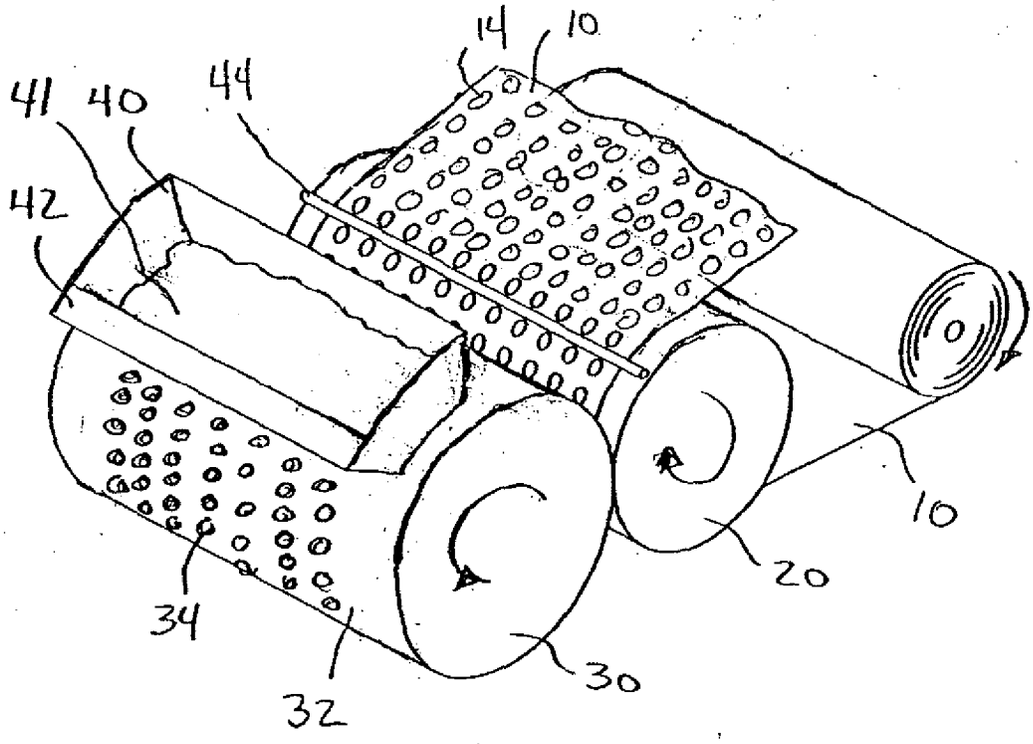

FIG. 11

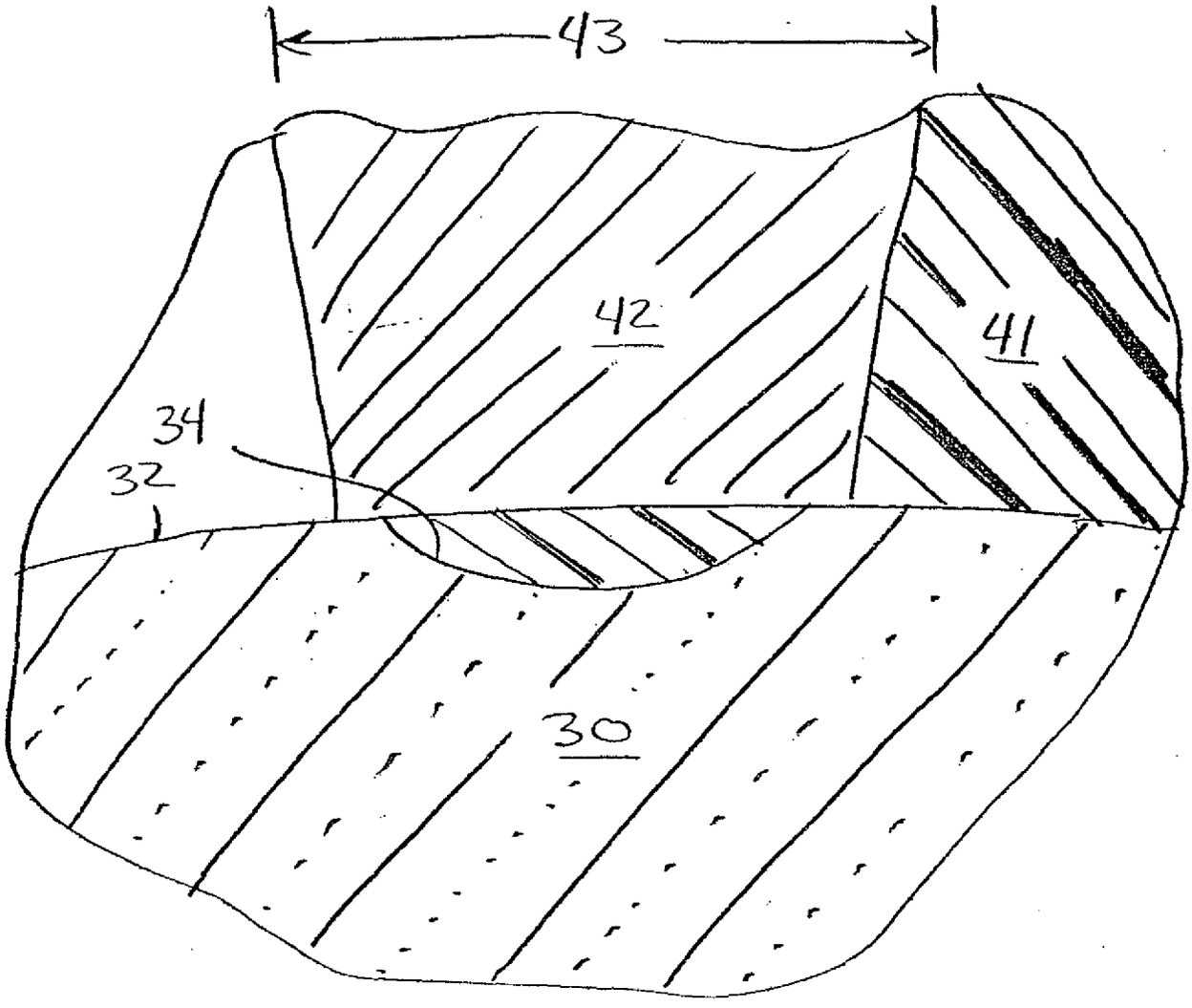

FIG. 11A

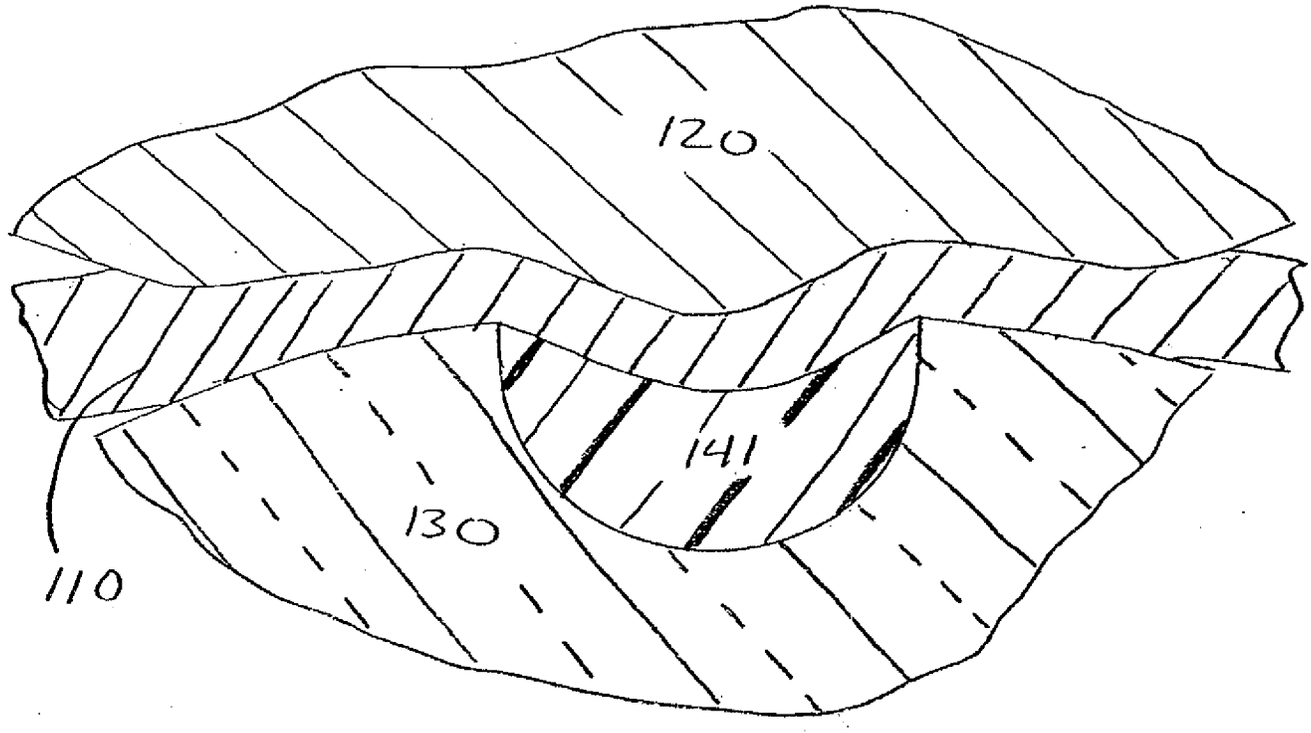

FIG. 11B

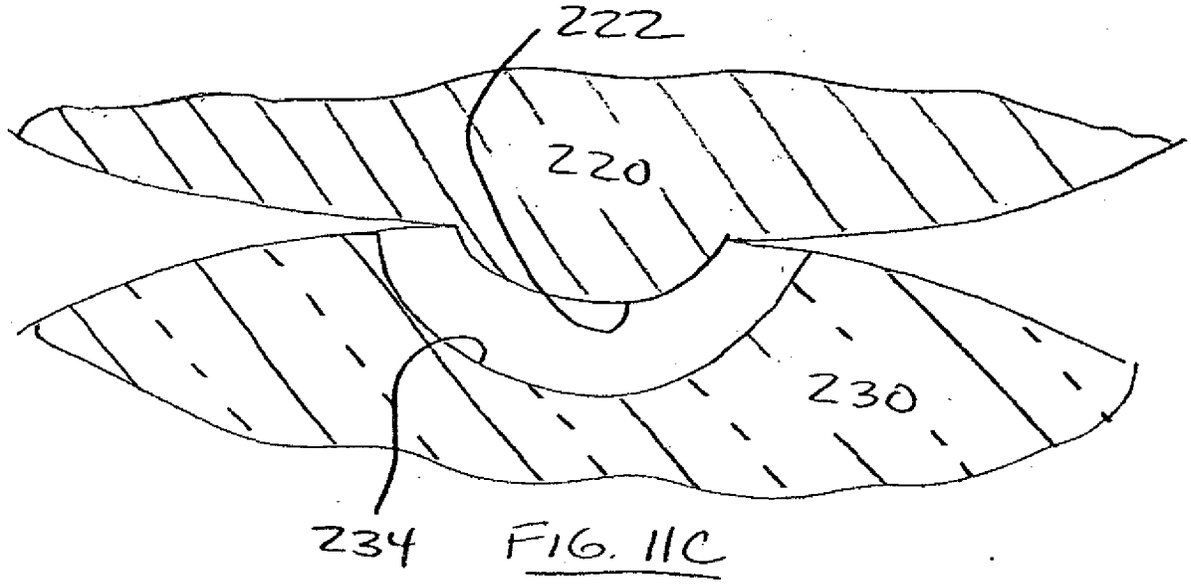

FIG. 11C

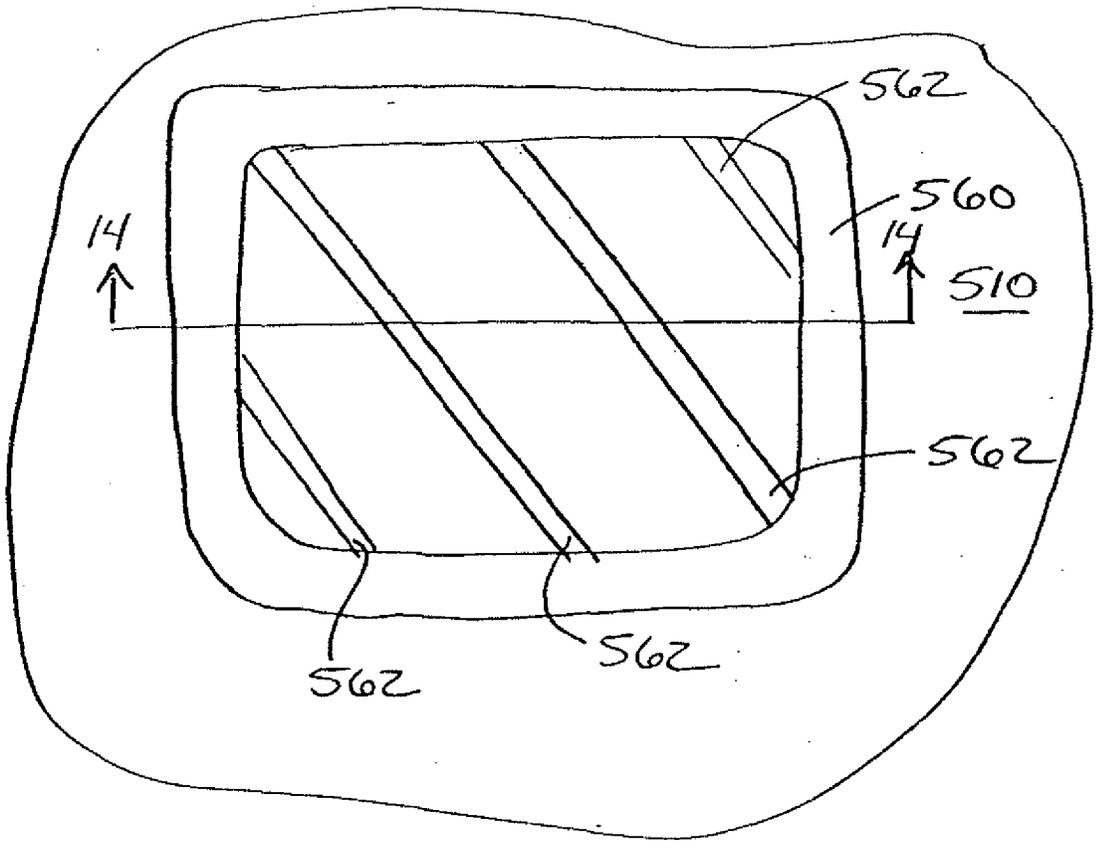

FIG. 13

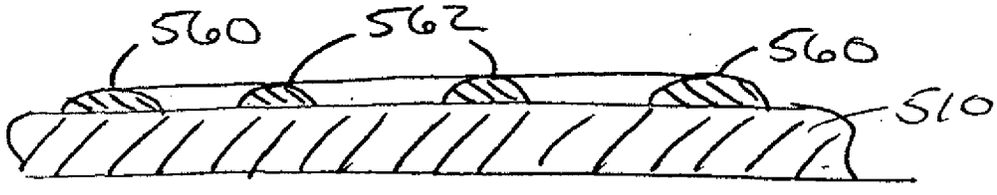

FIG. 14

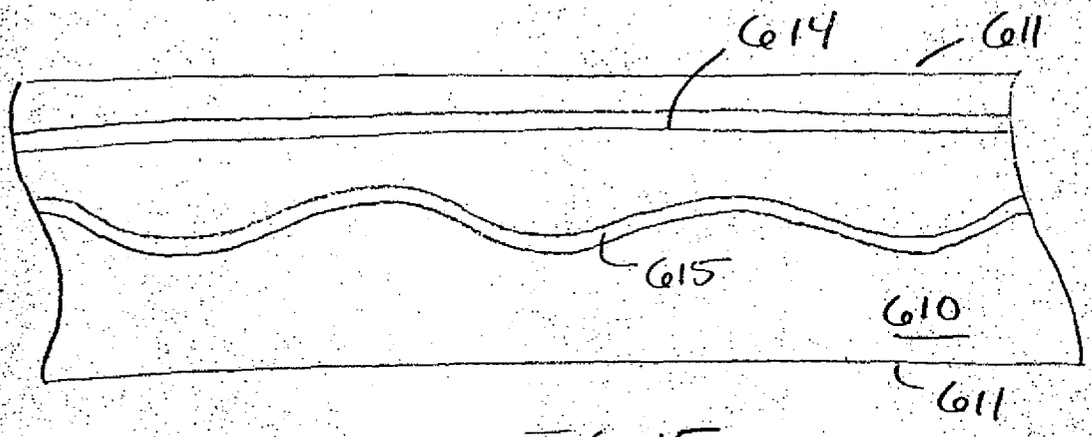

FIG. 15

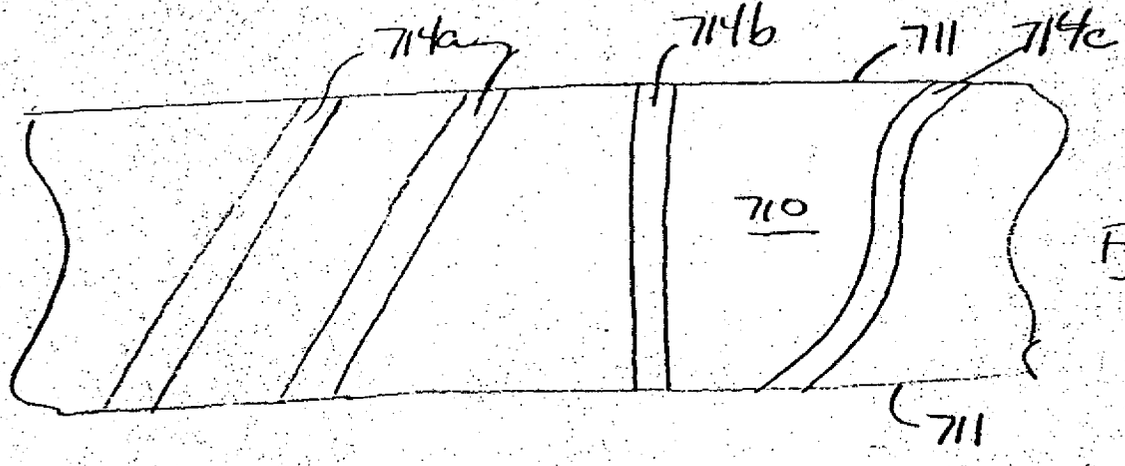

FIG. 17

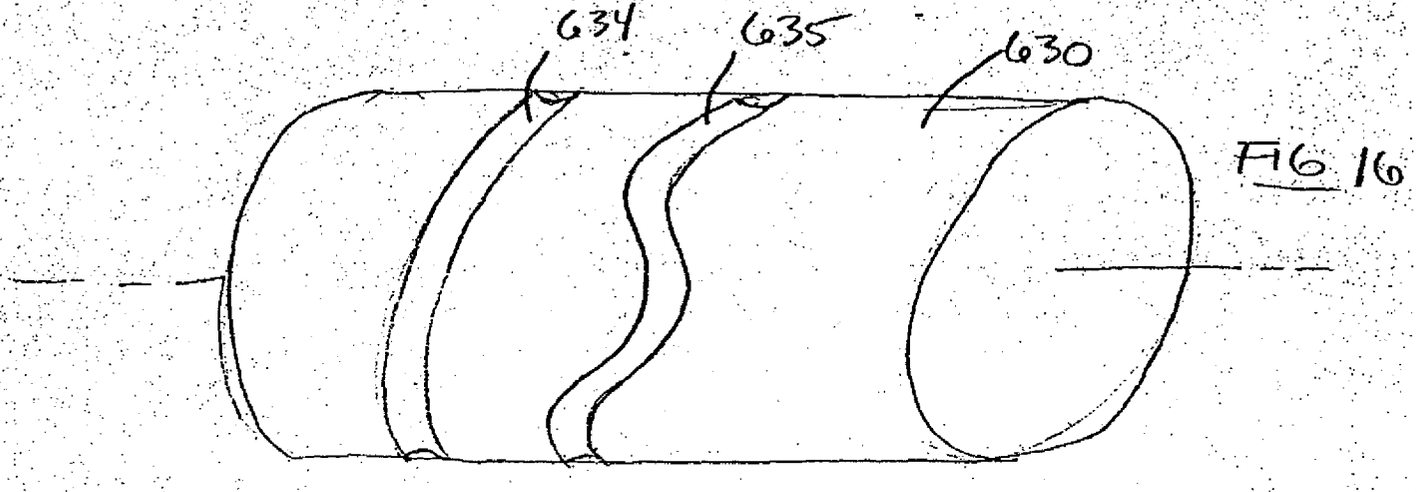

FIG 16

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10/013,304	11/06/2001	1732	0.00	57192US002	15	63	8

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Applicant(s)

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted 01/25/2002

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

Composite webs with discrete elastic polymeric regions

Preliminary Class

264

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184

COMPOSITE WEBS WITH DISCRETE ELASTIC POLYMERIC REGIONS

FIELD OF THE INVENTION

The present invention relates to methods of manufacturing composite webs that include one or more discrete polymeric regions of an elastomeric thermoplastic composition.

BACKGROUND

The manufacture of articles that exhibit elasticity, i.e., the ability to at least partially recover their original shape after moderate elongation, may be desired for a number of reasons. For example, elasticity may be useful in connection with fastening systems for items such as garments (e.g., diapers, training pants, gowns, etc.). Elasticity in garments can provide what may be referred to as dynamic fit, i.e., the ability to stretch and recover in response to movement by the wearer.

Elasticity may also be useful in connection with other applications. For example, some fasteners may provide more consistent attachment if the fastener is held in tension that can be supplied by stretching the fastener and relying on the recovery forces to provide the desired tension. In other instances, elasticity may allow for easy adjustment of the size or length of a fastener or other article.

Although elasticity may be beneficial in a variety of different applications, it may raise issues in manufacturing. Many attempts to provide elasticity rely on separate elastic components that are, e.g., glued or sewn to a backing or other nonelastic member to provide the desired elasticity. The manufacture of such composite articles may be problematic in that secure attachment of the elastic components may be difficult to achieve and/or maintain. Further, the cost and difficulty of providing and attaching separate elastic components may be relatively high. The handling and attachment of separate elastic components can reduce throughput, cause additional waste (where the separate components are not securely attached), etc.

In other instances, an entire article may be constructed to provide the desired elasticity. For example, many elastic fastening systems rely on the use of elastic laminate backings in which the elastic materials are provided in the form of a film that is coextensive with the backing. Such an approach may add costs associated with providing a coextensive elastic layer or layers. Further, many elastic materials are not breathable. If the elastic laminate backings are to be used in garments, it may be desirable to perforate the backing to improve its breathability. Such additional processing does, however, add to the cost of producing the elastic laminate backing. Another potential disadvantage of elastic laminate backings is that it may be difficult to provide any variability in the elastic recovery forces generated in different portions of the backing.

SUMMARY OF THE INVENTION

The present invention provides methods of manufacturing composite webs including a substrate with one or more discrete polymeric regions located thereon. Each of the discrete polymeric regions is formed of elastomeric thermoplastic composition that is transferred to the substrate in depressions formed on a transfer roll. The discrete elastomeric polymeric regions can be used to provide elasticity to a substrate that is not elastic or they may be used to adjust the elasticity of a substrate that is itself elastic.

In other aspects, the present invention may provide substrates or articles that exhibit elasticity as a result of the addition of one or more discrete elastomeric polymeric regions, with the elasticity being provided in combination with discrete polymeric regions that may serve other functions, e.g., mechanical fasteners, stress distribution, bonding sites, etc.

One advantage of some methods of the present invention is the ability to transfer one or more discrete polymeric regions onto a major surface of a substrate, where the elastomeric thermoplastic material of the discrete polymeric region can be forced against the substrate by a transfer roll. If the substrate is porous, fibrous, etc., that pressure may enhance attachment of the discrete polymeric regions to the substrates by forcing a portion of the elastomeric thermoplastic composition to infiltrate the substrate and/or encapsulate fibers of the substrate.

Another advantage of the present invention is the ability to provide different thermoplastic compositions, such that some discrete polymeric regions may be formed of one thermoplastic composition, while other discrete polymeric regions are formed of a different thermoplastic composition. For example, discrete elastomeric polymeric regions may be provided on the same substrate as discrete nonelastomeric polymeric regions.

Another advantage of the present invention is the ability to control the shape, spacing, and volume of the discrete polymeric regions. This may be particularly advantageous because these parameters (shape, spacing, and volume) can be fixed regardless of the line speed of the system.

Another advantage of the present invention is the ability to provide one or more discrete polymeric regions that extend for the length of the substrate (while not being formed over the width of the substrate, i.e., the discrete polymeric regions are not coextensive with the major surface of the substrate).

Still another advantage of the methods of the present invention is the ability to provide one or more discrete polymeric regions on both major surfaces of a substrate. The discrete polymeric regions on the opposing major surfaces may be formed with the same or different materials and other characteristics as desired.

In another aspect, the present invention provides method for producing a composite web by providing a transfer roll with an exterior surface that includes one or more depressions formed therein; and delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll. The method also includes wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and transferring at least a portion of the molten elastomeric thermoplastic composition in the one or more depressions to a first major surface of a substrate by contacting the first major surface of the substrate to the exterior surface of the transfer roll and the molten elastomeric

thermoplastic composition in the one or more depressions, followed by separating the substrate from the transfer roll, wherein one or more discrete polymeric regions formed of the elastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

In another aspect, the present invention provides method for producing a composite web by providing a transfer roll with an exterior surface that includes one or more depressions formed therein; and delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll. The method also includes wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and forcing a portion of a first major surface of a substrate into the one or more depressions, wherein the first major surface includes a porous surface including fibers, and wherein a portion of the elastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface, and still further wherein the molten elastomeric thermoplastic composition encapsulates at least a portion of at least some of the fibers. The method also includes separating the substrate from the transfer roll, wherein one or more discrete polymeric regions formed of the elastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

In another aspect, the present invention provides a method for producing a composite web by providing a transfer roll with an exterior surface that includes one or more depressions formed therein; and delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll. The method also includes wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric

thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and transferring at least a portion of the molten elastomeric thermoplastic composition in the one or more depressions to a first major surface of a first substrate by contacting the first major surface of the first substrate to the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions, followed by separating the first substrate from the transfer roll, wherein one or more discrete polymeric regions formed of the elastomeric thermoplastic composition are located on the first major surface of the first substrate after separating the first substrate from the transfer roll. The method further includes laminating a second substrate to the first major surface of the first substrate, wherein the one or more discrete polymeric regions on the first substrate are located between the first substrate and the second substrate after laminating the second substrate to the first substrate.

In another aspect, the present invention provides a method for producing a composite web by providing a first substrate including a first major surface and a second major surface, a plurality of discrete elastomeric polymeric regions formed of an elastomeric thermoplastic composition located on the first major surface of the first substrate, wherein each discrete elastomeric polymeric region of the plurality of discrete elastomeric polymeric regions infiltrates the first major surface of the first substrate. The method includes providing a second substrate having a first major surface and a second major surface, a plurality of discrete polymeric regions formed of a thermoplastic composition located on the first major surface of the second substrate, wherein each discrete polymeric region of the plurality of discrete polymeric regions infiltrates the first major surface of the second substrate. The method further includes laminating the first substrate to the second substrate.

In another aspect, the present invention provides an elastic fastening article including a substrate with first and second major surfaces; one or more mechanical fasteners attached to the first major surface of the substrate, wherein each mechanical fastener of the one or more mechanical fasteners includes a discrete thermoplastic region infiltrating the first major surface of the substrate,

and wherein each mechanical fastener of the one or more mechanical fasteners further includes a plurality of fastening structures located thereon, the fastening structures facing away from the first major surface of the substrate. The article further includes one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements includes a discrete elastomeric thermoplastic region infiltrating a portion of the substrate.

In another aspect, the present invention provides an elastic article including a substrate having first and second major surfaces; one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements includes a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and one or more bonding sites located on the first major surface of the substrate.

In another aspect, the present invention provides an elastic article including a substrate having first and second major surfaces; one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements includes a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and one or more slits formed through the substrate, wherein at least one of the one or more elastic elements spans each slit of the one or more slits.

In another aspect, the present invention provides an elastic article including a substrate with first and second major surfaces; one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements includes a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and one or more pleats formed in the substrate, wherein at least one of the one or more elastic elements spans at least one pleat of the one or more pleats.

These and other features and advantages of methods according to the present invention are described below in connection with various illustrative embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of one composite web manufactured according to the methods of the present invention.

FIG. 2 is a perspective view of a pleated composite web manufactured according to the methods of the present invention.

FIG. 3 is a plan view of the pleated composite web of FIG. 2.

FIG. 4 is a perspective view of one polymer transfer process useful in providing discrete polymeric regions on a substrate in accordance with the methods of the present invention.

FIG. 4A illustrates another transfer roll and polymer source useful in connection with zoned delivery systems and methods

FIG. 4B is an enlarged partial cross-sectional view depicting wiping of the transfer roll by a doctor blade.

FIG. 4C is an enlarged partial cross-sectional view depicting a conformable backup roll forcing a substrate against a transfer roll.

FIG. 4D is an enlarged partial cross-sectional view depicting a mating backup roll including protrusions aligned with depressions in the transfer roll.

FIG. 5 is a plan view of a disposable diaper.

FIG. 6 is a plan view of one fastening tab manufactured from a portion of a composite web according to the present invention.

FIG. 7 is a cross-sectional view of the article of FIG. 6, taken along line 7-7 in FIG. 6.

FIG. 8 is a cross-sectional view of the article of FIG. 6, taken along line 8-8 in FIG. 6.

FIG. 9 is a perspective view of one system for manufacturing a composite web including discrete polymeric regions in accordance with the present invention.

FIG. 10 is a plan view of one composite web according to the present invention, the composite web including lines of separation.

FIG. 11 is a plan view of another fastening tab manufactured from a portion of a composite web according to the present invention.

FIG. 11A is a plan view of an elastic article manufactured from a composite web according to the present invention.

FIG. 11B is a plan view of an elastic article manufactured from a composite web according to the present invention.

FIG. 12 is a cross-sectional view of the article of FIG. 11, taken along line 12-12 in FIG. 11.

FIG. 13 is a cross-sectional view of the article of FIG. 11, taken along line 13-13 in FIG. 11.

FIG. 14 depicts one system for manufacturing a composite web including discrete polymeric regions in accordance with the present invention.

FIG. 15 is a plan view of one depression on a transfer roll that may be used in connection with the methods of the present invention.

FIG. 16 is a cross-sectional view of the depression of FIG. 15 taken along line 16-16 in FIG. 15.

FIG. 17 is a plan view of alternative depressions on a transfer roll that may be used in connection with the methods of the present invention.

FIG. 18 is a cross-sectional view of one depression of FIG. 17 taken along line 18-18 in FIG. 17.

FIG. 19 is a plan view of a portion of one composite web manufactured according to the present invention.

FIG. 20 is a perspective view of one transfer roll that may be used to manufacture the composite web of FIG. 19.

FIG. 21 is a plan view of a portion of one composite web manufactured according to the present invention that includes discrete polymeric regions extending across the width of the substrate.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS OF THE INVENTION

The present invention provides methods and systems for producing composite webs that include a substrate with discrete elastomeric polymeric regions located one and/or within the substrate. Various different constructions will now be described to illustrate various embodiments of the composite webs that can be manufactured in accordance with the methods of the present invention. These illustrative constructions should not be considered to limit the present invention, which is to be limited only by the claims that follow.

For example, some embodiments of the invention will be described in the context of a disposable absorbent article, such as a disposable diaper. It is, however, readily apparent that the present invention could also be employed with other articles, such as caps, gowns, shoe covers, feminine care articles, incontinence garments and the like.

FIG. 1 is a cross-sectional view of a portion of one composite web manufactured in accordance with the present invention. The composite web includes a substrate 10 with a first major surface 18 and a second major surface 19. A plurality of discrete polymeric regions 14 are located on the first major surface 18 of the substrate 10. The regions 14 may preferably be formed of an elastomeric thermoplastic composition as discussed in more detail below.

The different discrete polymeric regions 14 are separated by exposed areas 16 on the first major surface 18 of substrate 10. As depicted in FIG. 1, the spacing, i.e., the size of the exposed area 16 between the discrete polymeric regions 14 may be the same or different. For example, the exposed area 16 located between the left-most pair of discrete polymeric regions 14 is larger than the exposed area 16 located between the right-most pair of discrete polymeric regions 14.

The discrete polymeric regions 14 may cover any desired portion of the surface area of the substrate 10 on which they are positioned, although it will be understood that the discrete polymeric regions 14 will not cover all of the surface of the substrate 10. Some variations in the percentage of surface area occupied by discrete polymeric regions may be as described in, for example, pending U.S. Patent Application Serial No. 09/257,447, entitled WEB HAVING DISCRETE STEM REGIONS, filed on Feb. 25, 1999 (published as International Publication No. WO 00/50229).

Further, although the discrete polymeric regions 14 are depicted as being disconnected from each other, it should be understood that some composite webs manufactured with the systems and methods of the present invention may include a relatively thin skin layer of the thermoplastic composition used to form the discrete polymeric regions. Such a skin layer may, in some instances, connect some or all of the discrete polymeric regions on the composite web. Where, e.g., the skin layer is formed of an elastomeric thermoplastic

composition, the amount of polymeric material in the skin layer will, however, be insufficient to significantly affect elasticity of the substrate 10 outside of the thicker discrete polymeric regions 14.

The substrates used in connection with the composite webs of the present invention may have a variety of constructions. For example, the substrates may be a woven material, nonwoven material, knit material, paper, film, or any other continuous media that can be fed through a nip point. The substrates may have a wide variety of properties, such as extensibility, elasticity, flexibility, conformability, breathability, porosity, stiffness, etc. Further, the substrates may include pleats, corrugations or other deformations from a flat planar sheet configuration.

In some instances, the substrates may exhibit some level of extensibility and also, in some instances, elasticity. Extensible webs that may be preferred may have an initial yield tensile force of at least about 50 gm/cm, preferably at least about 100 gm/cm. Further, the extensible webs may preferably be extensible nonwoven webs.

Suitable processes for making a nonwoven web that may be used in connection with the present invention include, but are not limited to, airlaying, spunbond, spunlace, bonded melt blown webs and bonded carded web formation processes. Spunbond nonwoven webs are made by extruding a molten thermoplastic, as filaments from a series of fine die orifices in a spinneret. The diameter of the extruded filaments is rapidly reduced under tension by, for example, by non-eductive or eductive fluid-drawing or other known spunbond mechanisms, such as described in U.S. Patent Nos. 4, 340,563 (Appel et al.); 3,692,618 (Dorschner et al.); 3,338,992 and 3,341,394 (Kinney); 3,276,944 (Levy); 3,502,538 (Peterson); 3,502,763 (Hartman) and 3,542,615 (Dobo et al.). The spunbond web is preferably bonded (point or continuous bonding).

The nonwoven web layer may also be made from bonded carded webs. Carded webs are made from separated staple fibers, which fibers are sent through a combing or carding unit which separates and aligns the staple fibers in the machine direction so as to form a generally machine direction-oriented fibrous nonwoven web. However, randomizers can be used to reduce this machine direction orientation.

Once the carded web has been formed, it is then bonded by one or more of several bonding methods to give it suitable tensile properties. One bonding method is powder bonding wherein a powdered adhesive is distributed through the web and then activated, usually by heating the web and adhesive with hot air. Another bonding method is pattern bonding wherein heated calender rolls or ultrasonic bonding equipment are used to bond the fibers together, usually in a localized bond pattern though the web can be bonded across its entire surface if so desired. Generally, the more the fibers of a web are bonded together, the greater the nonwoven web tensile properties.

Airlaying is another process by which fibrous nonwoven webs useful in the present invention can be made. In the airlaying process, bundles of small fibers usually having lengths ranging between about 6 to about 19 millimeters are separated and entrained in an air supply and then deposited onto a forming screen, often with the assistance of a vacuum supply. The randomly deposited fibers are then bonded to one another using, for example, hot air or a spray adhesive.

Meltblown nonwoven webs may be formed by extrusion of thermoplastic polymers from multiple die orifices, which polymer melt streams are immediately attenuated by hot high velocity air or steam along two faces of the die immediately at the location where the polymer exits from the die orifices. The resulting fibers are entangled into a coherent web in the resulting turbulent airstream prior to collection on a collecting surface. Generally, to provide sufficient integrity and strength for the present invention, meltblown webs must be further bonded such as by through air bonding, heat or ultrasonic bonding as described above.

A web can be made extensible by skip slitting as is disclosed in, e.g., International Publication No. WO 96/10481 (Abuto et al.). If an elastic, extensible web is desired, the slits are discontinuous and are generally cut on the web prior to the web being attached to any elastic component. Although more difficult, it is also possible to create slits in the nonelastic web layer after the nonelastic web is laminated to the elastic web. At least a portion of the slits in the nonelastic web should be generally perpendicular (or have a substantial perpendicular vector) to the intended direction of extensibility or elasticity (the

at least first direction) of the elastic web layer. By generally perpendicular it is meant that the angle between the longitudinal axis of the chosen slit or slits and the direction of extensibility is between 60 and 120 degrees. A sufficient number of the described slits are generally perpendicular such that the overall laminate is elastic. The provision of slits in two directions is advantageous when the elastic laminate is intended to be elastic in at least two different directions.

A nonwoven web used in connection with the present invention can also be a necked or reversibly necked nonwoven web as described in U.S. Patent Nos. 4,965,122; 4,981,747; 5,114,781; 5,116,662; and 5,226,992 (all to Morman). In these embodiments the nonwoven web is elongated in a direction perpendicular to the desired direction of extensibility. When the nonwoven web is set in this elongated condition, it will have stretch and recovery properties in the direction of extensibility.

The substrates used in connection with the present invention may preferably exhibit some porosity on one or both of the major surfaces of the substrate such that when a molten thermoplastic composition is provided on one of the major surfaces of the substrate, a mechanical bond is formed between the molten thermoplastic composition and the substrate as the molten thermoplastic composition infiltrates and/or encapsulates a portion of the porous surface of the substrate. As used in connection with the present invention, the term "porous" includes both structures that include voids formed therein, as well as structures formed of a collection of fibers (e.g., woven, nonwoven, knit, etc.) that allow for the infiltration of molten thermoplastic composition into the interstices between fibers. If the porous surface includes fibers, the thermoplastic composition may preferably encapsulate fibers or portions of fibers on the surface of the substrate.

As used herein, the term "fiber" includes fibers of indefinite length (e.g., filaments) and fibers of discrete length, e.g., staple fibers. The fibers used in connection with the present invention may be multicomponent fibers. The term "multicomponent fiber" refers to a fiber having at least two distinct longitudinally coextensive structured polymer domains in the fiber cross-section, as opposed to blends where the domains tend to be dispersed, random, or unstructured. The distinct domains may thus be formed of polymers from different polymer classes (e.g., nylon and polypropylene) or be formed of

polymers from the same polymer class (e.g., nylon) but which differ in their properties or characteristics. The term "multicomponent fiber" is thus intended to include, but is not limited to, concentric and eccentric sheath-core fiber structures, symmetric and asymmetric side-by-side fiber structures, island-in-sea fiber structures, pie wedge fiber structures, and hollow fibers of these configurations.

The type and construction of the material or materials in the substrate should be considered when selecting an appropriate substrate to which a molten thermoplastic composition is applied. Generally, such materials are of the type and construction that do not melt, soften, or otherwise disintegrate under the temperatures and pressures experienced during the step of transferring the thermoplastic composition to the substrate. For example, the substrate should have sufficient internal strength such that it does not fall apart during the process. Preferably, the substrate has sufficient strength in the machine direction at the temperature of the transfer roll to remove it intact from the transfer roll.

Although the substrates depicted in the various cross-sectional views of the present invention are illustrated as single layer structures, it should be understood that the substrates may be of single or multi-layer construction. If a multi-layer construction is used, it will be understood that the various layers may have the same or different properties, constructions, etc. Some of these variations may be as described in, for example, pending U.S. Patent Application Serial No. 09/257,447, entitled WEB HAVING DISCRETE STEM REGIONS, filed on Feb. 25, 1999 (published as International Publication No. WO 00/50229).

The discrete polymeric regions 14 may be formed of a wide variety of different thermoplastic polymeric materials. The thermoplastic compositions used in connection with the methods of the present invention should be capable of flowing or entering into depressions formed in a polymer transfer roll as will be described below. Furthermore, it may be desirable that some of the thermoplastic compositions also exhibit a relatively high degree of moldability, i.e., the ability to enter and preferably take the shape of a cavity when subjected to the proper conditions of temperature and pressure.

Suitable thermoplastic compositions are those that are melt processable. Such polymers are those that will flow sufficiently to at least partially fill the depressions, yet not significantly degrade during a melt process. A wide variety of thermoplastic compositions have suitable melt and flow characteristics for use in the process of the present invention depending on the geometry of the depressions and the processing conditions. It may further be preferred that the melt processable materials and conditions of processing are selected such that any viscoelastic recovery properties of the thermoplastic composition do not cause it to significantly withdraw from the wall(s) of the depressions until transfer of the thermoplastic composition to a substrate is desired.

As used in connection with the present invention, "thermoplastic" (and variations thereof) means a polymer or polymeric composition that softens when exposed to heat and returns to its original condition or near its original condition when cooled to room temperature.

Some examples of thermoplastic compositions that may be used in connection with the present invention include, but are not limited to, polyurethanes, polyolefins (e.g., polypropylenes, polyethylenes, etc.), polystyrenes, polycarbonates, polyesters, polymethacrylates, ethylene vinyl acetate copolymers, ethylene vinyl alcohol copolymers, polyvinylchlorides, acrylate modified ethylene vinyl acetate polymers, ethylene acrylic acid copolymers, nylons, fluorocarbons, etc. These materials can be elastomeric or nonelastomeric (e.g., polycarbonates, polymethacrylates, and polyvinylchlorides).

At least one or more of the discrete polymeric regions formed on a substrates in connection with the composite webs of the present invention is formed of an elastomeric thermoplastic composition. An elastomeric thermoplastic composition is a polymeric composition that melts and returns to its original condition or near its original condition upon cooling and exhibits elastomeric properties at ambient conditions (e.g., room temperature and pressure). As used in connection with the present invention, "elastomeric" means that the material will substantially resume its original shape after being stretched. Further, the elastomeric materials may preferably sustain only small permanent set following deformation and relaxation, which set is preferably no

greater than about 30 percent and more preferably no greater than about 20 percent of the original length at moderate elongation, e.g., about 50%. The elastomeric materials can be both pure elastomers and blends with an elastomeric phase or content that will still exhibit substantial elastomeric properties at room temperature. U.S. Patent No. 5,501,679 (Krueger et al.) provides some further discussion regarding elastomeric materials that may be considered for use in connection with the present invention.

The elastomeric thermoplastic compositions can include one or more polymers. For example, the elastomeric thermoplastic composition could be a blend with an elastomeric phase such that the composition exhibits elastomeric properties at room temperature. Suitable elastic thermoplastic polymers include block copolymers such as conventional A-B or A-B-A block copolymers (e.g., styrene-isoprene-styrene, styrene-butadiene-styrene, styrene-ethylene-butylene-styrene block copolymers), elastomeric polyurethanes, olefinic elastomers, particularly elastomeric ethylene copolymers (e.g., ethylene vinyl acetates, ethylene/octene copolymer elastomers, ethylene/propylene/diene terpolymer elastomers), as well as mixtures of these with each other, with other elastomeric thermoplastic polymers, or with nonelastomeric thermoplastic polymers.

The thermoplastic compositions used in connection with the present invention can also be combined with various additives for desired effect. These include, for example, fillers, viscosity reducing agents, plasticizers, tackifiers, colorants (e.g., dyes or pigments), antioxidants, antistatic agents, bonding aids, antiblocking agents, slip agents, stabilizers (e.g., thermal and ultraviolet), foaming agents, microspheres, glass bubbles, reinforcing fibers (e.g., microfibers), internal release agents, thermally conductive particles, electrically conductive particles, and the like. The amounts of such materials that can be useful in the thermoplastic compositions can be readily determined by those skilled in the art of processing and using such materials.

FIGS. 2 and 3 depict another embodiment of a composite web manufactured in accordance with the present invention that includes a substrate 110 on which a plurality of discrete polymeric regions 114a and 114b are located. The substrate 110 includes pleats 102 that extend across the width of

the substrate 110 (where the width is defined by the opposing edges 111 of the substrate 110).

Discrete polymeric region 114a is an example of a discrete polymeric region that extends along the length of the substrate 110, such that the discrete polymeric region 114a spans multiple pleats 102 as seen in FIGS. 2 and 3. Discrete polymeric regions 114b are examples of smaller discrete polymeric regions that span only one pleat 102 formed in the substrate 110.

When the discrete polymeric regions 114a and/or 114b are formed of an elastomeric thermoplastic composition, they may act to prevent unfolding of the pleats 102 or they may attempt to restore the pleats to their folded state if the substrate 110 is stretched in a manner that would cause the pleats 102 to unfold.

The smaller discrete polymeric regions 114b are oval in shape, but it will be understood that the discrete polymeric regions could be provided in any desired shape, e.g., squares, rectangles, hexagons, etc. The shapes may or may not be in the form of recognized geometric shapes, but may be randomly formed with irregular perimeters. In addition, the shapes may not necessarily be solid figures, but may include voids formed within the shape in which none of the thermoplastic composition is transferred. In yet another alternative, some or all of the discrete polymeric regions may be in the form of indicia, i.e., letters, numbers, or other graphic symbols.

FIG. 4 is a perspective view of one system and method of providing discrete polymeric regions on one surface of a substrate 210 in accordance with the principles of the present invention. The system depicted in FIG. 4 includes a substrate 210 that defines a web path through the system. The substrate 210 moves through the system in a downstream direction indicated by the rotation arrows on the various rolls. After being unwound or otherwise provided from a supply (e.g., the substrate 210 may be manufactured in-line with the system depicted in FIG. 4), the substrate 210 is directed into a transfer nip formed between a backup roll 220 and a transfer roll 230.

The process of providing discrete polymeric regions on the substrate 210 includes delivering a supply of a molten thermoplastic composition to the exterior surface 232 of transfer roll 230 that includes a one or more depressions 234 formed in its exterior surface 232. The molten thermoplastic composition

241 is supplied to the exterior surface 232 of the transfer roll 230 by a delivery apparatus in the form of a trough 240 (or other supply apparatus, e.g., extruder, gear pump, etc.). The excess molten thermoplastic composition is wiped or removed from the exterior surface 232 by a doctor blade 242 acting against the exterior surface 232 of the transfer roll 230. Although it may be ideal to remove all of the thermoplastic composition from the exterior surface 232 of the transfer roll 230, some of the thermoplastic composition may remain on the exterior surface 232 after wiping by the doctor blade 242.

The depressions 234 formed in the exterior surface 232 of the transfer roll 230 preferably receive a portion of the molten thermoplastic composition when the molten thermoplastic composition is deposited on the exterior surface 232 of the transfer roll 230. If the depressions 234 are not completely filled during or by the deposition of molten thermoplastic composition, the wiping action of the doctor blade 242 on the exterior surface 232 of the transfer roll 230 may assist in substantially filling the depressions with molten thermoplastic composition.

Although FIG. 4 depicts the application of only one thermoplastic composition using the transfer roll 230, it will be understood that two or more different thermoplastic compositions may be applied to the exterior surface of the transfer roll 230. FIG. 4A depicts a portion of one system in which a trough 340 is used to deliver three molten thermoplastic compositions (in zones A, B, & C) to the surface of a transfer roll 330 that rotates about an axis 331. The trough 340 may, for example, include barriers 342 such that molten thermoplastic compositions in the different zones of the trough 340 do not mix during processing. In another alternative, separate and distinct troughs could be used for each different thermoplastic composition to be applied to the transfer roll 330. The troughs or zones may, e.g., be used to deliver elastomeric and nonelastomeric thermoplastic compositions to the roll 330 at the same time.

The transfer roll 330 also includes different sets of depressions 334a, 334b, and 334c over which the different molten thermoplastic compositions may be applied. The depressions in the different zones on transfer roll 330 are differently shaped, have different sizes, and have different spacings. For example, the triangular depressions in zone C are arranged in an irregular, non-

repeating pattern while the depressions in zones A & B are arranged in regular, repeating patterns.

With the system of FIG. 4A, different sets of discrete polymeric regions may be formed on a single substrate using different thermoplastic compositions. As a result, the thermoplastic compositions may be selected for any of a number of different properties related to manufacturing or end-use performance of the finished articles made using the composite webs.

Control over the temperatures of the various rolls in the system depicted in FIG. 4 may be useful in obtaining the desired products. It may be preferred, e.g., that the exterior surface 232 of the transfer roll 230 be heated to a selected temperature that is at or above the melt temperature of the thermoplastic composition to be transferred to the substrate 210. Heating the transfer roll 230 may also enhance filling of the depressions 234 by the molten thermoplastic composition.

Because the molten thermoplastic composition 241 is itself heated within the trough 240, the doctor blade 242 will typically be heated by the molten thermoplastic composition. It may alternatively be desirable to control the temperature of the doctor blade 242 separately from the trough 240 containing the molten thermoplastic composition 241. For example, it may be desirable to heat the doctor blade 242 to a temperature above the melt temperature of the molten thermoplastic composition.

FIG. 4B is an enlarged partial cross-sectional view depicting one relationship between a doctor blade 242 and depression 234 in a transfer roll 230. Another characteristic of the doctor blade 242 that may be controlled is its thickness or length 243 along the exterior surface of the transfer roll 230 (as measured in the machine direction or the direction of rotation of the transfer roll). For example, a thicker or longer doctor blade 242 may help by allowing the molten thermoplastic composition more time to relax within the depressions 234, thereby improving filling of the depressions. In addition to varying the length of the doctor blade 242, the pressure or force exerted on the transfer roll 230 by the doctor blade 242 may also be adjusted based on a variety of factors including, e.g., the characteristics of the molten thermoplastic composition, the transfer roll characteristics, etc.

With the depressions 234 at least partially filled with the desired molten thermoplastic composition, the transfer roll 230 continues to rotate until the depressions 234 and the molten thermoplastic composition they contain are forced into contact with the substrate 210 against backup roll 220 at the transfer nip (i.e., the nip formed by the transfer roll 230 and the backup roll 220). It is at this point that transfer of the molten thermoplastic composition in the depressions 234 to the substrate 210 begins. It should be understood that under certain conditions, only a portion of the thermoplastic composition in the depressions 234 may transfer to the substrate 210.

When a substrate 210 that includes one or more porous major surfaces on which the molten thermoplastic composition is deposited is used in connection with the methods of the present invention, a mechanical bond is preferably formed by infiltration of the molten thermoplastic composition into the porous surface of the substrate 210. As used in connection with the present invention, the term "porous" includes both structures that include voids formed therein, as well as structures formed of a collection of fibers (e.g., woven, nonwoven, or knit) that allow for the infiltration of molten thermoplastic compositions.

The nip pressure between the transfer roll 230 and the backup roll 220 is preferably sufficient such that a portion of the thermoplastic composition in the discrete polymeric regions infiltrates into and/or encapsulates a portion of the porous substrate 210 to improve attachment of the discrete polymeric regions to the substrate 210. Where the surface of the substrate 210 includes fibers (e.g., where the substrate 210 includes woven, nonwoven, or knit materials on its major surfaces), it may be preferred that the thermoplastic composition encapsulate all or a portion of at least some of the fibers on the surface of the substrate 210 to improve attachment of the discrete polymeric regions to the substrate 210.

Under some conditions the molten thermoplastic composition in the depressions 234 may completely permeate the substrate 210 if, e.g., the substrate 210 is porous throughout its thickness. In other instances, penetration of the molten thermoplastic composition may be limited to the outer layer or layers of the substrate 210.

It should, however, be understood that although the outer surfaces of the substrate 210 may exhibit some porosity, that porosity may not necessarily extend through the entire thickness of the substrate 210. For example, the substrate 210 may have a variety of different layers, with one of the layers being substantially non-porous. In another alternative, the overall thickness of the substrate 210 may render it non-porous as a whole, even though the outer surfaces of the substrate 210 exhibit some porosity as discussed above.

The backup roll 220 may possess a variety of different characteristics depending on the types of substrate materials and/or molten thermoplastic compositions being processed. In some instances, the exterior of the backup roll 220 may be a rubber or other conformable material that conforms to the shape of the transfer roll 230. If a conformable material such as rubber is used, it may, e.g., have a durometer of, e.g., about 10-90 Shore A.

One such variation at the transfer nip is depicted in FIG. 4C, in which a conformable backup roll 330 is depicted as forcing a portion of the substrate 310 into the depression 334 (and the thermoplastic composition 341 contained therein). If the surface of the substrate 310 facing the depression 334 is porous, a portion of the molten thermoplastic composition 341 may be forced into or infiltrate the porous surface of the substrate 310. Forcing the substrate 310 into the depression may be particularly beneficial if the depression 334 is not completely filled with the molten thermoplastic composition 341 to improve the likelihood of contact between the substrate 310 and the molten thermoplastic composition 341.

Alternatively, the surface of the substrate may be forced into the depressions on the transfer roll using a mating backup roll. This variation at the transfer nip is depicted in FIG. 4D in which the backup roll 320' includes protrusions 322' that are complementary to or mate with the depressions 334' on the transfer roll 330'. The protrusions 322' would preferably force a substrate into the depressions with the same results and benefits described above with respect to FIG. 4C. A mating backup roll 320' could be formed of any suitable conformable material, nonconformable material, or combination of conformable or nonconformable materials.

Heating or otherwise controlling the temperature of the transfer roll is discussed above. It should also be appreciated that the temperature of the exterior surface of the backup roll may be controlled. For example, it may be desirable to cool the surface of the backup roll to a selected temperature below the temperature of the transfer roll. Cooling of the backup roll may be beneficial in maintaining the integrity of the substrate, particularly if the substrate integrity can be degraded from the heat of the transfer roll (if the transfer roll is heated) and/or the molten thermoplastic composition in the depressions of the transfer roll.

After passing through the transfer nip formed between the backup roll 220 and the transfer roll 230, the substrate 210 continues around the backup roll 220 as seen in FIG. 4. In some instances, a portion of the molten thermoplastic composition in the depressions may remain in the depressions 234 while the substrate 210 is pulled away from the transfer roll 230. As a result, the molten thermoplastic composition in the depressions 234 may tend to elongate or string between the depressions in transfer roll 230 and the substrate 210.

A device, such as a hot wire 244 seen in FIG. 4, may be used to sever any strands of thermoplastic composition that may be formed as the substrate 210 separates from the transfer roll 230. Other devices and/or techniques may be used to accomplish the desired severing of any molten thermoplastic composition strands. Examples may include, but are not limited to hot air knives, lasers, etc. Furthermore, under certain conditions, stringing of the thermoplastic composition may not be encountered during manufacturing.

The tendency of the molten thermoplastic composition in the depressions 234 to string as the substrate exits the transfer nip also raises another issue that should be considered when developing processes according to the present invention. That issue is the internal cohesive strength of the substrate 210 and/or the tensile strength of the substrate 210. This issue may be of more concern if the substrate 210 includes a fibrous construction (e.g., woven, nonwoven, or knit fibers) that could be separated from the remainder of the substrate by the forces exerted when the substrate 210 is pulled away from the transfer roll 230. These considerations may be more important if the molten thermoplastic composition has properties (e.g., tackiness, tensile strength, etc.) such that strands of the

molten thermoplastic composition can exert forces on the substrate 210 that exceed the internal cohesive strength and/or tensile strength of the substrate 210.

For example, if the substrate 210 includes a resin-bonded nonwoven portion, the temperature of the transfer roll 230 and/or molten thermoplastic composition may rise above the melting temperature of the resin, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate 210. Alternatively, a nonwoven substrate may include fibers that have a melting temperature similar to the temperature of the transfer roll 230 and/or molten thermoplastic composition, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate 210.

In either instance, the roll temperatures and/or molten thermoplastic composition temperature may need to be controlled to maintain the integrity of the substrate while transferring the molten thermoplastic composition. For example, the backup roll 220 may be cooled to, in turn, cool the substrate 210 to maintain its internal cohesive strength.

In another alternative, heating of the transfer roll 230 and/or backup roll 220 may be used to enhance the internal cohesive strength and/or tensile strength of the substrate 210. For example, if the substrate 210 includes multicomponent fibers or fibers having different compositions, some consolidation of the fibers or other components in the substrate 210 may be caused by heating the substrate 210 while transferring the molten thermoplastic composition from the transfer roll 230 to the substrate 210. That consolidation may improve the integrity of the substrate by forming a skin layer or other strength-enhancing structure on or within the substrate 210. Some exemplary processes may be described in, e.g., U.S. Patent No. 5,470,424 (Isaac et al.).

Having thus described some of the basic characteristics of composite webs and methods and systems of manufacturing them according to the present invention, a specific application of the present invention will now be described.

In that regard, FIG. 5 depicts one example of a disposable diaper 470 that may include one or more components manufactured according to the present invention. The diaper 470 includes a body 472 that may be manufactured of various materials useful in connection with diapers. Some exemplary diaper

constructions may be described in, e.g., U.S. Patent Nos. 5,399,219 (Roessler et al.) and 5,685,873 (Bruemmer et al.).

The diaper 470 includes fastening tabs 474 that extend laterally from the body 472 and are connected to opposing lateral ends of at least one waistband portion 473 for securing the waistband sections of the article about a wearer during the use of the article. The fastening tabs 474 are preferably formed of composite webs according to the principles of the present invention

The diaper 470 also includes fastening tab receiving areas 476 that are located in a waistband portion 475 at the opposite end of the diaper 470. Fastening tabs 474 may be attached to the fastening tab receiving areas 476 to retain the diaper on a wearer. Although two receiving areas are depicted in FIG. 5, it will be understood that in some instances a single larger receiving area may be provided that extends substantially across the diaper in the area of waistband 475.

Fastening tab receiving area 476 can have any suitable construction to retain the fastening tab 474. For example, if the fastening tab 474 includes hooks formed thereon, the receiving area 476 may be constructed of, e.g., loop material that cooperates with the hooks to retain the fastening tab 474 on the receiving area 476.

FIGS. 6-8 depict various views of one of the fastening tabs 474 attached to diaper 470 to illustrate various features of the present invention. Fastening tab 474 includes a substrate 410 on which a variety of different discrete polymeric regions are located. The different discrete polymeric regions provide a mechanical fastener (414a) for attaching the tab 474 to a complementary surface (e.g., receiving surface 476 in FIG. 5) and elastic elements (414b) to provide elasticity to the fastening tab 474. The tab 474 preferably includes an elongation axis 478 seen in FIG. 6.

Discrete polymeric region 414a is provided proximate the distal end of the tab 474. FIG. 7 is a cross-sectional view taken along line 7-7 in FIG. 6 and depicts structures 412 protruding from a base 413 of the discrete polymeric region 414a. In the embodiment depicted in FIG. 7, the structures 412 are fastening structures in the form of a plurality of capped stems, although many other suitable fastening structures could be used in place of capped stems.

The depicted stems 412 are oriented substantially perpendicular to the base 413 of the discrete polymeric region 414a, as well as the underlying substrate 410, although it will be understood that the exact form and structure of the stems 412 may vary based on the intended use of the composite web. Furthermore, although all of the stems 412 are shown as having the same size and shape, it will be understood that a variety of differently sized and/or shaped stems may be provided as desired based on the intended use of the fastening tab 474.

The discrete polymeric region 414a may be formed of elastomeric or nonelastomeric materials, although it may be preferred that the discrete polymeric region 414a be manufactured of nonelastomeric materials if it is desired that the discrete polymeric region 414a also function to distribute stresses over the width of the fastening tab 474 (where the width is measured generally transverse to the elongation axis 478 depicted in FIG. 6). It may be desirable to distribute the forces applied during elongation of the tab 474 to reduce or prevent necking or roping of the tab 474. Force distribution may also be helpful to improve uniformity in the forces seen across the width of the tab 474.

The fastening tab 474 also includes discrete polymeric regions 414b that preferably function as elastic elements to provide elasticity to the tab 474 if the substrate 410 is nonelastic. If the substrate 410 is elastic, the discrete polymeric regions 414b may still function as elastic elements that enhance the elasticity of the tab 474. To function as elastic elements, the discrete polymeric regions 414b are formed of an elastomeric thermoplastic composition as defined above.

Although the substrate 410 is preferably extensible, a nonextensible substrate 410 can be made extensible by, e.g., providing slits 406 in the substrate 410. The slits 406 are preferably spanned by at least one of the discrete elastomeric polymeric regions 414b. Some exemplary slitting processes to provide or improve extensibility of a substrate are described in International Publication No. WO 96/10481 (Abuto et al.). Other techniques may also be used to provide or improve the extensibility of substrates used in connection with the present invention. For example, the mechanical stretching processes

described in U.S. Patent Nos. 4,223,059 (Schwarz) and 5,167,897 (Weber et al.) may be used to provide or improve extensibility.

In the depicted embodiment, the discrete polymeric regions 414b are located on the same surface of the substrate 410 as the discrete polymeric region 414a. Each of the discrete polymeric regions 414b preferably includes a length that is substantially aligned with the elongation axis 478. For the purposes of the present invention, the length of the discrete polymeric regions 414b is the longest straight line dimension of the discrete polymeric regions 414b as measured along the surface of the substrate 410.

Another feature of the discrete polymeric regions 414b is their nonuniform or changing width. As seen in FIG. 6, the discrete polymeric regions 414b become wider when moving away from the discrete polymeric region 414a. If the height or thickness of the discrete polymeric regions 414b above the surface of the substrate 410 is constant, the net result of the changing width depicted in FIG. 6 is that the amount of elastomeric material in the discrete polymeric regions 414b increases when moving away from the discrete polymeric region 414a. The changing bulk of elastomeric material may, e.g., provide a tab 474 that has different elasticity and/or elongation properties at different locations along the elongation axis 478. Many other variations in the distribution of elastomeric material in the discrete polymeric regions 414b may be used to tailor the elasticity and/or elongation properties of the fastening tab 474, e.g., adjusting the thickness of the polymeric regions, the materials used, etc.

FIG. 9 depicts one system that may be used to manufacture, e.g., the fastening tabs 474 of FIGS. 6-8 where all of the discrete polymeric regions are located on the same surface of the substrate 410. The system includes a substrate 410 that moves through the system as indicated by the arrows at the left and right ends of the web path, as well as by the rotation arrows provided on the various rolls.

The substrate 410 is first directed into a first transfer nip formed by backup roll 420a and first transfer roll 430a. First transfer roll 430a includes depressions 434a formed in its exterior surface 432a. A molten thermoplastic

composition delivery apparatus 440a is located on transfer roll 430a to fill the depressions 434a with the desired molten thermoplastic composition.

After passing through the first transfer nip, substrate 410 includes discrete polymeric regions 414a located thereon. Because the discrete polymeric regions 414a on the fastening tab 474 preferably include some structure formed thereon to provide a fastening mechanism, the substrate 410 including discrete polymeric regions 414a may be directed into a forming nip provided by a forming tool 450 and backup roll 422. The forming nip is downstream of the transfer nip in the depicted system.

Although the forming tool 450 is depicted as providing the forming nip using backup roll 422, it should be understood that, alternatively, the transfer nip and the forming nip could be formed using the same backup roll. Using the same backup roll for both the transfer nip and the forming nip, may, e.g., be beneficial in that fewer system components and/or floorspace may be required for the system.

In systems and methods where the transfer nip and the forming nip are formed using different backup rolls, the thermoplastic composition in the discrete polymeric regions 414a may no longer be sufficiently molten to form structures in the forming nip. If this is the case, the discrete polymeric regions 414a on the substrate 410 may need to be heated before passing through the forming nip (by, e.g., contact or noncontact heat sources).

The forming tool 450 is provided in the form of a roll and includes cavities 452 formed in its surface. Forming tools such as that depicted in FIG. 9 are well known to those of skill in the art. Some forming tools are described in, for example, U.S. Patent Nos. 4,984,339 (Provost et al.), 5,077,870 (Melbye et al.), 5,755,015 (Akeno et al.), 5,868,987 (Kampfer et al.), 6,132,660 (Kampfer), 6,190,594 B1 (Gorman et al.), 6,287,665 B1 (Hammer), etc.

The forming tool 450 and/or backup roll 422 may be heated or cooled to a selected temperature based on the properties of the thermoplastic composition being formed to enhance forming of the discrete polymeric regions by the cavities 452 in the forming tool 450. For example, it may be desirable to heat or cool the forming tool 450 to enhance the forming process. Depending on the speed of the process and other factors, the discrete regions of thermoplastic

composition located on substrate 410 may also advantageously retain some of their molten nature as transferred to the substrate 410.

In any event, a portion of the thermoplastic composition in discrete polymeric regions 414a located on the substrate 410 enters the cavities 452 on the forming tool 450. As a result, structures such as the stems depicted in FIG. 9 (see FIGS 6 and 7 also) may be formed in the discrete polymeric regions 414a located on substrate 410.

In some instances, the thermoplastic composition provided in discrete regions on the substrate 410 may possess properties (e.g., viscosity, etc.) such that the thermoplastic composition replicates the shape of the cavities 452 provided in the forming tool 450. As used herein, the term "replicates" (and variations thereof) includes complete replication as well as partial replication of the shape of the cavities 452 by the thermoplastic composition. In other instances, the properties (e.g., viscosity, etc.) may result in forming of the thermoplastic composition on the substrate 410 into shapes that, although they differ from the shape of the thermoplastic composition before forming by the forming tool 450, do not replicate the shape of the cavities 452 as described above.

Following transfer and forming of the discrete polymeric regions 414a, the substrate 410 is directed into a second transfer nip at which the discrete polymeric regions 414b are deposited on the substrate 410. The second transfer nip includes a second transfer roll 430b and a backup roll 420b, as well as a molten thermoplastic composition delivery apparatus 440b located on transfer roll 430b to fill the depressions 434b formed in exterior surface 432b of transfer roll 430b with the desired molten thermoplastic composition.

As the substrate 410 exits the second transfer nip, it includes a second set of discrete polymeric regions 414b in addition to discrete polymeric regions 414a, with both sets being located on the same surface of the substrate 410. The different sets of discrete polymeric regions 414a and 414b may be manufactured of the same or different thermoplastic compositions.

Because the substrate 410 includes the set of discrete polymeric regions 414a as delivered to the second transfer nip, it may be desirable if, e.g., the

backup roll structures discussed in connection with FIGS. 4B and 4C be used to provide additional force that may assist in the transfer process.

FIG. 10 depicts one composite web 500 that may be, at least in part, manufactured using the system of FIG. 9. The composite web 500 includes a variety of different discrete polymeric regions 514a and 514b located thereon. In addition, the composite web 500 includes lines of separation 517 that define the boundaries of a number of different fastening tabs similar to those described above with respect to FIGS 6-8. The lines of separation 517 define a nested configuration of fastening tabs including the discrete polymeric regions 514a and 514b in a manner that may reduce waste when the composite web 500 is separated along the lines of separation 517 to provide the desired fastening tabs. The lines of separation 517 may take on any suitable form that facilitates separation of the composite web 500 along the lines of separation, e.g., score lines, lines of weakness, lines of perforations, etc.

The composite web 500 preferably has a length that extends along the direction of the straight line of separation 517 extending from left to right in FIG. 10. Although the composite web 500 includes only two pairs of nested tabs across the width of the composite web 500 (where width is transverse to length), it will be understood that any desired number of nested pairs of tabs may be provided in a single composite web according to the present invention.

FIGS. 11-13 depict various views of another fastening tab 674 that may be used in connection with a garment, e.g., a diaper. Fastening tab 674 includes a laminated substrate 610 on and in which a variety of different discrete polymeric regions are located. The different discrete polymeric regions provide a mechanical fastener (using discrete polymeric regions 614a) for attaching the tab 674 to a complementary surface and elastic elements (614b) to provide elasticity to the fastening tab 674. The tab 674 preferably includes an elongation axis 678 seen in FIG. 11.

Mechanical fasteners in the form of discrete polymeric regions 614a are provided proximate the distal end of the tab 674. FIG. 12 is a cross-sectional view taken along line 12-12 in FIG. 11 and depicts structures 612 (e.g., hooks) protruding from the discrete polymeric regions 614a. In the embodiment depicted in FIG. 12, the structures 612 are in the form of hooks, although many

other suitable structures could be used in place of the depicted hooks. The discrete polymeric regions 614a used to provide mechanical fasteners to the tab 674 may be formed of elastomeric or nonelastomeric materials.

The fastening tab 674 also includes discrete polymeric regions 614b that preferably function as elastic elements to provide elasticity to the tab 674 if the substrate 610 is nonelastic. If the substrate 610 is elastic, the discrete polymeric regions 614b may still function as elastic elements that enhance the elasticity of the tab 674. To function as elastic elements, the discrete polymeric regions 614b are formed of an elastomeric thermoplastic composition as defined above.

In the depicted embodiment, the discrete polymeric regions 614b are located between substrates 610a and 610b of laminated substrate 610. This construction may be desirable to protect the elastomeric discrete polymeric regions 614b and to provide a softer feel to the tab 674. One method and system of manufacturing a laminated composite web is described below in connection with FIG. 14.

Each of the discrete polymeric regions 614b preferably includes a length that is substantially aligned with the elongation axis 678. For the purposes of the present invention, the length of the discrete polymeric regions 614b is the longest straight line dimension of the discrete polymeric regions 614b as measured along the surface of the substrate 610.

Unlike the polymeric regions with a variable width as depicted n FIG. 6, the polymeric regions 614b have a generally consistent width over their length. Variable elasticity and/or elongation may, however, be obtained by providing more discrete polymeric regions with different lengths, such that their combined bulk or mass becomes larger when moving away from the discrete polymeric regions 614a along the elongation axis 678. If the height or thickness of the discrete polymeric regions 614b measured through the thickness of the substrate 610 is constant, the net result of the arrangement depicted in FIG. 11 is that the amount of elastomeric material in the discrete polymeric regions 614b increases when moving away from the discrete polymeric regions 614a. The varying bulk of elastomeric material may, e.g., provide a tab 674 that has varying elasticity and/or elongation properties when moving along the elongation axis 678. Many other variations in the distribution of elastomeric material in the discrete

polymeric regions 614b may be used to tailor the elasticity and/or elongation properties of the fastening tab 674,e.g., varying the thickness, materials, etc.

FIGS. 11 and 13 also depict another optional feature in the form of a bonding site 628 provided on the substrate 610. The bonding site 628 may be provided to assist in the attachment of fastening tab 674 to a larger article, e.g., a diaper, gown, etc. To assist in attachment, the bonding site 628 may take a variety of configurations. For example, the bonding site may be a consolidated area of a nonwoven or woven fabric amenable to thermal or other consolidation techniques. Alternatively, or in addition to consolidation, the bonding site may include one or more materials that assist in bonding, e.g., block copolymers, ethylene vinyl acetates, tackified ethylene vinyl acetates, adhesives (pressure sensitive, curable, heat activated, etc.), amorphous polyolefins, etc. The specific selection of materials to locate in the bonding site 628 will depend on the type of bonding to be performed and the materials to be bonded.

One advantage of the bonding site 628 is that it can be formed of materials that are particularly amenable to the attachment technique to be used, e.g., heat sealing, ultrasonic welding, etc. Another advantage is that the bonding site can be sized such that it is large enough to accomplish its function, but not so large that any materials used in the bonding site are wasted. Depending on the composition of the materials to be provided at the bonding site, it may be formed by the transfer methods described herein if a thermoplastic composition is to be used in the bonding site 628.

In some disposable articles, e.g., training pants, bonding sites may be provided to bond an element to a like element, where a bonding site is located on one or both of the elements. FIG. 11A depicts an article that includes two bonding sites 628a and 628b located on opposing sides of an area that includes discrete elastomeric polymeric regions 614 located on a substrate 610. If the article depicted in FIG. 11A is to be used as, e.g., a fastening tab, it may be preferred that one or both of the bonding sites 628a and 628b be adapted to receive a mechanical fastener that may be bonded to the tab separately. Alternatively, an adhesive (e.g., pressure sensitive, curable, heat activated, etc.) or cohesive material could be provided within one or both of the bonding sites 628a and 628b.

FIG. 11B depicts another alternative article including discrete polymeric regions on a substrate in accordance with the present invention. The article is formed on a substrate 610' and includes two discrete polymeric regions 614' that may include, e.g., hooks, stems, capped stems, or other fastening structures. At least one, and preferably more than one, discrete elastomeric polymeric regions 615' are located between the two discrete polymeric regions 614' on the article.

FIG. 14 depicts one system that may be used to manufacture, e.g., the fastening tabs 674 of FIGS. 11-13 where some discrete polymeric regions are located on the exterior surface of the substrate 610 and others are located between substrates forming the laminated substrate 610. The system includes a web path that moves through the system as indicated by the arrows at the left and right ends of the web path, as well as by the rotation arrows provided on the various rolls.

The substrate 710a is directed into a first transfer nip formed by backup roll 720a and first transfer roll 730a. First transfer roll 730a includes depressions formed in its exterior surface. A molten thermoplastic composition delivery apparatus 740a is located on transfer roll 730a to fill the depressions with the desired molten thermoplastic composition. After passing through the first transfer nip, substrate 710a includes discrete polymeric regions 714a located thereon.

The system also includes a second substrate 710b that is directed into a second transfer nip formed by backup roll 720b and second transfer roll 730b that includes depressions formed in its exterior surface. A molten thermoplastic composition delivery apparatus 740b is located on transfer roll 730b to fill the depressions with the desired molten thermoplastic composition. After passing through the second transfer nip, substrate 710b includes discrete polymeric regions 714b located thereon.

Because the discrete polymeric regions 714b preferably include some structure formed thereon to provide a fastening mechanism, the substrate 710b including discrete polymeric regions 714b may be directed into a forming nip provided by a forming tool 750a and backup roll 720b. The forming nip is downstream of the transfer nip in the web path of substrate 710b.

The forming tool 750a is provided in the form of a roll and includes cavities formed in its surface. Forming tools such as that depicted in FIG. 11 are well known to those of skill in the art. Some forming tools are described in, for example, U.S. Patent Nos. 4,984,339 (Provost et al.), 5,077,870 (Melbye et al.), 5,755,015 (Akeno et al.), 5,868,987 (Kampfer et al.), 6,132,660 (Kampfer), 6,190,594 B1 (Gorman et al.), 6,287,665 B1 (Hammer), etc.

The forming tool 750a and/or backup roll 720b may be heated or cooled to a selected temperature based on the properties of the thermoplastic composition being formed to enhance forming of the discrete polymeric regions by the cavities in the forming tool 750a. For example, it may be desirable to heat or cool the forming tool 750a to enhance the forming process. Depending on the speed of the process and other factors, the discrete regions of thermoplastic composition located on substrate 710b may also advantageously retain some of their molten nature as transferred to the substrate 710b.

In any event, a portion of the thermoplastic composition in discrete polymeric regions 714b located on the substrate 710b enters the cavities on the forming tool 750a. As a result, structures such as the stems depicted in FIG. 11 may be formed in the discrete polymeric regions 714b located on substrate 710b.

Following transfer and forming of the discrete polymeric regions 714b, the substrates 710a and 710b are directed into a lamination nip formed by rolls 750b and 722, where the substrates are laminated such that the discrete polymeric regions 714a are located between substrates 710a and 710b and the discrete polymeric regions 714b are located on a surface of the laminated substrate 710.

The lamination nip formed by rolls 722 and 750b may cause a portion of the thermoplastic composition in the discrete polymeric regions 714a to infiltrate the substrate 710b (and/or encapsulate at least a portion of at least some fibers, if any, present in the substrate 710b). If that mechanism is used to accomplish lamination of the substrates, no additional materials or processes need be formed to complete the lamination.

Lamination in the absence of any other agents or techniques, may need to occur while the polymer regions 714a are still in a somewhat molten state such that they can bond with counterpart discrete polymeric regions on the opposing

substrate or to the opposing substrate itself. The lamination between substrates 710a and 710b may alternatively be assisted by a variety of materials and/or techniques known to those skilled in the art, e.g., thermal bonding, adhesives, resins, tie films/webs, etc. See, e.g., U.S. Patent Nos. 2,787,244 (Hickin); 3,694,867 (Stumpf); 4,906,492 (Groshens); 5,685,758 (Paul et al.); and 6,093,665 (Sayovitz et al.).

The laminated constructions described in connection with FIGS. 11-14 may be useful, for example, to provide a cloth-like or softer feel or appearance, breathability, porosity, etc. on both sides of the composite web. This is in contrast to the composite webs in which all of the discrete polymeric regions are located on an exposed surface of the composite web. A laminated composite web structure such as that seen in, e.g., FIGS. 11 and 12 may also be used to provide different properties on opposite sides of the composite web structure. For example, the porosity or other properties may differ between the different substrates 710a and 710b.

The lamination nip formed by rolls 750b and 722 may also function as a deforming station to deform the structures formed on discrete polymeric regions 714b if so desired. The deforming station may, for example, perform a variety of processes to deform the structures on discrete polymeric regions 714b after they are formed at the forming nip. Examples of some suitable processes that may be performed at the deforming station include, but are not limited to, trimming, shaving, abrading heating or melting (using a contact or noncontact heat source), bending or otherwise distorting the structures. Where the structures are stems, the deforming may include, e.g., forming a cap on the stem, forming a hook on a stem, bending the stem, etc. Some potential apparatus and processes are described in, for example, U.S. Patent Nos. 5,077,870 (Melbye et al.), 5,868,987 (Kampfer et al.), 6,039,911 (Miller et al.), 6,054,091 (Miller et al.), and 6,132,660 (Kampfer).

After the laminated substrate 710 exits the lamination nip, it may be directed into an optional station formed by rolls 780 and 724. This station may also function as a deforming station in addition to lamination nip or in place of the lamination nip. Another potential process that may be performed by rolls

780 and 724 is the formation of lines of separation in the laminated substrate 710 similar to lines of separation 517 discussed in connection with FIG. 10 above.

FIG. 15 is a plan view of one exemplary depression 834 in transfer roll 830 of the present invention, while FIG. 16 is a cross-sectional view of the depression 834 taken along line 16-16 in FIG. 15. The depression 834 has a circular footprint (i.e. shape of the opening into the depression 834 at the surface 832 of the roll) with a diameter represented by the letter *d*. The depression 834 has a depth (represented by the letter *h*) measured from the exterior surface 832 of the transfer roll 830.

Transfer rolls used in connection with the present invention may preferably include depressions that are large enough to form discrete polymeric regions of sufficient size to support, for example, the formation of multiple stems or other structures in each of the discrete polymeric regions. The depressions may be characterized in a variety of manners. For example, the depressions 834 may be characterized in terms of the area occupied by their footprint on the exterior surface of the forming tool, a maximum dimension of the footprint (in any direction on the surface of the roll), the volume of the depression, the shape of the footprint, etc.

When characterized in terms of the area occupied by the footprint of the depressions, each of the depressions 834 may have a footprint with an area of about 4 square millimeters (mm^2) or more. In other situations, each of the depressions 834 may have footprints with an area of about 8 mm^2 or more.

Another manner in which the depressions may be characterized is in terms of the largest footprint dimension as measured on the surface 832 of the transfer roll 830. For a depression with a circular footprint as seen in FIGS. 15 and 16, the largest dimension is the same in all directions, but the depressions used in connection with the present invention may take any desired shape (e.g. elongated, irregular, etc.) in which the largest dimension will occur in one or more directions on the exterior surface of the transfer roll 830, but not in others. When characterized in terms of the largest footprint dimension, it may be that the depressions have a largest footprint dimension of about 2 mm or more, in some instances about 5 mm or more.

Yet another manner in which the depressions used in connection with the present invention may be characterized is in terms of volume. For example, the depressions may have a depression volume of at least about three (3) cubic millimeters (mm^3) or more, or alternatively, a depression volume of about five (5) cubic millimeters. Volume of the discrete polymeric regions may be important to provide enough of the thermoplastic composition to adequately enter the cavities in a forming tool. Depression volume may also be important because at least some of the molten thermoplastic composition may be retained within the depression during the transfer process, i.e., the depression volume may preferably be oversized relative to the preferred volume of the discrete polymeric regions to compensate for retention of thermoplastic composition within the depressions.

FIG. 17 depicts two depressions 934 formed in an exterior surface 932 of a transfer roll, with FIG. 18 being a cross-sectional view of one of the depressions 934 taken along line 18-18 in FIG. 17. The depressions 934 have elongated shapes in the form of, e.g., a trough. When compared to the circular depression 834 seen in FIGS. 15 and 16, the longer depressions 934 of FIGS. 17 and 18 would have a larger footprint dimension along their elongated direction than transverse to their elongated direction.

The orientation of the depressions 934 may be selected based on a variety of factors. The elongated depressions 934 may be aligned in the machine direction (i.e., the direction of travel of a substrate), in the cross-web direction (i.e., transverse to the direction of travel of the substrate), or any other orientation between machine direction or cross-web direction.

FIGS. 19 & 20 depict another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. 19 depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate 1010 on which two discrete polymeric regions 1014 and 1015 are located. The substrate includes two opposing edges 1011 that extend over the length of the composite web and, together, define the longitudinal length of the composite web.

Discrete polymeric region 1014 is provided in the shape of a line of the thermoplastic composition material deposited on the substrate 1010 along the

general direction of the longitudinal length of the composite web. The discrete polymeric region 1014 may be continuous along the longitudinal length of the composite web as shown in FIG. 19.

Discrete polymeric region 1015 is a variation of discrete polymeric region 1014 in that it is provided in an undulating shape as compared to the relative straight linear shape of the discrete polymeric region 1014. The undulating shape of the discrete polymeric region 1015 also, however, extends along the direction of the longitudinal length of the composite web. Further, the discrete polymeric region 1015 may be continuous along the longitudinal length of the composite web as shown in FIG. 19.

FIG. 20 is a perspective view of one transfer roll 1030 that may be used to transfer thermoplastic compositions in the shapes seen in FIG. 19 according to the methods of the present invention. The transfer roll 1030 includes a depression 1034 that preferably extends continuously around the outer circumference of the roll 1030 to form the discrete polymeric region 1014 as depicted in FIG. 19. The transfer roll 1030 also includes a depression 1035 that also extends around the outer circumference of the roll 1030 to form the discrete polymeric region 1015 as depicted in FIG. 19.

FIG. 21 depicts another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. 21 depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate 1110 on which discrete polymeric regions 1114a, 1114b, and 1114c are located, with the discrete polymeric regions extending across the width of the substrate. The substrate 1110 includes two opposing edges 1111 that extend over the length of the composite web and, together, define the width and the longitudinal length of the composite web.

Each of the discrete polymeric regions 1114a, 1114b, and 1114c is provided in the shape of a line of the thermoplastic composition material deposited on the substrate 1110 in a generally cross-web direction, i.e., extending between the opposing edges 1111 of the substrate 1110. The discrete polymeric regions 1114a, 1114b, and 1114c present variations from straight lines 1114a and 1114b to undulating line 1114c. Many other variations in placement,

shape and/or orientation of discrete polymeric regions may be envisioned in connection with methods according to the present invention.

In addition to the deposition of thermoplastic polymer in discrete regions, it is also contemplated that additional materials can be coated onto a major surface of the substrate using known methods. Such materials could be, for example adhesives, as described in, e.g., U.S. Patent Nos. 5,019,071 (Bany et al.); 5,028,646 (Miller et al.); and 5,300,057 (Miller et al.); or cohesives as described in, e.g. U.S. Patent Nos. 5,389,438 (Miller et al.) and 6,261,278 (Chen et al.).

EXAMPLES

The following examples are provided to enhance understanding of the present invention. They are not intended to limit the scope of the invention.

Example 1

A web of the present invention was produced using apparatus similar to that shown in Fig. 8. A 51 mm diameter single screw extruder was used to deliver a molten polymer consisting of ultra low density polyethylene (ENGAGE 8400, DupontDow Elastomers) at a melt temperature of approximately 207^{o}C to a neck tube. The neck tube was positioned such that a thick strand of molten polymer was extruded vertically downward onto the exterior surface 32 of an oil-heated steel transfer roll 30 having a diameter of 23 cm. The exterior surface of the transfer roll was machined using a computer controlled milling machine to have depressions in the shape of grooves parallel to the roll axis 25.4 cm long, 2.3 mm in width, 1.3 mm in depth, arranged with a center-to-center spacing between grooves of 1.0 cm. After the depressions were filled or partially filled with the molten polymer, any excess molten polymer was removed from the exterior surface of the transfer roll by a brass doctor blade 42 having a thickness of 1.5 mm at the contact point with the roll, acting against and normal to the exterior surface of the transfer roll. The excess molten polymer formed a small rolling bank of polymer contained in a trough formed by the doctor blade and two side walls pressed firmly against the transfer roll using a pressure of 88 N/lineal cm. The transfer roll was at approximately 204^{o}C. After

the wiping action of the doctor blade, the transfer roll continued to rotate until the depressions and the molten polymer they contain were forced into contact with a nonwoven substrate (HEF-140-070 spunlaced polyester, 30 grams/m^2, BBA Nonwovens) against a rubber backup roll 20 (66°C) using a nip pressure of 88 N/lineal cm. Transfer of some of the molten polymer from the depressions to the nonwoven substrate occurred. A portion of the molten polymer in the depressions remained in the depressions while the substrate pulled away from the transfer roll. As a result, the molten polymer tended to elongate or string between the depressions in the transfer roll and the substrate. A hot wire 44 was used to sever any strands of molten polymer formed as the substrate separated from the transfer roll. The basis weight of each transferred molten polymer region was 347 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 47 grams/m^2.

Example 2

A web was produced as in Example 1 except an SEBS block copolymer elastomer (KRATON G-1657, Shell Chemical) was used as the molten polymer. The temperature of the molten polymer was approximately 249°C and the transfer roll was at approximately 246°C. A nip pressure of 53 N/lineal cm was used. The basis weight of each transferred molten polymer region was 529 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 72 grams/m^2.

Example 3

A web was produced as in Example 1 except the temperature of the molten polymer was approximately 223°C and the transfer roll was at approximately 218°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 88 N/lineal cm was used. The basis weight of each transferred molten polymer region was 449 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 61 grams/m^2.

Example 4

A web was produced as in Example 1 except a blend of ENGAGE 8400 polyethylene - 50% and ENGAGE 8100 polyethylene - 50%, was used as the molten polymer. The temperature of the molten polymer was approximately 218°C and the transfer roll was at approximately 218°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 88 N/lineal cm was used. The basis weight of each transferred molten polymer region was 321 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 44 grams/m^2.

Example 5

A web was produced as in Example 1 except a blend of ENGAGE 8400 polyethylene - 75% and ENGAGE 8100 polyethylene - 25%, was used as the molten polymer. The temperature of the molten polymer was approximately 223°C and the transfer roll was at approximately 218°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 88 N/lineal cm was used. The basis weight of each transferred molten polymer region was 491 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 67 grams/m^2.

Example 6

A web was produced as in Example 2 except the temperature of the molten polymer was approximately 251°C and the transfer roll was at approximately 246°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 88 N/lineal cm was used. The basis weight of each transferred molten polymer region was 656 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 90 grams/m^2.

Example 7

A web was produced as in Example 1 except ENGAGE 8200 polyethylene was used as the molten polymer. The temperature of the molten polymer was approximately 204°C and the transfer roll was at approximately

204°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 767 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 104 grams/m^2.

Example 8

A web was produced as in Example 1 except an elastomeric polyurethane (58-680, Noveon) was used as the molten polymer. The temperature of the molten polymer was approximately 210°C and the transfer roll was at approximately 210°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 495 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 68 grams/m^2.

Example 9

A web was produced as in Example 1 except an elastomeric polyurethane (ESTANE 58-238, Noveon) was used as the molten polymer. The temperature of the molten polymer was approximately 207°C and the transfer roll was at approximately 210°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 110 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 151 grams/m^2.

Example 10

A web was produced as in Example 1 except an elastomeric polyurethane (2103-80AE, Dow Chemical) was used as the molten polymer. The temperature of the molten polymer was approximately 210°C and the transfer roll was at approximately 210°C. The temperature of the backup roll was approximately 38°C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 706 grams/m^2. The cumulative basis

weight of the transferred polymer regions on the nonwoven substrate was 96 grams/m^2.

Example 11

A web was produced as in Example 1 except an elastomeric polyurethane (455-203 Huntsman Chemical) was used as the molten polymer. The temperature of the molten polymer was approximately 210^{o}C and the transfer roll was at approximately 210^{o}C. The temperature of the backup roll was approximately 38^{o}C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 1265 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 172 grams/m^2.

Example 12

A web was produced as in Example 1 except an elastomeric polyurethane (ESTANE 58-271, Noveon) was used as the molten polymer. The temperature of the molten polymer was approximately 210^{o}C and the transfer roll was at approximately 210^{o}C. The temperature of the backup roll was approximately 38^{o}C. A nip pressure of 175 N/lineal cm was used. The basis weight of each transferred molten polymer region was 373 grams/m^2. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was 51 grams/m^2.

Example 13

A web was produced as in Example 1 except an ethylene-vinylacetate copolymer (ELVAX 150, Dupont) was used as the molten polymer and a polyester spunlaced nonwoven (SONTARA 8005, 40 grams/m^2, Dupont) was used as the substrate. The temperature of the molten polymer was approximately 189^{o}C and the transfer roll was at approximately 191^{o}C. The temperature of the backup roll was approximately 38^{o}C. A nip pressure of 88 N/lineal cm was used. The basis weight of the transferred polymer was not measured.

Example 14

A web was produced as in Example 15 except a polypropylene spunbond nonwoven (MIRATEC, 68 grams/m^2, PGI Nonwovens) was used as the substrate. The temperature of the molten polymer was approximately 193^{o}C and the transfer roll was at approximately 191^{o}C. The temperature of the backup roll was approximately 38^{o}C. A nip pressure of 88 N/lineal cm was used. The basis weight of the transferred polymer was not measured.

Example 15

A web was produced as in Example 1 except two different polymers were used and delivered to three separate regions on the transfer roll. The trough described in Example 1 was constructed with two dividers between the side walls so as to have three separate smaller troughs arranged in an A-B-A configuration across the transfer roll, that could receive three separate molten polymer streams. KRATON 1657 SEBS block copolymer was delivered to the 'A' troughs using the extruder described in Example 1 at a melt temperature of approximately 237^{o}C. Polyethylene (ASPUN 6806, Dow Chemical) was delivered by a J&M Grid Melter and heated pipe to the 'B' trough at a melt temperature of approximately 218^{o}C. The exterior surface of the transfer roll was machined using a computer controlled milling machine to have depressions in the shape of hemispheres 2.3 mm in diameter, 1.2 mm in depth, with 3.9 depressions per cm^2. Polyester spunlaced nonwoven (SONTARA 8005, 68 grams/m^2, Dupont) was used as the substrate. The transfer roll was at approximately 246^{o}C. The temperature of the backup roll was approximately 38^{o}C. A nip pressure of 263 N/lineal cm was used. The basis weight of each transferred molten polymer region was not measured. The cumulative basis weight of the transferred polymer regions on the nonwoven substrate was not measured.

Example 16

To demonstrate the use of different depression geometries, a transfer roll was machined with seven different areas arranged around and across the periphery of the roll, each area having a specific depression geometry and

spacing. Area 1 was machined using a computer controlled milling machine (2 mm ball diameter) to have depressions in the shape of grooves parallel to the roll axis 25 mm long, 0.75 mm in depth, 13 mm end to end spacing measured along the roll axis, 7.5 mm center to center spacing between grooves measured normal to the roll axis, with 12 rows of staggered grooves. Each row of grooves starting with a 6.4 mm shift from the previous row to create the staggered pattern. Area 2 was machined using a computer controlled milling machine (2 mm ball diameter) to have 15 rows of grooves parallel to the roll axis 114 mm long, 0.375 mm in depth, and 6.0 mm center to center spacing between grooves measured normal to the roll axis. Area 3 was machined using a computer controlled milling machine (2 mm ball diameter) to have 15 rows of grooves parallel to the roll axis 114 mm long, 0.5 mm in depth, and 6.0 mm center to center spacing between grooves measured normal to the roll axis. Area 4 was machined using a computer controlled milling machine (2 mm ball diameter) to have 12 rows of grooves parallel to the roll axis 114 mm long, 0.5 mm in depth, and 7.5 mm center to center spacing between grooves measured normal to the roll axis. Area 5 was machined using a computer controlled milling machine (2 mm ball diameter) to have 12 rows of grooves parallel to the roll axis 114 mm long, 0.875 mm in depth, and 7.5 mm center to center spacing between grooves measured normal to the roll axis. Area 6 was machined using a computer controlled milling machine (2 mm ball diameter) to have 9 rows of grooves parallel to the roll axis 114 mm long, 1.0 mm in depth, and 10.0 mm center to center spacing between grooves measured normal to the roll axis. Area 7 was machined using a computer controlled milling machine (3 mm ball diameter) to have 9 rows of grooves parallel to the roll axis 114 mm long, 0.75 mm in depth, and 10.0 mm center to center spacing between grooves measured normal to the roll axis. A web was produced as in Example 1 except a 40 mm diameter twin screw extruder fitted with a gear pump was used to deliver the molten polymer. An ultra low density polyethylene (ENGAGE 8200, DupontDow Elastomers) was used as the molten polymer and a polyester spunlaced nonwoven (SONTARA 8001, 40 grams/m^2, Dupont) was used as the substrate. The temperature of the molten polymer was approximately 232^{o}C and the transfer roll was at approximately 232^{o}C. The temperature of the backup roll was approximately

20°C.A nip pressure of 12 N/lineal cm was used. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 17

To demonstrate that a hot wire is not necessary in some instances to provide for effective transfer, a web was produced as in Example 16 except the hot wire was removed from the apparatus. The temperature of the molten polymer was approximately 232°C and the transfer roll was at approximately 232°C. . All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 18

To demonstrate a multi-layer laminate, a web was produced as in Example 16 except a second nonwoven substrate (SONTARA 8001) was laminated to the first nonwoven substrate containing the transferred polymer, using a second nip at a pressure of 6 N/lineal cm. The temperature of the molten polymer was approximately 232°C and the transfer roll was at approximately 232°C. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 19

A web was produced as in Example 16 except an SEBS block copolymer (KRATON G1657, Shell Chemical) was used as the molten polymer. The temperature of the molten polymer was approximately 246°C and the transfer roll was at approximately 232°C. A nip pressure of 12 N/lineal cm was used. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 20

To demonstrate a multi-layer laminate, a web was produced as in Example 18 except KRATON G1657 was used as the molten polymer. The temperature of the molten polymer was approximately 246°C and the transfer

roll was at approximately 232°C. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 21

A web was produced as in Example 16 except an elastomeric polyurethane (ESTANE 58-680, Noveon Inc.) was used as the molten polymer. The temperature of the molten polymer was approximately 210°C and the transfer roll was at approximately 210°C. A nip pressure of 12 N/lineal cm was used. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Example 22

To demonstrate a multi-layer laminate, a web was produced as in Example 18 except ESTANE 58-680 polyurethane was used as the molten polymer. The temperature of the molten polymer was approximately 210°C and the transfer roll was at approximately 210°C. All the depressions filled and transferred well. The basis weight of the transferred polymer in the separate regions was not measured.

Counter Example C1

To demonstrate that some nonwovens do not have enough internal strength to provide for a good substrate, a web was produced as in Example 19 except a resin bonded polyester nonwoven (STYLE 1545, 30 grams/m^2, HDK Industries) was used as the substrate. The temperature of the molten polymer was approximately 246°C and the transfer roll was at approximately 232°C. A nip pressure of 12 N/lineal cm was used. After contacting the molten polymer to the nonwoven substrate in the nip, the nonwoven delaminated and transferred to the transfer roll. The adhesion of the molten polymer in the depressions to the metal of the transfer roll was greater than the internal strength of the nonwoven.

The preceding specific embodiments are illustrative of the practice of the invention. This invention may be suitably practiced in the absence of any element

or item not specifically described in this document. The complete disclosures of all patents, patent applications, and publications are incorporated into this document by reference as if individually incorporated. Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope of this invention. It should be understood that this invention is not to be unduly limited to illustrative embodiments set forth herein.

CLAIMS:

1. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and

transferring at least a portion of the molten elastomeric thermoplastic composition in the one or more depressions to a first major surface of a substrate by contacting the first major surface of the substrate to the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions, followed by separating the substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the elastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

2. A method according to claim 1, wherein the transferring further comprises forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions.

3. A method according to claim 1, wherein the first major surface of the substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the substrate into the one or more depressions, wherein a portion of the molten elastomeric thermoplastic

composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

4. A method according to claim 3, wherein the porous surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition.

5. A method according to claim 1, wherein the first major surface of the substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition by forcing the first major surface of the substrate against the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions.

6. A method according to claim 1, wherein substantially all of the one or more depressions are substantially filled with the molten elastomeric thermoplastic composition after the wiping and before the transferring.

7. A method according to claim 1, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously along a length of the substrate.

8. A method according to claim 1, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously across a width of the substrate.

9. A method according to claim 1, wherein the one or more depressions comprise a plurality of depressions comprising depressions having at least two different shapes.

10. A method according to claim 1, wherein each depression of the one or more depressions comprises a depression volume of about 3 cubic millimeters or more.

11. A method according to claim 1, wherein each depression of the one or more depressions defines a depression volume, and further wherein the one or more depressions comprises at least two depressions that define different depression volumes.

12. A method according to claim 1, wherein a footprint of each depression of the one or more depressions comprises an area of about 4 square millimeters or more.

13. A method according to claim 1, wherein the substrate comprises at least one pleat, and further wherein at least one discrete polymeric region of the one or more discrete polymeric regions spans the at least one pleat.

14. A method according to claim 1, wherein the substrate comprises a plurality of pleats, and further wherein at least one discrete polymeric region of the one or more discrete polymeric regions spans two or more pleats of the plurality of pleats.

15. A method according to claim 1, further comprising providing one or more lines of separation in the composite web, wherein the one or more lines of separation define boundaries of a plurality of distinct articles, each article comprising at least one of the one or more discrete polymeric regions on the first major surface of the first substrate.

16. A method according to claim 15, further comprising separating the composite web along at least one of the one or more lines of separation.

17. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and

forcing a portion of a first major surface of a substrate into the one or more depressions, wherein the first major surface comprises a porous surface comprising fibers, and wherein a portion of the elastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface, and still further wherein the molten elastomeric thermoplastic composition encapsulates at least a portion of at least some of the fibers; and

separating the substrate from the transfer roll, wherein one or more discrete polymeric regions comprising the elastomeric thermoplastic composition are located on the first major surface of the substrate after separating the substrate from the transfer roll.

18. A method according to claim 17, wherein each depression of the one or more depressions defines a depression volume, and further wherein the one or more depressions comprises at least two depressions that define different depression volumes.

19. A method according to claim 17, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously along a length of the substrate.

20. A method according to claim 17, wherein at least one discrete polymeric region of the one or more discrete polymeric regions comprises a shape extending continuously across a width of the substrate.

21. A method according to claim 17, wherein the one or more depressions comprise a plurality of depressions comprising depressions having at least two different shapes.

22. A method according to claim 17, wherein each depression of the one or more depressions comprises a depression volume of about 3 cubic millimeters or more.

23. A method according to claim 17, wherein a footprint of each depression of the one or more depressions comprises an area of about 4 square millimeters or more.

24. A method for producing a composite web, the method comprising:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll;

transferring at least a portion of the molten elastomeric thermoplastic composition in the one or more depressions to a first major surface of a first substrate by contacting the first major surface of the first substrate to the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions, followed by separating the first substrate from

the transfer roll, wherein one or more discrete polymeric regions comprising the elastomeric thermoplastic composition are located on the first major surface of the first substrate after separating the first substrate from the transfer roll; and

laminating a second substrate to the first major surface of the first substrate, wherein the one or more discrete polymeric regions on the first substrate are located between the first substrate and the second substrate after laminating the second substrate to the first substrate.

25. A method according to claim 24, wherein the transferring further comprises forcing the first major surface of the first substrate against the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions.

26. A method according to claim 24, wherein the first major surface of the first substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the first substrate into the one or more depressions, wherein a portion of the molten elastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

27. A method according to claim 26, wherein the porous surface of the first substrate comprises fibers, and wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition.

28. A method according to claim 24, wherein the first major surface of the first substrate comprises fibers, and wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition.

29. A method according to claim 24, wherein the second substrate comprises one or more discrete polymeric regions located on the second substrate, and wherein the one or more discrete polymeric regions on the second substrate are

exposed on the second substrate after laminating the second substrate to the first substrate.

30. A method according to claim 29, wherein at least one discrete polymeric region of the one or more discrete polymeric regions on the second substrate comprises a plurality of structures formed thereon.

31. A method according to claim 30, wherein the plurality of structures comprise stems.

32. A method according to claim 30, wherein the plurality of structures comprise hooks.

33. A method according to claim 29, further comprising providing one or more lines of separation in the composite web, wherein the one or more lines of separation define boundaries of a plurality of elastic articles, each elastic article comprising at least one of the one or more discrete polymeric regions on the first major surface of the first substrate and at least one of the one or more discrete polymeric regions exposed on the second substrate after the laminating.

34. A method according to claim 33, further comprising separating the composite web along at least one of the one or more lines of separation.

35. A method for producing a composite web, the method comprising:

providing a first substrate comprising a first major surface and a second major surface, a plurality of discrete elastomeric polymeric regions formed of an elastomeric thermoplastic composition located on the first major surface of the first substrate, wherein each discrete elastomeric polymeric region of the plurality of discrete elastomeric polymeric regions infiltrates the first major surface of the first substrate;

providing a second substrate comprising a first major surface and a second major surface, a plurality of discrete polymeric regions formed of a thermoplastic composition located on the first major surface of the second

substrate, wherein each discrete polymeric region of the plurality of discrete polymeric regions infiltrates the first major surface of the second substrate; and

laminating the first substrate to the second substrate.

36. A method according to claim 35, wherein the plurality of discrete elastomeric polymeric regions on the first major surface of the first substrate are located between the first substrate and the second substrate after the laminating.

37. A method according to claim 35, wherein the laminating further comprises forcing a portion of the elastomeric thermoplastic composition of each discrete elastomeric polymeric region of the plurality of discrete elastomeric into a porous surface of the second substrate.

38. A method according to claim 37, wherein the porous surface of the second substrate comprises fibers, and wherein the laminating further comprises encapsulating at least a portion of at least some of the fibers in the elastomeric thermoplastic composition.

39. A method according to claim 35, wherein the plurality of discrete elastomeric polymeric regions on the first major surface of the first substrate are located between the first substrate and the second substrate after the laminating, and wherein the laminating comprises attaching the second major surface of the second substrate to the first substrate.

40. A method according to claim 39, wherein at least one discrete polymeric region of the one or more discrete polymeric regions on the second substrate comprises a plurality of structures formed thereon.

41. A method according to claim 40, wherein the plurality of structures comprise stems.

42. A method according to claim 40, wherein the plurality of structures comprise hooks.

43. A method according to claim 35, wherein providing the first substrate comprises:

providing a transfer roll comprising an exterior surface that comprises one or more depressions formed therein;

delivering a molten elastomeric thermoplastic composition onto the exterior surface of the transfer roll;

wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll, wherein a portion of the molten elastomeric thermoplastic composition enters the one or more depressions, and further wherein the portion of the molten elastomeric thermoplastic composition in the one or more depressions remains in the one or more depressions after wiping the molten elastomeric thermoplastic composition from the exterior surface of the transfer roll; and

transferring at least a portion of the molten elastomeric thermoplastic composition in the one or more depressions to a first major surface of a first substrate by contacting the first major surface of the first substrate to the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions, followed by separating the first substrate from the transfer roll to form the plurality of discrete elastomeric polymeric regions on the first major surface of the first substrate.

44. A method according to claim 43, wherein the transferring further comprises forcing the first major surface of the first substrate against the exterior surface of the transfer roll and the molten elastomeric thermoplastic composition in the one or more depressions.

45. A method according to claim 43, wherein the first major surface of the substrate comprises a porous surface, and wherein the transferring further comprises forcing a portion of the first major surface of the first substrate into the one or more depressions, wherein a portion of the molten elastomeric thermoplastic composition in the one or more depressions infiltrates the porous surface within the one or more depressions.

46. A method according to claim 45, wherein the porous surface of the first substrate comprises fibers, and further wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition.

47. A method according to claim 43, wherein the first major surface of the first substrate comprises fibers, and wherein the transferring further comprises encapsulating at least a portion of at least some of the fibers in the molten elastomeric thermoplastic composition.

48. An elastic fastening article comprising:

a substrate comprising first and second major surfaces;

one or more mechanical fasteners attached to the first major surface of the substrate, wherein each mechanical fastener of the one or more mechanical fasteners comprises a discrete thermoplastic region infiltrating the first major surface of the substrate, and wherein each mechanical fastener of the one or more mechanical fasteners further comprises a plurality of fastening structures located thereon, the fastening structures facing away from the first major surface of the substrate; and

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises a discrete elastomeric thermoplastic region infiltrating a portion of the substrate.

49. An article according to claim 48, wherein each elastic element of the one or more elastic elements is located between the first major surface and the second major surface of the substrate.

50. An article according to claim 48, wherein at least one elastic element of the one or more elastic elements is located on the first major surface of the substrate.

51. An article according to claim 48, wherein at least one elastic element of the one or more elastic elements is located on the second major surface of the substrate

52. An article according to claim 48, further comprising an elongation axis extending through at least one mechanical fastener of the one or more mechanical fasteners, wherein each elastic element of the one or more elastic elements comprises a length greater than a width, and wherein the length of each elastic element of the one or more elastic elements is aligned with the elongation axis.

53. An article according to claim 52, wherein the amount of elastomeric thermoplastic in each elastic element of the one or more elastic elements increases when moving away from the one or more mechanical fasteners along the elongation axis.

54. An elastic article comprising:

a substrate comprising first and second major surfaces;

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and

one or more bonding sites located on the first major surface of the substrate.

55. An article according to claim 54, wherein each elastic element of the one or more elastic elements is located between the first major surface and the second major surface of the substrate.

56. An article according to claim 54, wherein at least one elastic element of the one or more elastic elements is located on the first major surface of the substrate.

57. An article according to claim 54, wherein at least one elastic element of the one or more elastic elements is located on the second major surface of the substrate

58. An elastic article comprising:

a substrate comprising first and second major surfaces;

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and

one or more slits formed through the substrate, wherein at least one of the one or more elastic elements spans each slit of the one or more slits.

59. An article according to claim 58, wherein each elastic element of the one or more elastic elements is located between the first major surface and the second major surface of the substrate.

60. An article according to claim 58, wherein at least one elastic element of the one or more elastic elements is located on the first major surface of the substrate.

61. An elastic article comprising:

a substrate comprising first and second major surfaces;

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises a discrete elastomeric thermoplastic region infiltrating a portion of the substrate; and

one or more pleats formed in the substrate, wherein at least one of the one or more elastic elements spans at least one pleat of the one or more pleats.

62. An article according to claim 61, wherein at least some elastic elements of the one or more elastic elements spans only one pleat of the one or more pleats.

63. An article according to claim 61, at least some elastic elements of the one or more elastic elements span two or more pleats of the one or more pleats.

Docket No. 57192US002

METHODS FOR PRODUCING COMPOSITE WEBS WITH DISCRETE ELASTIC POLYMERIC REGIONS

ABSTRACT OF THE DISCLOSURE

Composite webs and methods and systems for manufacturing composite webs including a substrate with one or more discrete polymeric regions located thereon are disclosed. At least some of the discrete polymeric regions are formed of an elastomeric thermoplastic composition that is transferred to the substrate in depressions formed on a transfer roll. The discrete elastomeric polymeric regions can be used to provide elasticity to a substrate that is not elastic or they may be used to adjust the elasticity of a substrate that is itself elastic.

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I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE ASSISTANT COMMISSIONER FOR PATENTS, Att'n: Box Patent Application, WASHINGTON, D.C. 20231

PRINTED NAME: Rachel Cogliandi-Graham

SIGNATURE: Rachel Cogliandi-Graham

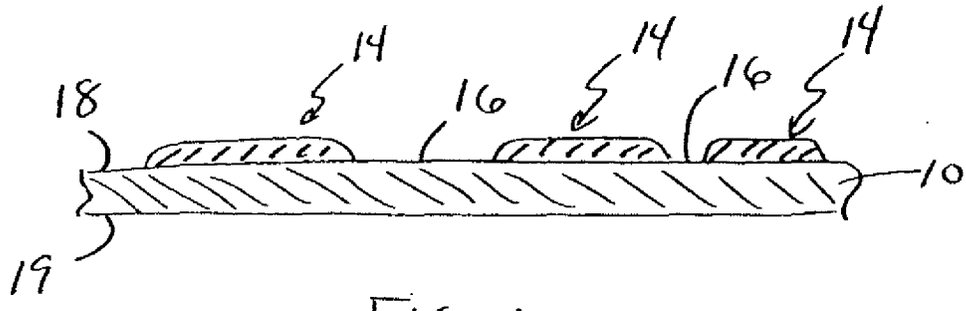

FIG. 1

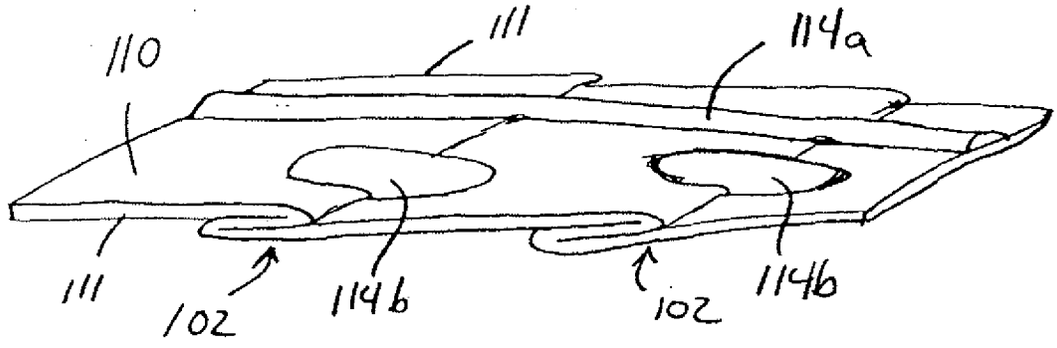

FIG. 2

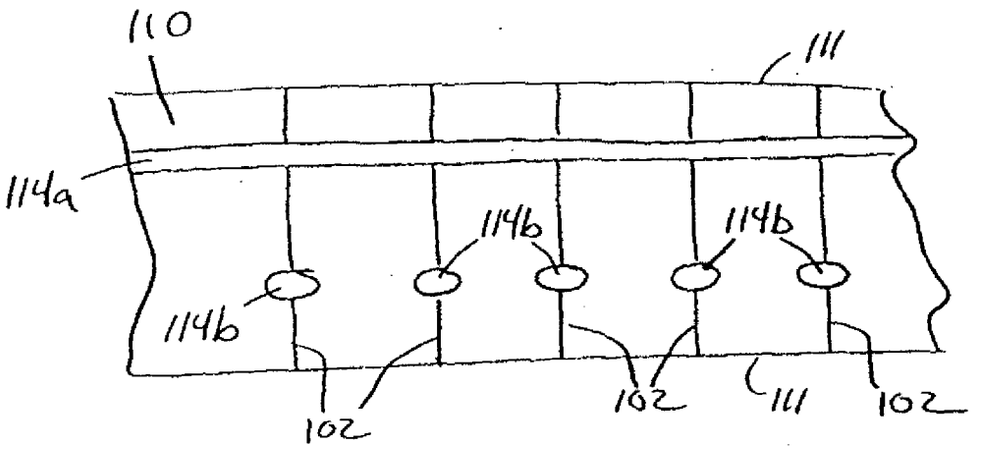

FIG. 3

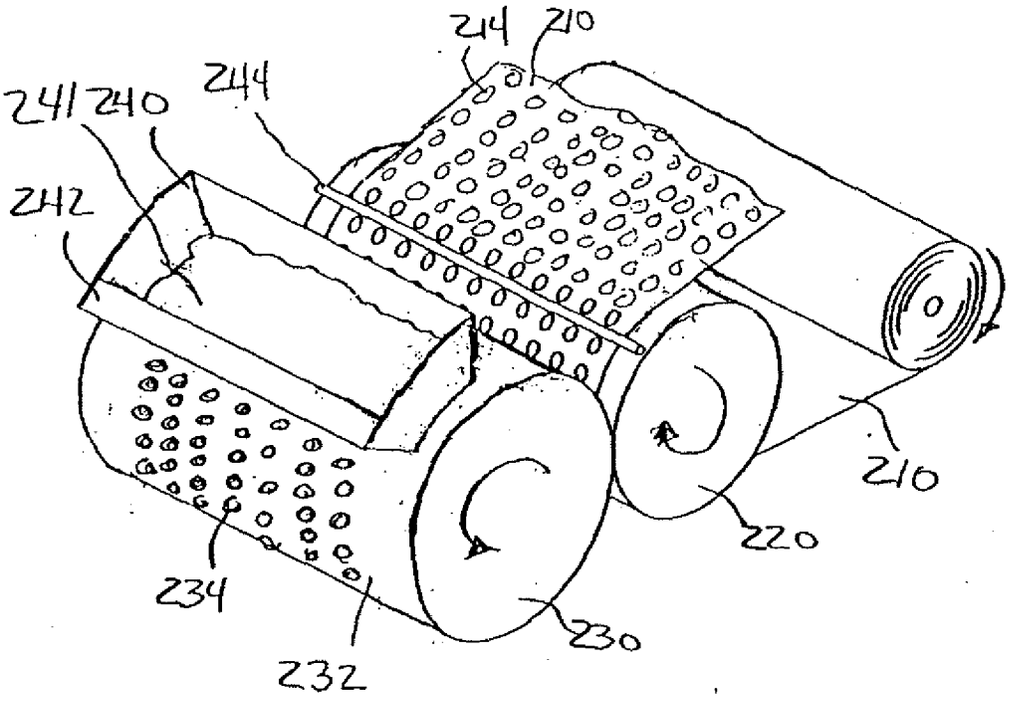
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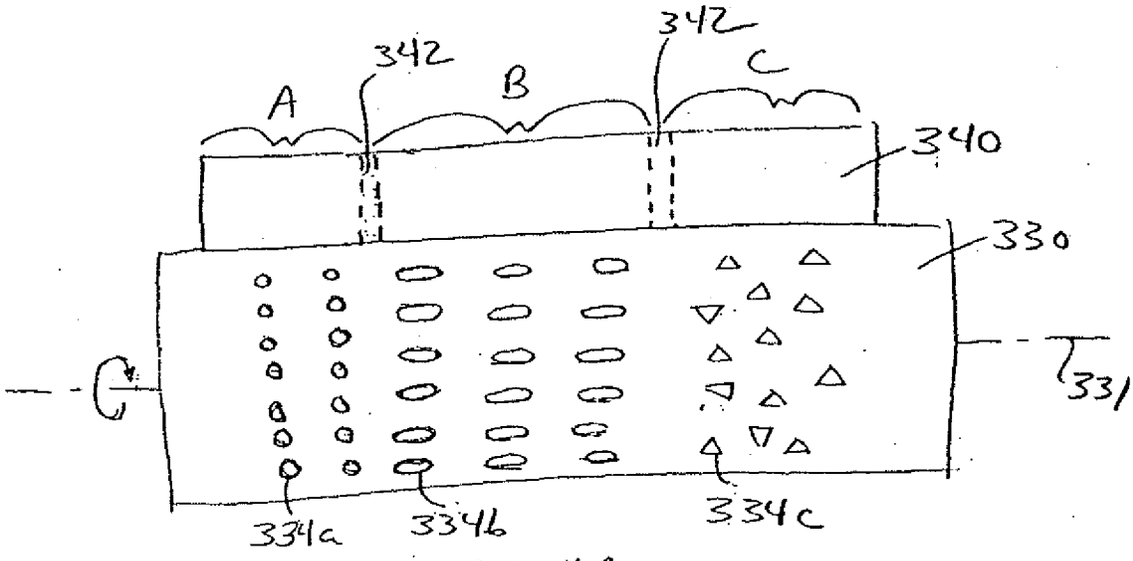
FIG. 4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A
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FIG. 4A

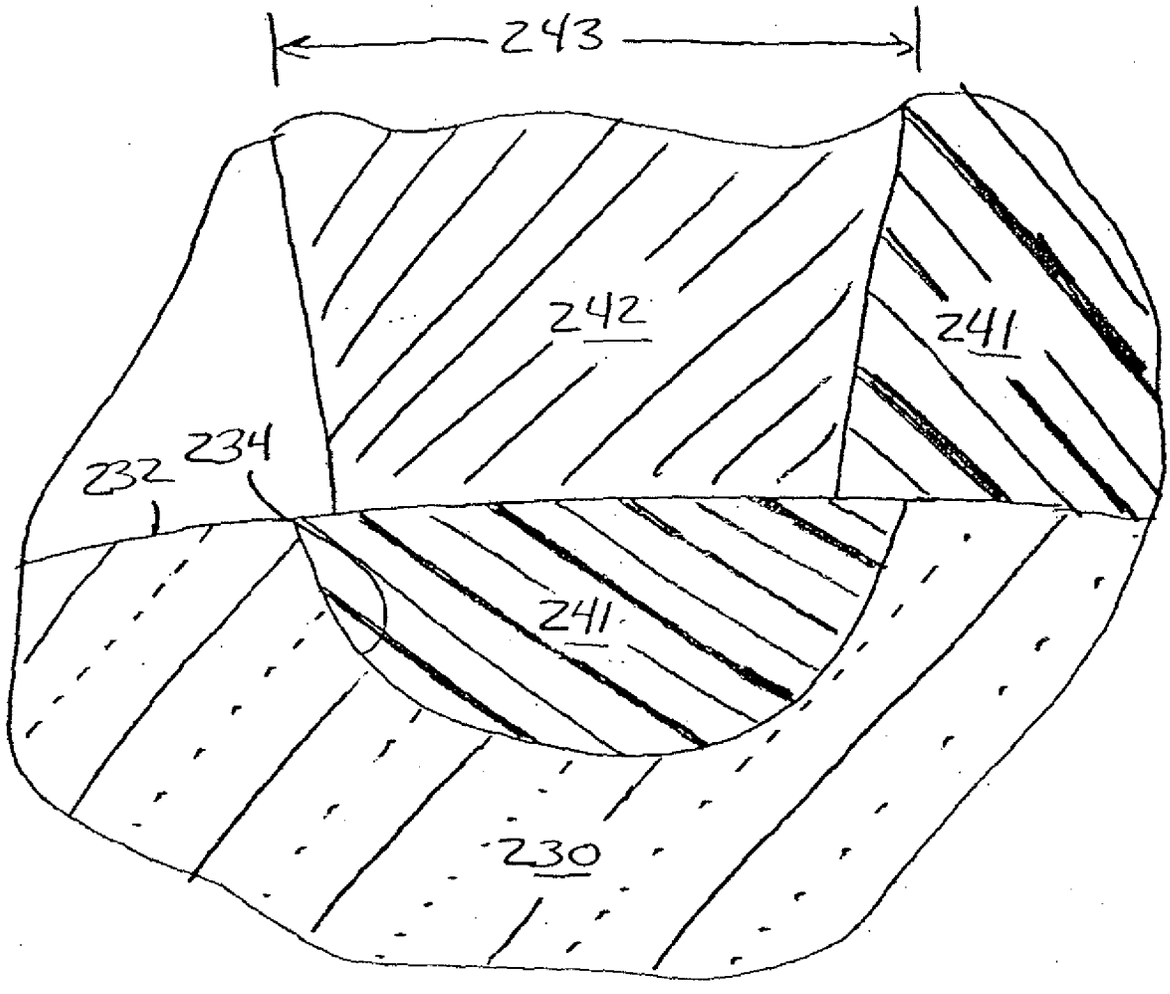

FIG. 4B

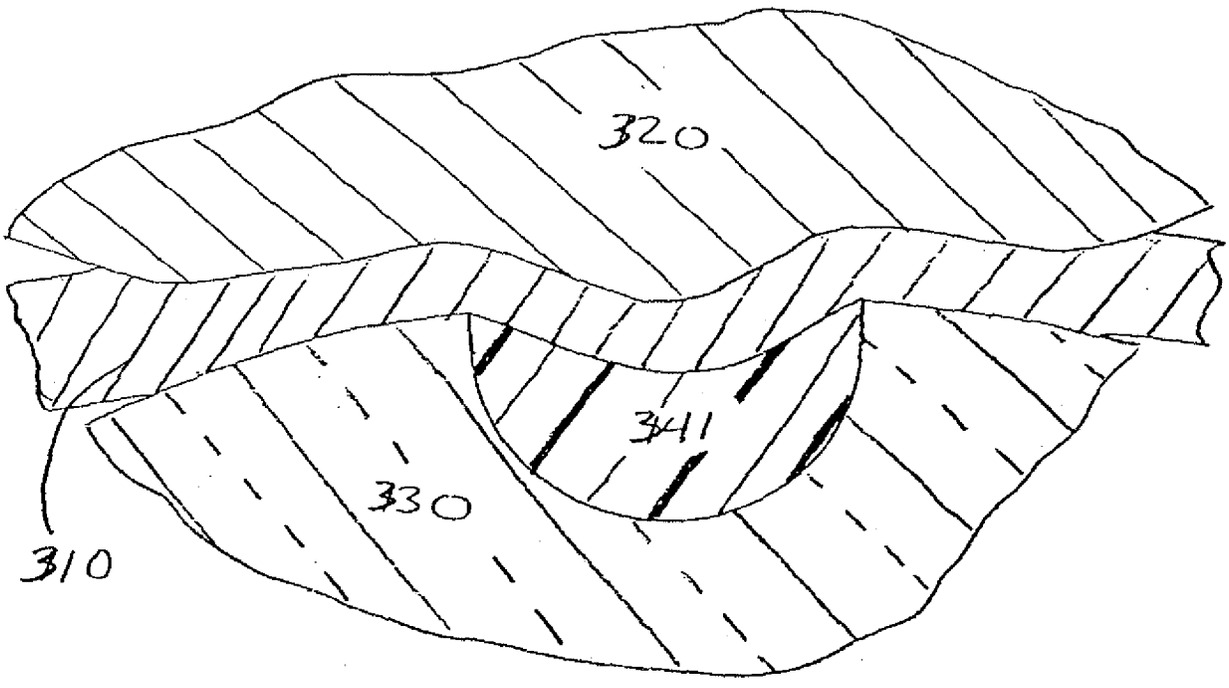

FIG. 4C

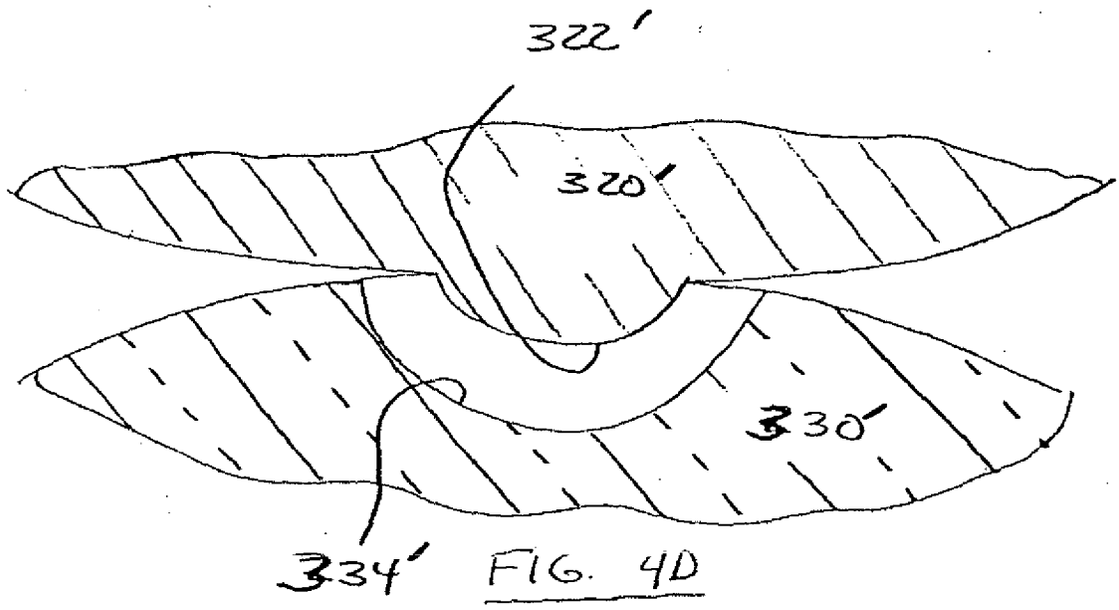

FIG. 4D

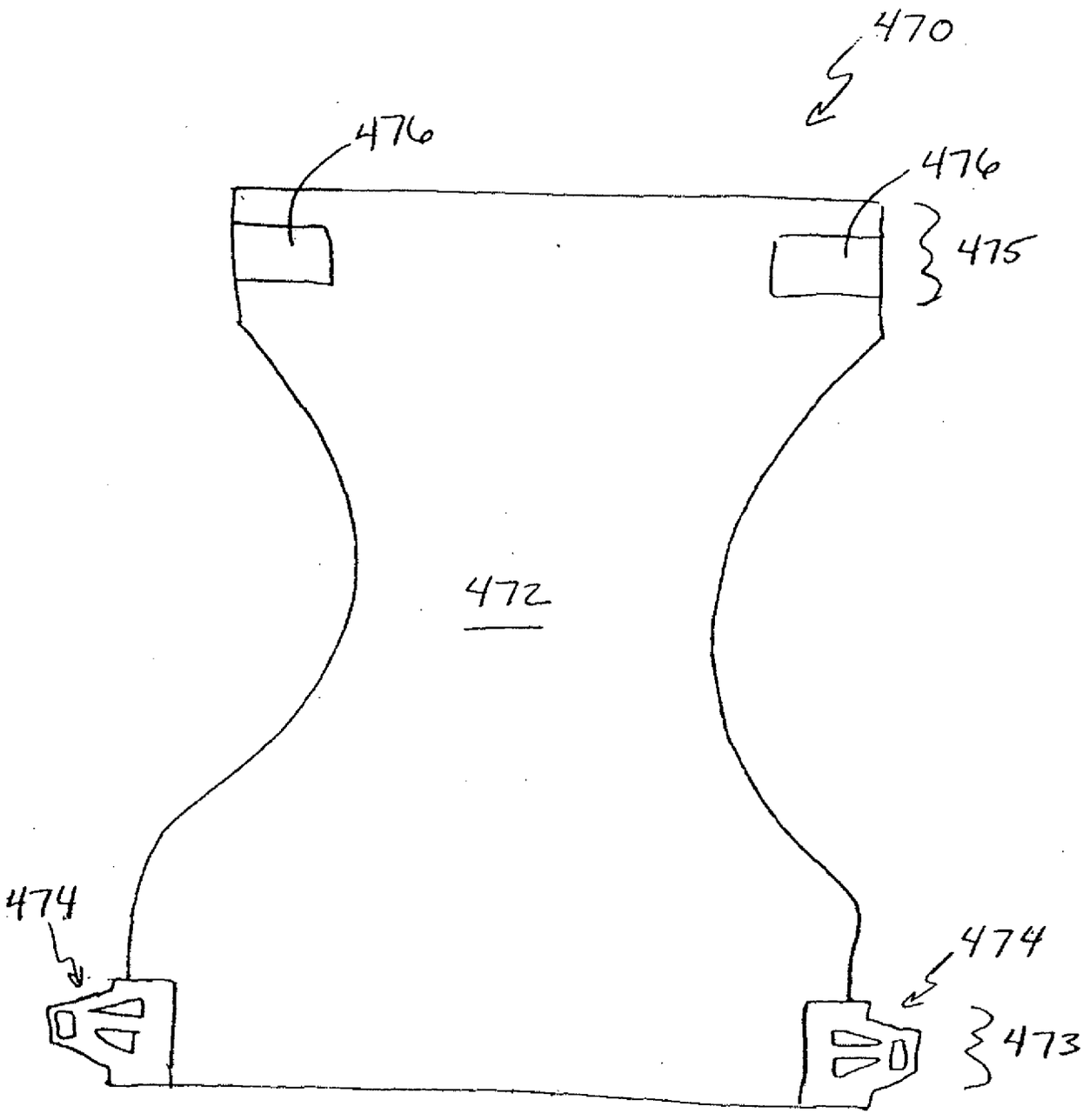

FIG. 5

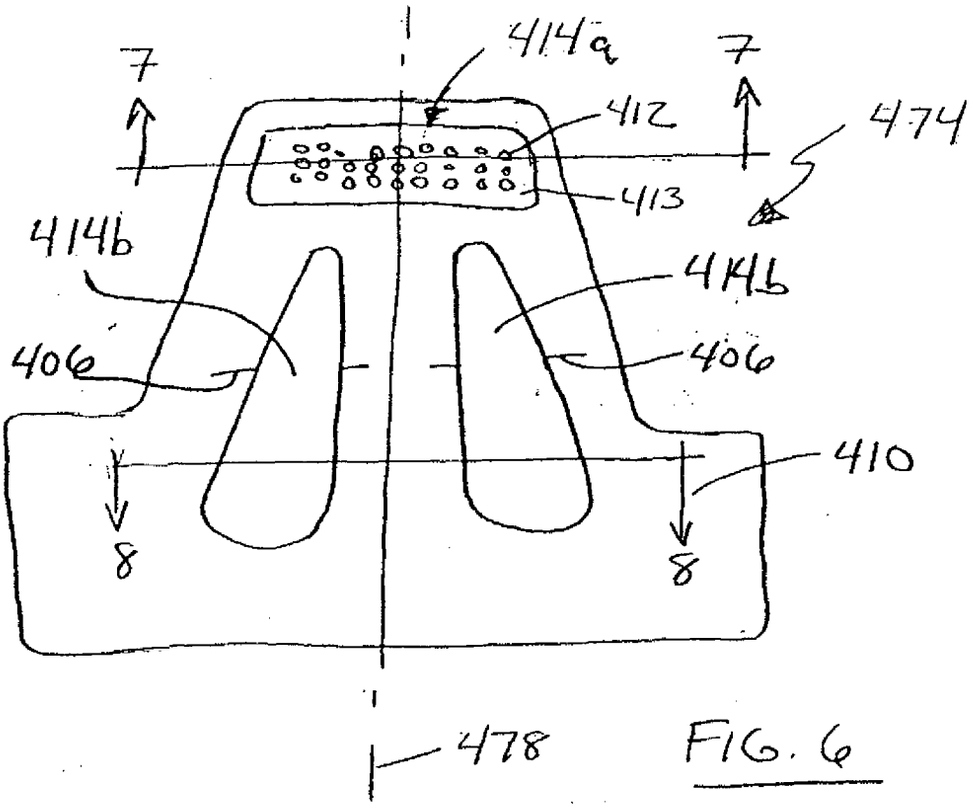

FIG. 6

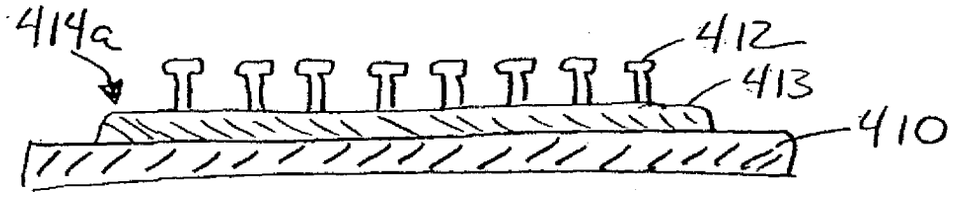

FIG. 7

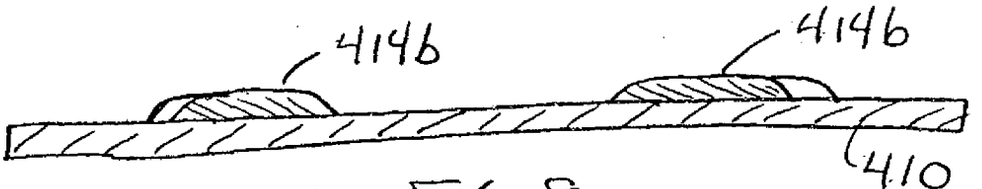

FIG. 8

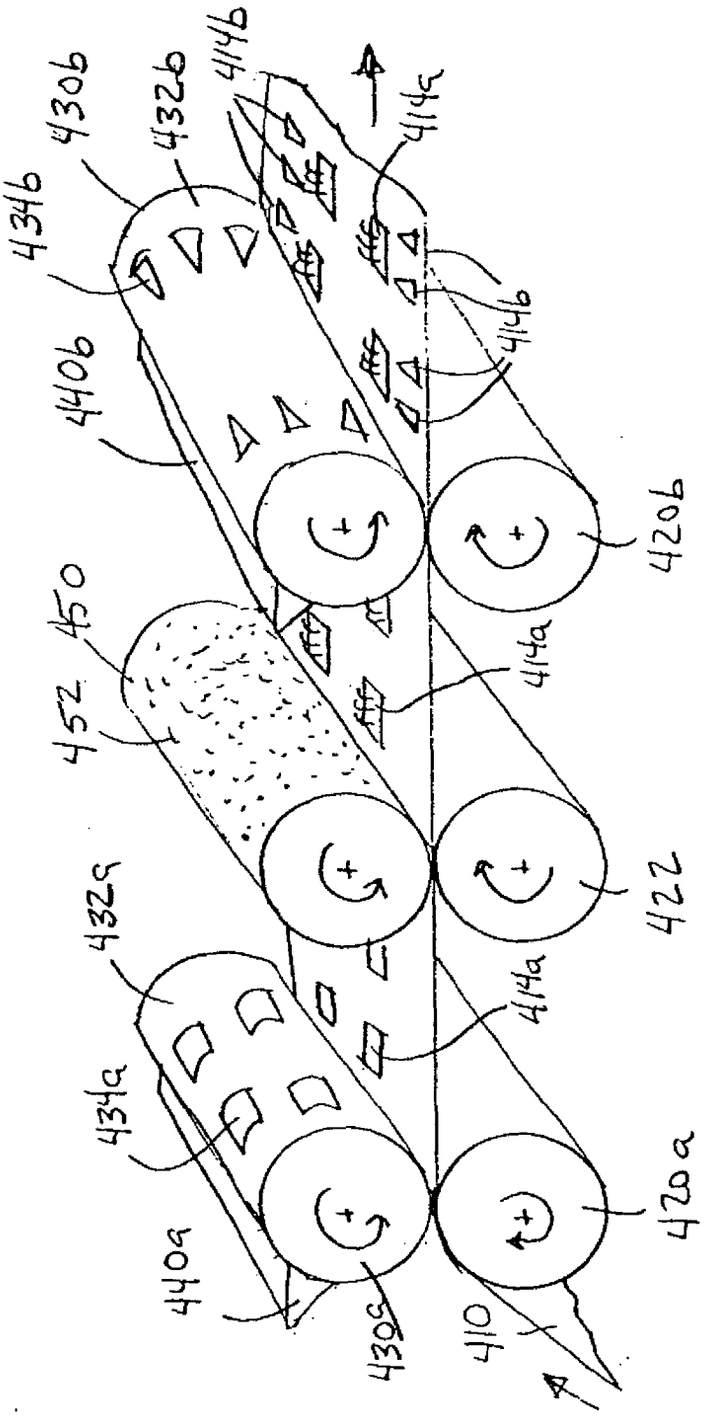
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FIG. 9

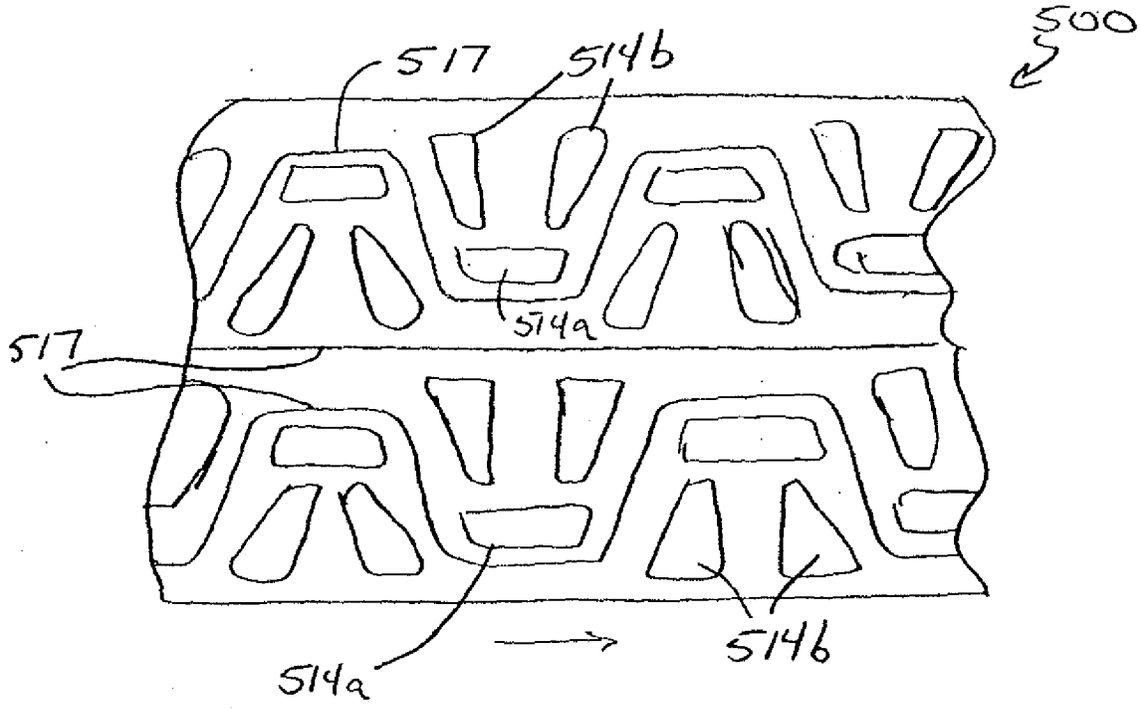

FIG. 10

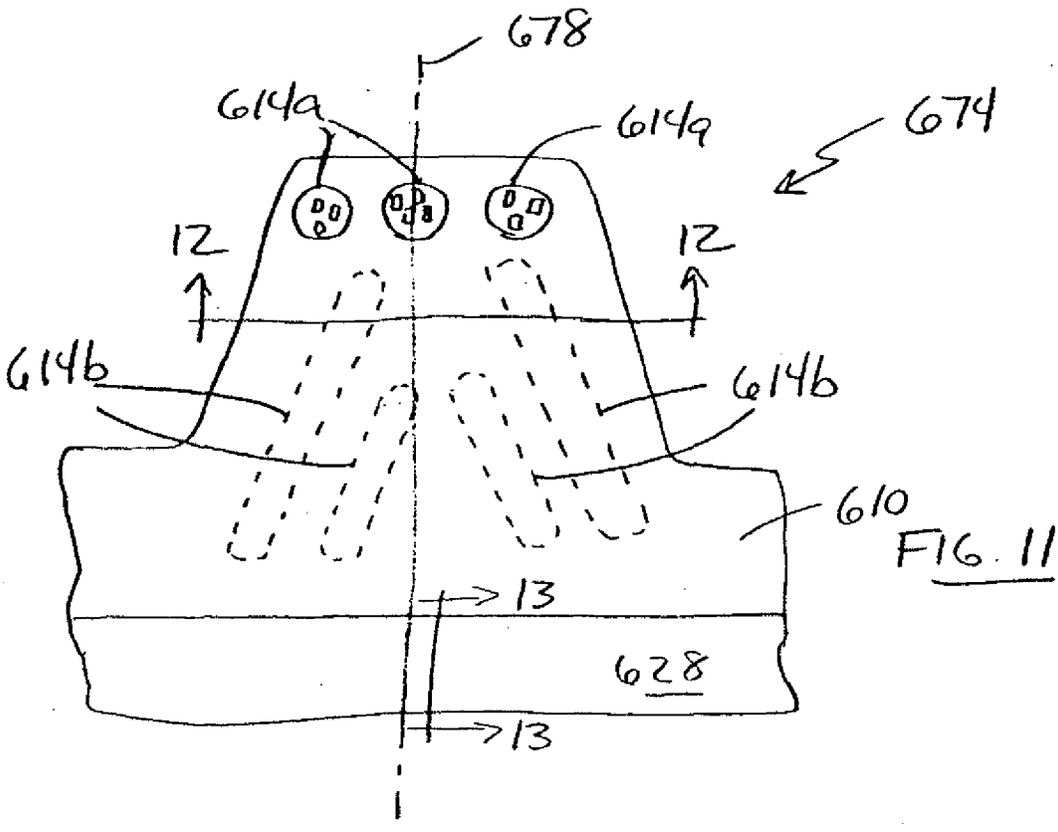

FIG. 11

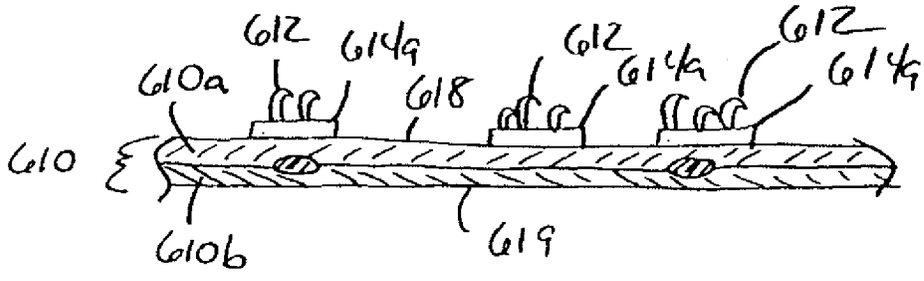

FIG. 12

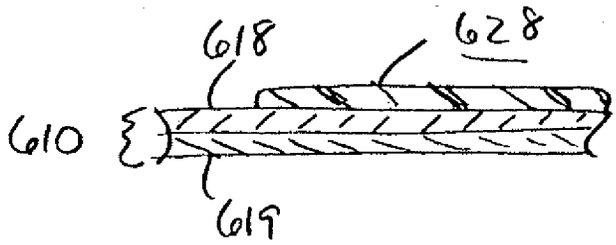

FIG. 13

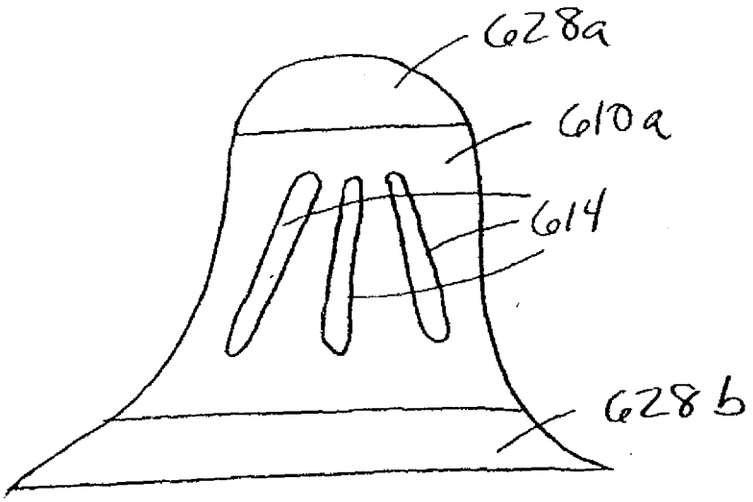

FIG. 11A

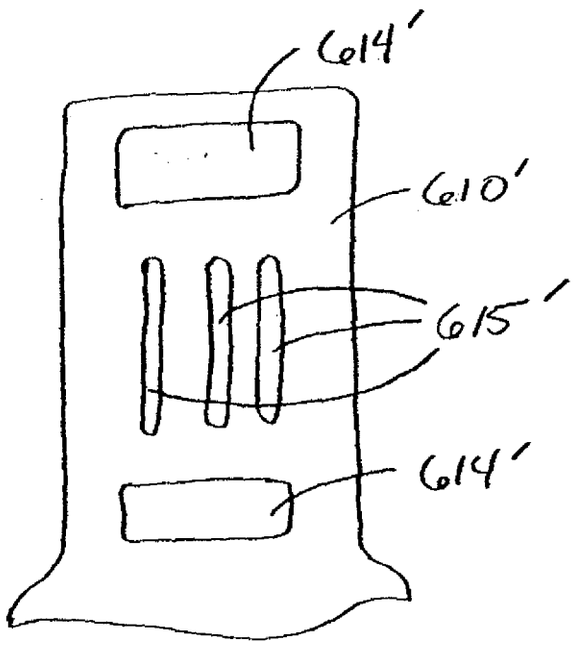

FIG. 11B

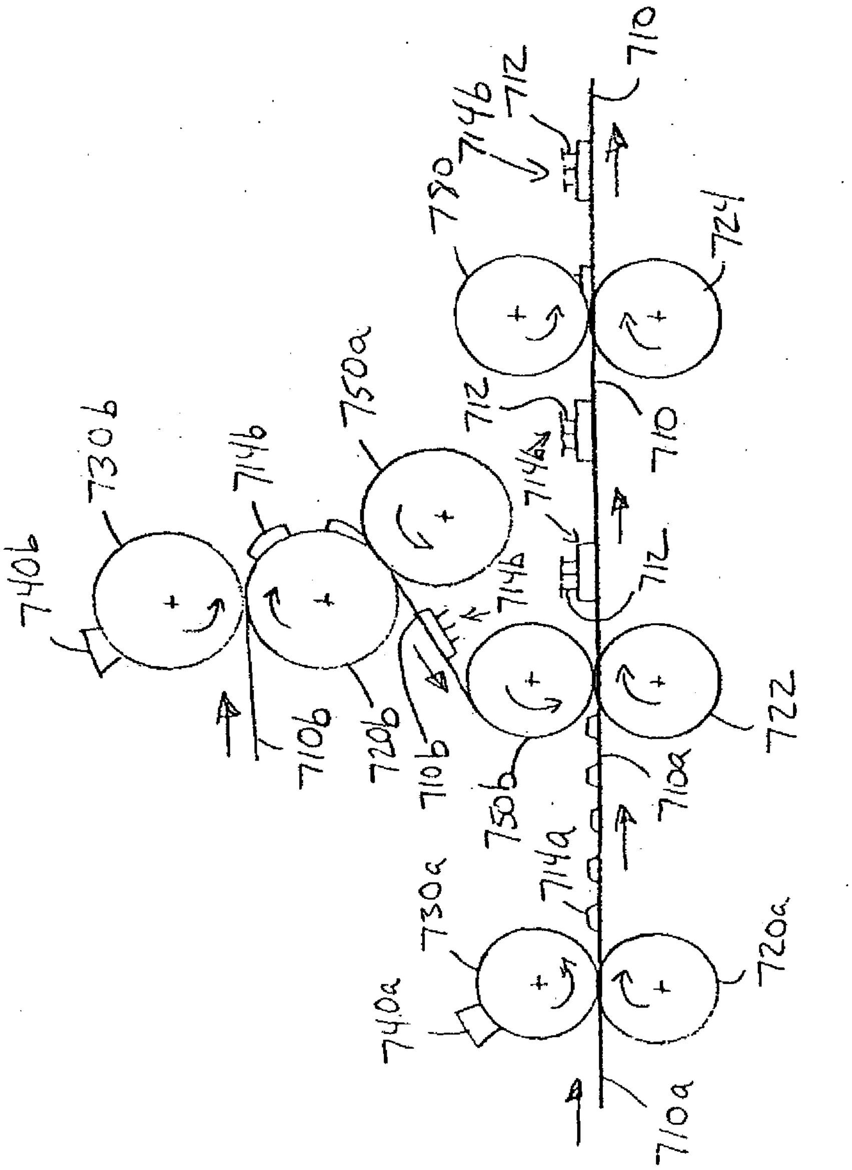
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FIG. 14

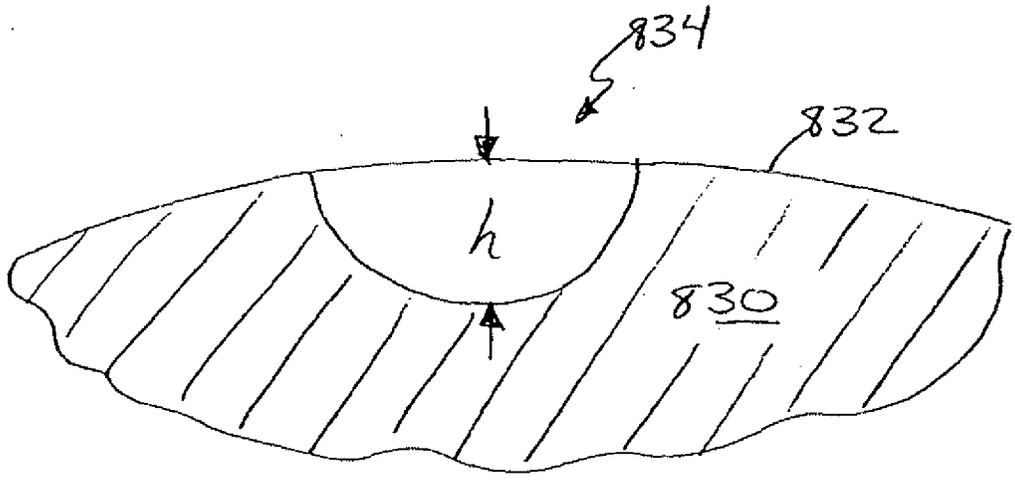

FIG. 16

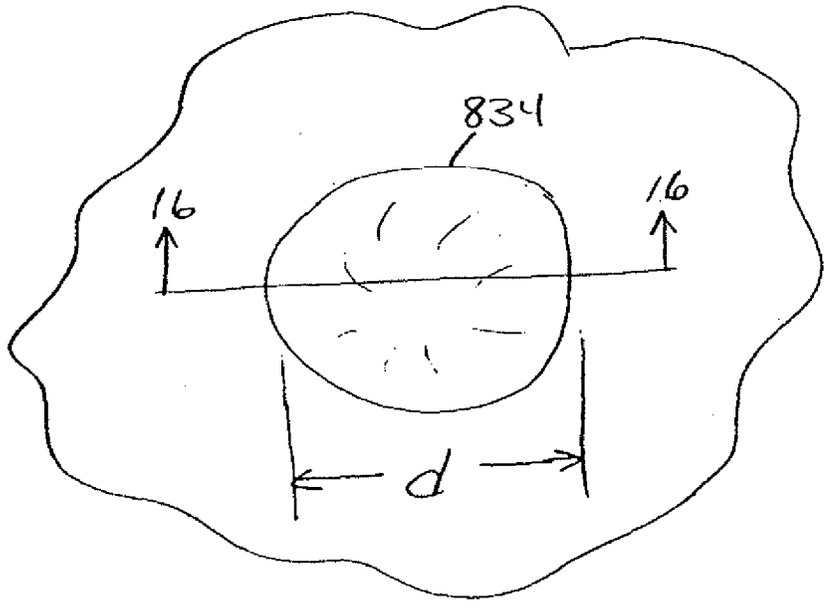

FIG. 15

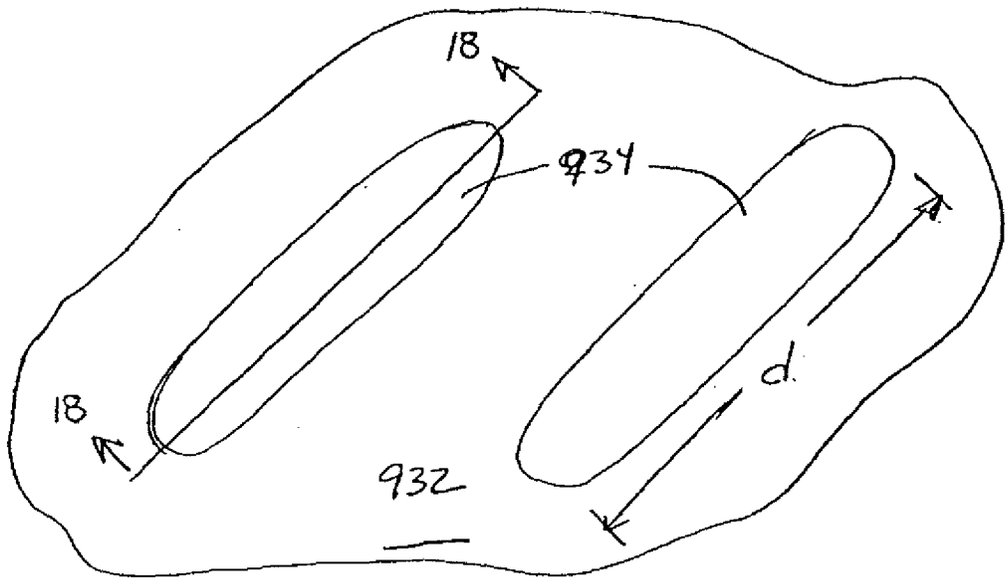

FIG. 17

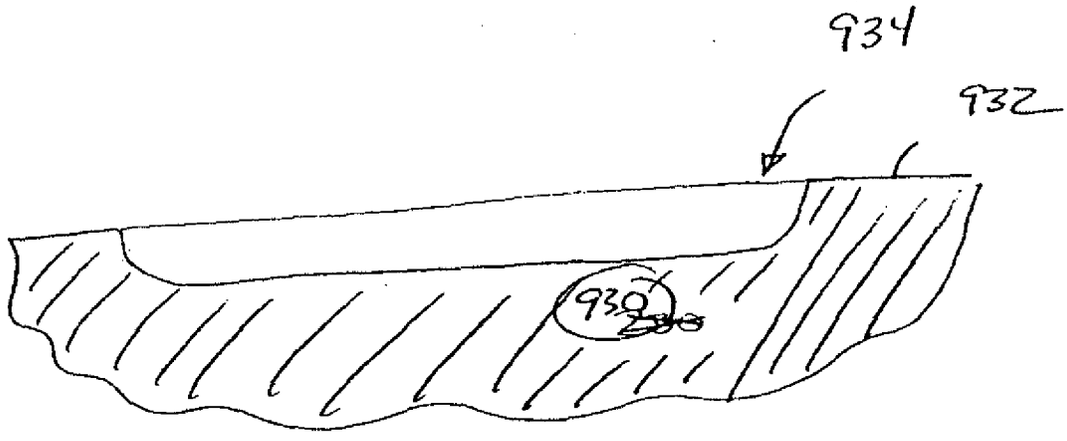

FIG. 18

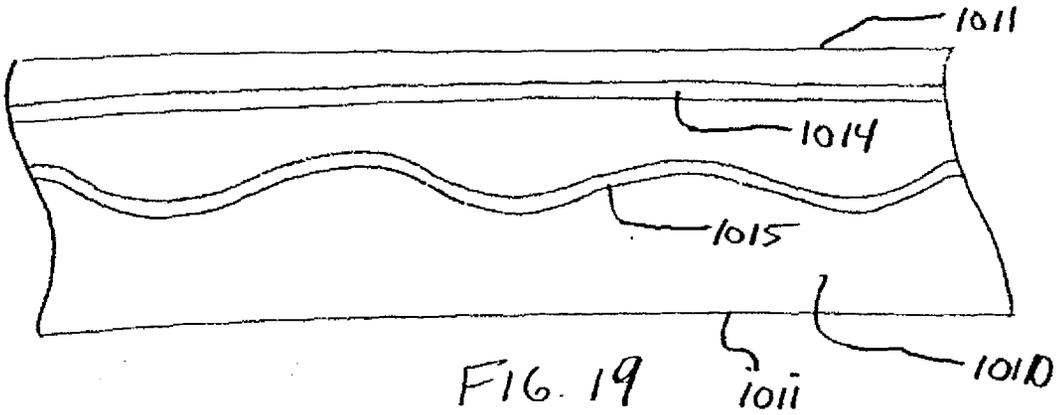

FIG. 19

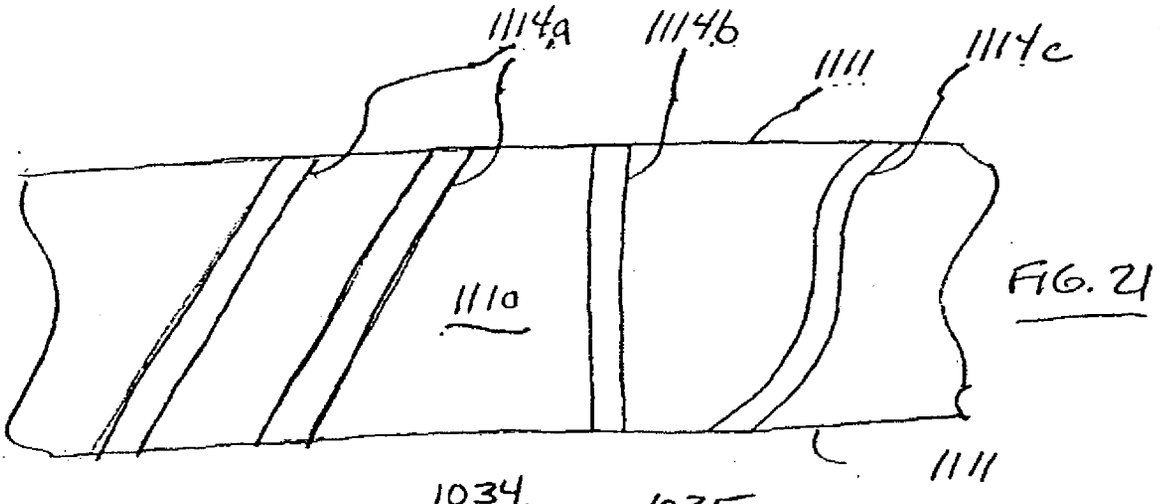

FIG. 21

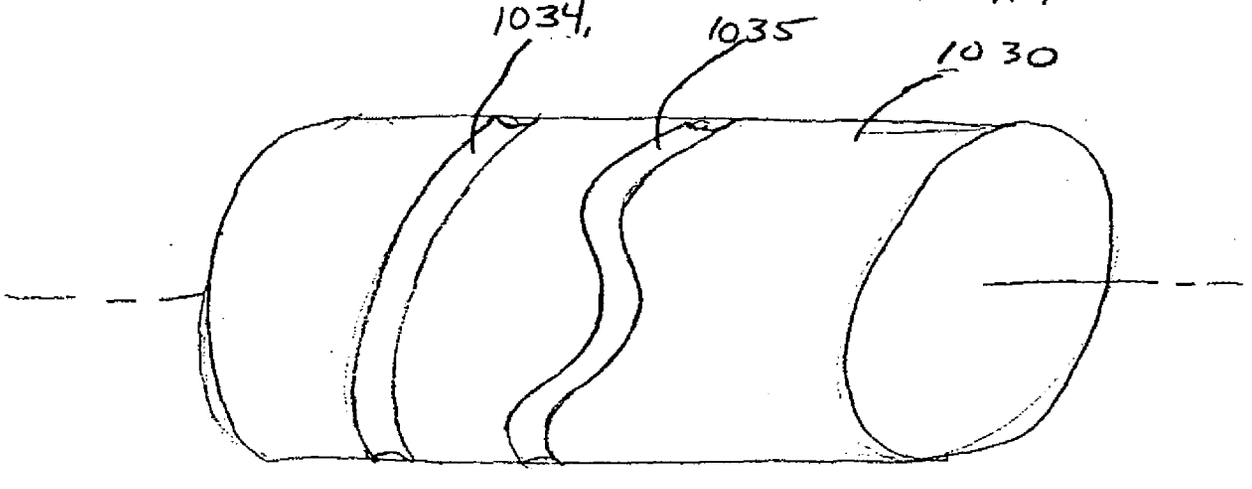

FIG. 20

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
DS		2,170,560	08/22/39	Hayes			
		2,787,244	04/02/57	Hicken			
		3,276,944	10/04/66	Levy			
		3,338,992	08/29/67	Kinney			
		3,341,394	09/12/67	Kinney			
		3,502,538	03/24/70	Peterson			
		3,502,763	03/24/70	Hartman			
		3,542,615	11/24/70	Dobo et al.			
		3,692,618	09/19/72	Dorschner et al.			
		3,694,867	10/03/72	Stumpf			
		3,814,052	06/04/74	Caratsch			
		4,223,059	09/16/80	Schwarz			
		4,340,563	07/20/82	Appel et al.			
		4,343,260	08/10/82	Yajima et al.			
		4,643,130	02/17/87	Sheath et al.			
		4,906,492	03/06/90	Groshens			
		4,965,122	10/23/90	Morman			
		4,981,747	01/01/91	Morman			
		4,984,339	01/15/91	Provost et al.			
		5,019,071	05/28/91	Bany et al.			
		5,028,646	07/02/91	Miller et al.			
		5,077,870	01/07/92	Melbye et al.			
		5,114,781	05/19/92	Morman			
V		5,116,563	05/26/92	Thomas et al.			

EXAMINER	Date Considered
[signature]	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		5,116,662	05/26/92	Morman			
		5,167,897	12/01/92	Weber			
		5,226,992	07/13/93	Morman			
		5,260,015	11/08/93	Kennedy et al.			
		5,300,057	04/05/94	Miller et al.			
		5,326,415	07/05/94	Thomas et al.			
		5,385,706	01/31/95	Thomas			
		5,389,438	02/14/95	Miller et al.			
		5,399,219	03/21/95	Roessler et al.			
		5,441,687	08/15/95	Murasaki et al.			
		5,454,801	10/03/95	Lauritzen			
		5,470,424	11/28/95	Isaac et al.			
		5,490,457	02/13/96	Boulanger et al.			
		5,501,679	03/26/96	Krueger et al.			
		5,578,344	11/26/96	Ahr et al.			
		5,679,302	10/21/97	Miller et al.			
		5,685,758	11/11/97	Paul et al.			
		5,685,873	11/11/97	Bruemmer			
		5,705,013	01/06/98	Nease et al.			
		5,755,015	05/26/98	Akeno et al.			
		5,792,411	08/11/98	Morris et al.			
		5,868,987	02/09/99	Kampfer et al.			
		5,916,207	06/29/99	Toyoda			
		5,948,707	09/07/99	Crawley			
		6,039,911	03/21/00	Miller et al.			

EXAMINER	Date Considered
	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT	**Atty. Docket No.:** 57190US002	**Serial No.:** 10/012,698
	Applicant(s): Eaton et al.	**Confirmation No.:** 9494
	Filing Date: 5 November 2001	**Group:** 1771

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		6,054,091	04/25/00	Miller et al.			
		6,093,665	07/25/00	Sayovitz et al.			
		6,132,411	10/17/00	Huber et al.			
		6,132,660	10/17/00	Kampfer			
		6,190,594 B1	02/20/01	Gorman et al.			
		6,255,236 B1	07/03/01	Cree et al.			
		6,261,278 B1	07/17/01	Chen et al.			
		6,287,665 B1	09/11/01	Hammer			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		WO 96/10481 A1	04/11/96	WIPO				
		WO 00/20200 A1	04/13/00	WIPO				
		WO 00/50229 A1	08/31/00	WIPO				
		WO 01/68019 A1	09/20/01	WIPO				
		WO 01/71080 A1	09/27/01	WIPO				

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	**Date Considered**
	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
10/012,698	11/05/2001	1771	0.00	57190US002	14	26	4

CONFIRMATION NO. 9494

26813
MUETING, RAASCH & GEBHARDT, P.A.
P.O. BOX 581415
MINNEAPOLIS, MN 55458

FILING RECEIPT

OC000000007312592

Date Mailed: 01/15/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted 01/15/2002

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

Composite webs with reinforcing polymeric regions and elastic polymeric regions

Preliminary Class

428

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
10/012,698	11/05/2001		57190US002

CONFIRMATION NO. 9494

26813
MUETING, RAASCH & GEBHARDT, P.A.
P.O. BOX 581415
MINNEAPOLIS, MN 55458

FORMALITIES LETTER

OC000000007312594

Date Mailed: 01/15/2002

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ **740** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- Total additional claim fee(s) for this application is $192.
  - **$108** for **6** total claims over 20.
  - **$84** for **1** independent claims over 3 .
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(l) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 1062.**

A copy of this notice ***MUST*** *be returned with the reply.*

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

04/26/2002 SSESHE1 00000016 134895 10012698
01 FC:101 740.00 CH
02 FC:103 108.00 CH
03 FC:102 84.00 CH
04 FC:105 130.00 CH

MH 04-25-02

#3 MRT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.

Group Art Unit: 1771

Serial No.: 10/012,698

Examiner: Unassigned

Filed: November 5, 2001

Docket No.: 57190US002
Confirmation No.: 9494

Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Assistant Commissioner for Patents
Attn: Box Missing Parts
Washington, D.C. 20231

We are transmitting the following documents along with this Transmittal Sheet (which is submitted in triplicate):

X An itemized return postcard.
X A Petition for Extension of Time for 2 month(s).
___ An Information Disclosure Statement (__ pgs); copies of ___ applications; 1449 forms (___ pgs); and copies of ___ documents cited on the 1449 forms.
X **PLEASE CHARGE ALL FEES TO DEPOSIT ACCOUNT NO. 13-4895.**
___ A certified copy of a __ application, Serial No. __, filed _____, the right of priority of which is claimed under 35 U.S.C. §119.
X Other: Communication Re: Missing Parts (2 pgs); copy of Notice to File Missing Parts of Nonprovisional Application (1 pg); Declaration (3 pgs); and Application Data Sheet (3 pgs).
___ Amendment ___ No Additional fee is required. ___ The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment

	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x $18 =	
Independent Claims				x $84 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add $280 Here →					
Total Additional Claim Fees Required					

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 13-4895. Triplicate copies of this sheet are enclosed.

MUETING, RAASCH & GEBHARDT, P.A.
Customer Number: 26813

26813
PATENT TRADEMARK OFFICE

By: _____
Name: Kevin W. Raasch
Reg. No.: 35,651
Direct Dial: 612-305-1218
Facsimile: 612-305-1228

CERTIFICATE UNDER 37 CFR §1.10::
"Express Mail" mailing label number: **EL 888274445 US** Date of Deposit: APRIL 24, 2002
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Attn: Box Missing Parts, Washington, D.C. 20231

By: _____
Name: SAM HER

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.10)

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.	)	Group Art Unit: 1771
	)	
Serial No.: 10/012,698	)	Examiner: Unassigned
Confirmation No.: 9494	)	
	)	
Filed: November 5, 2001	)	
	)	

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

COMMUNICATION RE: MISSING PARTS

Assistant Commissioner for Patents
Attn: Box Missing Parts
Washington, D.C. 20231

Sir:

In response to the "Notice to File Missing Parts of Application," enclosed is an executed Declaration by the named inventors. Please charge $130 for the missing parts surcharge to PTO Deposit Account No. 13-4895

In addition, please charge $932 ($740 to complete the statutory basic filing fee for a non-small entity and $192 for claim fees) to PTO Deposit Account No. 13-4895.

Please charge any additional fees or credit any over-payment to PTO Deposit Account No. 13-4895.

The application should now be in condition for examination. Please direct any inquiries to the undersigned attorney.

CERTIFICATE UNDER 37 C.F.R. 1.10:

The undersigned hereby certifies that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated below and is addressed to the Assistant Commissioner for Patents, Attn: Box Missing Parts, Washington, D.C. 20231.

Sam Her

SAM HER

"Express Mail" mailing label number: **EL 888274445 US**

Date of Deposit: APRIL 24, 2002

24 APRIL 2002

Date

Respectfully submitted for

Eaton et al.

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Telephone (612)305-1220
Facsimile (612)305-1228
Customer Number 26813

26813
PATENT TRADEMARK OFFICE

By: KW Raasch

Kevin W. Raasch
Reg. No. 35,651
Direct Dial (612)305-1218

APPLICATION DATA SHEET

APPLICATION INFORMATION

Application Number::	10/012,698
Application Date::	11/05/01
Application Type::	REGULAR
Subject Matter::	UTILITY
Suggested Group Art Unit::	1771
CD-ROM or CD-R?::	NONE
Title::	COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS
Attorney Docket Number::	57190US002
Total Drawing Sheets::	14

INVENTOR INFORMATION

Applicant Authority Type::	INVENTOR
Primary Citizenship Country::	USA
Status::	FULL CAPACITY
Given Name::	Bradley
Middle Name::	W
Family Name::	EATON
City of Residence::	Woodbury
State or Province of Residence::	MN
Country of Residence::	USA
Street of Mailing Address::	P.O. Box 33427
City of Mailing Address::	St. Paul
State or Province of Mailing Address::	MN
Country of Mailing Address::	USA
Postal or Zip Code of Mailing Address::	55133-3427

Applicant Authority Type::	INVENTOR
Primary Citizenship Country::	USA
Status::	FULL CAPACITY
Given Name::	Byron
Middle Name::	M
Family Name::	JACKSON
City of Residence::	Forest Lake
State or Province of Residence::	MN

Country of Residence::	USA
Street of Mailing Address::	P.O. Box 33427
City of Mailing Address::	St. Paul
State or Province of Mailing Address::	MN
Country of Mailing Address::	USA
Postal or Zip Code of Mailing Address::	55133-3427
Applicant Authority Type::	INVENTOR
Primary Citizenship Country::	USA
Status::	FULL CAPACITY
Given Name::	Leigh
Middle Name::	E
Family Name::	WOOD
City of Residence::	Woodbury
State or Province of Residence::	MN
Country of Residence::	USA
Street of Mailing Address::	P.O. Box 33427
City of Mailing Address::	St. Paul
State or Province of Mailing Address::	MN
Country of Mailing Address::	USA
Postal or Zip Code of Mailing Address::	55133-3427
Applicant Authority Type::	INVENTOR
Primary Citizenship Country::	USA
Status::	FULL CAPACITY
Given Name::	Scott
Middle Name::	J
Family Name::	TUMAN
City of Residence::	Woodbury
State or Province of Residence::	MN
Country of Residence::	USA
Street of Mailing Address::	P.O. Box 33427
City of Mailing Address::	St. Paul
State or Province of Mailing Address::	MN
Country of Mailing Address::	USA
Postal or Zip Code of Mailing Address::	55133-3427

ASSIGNMENT INFORMATION

Assignee Name::	3M Innovative Properties Company

Street of Mailing Address::	Office of Intellectual Property Counsel P.O. Box 33427
City of Mailing Address::	St. Paul
State or Province of Mailing Address::	MN
Country of Mailing Address::	US
Postal or Zip Code of Mailing Address::	55133-3427

Docket 57190US002

DECLARATION, POWER OF ATTORNEY, AND PETITION

We, Bradley W. EATON, Byron M. JACKSON, Leigh E. WOOD and Scott J. TUMAN, declare that: (1) our respective residences, citizenships, and mailing addresses are indicated below; (2) we have reviewed and understand the contents of the specification identified below, including the claims, as amended by any amendment specifically referred to herein, (3) we believe that we are the original, first, and joint inventors or discoverers of the invention or discovery in

COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Filed: November 5, 2001 Serial No.: 10/012,698

described and claimed therein and for which a patent is sought; and (4) we hereby acknowledge our duty to disclose to the Patent and Trademark Office all information known to us to be material to the patentability as defined in Title 37, Code of Federal Regulations, ' 1.56.*

We hereby appoint Gregory D. Allen (Reg. No. 35,048), Alan Ball (Reg. No. 42,286), Scott A. Bardell (Reg. No. 39,594), Carolyn A. Bates (Reg. No. 27,853), Bruce Black (Reg. No. 41,622), Colene E. H. Blank (Reg. No. 41,056), Jennie G. Boeder (Reg. No. 28,952), William J. Bond (Reg. No. 32,400), Arthur J. Brady (Reg. No. 42,356), Stephen W. Buckingham (Reg. No. 30,035), John A. Burtis (Reg. No. 39,924), Melissa E. Buss (Reg. No. 47,465), Gerald F. Chernivec (Reg. No. 26,537), James D. Christoff (Reg. No. 31,492), Philip Y. Dahl (Reg. No. 36,115), Janice L. Dowdall (Reg. No. 31,201), Lisa M. Fagan (Reg. No. 40,601), Carolyn A. Fischer (Reg. No. 39,091), Yen T. Florczak (Reg. No. 45,163), Darla P. Fonseca (Reg. No. 31,783), Melanie G. Gover (Reg. No. 41,793), Christopher D. Gram, (Reg. No. 43,643), Gary L. Griswold (Reg. No. 25,396), Doreen S. L. Gwin (Reg. No. 35,580), Michaele A. Hakamaki (Reg. No. 40,011), Karl G. Hanson (Reg. No. 32,900), Dean M. Harts (Reg. No. 47,634), Néstor F. Ho (Reg. No. 39,460), Rudolph P. Hofmann, Jr. (Reg. No. 38,187), Robert W. Hoke (Reg. No. 29,226), MarySusan Howard (Reg. No. 38,729), Stephen C. Jensen (Reg. No. 35,207), Robert H. Jordan (Reg. No. 31,973), Harold C. Knecht III (Reg. No. 35,576), Kent S. Kokko (Reg. No. 33,931), Douglas B. Little (Reg. No. 28,439), Eloise J. Maki (Reg. No. 33,418), Matthew B. McNutt (Reg. No. 39,766), Michelle M. Michel (Reg. No. 33,968), William D. Miller (Reg. No. 37,988), Peter L. Olson (Reg. No. 35,308), Daniel R. Pastirik (Reg. No. 33,025), David B. Patchett (Reg. No. 39,326), Robert J. Pechman (Reg. No. 45,002), Carolyn V. Peters (Reg. No. 33,271), Scott R. Pribnow (Reg. No. 43,869), Ted K. Ringsred (Reg. No. 35,658), Steven E. Skolnick (Reg. No. 33,789), Robert W. Sprague (Reg. No. 30,497), Brian E. Szymanski (Reg. No. 39,523), James J. Trussell (Reg. No. 37,251), Lucy C. Weiss (Reg. No. 32,834), and Kimberly S. Zillig (Reg. No. 46,346) my attorneys and/or agents with full powers (including the powers of appointment, substitution, and revocation) to prosecute this application and any division, continuation, continuation-in-part, reexamination, or reissue thereof, and to transact all business in the Patent and Trademark Office connected therewith; the mailing address and the telephone number of the above-mentioned attorneys and/or agents are:

Attention: William J. Bond, Esq.
3M Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, Minnesota 55133-3427
Telephone No. (612) 733-1500

We further appoint Ann M. Mueting (Reg. No. 33,977), Kevin W. Raasch (Reg. No. 35,651), Mark J. Gebhardt (Reg. No. 35,518), Victoria A. Sandberg (Reg. No. 41,287), David L. Provence (Reg. No. 43,022), Matthew W. Adams (Reg. No. 43,459), Loren Albin (Reg. No. 37,763), Kathleen L. Franklin (Reg. No. 47,574), and Joseph C. Huebsch (Reg. No. 42,673) of Mueting, Raasch & Gebhardt, P.A., P.O. Box 581415, Minneapolis, MN 55458-1415, Telephone No. (612) 305-1220, as our attorneys and/or agents with full powers (including the powers of appointment, substitution, and revocation) to prosecute this application and any division, continuation, continuation-in-part, reexamination, or reissue thereof, and to transact all business in the Patent and Trademark Office connected therewith.

The undersigned petitioners declare further that all statements made herein of their own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Declaration
Serial No.: 10/012,698
Filed: November 5, 2001
Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Wherefore, we pray that Letters Patent be granted to us for the invention or discovery described and claimed in the specification identified above and we hereby subscribe our names to the foregoing specification and claims, Declaration, Power of Attorney and Petition, on the dates indicated below.

Bradley W. Eaton 4/18/02

Name: **Bradley W. EATON** **DATE**
Residence: City of Woodbury, State of Minnesota
Citizenship: United States of America
Post Office Address: P.O. Box 33427, St. Paul, Minnesota 55133-3427

Byron M. Jackson 4-18-02

Name: **Byron M. JACKSON** **DATE**
Residence: City of Forest Lake, State of Minnesota
Citizenship: United States of America
Post Office Address: P.O. Box 33427, St. Paul, Minnesota 55133-3427

Leigh E Wood 4-19-02

Name: **Leigh E. WOOD** **DATE**
Residence: City of Woodbury, State of Minnesota
Citizenship: United States of America
Post Office Address: P.O. Box 33427, St. Paul, Minnesota 55133-3427

Scott J. Tuman 4/16/02

Name: **Scott J. TUMAN** **DATE**
Residence: City of Woodbury, State of Minnesota
Citizenship: United States of America
Post Office Address: P.O. Box 33427, St. Paul, Minnesota 55133-3427

' 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by ' ' 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
(2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
(2) It refutes, or is inconsistent with, a position the applicant takes in:
    (i) Opposing an argument of unpatentability relied on by the Office, or
    (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application;
(2) Each attorney or agent who prepares or prosecutes the application; and
(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.
Serial No.: 10/012,698
Confirmation No.: 9494
Filed: November 5, 2001

Group Art Unit: 1771
Examiner: Unassigned

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

PETITION FOR EXTENSION OF TIME

Assistant Commissioner for Patents
Attn: Box Missing Parts
Washington, DC 20231

Sir:

In accordance with the provisions of 37 C.F.R. §1.136(a), it is respectfully requested that a two-month extension of time be granted in which to respond to the outstanding Notice to File Missing Parts of Nonprovisional Application mailed January 15, 2002, thereby extending the date on which the period of response is set to expire from March 15, 2002, to May 15, 2002.

Please charge $400 to cover extension fee and any additional fees, or credit any over-payment, to PTO Deposit Account No. 13-4895.

CERTIFICATE UNDER 37 C.F.R. 1.10:

The undersigned hereby certifies that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated below and is addressed to the Assistant Commissioner for Patents, Attn: Box Missing Parts, Washington, D.C. 20231.

Sam Her
SAM HER

"Express Mail" mailing label number:
EL 888274445 US

Date of Deposit: APRIL 24, 2002

24 APRIL 2002
Date

Respectfully submitted for
Eaton et al.

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Phone: (612)305-1220
Facsimile: (612)305-1228
Customer Number 26813

26813
PATENT TRADEMARK OFFICE

By: KW Raasch
Kevin W. Raasch
Reg. No. 35,651
Direct Dial (612)305-1218

04/26/2002 SSESHE1 00000016 134895 10012698
05 FC:116 400.00 CH

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.

Group Art Unit: 1771

Serial No.: 10/012,698

Examiner: Unassigned

Filed: November 5, 2001

Docket No.: 57190US002
Confirmation No.: 9494

Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Assistant Commissioner for Patents
Attn: Box Missing Parts
Washington, D.C. 20231

We are transmitting the following documents along with this Transmittal Sheet (which is submitted in triplicate):

X An itemized return postcard.
X A Petition for Extension of Time for 2 month(s).
___ An Information Disclosure Statement (__ pgs); copies of ___ applications; 1449 forms (___ pgs); and copies of ___ documents cited on the 1449 forms.
X **PLEASE CHARGE ALL FEES TO DEPOSIT ACCOUNT NO. 13-4895.**
___ A certified copy of a __ application, Serial No. __, filed _____, the right of priority of which is claimed under 35 U.S.C. §119.
X Other: Communication Re: Missing Parts (2 pgs); copy of Notice to File Missing Parts of Nonprovisional Application (1 pg); Declaration (3 pgs); and Application Data Sheet (3 pgs).

Amendment ___ No Additional fee is required. ___ The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment

	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x $18 =	
Independent Claims				x $84 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add $280 Here →					
Total Additional Claim Fees Required					

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 13-4895. Triplicate copies of this sheet are enclosed.

MUETING, RAASCH & GEBHARDT, P.A.
Customer Number: 26813

26813
PATENT TRADEMARK OFFICE

By: _____
Name: Kevin W. Raasch
Reg. No.: 35,651
Direct Dial: 612-305-1218
Facsimile: 612-305-1228

CERTIFICATE UNDER 37 CFR §1.10::
"Express Mail" mailing label number: **EL 888274445 US** Date of Deposit: APRIL 24, 2002
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Attn: Box Missing Parts, Washington, D.C. 20231

By: _____
Name: SUSAN HER

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.10)

Patent
Case No.: 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	EATON, BRADLEY W.		
Application No.:	10/012698	Group Art Unit:	1771
Filed:	November 5, 2001	Examiner:	Unknown
Title:	COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
Washington, DC 20231

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on:
January 15, 2003 (Date)
Cheryl L. Schmitz (Signed by: Cheryl L. Schmitz)

Dear Sir:

Pursuant to 37 CFR§§1.56, 1.97, and 1.98, enclosed is a completed Form PTO-1449 citing references submitted for consideration by the Examiner. A copy of each cited reference is also enclosed. It is respectfully requested that the Examiner initial and return the enclosed Form PTO-1449 to indicate that each reference has been considered.

Under 37 CFR §1.97(e)(1), I hereby certify that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three (3) months prior to the filing of this Information Disclosure Statement.

Under 37 CFR §1.704(d), I hereby state that each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR §1.56(c) more than thirty (30) days prior to the filing of this Information Disclosure Statement.

A copy of the Search Report from a foreign counterpart application is enclosed.

It is believed that no fee is due; however, in the event a fee is required, please charge the fee to Deposit Account No. 13-3723.

Respectfully submitted,

January 15, 2003
Date

By: _____
William J. Bond, Reg. No. 32,400
Telephone No.: (651) 736-4790

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/27782

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B32B7/00 B32B3/08 B32B7/04 B29C43/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B29C A41D D06M D04H B05C B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 827 579 A (GROSHENS PIERROT) 27 October 1998 (1998-10-27) the whole document	1,12,17, 22
A	US 4 732 800 A (GROSHENS PIERRE) 22 March 1988 (1988-03-22) the whole document	1,12,17, 22
A	US 3 814 052 A (CARATSCH H) 4 June 1974 (1974-06-04) the whole document	1,12,17, 22
A	FR 1 117 251 A (REYMONDON ROBERT-VICTOR-ANTOIN) 22 May 1956 (1956-05-22) the whole document	1,12,17, 22

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 December 2002	30/12/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Ibarrola Torres, O

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/27782

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 50229 A (3M INNOVATIVE PROPERTIES CO) 31 August 2000 (2000-08-31) cited in the application the whole document	1,12,17, 22
A	FR 2 184 741 A (CLARK ET SONS LTD WILLIAM) 28 December 1973 (1973-12-28) the whole document	1,12,17, 22

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 02/27782

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5827579 A	27-10-1998	FR 2746264 A1	26-09-1997
		AT 192628 T	15-05-2000
		AU 710521 B2	23-09-1999
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		PL 319088 A1	29-09-1997
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		CN 1345270 T	17-04-2002
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		JP 2002537083 A	05-11-2002
		WO 0050229 A1	31-08-2000
		WO 0020200 A1	13-04-2000
		US 2001018110 A1	30-08-2001
		US 2001016245 A1	23-08-2001
FR 2184741 A	28-12-1973	BE 799414 A1	31-08-1973
		DE 2324142 A1	29-11-1973
		FR 2184741 A1	28-12-1973
		LU 67581 A1	24-07-1973
		NL 7306618 A	15-11-1973

Substitute for form 1449A/PTO (Modified)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Page 1 of 1

Application Number	10/012698
Filing Date	November 5, 2001
First Named Inventor	Eaton, Bradley W.
Art Unit	1771
Examiner Name	Salvatore, C.
Attorney Case Number	57190US002

RECEIVED JAN 23 2003 TC 1700

OIPE JAN 21 2003 PATENT & TRADEMARK OFFICE

U.S. Patent Documents

Exam. Init.*	Cite No.	Document Number: Doc. Number-(Kind Code if Known)	Publication Date or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	US- 4,732,800	03/22/88	Groshens	
	A2	US- 5,827,579	10/27/98	Groshens	
	A3	US-			
	A4	US-			
	A5	US-			
	A6	US-			
	A7	US-			
	A8	US-			
	A9	US-			
	A10	US-			
	A11	US-			

Foreign Patent Documents

Exam. Init.*	Cite No.	Foreign Patent Document: Ctry. Code	Number-KindCode (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	Translation (Check if yes)
	B1	FR	1117251	05/22/56	Reynaerdson Robert-Victor-Antoin	See enter doc.	
	B2	FR	2184741	12/28/73	Clark ET Sons LTD William	See entire doc.	
	B3						
	B4						
	B5						
	B6						
	B7						

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Exam. Init.*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
	C1	
	C2	
	C3	

*Examiner:	Date Considered: 12/10/03

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Information Disclosure Statement — PTO-1449 (Modified)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 06/26/2003

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

EXAMINER
SALVATORE, LYNDA

ART UNIT	CLASS-SUBCLASS
1771	442-327000

DATE MAILED: 06/26/2003

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

TITLE OF INVENTION: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1300	$300	$1600	09/26/2003

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:
A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (REV. 05-03) Approved for use through 04/30/2004.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
Alexandria, Virginia 22313-1450
Fax (703)746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

7590 06/26/2003

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

TITLE OF INVENTION: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1300	$300	$1600	09/26/2003

EXAMINER	ART UNIT	CLASS-SUBCLASS
SALVATORE, LYNDA	1771	442-327000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) ❑ individual ❑ corporation or other private group entity ❑ government

4a. The following fee(s) are enclosed:

❑ Issue Fee

❑ Publication Fee

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s):

❑ A check in the amount of the fee(s) is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Commissioner is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____(enclose an extra copy of this form).

Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

NOTE; The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

7590 06/26/2003

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

EXAMINER	
SALVATORE, LYNDA	
ART UNIT	**PAPER NUMBER**
1771	

DATE MAILED: 06/26/2003

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The patent term adjustment to date is 148 days. If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the term adjustment will be 148 days.

If a continued prosecution application (CPA) was filed in the above-identified application, the filing date that determines patent term adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (http://pair.uspto.gov)

Any questions regarding the patent term extension or adjustment determination should be directed to the Office of Patent Legal Administration at (703)305-1383.

PTOL-85 (REV. 05-03) Approved for use through 04/30/2004.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

7590 06/26/2003

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427
UNITED STATES

EXAMINER	
SALVATORE, LYNDA	
ART UNIT	**PAPER NUMBER**
1771	

DATE MAILED: 06/26/2003

Notice of Fee Increase on January 1, 2003

If a reply to a "Notice of Allowance and Fee(s) Due" is filed in the Office on or after January 1, 2003, then the amount due will be higher than that set forth in the "Notice of Allowance and Fee(s) Due" since there will be an increase in fees effective on January 1, 2003. See Revision of Patent and Trademark Fees for Fiscal Year 2003; Final Rule, 67 Fed. Reg. 70847, 70849 (November 27, 2002).

The current fee schedule is accessible from: http://www.uspto.gov/main/howtofees.htm.

If the issue fee paid is the amount shown on the "Notice of Allowance and Fee(s) Due," but not the correct amount in view of the fee increase, a "Notice to Pay Balance of Issue Fee" will be mailed to applicant. In order to avoid processing delays associated with mailing of a "Notice to Pay Balance of Issue Fee," if the response to the Notice of Allowance and Fee(s) due form is to be filed on or after January 1, 2003 (or mailed with a certificate of mailing on or after January 1, 2003), the issue fee paid should be the fee that is required at the time the fee is paid. If the issue fee was previously paid, and the response to the "Notice of Allowance and Fee(s) Due" includes a request to apply a previously-paid issue fee to the issue fee now due, then the difference between the issue fee amount at the time the response is filed and the previously paid issue fee should be paid. See Manual of Patent Examining Procedure, Section 1308.01 (Eighth Edition, August 2001).

Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (REV. 05-03) Approved for use through 04/30/2004.

AS7

Notice of Allowability	Application No.	Applicant(s)	
	10/012,698	EATON ET AL.	
	Examiner	Art Unit	
	Lynda M Salvatore	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *01/21/03*.
2. ☒ The allowed claim(s) is/are *1-11 and 22-26*.
3. ☒ The drawings filed on *05 November 2001* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
   (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

8. ☐ CORRECTED DRAWINGS must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No. ____.
   (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
   (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1☐ Notice of References Cited (PTO-892)
2☐ Notice of Informal Patent Application (PTO-152)
3☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
4☐ Interview Summary (PTO-413), Paper No.____ .
5☒ Information Disclosure Statements (PTO-1449), Paper No. *5&6* .
6☒ Examiner's Amendment/Comment
7☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
8☒ Examiner's Statement of Reasons for Allowance
9☐ Other

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Kevin Raasch on June 10, 2003.

IN THE CLAIMS

1. In claim 2, line 2, replace the word "fist" with the word "first".

2. In claim 23, line 2, replace the word "fist" with the word "first".

3. Cancel non-elected method claims 12-21.

DETAILED ACTION

Allowable Subject Matter

1. The following is an examiner's statement of reasons for allowance: Claims 1-11 and 22-26.

Specifically, said claims are allowable over the closest prior art of Tuman et al., and Menzies et al., which fails to teach or fairly suggest an elastic article comprising first and second substrates having one or more reinforcing discrete non-elastomeric and elastomeric thermoplastic polymeric regions attached to the substrate such that the non-elastomeric and elastomeric thermoplastic composition infiltrates a portion of said substrate. Furthermore, the prior art of Tuman et al., and Menzies et al., fails to teach a composite web having the above aforementioned limitations and further comprising one or more lines of separation defining boundries of a plurality of distinct articles, wherein the plurality of articles comprise at least one non-elastomeric discrete polymeric region and at least one elastomeric discrete polymeric region.

The prior art of Tuman et al., teaches a web material having polymer stems fused into the substrate, but fails to teach the use of non-elastomeric and elastomeric thermoplastic polymers. The prior art of Menzies et al., teaches a laminated composite comprising a non-woven fiber layer, and elastic layer and adhesive layer, and a second non-woven fiber layer, but fails to teach a composite having non-elastomeric and elastomeric thermoplastic polymeric regions, comprising one or more lines of separation defining boundries of a plurality of distinct articles, wherein the plurality of articles comprise at least one non-elastomeric discrete polymeric region and at least one elastomeric discrete polymeric region. Thus claims 1-11 and 22-26 are found to be allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynda M Salvatore whose telephone number is 703-305-4070. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 703-308-2414. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

ls
June 11, 2003

TERREL MORRIS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2,170,560	08/22/39	Hayes			
		2,787,244	04/02/57	Hicken			
		3,276,944	10/04/66	Levy			
		3,338,992	08/29/67	Kinney			
		3,341,394	09/12/67	Kinney			
		3,502,538	03/24/70	Peterson			
		3,502,763	03/24/70	Hartman			
		3,542,615	11/24/70	Dobo et al.			
		3,692,618	09/19/72	Dorschner et al.			
		3,694,867	10/03/72	Stumpf			
		3,814,052	06/04/74	Caratsch			
		4,223,059	09/16/80	Schwarz			
		4,340,563	07/20/82	Appel et al.			
		4,343,260	08/10/82	Yajima et al.			
		4,643,130	02/17/87	Sheath et al.			
		4,906,492	03/06/90	Groshens			
		4,965,122	10/23/90	Morman			
		4,981,747	01/01/91	Morman			
		4,984,339	01/15/91	Provost et al.			
		5,019,071	05/28/91	Bany et al.			
		5,028,646	07/02/91	Miller et al.			
		5,077,870	01/07/92	Melbye et al.			
		5,114,781	05/19/92	Morman			
		5,116,563	05/26/92	Thomas et al.			

EXAMINER	Date Considered
	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		5,116,662	05/26/92	Morman			
		5,167,897	12/01/92	Weber			
		5,226,992	07/13/93	Morman			
		5,260,015	11/08/93	Kennedy et al.			
		5,300,057	04/05/94	Miller et al.			
		5,326,415	07/05/94	Thomas et al.			
		5,385,706	01/31/95	Thomas			
		5,389,438	02/14/95	Miller et al.			
		5,399,219	03/21/95	Roessler et al.			
		5,441,687	08/15/95	Murasaki et al.			
		5,454,801	10/03/95	Lauritzen			
		5,470,424	11/28/95	Isaac et al.			
		5,490,457	02/13/96	Boulanger et al.			
		5,501,679	03/26/96	Krueger et al.			
		5,578,344	11/26/96	Ahr et al.			
		5,679,302	10/21/97	Miller et al.			
		5,685,758	11/11/97	Paul et al.			
		5,685,873	11/11/97	Bruemmer			
		5,705,013	01/06/98	Nease et al.			
		5,755,015	05/26/98	Akeno et al.			
		5,792,411	08/11/98	Morris et al.			
		5,868,987	02/09/99	Kampfer et al.			
		5,916,207	06/29/99	Toyoda			
		5,948,707	09/07/99	Crawley			
		6,039,911	03/21/00	Miller et al.			

EXAMINER	Date Considered
	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		6,054,091	04/25/00	Miller et al.			
		6,093,665	07/25/00	Sayovitz et al.			
		6,132,411	10/17/00	Huber et al.			
		6,132,660	10/17/00	Kampfer			
		6,190,594 B1	02/20/01	Gorman et al.			
		6,255,236 B1	07/03/01	Cree et al.			
		6,261,278 B1	07/17/01	Chen et al.			
		6,287,665 B1	09/11/01	Hammer			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		WO 96/10481 A1	04/11/96	WIPO				
		WO 00/20200 A1	04/13/00	WIPO				
		WO 00/50229 A1	08/31/00	WIPO				
		WO 01/68019 A1	09/20/01	WIPO				
		WO 01/71080 A1	09/27/01	WIPO				

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	Date Considered
Thuan Dinh	06/10/03

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/[illegible] modified)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Page 1 of 1

Application Number	10/012698
Filing Date	November 5, 2001
First Named Inventor	Eaton, Bradley W.
Art Unit	1771
Examiner Name	Salvatore, C
Attorney Case Number	57190US002

U.S. Patent Documents

Exam. Init.*	Cite No.	Document Number Doc. Number-(Kind Code if Known)	Publication Date or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	US- 4,732,800	03/22/88	Groshens	
	A2	US- 5,827,579	10/27/98	Groshens	
	A3	US-			
	A4	US-			
	A5	US-			
	A6	US-			
	A7	US-			
	A8	US-			
	A9	US-			
	A10	US-			
	A11	US-			

Foreign Patent Documents

Exam. Init.*	Cite No.	Foreign Patent Document Ctry. Code	Foreign Patent Document Number-KindCode (If known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	Translation (Check if yes)
	B1	FR	1117251	05/22/56	Reynardon Robert-Victor-Antoin	See interl doc.	
	B2	FR	2184741	12/28/73	Clark ET Sons LTD William	See entire doc.	
	B3						
	B4						
	B5						
	B6						
	B7						

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Exam. Init.*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
	C1	
	C2	
	C3	

*Examiner:	Date Considered: 06/10/03

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Information Disclosure Statement — PTO-1449 (Modified)

9-5-3

RCE/1771

PTO/SB/30 (5/2000)
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REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL

Subsection (b) of 35 U.S.C. § 132, effective on May 29, 2000, provides for continued examination of an utility or plant application filed on or after June 8, 1995. See The American Inventors Protection Act of 1999 (AIPA).

Application Number	10/012,698
Filing Date	November 5, 2001
First Named Inventor	EATON et al.
Group Art Unit	1771
Examiner Name	L. SALVATORE
Attorney Docket Number	57190US002

This is a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application.

NOTE: *37 C.F.R. § 1.114 is effective on May 29, 2000. If the above-identified application was filed prior to May 29, 2000, applicant may wish to consider filing a continued prosecution application (CPA) under 37 C.F.R. § 1.53 (d) (PTO/SB/29) instead of a RCE to be eligible for the patent term adjustment provisions of the AIPA. See Changes to Application Examination and Provisional Application Practice,* Interim Rule, 65 *Fed. Reg.* 14865 (Mar. 20, 2000), 1233 *Off. Gaz. Pat. Office* 47 (Apr. 11, 2000), which established RCE practice.

1. Submission required under 37 C.F.R. § 1.114
   - a. ☐ Previously submitted
     - i. ☐ Consider the amendment(s)/reply under 37 C.F.R. § 1.116 previously filed on _____ (Any unentered amendment(s) referred to above will be entered).
     - ii. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
     - iii. ☐ Other _____
   - b. ☒ Enclosed
     - i. ☒ Amendment/Reply
     - ii. ☐ Affidavit(s)/Declaration(s)
     - iii. ☒ Information Disclosure Statement (IDS)
     - iv. ☐ Other _____
2. Miscellaneous
   - a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. § 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(i) required)
   - b. ☐ Other _____
3. Fees The RCE fee under 37 C.F.R. § 1.17(e) is required by 37 C.F.R. § 1.114 when the RCE is filed.
   - a. ☒ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 13-4895
     - i. ☒ RCE fee required under 37 C.F.R. § 1.17(e)
     - ii. ☐ Extension of time fee (37 C.F.R. §§ 1.136 and 1.17)
     - iii. ☐ Other _____

09/08/2003 MAHMED1 00000051 134895 10012698
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   - b. ☐ Check in the amount of $_____ enclosed
   - c. ☐ Payment by credit card (Form PTO-2038 enclosed)

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print/Type)	KEVIN W. RAASCH	*Registration No. (Attorney/Agent)*	35,651
Signature	KW Raasch	*Date*	04 SEPT. 2003

CERTIFICATE OF MAILING OR TRANSMISSION

CERTIFICATE UNDER 37 CFR §1.10::
"Express Mail" mailing label number: EV 073 686 094 US Date of Deposit: September 4, 2003
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Mail Stop RCE, P.O. Box 1450, Alexandria, VA 22313-1450

By: Rachel Gagliardi-Graham
Name: Rachel Gagliardi - Graham

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.10)

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	EATON et al.	Group Art Unit: 1771
Serial No.:	10/012,698	Examiner: LYNDA SALVATORE
Confirmation No.:	9494	
Filed:	5 November 2001	

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

AMENDMENT

Assistant Commissioner for Patents
Mail Stop RCE
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Amendment accompanies a Request for Continued Examination filed herewith.

Amendments to the Claims are reflected in the listing of claims which begin on the page entitled "Amendments to the Claims."

Remarks begin on the page entitled "Remarks."

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. (original) An elastic article comprising: a substrate comprising first and second major surfaces;

one or more reinforcing discrete polymeric regions attached to the substrate, wherein each reinforcing discrete polymeric region of the one or more reinforcing discrete polymeric regions comprises a nonelastomeric thermoplastic composition that infiltrates a portion of substrate; and

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises an elastic discrete polymeric region comprising an elastomeric thermoplastic composition that infiltrates a portion of the substrate.

2. (previously presented) An article according to claim 1, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each elastic element of the one or more elastic elements is located between the first substrate and the second substrate.

3. (original) An article according to claim 1, wherein at least one elastic element of the one or more elastic elements is located on the first major surface of the substrate.

4. (original) An article according to claim 1, wherein at least one elastic element of the one or more elastic elements is located on the second major surface of the substrate

5. (original) An article according to claim 1, further comprising an elongation axis, wherein each elastic element of the one or more elastic elements comprises a length greater than

a width, and wherein the length of each elastic element of the one or more elastic elements is aligned with the elongation axis.

6. (original) An article according to claim 5, wherein the amount of elastomeric thermoplastic in each elastic element of the one or more elastic elements increases when moving away from the one or more reinforcing discrete polymeric regions along the elongation axis.

7. (original) An article according to claim 1, wherein at least one reinforcing discrete polymeric region of the one or more reinforcing discrete polymeric regions comprises an opening formed through the substrate within a surrounding ring formed of the nonelastomeric thermoplastic composition of the at least one reinforcing discrete polymeric region.

8. (original) An article according to claim 1, further comprising one or more slits formed through the substrate, wherein at least one of the one or more elastic elements spans at least one slit of the one or more slits.

9. (original) An article according to claim 1, further comprising one or more pleats formed in the substrate, wherein at least one of the one or more elastic elements spans at least one pleat of the one or more pleats.

10. (original) An article according to claim 9, wherein at least some elastic elements of the one or more elastic elements spans only one pleat of the one or more pleats.

11. (original) An article according to claim 9, at least some elastic elements of the one or more elastic elements span two or more pleats of the one or more pleats.

12-21. (canceled)

22. (original) A composite web comprising:

a substrate comprising first and second major surfaces;

a plurality of nonelastomeric discrete polymeric regions attached to the substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions comprises a nonelastomeric thermoplastic composition that infiltrates a portion of substrate;

a plurality of elastomeric discrete polymeric regions attached to the substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions comprises an elastomeric thermoplastic composition that infiltrates a portion of the substrate; and

one or more lines of separation in the composite web, wherein the one or more lines of separation define boundaries of a plurality of distinct articles in the composite web, and wherein each article of the plurality of articles comprising at least one nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions and at least one elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions.

23. (previously presented) A composite web according to claim 22, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions is located between the first substrate and the second substrate.

24. (currently amended) A composite web according to claim 22, wherein the substrate comprises a laminated substrate comprising a <u>first</u> [[fist]] substrate and a second substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions is located on the first major surface or the second major surface of the substrate.

25. (currently amended) A composite web according to claim 22, wherein the substrate comprises a laminated substrate comprising a first [[fist]] substrate and a second substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions is located between the first substrate and the second substrate

26. (currently amended) A composite web according to claim 22, wherein the substrate comprises a laminated substrate comprising a first [[fist]] substrate and a second substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions is located on the first major surface or the second major surface of the substrate.

Remarks

The Notice of Allowance mailed June 26, 2003 has been received and reviewed. Applicants are filing a Request for Continued Examination (RCE) in place of the issue fee.

Applicants are filing the RCE to present additional references for review by the Examiner in the accompanying Information Disclosure Statement.

Applicants have also amended claims 24-26 to correct the same typographical error identified by the Examiner in claims 2 and 23 (replacing "fist" with "first). The amendments to claims 2 and 23 were made in by Examiner's Amendment as documented in the Notice of Allowability issued with the Notice of Allowance.

Comments on Statement of Reasons for Allowance:

Applicants have also reviewed the statement of reasons for allowance issued with the Notice of Allowability and have the following comments.

With respect to the paragraph beginning:"Specifically, said claims are allowable over the closest prior art of Tuman et al., and Menzies et al., which fails to teach or fairly suggest and elastic article comprising first and second substrates . . ." Applicants submit that independent claims 1 and 22 do not recite "first and second substrates." Rather, independent claims 1 and 22 recite "a substrate comprising first and second major surfaces." In context, it appears that the statement of reasons for allowance includes a typographical error in which the word "substrates" was used instead of "surfaces." It should, of course, be understood that elastic articles falling within the scope of claims 1 and 22 could include two substrates (as explicitly recited in, e.g., dependent claims 2 and 23).

With respect to the paragraph beginning: "The prior art of Tuman et al. . . ." Applicants note that many of the limitations recited in that paragraph are found in independent claim 22, but not claims 1-11. Applicants further submit that claims 1-11 should not be interpreted as including all of the limitations recited in this paragraph to be allowable over the prior art.

Summary

It is respectfully submitted that the pending claims 1-11 and 22-26 are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for
EATON et al.

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
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04 SEPT. 2003
Date

By: KW Raasch
Attorney: Kevin W. Raasch
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CERTIFICATE UNDER 37 CFR §1.10:
"Express Mail" mailing label number: EV 073 686 094 US Date of Deposit: September 4, 2003
The undersigned hereby certifies that the Transmittal Letter and the paper(s) and/or fee(s), as described hereinabove, are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

By: Rachel Cayla Gabrielson
Name: Rachel Cayla Gabrielson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.

Group Art Unit: 1771

Serial No.: 10/012,698

Examiner: L. Salvatore

Filed: November 5, 2001

Docket No.: 57190US002
Confirmation No.: 9494

Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Assistant Commissioner for Patents
Mail Stop RCE
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting the following documents along with this Transmittal Sheet (which is submitted in triplicate):

X An itemized return postcard.
__ A Petition for Extension of Time for __ month(s).
X An Information Disclosure Statement (2 pgs); 1449 form (1pg); and copies of 5 documents cited on the 1449 forms.
X **PLEASE CHARGE RCE FEE OF $750.00 TO DEPOSIT ACCOUNT NO. 13-4895.**
__ A certified copy of a __ application, Serial No. __, filed _____, the right of priority of which is claimed under 35 U.S.C. §119.
X Other: Request for Continued Examination (1 pg.); Amendment (7 pgs.)
X No Additional fee is required. __ The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment					
	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x $18 =	
Independent Claims				x $84 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add $280 Here →					
Total Additional Claim Fees Required					

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 13-4895. Triplicate copies of this sheet are enclosed.

MUETING, RAASCH & GEBHARDT, P.A.

By: Kevin W. Raasch
Name: Kevin W. Raasch
Reg. No.: 35,651
Direct Dial: 612-305-1218
Facsimile: 612-305-1228

CERTIFICATE UNDER 37 CFR §1.10::
"Express Mail" mailing label number: EV 073 686 094 US Date of Deposit: September 4, 2003
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Mail Stop RCE, P.O. Box 1450, Alexandria, VA 22313-1450

By: Rachel Gagliardi-Graham
Name: Rachel Gagliardi-Graham

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.10)

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Eaton et al.	Group Art Unit:	1771
Serial No.:	10/012,698	Examiner:	Unassigned
Confirmation No.:	9494		
Filed:	05 November 2001		

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Mail Stop RCE
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with C.F.R. §§ 1.97 *et. seq.*, the materials enclosed herewith are brought to the attention of the Examiner as possibly being of interest in connection with the above-identified patent application. Per M.P.E.P. § 609, the information cited in the present Information Disclosure Statement shall not be construed to be an admission that the information is, or is considered to be, material to patentability. Consideration of each of the documents listed on the attached 1449 form(s) is respectfully requested. Pursuant to the provisions of M.P.E.P. §609, Applicants further request that a copy of the 1449 form(s), marked as being considered and initialed by the Examiner, be returned with the next Official Communication.

Since this Information Disclosure Statement is submitted with a Request for Continued Examination (RCE), it is believed that no fee is due. However, in the event a fee is due, please charge any fee or credit any overpayment to Account No. 13-4895.

The Examiner is invited to contact Applicants'Representatives at the below-listed telephone number, if they can be of any assistance during prosecution of the present application.

CERTIFICATE UNDER 37 C.F.R. 1.10:

The undersigned hereby certifies that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated below and is addressed to the Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

"Express Mail" mailing label number:
EV073686094US
Date of Deposit: 4 September 2003
Name: Rachel Baglundi-Graba

04 SEPT. 2003
Date

KWR/rgg/sjt

Respectfully submitted for
EATON et al.

By
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Facsimile: (612)305-1228
Customer Number 26813

By: _____
Attorney: Kevin W. Raasch
Reg. No. 35,651
Direct Dial (612)305-1218

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/17555

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61F13/15 B05C1/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61F B05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 16 037 A (NORDSON CORP) 7 November 1996 (1996-11-07) abstract column 2, line 39 - line 51 column 3, line 53 -column 4, line 15; claims; figure	1-8
A	EP 0 333 400 A (ACUMETER LAB) 20 September 1989 (1989-09-20) abstract column 4, line 43 - line 55 column 8, line 48 - line 50; claims; figures	1-10
A	WO 95 29765 A (MINNESOTA MINING & MFG) 9 November 1995 (1995-11-09)	

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 October 1999	29/10/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Soederberg, J

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Int tional Application No
PCT/US 99/17555

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 622 127 A (MINNESOTA MINING & MFG) 2 November 1994 (1994-11-02)	
A	EP 0 745 433 A (PROCTER & GAMBLE) 4 December 1996 (1996-12-04) cited in the application	
A	US 5 417 789 A (LAURITZEN NELS J) 23 May 1995 (1995-05-23) cited in the application	
A	US 3 327 708 A (SOKOLOWSKI) 27 June 1967 (1967-06-27) cited in the application	

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int ational Application No
PCT/US 99/17555

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19516037 A	07-11-1996	NONE	
EP 0333400 A	20-09-1989	US 4871593 A	03-10-1989
		AU 3015689 A	21-09-1989
		CN 1036154 A	11-10-1989
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US 3327708 A	27-06-1967	DE 1560871 A	10-08-1972
		NL 6406432 A,B	08-12-1964

Form PCT/ISA/210 (patent family annex) (July 1992)

INFORMATION DISCLOSURE STATEMENT	**Atty. Docket No.:** 57190US002	**Serial No.:** 10/012,698
	Applicant(s): Eaton et al.	**Confirmation No.:** 9494
	Filing Date: 5 November 2001	**Group:** 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088220 A1	05/08/03	Molander et al.			
		2003/0111166 A1	06/19/03	Uitenbroek et al.			
		2003/0091807 A1	05/15/03	Desai et al.			
		5,230,851	07/27/93	Thomas			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
							Yes	No
		1117251	May 1956	France (English Language Translation Included)			X	

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	**Date Considered**

***Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.**

92

1771

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eaton et al.

Group Art Unit: 1771

Serial No.: 10/012,698

Examiner: L. Salvatore

Filed: November 5, 2001

Docket No.: 57190US002
Confirmation No.: 9494

Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting the following documents along with this Transmittal Sheet (which is submitted in triplicate):

X An itemized return postcard.
__ A Petition for Extension of Time for __ month(s).
__ A certified copy of a __ application, Serial No. __, filed _____, the right of priority of which is claimed under 35 U.S.C. §119.
X Other: Supplemental Information Disclosure Statement (2 pgs.); 1449 Form (1 pg.); copy of 1 document cited on the 1449 form

__ No Additional fee is required. __ The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment					
	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x $18 =	
Independent Claims				x $84 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add $280 Here →					
Total Additional Claim Fees Required					

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 13-4895. Triplicate copies of this sheet are enclosed.

CERTIFICATE UNDER 37 CFR §1.8:
The undersigned hereby certifies that the Transmittal Letter and the paper(s) and/or fee(s), as described hereinabove, are being deposited with the United States Postal Service as first class mail, in an envelope addressed to: Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 7th day of OCTOBER, 2003.

MUETING, RAASCH & GEBHARDT, P.A.

By: KWRaasch

Name: Kevin W. Raasch
Reg. No.: 35,651
Direct Dial: 612-305-1218
Facsimile: 612-305-1228

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.8)

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Eaton et al.	Group Art Unit:	1771
Serial No.:	10/012,698	Examiner:	Lynda Salvatore
Confirmation No.:	9494		
Filed:	05 November 2001		

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with C.F.R. §§ 1.97 *et. seq.*, the materials enclosed herewith are brought to the attention of the Examiner as possibly being of interest in connection with the above-identified patent application. Per M.P.E.P. § 609, the information cited in the present Information Disclosure Statement shall not be construed to be an admission that the information is, or is considered to be, material to patentability. Consideration of each of the documents listed on the attached 1449 form(s) is respectfully requested. Pursuant to the provisions of M.P.E.P. §609, Applicants further request that a copy of the 1449 form(s), marked as being considered and initialed by the Examiner, be returned with the next Official Communication.

It is believed that no fee is due, as this Information Disclosure Statement is filed prior to the receipt of any Action on the merits. However, in the event a fee is due, please charge any fee or credit any overpayment to Account No. 13-4895.

The Examiner is invited to contact Applicants' Representatives at the below-listed telephone number, if they can be of any assistance during prosecution of the present application.

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By: KW Raasch
Name: KEVIN W. RAASCH

Respectfully submitted for
EATON et al.

By
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Facsimile: (612)305-1228

_____ By:_____
Date Attorney: Kevin W. Raasch
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KWR/rgg/sjt

INFORMATION DISCLOSURE STATEMENT	**Atty. Docket No.:** 57190US002	**Serial No.:** 10/012,698
	Applicant(s): Eaton et al.	**Confirmation No.:** 9494
	Filing Date: 5 November 2001	**Group:** 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088228 A1	05/08/03	Desai et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
							Yes	No
		None						

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		None

EXAMINER	Date Considered

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

92

1771
B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	EATON et al.	Group Art Unit:	1771
Serial No.:	10/012,698	Examiner:	Lynda Salvatore
Confirmation No.:	9494		
Filed:	5 November 2001	Docket No.:	57190US002

Title: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting the following documents along with this Transmittal Sheet (which is submitted in triplicate):

X An itemized return postcard.
__ A Petition for Extension of Time for __ month(s) and a check in the amount of $___ for the required fee.
X An Information Disclosure Statement (2 pgs); copies of 0 applications; 1449 form (1 pg); and copies of 10 documents cited on the 1449 forms.
__ A check in the amount of $___, for __.
__ A certified copy of a __ application, Serial No. __, filed _____, the right of priority of which is claimed under 35 U.S.C. §119.
__ Other:
__ Amendment __ No Additional fee is required. __ The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment					
	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x $18 =	
Independent Claims				x $86 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add $290 Here →					
Total Additional Claim Fees Required					

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 13-4895. Triplicate copies of this sheet are enclosed.

CERTIFICATE UNDER 37 C.F.R. §1.8: The undersigned hereby certifies that this Transmittal Letter and the paper(s), as described hereinabove, are being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 5th day of February, 2004.

MUETING, RAASCH & GEBHARDT, P.A.

By: KW Raasch
Kevin W. Raasch
Reg. No.: 35,651
Direct Dial: 612-305-1218
Facsimile: 612-305-1228

(LARGE ENTITY TRANSMITTAL UNDER RULE 1.8)

PATENT
Docket No. 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	EATON et al.	Group Art Unit:	1771
Serial No.:	10/012,698	Examiner:	Lynda Salvatore
Confirmation No.:	9494		
Filed:	5 November 2001		

For: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the continuing duty of candor and good faith that is to be demonstrated before the United States Patent and Trademark Office (USPTO), enclosed herewith are copies of documents which Applicants bring to the Examiner's attention as possibly being of interest in connection with the above-identified patent application. Per M.P.E.P. § 609, the information cited in the present Information Disclosure Statement shall not be construed to be an admission that the information is, or is considered to be, material to patentability. Consideration of each of the documents listed on the attached 1449 form is respectfully requested. Pursuant to the provisions of MPEP §609, Applicants further request that a copy of the 1449 form, marked as being considered and initialed by the Examiner, be returned with the next Official Communication.

It is believed that no fee is due, as this Supplemental Information Disclosure Statement is filed prior to the receipt of any Action on the merits. However, in the event a fee is due, please charge any fee or credit any overpayment to Account No. 13-4895.

When the Examiner takes up the present application, consideration of these documents is respectfully requested. The Examiner is invited to contact Applicants' Representatives at the below-listed telephone number, if they can be of any assistance during prosecution of the present application.

CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper is being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 5th day of February, 2004.

Signature: KW Raasch
Name: KEVIN W. RAASCH

5 FEBRUARY 2004
Date

KWR/rgg

Respectfully submitted for

EATON et al.

By
Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
Telephone (612)305-1220
Facsimile (612)305-1228

By: KW Raasch
Kevin W. Raasch
Reg. No. 35,651
Direct Dial (612)305-1218

INFORMATION DISCLOSURE STATEMENT	**Atty. Docket No.:** 57190US002	**Serial No.:** 10/012,698
	Applicant(s): EATON et al.	**Confirmation No.:** 9494
	Application Filing Date: 5 November 2001	**Group:** 1771
	Information Disclosure Statement mailed: February 5, 2004	

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		5,458,590	10/17/95	Schleinz et al.			
		5,503,076	04/02/96	Yeo			
		5,843,057	12/01/98	McCormack			
		6,638,605 B1	10/28/03	Ankuda, Jr. et al.			
		2002/0115972 A1	08/22/02	Dabi et al.			
		2003/0085485 A1	05/08/03	Seidel et al.			
		2003/0087059 A1	05/08/03	Jackson et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
							Yes	No
		EP 0 189 351 A2	07/30/86	EPO (English Language Abstract Included)				X
		EP 0 189 351 B1	03/27/91	EPO (English Language Abstract Included)				X
		WO 00/07532	02/17/00	WIPO				

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	Date Considered

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

MD

NOTICE OF ALLOWANCE AND FEE(S) DUE

7590 03/17/2004

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

EXAMINER	
SALVATORE, LYNDA	
ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 03/17/2004

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

TITLE OF INVENTION: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$300	$1630	06/17/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:
A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

7590 03/17/2004

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

TITLE OF INVENTION: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$300	$1630	06/17/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
SALVATORE, LYNDA	1771	442-066000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent); ❑ individual ❑ corporation or other private group entity ❑ government

4a. The following fee(s) are enclosed:

❑ Issue Fee
❑ Publication Fee
❑ Advance Order - # of Copies _____

4b. Payment of Fee(s):

❑ A check in the amount of the fee(s) is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

NOTE; The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

7590 03/17/2004

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

EXAMINER	
SALVATORE, LYNDA	
ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 03/17/2004

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 148 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 148 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

Notice of Allowability	Application No.	Applicant(s)	
	10/012,698	EATON ET AL.	
	Examiner	Art Unit	
	Lynda M Salvatore	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *09/04/03*.
2. ☒ The allowed claim(s) is/are *1-11 and 22-26*.
3. ☒ The drawings filed on *05 November 2001* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
   (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

8. ☐ CORRECTED DRAWINGS must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No. _____.
   (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
   (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1☐ Notice of References Cited (PTO-892)
2☐ Notice of Informal Patent Application (PTO-152)
3☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
4☐ Interview Summary (PTO-413), Paper No._____ .
5☒ Information Disclosure Statements (PTO-1449), Paper No. ____.
6☐ Examiner's Amendment/Comment
7☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
8☒ Examiner's Statement of Reasons for Allowance
9☐ Other .

DETAILED ACTION

Continued Examination

1. Applicant's request for continuing examination (RCE), accompanying amendments, remarks, and Information Disclosure Statement filed 09/04/03 have been fully considered and entered as requested. Applicant amended claims 24-26 to correct a typographical error identified by the Examiner as set forth in Examiner's amendment made of record at the time of Allowance. Since Applicant's amendment did not affect the scope of the claimed subject matter, it is the position of the Examiner that claims 1-11 and 22-26 are allowable over the prior art of record. In addition, Applicant's comments on the Examiner's last statement for reasons for allowance have been noted and as such a new statement including remarks on the newly submitted reference, is set forth herein below.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 09/04/03 was filed after the mailing date of the Notice of Allowance on 06/26/03. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement.

Allowable Subject Matter

3. The following is an examiner's statement of reasons for allowance: Claims 1-11 and 22-26.

Specifically, said claims are allowable over the closest prior art of Tuman et al., and Menzies et al., which fails to teach or fairly suggest an elastic article comprising first and second surfaces having one or more reinforcing discrete non-elastomeric and

elastomeric thermoplastic polymeric regions attached to the substrate such that the non-elastomeric and elastomeric thermoplastic composition infiltrates a portion of said substrate. With specific regard to the limitations set forth in claim 22, the prior art of Tuman et al., and Menzies et al., fails to teach a composite web having the above aforementioned limitations and further comprising one or more lines of separation defining boundaries of a plurality of distinct articles, wherein the plurality of articles comprise at least one non-elastomeric discrete polymeric region and at least one elastomeric discrete polymeric region.

Tuman et al., teaches a web material having polymer stems fused into the substrate, but fails to teach the use of non-elastomeric and elastomeric thermoplastic polymers. The prior art of Menzies et al., teaches a laminated composite comprising a non-woven fiber layer, and elastic layer and adhesive layer, and a second non-woven fiber layer, but fails to teach a layer having non-elastomeric and elastomeric thermoplastic polymeric regions.

Additionally, the published patent application issued to Desai et al., teaches disposing one or more first and second elastomeric members on first and second regions of an extensible substrate (Abstract). Desai et al., also teaches that the elastomeric material partially penetrates the substrate and that each first and second region elastomeric material may have differing elasticity, melt viscosity, add-on level, shape, pattern or composition properties, but fails to specifically teach regions of *non-elastic* and elastic material (Section 0010). With specific regard to claim 22, Desai et al., fails to further teach the limitation of lines of separation defining boundaries of a plurality of distinct articles, wherein the plurality of articles comprise at least one non-elastomeric

discrete polymeric region and at least one elastomeric discrete polymeric region. An updated search did not produce any new substantial art for which to base a rejection and presently no motivation exists to combine references to form and obvious type rejection. Thus claims 1-11 and 22-26 are found to be allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

TERREL MORRIS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynda M Salvatore whose telephone number is 571-272-1482.. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 571-272-1482. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 18, 2004
ls

TERREL MORRIS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

INFORMATION DISCLOSURE STATEMENT	**Atty. Docket No.:** 57190US002	**Serial No.:** 10/012,698
	Applicant(s): Eaton et al.	**Confirmation No.:** 9494
	Filing Date: 5 November 2001	**Group:** 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088228 A1	05/08/03	Desai et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		None						

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		None

EXAMINER	Date Considered
	02/18/04

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): EATON et al.	Confirmation No.: 9494
	Application Filing Date: 5 November 2001	Group: 1771
	Information Disclosure Statement mailed: February 5, 2004	

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
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		5,503,076	04/02/96	Yeo			
		5,843,057	12/01/98	McCormack			
		6,638,605 B1	10/28/03	Ankuda, Jr. et al.			
		2002/0115972 A1	08/22/02	Dabi et al.			
		2003/0085485 A1	05/08/03	Seidel et al.			
		2003/0087059 A1	05/08/03	Jackson et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		EP 0 189 351 A2	07/30/86	EPO (English Language Abstract Included)				X
		EP 0 189 351 B1	03/27/91	EPO (English Language Abstract Included)				X
		WO 00/07532	02/17/00	WIPO				

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	Date Considered
	02/18/04

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Issue Classification	Application No.	Applicant(s)	
	10/012,698	EATON ET AL.	
	Examiner	Art Unit	
	Lynda M Salvatore	1771	

ISSUE CLASSIFICATION

ORIGINAL CLASS	ORIGINAL SUBCLASS	CROSS REFERENCE(S) CLASS	CROSS REFERENCE(S) SUBCLASS (ONE SUBCLASS PER BLOCK)						
442	66	428	134	136	137	100	141	167	

INTERNATIONAL CLASSIFICATION

B	32	B	27	104
			27	12
			3	06
			3	10
			3	128

Lynda Salvatore 02/04
(Assistant Examiner) (Date)

(Legal Instruments Examiner) (Date)

TERREL MORRIS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700
(Primary Examiner) (Date) 2/23/04

Total Claims Allowed: 16

O.G. Print Claim(s)	O.G. Print Fig.
1	19

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1		31		61		91		121		151		181
2	2		32		62		92		122		152		182
3	3		33		63		93		123		153		183
4	4		34		64		94		124		154		184
5	5		35		65		95		125		155		185
6	6		36		66		96		126		156		186
7	7		37		67		97		127		157		187
8	8		38		68		98		128		158		188
9	9		39		69		99		129		159		189
10	10		40		70		100		130		160		190
11	11		41		71		101		131		161		191
	~~12~~		42		72		102		132		162		192
	~~13~~		43		73		103		133		163		193
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	27		57		87		117		147		177		207
	28		58		88		118		148		178		208
	29		59		89		119		149		179		209
	30		60		90		120		150		180		210

Index of Claims

Application No.	Applicant(s)	
10/012,698	EATON ET AL.	
Examiner	**Art Unit**	
Lynda M Salvatore	1771	

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	02/04
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Claim		Date
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Claim		Date
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Search Notes	Application No.	Applicant(s)	
	10/012,698	EATON ET AL.	
	Examiner	Art Unit	
	Lynda M Salvatore	1771	

SEARCHED			
Class	Subclass	Date	Examiner
442	66	02/04	LS
428	134		
	136		
	137		
	141		
	100		
	167		
~~604~~	~~385.24~~		
	~~385.25~~		
	~~385.27~~		
	~~382~~		

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
428	134-141	02/04	LS
	167		
604	378-382		

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
East text search	02/04	LS

32692
Customer Number

Patent
Case No.: 57190US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	EATON, BRADLEY W.		
Application No.:	10/012698	Group Art Unit:	1771
Filed:	November 5, 2001	Examiner:	Lynda Salvatore
Title:	COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS		

COMMUNICATION AFTER NOTICE OF ALLOWANCE

Mail Stop: Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF TRANSMISSION
To Fax No.: 703-872-9306
I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office on:
4/5/04 (Date)
Cheryl L. Schmitz (Signed by: Cheryl L. Schmitz)

Dear Sir:

The undersigned respectfully requests that the Examiner return the PTO-1449 forms included with the Information Disclosure Statement dated September 4, 2003, acknowledging consideration of the references listed thereon. Copies of the forms are enclosed for the Examiner's convenience.

The issue fee due on June 17, 2004, has not yet been paid.

Respectfully submitted,

April 5, 2004
Date

By: _____
William J. Bond, Reg. No.: 32,400
Telephone No.: (651) 736-4790

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

OMB No. 0651-0011
Page 1 of 1

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088220 A1	05/08/03	Molander et al.			
		2003/0111166 A1	06/19/03	Uitenbrock et al.			
		2003/0091807 A1	05/15/03	Desai et al.			
		5,230,851	07/27/93	Thomas			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		1117251	May 1956	France (English Language Translation Included)			X	

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	Date Considered

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FACSIMILE TRANSMITTAL COVER SHEET

Date: April 5, 2004

No. of Pages (including this page): 3

To: Examiner Lynda Salvatore
U.S. Patent and Trademark Office
Alexandria, VA 22313-1450

Group Art Unit: 1771

Phone: (703) 305-4070
Fax: (703) 872-9306

From: William J. Bond
Office of Intellectual Property Counsel
3M Innovative Properties Company
P.O. Box 33427
St. Paul, MN 55133-3427
U.S.A.
Phone: (651) 736-4790
Fax: (651) 736-3833

Application No.: 10/012698
First Named Inventor: Eaton, Bradley W.
Title: Composite Webs with Reinforcing Polymeric Regions and Elastic Polymeric Regions

Case No.: 57190US002

Attachments: Communication After Notice of Allowance (1 page) and PTO Form-1449 (1 page)

PAIDC

QUERY CONTROL FORM				RTIS USE ONLY	
Application No.	10/012,698	Prepared by	NH	Tracking Number	05931009
Examiner-GAU	Morris - 1771	Date	4-23-4	Week Date	04/05/04
		No. of queries	1	IFW	

JACKET			
a. Serial No.	f. Foreign Priority	k. Print Claim(s)	p. PTO-1449
b. Applicant(s)	g. Disclaimer	l. Print Fig.	q. PTOL-85b
c. Continuing Data	h. Microfiche Appendix	m. Searched Column	r. Abstract
d. PCT	i. Title	n. PTO-270/328	s. Sheets/Figs
e. Domestic Priority	j. Claims Allowed	o. PTO-892	t. Other

SPECIFICATION

a. Page Missing
b. Text Continuity
c. Holes through Data
d. Other Missing Text
e. Illegible Text
f. Duplicate Text
g. Brief Description
h. Sequence Listing
i. Appendix
j. Amendments
k. Other

CLAIMS

a. Claim(s) Missing
b. Improper Dependency
c. Duplicate Numbers
d. Incorrect Numbering
e. Index Disagrees
f. Punctuation
g. Amendments
h. Bracketing
i. Missing Text
j. Duplicate Text
k. Other

MESSAGE

PTO-1449: Please either initial or line through citations. Copy provided for reference.

Thank you

initials NH

RESPONSE

initials

E-5 (Rev. 10/01/02)

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088220 A1	05/08/03	Molander et al.			
		2003/0111166 A1	06/19/03	Uitenbroek et al.			
		2003/0091807 A1	05/15/03	Desai et al.			
		5,230,851	07/27/93	Thomas			

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		1117251	May 1956	France (English Language Translation Included)			X	

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		NONE

EXAMINER	Date Considered

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PAIDC

QUERY CONTROL FORM				RTIS USE ONLY	
Application No.	10/012,698	Prepared by	NH	Tracking Number	05931009
Examiner-GAU	Morris - 1771	Date	4-23-4	Week Date	04/05/04
		No. of queries	1	IFW	

JACKET			
a. Serial No.	f. Foreign Priority	k. Print Claim(s)	p. PTO-1449
b. Applicant(s)	g. Disclaimer	l. Print Fig.	q. PTOL-85b
c. Continuing Data	h. Microfiche Appendix	m. Searched Column	r. Abstract
d. PCT	i. Title	n. PTO-270/328	s. Sheets/Figs
e. Domestic Priority	j. Claims Allowed	o. PTO-892	t. Other

SPECIFICATION

a. Page Missing
b. Text Continuity
c. Holes through Data
d. Other Missing Text
e. Illegible Text
f. Duplicate Text
g. Brief Description
h. Sequence Listing
i. Appendix
j. Amendments
k. Other

CLAIMS

a. Claim(s) Missing
b. Improper Dependency
c. Duplicate Numbers
d. Incorrect Numbering
e. Index Disagrees
f. Punctuation
g. Amendments
h. Bracketing
i. Missing Text
j. Duplicate Text
k. Other

MESSAGE

PTO-1449: Please either initial or line through citations. Copy provided for reference.

initials NH

RESPONSE

initials

E-5 (Rev. 10/01/02)

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
		2003/0088228 A1	05/08/03	Desai et al.			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
		None						

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
		None

EXAMINER	Date Considered
	02/18/04

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

7590 03/17/2004

Attn: William J. Bond
3M Innovative Properties Company
Office of Intellectual Property Counsel
P.O. Box 33427
St. Paul, MN 55133-3427

OIPE JC1/80 JUN 15 2004 PATENT & TRADEMARK OFFICE

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

Cheryl L. Schmitz	(Depositor's name)
Cheryl L. Schmitz	(Signature)
June 9, 2004	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/012,698	11/05/2001	Bradley W. Eaton	57190US002	9494

TITLE OF INVENTION: COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$300	$1630	06/17/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
SALVATORE, LYNDA	1771	442-066000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Gary L. Griswold
2 Kevin W. Raasch
3 William J. Bond

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

3M Innovative Properties Company St. Paul, MN U.S.A.

Please check the appropriate assignee category or categories (will not be printed on the patent); ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

☒ Issue Fee
☒ Publication Fee
☒ Advance Order - # of Copies 5

4b. Payment of Fee(s):

☐ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 13-3723 (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

William J. Bond, Reg. No. 32,400 6/9/04

NOTE; The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

06/17/2004 ZJUHAR2 00000105 133723 10012698

01 FC:1501 1330.00 DA
02 FC:1504 300.00 DA
03 FC:8001 15.00 DA

TRANSMIT THIS FORM WITH FEE(S)

PRINTER RUSH
(PTO ASSISTANCE)

IFW

Application :	10/012698	**Examiner :**	Morris	**GAU :**	1771
From:	LAS	**Location:**	(IDC) FMF FDC	**Date:**	12/28/04

Tracking #: 5931009 Week Date: 4/5/04

DOC CODE	DOC DATE	MISCELLANEOUS
☐ 1449		☐ Continuing Data
☑ IDS	9-4-2003	☐ Foreign Priority
☐ CLM		☐ Document Legibility
☐ IIFW		☐ Fees
☐ SRFW		☐ Other
☐ DRW		
☐ OATH		
☐ 312		
☐ SPEC		

[RUSH] **MESSAGE:**

Please initial / line through the citations.

Thanks you

[XRUSH] **RESPONSE:**

INITIALS:

NOTE: This form will be included as part of the official USPTO record, with the Response document coded as XRUSH.

REV 10/04

PRINTER RUSH
(PTO ASSISTANCE)

IFW

Application :	10/012698	**Examiner :**	Morris	**GAU :**	1771
From:	LAS	**Location:**	(IDC) FMF FDC	**Date:**	12/28/04
		Tracking #:	5931009	**Week Date:**	4/5/04

DOC CODE	DOC DATE	MISCELLANEOUS
☐ 1449		☐ Continuing Data
☑ IDS	9-4-2003	☐ Foreign Priority
☐ CLM		☐ Document Legibility
☐ IIFW		☐ Fees
☐ SRFW		☐ Other
☐ DRW		
☐ OATH		
☐ 312		
☐ SPEC		

[RUSH] **MESSAGE:** Please initial / line through the citations.

Thank you

[XRUSH] **RESPONSE:** OK -

INITIALS:

NOTE: This form will be included as part of the official USPTO record, with the Response document coded as XRUSH.

REV 10/04

INFORMATION DISCLOSURE STATEMENT	Atty. Docket No.: 57190US002	Serial No.: 10/012,698
	Applicant(s): Eaton et al.	Confirmation No.: 9494
	Filing Date: 5 November 2001	Group: 1771

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
JA		2003/0088220 A1	05/08/03	Molander et al.			
		2003/0111166 A1	06/19/03	Uitenbroek et al.			
		2003/0091807 A1	05/15/03	Desai et al.			
		5,230,851	07/27/93	Thomas			

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
JA		1117251	May 1956	France (English Language Translation Included)			X	

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

Examiner Initial		Document Description
JA		NONE

EXAMINER	Date Considered
	01/31/05

*Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

10/012698

CJC

Patent
Case No.: 57190US002

32692
Customer Number

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	EATON, BRADLEY W.		
Patent No.:	6875710	Group Art Unit:	1771
Dated:	April 5, 2005	Examiner:	L. Salvatore
Title:	COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS		

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 CFR § 1.322

Attn: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being: deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Oct. 20, 2005 — Carrie M. Arcand
Date — Signed by: Carrie M. Arcand

Dear Sir:

It is respectfully requested that a Certificate of Correction be issued in connection with the above-identified patent. The required text is submitted on the attached form.

Certificate
OCT 26 2005
of Correction

Because the listed errors first occurred in the printed patent, and are not due to Applicant's mistake, no fee is required in connection with this Certificate of Correction.

Enclosed are copies of 3 pages of 1449 forms and a copy of the return postcard acknowledging receipt of an Information Disclosure Statement with these 3 pages of 1449 forms by the USPTO on April 12, 2002. One of these forms (Page 1 of 3) was not initialed and returned. The other two pages (Page 2 of 3 and Page 3 or 3) were subsequently initialed and dated by the Examiner. This paperwork substantiates that the references listed on the attached Certificate of Correction were received by the USPTO and thus should have been considered by the Examiner and those initialed should appear on the printed patent. Also enclosed is another 1449 form which had been initialed by the Examiner but the references have been omitted from the printed patent. Accordingly, the error of omitting the references on the printed patent is

OCT 27 2005

attributed solely to the USPTO. The Applicant requests that the 1449 Form (pg. 1 of 3) be signed and dated by the Examiner.

Respectfully submitted,

10/20/05
Date

By: _____
William J. Bond, Reg. No.: 32,400
Telephone No.: 651-736-4790

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

Staple Here Only! | Printer's Trim Line

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.: 6875710

DATED: April 5, 2005

FIRST NAMED INVENTOR: EATON, BRADLEY W.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,

References Cited, under U.S. Patent Documents, please add:

2,170,560	8/1939	Hayes
2,787,244	4/1957	Hicken
3,276,944	10/1966	Levy
3,338,992	8/1967	Kinney
3,341,394	9/1967	Kinney
3,502,538	3/1970	Peterson
3,502,763	3/1970	Hartman
3,542,614	11/1970	Dobo et al.
3,692,618	9/1972	Dorschner et al.
3,694,867	10/1972	Stumpf
3,814,052	6/1974	Caratsch
4,223,059	9/1980	Schwarz
4,340,563	7/1982	Appel et al.
4,343,260	8/1982	Yajima et al.
4,643,130	2/1987	Sheath et al.
4,732,800	3/1988	Groshens
4,906,492	3/1990	Groshens
4,965,122	10/1990	Morman
4,981,747	1/1991	Morman
4,984,339	1/1991	Provost et al.
5,019,071	5/1991	Bany et al.
5,028,646	7/1991	Miller et al.
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5,116,662	5/1992	Morman

MAILING ADDRESS OF SENDER:

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.: 6875710

DATED: April 5, 2005

FIRST NAMED INVENTOR: EATON, BRADLEY W.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

5,167,897	12/1992	Weber
5,226,992	7/1993	Morman
5,260,015	11/1993	Kennedy et al.
5,300,057	4/1994	Miller et al.
5,326,415	7/1994	Thomas et al.
5,385,706	1/1995	Thomas
5,389,438	2/1995	Miller et al.
5,399,219	3/1995	Roessler et al.
5,441,687	8/1995	Murasaki et al.
5,454,801	10/1995	Lauritzen
5,470,424	11/1995	Isaac et al.
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5,868,987	2/1999	Kampfer et al.
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5,948,707	9/1999	Crawley
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6,054,091	4/2000	Miller et al.
6,093,665	7/2000	Sayovitz et al.
6,132,411	10/2000	Huber et al.
6,132,660	10/2000	Kampfer

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DATED: April 5, 2005

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6,190,594 B1	2/2001	Gorman et al.
6,255,236 B1	7/2001	Cree et al.
6,261,278 B1	7/2001	Chen et al.
6,287,665 B1	9/2001	Hammer

Title page,

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FR	2184741	12/1973
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WO	WO 00/20200 A1	4/2000
WO	WO 00/50229 A1	8/2000
WO	WO 01/68019 A1	9/2001
WO	WO 01/71080 A1	9/2001

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CERTIFICATE OF CORRECTION

PATENT NO. : 6,875,710 B2
DATED : April 5, 2005
INVENTOR(S) : Eaton, Bradley W.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,

Item [56], **References Cited**, U.S. PATENT DOCUMENTS, please add:

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5,114,781	5/1992	Morman
5,116,563	5/1992	Thomas et al.
5,116,662	5/1992	Morman
5,167,897	12/1992	Weber
5,226,992	7/1993	Morman
5,260,015	11/1993	Kennedy et al.
5,300,057	4/1994	Miller et al.
5,326,415	7/1994	Thomas et al.
5,385,706	1/1995	Thomas
5,389,438	2/1995	Miller et al.
5,399,219	3/1995	Roessler et al.
5,441,687	8/1995	Murasaki et al.
5,454,801	10/1995	Lauritzen
5,470,424	11/1995	Isaac et al.
5,490,457	2/1996	Boulanger et al.
5,501,679	3/1996	Krueger et al.

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CERTIFICATE OF CORRECTION

PATENT NO. : 6,875,710 B2
DATED : April 5, 2005
INVENTOR(S) : Eaton, Bradley W.

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Title page, (cont'd),

5,578,344	11/1996	Ahr et al.
5,679,302	10/1997	Miller et al.
5,685,758	11/1997	Paul et al.
5,685,873	11/1997	Bruemmer
5,705,013	1/1998	Nease et al.
5,755,015	5/1998	Akeno et al.
5,792,411	8/1998	Morris et al.
5,827,579	10/1998	Groshens
5,868,987	2/1999	Kampfer et al.
5,916,207	6/1999	Toyoda
5,948,707	9/1999	Crawley
6,039,911	3/2000	Miller et al.
6,054,091	4/2000	Miller et al.
6,093,665	7/2000	Sayovitz et al.
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6,132,660	10/2000	Kampfer
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6,261,278 B1	7/2001	Chen et al.
6,287,665 B1	9/2001	Hammer --.

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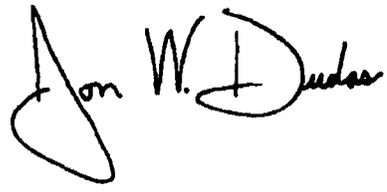
-- FR	2184741	12/1973
WO	WO 96/10481 A1	4/1996
WO	WO 00/20200 A1	4/2000
WO	WO 00/50229 A1	8/2000
WO	WO 01/68019 A1	9/2001
WO	WO 01/71080 A1	9/2001 --.

Signed and Sealed this

Sixth Day of December, 2005



JON W. DUDAS
Director of the United States Patent and Trademark Office

US006875710B2

(12) **United States Patent**
Eaton et al.

(10) **Patent No.: US 6,875,710 B2**
(45) **Date of Patent: Apr. 5, 2005**

(54) **COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS**

(75) Inventors: **Bradley W. Eaton**, Woodbury, MN (US); **Byron M. Jackson**, Forest Lake, MN (US); **Leigh E. Wood**, Woodbury, MN (US); **Scott J. Tuman**, Woodbury, MN (US)

(73) Assignee: **3M Innovative Properties Company**, St. Paul, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 320 days.

(21) Appl. No.: **10/012,698**

(22) Filed: **Nov. 5, 2001**

(65) **Prior Publication Data**

US 2003/0087098 A1 May 8, 2003

(51) **Int. Cl.**[7] **B32B 27/04**; B32B 27/12; B32B 3/06; B32B 3/10; B32B 3/28

(52) **U.S. Cl.** **442/66**; 428/134; 428/136; 428/137; 428/100; 428/141; 428/167

(58) **Field of Search** 442/66; 428/134, 428/136, 137, 141, 100, 167

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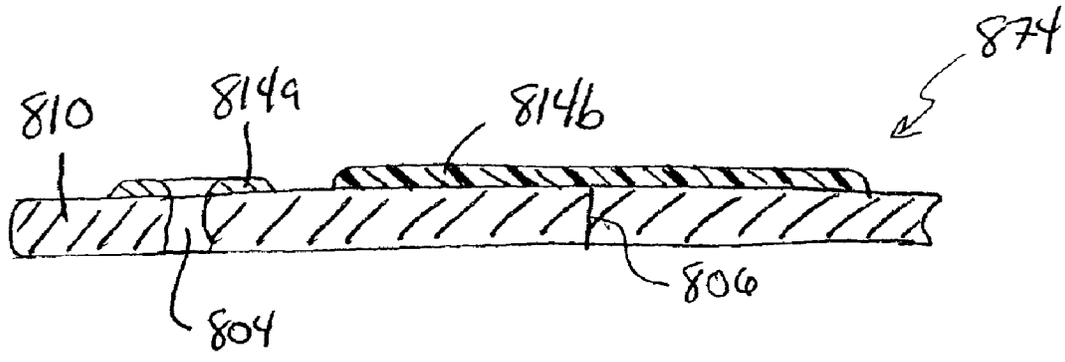
Primary Examiner—Terrel Morris
Assistant Examiner—Lynda Salvatore
(74) *Attorney, Agent, or Firm*—Gary L. Griswold; Kevin W. Raasch; William J. Bond

(57) **ABSTRACT**

Methods of manufacturing composite webs including a substrate with one or more reinforcing discrete polymeric regions located on or within the composite web are disclosed. Molten nonelastomeric thermoplastic material of the discrete polymeric region is forced against the substrate by a transfer roll. If the substrate is porous, fibrous, etc., a portion of the nonelastomeric thermoplastic composition may infiltrate the substrate and/or encapsulate fibers of the substrate. The composite webs also include elastomeric thermoplastic material in discrete polymeric regions on or within the composite web.

16 Claims, 14 Drawing Sheets



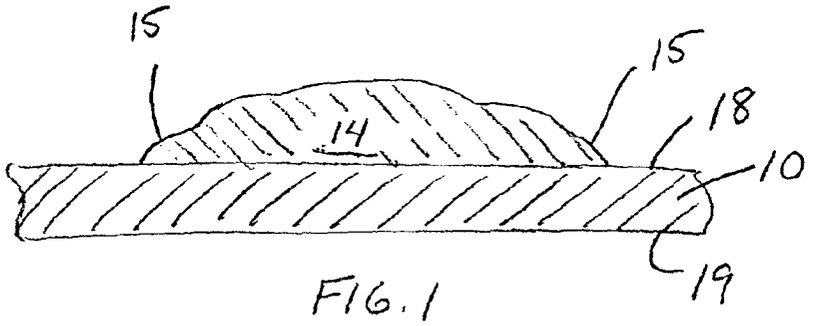


FIG. 1

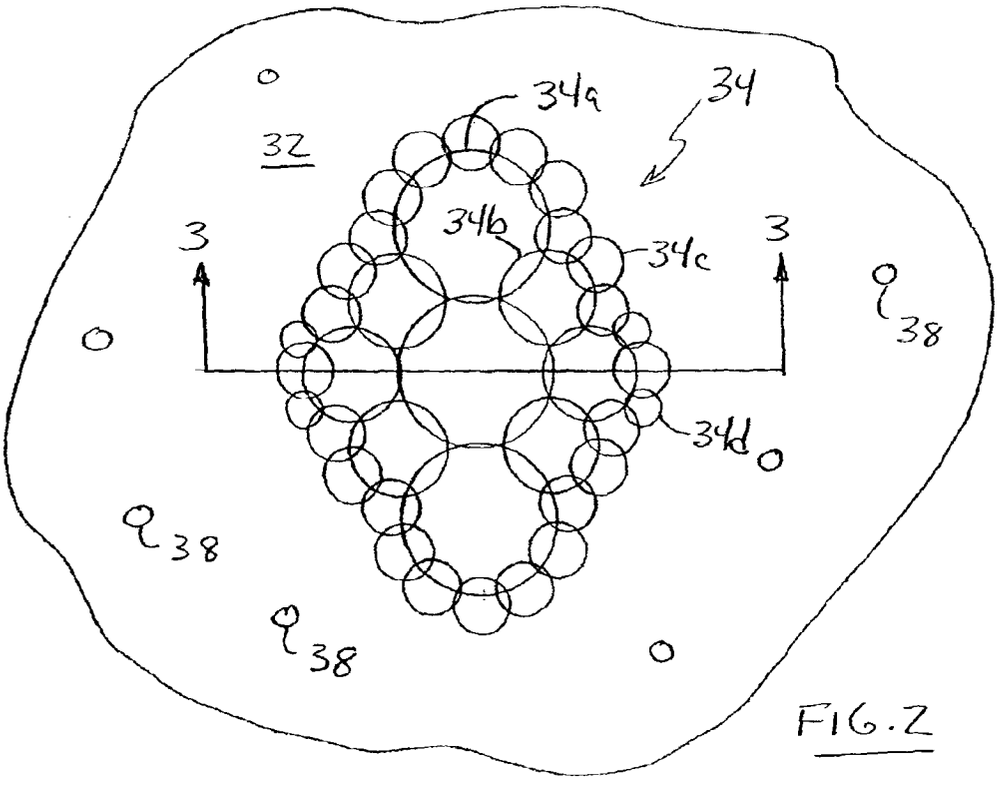


FIG. 2

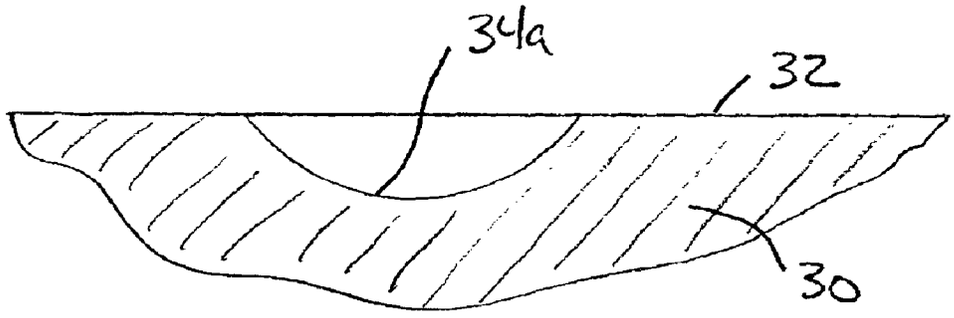


FIG. 3A

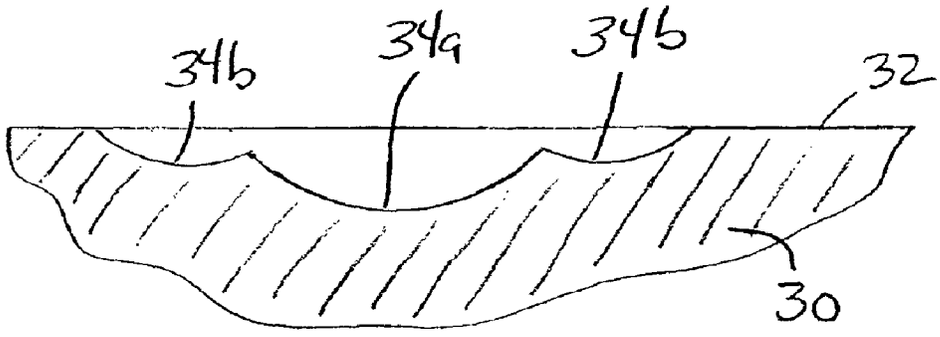


FIG. 3B

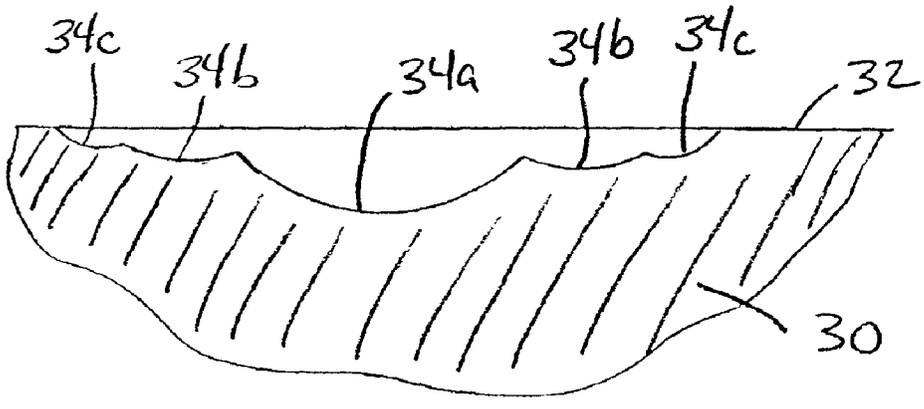


FIG. 3C

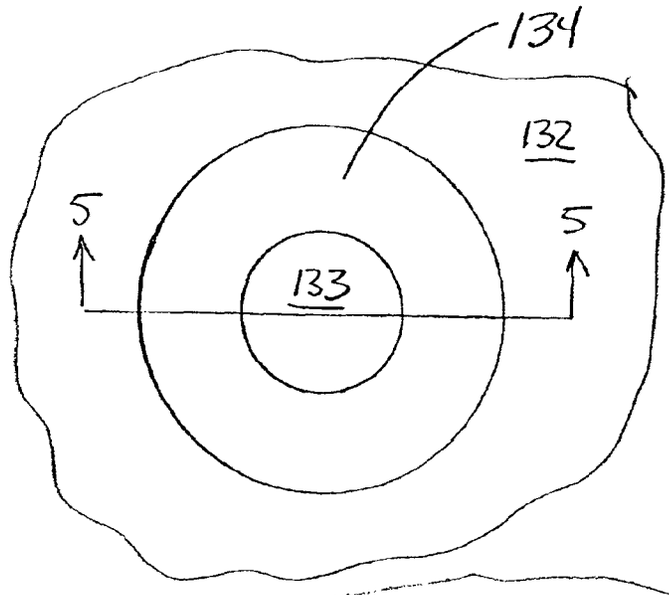


FIG. 4

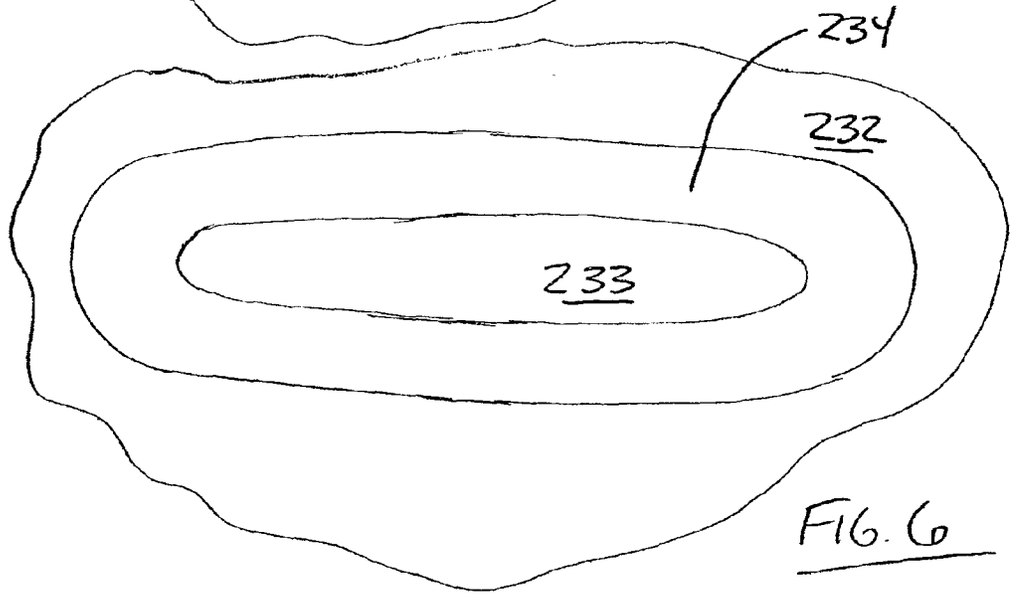


FIG. 6

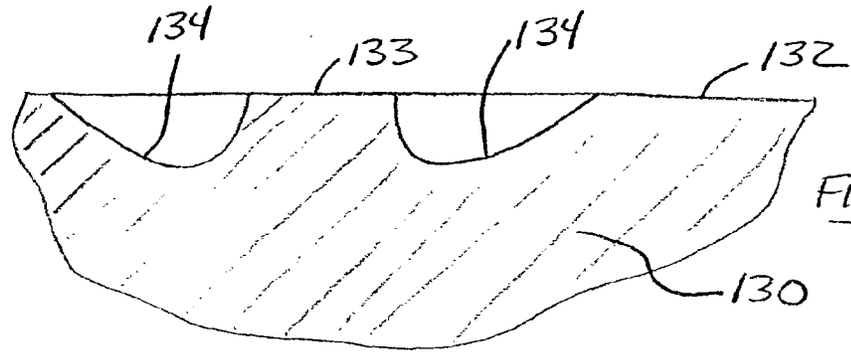


FIG. 5

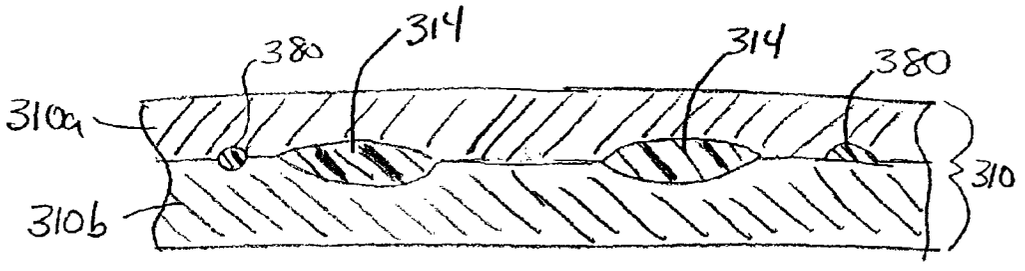


FIG. 7

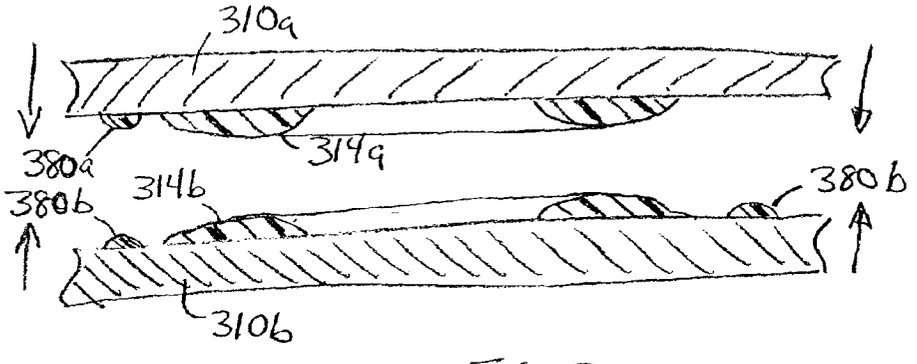


FIG. 8

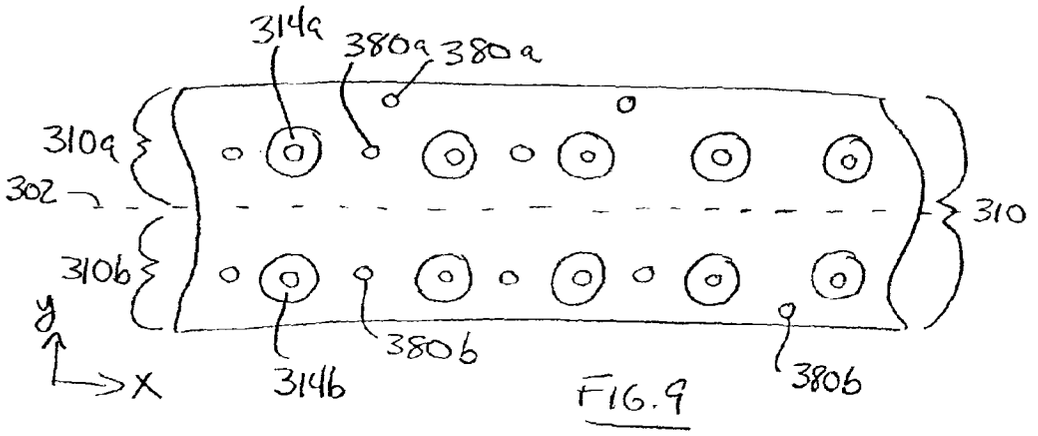


FIG. 9

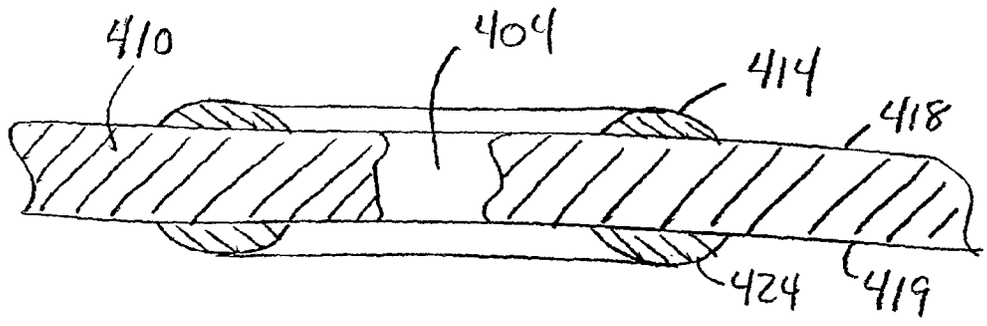


FIG. 10

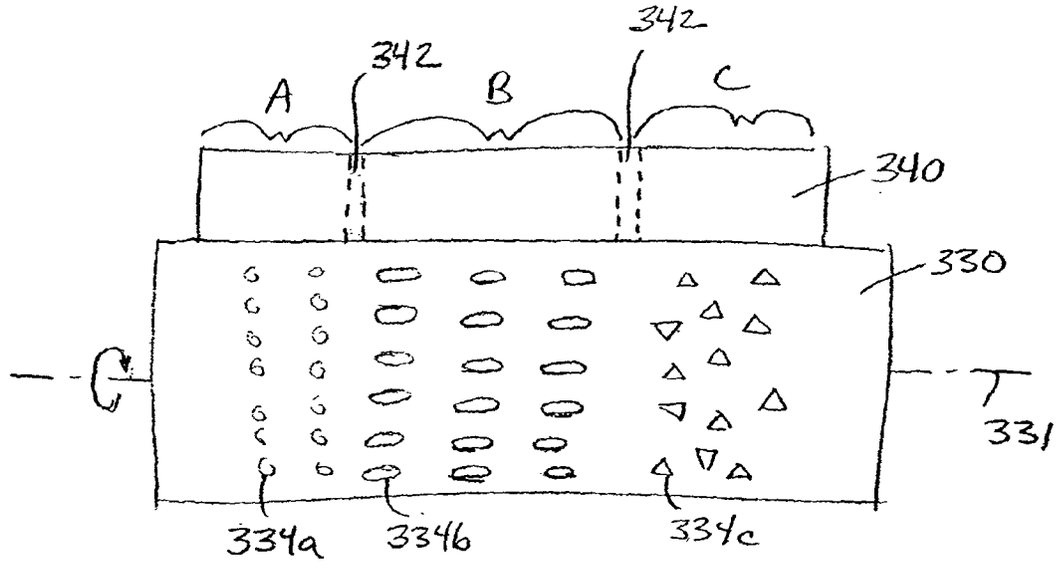


FIG. 12

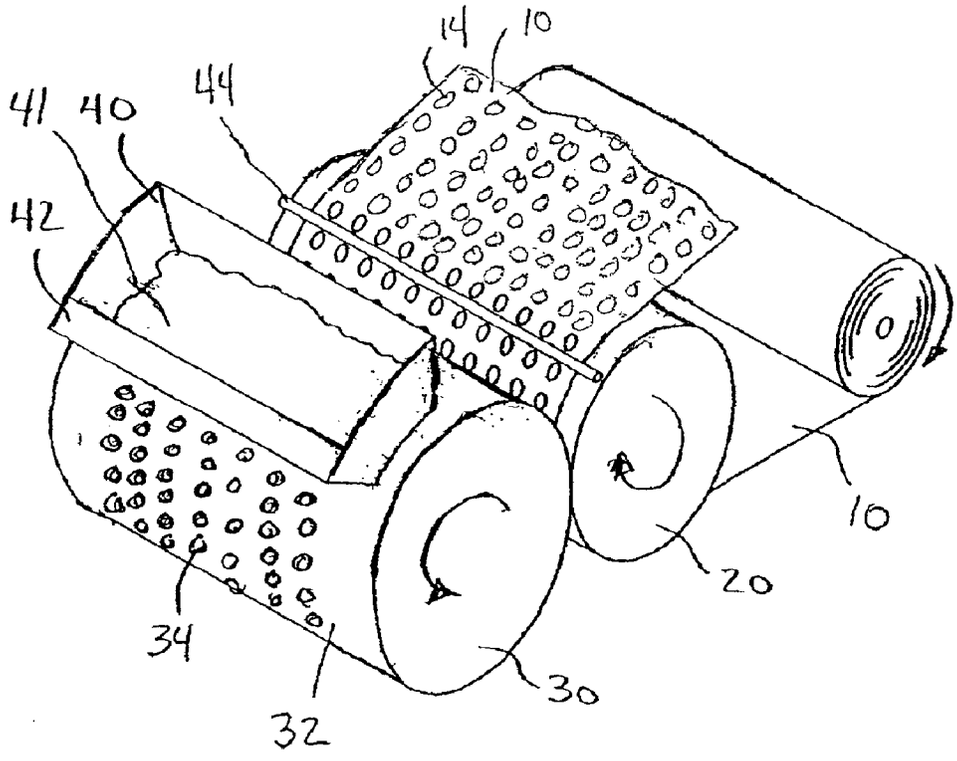


FIG. 11

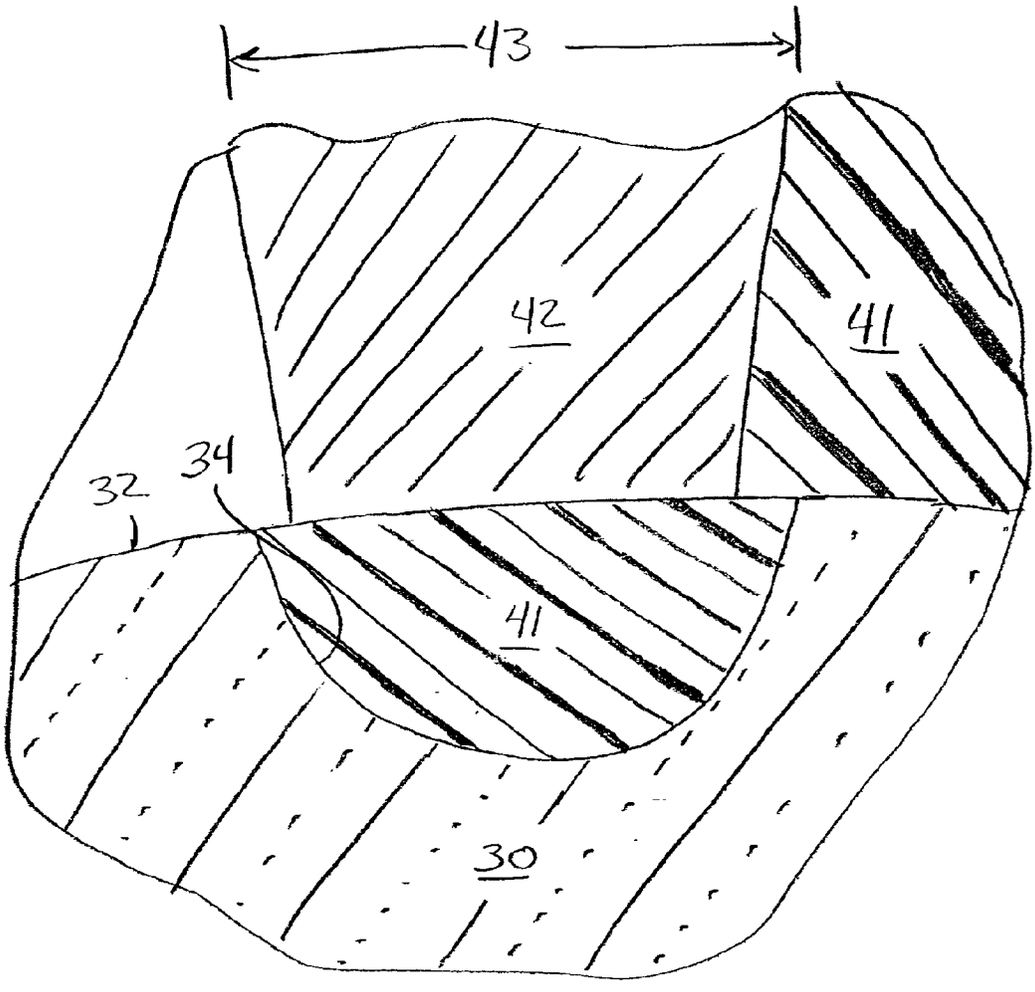


FIG. 11A

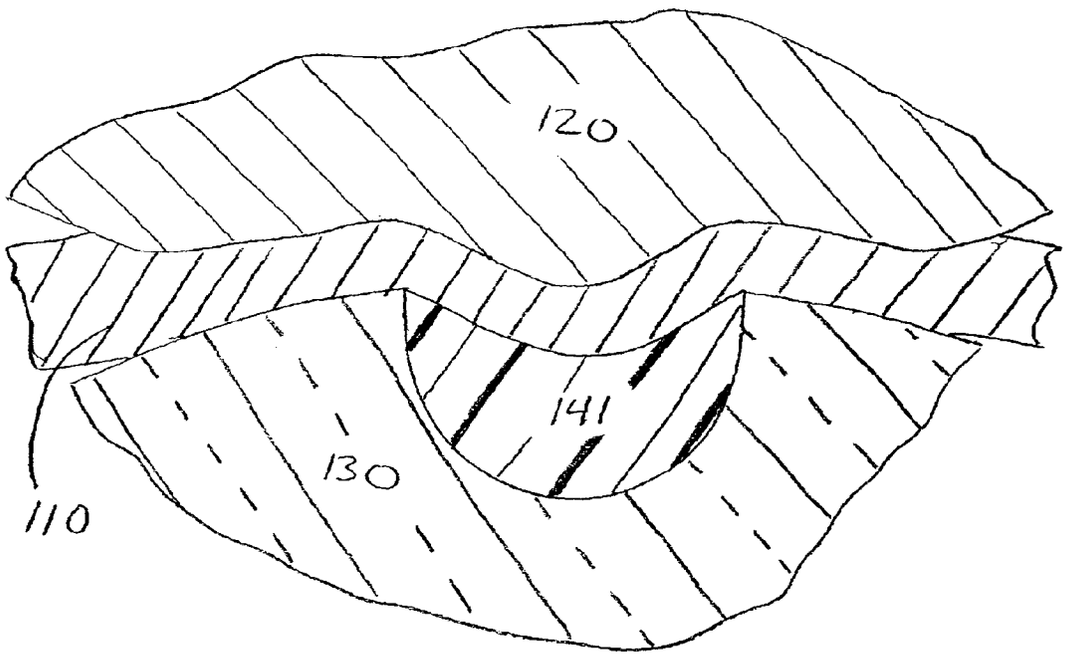


FIG. 11B

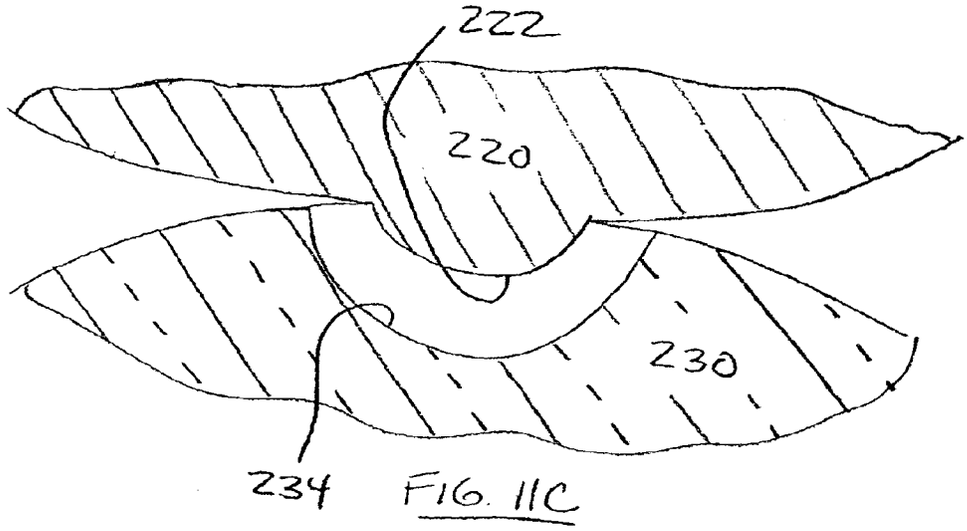
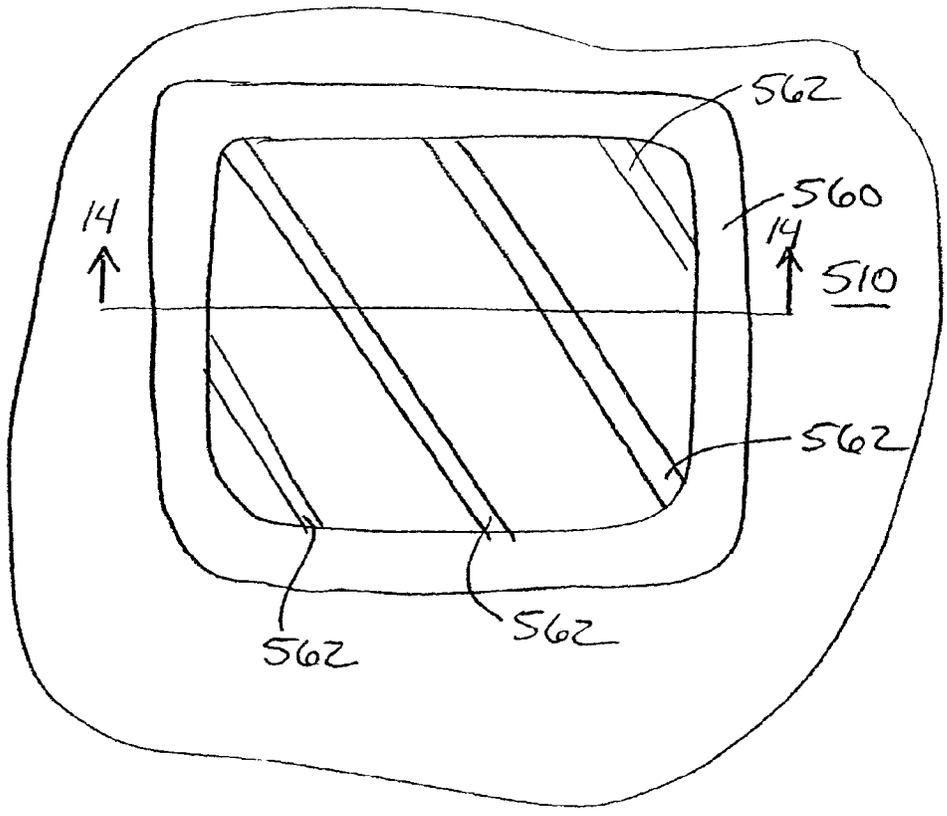


FIG. 11C



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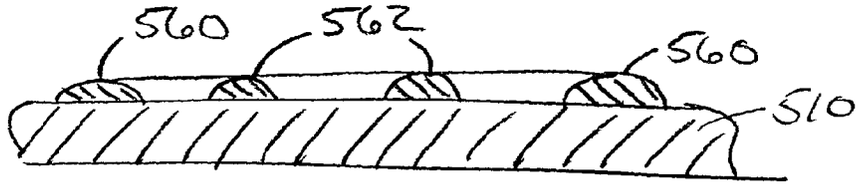

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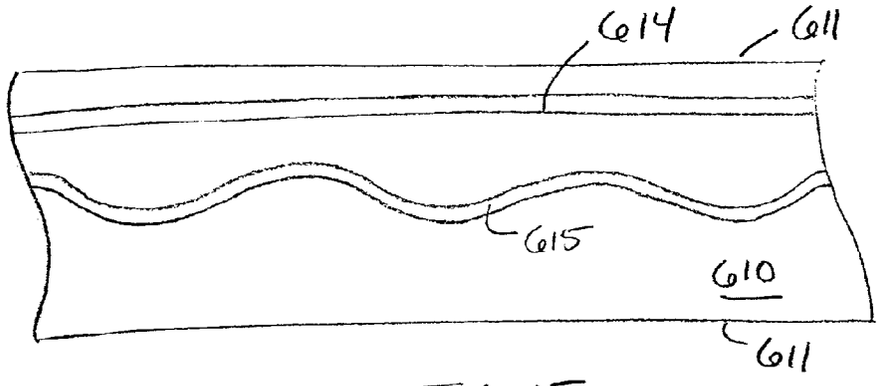


FIG. 15

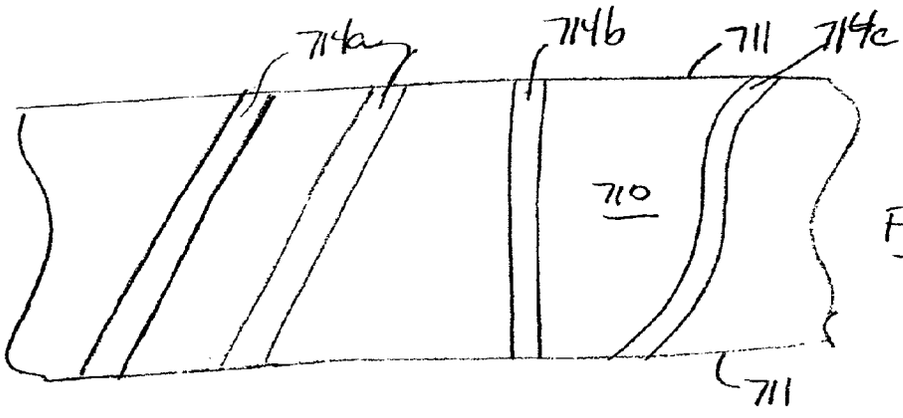
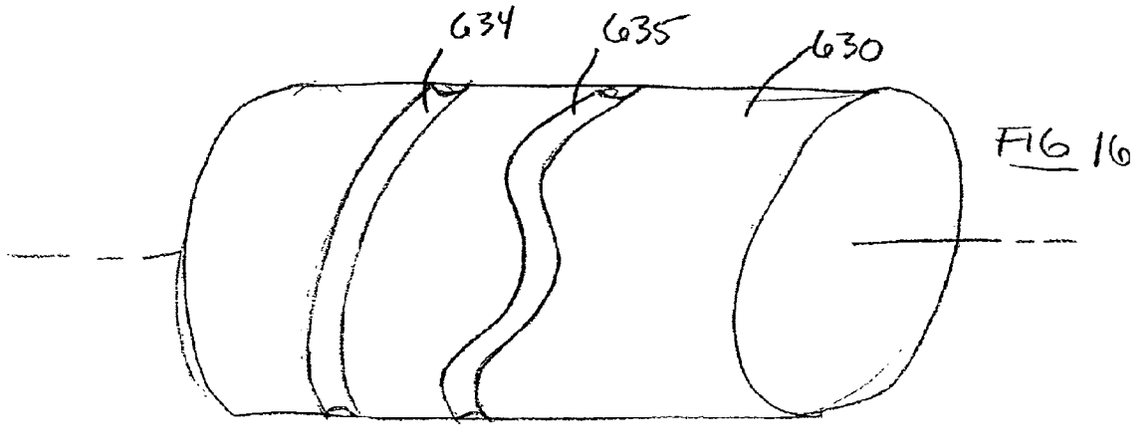


FIG. 17



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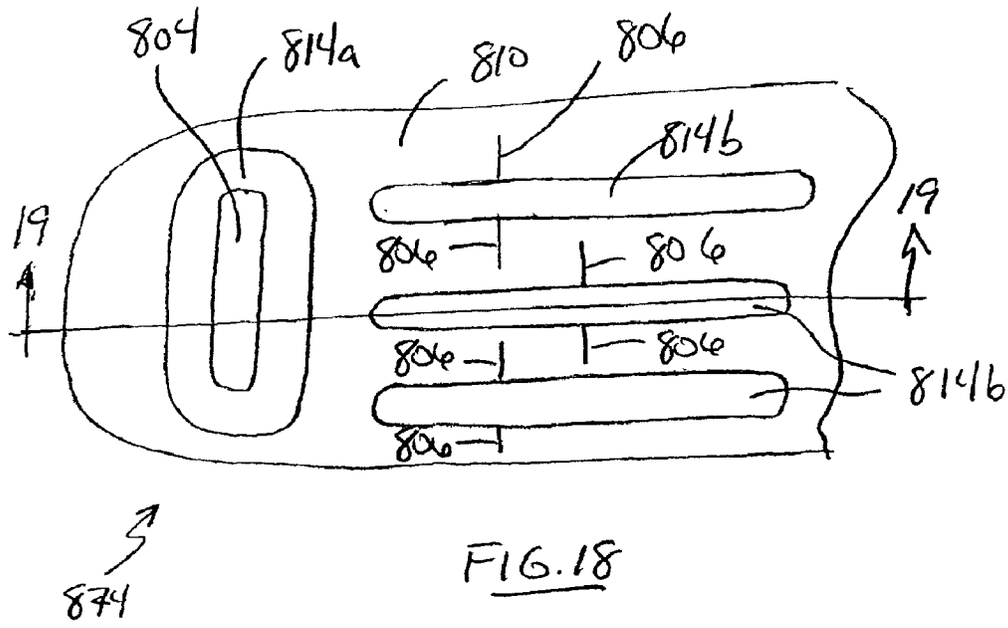
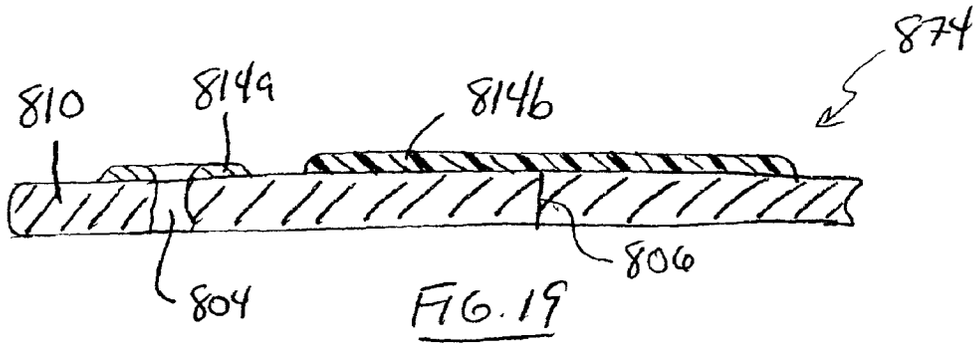


FIG. 18



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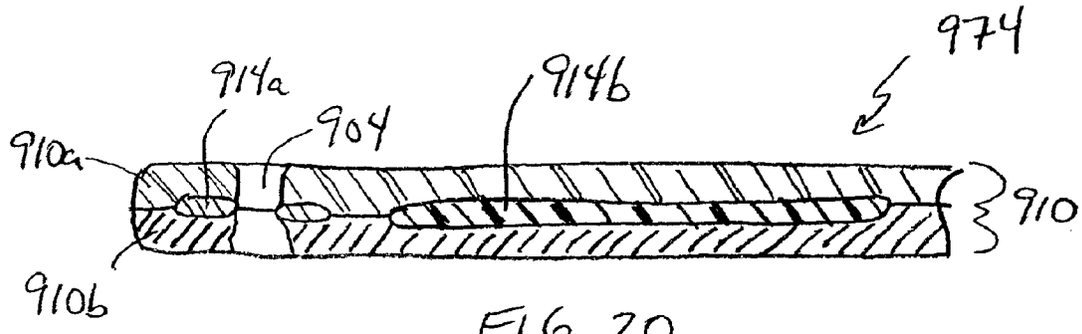

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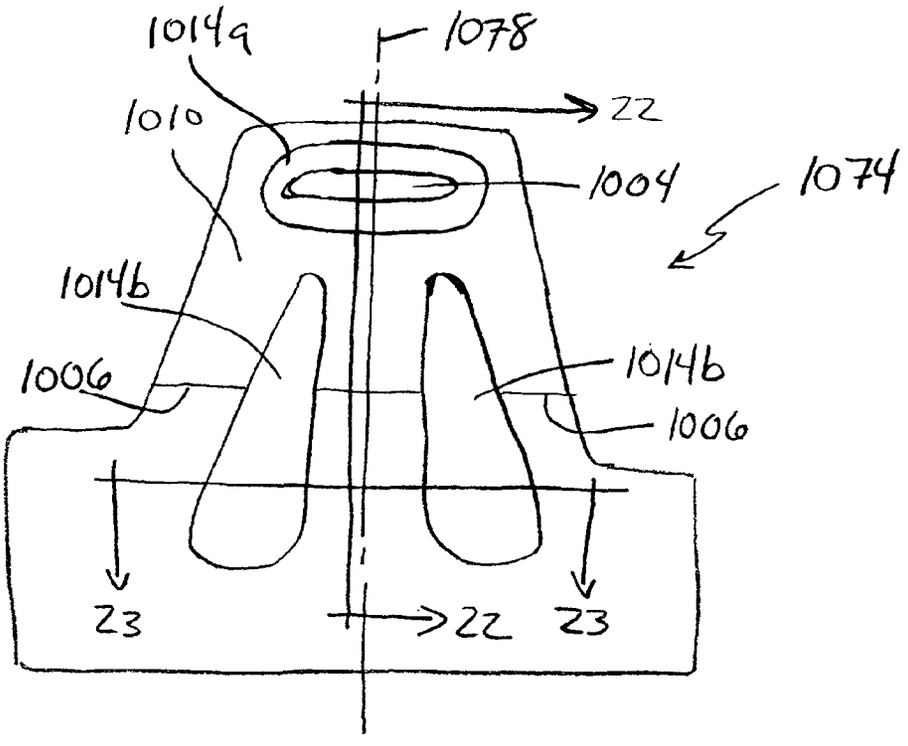

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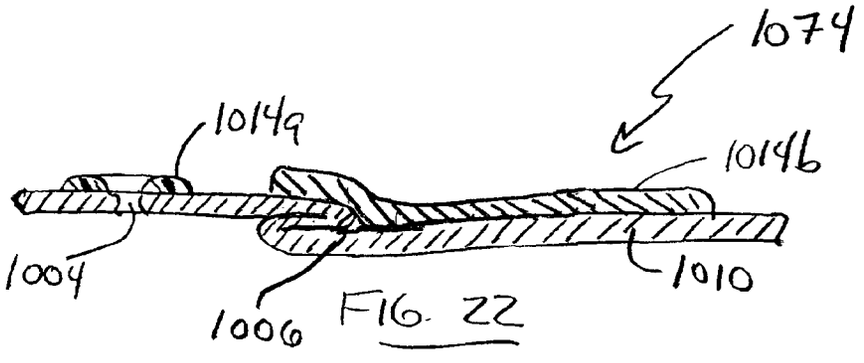

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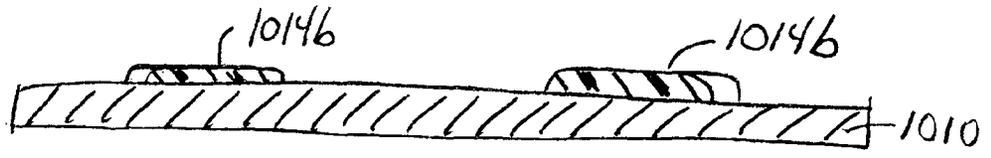

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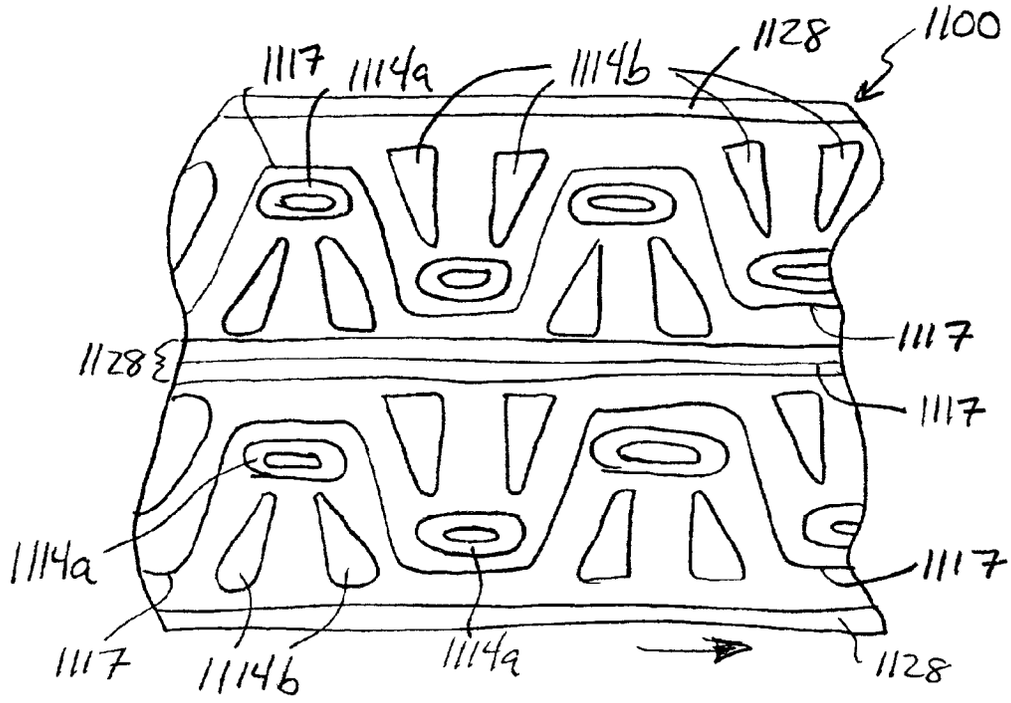
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FIG. 24

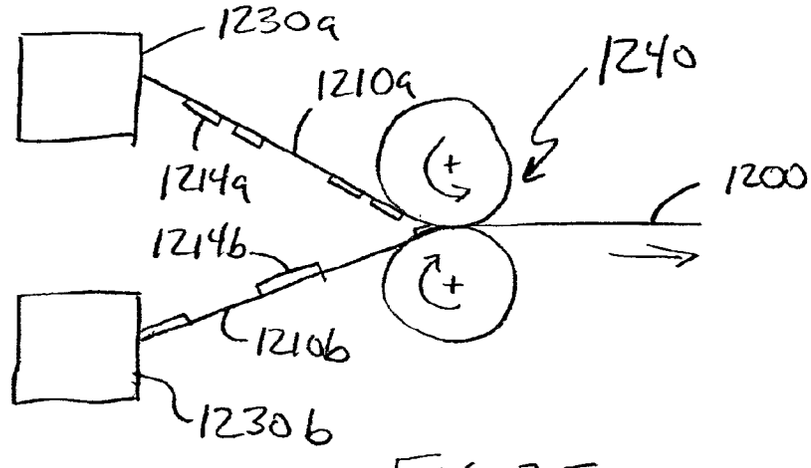
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FIG. 25

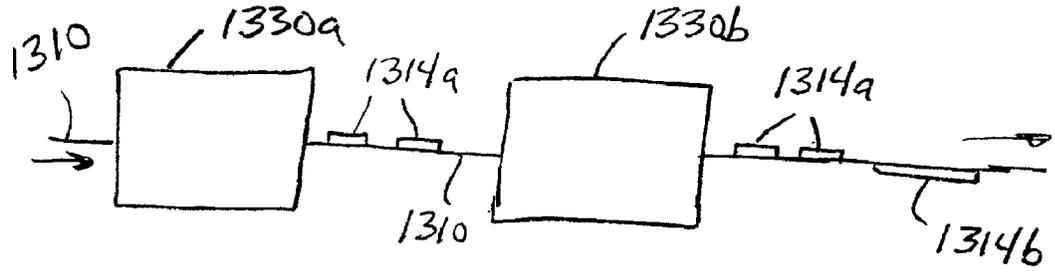

FIG. 26

COMPOSITE WEBS WITH REINFORCING POLYMERIC REGIONS AND ELASTIC POLYMERIC REGIONS

FIELD OF THE INVENTION

The present invention relates to composite webs that include reinforcing discrete polymeric regions and elastic discrete polymeric regions.

BACKGROUND

The manufacture of articles formed of webs that require some reinforcement to withstand forces experienced during use are known. In many cases, reinforcement is simply provided over the entire substrate or web. Such approaches can, however, add cost and weight to the web, as well as stiffness over the entire surface of the web—even in those areas that do not require reinforcement. Furthermore, reinforcing layers that are coextensive with the web may also reduce its breathability.

To address some of these issues, smaller pieces of reinforcing materials may be attached to a web or substrate in selected areas that require reinforcement. The handling and attachment of such discrete pieces can, however, be problematic, by potentially reducing throughput, causing waste (where the discrete pieces are not securely attached), requiring precise registration or location on the web, requiring the use of adhesives or other bonding agents, etc. The discrete pieces may also present relatively sharp that may be the source of irritation or discomfort. The irritation or discomfort can be exacerbated because the reinforcing pieces are typically located on the surface of the substrate.

In addition to reinforcing substrates or webs, it may also be desirable to manufacture articles that exhibit elasticity in addition to reinforcing regions. The manufacture of articles that exhibit elasticity, i.e., the ability to at least partially recover their original shape after moderate elongation, may be desired for a number of reasons. For example, elasticity may be useful in connection with fastening systems for items such as garments (e.g., diapers, training pants, gowns, etc.). Elasticity in garments can provide what may be referred to as dynamic fit, i.e., the ability to stretch and recover in response to movement by the wearer.

Elasticity may also be useful in connection with other applications. For example, some fasteners may provide more consistent attachment if the fastener is held in tension that can be supplied by stretching the fastener and relying on the recovery forces to provide the desired tension. In other instances, elasticity may allow for easy adjustment of the size or length of a fastener or other article.

Although elasticity may be beneficial in a variety of different applications, it may raise issues in manufacturing. Many attempts to provide elasticity rely on separate elastic components that are, e.g., glued or sewn to a backing or other nonelastic member to provide the desired elasticity. The manufacture of such composite articles may be problematic in that secure attachment of the elastic components may be difficult to achieve and/or maintain. Further, the cost and difficulty of providing and attaching separate elastic components may be relatively high. The handling and attachment of separate elastic components can reduce throughput, cause additional waste (where the separate components are not securely attached), etc.

In other instances, an entire article may be constructed to provide the desired elasticity. For example, many elastic fastening systems rely on the use of elastic laminate backings in which the elastic materials are provided in the form of a film that is coextensive with the backing. Such an approach may add costs associated with providing a coextensive elastic layer or layers. Further, many elastic materials are not breathable. If the elastic laminate backings are to be used in garments, it may be desirable to perforate the backing to improve its breathability. Such additional processing does, however, add to the cost of producing the elastic laminate backing. Another potential disadvantage of elastic laminate backings is that it may be difficult to provide any variability in the elastic recovery forces generated in different portions of the backing.

SUMMARY OF THE INVENTION

The present invention provides methods of manufacturing composite webs including a substrate with one or more reinforcing discrete polymeric regions located on or within the composite web and one or more discrete elastic polymeric regions located on or within the composite web.

One advantage of the methods of the present invention is the ability to transfer one or more discrete polymeric regions onto a major surface of a substrate, where the thermoplastic material of the discrete polymeric region can be forced against the substrate by a transfer roll. If the substrate is porous, fibrous, etc., pressure may enhance attachment of the discrete polymeric regions to the substrates by forcing a portion of the thermoplastic composition to infiltrate the substrate and/or encapsulate fibers of the substrate.

Another advantage is the ability to control the shape, spacing, and volume of the discrete polymeric regions. This may be particularly advantageous because these parameters (shape, spacing, and volume) can be fixed regardless of the line speed of the system.

Another advantage of the present invention may be found in the composite depressions and their use, which may improve the formation of reinforcing discrete polymeric regions in accordance with the present invention. The composite depressions may, e.g., improve the transfer of relatively large discrete polymeric regions onto the substrates as well as the transfer of discrete polymeric regions that have a varying thickness.

Another advantage of the methods of the present invention is the ability to provide one or more discrete polymeric regions that extend for the length of the substrate (while not being formed over the width of the substrate, i.e., the discrete polymeric regions are not coextensive with the major surface of the substrate).

Another advantage of the methods of the present invention is the ability to provide different thermoplastic compositions across the width of the substrate, such that some discrete polymeric regions may be formed of one thermoplastic composition, while other discrete polymeric regions are formed of a different thermoplastic composition.

Yet another advantage of the methods of the present invention is the ability to provide one or more discrete polymeric regions on both major surfaces of a substrate. The discrete polymeric regions on the opposing major surfaces may be formed with the same or different features as desired.

In one aspect, the present invention provides an elastic article including a substrate with first and second major surfaces; one or more reinforcing discrete polymeric regions attached to the substrate, wherein each reinforcing discrete polymeric region of the one or more reinforcing discrete polymeric regions is formed of a nonelastomeric thermoplastic composition that infiltrates a portion of substrate; and

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements includes an elastic discrete polymeric region formed of an elastomeric thermoplastic composition that infiltrates a portion of the substrate.

In another aspect, the present invention provides a method for producing a composite web by providing a first substrate having a first major surface and a second major surface, wherein a plurality of discrete elastomeric polymeric regions formed of an elastomeric thermoplastic composition are located on the first major surface of the first substrate, wherein each discrete elastomeric polymeric region of the plurality of discrete elastomeric polymeric regions infiltrates the first major surface of the first substrate. The method further includes providing a second substrate having a first major surface and a second major surface, a plurality of discrete nonelastomeric polymeric regions formed of a nonelastomeric thermoplastic composition located on the first major surface of the second substrate, wherein each discrete nonelastomeric polymeric region of the plurality of discrete nonelastomeric polymeric regions infiltrates the first major surface of the second substrate; and laminating the first substrate to the second substrate.

In another aspect, the present invention provides a method for producing a composite web by providing a substrate with a first major surface and a second major surface; and forming a plurality of discrete elastomeric polymeric regions formed of an elastomeric thermoplastic composition on the first major surface of the substrate, wherein each discrete elastomeric polymeric region of the plurality of discrete elastomeric polymeric regions infiltrates the first major surface of the substrate. The method further includes forming a plurality of discrete nonelastomeric polymeric regions formed of a nonelastomeric thermoplastic composition located on the first major surface or the second major surface of the substrate, wherein each discrete nonelastomeric polymeric region of the plurality of discrete nonelastomeric polymeric regions infiltrates the second substrate.

In another aspect, the present invention provides a composite web that includes a substrate with first and second major surfaces; a plurality of nonelastomeric discrete polymeric regions attached to the substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions is formed of a nonelastomeric thermoplastic composition that infiltrates a portion of substrate; a plurality of elastomeric discrete polymeric regions attached to the substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions is formed of an elastomeric thermoplastic composition that infiltrates a portion of the substrate; and one or more lines of separation in the substrate. The one or more lines of separation define boundaries of a plurality of distinct articles in the composite web, and wherein each article of the plurality of articles includes at least one nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions and at least one elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions.

These and other features and advantages of methods according to the present invention are described below in connection with various illustrative embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view of one reinforcing discrete polymeric region on a composite web manufactured according to the methods of the present invention.

FIG. **2** is a plan view of a portion of a transfer roll that can be used in manufacturing composite webs according to the methods of the present invention.

FIG. **3**A is a cross-sectional view of the depression of FIG. **2**, taken along line **3**—**3** in FIG. **2** at one point during formation of the depression.

FIG. **3**B is a cross-sectional view of the depression of FIG. **2**, taken along line **3**—**3** in FIG. **2** at another point during formation of the depression.

FIG. **3**C is a cross-sectional view of the depression of FIG. **2**, taken along line **3**—**3** in FIG. **2** during formation of the depression.

FIG. **4** is a plan view of another depression on a portion of a transfer roll that can be used to manufacture reinforcing discrete polymeric regions on a composite web according to the methods of the present invention.

FIG. **5** is a cross-sectional view of the depression of FIG. **4**, taken along line **5**—**5** in FIG. **4**.

FIG. **6** is a plan view of another depression on a portion of a transfer roll that can be used to manufacture reinforcing discrete polymeric regions on a composite web according to the methods of the present invention.

FIG. **7** is a cross-sectional view of a composite web manufactured according to the methods of the present invention including reinforcing discrete polymeric regions between two substrates.

FIG. **8** is a cross-sectional view of the composite web of FIG. **7**, before attachment of the two substrates to form the composite web in accordance with the methods of the present invention.

FIG. **9** is a plan view of one illustrative substrate with reinforcing discrete polymeric regions formed thereon that can be manufactured into a composite web according to the methods of the present invention.

FIG. **10** is a cross-sectional view of another composite web with reinforcing discrete polymeric regions on both major surfaces of a substrate.

FIG. **11** is a perspective view of one polymer transfer process useful in providing discrete polymeric regions on a substrate in accordance with the methods of the present invention.

FIG. **11**A is an enlarged schematic diagram depicting the relationship between a doctor blade and a depression on a transfer roll used in connection with the present invention.

FIG. **11**B is an enlarged partial cross-sectional view depicting a conformable backup roll forcing a substrate against a transfer roll.

FIG. **11**C is an enlarged partial cross-sectional view depicting a mating backup roll including protrusions aligned with depressions in the transfer roll.

FIG. **12** illustrates another transfer roll and polymer source useful in connection with zoned delivery systems and methods.

FIG. **13** is a plan view of one article formed in a composite web by providing reinforcing discrete polymeric regions on a substrate according to the methods of the present invention.

FIG. **14** is a cross-sectional view of the article of FIG. **13** taken along line **14**—**14** in FIG. **13**.

FIG. **15** is a plan view of a portion of one composite web manufactured according to the present invention.

FIG. **16** is a perspective view of one transfer roll that may be used to manufacture the composite web of FIG. **15**.

FIG. **17** is a plan view of a portion of one composite web manufactured according to the present invention that

includes discrete polymeric regions extending across the width of the substrate.

FIG. **18** is a plan view of one article manufactured from a composite web including elastomeric and nonelastomeric discrete polymeric regions.

FIG. **19** is a cross-sectional view of the article of FIG. **18**, taken along line **19—19** in FIG. **18**.

FIG. **20** is a cross-sectional view of an article manufactured from a laminated composite web including elastomeric and nonelastomeric discrete polymeric regions.

FIG. **21** is a plan view of another article manufactured from a composite web including elastomeric and nonelastomeric discrete polymeric regions.

FIG. **22** is a cross-sectional view of the article of FIG. **21**, taken along line **22—22** in FIG. **21**.

FIG. **23** is a cross-sectional view of the article of FIG. **21**, taken along line **23—23** in FIG. **21**.

FIG. **24** is a plan view of one composite web according to the present invention, the composite web including lines of separation formed therein.

FIG. **25** is a schematic diagram of one system and method for manufacturing composite webs according to the present invention.

FIG. **26** is a schematic diagram of another system and method for manufacturing composite webs according to the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS OF THE INVENTION

As discussed above, the present invention provides methods and systems for producing composite webs that include a substrate with reinforcing discrete polymeric regions located on the surface or within the composite web. Various different constructions will now be described to illustrate various embodiments of the composite webs that can be manufactured in accordance with the methods of the present invention. These illustrative constructions should not be considered to limit the methods of the present invention, which is to be limited only by the claims that follow.

FIG. **1** is a cross-sectional view of a portion of one composite web manufactured in accordance with the present invention. The composite web includes a substrate **10** with a first major surface **18** and a second major surface **19**. One or more reinforcing discrete polymeric regions **14** are located on the first major surface **18** of the substrate **10**, it being understood that the substrate may include more than one reinforcing discrete polymeric region as depicted in, e.g., FIGS. **7–12**.

It may be preferred that the reinforcing discrete polymeric regions **14** of composite webs manufactured in accordance with the present invention each include a varying thickness or height above the surface **18** of the substrate **10**. It may be particularly preferred that the thickness variations be provided in the form of a thinner discrete polymeric region proximate the edges **15** of the reinforcing discrete polymeric region **14**.

The combination of thicker central portions of the reinforcing discrete polymeric region **14** and thinner edges **15** may provide advantages. The thinner edges **15** may be more flexible or softer, which may enhance comfort if the composite web including such discrete polymeric regions is incorporated into a garment such as, e.g., a diaper, surgical gown, etc. At the same time, the thicker central portion of the reinforcing discrete polymeric region **14** may provide a desired level of rigidity to the discrete polymeric region.

The reinforcing discrete polymeric regions **14** may cover any desired portion of the surface **18** of the substrate **10** on which they are positioned, although it will be understood that the discrete polymeric regions **14** will not cover all of the surface of the substrate **10**. Some variations in the percentage of surface area occupied by discrete polymeric regions may be as described in, for example, pending U.S. patent application Ser. No. 09/257,447, entitled WEB HAVING DISCRETE STEM REGIONS, filed on Feb. 25, 1999 (published as International Publication No. WO 00/50229).

Further, although the discrete polymeric regions **14** are depicted as being disconnected from each other, it should be understood that some composite webs manufactured with the systems and methods of the present invention may include a relatively thin skin layer of the thermoplastic composition used to form the discrete polymeric regions. Such a skin layer may, in some instances, connect some or all of the discrete polymeric regions on the composite web. In any event, however, the amount of polymeric material in the skin layer will be insufficient to provide significant reinforcement of the substrate outside of the thicker discrete polymeric regions. If the composite web includes elastomeric discrete polymeric regions as discussed in connection with FIGS. **18–26**, the amount of elastomeric polymeric material in any elastomeric skin layer will be insufficient to provide significant elasticity to the substrate outside of the thicker elastomeric discrete polymeric regions.

The substrates used in connection with the composite webs of the present invention may have a variety of constructions. For example, the substrates may be a woven material, nonwoven material, knit material, paper, film, or any other continuous media that can be fed through a nip point. The substrates may have a wide variety of properties, such as extensibility, elasticity, flexibility, conformability, breathability, porosity, stiffness, etc. Further, the substrates may include pleats, corrugations or other deformations from a flat planar sheet configuration.

In some instances, the substrates may exhibit some level of extensibility and also, in some instances, elasticity. Extensible webs that may be preferred may have an initial yield tensile force of at least about 50 gm/cm, preferably at least about 100 gm/cm. Further, the extensible webs may preferably be extensible nonwoven webs.

Suitable processes for making a nonwoven web that may be used in connection with the present invention include, but are not limited to, airlaying, spunbond, spunlace, bonded melt blown webs and bonded carded web formation processes. Spunbond nonwoven webs are made by extruding a molten thermoplastic, as filaments from a series of fine die orifices in a spinneret. The diameter of the extruded filaments is rapidly reduced under tension by, for example, by non-eductive or eductive fluid-drawing or other known spunbond mechanisms, such as described in U.S. Pat. No. 4,340,563 (Appel et al.); U.S. Pat. No. 3,692,618 (Dorschner et al.); U.S. Pat. Nos. 3,338,992 and 3,341,394 (Kinney); U.S. Pat. No. 3,276,944 (Levy); U.S. Pat. No. 3,502,538 (Peterson); U.S. Pat. No. 3,502,763 (Hartman) and U.S. Pat. No. 3,542,615 (Dobo et al.). The spunbond web is preferably bonded (point or continuous bonding).

The nonwoven web layer may also be made from bonded carded webs. Carded webs are made from separated staple fibers, which fibers are sent through a combing or carding unit which separates and aligns the staple fibers in the machine direction so as to form a generally machine direction-oriented fibrous nonwoven web. However, randomizers can be used to reduce this machine direction orientation.

Once the carded web has been formed, it is then bonded by one or more of several bonding methods to give it suitable tensile properties. One bonding method is powder bonding wherein a powdered adhesive is distributed through the web and then activated, usually by heating the web and adhesive with hot air. Another bonding method is pattern bonding wherein heated calender rolls or ultrasonic bonding equipment are used to bond the fibers together, usually in a localized bond pattern though the web can be bonded across its entire surface if so desired. Generally, the more the fibers of a web are bonded together, the greater the nonwoven web tensile properties.

Airlaying is another process by which fibrous nonwoven webs useful in the present invention can be made. In the airlaying process, bundles of small fibers usually having lengths ranging between about 6 to about 19 millimeters are separated and entrained in an air supply and then deposited onto a forming screen, often with the assistance of a vacuum supply. The randomly deposited fibers are then bonded to one another using, for example, hot air or a spray adhesive.

Meltblown nonwoven webs may be formed by extrusion of thermoplastic polymers from multiple die orifices, which polymer melt streams are immediately attenuated by hot high velocity air or steam along two faces of the die immediately at the location where the polymer exits from the die orifices. The resulting fibers are entangled into a coherent web in the resulting turbulent airstream prior to collection on a collecting surface. Generally, to provide sufficient integrity and strength for the present invention, meltblown webs must be further bonded such as by through air bonding, heat or ultrasonic bonding as described above.

A web can be made extensible by skip slitting as is disclosed in, e.g., International Publication No. WO 96/10481 (Abuto et al.). If an elastic, extensible web is desired, the slits are discontinuous and are generally cut on the web prior to the web being attached to any elastic component. Although more difficult, it is also possible to create slits in the nonelastic web layer after the nonelastic web is laminated to the elastic web. At least a portion of the slits in the nonelastic web should be generally perpendicular (or have a substantial perpendicular vector) to the intended direction of extensibility or elasticity (the at least first direction) of the elastic web layer. By generally perpendicular it is meant that the angle between the longitudinal axis of the chosen slit or slits and the direction of extensibility is between 60 and 120 degrees. A sufficient number of the described slits are generally perpendicular such that the overall laminate is elastic. The provision of slits in two directions is advantageous when the elastic laminate is intended to be elastic in at least two different directions.

A nonwoven web used in connection with the present invention can also be a necked or reversibly necked nonwoven web as described in U.S. Pat. Nos. 4,965,122; 4,981,747; 5,114,781; 5,116,662; and 5,226,992 (all to Morman). In these embodiments the nonwoven web is elongated in a direction perpendicular to the desired direction of extensibility. When the nonwoven web is set in this elongated condition, it will have stretch and recovery properties in the direction of extensibility.

The substrates used in connection with the present invention may preferably exhibit some porosity on one or both of the major surfaces of the substrate such that when a molten thermoplastic composition is provided on one of the major surfaces of the substrate, a mechanical bond is formed between the molten thermoplastic composition and the substrate as the molten thermoplastic composition infiltrates and/or encapsulates a portion of the porous surface of the substrate. As used in connection with the present invention, the term "porous" includes both structures that include voids formed therein, as well as structures formed of a collection of fibers (e.g., woven, nonwoven, knit, etc.) that allow for the infiltration of molten thermoplastic composition into the interstices between fibers. If the porous surface includes fibers, the thermoplastic composition may preferably encapsulate fibers or portions of fibers on the surface of the substrate.

The type and construction of the material or materials in the substrate should be considered when selecting an appropriate substrate to which a molten thermoplastic composition is applied. Generally, such materials are of the type and construction that do not melt, soften, or otherwise disintegrate under the temperatures and pressures experienced during the step of transferring the thermoplastic composition to the substrate. For example, the substrate should have sufficient internal strength such that it does not fall apart during the process. Preferably, the substrate has sufficient strength in the machine direction at the temperature of the transfer roll to remove it intact from the transfer roll.

As used herein, the term "fiber" includes fibers of indefinite length (e.g., filaments) and fibers of discrete length, e.g., staple fibers. The fibers used in connection with the present invention may be multicomponent fibers. The term "multicomponent fiber" refers to a fiber having at least two distinct longitudinally coextensive structured polymer domains in the fiber cross-section, as opposed to blends where the domains tend to be dispersed, random, or unstructured. The distinct domains may thus be formed of polymers from different polymer classes (e.g., nylon and polypropylene) or be formed of polymers from the same polymer class (e.g., nylon) but which differ in their properties or characteristics. The term "multicomponent fiber" is thus intended to include, but is not limited to, concentric and eccentric sheath-core fiber structures, symmetric and asymmetric side-by-side fiber structures, island-in-sea fiber structures, pie wedge fiber structures, and hollow fibers of these configurations.

Although the substrates depicted in the various cross-sectional views of the articles manufactured according to the methods of the present invention are illustrated as single layer structures, it should be understood that the substrates may be of single or multi-layer construction. If a multi-layer construction is used, it will be understood that the various layers may have the same or different properties, constructions, etc. Some of these variations may be as described in, for example, pending U.S. patent application Ser. No. 09/257,447, entitled WEB HAVING DISCRETE STEM REGIONS, filed on Feb. 25, 1999 (published as International Publication No. WO 00/50229).

The discrete polymeric regions **14** may be formed of a wide variety of different nonelastomeric thermoplastic polymeric materials. As used in connection with the present invention, "thermoplastic" (and variations thereof) means a polymer or polymeric composition that softens when exposed to heat and returns to its original condition or near its original condition when cooled to room temperature. The thermoplastic compositions used in connection with the methods of the present invention should be capable of flowing or entering into depressions formed in a polymer transfer roll as will be described below.

Suitable thermoplastic compositions are those that are melt processable. Such polymers are those that will flow sufficiently to at least partially fill the depressions, yet not

significantly degrade during a melt process. A wide variety of thermoplastic compositions have suitable melt and flow characteristics for use in the process of the present invention depending on the geometry of the depressions and the processing conditions. It may further be preferred that the melt processable materials and conditions of processing are selected such that any viscoelastic recovery properties of the thermoplastic compositions do not cause them to significantly withdraw from the wall(s) of the depressions until transfer of the thermoplastic composition to a substrate is desired.

Some examples of nonelastomeric thermoplastic compositions that may be used in connection with the present invention include, but are not limited to, polyurethanes, polyolefins (e.g., polypropylenes, polyethylenes, etc.), polystyrenes, polycarbonates, polyesters, polymethacrylates, ethylene vinyl acetate copolymers, ethylene vinyl alcohol copolymers, polyvinylchlorides, acrylate modified ethylene vinyl acetate polymers, ethylene acrylic acid copolymers, nylons, fluorocarbons, etc.

A nonelastomeric thermoplastic polymer is one that melts and returns to its original condition or near its original condition upon cooling and which does not exhibit elastomeric properties at ambient conditions (e.g., room temperature and pressure). As used in connection with the present invention, "nonelastomeric" means that the material will not substantially resume its original shape after being stretched. Further, the nonelastomeric materials may preferably sustain permanent set following deformation and relaxation, which set is preferably at least about 20 percent or more, and more preferably at least about 30 percent or more of the original length at moderate elongation, e.g., about 50% (for those materials that can even be stretched up to 50% without fracture or other failure).

The nonelastomeric thermoplastic compositions used in connection with the present invention can also be combined with various additives for desired effect. These include, for example, fillers, viscosity reducing agents, plasticizers, tackifiers, colorants (e.g., dyes or pigments), antioxidants, antistatic agents, bonding aids, antiblocking agents, slip agents, stabilizers (e.g., thermal and ultraviolet), foaming agents, microspheres, glass bubbles, reinforcing fibers (e.g., microfibers), internal release agents, thermally conductive particles, electrically conductive particles, and the like. The amounts of such materials that can be useful in the thermoplastic compositions can be readily determined by those skilled in the art of processing and using such materials.

FIG. **2** is a plan view of a portion of the exterior surface of one transfer tool that can be used to deposit the reinforcing discrete polymeric region **14** on the substrate **10** depicted in FIG. **1**. That depicted portion of the exterior surface **32** includes a depression **34** formed therein. FIG. **2** also depicts a number of smaller depressions **38** dispersed over the surface **32** of the transfer roll. Each of the depressions **38** is smaller than the larger depression **34**, both in terms of footprint (see below) as well as depression volume. The smaller depressions **38** may also fill with molten thermoplastic composition during use of the transfer roll, with the smaller discrete polymeric regions formed by the depressions **38** serving a variety of purposes as discussed in connection with FIGS. **7–9** below.

The depression **34** is preferably a composite of cells **34***a*, **34***b*, **34***c* and **34***d* formed in the surface **32** by any suitable technique, e.g., machining, etching, laser ablation, etc. FIGS. **3A–3C** depict one set of steps that can be used to manufacture a composite depression **34** in the transfer roll **30** as seen in FIG. **2**. The views in FIGS. **3A–3C** are taken along line **3—3** in FIG. **2** and, as a result, do not include the smallest cells **34***d* seen in FIG. **2**.

Further, the complete outline of each of the cells is depicted in FIG. **2** for a better understanding of the invention, although it will be understood that portions of each of the cells may not actually be visible in the finished composite depression **34**. In addition, the depicted composite depression **34** is made of a multiple circular cells **34***a*–**34***d*. It should, however, be understood that composite depressions according to the present invention may be made of cells having any selected shape, e.g., oval, square, triangular, etc. Further, the composite depressions of the present invention may be constructed of cells having a variety of shapes and/or sizes.

In the depicted composite depression **34**, cells **34***a* have the largest diameter and are formed to the greatest depth into the surface **32**. Further, the cells **34***a* may be formed first as seen in FIG. **3A**. Alternatively, the smaller cells may be formed first, with the larger cells formed later. The cells **34***b* may be formed next as depicted in FIG. **3B**. Cells **34***b* are, in the depicted embodiment, formed to a shallower depth in the transfer roll **30** than cell **34***a*. It can be seen there that the cells **34***b* overlap the larger cell **34***a*, such that not all of the outline of the smaller cells **34***b* is actually formed into the transfer roll **30**.

The final step depicted in FIG. **3C** is the formation of smaller cells **34***c* farther outward from the central cell **34***a* than cells **34***b*. In the depicted embodiment, these outer cells **34***c* are formed to a shallower depth than cells **34***b*, thereby contributing to the general thinning at the edges of a reinforcing discrete polymeric region as seen in, e.g., FIG. **1**.

Although not wishing to be bound by any theory, it is hypothesized that the features (e.g., edges, ridges, etc.) formed at the boundaries between the various cells in the composite structure of depression **34** may enhance its ability to retain molten thermoplastic composition during the transfer process as discussed below.

The depressions on transfer rolls used in connection with the present invention may be characterized in terms of the area occupied by their footprint on the exterior surface of the forming tool, a maximum dimension of the footprint (in any direction on the surface of the roll), the volume of the depression, the shape of the footprint, etc.

When characterized in terms of the area occupied by the footprint of the depressions, each of the depressions **34** may have a footprint with an area of about 4 square millimeters (mm^2) or more. In other situations, each of the depressions **34** may have footprints with an area of about 8 mm^2 or more.

Another manner in which the depressions may be characterized is in terms of the largest footprint dimension as measured on the surface **32** of the transfer roll **30**. When characterized in terms of the largest footprint dimension of the footprint, it may be that the depressions have a largest footprint dimension of about 2 mm or more, in some instances about 5 mm or more.

Yet another manner in which the depressions used in connection with the present invention may be characterized is in terms of depression volume. For example, the depressions may have a depression volume of at least about three (3) cubic millimeters (mm^3) or more, or alternatively a depression volume of about five (5) cubic millimeters or more. Volume may be important because at least some of the molten thermoplastic composition may be retained within the depression during the transfer process, i.e., the depres-

sion volume may preferably be oversized relative to the preferred volume of the discrete polymeric regions to be formed by the depressions to compensate for retention of thermoplastic composition within the depressions.

The orientation of the depression **34** on a transfer roll **30** may be selected based on a variety of factors. The elongated depression **34** may be aligned in the machine direction (i.e., the direction of travel of a substrate), in the cross-web direction (i.e., transverse to the direction of travel of the substrate), or any other orientation between machine direction or cross-web direction.

FIGS. **4** and **5** depict yet another variation in the shape of depressions formed in transfer tools used to provide reinforcing discrete polymeric regions on substrates in connection with the methods of the present invention. The depression **134** is located in the surface **132** of a transfer tool in the shape of a circular trough with an island **133** located in the center of depression **134** formed in the exterior surface **132**.

Depressions that include islands such as that depicted in FIG. **4** can be used to provide reinforcing discrete polymeric regions on a substrate in which a portion of the substrate is exposed within a surrounding ring of polymer. The resulting construction may, for example, be used to reinforce the substrate in the area of, e.g., a buttonhole, slot, perforation, or other opening formed on in the substrate. Other uses for similar structures may also be envisioned.

The island **133** formed in the center of depression **134** is preferably the same height as the exterior surface **132** of the transfer roll that surrounds the depression **134**. Although the depression **134** is depicted with only a single island **133** formed therein, depressions used in connection with the methods of the present invention may include two or more islands located within each depression if so desired. Furthermore, the shape of the island and surrounding depression may also vary, e.g., a depression that has a circular outermost perimeter may be paired with an island having a different shape. In another variation, the island may not be centered within the depression as depicted in FIG. **4**.

Another variation depicted in FIG. **5** is the variation in depth of the depression **134**, with the depression being deepest proximate the island and rising to a shallower depth at the outermost perimeter of the depression **134**. Such a construction may provide a reinforcing discrete polymeric region with more flexible edges due to thinning of the polymeric region as discussed above in connection with FIG. **1**. Further, although the depression **134** is not depicted as having a composite construction as does depression **34** in FIG. **2**, the depression **134** including island **133** may advantageously be formed as a composite depression of multiple cells.

FIG. **6** depicts another depression **234** formed in the surface **232** of a transfer tool, with the depression **234** also including an island **233** in a manner similar to the depression **134** of FIGS. **4** and **5**. Unlike depression **134**, the depression **234** is elongated in a generally oval shape that may be more conducive to the formation of a buttonhole or similar structure. Again, although the depression **234** is not depicted as having a composite construction as does depression **34** in FIG. **2**, it may advantageously be formed as a composite depression of multiple cells.

FIGS. **7** and **8** depict yet another variation in a composite web manufactured according to the methods of the present invention. The composite web of FIG. **7** is a laminated structure including a first substrate **310***a* laminated to a second substrate **310***b* to form a laminated substrate **310**. A number of discrete polymeric regions **314** are located between the two substrates **310***a* and **310***b*. A number of smaller discrete polymeric regions **380** are depicted as being located between the larger discrete polymeric regions **314**. The smaller discrete polymeric regions **380** are optional, i.e., they may not be required in addition to the larger discrete polymeric regions **314**. These smaller features may be helpful to attach the two substrates **310***a* and **310***b* together between the larger discrete polymeric regions **314**.

In some instances, attachment of the two substrates **310***a* and **310***b* may be accomplished using the discrete polymeric regions **314** and **380** alone when the lamination is performed while the polymer regions **314** and **380** are still in a somewhat molten state such that they can bond with counterpart discrete polymeric regions on the opposing substrate or to the opposing substrate itself. One advantage of this construction is that the lamination may be accomplished without the need for additional materials and/or process steps. The lamination between substrates **310***a* and **310***b* may alternatively be assisted by a variety of materials and/or techniques known to those skilled in the art, e.g., thermal bonding, adhesives, resins, tie films/webs, etc. See, e.g., U.S. Pat. No. 2,787,244 (Hickin); U.S. Pat. No. 3,694,867 (Stumpf); U.S. Pat. No. 4,906,492 (Groshens); U.S. Pat. No. 5,685,758 (Paul et al.); and U.S. Pat. No. 6,093,665 (Sayovitz et al.).

The laminated construction of FIG. **7** may be useful, for example, to provide a cloth-like or softer feel or appearance, breathability, porosity, etc. on both sides of the composite web. This is in contrast to the composite webs in which the discrete polymeric regions are located on an exposed surface of the composite web. A laminated composite web structure such as that seen in FIG. **7** may also be used to provide different properties on opposite sides of the composite web structure. For example, the porosity or other properties may differ between the different substrates **310***a* and **310***b*.

FIG. **8** depicts lamination of the substrates **310***a* and **310***b* by forces operating in the directions of the arrows located at both sides of the figure. One of the aspects depicted in FIG. **8** is the combination of discrete polymeric regions **314***a* on substrate **310***a* with discrete polymeric regions **314***b* located on the opposing surface of substrate **310***b* to form the discrete polymeric regions **314** in the composite web as depicted in FIG. **7**.

Another aspect depicted in FIG. **8** is that the smaller polymeric regions **380** seen in FIG. **7** may be constructed from the combination of a polymeric region **380***a* on substrate **310***a* and a polymeric region **380***b* on substrate **310***b*. In other instances, the smaller polymeric region is located on only one of the substrates **310***a* or **310***b* and preferably bonds directly to the opposing substrate during lamination. Similarly, in some instances the larger discrete polymeric regions **314** may be formed by depositing polymer on only one of the substrates **310***a* or **310***b* before attaching the opposing substrate.

Another potential advantage of the laminated construction of the composite web seen in FIGS. **7** and **8** is that the reinforcing discrete polymeric regions **314** formed by laminating two separate polymeric regions **314***a* and **314***b* together may provide a combined reinforcing discrete polymeric region **314** that contains more polymer than could be effectively deposited as a single reinforcing discrete polymeric region using the methods of the present invention. That additional polymer may provide reinforcing discrete polymeric regions that are stiffer, thicker, or have other advantageous features.

FIG. **9** is a plan view of a composite web that may be used to form the composite web depicted in FIG. **7** in which two

portions **310***a* and **310***b* of a single, unitary substrate **310** can be folded along a fold line **302** to provide the laminated structure of FIGS. **7** and **8**. Alternatively, the substrates **310***a* and **310***b* as seen in, e.g., FIG. **8**, may be separate from each other before lamination. The substrate **310** includes opposing reinforcing discrete polymeric regions **314***a* and **314***b* on portions **310***a* and **310***b* that are combined when the substrate **310** is folded along fold line **302**.

The substrate **310** also includes a number of opposing smaller discrete polymeric regions **380***a* and **380***b* on portions **310***a* and **310***b* that are combined when the substrate **310** is folded along fold line **302**. Further, the substrate **310** includes some smaller discrete polymeric regions **380***a* and **380***b* that do not oppose any similar deposits on the opposite side of the fold line **302**.

Although the discrete polymeric regions **314***a* and **314***b* are shown as being uniformly spaced over the surface of the substrate **310** in a regular, repeating pattern (in both the x and y directions), it should be understood that spacing between the reinforcing discrete polymeric regions **314***a* and **314***b* may be non-uniform if so desired. Furthermore, the pattern in which the reinforcing discrete polymeric regions are arranged, may be irregular and/or non-repeating.

In other variations, portions of the composite webs manufactured in accordance with the present invention may include uniformly-spaced discrete polymeric regions as depicted in FIG. **9** while other portions of the same composite web may be free of any discrete polymeric regions. In yet another alternative, portions of the composite web manufactured in accordance with the present invention may include uniformly spaced discrete polymeric regions as seen in FIG. **9**, while other portions of the same composite web may include discrete polymeric regions that are arranged in a non-uniform and/or non-repeating patterns. Further, different portions of a composite web manufactured according to the present invention may include different sets of discrete polymeric regions that are both uniformly spaced in repeating patterns that are different from each other.

The discrete polymeric regions could be provided in any desired shape, e.g., squares, rectangles, hexagons, etc. The shapes may or may not be in the form of recognized geometric shapes, but may be randomly formed with irregular perimeters. In addition, the shapes may not necessarily be solid figures, but may include islands formed within the shape in which none of the thermoplastic composition is transferred. In yet another alternative, some or all of the discrete polymeric regions may be in the form of indicia, i.e., letters, numbers, or other graphic symbols.

FIG. **10** illustrates yet another embodiment of a composite web manufactured in accordance with the present invention. The composite web includes a substrate **410** with opposing major surfaces **418** and **419**. One feature illustrated in FIG. **10** is the two-sided nature of the reinforcing discrete polymeric regions located on the opposing major surfaces **418** and **419**, respectively. Reinforcing discrete polymeric region **414** is provided on major surface **418** and reinforcing discrete polymeric region **424** is provided on opposing major surface **419**. Both discrete polymeric region **414** and discrete polymeric region **424** are exposed on opposite sides of the composite web.

The discrete polymeric regions on opposing major surfaces are depicted as being in registration through the substrate **410**. In other words, the discrete polymeric region **414** is aligned with the discrete polymeric region **424** on the opposite side of the substrate **410**. Further, the discrete polymeric region **414** is depicted as being substantially the same size as the discrete polymeric region **424** located on the opposite side of the substrate **410**. It should, however, be understood that when a composite web having discrete polymeric regions on both major surfaces is desired, the discrete polymeric regions on the opposing surfaces may or may not be the same size as seen in FIG. **10**. Also, it should be understood that the discrete polymeric regions may or may not be in registration with each other through the substrate **410** as seen in FIG. **10**.

The reinforcing discrete polymeric regions **414** and **424** may be envisioned as forming a grommet structure on the substrate **410**. As a result, it may be desired to provide an optional opening **404** through the substrate **410** as seen in FIG. **10**. The opening may be formed by any suitable technique, e.g., mechanical perforation with a tool, laser ablation, water or gas-jet cutting, etc. It will be understood that similar openings could be provided in, e.g., the laminated composite web seen in FIG. **7** as well.

FIG. **11** is a perspective view of one system and method of providing discrete polymeric regions on one surface of a substrate **10** in accordance with the principles of the present invention. The system depicted in FIG. **11** includes a substrate **10** that defines a web path through the system. The substrate **10** moves through the system in a downstream direction indicated by the rotation arrows on the various rolls. After being unwound or otherwise provided from a supply (e.g., the substrate **10** may be manufactured in-line with the system depicted in FIG. **11**), the substrate **10** is directed into a transfer nip formed between a backup roll **20** and a transfer roll **30**.

The process of providing discrete polymeric regions on the substrate **10** includes delivering a supply of a molten thermoplastic composition to the exterior surface **32** of transfer roll **30** that includes a one or more depressions **34** formed in its exterior surface **32**. The molten thermoplastic composition **41** is supplied to the exterior surface **32** of the transfer roll **30** by a delivery apparatus in the form of a trough **40** (or other supply apparatus, e.g., extruder, gear pump, etc.).

The excess molten thermoplastic composition is wiped or removed from the exterior surface **32** by a doctor blade **42** acting against the exterior surface **32** of the transfer roll **30**. Although it may be ideal to remove all of the thermoplastic composition from the exterior surface **32** of the transfer roll **30**, some of the thermoplastic composition may remain on the exterior surface **32** after wiping by the doctor blade **42**.

The depressions **34** formed in the exterior surface **32** of the transfer roll **30** preferably receive a portion of the molten thermoplastic composition when the molten thermoplastic composition is deposited on the exterior surface **32** of the transfer roll **30**. If the depressions **34** are not completely filled during or by the deposition of molten thermoplastic composition, the wiping action of the doctor blade **42** on the exterior surface **32** of the transfer roll **30** may assist in substantially filling the depressions with molten thermoplastic composition.

Control over the temperatures of the various rolls in the system depicted in FIG. **11** may be useful in obtaining the desired products. It may be preferred, e.g., that the exterior surface **32** of the transfer roll **30** be heated to a selected temperature that is at or above the melt temperature of the thermoplastic composition to be transferred to the substrate **10**. Heating the transfer roll **30** may also enhance filling of the depressions **34** by the molten thermoplastic composition.

Because the molten thermoplastic composition **41** is itself heated within the trough **40**, the doctor blade **42** will

typically be heated by the molten thermoplastic composition. It may alternatively be desirable to control the temperature of the doctor blade **42** separately from the trough **40** containing the molten thermoplastic composition **41**. For example, it may be desirable to heat the doctor blade **42** to a temperature above the melt temperature of the molten thermoplastic composition.

FIG. **11**A is an enlarged partial cross-sectional view depicting one relationship between a doctor blade **42** and depression **34** in a transfer roll **30**. Another characteristic of the doctor blade **42** that may be controlled is its thickness or length **43** along the exterior surface of the transfer roll **30** (as measured in the machine direction or the direction of rotation of the transfer roll). For example, a thicker or longer doctor blade **42** may help by allowing the molten thermoplastic composition more time to relax within the depressions **34**, thereby improving filling of the depressions. In addition to varying the length of the doctor blade **42**, the pressure or force exerted on the transfer roll **30** by the doctor blade **42** may also be adjusted based on a variety of factors including, e.g., the characteristics of the molten thermoplastic composition, the transfer roll characteristics, etc.

With the depressions **34** at least partially filled with the desired molten thermoplastic composition, the transfer roll **30** continues to rotate until the depressions **34** and the molten thermoplastic composition they contain are forced into contact with the substrate **10** against backup roll **20** at the transfer nip (i.e., the nip formed by the transfer roll **30** and the backup roll **20**. It is at this point that transfer of the molten thermoplastic composition in the depressions **34** to the substrate **10** begins. It should be understood that under certain conditions, only a portion of the thermoplastic composition in the depressions **34** may transfer to the substrate **10**.

When a substrate **10** that includes one or more porous major surfaces on which the molten thermoplastic composition is deposited is used in connection with the methods of the present invention, a mechanical bond is preferably formed by infiltration of the molten thermoplastic composition into the porous surface of the substrate **10**. As used in connection with the present invention, the term "porous" includes both structures that include voids formed therein, as well as structures formed of a collection of fibers (e.g., woven, nonwoven or knit) that allow for the penetration of molten thermoplastic compositions.

The nip pressure between the transfer roll **30** and the backup roll **20** is preferably sufficient such that a portion of the thermoplastic composition in the discrete polymeric regions infiltrates and/or encapsulates a portion of the porous substrate **10** to improve attachment of the discrete polymeric regions to the substrate **10**. Where the surface of the substrate **10** includes fibers (e.g., where the substrate **10** includes woven, nonwoven, or knit materials on its major surfaces), it may be preferred that the thermoplastic composition encapsulate all or a portion of at least some of the fibers on the surface of the substrate **10** to improve attachment of the discrete polymeric regions to the substrate **10**.

Under some conditions the molten thermoplastic composition in the depressions **34** may completely permeate the substrate **10** if, e.g., the substrate **10** is porous throughout its thickness. In other instances, penetration of the molten thermoplastic composition may be limited to the outer layer or layers of the substrate **10**.

It should, however, be understood that although the outer surfaces of the substrate **10** may exhibit some porosity, that porosity may not necessarily extend through the entire thickness of the substrate **10**. For example, the substrate **10** may have a variety of different layers, with one of the layers being substantially non-porous. In another alternative, the overall thickness of the substrate **10** may render it non-porous as a whole, even though the outer surfaces of the substrate **10** exhibit some porosity as discussed above.

The backup roll **20** may possess a variety of different characteristics depending on the types of substrate materials and/or molten thermoplastic compositions being processed. In some instances, the exterior of the backup roll **20** may be a rubber or other conformable material that conforms to the shape of the transfer roll **30**. If a conformable material such as rubber is used, it may, e.g., have a durometer of, e.g., about 10–90 Shore A.

One such variation at the transfer nip is depicted in FIG. **11**B, in which a conformable backup roll **130** is depicted as forcing a portion of the substrate **110** into the depression **134** (and the thermoplastic composition **141** contained therein). If the surface of the substrate **110** facing the depression **134** is porous, a portion of the molten thermoplastic composition **141** may be forced in the porous surface of the substrate **110**. Forcing the substrate **110** into the depression may be particularly beneficial if the depression **134** is not completely filled with the molten thermoplastic composition **141** to improve the likelihood of contact between the substrate **10** and the molten thermoplastic composition **141**.

Alternatively, the surface of the substrate may be forced into the depressions on the transfer roll using a mating backup roll. This variation at the transfer nip is depicted in FIG. **11**C in which the backup roll **220** includes protrusions **222** that are complementary to or mate with the depressions **234** on the transfer roll **230**. The protrusions **222** would preferably force a substrate into the depressions with the same results and benefits described above with respect to FIG. **11**B. A mating backup roll **220** could be formed of any conformable material, nonconformable material, or combination of conformable or nonconformable materials.

Heating or otherwise controlling the temperature of the transfer roll is discussed above. It should also be appreciated that the temperature of the exterior surface of the backup roll may be controlled. For example, it may be desirable to cool the surface of the backup roll to a selected temperature below the temperature of the transfer roll. Cooling of the backup roll may be beneficial in maintaining the integrity of the substrate, particularly if the substrate integrity can be degraded from the heat of the transfer roll (if the transfer roll is heated) and/or the molten thermoplastic composition in the depressions of the transfer roll.

The substrate **10** continues around the backup roll **20** as seen in FIG. **11**. In some instances, a portion of the molten thermoplastic composition in the depressions may remain in the depressions **34** while the substrate **10** is pulled away from the transfer roll **30**. As a result, the molten thermoplastic composition in the depressions **34** may tend to elongate or string between the depressions in transfer roll **30** and the substrate **10**.

A device, such as a hot wire **44** seen in FIG. **11**, may be used to sever any strands of thermoplastic composition that may be formed as the substrate **10** separates from the transfer roll **30**. Other devices and/or techniques may be used to accomplish the desired severing of any molten thermoplastic composition strands. Examples may include, but are not limited to hot air knives, lasers, etc. Furthermore, under certain conditions, stringing of the thermoplastic composition may not be encountered during manufacturing.

The tendency of the molten thermoplastic composition in the depressions **34** to string as the substrate exits the transfer

nip also raises another issue that should be considered when developing processes according to the present invention. That issue is the internal cohesive strength of the substrate **10** and/or the tensile strength of the substrate **10**. This issue may be of more concern if the substrate **10** includes a fibrous construction (e.g., woven, nonwoven, or knit fibers) that could be separated from the remainder of the substrate by the forces exerted when the substrate **10** is pulled away from the transfer roll **30**. These considerations may be more important if the molten thermoplastic composition has properties (e.g., tackiness, tensile strength, etc.) such that strands of the molten thermoplastic composition can exert forces on the substrate **10** that exceed the internal cohesive strength and/or tensile strength of the substrate **10**.

For example, if the substrate **10** includes a resin-bonded nonwoven portion, the temperature of the transfer roll **30** and/or molten thermoplastic composition may rise above the melting temperature of the resin, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate **10**. Alternatively, a nonwoven substrate may include fibers that have a melting temperature similar to the temperature of the transfer roll **30** and/or molten thermoplastic composition, thereby potentially degrading the internal cohesive strength and/or tensile strength of the substrate **10**.

In either instance, the roll temperatures and/or molten thermoplastic composition temperature may need to be controlled to maintain the integrity of the substrate while transferring the molten thermoplastic composition. For example, the backup roll **20** may be cooled to, in turn, cool the substrate **10** to maintain its internal cohesive strength.

In another alternative, heating of the transfer roll **30** and/or backup roll **20** may be used to enhance the internal cohesive strength and/or tensile strength of the substrate **10**. For example, if the substrate **10** includes multi-component fibers or fibers having different compositions, some consolidation of the fibers or other components in the substrate **10** may be caused by heating the substrate **10** while transferring the molten thermoplastic composition from the transfer roll **30** to the substrate **10**. That consolidation may improve the integrity of the substrate by forming a skin layer or other strength-enhancing structure on or within the substrate **10**. Some exemplary processes may be described in, e.g., U.S. Pat. No. 5,470,424 (Isaac et al.).

Although the system and method depicted in FIG. **11** produces composite webs with reinforcing discrete polymeric regions on only one major side thereof, those of skill in the art will recognize the modifications required to provide discrete polymeric regions on both major surfaces of the substrate in accordance with the principles of the present invention. One example may include, e.g., forming discrete polymeric regions on one surface of each of two separate substrates, with the two substrates then being laminated together to form a single substrate with discrete polymeric regions on both major surfaces (see, e.g., FIG. **10**). Alternatively, a single substrate may be directed into a nip formed by two transfer rolls, with each of the transfer rolls depositing discrete polymeric regions on both sides of the web essentially simultaneously.

Although FIG. **11** depicts the application of only one thermoplastic composition using the transfer roll **30**, it will be understood that two or more different thermoplastic compositions may be applied to the exterior surface of the transfer roll **30**. FIG. **12** depicts a portion of one system in which a trough **340** is used to deliver three molten thermoplastic compositions (in zones A, B, & C) to the surface of a transfer roll **330** that rotates about an axis **331**. The trough **340** may, for example, include barriers **342** such that molten thermoplastic compositions in the different zones of the trough **340** do not mix during processing. In another alternative, separate and distinct troughs could be used for each different thermoplastic composition to be applied to the transfer roll **330**.

The transfer roll **330** also includes different sets of depressions **334***a*, **334***b*, and **334***c* over which the different molten thermoplastic compositions may be applied. The depressions in the different zones on transfer roll **330** are differently shaped, have different sizes, and have different spacings. For example, the triangular depressions in zone C are arranged in an irregular, non-repeating pattern while the depressions in zones A & B are arranged in regular, repeating patterns.

With the system of FIG. **12**, different sets of discrete polymeric regions may be formed on a single substrate using different thermoplastic compositions. As a result, the thermoplastic compositions may be selected for any of a number of different properties related to manufacturing or end-use performance of the finished articles made using the composite webs.

FIGS. **13** and **14** depict an article that may be manufactured from a composite web according to the methods of the present invention, with FIG. **13** being a plan view of the article and FIG. **14** being a cross-sectional view of the article taken along line **14**—**14** in FIG. **13**. The article includes a frame **560** formed by a reinforcing discrete polymeric region on a substrate **510**. The article may be, e.g., a filter in which the frame **560** provides an integral support for substrate **510** which functions as filter media. The frame **560**, when deposited as a reinforcing discrete polymeric region, preferably does not require the use of bonding agents (e.g., adhesives, etc.) to secure the frame **560** to the filtration substrate **510**.

The depicted article also includes one or more optional reinforcement strips **562** that extend across the central area of substrate **510** defined by the frame **560**. The reinforcement strips **562** may also preferably be formed by discrete polymeric regions deposited on the substrate **510** according to the methods of the present invention. The reinforcement strips **562** may be formed of the same or different polymeric compositions as the frame **560**.

FIGS. **15** & **16** depict another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. **15** depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate **610** on which two discrete polymeric regions **614** and **615** are located. The substrate **610** includes two opposing edges **611** that extend over the length of the composite web and, together, define the longitudinal length of the composite web.

Discrete polymeric region **614** is provided in the shape of a line of the thermoplastic composition material deposited on the substrate **610** along the general direction of the longitudinal length of the composite web. The discrete polymeric region **614** may be continuous along the longitudinal length of the composite web as shown in FIG. **15**.

Discrete polymeric region **615** is a variation of discrete polymeric region **614** in that it is provided in an undulating shape as compared to the relative straight linear shape of the discrete polymeric region **614**. The undulating shape of the discrete polymeric region **615** also, however, extends along the direction of the longitudinal length of the composite

web. Further, the discrete polymeric region **615** may be continuous along the longitudinal length of the composite web as shown in FIG. **15**.

FIG. **16** is a perspective view of one transfer roll **630** that may be used to transfer molten thermoplastic compositions to a substrate in the shapes seen in FIG. **15** according to the methods of the present invention. The transfer roll **630** includes a depression **634** that preferably extends continuously around the outer circumference of the transfer roll **630** to form the discrete polymeric region **614** as depicted in FIG. **15**. The transfer roll **630** also includes a depression **635** that also extends around the outer circumference of the roll **630** to form the discrete polymeric region **615** as depicted in FIG. **15**.

FIG. **17** depicts another variation associated with the methods of manufacturing composite webs according to the present invention. FIG. **17** depicts, in a plan view, a portion of a composite web manufactured according to the present invention. The composite web includes a substrate **710** on which discrete polymeric regions **714***a*, **714***b*, and **714***c* are located, with the discrete polymeric regions extending across the width of the substrate. The substrate **710** includes two opposing edges **711** that extend over the length of the composite web and, together, define the width and the longitudinal length of the composite web.

Each of the discrete polymeric regions **714***a*, **714***b*, and **714***c* is provided in the shape of a line of the thermoplastic composition material deposited on the substrate **710** in a generally cross-web direction, i.e., extending between the opposing edges **711** of the substrate **710**. The discrete polymeric regions **714***a*, **714***b*, and **714***c* present variations from straight lines **714***a* and **714***b* to undulating line **714***c*. Many other variations in placement, shape and/or orientation of reinforcing discrete polymeric regions may be envisioned in connection with methods according to the present invention.

In addition to the provision of articles that include discrete polymeric regions of nonelastomeric thermoplastic compositions on or within a composite web, it may also be desirable to provide such reinforced composite webs with one or more discrete polymeric regions of elastomeric thermoplastic compositions to provide elasticity to the resulting composite webs.

One such example of an article that includes discrete polymeric regions that are either elastomeric or nonelastomeric is depicted in FIGS. **18** & **19**. The article **874** may, for example, be provided as a fastening article that may be used in securing a garment (e.g., a diaper, gown, etc.) on a wearer. The article **874** includes a reinforcing ring **814***a* in the form of a discrete polymeric region formed of a nonelastomeric thermoplastic composition. Although only one discrete polymeric region **814***a* formed of a nonelastomeric thermoplastic composition is depicted in connection with the article **874**, it will be understood that articles of the present invention may include one or more such reinforcing discrete polymeric regions.

The article **874** also includes elastomeric thermoplastic compositions in discrete polymeric regions **814***b*. Although three such regions are depicted in FIG. **18**, it will be understood that articles of the present invention may include only one or more than one discrete polymeric regions formed of elastomeric thermoplastic compositions.

As seen in FIG. **19**, a cross-sectional view of the article **874** of FIG. **18** taken along line **19**—**19** in FIG. **18**, the different discrete polymeric regions **814***a* and **814***b* are provided on the same major surface of the substrate **810** on which the article **874** is formed. As discussed above, however, it will be understood that any combination of the discrete polymeric regions **814***a* and **814***b* may be located on the same or different major surfaces of the substrate **810**.

Also depicted in FIG. **19** is an opening **804** formed through the substrate **810** within the surrounding ring of nonelastomeric thermoplastic composition forming the discrete polymeric region **814***a*. As discussed above in connection with FIG. **10**, such openings may be formed by any suitable technique. This opening may, for example, be sized to receive a tab or other structure that fits within the slot formed by the opening **804** formed within the discrete polymeric region **814***a* in such a manner that retains the tab or other structure within the slot.

The fastening article **874** also includes discrete polymeric regions **814***b* that preferably function as elastic elements to provide elasticity to the article **874** if the substrate **810** is nonelastic. If the substrate **810** is itself elastic, the discrete polymeric regions **814***b* may still function as elastic elements that enhance the elasticity of the article **874**.

Although the substrate **810** is preferably extensible, a nonextensible substrate **810** can be made extensible by, e.g., providing slits **806** in the substrate **810**. The slits **806** are preferably spanned by at least one of the discrete elastomeric polymeric regions **814***b*. Some exemplary slitting processes to provide or improve extensibility of a substrate are described in International Publication No. WO 96/10481 (Abuto et al.). Other techniques may also be used to provide or improve the extensibility of substrates used in connection with the present invention. For example, the mechanical stretching processes described in U.S. Pat. Nos. 4,223,059 (Schwarz) and U.S. Pat. No. 5,167,897 (Weber et al.) may be used to provide or improve extensibility.

FIG. **20** depicts a laminated variation of the elastic fastening article **874** of FIGS. **18** and **19**. The fastening article **974** includes two substrates **910***a* and **910***b* that are laminated together, such that the discrete polymeric regions **914***a* and **914***b* are located within the composite web **910**. The article also includes an opening **904** formed within the reinforcing ring formed by the nonelastomeric thermoplastic composition of the discrete polymeric region **914***a*.

FIGS. **21**–**23** depict various views of another fastening article according to the present invention. Fastening tab **1074** includes a substrate **1010** on which a variety of different discrete polymeric regions are located. The different discrete polymeric regions provide a reinforcing surrounding ring (**1014***a*) for attaching the article **1074** to a complementary structure and elastic elements (**1014***b*) to provide elasticity to the fastening article **1074**. The tab **1074** preferably includes an elongation axis **1078** seen in FIG. **21**.

Discrete polymeric region **1014***a* is provided proximate the distal end of the fastening article **1074**. FIG. **22** is a cross-sectional view taken along line **22**—**22** in FIG. **21** and depicts a pleat **1006** formed in the substrate **1010**, with the elastic elements **1014***b* spanning the pleat **1006**. In the embodiment depicted in FIG. **22**, the substrate **1010** includes only one pleat, although it should be understood that the articles of the present invention may include one or more pleats as desired for extensibility purposes.

The discrete polymeric region **1014***a* is formed of nonelastomeric materials and, as such, the discrete polymeric region **1014***a* may also function to distribute stresses over the width of the article **1074** (where the width is measured generally transverse to the elongation axis **1078** depicted in FIG. **21**). It may be desirable to distribute the forces applied during elongation of the article **1074** to reduce or prevent

necking or roping of the article **1074**. Force distribution may also be helpful to improve uniformity in the forces seen across the width of the article **1074**.

In the depicted embodiment, the elastomeric discrete polymeric regions **1014***b* are located on the same surface of the substrate **1010** as the nonelastomeric discrete polymeric region **1014***a*. Each of the elastomeric discrete polymeric regions **1014***b* preferably includes a length that is substantially aligned with the elongation axis **1078**. For the purposes of the present invention, the length of the discrete polymeric regions **1014***b* is the longest straight line dimension of the discrete polymeric regions **1014***b* as measured along the surface of the substrate **1010**.

Another feature of the elastomeric discrete polymeric regions **1014***b* is their nonuniform or changing width. As seen in FIG. **21**, the discrete polymeric regions **1014***b* become wider when moving away from the discrete polymeric region **1014***a*. If the height or thickness of the discrete polymeric regions **1014***b* above the surface of the substrate **1010** is constant, the net result of the changing width depicted in FIG. **21** is that the amount of elastomeric material in the discrete polymeric regions **1014***b* increases when moving away from the discrete polymeric region **1014***a*. The changing bulk of elastomeric material may, e.g., provide an article **1074** that has different elasticity and/or elongation properties at different locations along the elongation axis **1078**. Many other variations in the distribution of elastomeric material in the discrete polymeric regions **1014***b* may be used to tailor the elasticity and/or elongation properties of the fastening tab **1074**, e.g., adjusting the thickness of the polymeric regions, the materials used, etc.

FIG. **24** depicts one composite web **1100** that may be, at least in part, manufactured using the system of FIG. **24**. The composite web **1100** includes a variety of different discrete polymeric regions **1114***a* and **1114***b* located thereon. In addition, the composite web **1100** includes lines of separation **1117** that define the boundaries of a number of different fastening tabs similar to those described above with respect to FIGS. **21–23**. The lines of separation **1117** define a nested configuration of fastening articles including the nonelastomeric discrete polymeric regions **1114***a* and elastomeric discrete polymeric regions **1114***b* in a manner that may reduce waste when the composite web **1100** is separated along the lines of separation **1117** to provide the desired fastening articles. The lines of separation **1117** may take on any suitable form that facilitates separation of the composite web **1100** along the lines of separation, e.g., score lines, lines of weakness, lines of perforations, etc.

The composite web **1100** preferably has a length that extends along the direction of the straight line of separation **1117** extending from left to right in FIG. **24**. Although the composite web **1100** includes only two pairs of nested tabs across the width of the composite web **1100** (where width is transverse to length), it will be understood that any desired number of nested pairs of tabs may be provided in a single composite web according to the present invention.

Another optional feature depicted in FIG. **24** are bonding sites **1128** that, in the depicted embodiment, is provided in the form of strips extending along the central line of separation bisecting the composite web **1100**, and along the edges of the composite web **1100**. Although depicted as continuous strips that extend along the length of the composite web **1100**, each of the elastic articles defined by the lines of separation **1117** may alternatively include one or more discrete bonding sites if so desired.

The bonding sites **1128** may be provided to assist in the attachment of the elastic articles defined by the lines of separation **1117** to a larger article, e.g., a diaper, gown, etc. To assist in attachment, the bonding sites **1128** may take a variety of configurations. For example, the bonding site may be a consolidated area of a nonwoven or woven fabric amenable to thermal or other consolidation techniques. Alternatively, or in addition to consolidation, the bonding sites may include one or more materials that assist in bonding, e.g., block copolymers, ethylene vinyl acetates, tackified ethylene vinyl acetates, adhesives (pressure sensitive, curable, heat activated, etc.), amorphous polyolefins, etc. The specific selection of materials to locate in the bonding sites **1128** will depend on the type of bonding to be performed and the materials to be bonded.

One advantage of the bonding sites **1128** is that they can be formed of materials that are particularly amenable to the attachment technique to be used, e.g., heat sealing, ultrasonic welding, etc. Another advantage is that the bonding sites can be sized such that they are large enough to accomplish their function, but not so large that any materials used in the bonding sites are wasted. Depending on the composition of the materials to be provided at the bonding sites, they may be formed by the transfer methods described herein if a thermoplastic composition is to be used in the bonding sites **1128**.

If the elastic articles defined by the lines of separation **1117** are to be used as, e.g., fastening articles, it may be preferred that the bonding sites **1128** be adapted to receive a mechanical fastener or fasteners that may be bonded to the tab separately. Alternatively, an adhesive (e.g., pressure sensitive, curable, heat activated, etc.) or cohesive material could be provided within the bonding sites **1128**.

The deposition of discrete polymeric regions formed of elastomeric thermoplastic compositions on a substrate may be accomplished in much the same manner as used in connection with the deposition of discrete polymeric regions formed of nonelastomeric thermoplastic compositions discussed above. The different thermoplastic compositions may be transferred to the substrates using a zoned system as discussed in connection with FIG. **12**, or the different thermoplastic compositions may by transferred to the substrates at different transfer stations.

An alternative system may include lamination of two substrates together, with each substrate including one or the other of the elastomeric or nonelastomeric discrete polymeric regions as described, e.g., above. FIG. **25** is a schematic depiction of one such system and method in which a transfer station **1230***a* produces nonelastomeric discrete polymeric regions **1214***a* on substrate **1210***a*. Transfer station **1230***b* produces elastomeric discrete polymeric regions **1214***b* on substrate **1210***b*. Each of the transfer stations may, e.g., be constructed similar to the system depicted in FIG. **11**.

Both substrates **1210***a* and **1210***b* are directed into a laminating station **1240** that produces a laminated composite web **1200** which, in the depicted embodiment, would provide both the nonelastomeric discrete polymeric regions **1214***a* and the elastomeric discrete polymeric regions **1214***b* located within the surrounding layers of substrates **1210***a* and **1210***b*. Alternatively, it will be understood that one or both sets of discrete polymeric regions could be laminated to the exterior of the laminated composite web **1200**.

FIG. **26** depicts another system and method in which the different discrete polymeric regions **1314***a* and **1314***b* are sequentially deposited on the same substrate **1310**. The system and method includes a transfer station **1330***a* in which the substrate **1310** is processed to provide a first set

of discrete polymeric regions **1314***a* thereon. The substrate **1310** with discrete polymeric regions **1314***a* is then directed into a second transfer station **1330***b* in which a second set of discrete polymeric regions **1314***b* is provided on the substrate **1310**. Although the second set of discrete polymeric regions **1314***b* are depicted as being located on the opposite side of the substrate **1310** from the first set of discrete polymeric regions **1314***a*, it will be understood that both sets of discrete polymeric regions could be located on the same side of the substrate **1310**. In yet another alternative, the different sets of discrete polymeric regions could both be located on both sides of the substrate **1310**.

The order in which any elastomeric and nonelastomeric discrete polymeric regions are deposited on the substrate **1310** may vary. Further, it will be understood that additional transfer stations could be added to the system and method depicted in FIG. **26** to provide more of the same discrete polymeric regions or yet additional different discrete polymeric regions on the substrate **1310**. Further, additional stations may be added to laminate one or more additional substrates to the substrate **1310**.

As with the nonelastomeric thermoplastic compositions described above, elastomeric thermoplastic compositions used for elastic discrete polymeric regions should be capable of flowing or entering into depressions formed in a polymer transfer roll as will be described below. Suitable elastomeric thermoplastic compositions are those that are melt processable. Such polymers are those that will flow sufficiently to at least partially fill the depressions, yet not significantly degrade during a melt process. A wide variety of elastomeric thermoplastic compositions have suitable melt and flow characteristics for use in the process of the present invention depending on the geometry of the depressions and the processing conditions. It may further be preferred that the melt processable materials and conditions of processing are selected such that any viscoelastic recovery properties of the thermoplastic composition do not cause it to significantly withdraw from the wall(s) of the depressions until transfer of the thermoplastic composition to a substrate is desired.

As used in connection with the present invention, "elastomeric" means that the material will substantially resume its original shape after being stretched. Further, the elastomeric materials may preferably sustain only small permanent set following deformation and relaxation, which set is preferably no greater than about 30 percent and more preferably no greater than about 20 percent of the original length at moderate elongation, e.g., about 50%. The elastomeric materials can be both pure elastomers and blends with an elastomeric phase or content that will still exhibit substantial elastomeric properties at room temperature. U.S. Pat. No. 5,501,679 (Krueger et al.) provides some further discussion regarding elastomeric materials that may be considered for use in connection with the present invention.

The elastomeric thermoplastic compositions can include one or more polymers. For example, the elastomeric thermoplastic composition could be a blend with an elastomeric phase such that the composition exhibits elastomeric properties at room temperature. Suitable elastic thermoplastic polymers include block copolymers such as conventional A-B or A-B-A block copolymers (e.g., styrene-isoprene-styrene, styrene-butadiene-styrene, styrene-ethylene-butylene-styrene block copolymers), elastomeric polyurethanes, olefinic elastomers, particularly elastomeric ethylene copolymers (e.g., ethylene vinyl acetates, ethylene/octene copolymer elastomers, ethylene/propylene/diene terpolymer elastomers), as well as mixtures of these with each other, with other elastomeric thermoplastic polymers, or with nonelastomeric thermoplastic polymers.

The elastomeric thermoplastic compositions used in connection with the present invention can also be combined with various additives for desired effect. These include, for example, fillers, viscosity reducing agents, plasticizers, tackifiers, colorants (e.g., dyes or pigments), antioxidants, antistatic agents, bonding aids, antiblocking agents, slip agents, stabilizers (e.g., thermal and ultraviolet), foaming agents, microspheres, glass bubbles, reinforcing fibers (e.g., microfibers), internal release agents, thermally conductive particles, electrically conductive particles, and the like. The amounts of such materials that can be useful in the thermoplastic compositions can be readily determined by those skilled in the art of processing and using such materials.

In addition to the deposition of nonelastic or elastic thermoplastic polymer in discrete regions, it is also contemplated that additional materials can be coated onto a major surface of the substrate using known methods. Such materials could be, for example adhesives, as described in, e.g., U.S. Pat. No. 5,019,071 (Bany et al.); U.S. Pat. No. 5,028,646 (Miller et al.); and U.S. Pat. No. 5,300,057 (Miller et al.); or cohesives as described in, e.g. U.S. Pat. No. 5,389,438 (Miller et al.) and U.S. Pat. No. 6,261,278 (Chen et al.).

EXAMPLE

The following example is provided to enhance understanding of the present invention. The example is not intended to limit the scope of the invention.

To demonstrate that two different polymers can be used to produce both an elastic region and a reinforcing region on two different substrates followed by lamination, a web was prepared using the apparatus shown in FIG. **11**, except a second transfer roll, similar to the transfer roll **30**, a second rubber backup roll, similar to the rubber backup roll **20**, a second doctor blade, similar to the doctor blade **42**, and a second hot wire, similar to the hot wire **44**, were used to transfer a discrete reinforcing polymer region to a second nonwoven substrate (SONTARA 8001 spunlaced polyester, Dupont). KRATON G-1657 SEBS block copolymer was used as the molten polymer for delivery to transfer roll **30** at a melt temperature of 246° C. using a 40 mm twin screw extruder. SONTARA 8001 spunlaced polyester (Dupont) was used as the substrate **10**.

Transfer roll **30** was machined with seven different areas arranged around and across the periphery of the roll, each area having a specific depression geometry and spacing. Area **1** was machined using a computer controlled milling machine (2 mm ball diameter) to have depressions in the shape of grooves parallel to the roll axis 25 mm long, 0.75 mm in depth, 13 mm end to end spacing measured along the roll axis, 7.5 mm center to center spacing between grooves measured normal to the roll axis, with 12 rows of staggered grooves. Each row of grooves starting with a 6.4 mm shift from the previous row to create the staggered pattern. Area **2** was machined using a computer controlled milling machine (2 mm ball diameter) to have 15 rows of grooves parallel to the roll axis 114 mm long, 0.375 mm in depth, and 6.0 mm center to center spacing between grooves measured normal to the roll axis. Area **3** was machined using a computer controlled milling machine (2 mm ball diameter) to have 15 rows of grooves parallel to the roll axis 114 mm long, 0.5 mm in depth, and 6.0 mm center to center spacing between grooves measured normal to the roll axis. Area 4 was machined using a computer controlled milling machine (2 mm ball diameter) to have 12 rows of grooves parallel to the roll axis 114 mm long, 0.5 mm in depth, and 7.5 mm center to center spacing between grooves measured normal

to the roll axis. Area **5** was machined using a computer controlled milling machine (2 mm ball diameter) to have 12 rows of grooves parallel to the roll axis 114 mm long, 0.875 mm in depth, and 7.5 mm center to center spacing between grooves measured normal to the roll axis. Area **6** was machined using a computer controlled milling machine (2 mm ball diameter) to have 9 rows of grooves parallel to the roll axis 114 mm long, 1.0 mm in depth, and 10.0 mm center to center spacing between grooves measured normal to the roll axis. Area **7** was machined using a computer controlled milling machine (3 mm ball diameter) to have 9 rows of grooves parallel to the roll axis 114 mm long, 0.75 mm in depth, and 10.0 mm center to center spacing between grooves measured normal to the roll axis.

The temperature of the second transfer roll was 232° C. The brass doctor blade **42** having a thickness of 1.5 mm at the point of contact with the transfer roll **30**, was pressed firmly against and normal to the exterior surface of the transfer roll at a pressure of 123 N/lineal cm. A nip pressure of 12 N/lineal cm between the transfer roll and rubber backup roll (20° C.) was used. SC-917 polypropylene (Basell Olefins) was used as the molten polymer for delivery to the second transfer roll at a melt temperature of 227° C. using a 19 mm single screw extruder.

The second transfer roll was machined using a computer controlled milling machine to have a circle of 8 depressions around the periphery of the roll near the center of the roll positioned so as not to overlap the depressions in transfer roll **30** forming the elastic regions. The depressions were elliptical in shape 7.6 cm long and 1.9 cm in width at the widest point of the ellipse. The long axis of each ellipse was parallel to the machine direction (downweb). The ellipses were arranged with a center-to-center spacing of 8.9 cm. The elliptical depressions were machined in a seven step process. Step 1 consisted of milling 0.333 mm depth cells using a 2 mm tool in a 7.6 cm by 1.9 cm elliptical pattern. Step 2 consisted of milling 0.500 mm depth cells using a 3 mm tool. Step 3 consisted of milling 0.666 mm depth cells using a 4 mm tool. Step 4 consisted of milling 0.833 mm depth cells using a 5 mm tool. Step 5 consisted of milling 0.999 mm depth cells using a 6 mm tool. Step 6 consisted of milling 1.165 mm depth cells using a 7 mm tool. Step 7 consisted of milling 1.332 mm depth cells using a 8 mm tool. The cells were positioned such that the deeper cells were in the middle of the ellipse with progressively shallower cells tapering outwards towards the perimeter of the ellipse.

The temperature of the transfer roll was 227° C. The pressure of the doctor blade against the second transfer roll was 123 N/lineal cm. A nip pressure of 25 N/lineal cm between the transfer roll and rubber backup roll (20° C.) was used. SONTARA 8001 spunlaced polyester (Dupont) was used as the substrate. A nip pressure of 6 N/lineal cm between the two rubber rolls was used to laminate the two substrates together resulting in a web that had discrete elastic polymeric regions and discrete reinforcing polymer regions.

The preceding specific embodiments are illustrative of the practice of the invention. This invention may be suitably practiced in the absence of any element or item not specifically described in this document. The complete disclosures of all patents, patent applications, and publications are incorporated into this document by reference as if individually incorporated. Various modifications and alterations of this invention will become apparent to those skilled in the art without departing from the scope of this invention. It should be understood that this invention is not to be unduly limited to illustrative embodiments set forth herein.

What is claimed is:

1. An elastic article comprising: a substrate comprising first and second major surfaces;

one or more reinforcing discrete polymeric regions attached to the substrate, wherein each reinforcing discrete polymeric region of the one or more reinforcing discrete polymeric regions comprises a nonelastomeric thermoplastic composition that infiltrates a portion of substrate; and

one or more elastic elements attached to the substrate, wherein each elastic element of the one or more elastic elements comprises an elastic discrete polymeric region comprising an elastomeric thermoplastic composition that infiltrates a portion of the substrate.

2. An article according to claim **1**, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each elastic element of the one or more elastic elements is located between the first substrate and the second substrate.

3. An article according to claim **1**, wherein at least one elastic element of the one or more elastic elements is located on the first major surface of the substrate.

4. An article according to claim **1**, wherein at least one elastic element of the one or more elastic elements is located on the second major surface of the substrate.

5. An article according to claim **1**, further comprising an elongation axis, wherein each elastic element of the one or more elastic elements comprises a length greater than a width, and wherein the length of each elastic element of the one or more elastic elements is aligned with the elongation axis.

6. An article according to claim **5**, wherein the amount of elastomeric thermoplastic in each elastic element of the one or more elastic elements increases when moving away from the one or more reinforcing discrete polymeric regions along the elongation axis.

7. An article according to claim **1**, wherein at least one reinforcing discrete polymeric region of the one or more reinforcing discrete polymeric regions comprises an opening formed through the substrate within a surrounding ring formed of the nonelastomeric thermoplastic composition of the at least one reinforcing discrete polymeric region.

8. An article according to claim **1**, further comprising one or more slits formed through the substrate, wherein at least one of the one or more elastic elements spans at least one slit of the one or more slits.

9. An article according to claim **1**, further comprising one or more pleats formed in the substrate, wherein at least one of the one or more elastic elements spans at least one pleat of the one or more pleats.

10. An article according to claim **9**, wherein at least some elastic elements of the one or more elastic elements spans only one pleat of the one or more pleats.

11. An article according to claim **9**, at least some elastic elements of the one or more elastic elements span two or more pleats of the one or more pleats.

12. A composite web comprising:

a substrate comprising first and second major surfaces;

a plurality of nonelastomeric discrete polymeric regions attached to the substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions comprises a nonelastomeric thermoplastic composition that infiltrates a portion of substrate;

a plurality of elastomeric discrete polymeric regions attached to the substrate, wherein each elastomeric

discrete polymeric region of the plurality of elastomeric discrete polymeric regions comprises an elastomeric thermoplastic composition that infiltrates a portion of the substrate; and

one or more lines of separation in the composite web, wherein the one or more lines of separation define boundaries of a plurality of distinct articles in the composite web, and wherein each article of the plurality of articles comprising at least one nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions and at least one elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions.

13. A composite web according to claim **12**, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions is located between the first substrate and the second substrate.

14. A composite web according to claim **12**, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each elastomeric discrete polymeric region of the plurality of elastomeric discrete polymeric regions is located on the first major surface or the second major surface of the substrate.

15. A composite web according to claim **12**, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions is located between the first substrate and the second substrate.

16. A composite web according to claim **12**, wherein the substrate comprises a laminated substrate comprising a first substrate and a second substrate, wherein each nonelastomeric discrete polymeric region of the plurality of nonelastomeric discrete polymeric regions is located on the first major surface or the second major surface of the substrate.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,875,710 B2
DATED : April 5, 2005
INVENTOR(S) : Eaton, Bradley W.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,

Item [56], **References Cited**, U.S. PATENT DOCUMENTS, please add:

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,875,710 B2
DATED : April 5, 2005
INVENTOR(S) : Eaton, Bradley W.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, (cont'd),
FOREIGN PATENT DOCUMENTS, please add:

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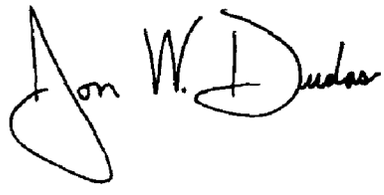
Signed and Sealed this

Sixth Day of December, 2005



JON W. DUDAS
Director of the United States Patent and Trademark Office