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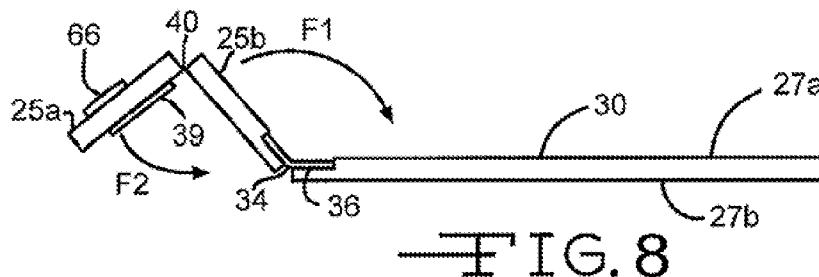
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(54) **Title:** HIP AND RIDGE ROOFING MATERIAL



(57) **Abstract:** A shingle blank (26) is provided. The shingle blank (26) includes a substrate (44) coated with an asphalt coating (46) and a first fold region (25a), a second fold region (25b), a third region (30), a lower edge (29b) and an upper edge (29a). The shingle blank (26) has a length. The first fold region (25a) extends substantially across the length of the shingle blank (26). The second fold region (25b) extends substantially across the length of the shingle blank (26) and is positioned between the first fold region (25a) and third region (30). A first perforation line (34) is positioned between the second fold region (25b) and third region (30). A second perforation line (40) is positioned between the first fold region (25a) and second fold region (25b). The first and second perforation lines (34, 40) are sufficient to facilitate folding of the first fold region (25a) and the second fold region (25b) on top of the third region (30) to form a three layered stack (53) configured to be applied across a ridge or hip.

HIP AND RIDGE ROOFING MATERIAL

5 **CROSS-REFERENCE TO RELATED APPLICATIONS**

The present application claims priority to and any other benefit of co-pending U.S. Patent Application Serial No. 12/392,392, entitled HIP AND RIDGE ROOFING MATERIAL, filed February 25, 2009, the disclosure of which is incorporated herein by reference in its entirety

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BACKGROUND

Asphalt-based roofing materials, such as roofing shingles, roll roofing and commercial roofing, are installed on the roofs of buildings to provide protection from the elements. The roofing material may be constructed of a substrate such as a glass fiber mat or an organic felt, an asphalt coating on the substrate, and a surface layer of granules embedded in the asphalt coating.

Roofing materials are applied to roofs having various surfaces formed by roofing planes. The various surfaces and roofing planes form intersections, such as for example, hips and ridges. A ridge is the uppermost horizontal intersection of two sloping roof planes. Hips are formed by the intersection of two sloping roof planes running from a ridge to the eaves. It would be desirable to improve the methods used to manufacture hip and ridge roofing material to be more efficient.

SUMMARY

25 In accordance with embodiments of this invention there are provided shingle blanks. The shingle blanks include a substrate coated with an asphalt coating and a first fold region, a second fold region, a third region, a lower edge and an upper edge. The shingle blank has a length. The first fold region extends substantially across the length of the shingle blank. The second fold region extends substantially across the length of the shingle blank and is positioned between the first fold region and the third region. A first perforation line is positioned between the second fold region and the third region. A second perforation line is positioned between the first fold region and the second fold

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region. The first and second perforation lines are sufficient to facilitate folding of the first fold region and the second fold region on top of the third region to form a three layered stack configured to be applied across a ridge or hip.

Various advantages of this invention will become apparent to those skilled in the art from the following detailed description of the invention, when read in light of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a building structure incorporating the hip and ridge roofing material in accordance with embodiments of this invention.

Fig. 2 is a perspective view of the installation of the ridge roofing material of Fig. 1.

Fig. 3 is a perspective view of an upper surface of a shingle blank used for making the hip and ridge roofing material of Fig. 2.

Fig. 4 is a perspective view of a bottom surface of a shingle blank used for making the hip and ridge roofing material of Fig. 2.

Fig. 5 is an enlarged cross-sectional view, taken along the line 5-5 of Fig. 3, of a portion of the hip and ridge roofing material of Fig. 3.

Fig. 6 is a perspective view of the shingle blank of Fig. 3 illustrating the formation of the individual hip and ridge roofing material of Fig. 2.

Fig. 7 is a side view in elevation of the individual hip and ridge roofing material of Fig. 6 prior to forming the hip and ridge roofing material of Fig. 2.

Fig. 8 is a side view in elevation of an individual hip and ridge roofing material of Fig. 6 illustrating the folds forming the hip and ridge roofing material of Fig. 2.

Fig. 9 is a side view in elevation of an individual hip and ridge material of Fig. 2.

Fig. 10 is a schematic view in elevation of apparatus for manufacturing the hip and ridge roofing material of Fig. 2.

Fig. 11 is a perspective view of a second embodiment of a shingle blank used for making the hip and ridge roofing material illustrating an upper surface.

Fig. 12 is a perspective view of a bottom surface of the shingle blank of Fig. 11.

Fig. 13 is an enlarged cross-sectional view, taken along the line 13-13 of Fig. 11, of a portion of the shingle blank of Fig. 11.

Fig. 14 is a perspective view of the shingle blank of Fig. 11 illustrating the formation of the individual hip and ridge roofing material.

5 Fig. 15 is a side view in elevation of the shingle blank of Fig. 11 prior to forming hip and ridge roofing material.

Fig. 16 is a side view in elevation of the shingle blank of Fig. 11 illustrating the folds forming the hip and ridge roofing material.

10 Fig. 17 is a side view in elevation of a second embodiment of an individual hip and ridge roofing material.

Fig. 18 is a plan view of a reinforcement material used in the shingle blank of Fig. 11.

DETAILED DESCRIPTION OF THE INVENTION

15 The present invention will now be described with occasional reference to the specific embodiments of the invention. This invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

20 Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The terminology used in the description of the invention herein is for describing particular embodiments only and is not intended to be limiting of the invention. As used in the description of the invention and the appended claims, the
25 singular forms “a,” “an,” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise.

Unless otherwise indicated, all numbers expressing quantities of dimensions such as length, width, height, and so forth as used in the specification and claims are to be understood as being modified in all instances by the term “about.” Accordingly, unless
30 otherwise indicated, the numerical properties set forth in the specification and claims are approximations that may vary depending on the desired properties sought to be obtained in embodiments of the present invention. Notwithstanding that the numerical ranges and

parameters setting forth the broad scope of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as possible. Any numerical values, however, inherently contain certain errors necessarily resulting from error found in their respective measurements.

5 In accordance with embodiments of the present invention, a hip and ridge shingle, and methods to manufacture the hip and ridge shingle, are provided. It will be understood the term “ridge” refers to the intersection of the uppermost sloping roof planes. The term “roof plane” is defined to mean a plane defined by a flat portion of the roof formed by an area of roof deck. The term “hip” is defined to mean the intersection of sloping roof
10 planes located below the ridge. It will be understood the term “slope” is defined to mean the degree of incline of a roof plane. The term “granule” is defined to mean particles that are applied to a shingle that is installed on a roof.

The description and figures disclose a hip and ridge roofing material for a roofing system and methods of manufacturing the hip and ridge roofing material. Referring now
15 to Fig. 1, a building structure 10 is shown having a shingle-based roofing system 12. While the building structure 10 illustrated in Fig. 1 is a residential home, it should be understood that the building structure 10 can be any type of structure, such as a garage, church, arena, industrial or commercial building, having a shingle-based roofing system 12.

20 The building structure 10 has a plurality of roof planes 14a-14d. Each of the roof planes 14a-14d can have a slope. While the roof planes 14a-14d shown in Fig. 1 have their respective illustrated slopes, it should be understood that the roof planes 14a-14d can have any suitable slope. The intersection of the roof planes 14b and 14c form a hip 16. Similarly, the intersection of the roof planes 14b and 14d form a ridge 18. The building
25 structure 10 is covered by the roofing system 12 having a plurality of shingles 20.

Referring now to Fig. 2, the shingles 20 are installed on the various roof decks in generally horizontal courses 22a-22g in which the shingles 20 overlap the shingles 20 of a preceding course. The shingles 20 shown in Figs. 1 and 2 can be any suitable shingle.

Hip and ridge roofing materials are installed to protect hips and ridges from the
30 elements. As shown in Fig. 2, hip and ridge roofing materials 24 are installed in an overlapping manner on the ridge 18 and over the shingles 20. In a similar fashion, hip

roofing materials (not shown) are installed on a hip and over the shingles. The method of installing the hip and ridge roofing materials 24 will be discussed in more detail below.

Referring now to Figs. 3 and 4, hip and ridge roofing materials 24 are made from a shingle blank 26. The shingle blank 26 has an upper surface 27a, a lower surface 27b, an upper edge 29a, a lower edge 29b, a generally horizontal first perforation line 34 and a generally horizontal second perforation line 40.

As shown in Fig. 3, an optional reinforcement material 36 is positioned on the upper surface 27a. The reinforcement material 36 is positioned over the first perforation line 34 in the shingle blank 26 and is configured to prevent breakage of the shingle blank 26 as the shingle blank 26 is folded about the first perforation line 34. In one embodiment, the reinforcement material 36 is a tape formed from a polymeric material. In other embodiments, the reinforcement material 36 can be made of other suitable materials. However, configuring the shingle blank 26 to include a reinforcement material 36 is optional and not necessary for the use of the shingle blank 26.

Referring again to Fig. 3, the shingle blank 26 may have any desired dimensions. For example, a typical residential roofing shingle blank 26 has a length L of approximately 36 inches (91.5 cm) and a height H of approximately 12 inches (30.5 cm) high. However, it will be understood that other desired dimensions may be used.

As shown in Fig. 3, the shingle blank 26 includes a first fold region 25a, a second fold region 25b and a third region 30. The first fold region 25a is the area between the second perforation line 40 and the upper edge 29a. The first fold region 25a is configured to provide a nailing surface for the installation of the ridge or hip roofing material 24. The second fold region 25b is the area between the second perforation line 40 and the first perforation line 34. The first fold region 25a has a height HFF, the second fold region 25b has a height HSF and the third region 30 has a height HT. In the illustrated embodiment, the height HFF is approximately 1.75 inches (4.44 cm), the height HSF is approximately 2.00 inches (5.08 cm) and the height HT is approximately 8.25 inches (20.95 cm). In other embodiments the heights HFF, HSF and HT can be other desired dimensions, and it will be understood that the heights HFF, HSF, and HT are largely a matter of design choice.

Referring again to Fig. 3, the first fold region 25a, second fold region 25b and third region 30 extend substantially across the length L of the shingle blank 26. The term

"substantially" as used herein, is defined to mean any desired distance in a range of from between approximately one-half of the length L to the full length L.

As further shown in Fig. 3, the shingle blank 26 includes a third and fourth perforation line, 60 and 62. As will be discussed in more detail below, the third and fourth
5 perforation lines, 60 and 62, are configured to allow separation of the shingle blank 26 into three pieces, thereby forming ridge and hip roofing materials 24.

Referring again to Fig. 3, optionally the shingle blank 26 can include a sealant line 66. The sealant line 66 is configured to provide an adhesive seal for subsequent overlapping hip and ridge roofing materials 24. The sealant line 66 can be any suitable
10 adhesive and can be applied in any form or configuration in any location. In one embodiment, the sealant line 66 can be a continuous strip (not shown) or continuous strips (not shown) having a constant width. Alternatively, the sealant line 66 can be a discontinuous strip or strips having varying widths. One example of a sealant line is the sealant line of the type disclosed in U.S. Patent No. 4,738,884 to Algrim et al., the
15 disclosure of which is incorporated herein in its entirety.

As shown in Fig. 4, the lower surface 27b of the shingle blank 26 includes an optional release tape 39. The release tape 39 is positioned on the lower surface 27b of the shingle blank 26 in a location suitable to cover the optional sealant line 66 as the shingle
20 blanks 26 are stacked for storage or shipping. In the illustrated embodiment, the release tape 39 is made of a polymeric material. In other embodiments, the release tape 39 can be made of other desired materials or combinations of materials. In still other embodiments, the release tape 39 can have any desired coating or combination of coatings. The release tape 39 can have any configuration, orientation and dimensions suitable to cover the optional sealant line 66 as the shingle blanks 26 are stacked for storage or shipping.
25 However, configuring the shingle blank 26 to include a release tape 39 is optional and not necessary for the use of the shingle blank 26.

Referring now to Fig. 5, one embodiment of the composition of the shingle blank 26 is illustrated. The shingle blank 26 includes a substrate 44 that is coated with an asphalt coating 46. The substrate 44 can be any suitable substrate for use in reinforcing
30 asphalt-based roofing materials, including, but not limited to a nonwoven web, scrim or felt of fibrous materials such as glass fibers, mineral fibers, cellulose fibers, rag fibers,

mixtures of mineral and synthetic fibers, or the like. Combinations of materials can also be used in the substrate 44.

The asphalt coating 46 includes an upper section 48 that is positioned above the substrate 44 when the roofing material is installed on a roof, and a lower section 50 that is positioned below the substrate 44. The upper section 48 includes an upper surface 52. The term "asphalt coating" means any type of bituminous material suitable for use on a roofing material, including, but not limited to asphalts, tars, pitches, or mixtures thereof. The asphalt can be either manufactured asphalt produced by refining petroleum or naturally occurring asphalt. The asphalt coating 46 can include various additives and/or modifiers, such as inorganic fillers or mineral stabilizers, organic materials such as polymers, recycled streams, or ground tire rubber.

A layer of granules 42 is pressed into the upper surface 52 of the upper section 48 on either side of the reinforcement material 36. The granules 42 can be any desired granules or combination of granules. Some examples of granules include prime, headlap granules or waste granules. Optionally, the lower section 50 can be coated with a suitable backdust material 54.

Referring now to Fig. 6, the shingle blank 26 includes the third perforation line 60 and the fourth perforation line 62. The third and fourth perforation lines, 60 and 62, include perforations 64. The third and fourth perforation lines, 60 and 62, are spaced apart substantially perpendicular to the lower edge 29b of the shingle blank 26 and span the height H of the shingle blank 26. The third and fourth perforation lines, 60 and 62, are positioned such that subsequent separation of the shingle blank 26 along the third and fourth perforation lines, 60 and 62, forms hip and ridge roofing material 24. In the illustrated embodiment, each of the formed hip and ridge roofing materials 24 has a length of approximately 12.0 inches (30.48 cm). In other embodiments, the third and fourth perforation lines, 60 and 62, can be positioned relative to each other, to result in formed hip and ridge roofing materials having lengths of more or less than approximately 12.0 inches (30.48 cm).

In the illustrated embodiment, the perforations 64 extend through the upper section 48 of the asphalt coating 46, the substrate 44 and the lower section 50 of the asphalt coating 46. In other embodiments, the perforations 64 can extend through any suitable

layers of the shingle blank 26. The perforations 64 can be arranged in any suitable pattern to form the third and fourth perforation lines, 60 and 62.

In one example of a perforation pattern, the perforations 64 can be about 0.25 inches (.64 cm) long and spaced apart from edge to edge by about 0.25 inches (.64 cm). In another embodiment of a perforation pattern, the perforations 64 can be about 0.50 inches (1.27 cm) long and spaced apart from edge to edge about 0.50 inches (1.27 cm).

Alternatively, the perforations 64 can be any suitable length and can be spaced apart edge to edge by any suitable length. The perforations 64 are configured such that an installer is able to separate the shingle blanks 26 into the hip and ridge shingle blanks 69 at the installation site. In the illustrated embodiment, the third and fourth perforation lines, 60 and 62, extend the full height H of the shingle blank 26. Alternatively, the third and fourth perforation lines, 60 and 62, can extend any length sufficient to enable an installer to separate the shingle blanks 26 into the hip and ridge shingle blanks 69 at an installation site. While the embodiment shown in Fig. 6 illustrates two perforation lines, 60 and 62, it should be understood that more or less than two perforation lines, sufficient to enable an installer to separate the shingle blanks 26 into the hip and ridge shingle blanks 69, can be used.

Referring again to Fig. 6, the shingle blanks 26 arrive at the installation site having third and fourth perforation lines 60 and 62. During installation, the roofing installer separates the shingle blank 26 along the third and fourth perforation lines, 60 and 62 to form hip and ridge shingle blanks 69. The perforations 64 allow the hip and ridge shingle blanks 69 to be formed from the shingle blanks 26 as the perforations 64 allow the substrate 44 and asphalt regions, 48 and 50, to be readily separated. The hip and ridge shingle blanks 69 have perforated edges 122. The configuration of the perforations 64 result in a perforated edge 122 which in some embodiments is somewhat ragged. As one example, if the individual perforations 64 have a relatively long length or if a larger quantity of perforations 64 are used, then the perforation edges 122 are somewhat smoother. Conversely, if the individual perforations 64 have a relatively short length or if a fewer number of perforations 64 are used, then the perforation edges 122 are somewhat more ragged.

Referring now to Figs. 7-8, the hip and ridge shingle blanks 69 are formed into the hip and ridge roofing materials 24 as shown in Fig. 9 by a series of folds. First, as shown

in Fig. 7, the hip and ridge shingle blank 69 is positioned such that the upper surface 27a is facing upward and the lower surface 27b is facing downward. Next, as shown in Fig. 8, the second fold region 25b is folded about the first perforation line 34 in direction F1 at the same time the first fold region 25a is folded about the second perforation line 40 in direction F2. As shown in Fig. 9, the folds result in a three-layered stack 53 that includes the first fold region 25a, the second fold region 25b and the third region 30. The three-layered stack 53 has a leading edge 55. The optional sealant line 66 is shown on the first fold region 25a. Folding the hip and ridge single blanks 69 and forming the three layered stack 53 forms the hip and ridge roofing materials 24. As shown in Fig. 9, the resulting three layered stack 53 can have aligned edges or offset edges.

Referring again to Fig. 2, the hip and ridge roofing materials 24 are installed in an overlapping manner on the ridge 18 and over the shingles 20. As a first installation step, a three-layered stack 53 is cut from a hip and ridge roofing material 24 and fastened to the farthest downwind point on the ridge 18. As shown in Fig. 2, the direction of the wind is indicated by the arrow marked W. The three-layered stack 53 can be fastened by any desired fastening method, such as for example, roofing nails (not shown). Next, a hip and ridge roofing material 24 is installed over the three-layered stack 53 such that a portion of the hip and ridge roofing material 24 overlaps the three-layered stack 53 and the leading edge 55 of the three-layered stack 53 is facing the wind direction W. The hip and ridge roofing material 24 is fastened to the ridge 18 in any desired manner. Additional hip and ridge roofing materials 24 are installed in a similar fashion until the ridge 18 is covered.

While the hip and ridge roofing material 24 illustrated in Figs. 2 and 9 illustrates a three layered stack 53, it should be appreciated that the hip and ridge roofing material 24 can be practiced with a stack formed by more than three layers. The hip and ridge roofing material 24 having a stack of more than three layers would have a corresponding number of fold regions and would be formed by folding the various fold regions to form the stack.

Referring now to Fig. 10, an apparatus 70 for manufacturing shingle blanks 26 is illustrated. The manufacturing process involves passing a continuous sheet 72 in a machine direction (indicated by the arrow) through a series of manufacturing operations. The continuous sheet 72 usually moves at a speed of at least about 200 feet/minute (61 meters/minute), and typically at a speed within the range of between about 450 feet/minute

(137 meters/minute) and about 800 feet/minute (244 meters/minute). The continuous sheet 72, however, may move at any desired speed.

In a first step of the illustrated manufacturing process, the continuous sheet 72 of substrate or shingle mat is payed out from a roll 74. The continuous sheet 72 can be any
5 type of substrate known for use in reinforcing asphalt-based roofing materials, such as a non-woven web of glass fibers. The continuous sheet 72 may be fed through a coater 78 where an asphalt coating is applied to the continuous sheet 72. The asphalt coating can be applied in any suitable manner. In the illustrated embodiment, the continuous sheet 72 contacts a roller 73, that is in contact with a supply of hot, melted asphalt. The roller 73
10 completely covers the continuous sheet 72 with a tacky coating of hot, melted asphalt to define a first asphalt coated sheet 80. In other embodiments, however, the asphalt coating could be sprayed on, rolled on, or applied to the continuous sheet 72 by other means. In some embodiments, the asphalt material is highly filled with a ground stone filler material, amounting to at least about 60 percent by weight of the asphalt/filler combination.

15 A continuous strip of the reinforcement material 36 is then payed out from a roll 82. The reinforcement material 36 adheres to the upper surface 27a of the first asphalt coated sheet 80 to define a second asphalt coated sheet 83. In one embodiment, the reinforcement material 36 is attached to the first asphalt coated sheet 80 by the adhesive mixture of the asphalt in the first asphalt coated sheet 80. The reinforcement material 36,
20 however, may be attached to the first asphalt coated sheet 80 by any suitable means, such as other adhesives.

The resulting second asphalt coated sheet 83 is then passed beneath a series of granule dispensers 84 for the application of granules to the upper surface 27a of the second asphalt coated sheet 83. While the illustrated embodiment shows two granule
25 dispensers 84, it should be understood that any number of granule dispensers 84 can be used. The granule dispensers 84 can be of any type suitable for depositing granules onto the second asphalt coated sheet 83. A granule dispenser that can be used is a granule valve of the type disclosed in U.S. Patent No. 6,610,147 to Aschenbeck. The granule dispensers 84 are configured to provide the desired blend drops of headlap and prime
30 granules. The granule dispensers 84 are supplied with granules from sources of granules (not shown). After the granules are deposited on the second asphalt coated sheet 83 by the

series of granule dispensers 84, the second asphalt covered sheet 83 becomes a granule covered sheet 85.

In one embodiment, the reinforcement material 36 includes an upper surface to which granules substantially will not adhere. The reinforcement material 36, however, 5 may include an upper surface or portions of an upper surface to which granules will adhere. For example, the apparatus 70 may include any desired means for depositing granules onto substantially the entire second asphalt coated sheet 83, except for the portion of the second asphalt coated sheet 83 covered by the reinforcement material 36, as best shown in Fig. 3. Alternately, granules may be deposited onto substantially the entire 10 second asphalt coated sheet 83, including the reinforcement material 36, but wherein the reinforcement material 36 includes an upper surface or portions of an upper surface to which granules substantially will not adhere.

The granule covered sheet 85 is then turned around a slate drum 86 configured to press the granules into the asphalt coating and to temporarily invert the granule covered 15 sheet 85 so that the excess granules will fall off and will be recovered and reused. Turning the third asphalt coated sheet around the slate drum forms inverted sheet 88.

A continuous strip of the release tape 39 is then payed out from a roll 89 and applied to the inverted sheet 88. The release tape 39 adheres to the lower surface 27b of the inverted sheet 88 to define a taped inverted sheet 90. In one embodiment, the release 20 tape 39 is attached to the inverted sheet 88 by the adhesive mixture of the asphalt in the inverted sheet 88. The release tape 39, however, may be attached to the inverted sheet 88 by any suitable means, such as other adhesives.

In the embodiment illustrated in Fig. 10, a backdust applicator 92 is positioned to apply a thin layer of backdust material 94 to a bottom surface of the taped inverted sheet 25 90. The backdust material 94 is configured to adhere to the bottom surface of the taped inverted sheet 90 and results in a substantially less tacky bottom surface for downstream shingle production operations. In one embodiment, the backdust material 94 is sand. Alternatively, the backdust material 94 can be any material, such as for example natural rock dust or small glass particles, sufficient to adhere to the bottom surface of the taped 30 inverted sheet 90 and result in a substantially less tacky bottom surface. Application of the backdust material 94 to the taped inverted sheet 90 forms dusted inverted sheet 96.

Subsequent to the application of the backdust material 94 to the taped inverted sheet 90, the dusted inverted sheet 96 is turned around a sand drum 101 to press the backdust material 94 into the bottom surface of the dusted inverted sheet 96. Pressing the backdust material 96 into the dusted inverted sheet 96 forms pressed sheet 102.

5 Referring again to Fig. 10, the pressed sheet 102 is cooled by any suitable cooling apparatus 104, or allowed to cool at ambient temperature to form a cooled sheet 105.

The cooled sheet 105 is passed through optional sealant applicator 106. The sealant applicator 106 is configured to apply the sealant line 66 to the first fold region 25a of the cooled sheet 105. The sealant applicator 106 can be any suitable mechanism for
10 applying the sealant line 66 to the cooled sheet 105. In the illustrated embodiment, a single sealant applicator 106 is shown. Alternatively, any number of sealant applicators 106 can be used. Application of the sealant line 66 to the cooled sheet 105 forms sealant lined sheet 107.

The sealant lined sheet 107 is passed through cutting roller 108a and anvil roller
15 108b. In the illustrated embodiment, the rollers, 108a and 108b, are configured to perform several manufacturing operations. First, the cutting roller 108a and the anvil roller 108b are configured to form the perforation lines, 34, 40, 60 and 62, each having the perforations 64. As discussed above, the perforations 64 can have any desired configuration and the perforation lines, 34, 40, 60 and 62, can be positioned in any desired
20 location. The cutting roller 108a includes a plurality of perforating knives 109 configured to form the perforations 64 as the cutting roller 108a rotates and contacts the sealant lined sheet 107. Last, the cutting roller 108a and the anvil roller 108b are configured to cut the sealant lined sheet 107 to form individual shingle blanks 26.

While Fig. 10 illustrates one example of an apparatus 70 configured for forming
25 the perforations 64 and cutting the individual shingle blanks 26, it should be understood that other suitable mechanisms or combinations of mechanisms can be used.

The shingle blanks 26 are collected and packaged such that the release tape 39 positioned on the lower surface 27b of the shingle blanks 26 covers the optional sealant line 66 located on the upper surface 27a of a subsequent shingle blank 26. While the
30 embodiment shown in Fig. 10 illustrates the perforating and cutting processes as a single process, it is within the contemplation of this invention that the perforating and cutting processes can be completed at different times and by different apparatus.

While the apparatus is shown and described in terms of a continuous process, it should be understood that the manufacturing method can also be practiced in a batch process using discreet lengths of materials instead of continuous sheets.

Referring now to Figs. 11-18, a second embodiment of a shingle blank will be discussed. Referring first to Figs. 11 and 12, hip and ridge roofing materials are made from a shingle blank 226. The shingle blank 226 has an upper surface 227a, a lower surface 227b, an upper edge 229a, a lower edge 229b, a generally horizontal first perforation line 234 and a generally horizontal second perforation line 240.

As shown in Fig. 11, a reinforcement material 236 is positioned on the upper surface 227a of the shingle blank 226 and over the first perforation line 234. The reinforcement material 236 is configured for several purposes. First, the reinforcement material 236 is configured to prevent breakage of the shingle blank 226 as the shingle blank 226 is folded about the first perforation line 234. Second, as will be explained in more detail below, the reinforcement material 236 is configured to allow asphaltic material to bleed through the reinforcement material 236, thereby providing a surface for subsequently applied one or more layers of granules to adhere to. In the illustrated embodiment, the reinforcement material 236 is a tape made from a polymeric film material, such as for example polyester. In other embodiments, the reinforcement material 236 can be made from other desired materials, such as the non-limiting examples of a low permeability mat or scrim made from fibrous materials or netting. In the illustrated embodiment, the reinforcement material 236 extends substantially across the length L of the shingle blank 226. The term "substantially" as used herein, is defined to mean any desired distance in a range of from between approximately one-half of the length L to the full length L.

Referring now to Fig. 18, the reinforcement material 236 is illustrated. The reinforcement material 236 has a width WRM and a thickness. In the illustrated embodiment, the width WRM of the reinforcement material 236 is in a range of from about 1.0 inches (2.54 cm) to about 2.0 inches (5.08 cm) and the thickness is in a range of from about 50 gauge (0.0127 mm) to about 96 gauge (0.0244 mm). In other embodiments, the width WRM of the reinforcement material 236 can be less than about 1.0 inches (2.54 cm) or more than about 2.0 inches (5.08 cm) and the thickness can be less than about 50 gauge (0.0127 mm) or more than about 96 gauge (0.0244 mm).

As shown in Fig. 18, the reinforcement material 236 includes a plurality of apertures 237. The apertures 237 are configured to allow asphaltic material to bleed through the reinforcement material 236. In the illustrated embodiment, the apertures 237 are arranged in a pattern of columns and rows are present in concentrations of approximately 330 per square inch (2128 per square cm). Alternatively, the apertures 237 can be arranged randomly or in other patterns and can have concentrations of less than 330 per square inch (2128 per square cm) or more than 330 per square inch (2128 per square cm). In the illustrated embodiment, the apertures 237 have a circular shape with diameter in a range of from about 300 microns (0.3 mm) to about 500 microns (0.5 mm). Alternatively, the apertures 237 can have a diameter less than about 300 microns (0.3 mm) or more than about 500 microns (0.5 mm). In still other embodiments, the apertures 237 can have other desired shapes, including the non-limiting examples of square, and polygonal shapes as well as slits.

Referring again to Fig. 11, the shingle blank 226 has a length L-2 and a height H-2. In the illustrated embodiment, the length L-2 and the H-2 are the same as, or similar to, the length L and the height H of the shingle blank 26 discussed above and as shown in Fig. 3. However, in other embodiments, the length L-2 and the H-2 can be different from the length L and the height H of the shingle blank 26.

As shown in Fig. 11, the shingle blank 226 includes a first fold region 225a, a second fold region 225b and a third region 230. The first fold region 225a is the area between the second perforation line 240 and the upper edge 229a. The first fold region 225a is configured to provide a nailing surface for the installation of the hip and ridge roofing material 24 and further configured to provide an optional sealant area. The optional sealant area will be discussed in more detail below. The second fold region 225b is the area between the second perforation line 240 and the first perforation line 234. The first fold region 225a has a height HFF-2, the second fold region 225b has a height HSF-2 and the third region 230 has a height HT-2. In the illustrated embodiment, the heights HFF-2, HSF-2 and HT-2 are the same as, or similar to, the heights HFF, HSF and HT discussed above and as shown in Fig. 3. However, in other embodiments, the heights HFF-2, HSF-2 and HT-2 can be different from the heights HFF, HSF and HT.

Referring again to Fig. 11, the first fold region 225a, second fold region 225b and third region 230 extend substantially across the length L of the shingle blank 226.

As further shown in Fig. 11, the shingle blank 226 includes a third and fourth perforation line, 260 and 262. As will be discussed in more detail below, the third and fourth perforation lines, 260 and 262, are configured to allow separation of the shingle blank 226 into three pieces, thereby forming ridge or hip roofing materials 24.

5 Referring again to Fig. 11, optionally the shingle blank 226 can include a sealant line 266b. In the illustrated embodiment, the sealant line 266b is the same as, or similar to, the sealant line 66 discussed above and shown in Fig. 3. However in other embodiments, the sealant line 266b can be different from the sealant line 66.

Referring now to Fig. 12, the lower surface 227b of the shingle blank 226 includes
10 a release tape 239 and an optional sealant line 266a. The release tape 239 is positioned on the lower surface 227b of the shingle blank 226 in a location suitable to cover the optional sealant line 266b and also to cover the second perforation line 240. The release tape 239 is configured for several purposes. First, the release tape 239 is configured to cover the optional sealant line 266b as shingle blanks 226 are stacked for storage or shipping.
15 Second, the release tape 239 is configured to prevent breakage of the shingle blank 226 as the shingle blank 226 is folded about the second perforation line 240. In the illustrated embodiment, the release tape 239 is made of a polymeric film material having a thickness in a range of about 30 gauge to about 96 gauge. In other embodiments, the release tape 239 can be made of other desired materials or combinations of materials and can have
20 thicknesses less than about 30 gauge (0.007 mm) or more than about 96 gauge (0.024 mm).

Referring again to Fig. 12, the optional sealant line 266a is configured to provide an adhesive seal for subsequent overlapping hip and ridge roofing materials 24. In the illustrated embodiment, the sealant line 266a is the same as, or similar to, the optional
25 sealant line 266b illustrated in Fig. 11 and discussed above. Alternatively, the sealant line 266a can be different from the sealant line 266b. In some embodiments, when the shingle blanks 226 are stacked for storage and shipping, the shingle blanks 226 are flipped such that the release tape 239 of one shingle blanks substantially aligns with the sealant line 266a of a subsequently stacked shingle blank. This alignment allows for easy separation
30 of the stacked shingle blanks 226 at an installation site.

Referring again to the embodiment illustrated in Fig. 12, the release tape 239 has a width WRT in a range of from about 3.00 inches (7.62 cm) to about 4.00 inches (10.16

cm). However, in other embodiments, the width WRT of the release tape 239 can be less than about 3.00 inches (7.62 cm) or more than about 4.00 inches (10.16 cm). In still other embodiments, the release tape 239 can have any desired coatings.

Referring now to Fig. 13, one embodiment of the composition of the shingle blank 226 is illustrated. The shingle blank 226 includes a substrate 244 that is coated with an asphalt coating 246. In the illustrated embodiment, the substrate 244 is the same as, or similar to, the substrate 44 discussed above and shown in Fig. 5. In other embodiments, the substrate 244 can be different from the substrate 44.

The asphalt coating 246 includes an upper section 248 that is positioned above the substrate 244 when the roofing material is installed on a roof, and a lower section 250 that is positioned below the substrate 244. The upper section 248 includes an upper surface 252. In the illustrated embodiment, the asphalt coating 246 is the same as, or similar to, the asphalt coating 46 discussed above and shown in Fig. 5. In other embodiments, the asphalt coating 246 can be different from the asphalt coating 46.

Referring again to Fig. 13, the reinforcement material 236 is positioned on the upper surface 252 of the upper section 248 such that portions of the asphalt coating 246 bleed through the apertures (not shown) within the reinforcement material 236. The portion of the asphalt coating 246 that has bled through the reinforcement material 236 forms a reinforced portion 251 of the upper section 248. The reinforced portion 251 of the upper section 248 has a thickness TRP. In the illustrated embodiment, the thickness TRP of the reinforced portion 251 is in a range of from about 0.05 inches (1.27 mm) to about 0.30 inches (7.62 mm). In other embodiments, the thickness TRP of the reinforced portion 251 can be less than about 0.05 inches (1.27 mm) or more than about 0.30 inches (7.62 mm).

A layer of granules 242 is pressed into the upper surface 252 and the reinforced portion 251 of the upper section 48 and optionally, the lower section 250 can be coated with a suitable backdust material 254. In the illustrated embodiment, the granules 242 and the backdust material 254 are the same as, or similar to, the granules 42 and the backdust material 54 discussed above and illustrated in Fig. 5. However, in other embodiments, the granules 242 and the backdust material 254 can be different from the granules 42 and the backdust material 54.

Referring now to Fig. 14, the shingle blank 226 includes the third perforation line 260 and the fourth perforation line 262. The third and fourth perforation lines, 260 and 262, include perforations 264. In the illustrated embodiment, the third and fourth perforation lines, 260 and 262, and the perforations 264 are the same as, or similar to, the third and fourth perforation lines, 60 and 62, and perforations 64 discussed above and shown in Fig. 6. Alternatively, the third and fourth perforation lines, 260 and 262, and the perforations 264 can be different from the third and fourth perforation lines, 60 and 62, and perforations 64.

Referring again to Fig. 14, the perforations 264 are configured such that an installer is able to separate the shingle blanks 226 into the hip and ridge shingle blanks 269 at the installation site. Optionally a plurality of headlap courtesy cuts 268a are positioned in the first fold region 225a and a plurality of prime courtesy cuts 268b are positioned in the third region 230 of the shingle blank 226. In the illustrated embodiment, the headlap courtesy cuts 268a are configured to substantially align with a corresponding prime courtesy cut 268b, and the aligned headlap and prime courtesy cuts, 268a and 268b, are further aligned along the perforation lines, 260 and 262. As shown in the illustrated embodiment, the headlap courtesy cuts 268a and the prime courtesy cuts 268b extend substantially through the thickness of the shingle blank 226. In other embodiments, the courtesy cuts, 268a and 268b, can extend through any suitable layers of the shingle blank 226. The headlap and prime courtesy cuts, 268a and 268b, have a length. In the illustrated embodiment, the length of the headlap and prime courtesy cuts, 268a and 268b, is in a range of from about 1.0 inches (2.54 cm) to about 5.0 inches (12.7 cm). In other embodiments, the length of the headlap and prime courtesy cuts, 268a and 268b, can be less than about 1.0 inches (2.54 cm) or more than about 5.0 inches (12.7 cm). While the illustrated embodiment shows the headlap courtesy cuts 268a and the prime courtesy cuts 268b as being the same length, it should be understood that headlap courtesy cuts 268a and the prime courtesy cuts 268b can be different lengths. The courtesy cuts, 268a and 268b, are configured to assist the installer in separating the shingle blanks 226. As will be explained below in more detail, the courtesy cuts, 268a and 268b, are provided in the shingle blank 226 during the manufacture of the shingle blank 226.

Referring again to Fig. 14, the shingle blanks 226 arrive at the installation site having third and fourth perforation lines 260 and 262. During installation, the roofing

installer separates the shingle blank 226 along the third and fourth perforation lines, 260 and 262 to form the hip and ridge shingle blanks 269 in a manner as discussed above and as shown in Fig. 6.

Referring now to Figs. 15-16, the hip and ridge shingle blanks 269 are formed into the hip and ridge roofing materials 224 as shown in Fig. 17 by a series of folds. First, as shown in Fig. 15, the hip and ridge shingle blank 69 is positioned such that the upper surface 227a is facing upward and the lower surface 27b is facing downward. Next, as shown in Fig. 16, the second fold region 225b is folded about the first perforation line 234 in direction F201 at the same time the first fold region 225a is folded about the second perforation line 240 in direction F202. As shown in Fig. 17, the folds result in a three-layered stack 253 that includes the first fold region 225a, the second fold region 225b and the third region 230. The three-layered stack 253 has a leading edge 255. The optional sealant line 266b is shown on the first fold region 225a and the optional sealant line 266a is shown on the lower surface 227b. Folding the hip and ridge single blanks 269 and forming the three layered stack 253 forms the hip and ridge roofing materials 224. The hip and ridge roofing materials 224 are installed in an overlapping manner similar to the installation of the hip and ridge roofing materials 24 as previously described and as shown in Fig. 2.

As shown in Fig. 17, the resulting three layered stack 253 has substantially aligned edges. Optionally, the resulting three layered stack can have offset edges.

While the hip and ridge roofing material 224 illustrated in Fig. 17 shows a three layered stack 253, it should be appreciated that the hip and ridge roofing material 224 can be practiced with a stack formed by more than three layers. The hip and ridge roofing material 224 having a stack of more than three layers would have a corresponding number of fold regions and would be formed by folding the various fold regions to form the stack.

In one embodiment, the shingle blanks 226 are generally manufactured in a manner similar to the manufacture of the shingle blanks 26 described above and illustrated in Fig. 10 with a few exceptions.

First, as the reinforcement material 236 adheres to the upper surface 227a of the asphalt coated sheet, the reinforcement material 236 is configured to allow asphaltic material to bleed through the apertures 237 of the reinforcement material 236, thereby forming the reinforced portion 251 of the upper section 248 as illustrated in Fig. 13.

Second, in addition to being configured to form the perforation lines 34, 40, 60 and 62 and cutting the sealant lined sheet to form individual shingle blanks, the cutting roller 108a and anvil roller 108b are further configured to form the courtesy cuts, 268a and 268b.

5 While Fig. 10 illustrates one example of an apparatus 70 configured for forming the perforations 264, the optional courtesy cuts 268a and 268b and cutting the individual shingle blanks 226, it should be understood that other suitable mechanisms or combinations of mechanisms can be used.

10 The shingle blanks 226 are collected and packaged such that the release tape 239 positioned on the lower surface 227b of the shingle blanks 226 covers the optional sealant line 266b located on the upper surface 227a of a subsequent shingle blank 226. While the embodiment shown in Fig. 10 illustrates the perforating and cutting processes as a single process, it is within the contemplation of this invention that the perforating and cutting processes can be completed at different times and by different apparatus.

15 The principle and mode of operation of this invention have been described in certain embodiments. However, it should be noted that this invention may be practiced otherwise than as specifically illustrated and described without departing from its scope.

CLAIMS

1. A shingle blank (26) comprising:
 - a substrate (44) coated with an asphalt coating (46), the shingle blank (26) having a length, an upper edge (29a) and a lower edge (29b);
 - characterized in that the substrate includes a first fold region (25a), a second fold region (25b) and a third region (30), the first fold region (25a) extending substantially across the length of the shingle blank (26), the second fold region (25b) extending substantially across the length of the shingle blank (26) and positioned between the first fold region (25a) and the third region (30);
 - a first perforation line (34) positioned between the second fold region (25b) and the third region (30); and
 - a second perforation line (40) positioned between the first fold region (25a) and the second fold region (25b);
 - wherein the first and second perforation lines (34, 40) are sufficient to facilitate folding of the first fold region (25a) and the second fold region (25b) on top of the third region (30) to form a three layered stack (53) configured to be applied across a ridge or hip.
2. The shingle blank (226) of claim 1, wherein a reinforcement material (236) is positioned over the first perforation line (234) and configured to reinforce the first perforation line (234), the reinforcement material (236) including a plurality of apertures (237) configured to allow the asphalt coating (246) to bleed through the reinforcement material (236).
3. The shingle blank (226) of claim 2, wherein the portion of the shingle blank (226) having the asphalt coating (246) bled through the reinforcement material (236) forms a reinforced region (251).
4. The shingle blank (226) of claim 1, wherein a release tape (239) is positioned over the second perforation line (240) and configured to span a portion of the first fold region (225a) and the second fold region (225b), the release tape (239) configured to reinforce the second perforation line (240).

5. The shingle blank (226) of claim 4, wherein the shingle blank (226) has a lower surface (227b), wherein the release tape (239) is positioned on the lower surface (227b).

6. The shingle blank (226) of claims 1, 2, 3, 4 or 5, wherein the first fold region (225a), the second fold region (225b) and the third region (230) are covered with prime granules (242).

7. The shingle blank (226) of claims 1, 2, 3, 4, 5 or 6, wherein the three layered stack (253) is positioned at one end of the shingle blank (226).

8. The shingle blank (226) of claims 1, 2, 3, 4, 5, 6 or 7, wherein the first fold region (225a) and the second fold region (225b) have a height, wherein the height of the first fold region (225a) and the second fold region are different (225b).

9. The shingle blank (226) of claim 2, wherein the reinforcement material (236) is positioned on an upper surface (227a) of the shingle blank (226).

10. The shingle blank (226) of claims 1, 2, 3, 4, 5, 6, 7, 8, or 9, wherein at least two additional perforation lines (260, 262) extend substantially across the shingle blank (226) in a direction substantially perpendicular to the lower edge (229b) of the shingle blank (226), wherein the at least two additional perforation lines (260, 262) are sufficient to facilitate separation of the shingle blank (226).

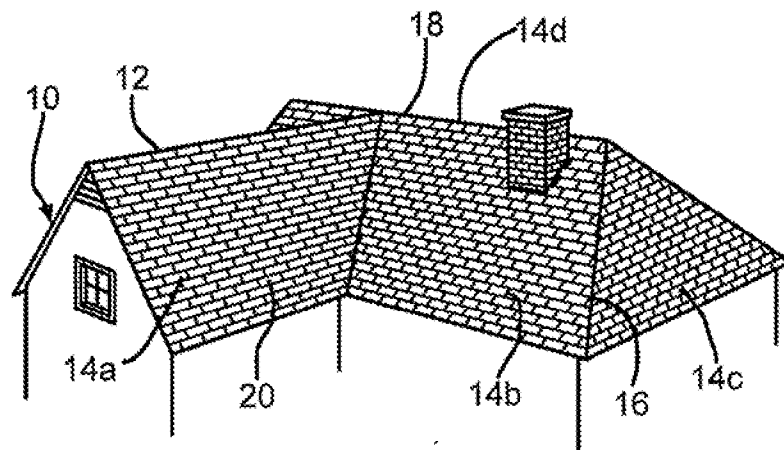


FIG. 1

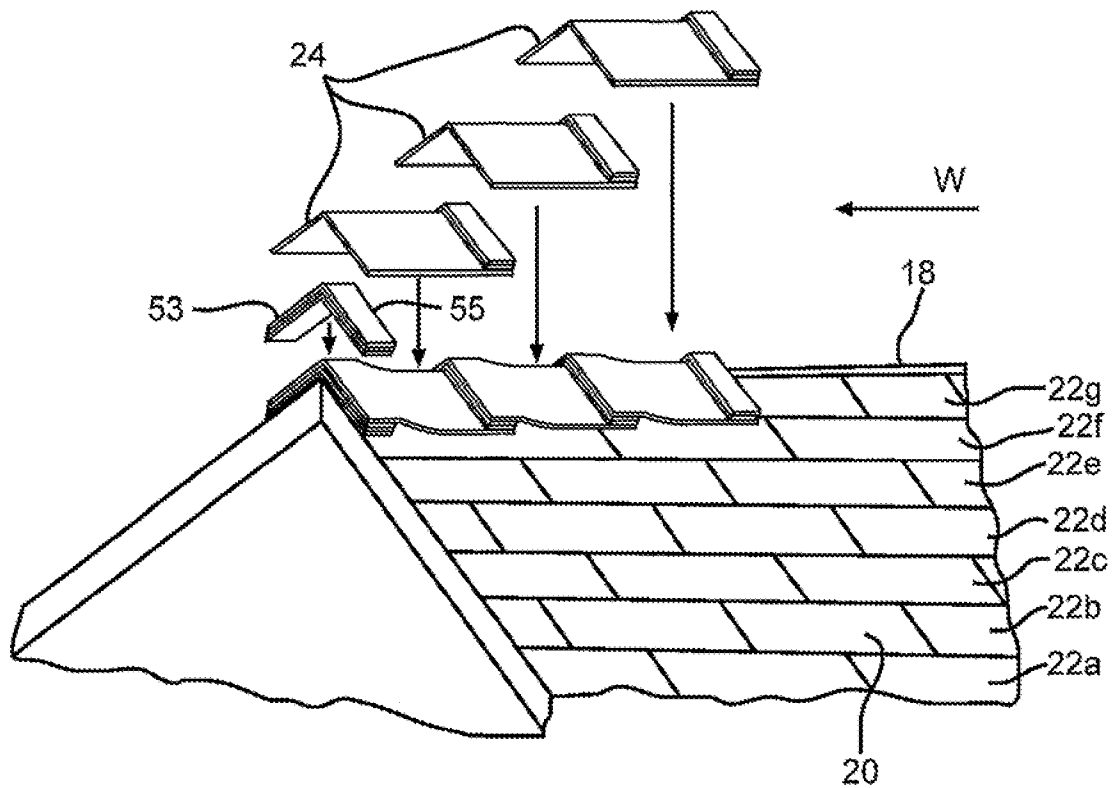


FIG. 2

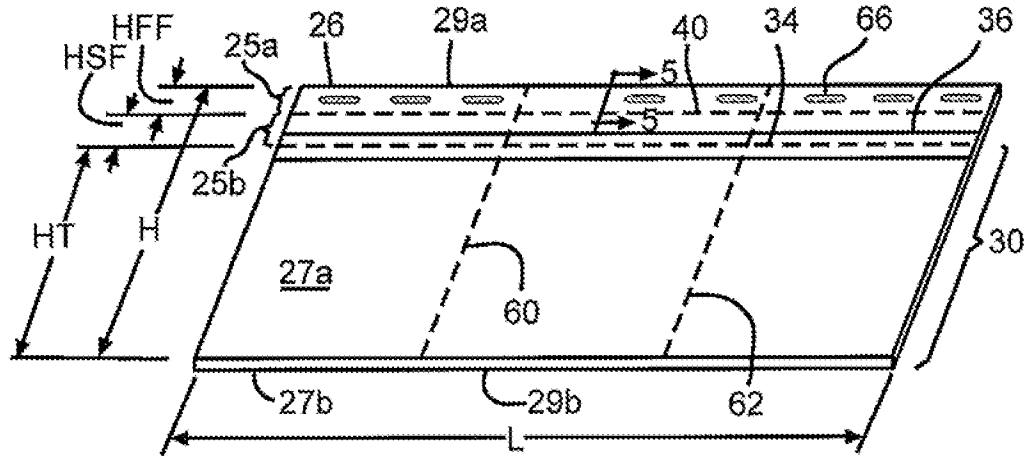


FIG. 3

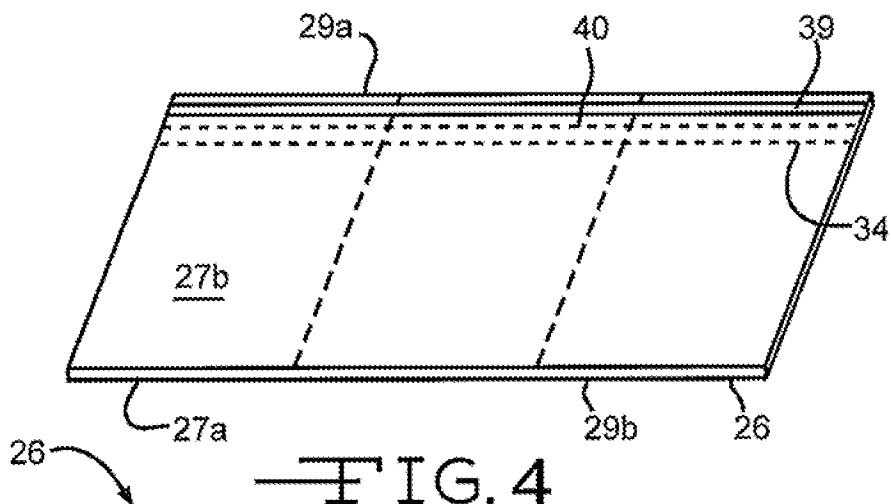


FIG. 4

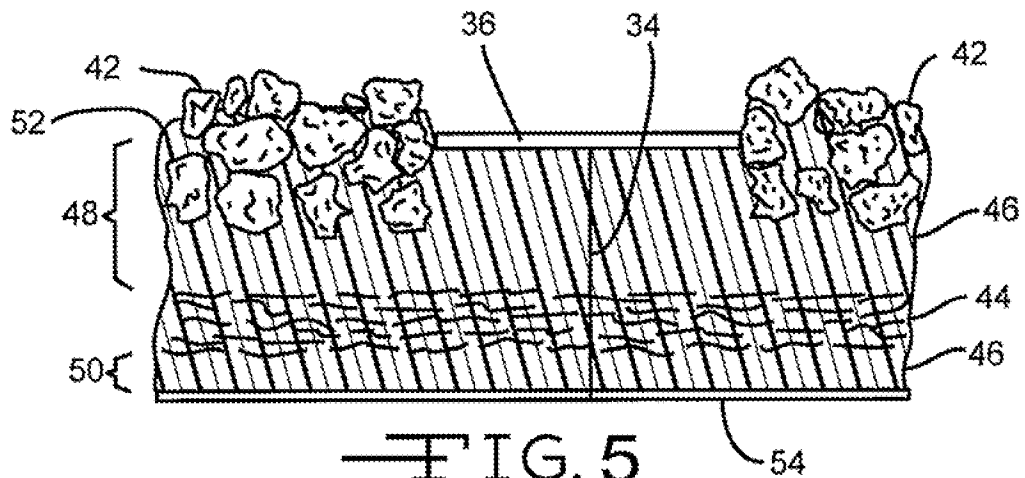


FIG. 5

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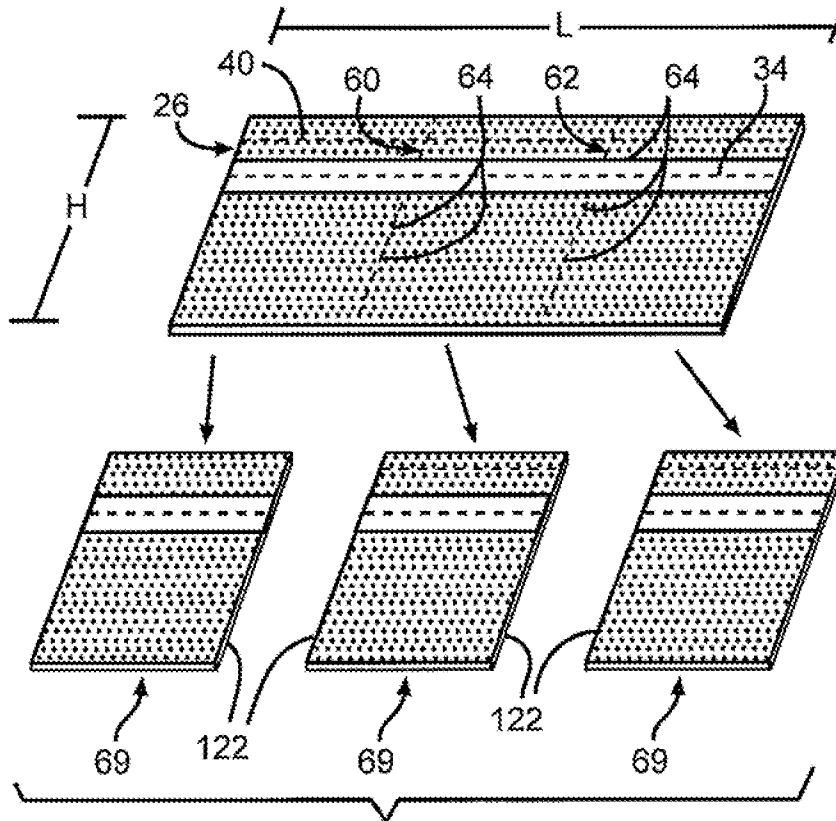


FIG. 6

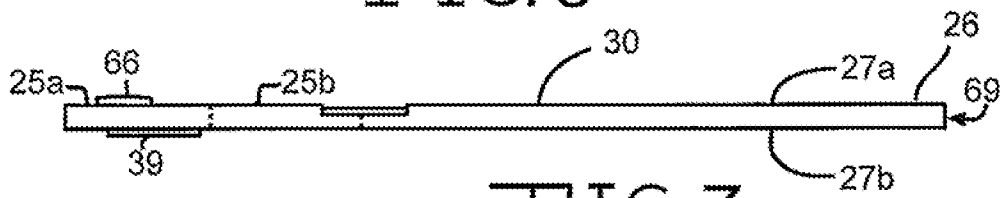


FIG. 7

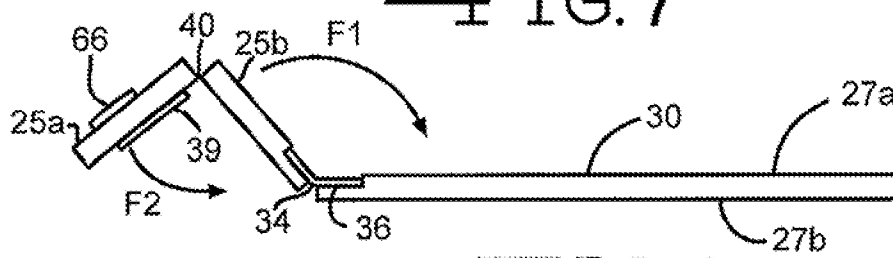


FIG. 8

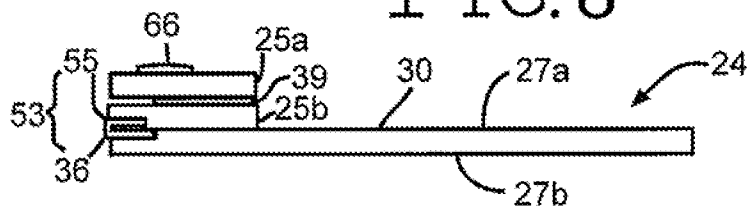


FIG. 9

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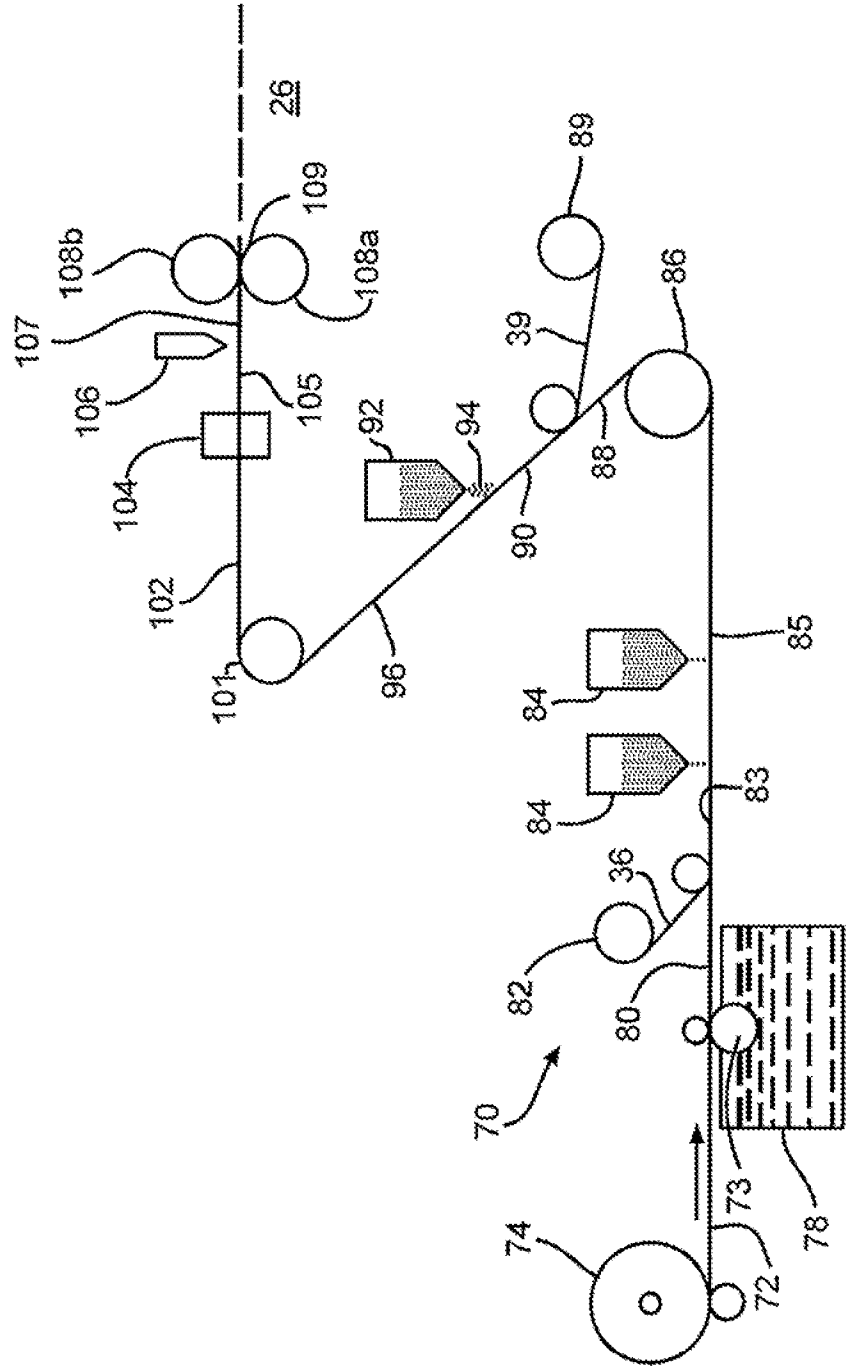


FIG. 10

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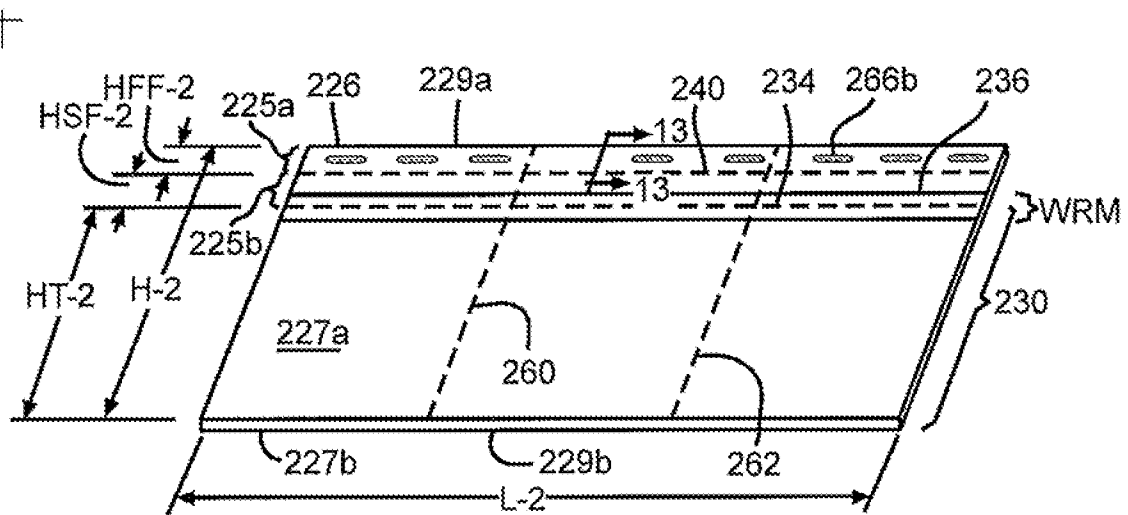


FIG. 11

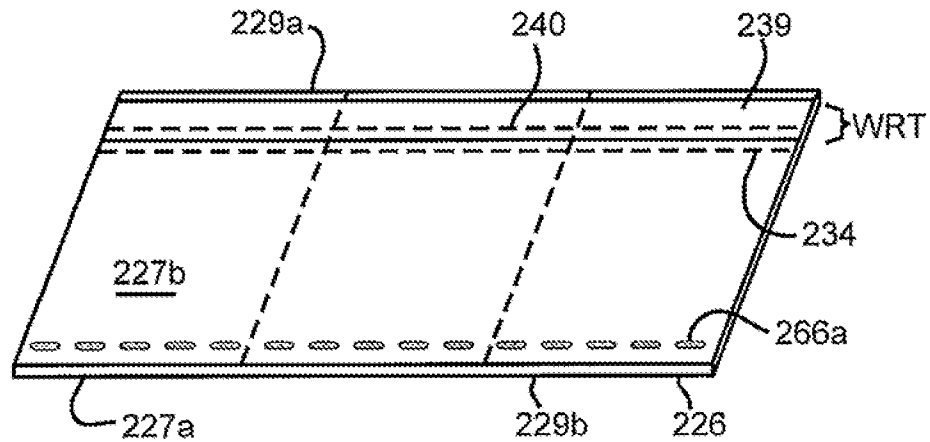


FIG. 12

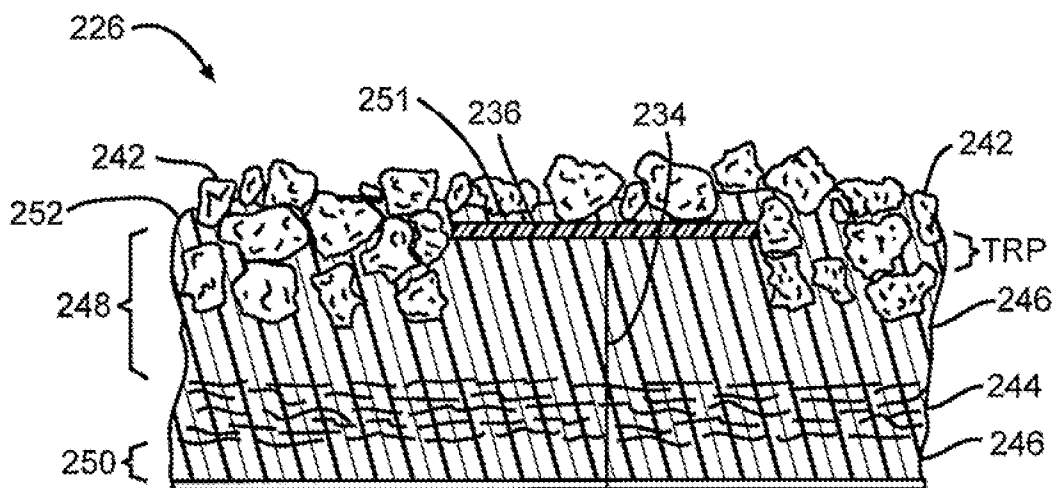


FIG. 13 254

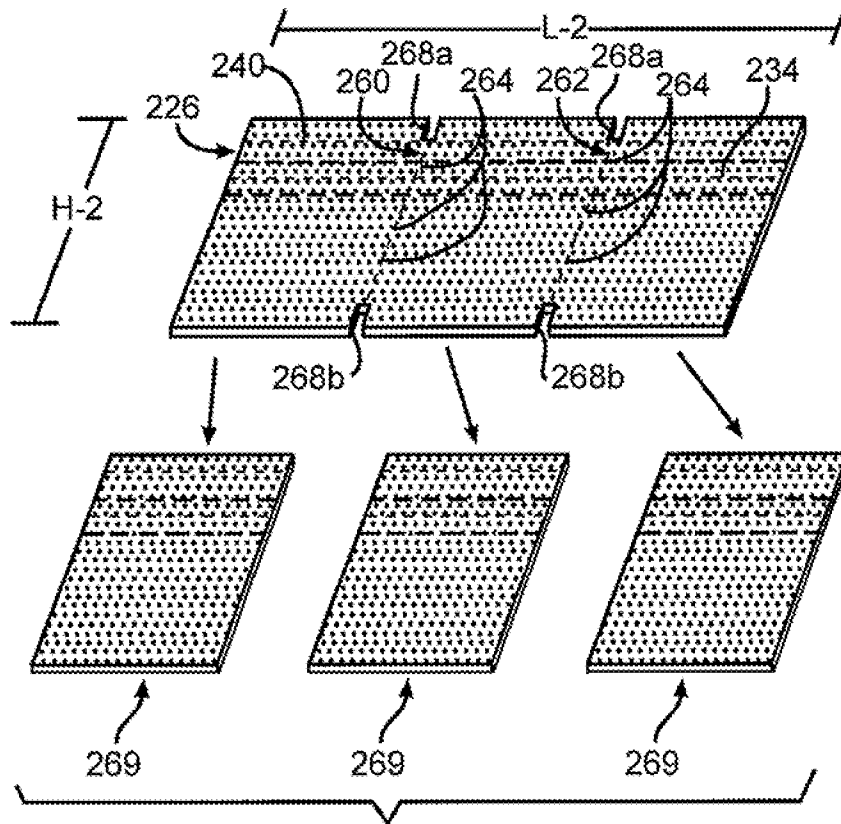


FIG. 14

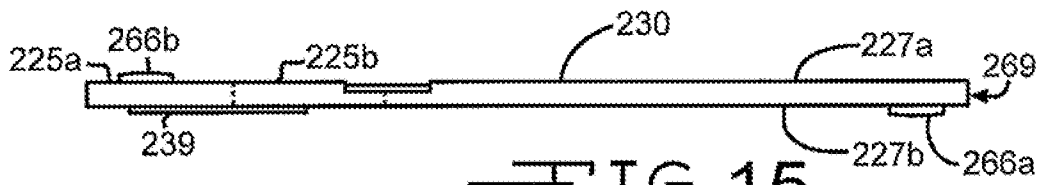


FIG. 15

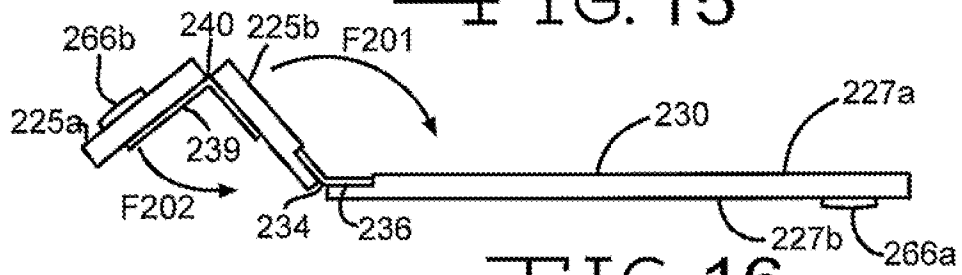


FIG. 16

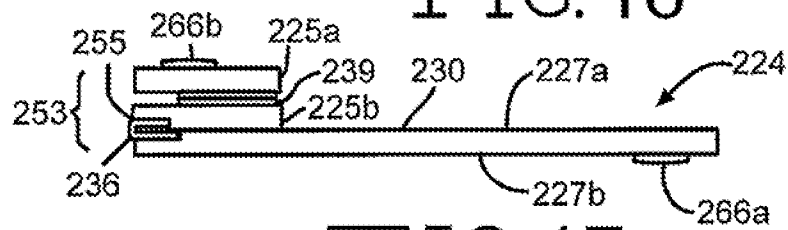


FIG. 17

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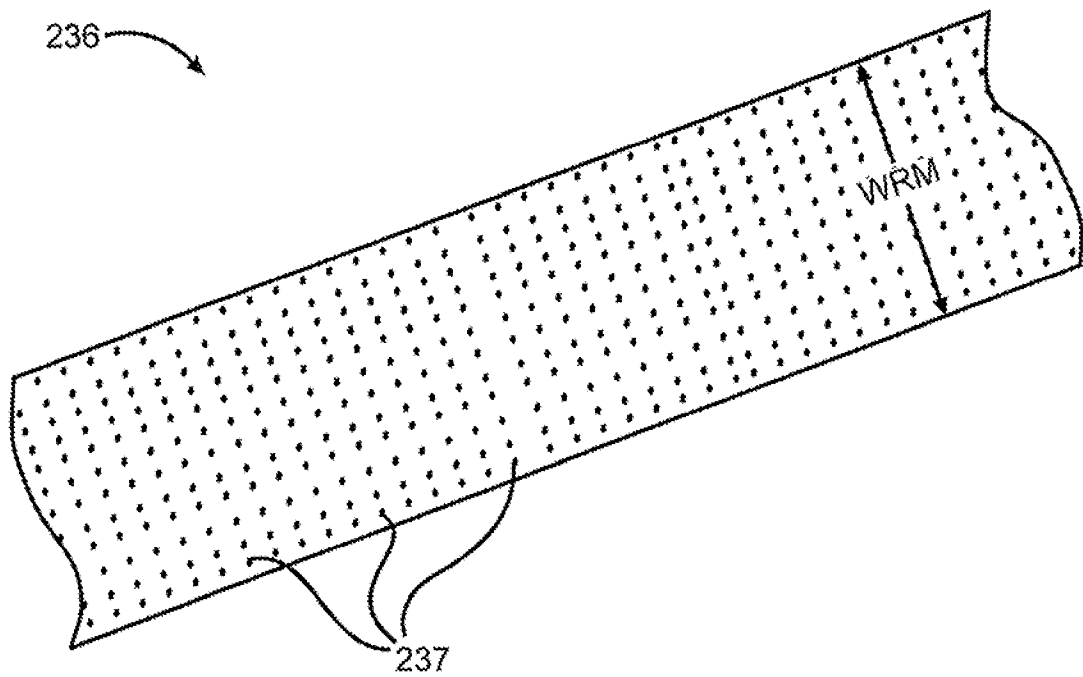


FIG. 18

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/023541

A. CLASSIFICATION OF SUBJECT MATTER
 INV. E04D1/20 E04D1/30
 ADD.

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)
 E04D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 3 913 294 A (FREIBORG BENNIE) 21 October 1975 (1975-10-21) column 4, line 35 - line 53 -----	1
A	US 5 247 771 A (POPLIN JAMES E [US]) 28 September 1993 (1993-09-28) column 2, line 22 - line 37; figures 2-5 ----- -/--	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

30 June 2010

Date of mailing of the international search report

06/07/2010

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 Fax: (+31-70) 340-3016

Authorized officer

Demeester, Jan

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/023541

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y		2,3,9
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/023541

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