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(54) Title: DUAL-COLORED MULCH MAT WITH REALISTIC APPEARANCE

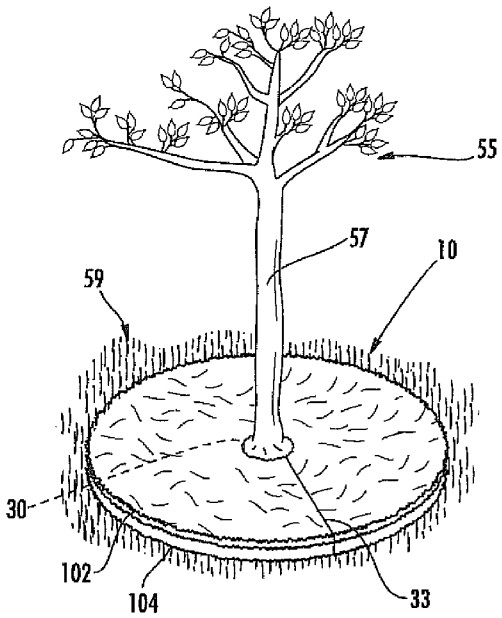


FIG. 1

(57) Abstract: The present mulch mats exhibit a realistic appearance and have different colors and/or textures on opposite sides. The present elastomeric mulch mats are thus reversible, and each side includes rubber components, a curable binder holding the components together, and a coloring agent. The rubber components may be rubber buffings and/or rubber granules, for example. The mat features a perimeter edge, a lower surface, and an upper surface opposite the lower surface, the upper and lower surfaces having different colors. The first and second colors in this aspect may be red, white, brown, green, blue, sandstone, black, or some other color, the first color being different from the second color. The first and second colors are derived from respective coloring pigments.

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# DUAL-COLORED MULCH MAT WITH REALISTIC APPEARANCE

## TECHNICAL FIELD

**[0001]** The present disclosure relates to dual-colored, decorative ground cover useful for the protection of trees and plants and for covering other outdoor areas (such as walkways). More particularly, the disclosure is directed to reversible rubber mat products that provide a realistic appearance characteristic of natural mulch and that exhibit different colors on opposite sides. Also provided herein are natural-looking rubber mat products that may include fertilizer compounds, which nurture the plants surrounded by the mat products. Processes for producing such dual-colored mat products are also provided.

## BACKGROUND

**[0002]** To beautify lawns, gardens, and other outdoor grounds, natural mulching systems—such as natural bark, wood products, peat, pine needles, and the like—are commonly used for mulching around trees, plants, and other items. In addition to their aesthetic function, these natural mulching systems protect the root systems of the surrounded plant life from sometimes harsh environmental conditions and also inhibit weed and grass growth in the areas that have been mulched. As a result, the need for mowing or trimming in close proximity to the surrounded plant life is minimized, thereby reducing the risk that the plant life may be damaged by these activities.

**[0003]** Natural mulching systems have several attendant disadvantages, however. First, because the materials are natural, they tend to degrade (i.e., deteriorate or fade) over time due to exposure to the elements. Natural mulching elements may further be eroded by hard rains, routine watering, or wind, for example, leaving the ground thereunder subject to erosion and other environmental conditions. Consequently, the mulch systems require on-going maintenance and replenishment to ensure an adequate level of protection and to preserve a groomed appearance. Such continuing care may be expensive and cumbersome to maintain, leaving some areas exposed for some period of time.

**[0004]** Another disadvantage of some mulching systems may be the tendency of the mulching systems themselves to absorb water, thereby preventing water from seeping through the mulching system to the underlying roots. Alternately, or in addition, some mulching systems exhibit a tendency to draw water or moisture away from the underlying roots by capillary action. In each instance, the risk of damage to the plants may be increased, if such conditions exist for a long period.

**[0005]** Yet another shortcoming of natural mulching systems may be that such systems provide few, if any, nutrients to the underlying roots of plants that they surround. For example, a gardener or groundskeeper may have to apply fertilizer before the mulching system is installed or with some frequency after installation. Such efforts may be ineffective or labor-intensive, especially if the mulching system is applied over an impermeable landscape sheet.

**[0006]** To address some of these problems, artificial mulching systems have been introduced, in which rubber or other synthetic materials are chipped or ground to a desired size and/or shape. In some instances, loose rubber chips or granules may be arranged around a desired area (such as a flower bed), in much the same manner as conventional natural mulch. In other instances, the rubber chips or granules are secured with a binder composition to form a mulch mat, as described, for example, in US Patent No. 5,396,731 to Byrne. The production process for manufacturing these and similar rubber mats, however, may sometimes lead to an unnatural appearance, either because the binder causes the finished mat to appear shiny or because the mat surfaces are smoothed to create a mat of a substantially uniform thickness.

**[0007]** Another drawback of both natural and artificial mulch systems is that the consumer may only purchase mulch or a mulch mat of a single color. If the consumer desires a different color (or if the color fades, as may happen with natural mulch), then a subsequent purchase and reinstallation are required. In the case of natural mulch, consumers have the option of purchasing and applying mulch dye to their faded mulch, but such applications may be costly, messy, and burdensome.

**[0008]** To satisfy consumer interest in mulch products of different colors, many retail stores are compelled to allot additional floor or shelf space for similar products of different colors. Where additional shelf or floor space is unavailable, the store may be forced to stock the one or two colors that previously have been most popular. As a

result, the retailer may have to accommodate special orders from customers who want a product of a color different from the one or two the retailer may have elected to stock.

**[0009]** Accordingly, the consumer and retailer would each benefit from the production of a realistic-appearing artificial mulch pad, which includes opposing sides of different colors; which minimizes the floor or shelf space necessary to display the product due to its reversibility; and which facilitates an easy transition from one appearance to another, due to its lightweight construction.

## SUMMARY

**[0010]** The present disclosure is directed in general to dual-colored mats made from rubber, and, particularly, from recycled rubber. The mats may be used to create natural but manicured edges around trees, shrubbery, flower beds, posts, poles and the like to define lawn boundaries and to inhibit grass and weed growth in the covered areas. The mats may also be used to create larger manicured edges or areas for walkways or for situating water hose storage carts, outdoor garden supply sheds, playground equipment and the like in order to render mowing or trimming around or under such items unnecessary.

**[0011]** In one aspect, the present mulch mats exhibit a realistic appearance and have different colors on opposite sides. The present elastomeric mulch mats are thus reversible, and each side includes rubber components, a binder holding the components together, and a coloring agent. The rubber components may be rubber

buffings and/or rubber granules, for example. The mat features a perimeter edge, a lower surface, and an upper surface opposite the lower surface, the upper and lower surfaces having different colors. The first and second colors in this aspect may be red, white, brown, green, blue, sandstone, black, or some other color, the first color being different from the second color. The first and second colors are derived from respective coloring pigments.

**[0012]** To simulate the appearance of natural mulch, the rubber buffings may be randomly oriented within the mat, resulting in the angular positioning of the rubber buffings relative to each other and in the creation of uneven, or jagged, surfaces. The thickness of the mat, as measured from the lower surface to the upper surface, varies from point to point, due to the irregular texture produced by the randomly projecting rubber buffings. The rough texture and variable thickness produce an appearance more characteristic of natural mulch.

**[0013]** In another aspect, the mulch mats may exhibit different textures on opposite sides, in addition to, or instead of, different colors. For example, one side may include rubber buffings, binder, and a first colorant to resemble shredded wood mulch or pine needles, while the opposite side may include rounded rubber granules, binder, and a second colorant to resemble small pebbles. In keeping with this theme, the first side may be brown or reddish in color, and the second side may be gray.

**[0014]** According to other aspects, the mulch mat may include rubber buffings, rubber granules, fibers, an anti-gloss agent, a fertilizer compound, and various combinations of the above. In those mats where a fertilizer compound is present, the fertilizer may be in granular form. The fertilizer may be primarily located on a single surface of the mat, may be localized on both outer surfaces of the mat, or may be intimately mixed with the rubber components within the mat.

**[0015]** In the production of such elastomeric mats, rubber components (i.e., buffings or granules) are combined with at least a binder and a first coloring agent (e.g., a pigment) to create a first matrix that is subsequently shaped and cured in a mold to form a first layer of the mat. A second rubber matrix is similarly produced, using at least rubber components, a binder, and a second coloring agent having a color different from that of the first coloring agent. The second rubber matrix may be introduced onto the first layer, via a cap placed over the mold, or may be molded separately and then secured to the first layer. In some aspects, the rubber matrices are roughly distributed (e.g., manually) to preserve an uneven texture and, thus, a more natural appearance. Catalysts may be used to promote curing.

**[0016]** The dual-colored mats may have a variety of color combinations; for instance, brown on one of their sides and red on the opposite side. Accordingly, a home improvement store, garden store or the like is able to offer a choice of at least two colored products to consumers while using only one section of limited floor or shelf space. Whereas one consumer may want a brown mat and another consumer may

want a red mat, both consumers can each purchase one of the brown-red mats and simply place the desired color facing up to create their respective mulch-like areas. Moreover, where the store previously had offered only a choice of brown and red mats—each occupying its own section of floor or shelf space—the store can now offer another color combination (such as mats having green on one side and black on the other), thus doubling consumer choices, in this example to four colors, using the same two sections of floor or shelf space.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0017]** A full and detailed disclosure is set forth in the accompanying Detailed Description, which makes references to the appended drawings, in which:

**[0018]** **FIG. 1** is a perspective view of a flexible mulch mat shown in an intended use, according to one aspect of the disclosure;

**[0019]** **FIG. 2** is a top plan view of the flexible mulch mat of **FIG. 1**;

**[0020]** **FIG. 3A** is a perspective view of a mulch mat, according to one aspect of the disclosure;

**[0021]** **FIG. 3B** is a schematic cross-section of the mat of **FIG. 3A**;

**[0022]** **FIG. 4A** is a perspective view of a mulch mat, according to another aspect of the disclosure;

**[0023]** **FIG. 4B** is a schematic cross-section of the mat of **FIG. 4A**;

**[0024]** **FIG. 5A** is a perspective view of yet another mulch mat, according to yet another aspect of the disclosure;

**[0025]** **FIG. 5B** is a perspective view of the mat of **FIG. 5A**, as installed proximate a building;

**[0026]** **FIG. 6** is a schematic view of a manufacturing line showing a process of forming the rubber components of the present mulch mats;

**[0027]** **FIG. 7** provides plan and elevational views of a mold used in the manufacturing lines of **FIGS. 8 and 9**, according to other aspects of the disclosure;

**[0028]** **FIG. 8** is a schematic view of a manufacturing line showing one process of forming the mulch mats of the present disclosure;

**[0029]** **FIG. 9** is a schematic view of another manufacturing line showing additional processes of forming the mulch mats of the present disclosure; and

**[0030]** **FIG. 10** is an elevational view of a cross-section of the mulch mat of **FIG. 5A**.

## DETAILED DESCRIPTION

**[0031]** Reference is now made to the drawings for illustration of various components of the present mulch mats and various processes used in the manufacture thereof. While the particular descriptions used for certain aspects or embodiments may refer to "rubber" or "recycled rubber" components, it should be understood that elastomeric materials other than rubber may be used, that the word "rubber" encompasses synthetic and natural rubbers, and that virgin rubber may be substituted for, or used in conjunction with, recycled rubber. It should also be understood that post-consumer products other than tires may also, or instead, be used to create the rubber components referenced herein.

**[0032]** The term "dual-colored", as used herein, refers to products that exhibit different colors on opposite sides thereof. The term "reversible" refers to a characteristic of the present products, attributable to their dual colors, in which either side of the products may be displayed.

**[0033]** Generally, the present mulch mats (alternately, "pads", "skirts", or "rings") may comprise rubber buffings (or shavings) and/or rubber granules that are adhered together by a binder and that have opposite sides colored with different pigments. The rubber buffings and/or rubber granules may be obtained by chipping, cutting, or chopping used tires or other post-industrial rubber, or synthetic materials, as shown in

**FIG. 6**, into rubber components **12**, which are made to appear as wood chips, wood shreds, wood nuggets, pebbles, stones, pine needles, or other natural materials. Such process will be described below, in reference to **FIGS. 6-9**.

**[0034]** The mulch mat may be shaped as a ring, or skirt, which encircles trees, shrubbery, posts, poles, and the like (as shown in **FIG. 1**), or the mulch mat may be shaped as a longitudinal panel (e.g., as a rectangle) that may be used to cover larger outdoor areas (as shown in **FIGS. 5A** and **5B**). When the mulch mat is configured as a tree ring (that is, as a surround for trees or plants), the mulch mat (**10**) features a hole (**30**) therethrough and a slit (**33**) that extends from the perimeter edge to the hole (**30**) to permit the mulch mat to be fitted around a plant (**55**) or other object.

**[0035]** Specifically, **FIG. 1** illustrates a representative use of a dual-colored mulch mat, according to the present disclosure, in which a mulch mat **10** is placed around a tree **55** or other plant to function as a tree ring or skirt. The mulch mat **10** may be generally circular in shape and may include a centrally located hole, or aperture, **30** that may be fitted around a tree trunk **57**. A slit **33** permits the mulch mat **10** to be positioned properly around the trunk **57**. Optionally, the mulch mat **10** may include fertilizer disposed about the rubber components comprising the mat **10**, as will be discussed in greater detail herein. The mulch mat **10** provides a protective border around the tree **55**, preventing grass **59** from growing too close to the trunk **57** and thereby reducing the likelihood of the tree **55** being damaged from mowers, flexible line

trimmers, edgers, and the like. The mulch mat **10** may have a thickness of between about 1 inch and about 4 inches.

**[0036]** In some configurations, the mulch mat **10** includes opposite sides, or layers, **102**, **104** of different colors, which may be produced by combining the respective rubber components and binder with different coloring agents, such as pigments. The first and second layers may be one of brown, red, white, green, black, sandstone, blue, or some other color, the first and second layers being of different colors to maximize consumer options. As desired, the consumer may reverse, or flip, the mulch mat **10** to display the color and/or texture associated with the previously ground-contacting side (for instance, using **FIG. 1** as an example, layer **102** may be placed in contact with the ground and layer **104** may be displayed). Such reversibility provides the consumer with greater flexibility in producing an aesthetically pleasing appearance.

**[0037]** **FIG. 2** shows the dual-colored mulch mat **10** from one surface (for example, a surface having the appearance of shredded, natural mulch). Notably, although the mulch mat **10** is generally circular in shape, this surface of the mulch mat **10** features an irregular (i.e., non-uniform) texture and perimeter. Such perimeter results from the random and angular orientation of the rubber components, resulting in an irregular arrangement and an irregular spacing between the rubber components with some of the rubber components extending beyond the perimeter edge. Further, this irregular spacing leads to voids between the rubber components, thereby creating passageways for water to flow through the mulch mat **10** and for moisture to evaporate upward from beneath the mulch mat **10**. While the mat **10** is shown in a generally circular shape,

other shapes having curved or straight sides may also be manufactured to meet user preferences (for example, long rectilinear panels that may be used to cover larger areas, as shown in **FIGS. 5A** and **5B**).

**[0038]** The hole, or aperture, **30** may be centrally located within the mulch mat **10**, though other placements may be possible as needs dictate. As shown in **FIGS. 1** and **2**, the hole, or aperture, **30** may be circular in shape. However, the hole **30** may be formed or cut into any suitable or desired shape, such as a square, for instance, in the event that the mulch mat is to be placed around a square-shaped post, such as those used to support a mailbox. In the event that the hole or aperture **30** is too small to fit around the trunk of the tree or plant to be protected, the mulch mat **10** may be cut by the user to remove an additional portion of the mulch mat **10**. The mulch mat **10** is sufficiently pliable to permit cutting.

**[0039]** The slit **33** extends from the hole **30** to the perimeter edge, such that the mulch mat **10** may be fitted around a tree trunk, as shown in **FIG. 1**, or some other object. According to one practice, the slit **33** may be cut from one surface of the mulch mat **10**, using any suitable means, such as a heated wire cutter. By stopping short of the opposite surface, uncut areas remain, which facilitate handling before installation. In addition, the tearing of the mulch mat **10** along the slit **33** results in an uneven appearance along the opposite surface of the mulch mat **10**, further enhancing its resemblance to natural mulch. Due to the irregular surface contours of the mulch mat

**10**, the slit **33** is rejoinable to impart a seamless (and more realistic) appearance to the mat **10**.

**[0040]** According to another aspect of the present disclosure, the pre-formed slit **33** may have a tortuous or serpentine shape (not shown), which is relockable by virtue of interlocking members formed when the mulch mat **10** is torn along the slit **33**. As described above, the uneven edges along the upper surface of the mat **10**, when locked together around a tree or plant, produce the visual appearance of a continuous natural surface.

**[0041]** **FIG. 3A** provides a perspective view of the irregular mass of rubber components – and, specifically, rubber buffings – that produce one configuration of the present mulch mats **10**. A portion of the rubber components project from layer **102**, resulting in a non-uniform, rough texture and a realistic appearance. As shown, the rubber components are similarly randomly oriented in the layer **104**. The angular orientation of the rubber buffings within the mat **10** forms an interlocking matrix that enhances the structural integrity of the mat **10**. The use of rubber components of different sizes further contributes to the random contours of the mat and to the creation of non-linear channels throughout the body of the mat for water and moisture transport.

**[0042]** A schematic cross-section of the dual-colored mulch mat **10** of **FIGS. 2** and **3A** is shown in **FIG. 3B**. The mat **10** includes rubber components (primarily buffings, in this example), which are held together with a binder material and which are colored, in

layer **102**, with a first pigment and, in layer **104**, with a second pigment. In one possible configuration, the first pigment may be brown, and the second pigment red to create the appearance of two different mulch products. In another possible configuration, the first pigment may be brown to resemble mulch and the second pigment green to resemble freshly mown grass. These configurations are provided for illustration only and not as limitations of many other combinations. Additionally, fertilizer granules (not shown) may be disposed about the rubber components, either throughout the mat layers or disposed proximate to one surface of the mat.

**[0043]** The mulch mat **10** may be described as occupying a plane defining an x-axis and a y-axis. The rubber buffings are randomly oriented and occupy various angular positions relative to the central planar surface (that is, the area where layer **102** and layer **104** meet). Said differently, the rubber buffings may be affixed in an irregular arrangement, in which the buffings extend, or project, at a variety of angles (i.e., in the "z"-direction) relative to the central planar surface (i.e., the "x-y" plane). As a result of this random orientation, the thickness of the mat varies from point to point

**[0044]** In addition to, or instead of, different colors on opposite sides, the mulch mats **10** may feature different textures on opposite sides. As shown in **FIGS. 4A** and **4B**, the mulch mat **10** may have a first layer **102** made of rubber buffings colored with a first color to resemble shredded wood mulch, pine needles, or cut grass and a second layer **106** made of rubber granules colored with a second, different color to resemble small pebbles. Representative colors for such a construction include brown, red, or black for

the mulch-resembling layer (or green to resemble cut grass), and gray, black, or brown for the pebble-resembling layer.

**[0045]** Instead of a circular mat – such as the mats **10** – the perimeter edges may define a rectangular, or other polygonal, shape, suitable for covering a large area. Such a mat may be rollable for easy handling and may be useful in creating a walkway, a patio, or an area for storage of water hoses, outdoor equipment, or outdoor sheds. In yet another variation, the mulch mat or pad may have an irregular shape bounded by straight edges, curved edges, or a combination of straight and curved edges.

**[0046]** Turning now to **FIGS. 5A** and **5B**, a lawn and garden mulch mat **20** is shown, which is constructed of the same materials as those used for the mulch mats **10**. Like the mulch mat **10**, the mulch mat **20** is a dual-colored ground cover, in which opposite sides, or layers, **202**, **204**, exhibit different colors and/or textures. For a mulch-like appearance, one of the layers (**202** or **204**) may be comprised of rubber buffings. For an alternate appearance, one of the layers (**202** or **204**) may include rubber components of a different shape (e.g., rounded granules) and/or color to resemble small pebbles, stones, or wood chips. Thus, the various combinations of texture and color in a rectangular shape provide the consumer with more choices in the selection of a lawn and garden mat **20**.

**[0047]** Such mats **20** may have a square shape (for example, of about 18 square inches, although sizes up to 40 square inches may instead be used) or a rectangular

shape, in which the width of the mat **20** may be from about 18 inches to about 36 inches and the length of the mat **20** may be from about 24 inches to about 48 inches, the width and length being independently selected from within these ranges.

**[0048]** Any combination of colors may be used for the layers **202**, **204**. In one aspect, different colors are used for layers **202**, **204**. As a representative example, the layer **202** may be brown to resemble shredded wood mulch and the layer **204** may be red to resemble shredded cedar wood mulch. In another aspect, different textures (arising from the use of different sized and/or shaped rubber components) may be used. As a representative, non-limiting example, the layer **202** may include rubber buffings and be brown to resemble pine needles and the layer **204** may include rubber granules and also be brown to resemble small pebbles. In yet another aspect, different colors and textures may be used. As a representative, non-limiting example, the layer **202** may have rubber buffings and a green pigment to resemble cut grass, while the layer **204** may include rounded rubber chunks and a gray pigment to resemble small river rocks.

**[0049]** **FIG. 5B** shows that the mat **20** may be used to park or store lawn and garden equipment, such as a wheelbarrow **701**. Accordingly, because the mat **20** is configured to prevent grass or weed growth in the covered areas, the need for mowing or trimming grass and weeds around the equipment **701** is eliminated.

**[0050]** Moreover, by virtue of the substantially straight edges or sides of the mats **20**, a plurality of the mats **20** may be abutted against each other to form a relatively large area, such as a patio-type area, in which the mats **20** are adjacent along a seam **22** without any significant gaps between neighboring mats **20** (as shown in **FIG. 5A**). Such a large assembly of the mats **20** may be useful in any number of locations, including use as a patio, an underlayment for a bench-type swing, a base for an outdoor shed or equipment storage area, or a ground cover beneath a deck, where it is desirable to inhibit weed growth but where mulch installation and maintenance is difficult.

**[0051]** The skilled artisan may instantly appreciate that any or all of the sides of the mats **10**, **20** may be irregularly shaped (or cut to an irregular shape) to mimic natural stones and pavers or to conform to the shape of existing landscaping or structural elements, such as ponds, stones, driveways, and the like.

**[0052]** As mentioned above, the mulch mat **10** (or **20**) may include rubber shavings or buffings **613** and may also include rubber granules **611** (the production of which is shown in **FIG. 6**), generically and, optionally, collectively referred to herein as the rubber components **12**. The rubber buffings **613** and rubber granules **611** may be combined, in various proportions, in the separate layers **102**, **104** (or **202**, **204**) of the mulch mats **10** (**20**), or may be segregated to one of the layers **102**, **104** (**202**, **204**). Alternately, the mulch mat **10** (**20**) may include two layers **102**, **104** (**202**, **204**) of a single type of rubber component. It should be understood that the rubber components **12** (whether granules

**611** or buffings **613**) may vary in size within a given layer or a given mat construction, if desired.

**[0053]** Turning now to **FIG. 6**, the rubber components **12** may be obtained from used tires **610**, which are processed to produce rubber shavings or buffings **613** and/or rubber granules **611**.

**[0054]** The rubber components may be derived from used tires or retread pieces, although other rubber sources (including virgin sources) may be used instead of, or in conjunction with, tires. The shavings or granules may be made of any of various types of rubber, including acrylonitrile-butadiene rubber (NBR), styrene-butadiene rubber (SBR), carboxylated NBR, chlorinated rubber, silicone containing rubber, ethylene-propylene-diene monomer (EPDM) and the like. Alternately, the buffings **613** or granules **611** may be made of an elastomer material other than rubber.

**[0055]** When the used tires **610** or retread pieces are ground in a granulator **615**, steel or other fiber components **14** are removed, leaving rubber granules **611**. Obviously, other rubber or elastomeric sources may not include fiber or other reinforcing constituents. The resulting rubber granules **611** are generally in the range of about 1/8 inch to about ¾ inch in major dimension. The granulator **615** may be adjusted to produce granules of different dimensions, and granules having different dimensions may be used in the same mulch mat.

**[0056]** To create a surface (or layer) having the appearance of shredded or chipped wood mulch, pine needles, or grass clippings, the majority of the rubber components **12** of the given layer of the mulch mat **10** may be rubber shavings or buffings, which provide relatively more strength and flexibility to the mat **10**. To produce such buffings, or shavings, **613**, a buffing machine **617** is rotated about the tire **610** (or vice versa) to shed the buffings **613**. The rubber buffings, or shavings, are characterized as having a length greater than their width (e.g., about ¼ inch to about 3 inches in length and about 1/8 inch to about 1 inch in width). According to one aspect provided herein, the buffings **613** and/or granules **611** are of non-uniform size and shape to enhance the natural appearance of the mulch mat **10**.

**[0057]** If rayon, nylon, polyaramid, or other such materials were used to reinforce the tires **610**, the discrete fibers **14** of such materials may also be the byproduct of shredding, mulching, granulating, or buffing the tires **610**. Such fibers may have a length of about 1 inch. Optionally, these fibers **14** may be included with the rubber components **12** in the manufacturing process. As yet another option, virgin fibers **14** may also, or instead, be used in the mulch mat **10**.

**[0058]** **FIG. 7** illustrates a mold **50** and a complementary cap, or frame, **56** that may be used in the manufacture of the present mat products (e.g., **10**, **20**). In one aspect, the mold **50** may have a height (as indicated by a top edge **52**) that is about half the desired thickness of the finished mat product and that ranges from about 0.5 inches to about 2 inches. The mold **50** includes a peripheral lip **60** from which a projection, or

anchor, **62** extends. The cap, or frame, **56** may have a complementary, or compatible ledge **64** about its perimeter, the ledge **64** supporting a downwardly-oriented shoulder **66**. The ledge **64** of the cap **56** may have the same height as the anchor **62** of the mold **50**, thus facilitating the creation of a two-layer mat structure, in which the layers (e.g., **102**, **104**) are of roughly equal thickness. Alternately, the ledge **64** may be of a different height to create a mat structure with layers (e.g., **102**, **104**) of different thicknesses, as may be useful in circumstances where the second layer (e.g., **104**) includes only a coloring agent and a binder or where different thicknesses are otherwise desired. The cap **56** further includes a hole, or opening, **68**, through which a second color or colored matrix may be introduced, as will be described below.

**[0059]** As shown, the anchor **62** and the ledge **64** fit together to seat the cap **56** onto the mold **50**. This seating may be accomplished because the inside area **58** defined by the cap **56** is equal to the area **54** defined by the mold **50** and because the height of the shoulder **66** is comparable to the height of the anchor **62**. Clearly, the length and width of the mold **54** determine the dimensions, or footprint, of the resulting mat (**10** or **20**), and molds having various dimensions may be employed to meet user specifications. If desired, the anchor **62** and the ledge **64** may be reversed or arranged in a variety of other orientations relative to each other, or alternate seating mechanisms may be substituted. Thus, the manufacturing process is not limited to the exemplary configuration shown in **FIG. 7**.

**[0060]** Exemplary processes for creating dual-colored mat products (e.g., **10**, **20**) are illustrated in **FIGS. 8** and **9**, each of which employ the previously described mold **50** and some of which also employ the corresponding cap **56**. Common to all exemplary processes are components of the mats **10** or **20**, which include rubber components **12** (in the form of rubber granules **611**, rubber buffings **613**, or both), a binder **16**, and a coloring agent **18**. Optionally, the mat **10**, **20** may further include fibers **14** and a catalyst **22**.

**[0061]** The binder (shown as **16** in **FIGS. 8** and **9**) functions to hold the rubber components **12** together. The binder **16** may be a curable latex or urethane binder, such as a moisture-curable polyurethane. Binders other than polyurethane (e.g., polyacrylates) may instead be used to adhere the rubber components **12**. Additionally, binders that are cured by other means, such as exposure to heat, UV radiation, electron beams, or chemicals, may instead be used.

**[0062]** Although functional, the simple combination of rubber components and binder fails to produce mats having a natural aesthetic appearance, e.g., an indigenous mulch-like appearance. First, rubber tire particles are typically coal black, while the binder coating them typically is clear or yellowish in appearance. As a result, such binder/rubber mix, when cured, may have an undesirable color. Further, the presence of the binder may generate an unrealistic sheen or gloss.

**[0063]** Thus, to provide a natural appearance to the mulch mat **10** (or **20**), coloring agents **18** and **18'** may be incorporated into the layers **102**, **104** of the mulch mat **10** (**20**), preferably after having been combined with the binder **16**. The coloring agent **18**, **18'** may be a pigment, such as an iron oxide pigment or may be some other colorant, such as a dye or polymeric colorant. The coloring agent(s) **18**, **18'** may further include an anti-gloss agent or compound to minimize sheen or gloss. Diatomaceous silica may be used as anti-gloss agent. The diatomaceous silica, for instance, may be sprinkled on the surface of the uncured, molded mixture (**24** or **24'**) to reduce gloss.

**[0064]** As discussed previously, the layers **102**, **104** of the mulch mat **10** may be colored with different colored pigments to provide a dual-colored product. The first and second pigments **18**, **18'** may be red, white, brown, green, blue, black, sandstone, or some other color. In one aspect, the first and second pigments **18**, **18'** are different from one another.

**[0065]** An almost limitless variety of colors (including shades and tints) and color combinations may be incorporated into the present mat products, which are not to be limited to the previously recited colors. Among many possible variations, the following may be most common: red/brown, brown/green, brown/black, red/green, and red/black. Also, although natural colors and color combinations (that is, those that mimic wood, stones, grass, and the like) are expected in most cases, it is conceivable that some consumers may desire unusual colors (e.g., purple or pink) to compliment a particular

motif or to decorate for a special occasion. Accordingly, the selection of colors for the layers (**102**, **104**) of the mat (**10**) may be limited only by consumer imagination.

**[0066]** As described with reference to **FIGS. 8** and **9**, the mulch mat mixture **24**, **24'** may further include a catalyst **22** to promote curing of the binder **18**. The catalyst may be chosen based on the type of binder system being used.

**[0067]** The skilled artisan will appreciate that these sources and brands are provided by way of example only and that any suitable binder, colorant (pigment), anti-gloss additive, catalyst, and the like may be used.

**[0068]** Turning now to **FIG. 8**, a mold **50** is provided for making the mulch mat **10** (or **20**). The mold **50** (as shown in **FIG. 7**) has anchors **62** projecting upwardly from the peripheral lip **60**. The distance between the interior portions of the anchors **62** defines an inner diameter **51**, which is determinative of the dimensions of the mat product **10** (or **20**). The distance between the exterior, or outward-facing, portions of the anchors **62** defines an outer diameter **54**.

**[0069]** As previously discussed, a corresponding cap **56** may be used with the mold **50**. The cap **56** includes a shoulder **66** that is sized to seat the cap **56** on the mold **50** when the shoulder **66** is positioned on the lip **60** adjacent the anchors **62**. The distance between the interior-facing sides of the shoulders **66** defines the inner cap diameter **58**, which is equal to, or just slightly larger than, the outer diameter **54** of the mold **50**. The

cap **56** further includes an opening **68** through which a second layer may be introduced. The opening **68** may be substantially equal in area to the inside area of the mold **50**, so that the second layer (e.g., **104**) may be easily spread onto the first layer (e.g., **102**). Alternately, the opening **68** may be much smaller, as represented schematically in **FIGS. 8** and **9**, in which case, vibration or other means may be necessary to spread the second layer **104** to a relatively uniform thickness.

**[0070]** A first mixture **24** is produced by mixing the rubber components **12**, (optionally) the fibers **14**, a binder **16**, a first coloring agent **18**, and a catalyst **22** in a mixing vessel. The resultant mixture **24** is weighed and placed into the mold **50**. If necessary, the upper surface may be manually leveled, as schematically depicted by a hand symbol **152**, to form an irregular surface. As shown, the mixture **24** is allowed to create an uneven and jagged surface texture on the upper surface of the first layer **102**. Depending on the degree of compaction used to press the mixture **24** into the mold **50**, the mold-contacting side of the first layer **102** may also be somewhat irregular or uneven, further contributing to a more natural appearance. Once the first layer **102** (having a first color derived from the first pigment **18**) is created within the mold **50**, the cap **56** may be positioned over the mold **50**, such that the shoulders **66** of the cap **56** are aligned with the anchors **62** of the mold **50** and are positioned on the peripheral lip **60** of the mold **50**.

**[0071]** In a second mixing operation, a second mixture **24'** is produced by combining rubber components **12**, binder **16**, a second colorant **18'**, and, optionally, fibers **14** and

a catalyst **22**. The second colorant **18'** may be a different color than the first colorant **18**, resulting eventually in a dual-colored mat **10**. The rubber components **12** may be rubber buffings **613**, rubber granules **611**, or some combination thereof and may or may not be the same type or combination used in the first mixture **24**.

**[0072]** The second mixture **24'** may be applied to the first layer **102** by pouring the second mixture **24'** through the opening **68** in the cap **56** to form the second layer **104**. The second layer **104** may again be manually spread, or may be vibrated or moved through some other means, to fully and relatively evenly cover the first layer **102**. After curing, the cap **56** and mold **50** are removed, and the finished dual-colored mat **10** may be prepared for packaging for storage, shipment, or sale.

**[0073]** **FIG. 9** shows several alternate processes for making a realistic-looking dual-sided mat **10**. Again, the mold **50** is used, which has an upper perimeter edge **52**, an inner diameter **51**, a peripheral lip **60**, anchors **62** projecting from the peripheral lip **60**, and an outer diameter **54** between the exterior-facing sides of the anchors **62**. As before, a mixture **24** having a first color is produced by combining the rubber components **12**, (optionally) the fibers **14**, the binder **16**, the first coloring agent **18**, and the catalyst **22**. The resultant mixture **24** is weighed and placed into the mold **50**. If necessary, the upper surface may be manually leveled, as schematically depicted by a hand symbol **152**, to form an irregular surface on the first layer **102**. The first layer **102** has an uneven and jagged surface texture on at least the exposed surface of the first layer **102**, and the mold-contacting (lower) surface may be uneven or irregular as well,

depending upon the degree of compaction with which the first mixture **24** is introduced into the mold **50**.

**[0074]** Subsequently or simultaneously, a second mixture **24'** may be prepared by combining rubber components **12**, binder **16**, and a second coloring agent **18'**, optionally with fibers **14** and a catalyst **22**. As mentioned previously, the rubber components **12** may or may not be the same size and/or shape as the rubber components **12** used in the first mixture **24**, and the second coloring agent **18'** is different from the first coloring agent **18**. The second mixture **24'** is introduced onto the first layer **102** created by the first mixture **24**, in a manner that will be described below.

**[0075]** According to a first approach, a partially or fully cured first layer **102** may be extracted from the mold **50**, reversed or flipped such that the upper surface faces downward, and returned to the mold **50**. The previously described cap, or frame, **56** may then be seated on the mold **50**.

**[0076]** The second mixture **24'** may then be introduced through the opening **68** in the cap **56** to form a second layer **104** in contact with the first layer **102**. After the second layer **104** has been leveled (e.g., manually, as indicated by hand symbol **152**, or by vibration or some other method) and cured, the cap **56** is removed, and the finished dual-colored mat **10'** may be extracted from the mold **50**. The resulting mat **10'** has an irregular, or uneven, surface on each side, which may be desirable when both of the

layers **102**, **104** are configured to resemble shredded or chipped wood mulch or cut grass.

**[0077]** Alternately, as illustrated in **FIG. 9** by a double-line arrow, the first layer **102** may be produced (and at least partially cured) before being removed from the mold **50**. Subsequently, the second mixture **24'** may be introduced into the mold **50** and, optionally, manually smoothed (**152**), according to the process used to produce the first layer **102**. The first layer **102** may then be placed over the uncured second layer **104**, such that the curing of the second layer **104** serves to bond the first and second layers **102**, **104**. The resulting mat **10** resembles that manufactured according to the process illustrated in **FIG. 8**, in which the upper surface of the first layer **102** may possess a more uneven or jagged texture, as compared to the lower surface of the mat **10** (formed by the mold-contacting side of the second layer **104**). The degree of irregularity, as previously mentioned, depends upon the amount of compaction and the volume of the second mixture **24'**. Accordingly, while this method may work sufficiently to produce dual-sided mats **10** in which each layer is comprised primarily of rubber buffings **613** and, therefore, resembles shredded wood or grass clippings, the method may be better suited for a mat **10** in which at least one layer (e.g., **104**) is comprised primarily of rubber granules **611**, resulting in the appearance of pebbles or stones.

**[0078]** Finally, yet another approach (indicated with a dashed arrow in **FIG. 9**) includes the formation and extraction of the first layer **102** from the mold **50** and the subsequent formation and extraction of the second layer **104** from the mold **50**. The

first layer **102** and the second layer **104** may then be joined to one another by chemical reaction or by application of heat, compression, adhesive, or combinations thereof. The resulting mat **10'** may include outermost surfaces having an irregular, or random, surface texture associated with shredded or chipped wood mulch or cut grass.

**[0079]** By way of example, the mixtures **24**, **24'** may contain, by weight,:

from about 75% to about 88% rubber components **12**;

from about 0 % to about 2% fiber **14**;

from about 10% to about 15% binder **16**;

from about 2% to about 5% coloring agent **18** or **18'** (based on the total weight of the binder **16**);

from about 0.01% to about 0.03% catalyst **22** (based on the total weight of the binder **16**); and

a negligible percent of UV light stabilizers and anti-oxidants.

**[0080]** In some instances, it may be desirable to incorporate a fertilizer compound into the mulch mat **10**. The fertilizer may be organic, inorganic, or a combination of organic and inorganic components. Moreover, the fertilizer may be granular, a powder, a liquid, a slow-release fertilizer, and combinations of these and other fertilizer types. Further, the fertilizer may be added during the mat formation process (i.e., by incorporating into one or both mixtures **24**, **24'**) or after the mat formation process (i.e., by sprinkling onto one or both layers **102**, **104**). The fertilizer may also be added to the mat **10** after use for a period of time to replenish the fertilizing properties of the mat **10**.

When used, the fertilizer may be added into one or both mixtures (**24**, **24'**) or on one or both layers (**102**, **104**) in an amount equivalent to from about 1% to about 10% of the weight of the mat **10**.

**[0081]** **FIG. 10** shows the mulch mat **20** to which fertilizer granules **150** have been applied. As rain or water **162** contacts the fertilizer **150**, the fertilizer **150** activates, such as by becoming a liquid **154**, and passes through the mat **20** to nourish the tree roots **58**. Also as shown, the mat **20** is sufficiently porous to permit the liquid **154** to pass through to the tree roots, but is sufficiently dense to prevent weeds, grass, and other undesired plant life from growing through the mat **20**. It will be appreciated that, although fertilizer **150** is depicted as granules on the upper surface of the mat **20**, the fertilizer **150** may be embedded in various portions of the mulch mat **20**. Alternately or additionally, the fertilizer **150** may be in the form of a liquid that is incorporated into the mixture **24** (and/or **24'**) to form at least one layer of the mat **20**.

**[0082]** Once the fertilizer **150** is depleted, perhaps after a season of use, the user may replenish the fertilizer **150** by sprinkling or spraying new fertilizer onto the upper surface of the mat, from which the newly applied fertilizer will leach or seep into the underlying roots, as described above.

**[0083]** Although reference has been made to the use of the present mulch mats around trees, it should be understood that the mat may be used around foliage other than trees (such as shrubs), or around posts or poles (such as mailbox posts, light

poles, and other inanimate objects) to protect wooden or painted surfaces. Obviously, in the event that the mat is to be used around a non-living object, a fertilizer compound is unnecessary.

**[0084]** In use, the mulch mat **10** (or **20**) appears as a natural mulch-covered area. The mulch mats **10**, **20** are sufficiently durable to withstand various weather conditions and last many times longer than natural mulch, which tends to fade, decompose, and become scattered, due to wind, rain, and foot traffic. The mulch mat **10** provides protection to trees and plants, preventing weed or grass growth adjacent to the trees or plants and preventing incidental damage from mowers or trimmers. Additionally, the fertilizer-treated mulch mats **10** (or **20**) beneficially nurture trees or plants, as fertilizer leaches through the mat's lower surface and into the root system of the trees or plants.

**[0085]** Accordingly, edging systems or mats of the composition according to the present disclosure can be used over ground to delineate lawn edges or outdoor equipment storage areas. Moreover, due to their dual colors, the products save storage and sales space; i.e., one multicolored edging systems or mats is attractive to different consumers having different landscaping needs.

**[0086]** It will thus be appreciated that those skilled in the art will be able to devise various arrangements, which, although not explicitly described or shown, embody the principles of the invention and are included within its spirit and scope. Furthermore, all examples and conditional language recited herein are principally intended for

pedagogical purposes to aid the reader in understanding the principles of the inventions and the concepts contributed by the inventor(s) to furthering the art and are to be construed as being without limitation to such specifically recited examples and conditions.

**[0087]** Moreover, all statements herein reciting principles, aspects, and embodiments of the inventive products and processes, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents and equivalents developed in the future, i.e., any elements that perform the same function, regardless of structure.

**[0088]** This description of the exemplary embodiments is intended to be read in connection with the figures of the accompanying drawings, which are to be considered part of the entire description of the invention. In the description, relative terms such as "lower", "upper", "horizontal", "vertical", "above", "below", "up", "down", "top" and "bottom", as well as derivatives thereof (e.g., "horizontally", "downwardly", etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description and do not require that the apparatus be constructed or operated in a particular orientation, unless otherwise indicated. Terms concerning attachment, coupling, bonding, and the like, such as "bonded", "connected", "attached", or "interconnected", refer to a relationship

wherein structures are secured or attached to one another either directly or indirectly through intervening structures, unless expressly described otherwise.

**[0089]** The foregoing description provides a teaching of the subject matter of the appended claims, including the best mode known at the time of filing, but is in no way intended to preclude foreseeable variations contemplated by those of skill in the art.

**We claim:**

1. A dual-colored elastomeric mat comprising:

a first side being configured for contacting ground, the first side comprising a cured matrix of a first plurality of rubber components, a curable binder, and a first coloring agent, the cured binder holding the rubber components together;

a second side opposite the first side and being configured for alternative contact with the ground, the second side comprising a cured matrix of a second plurality of rubber components, a curable binder, and a second coloring agent, the cured binder holding the rubber components together and the second side to the first side, and the second coloring agent being a different color than the first coloring agent; and

wherein a portion of the rubber components are randomly and angularly oriented within the mat to impart a non-uniform thickness to the mat and a non-uniform texture to at least one of the first side and the second side of the mat.

2. The mat of Claim 1, wherein the rubber components are selected from the group consisting of rubber buffings, rubber granules, and combinations thereof.

3. The mat of Claim 2, wherein the first side comprises rubber buffings and the second side comprises rubber granules.

4. The mat of Claim 1, wherein the cured matrix of one of the first side and the second side comprises fibers.

5. The mat of Claim 1, further comprising an anti-gloss agent.

6. The mat of Claim 1, wherein the mat comprises a perimeter edge, the perimeter edge defining a substantially circular shape.

7. The mat of Claim 5, wherein the randomly and angularly oriented buffings extend beyond the perimeter edge of the upper surface of the mat to create a non-uniform perimeter.

8. The mat of Claim 1, wherein the mat comprises a rectangular shape.

9. The mat of Claim 1, further comprising a fertilizer compound.

10. The mat of Claim 8, wherein the fertilizer compound is in granular form.

11. The mat of Claim 8, wherein the fertilizer compound is primarily located on one side of the mat.

12. The mat of Claim 8, wherein the fertilizer compound is intimately mixed within the mat.

13. A method of manufacturing a dual-colored rubber mat, the method comprising:

providing a mold;

introducing a first colored matrix comprised of rubber components, a binder, and a first coloring agent into the mold and curing the first matrix to form a first layer;

creating a second colored matrix of rubber components, a binder, and a second coloring agent;

introducing the second colored matrix in contact with one side of the first layer;

curing the second colored matrix to form a second layer; and

securing the second layer to the first layer to form a dual-colored mat;

wherein a portion of the rubber components are randomly and angularly oriented within the mat to impart a non-uniform thickness to the mat and a non-uniform texture to at least one of the first side and the second side of the mat.

14. The method of Claim 13, wherein the mold includes a peripheral lip and a projection, the projection depending from the peripheral lip.

15. The method of Claim 14, further comprising joining the mold with a cap, the cap defining an opening therethrough for the passage of the second colored matrix onto the first layer.

16. The method of Claim 15, wherein the cap includes a ledge defining a shoulder, the ledge being complementarily shaped with the projection of the mold, to seat the cap and the mold together.

17. The method of Claim 13, wherein the rubber components are selected from the group consisting of rubber buffings, rubber granules, and combinations thereof.

18. The method of Claim 17, wherein the first colored matrix includes a first type of rubber components and the second colored matrix includes a second type of rubber components.

19. The method of Claim 13, further comprising mixing a catalyst into the first colored matrix.

20. The method of Claim 13, further comprising mixing fibers into the first colored matrix.

21. The method of Claim 13, wherein the first layer comprises an upper side and a lower side, the lower side being opposite the upper side and being in contact with the mold, the method further comprising reversing the first layer before the introduction of the second matrix, such that the second matrix is introduced onto the lower side of the first layer.

22. The method of Claim 13, wherein the securing of the second layer to the first layer to form a dual-colored mat occurs simultaneously with the curing of the second colored matrix to form a second layer.

23. The method of Claim 13, wherein the securing of the second layer to the first layer to form a dual-colored mat occurs as a result of a chemical reaction.

24. The method of Claim 13, wherein the securing of the second layer to the first layer to form a dual-colored mat occurs with an application selected from the group consisting of heat, compression, adhesive, and combinations thereof.

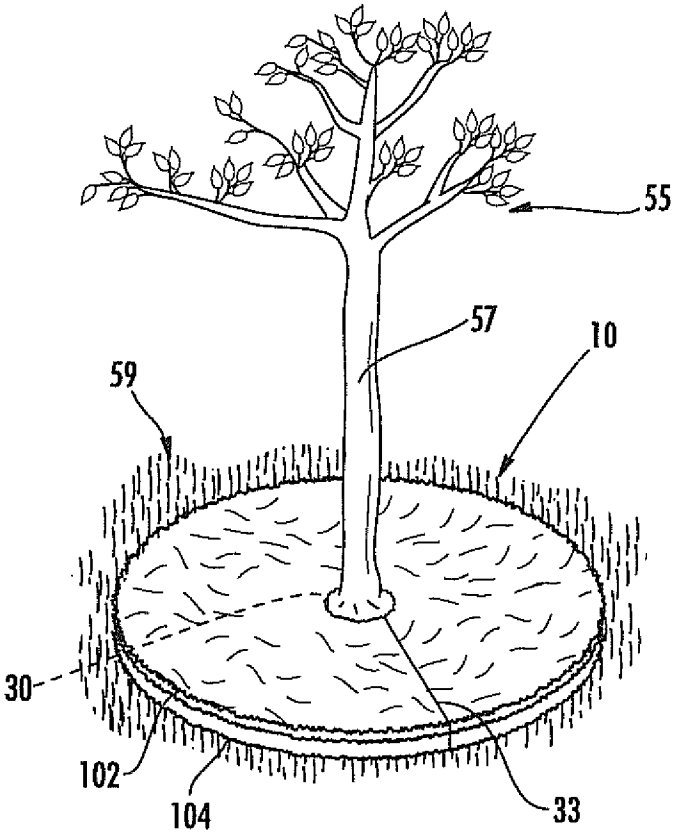



FIG. 1

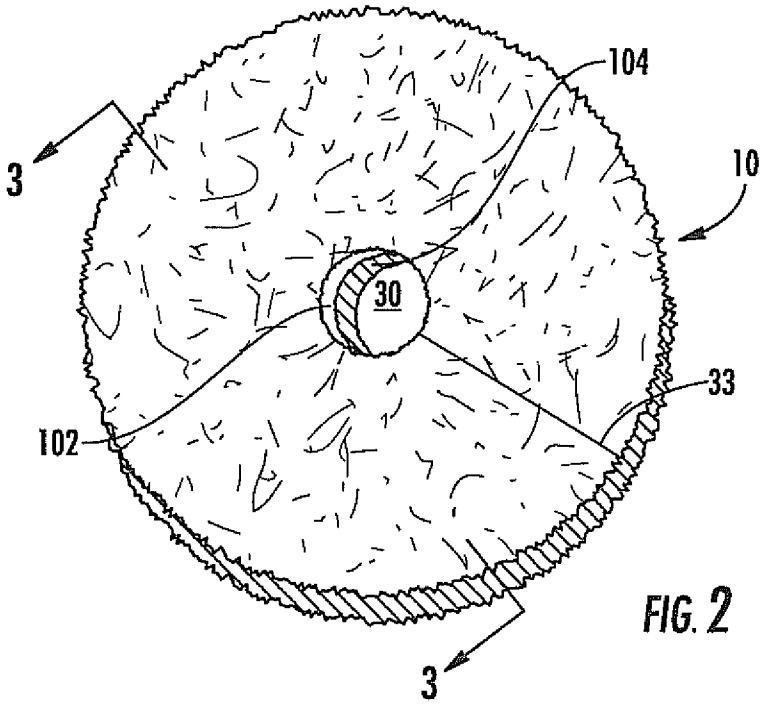



FIG. 2

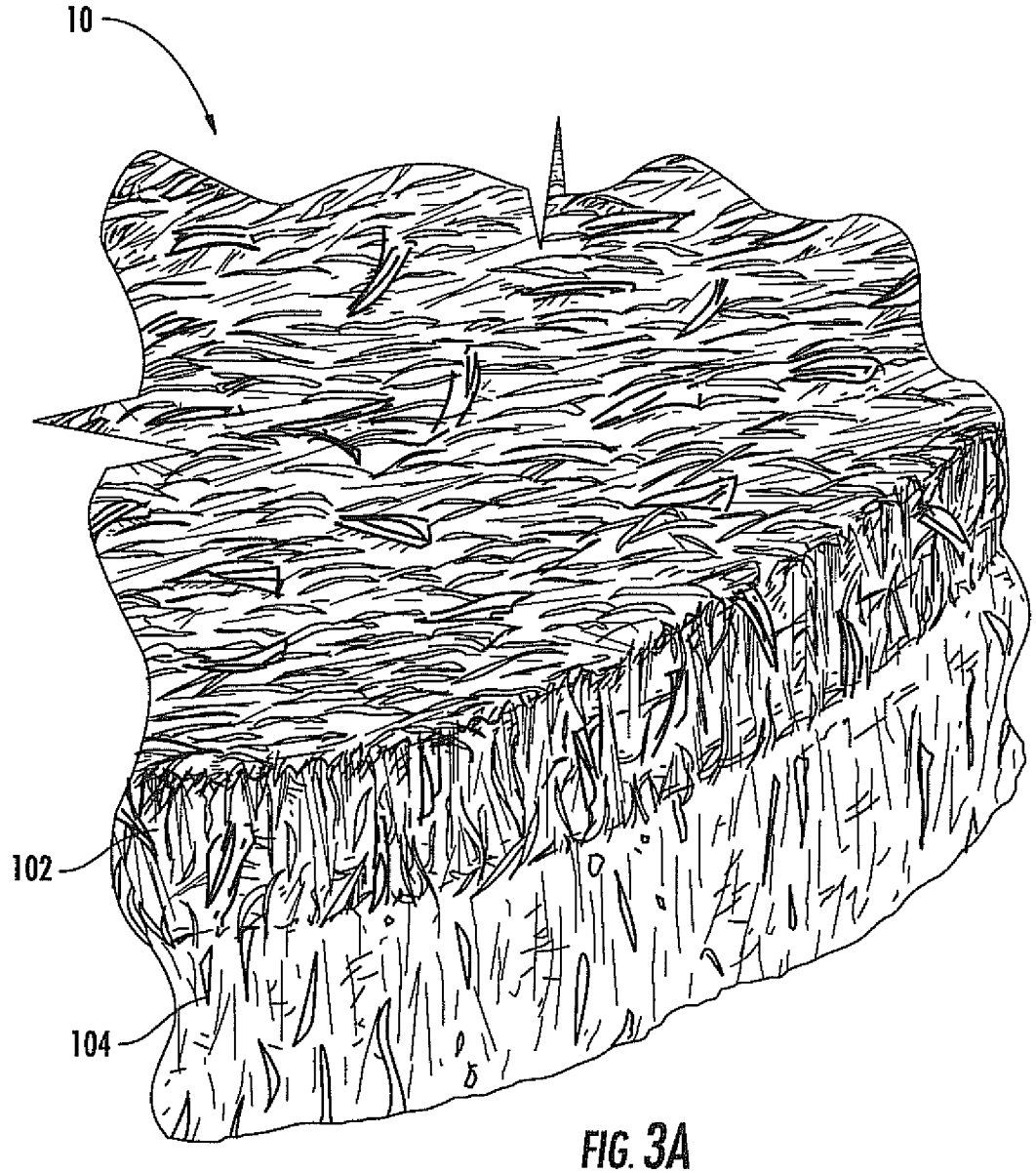



FIG. 3A

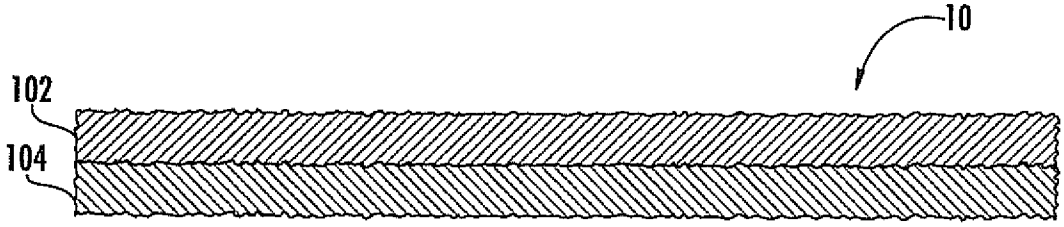



FIG. 3B

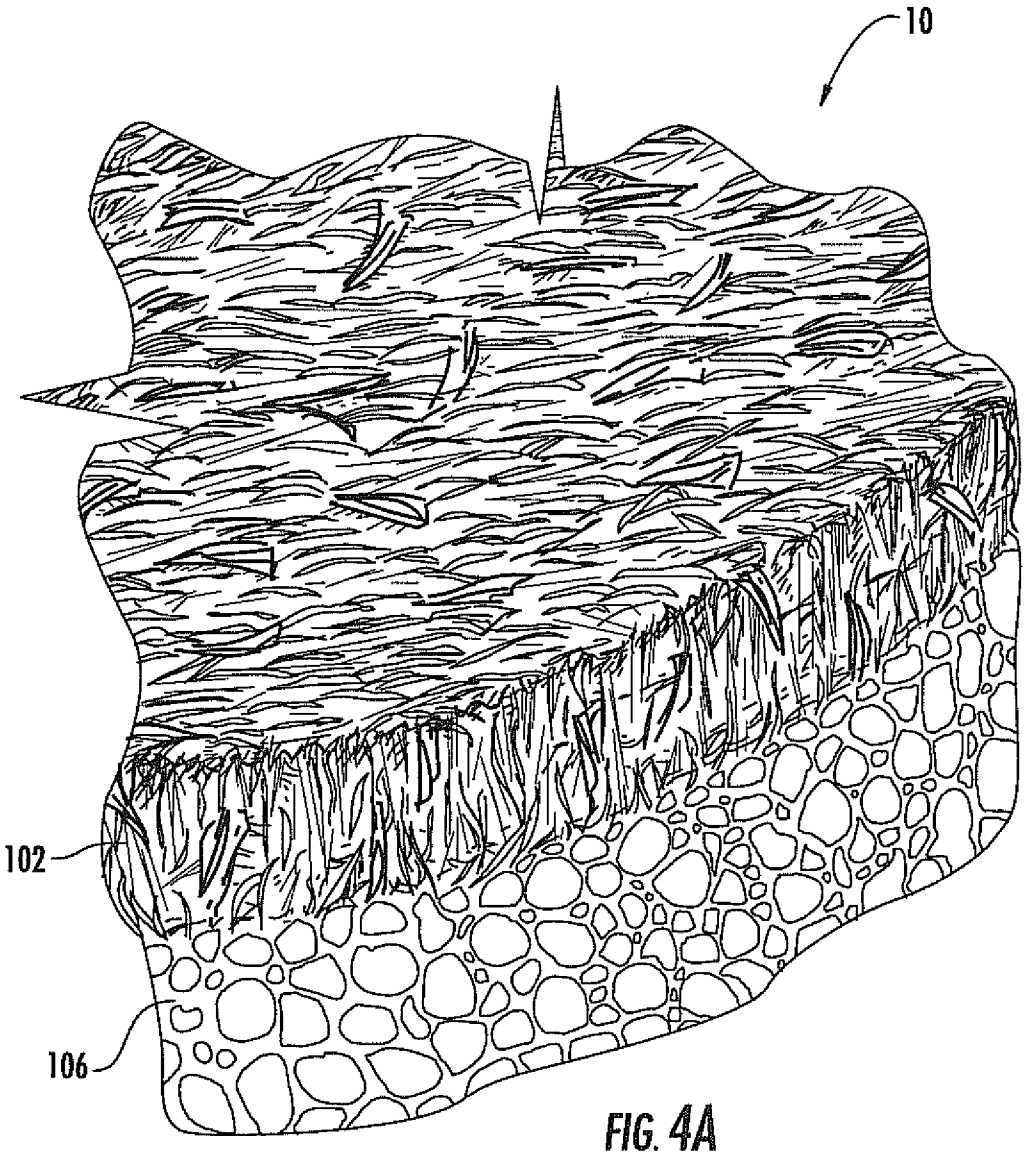



FIG. 4A

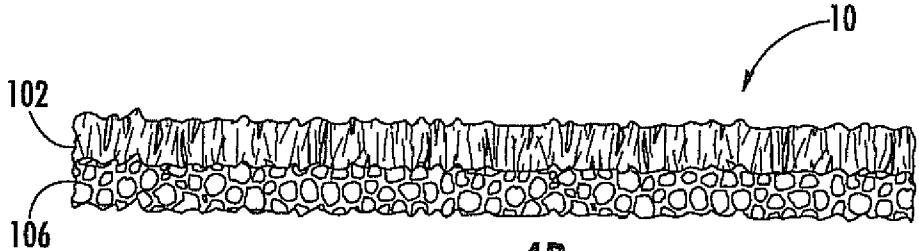



FIG. 4B

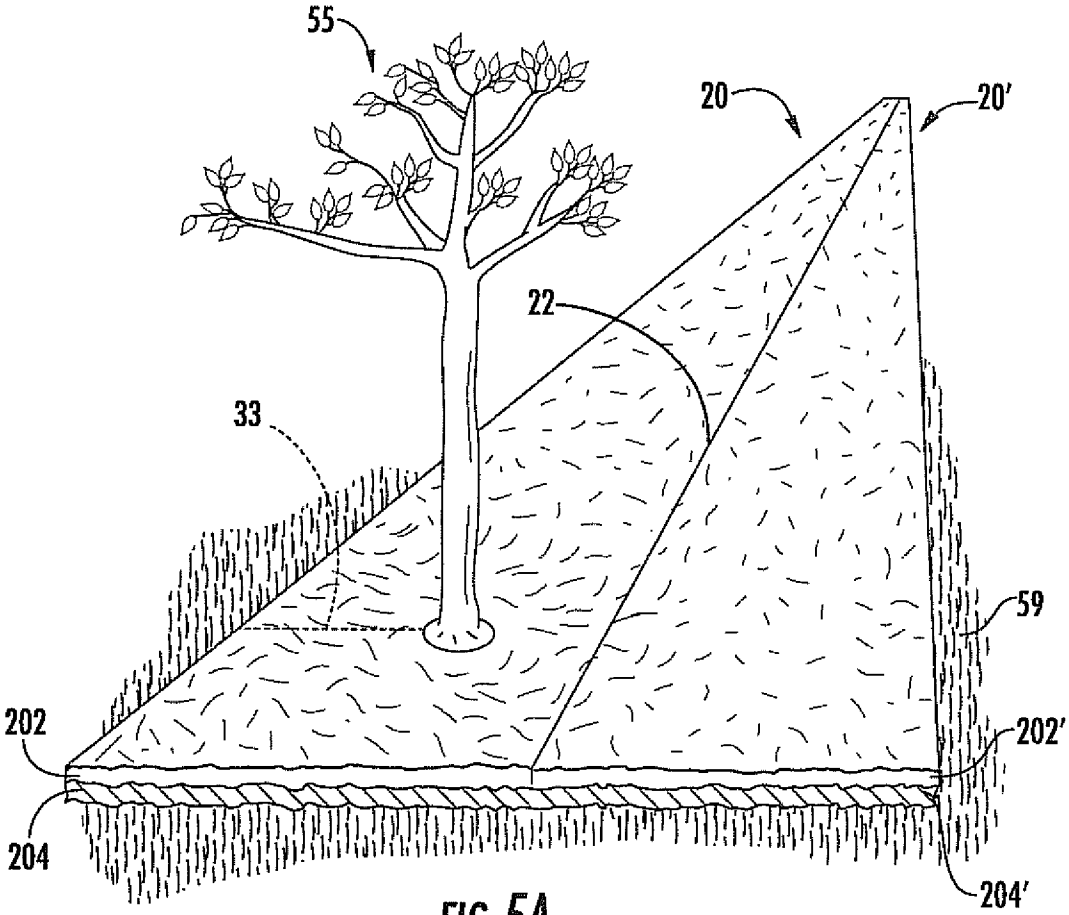



FIG. 5A

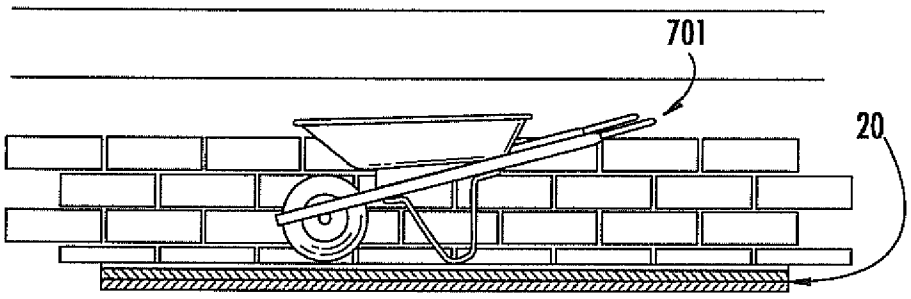



FIG. 5B

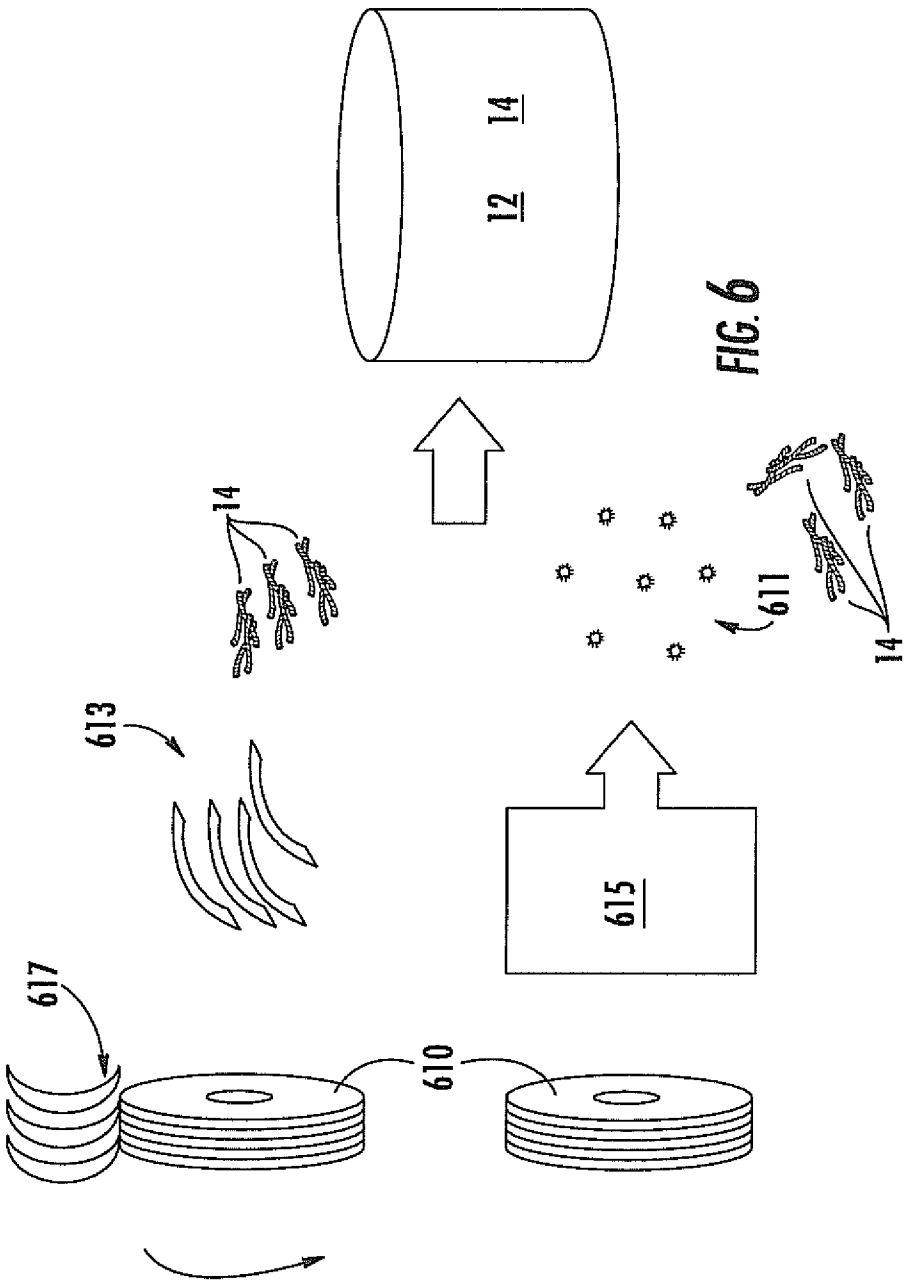



FIG. 6

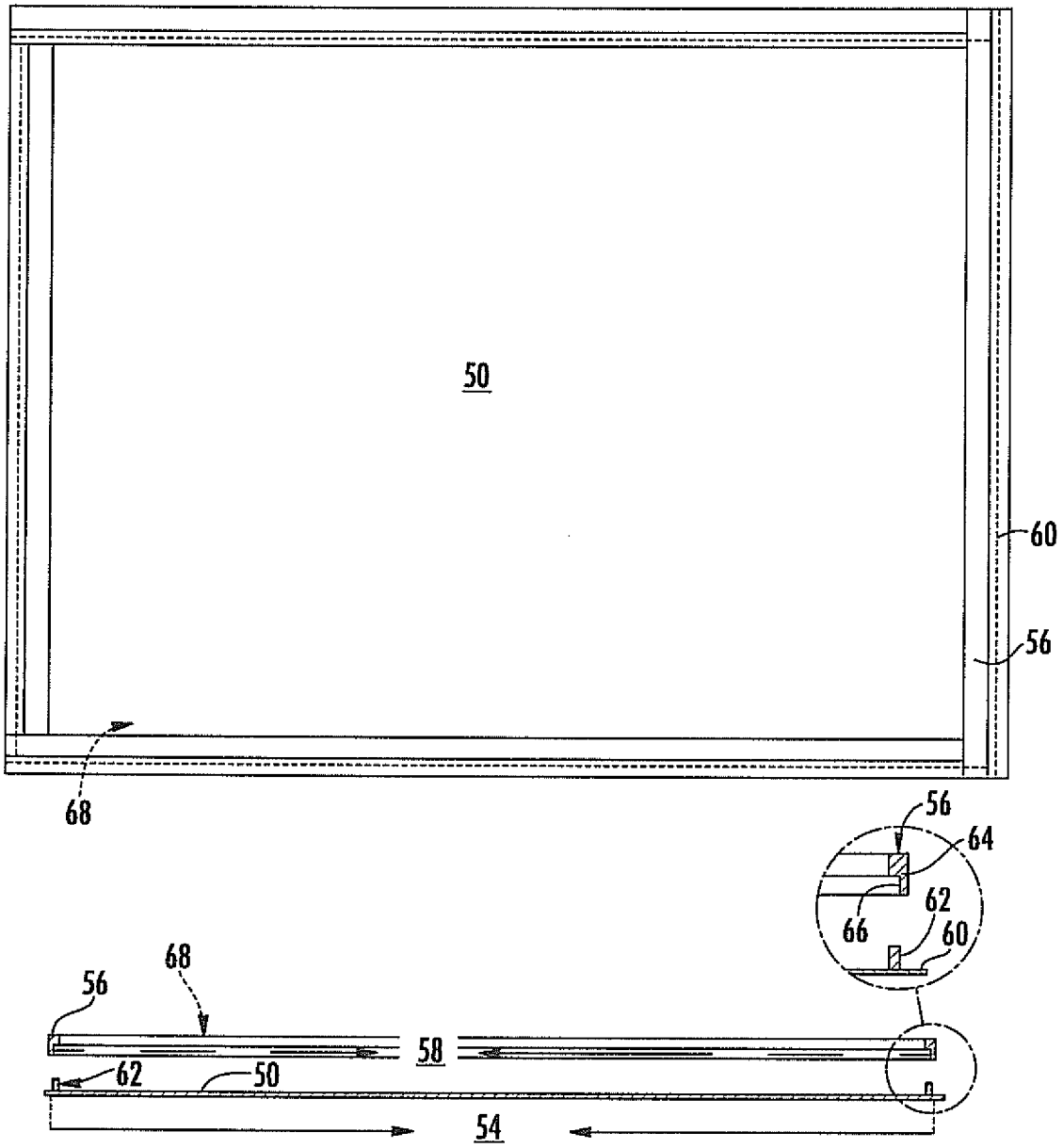
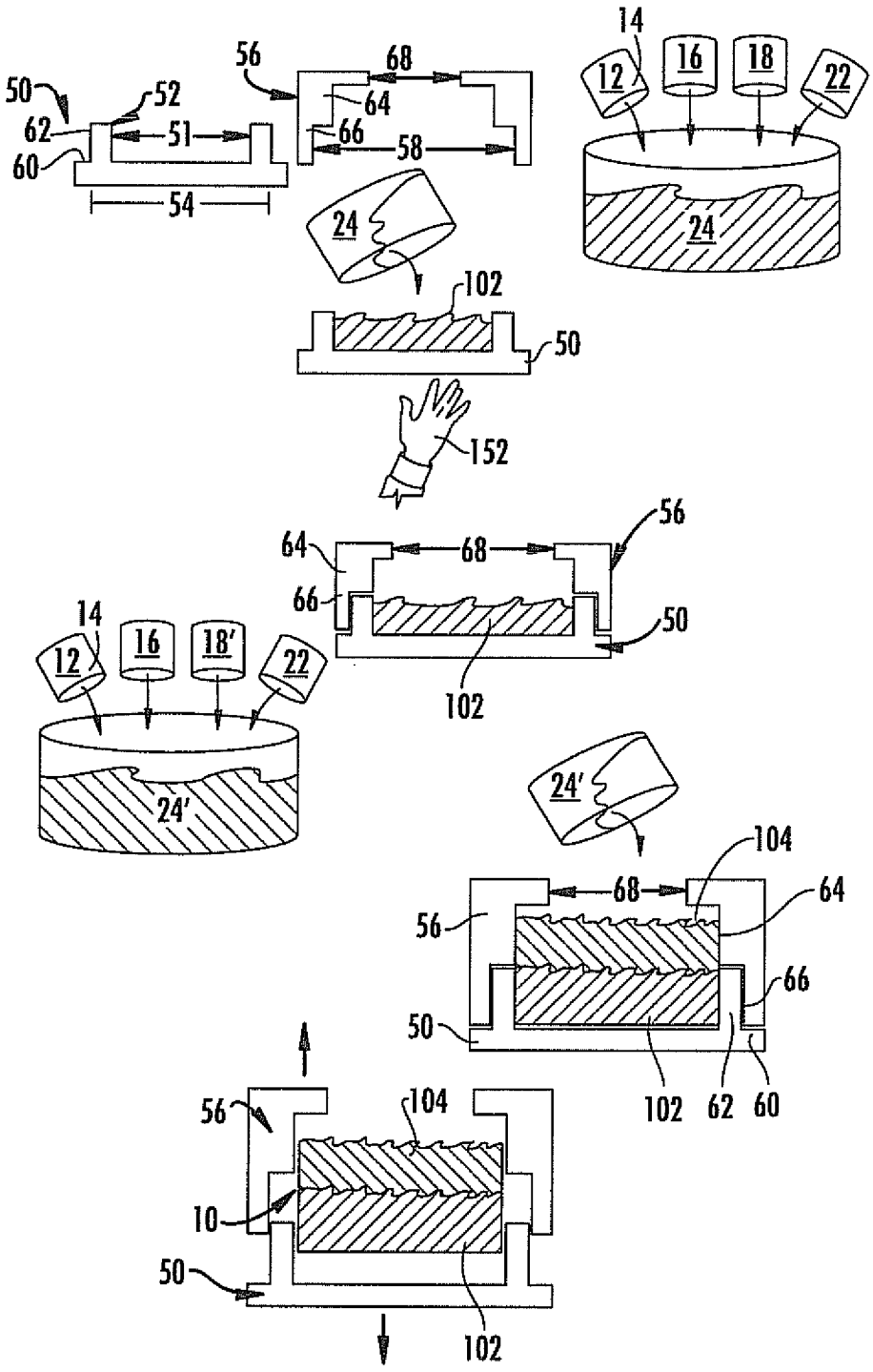



FIG. 7


50
52
62
51
60
54
56
68
64
66
58
24
102
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152
14
12
16
18
22
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64
68
56
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102
14
12
16
18'
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24'
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104
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104
10
50
102

FIG. 8

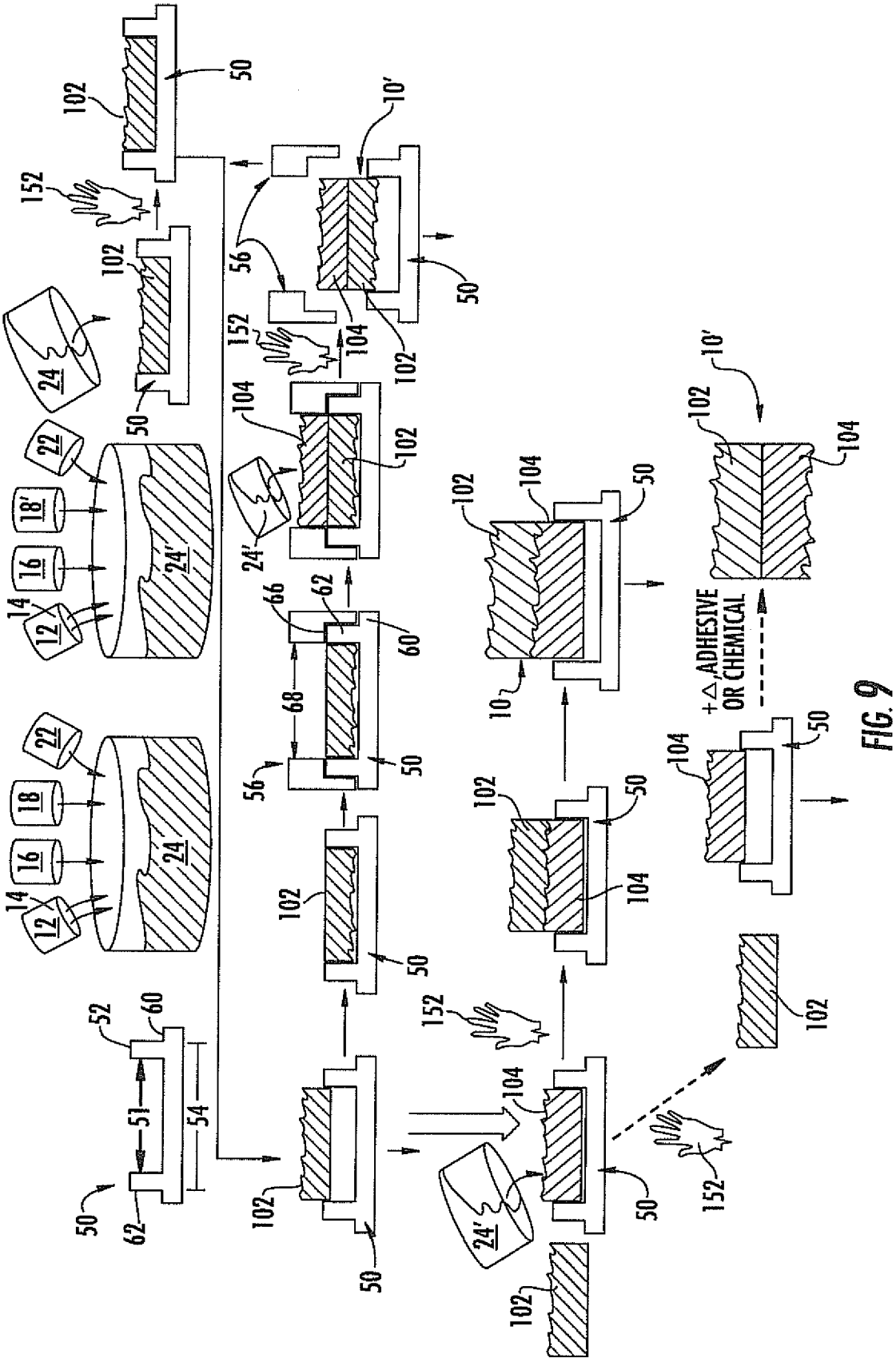


FIG. 9

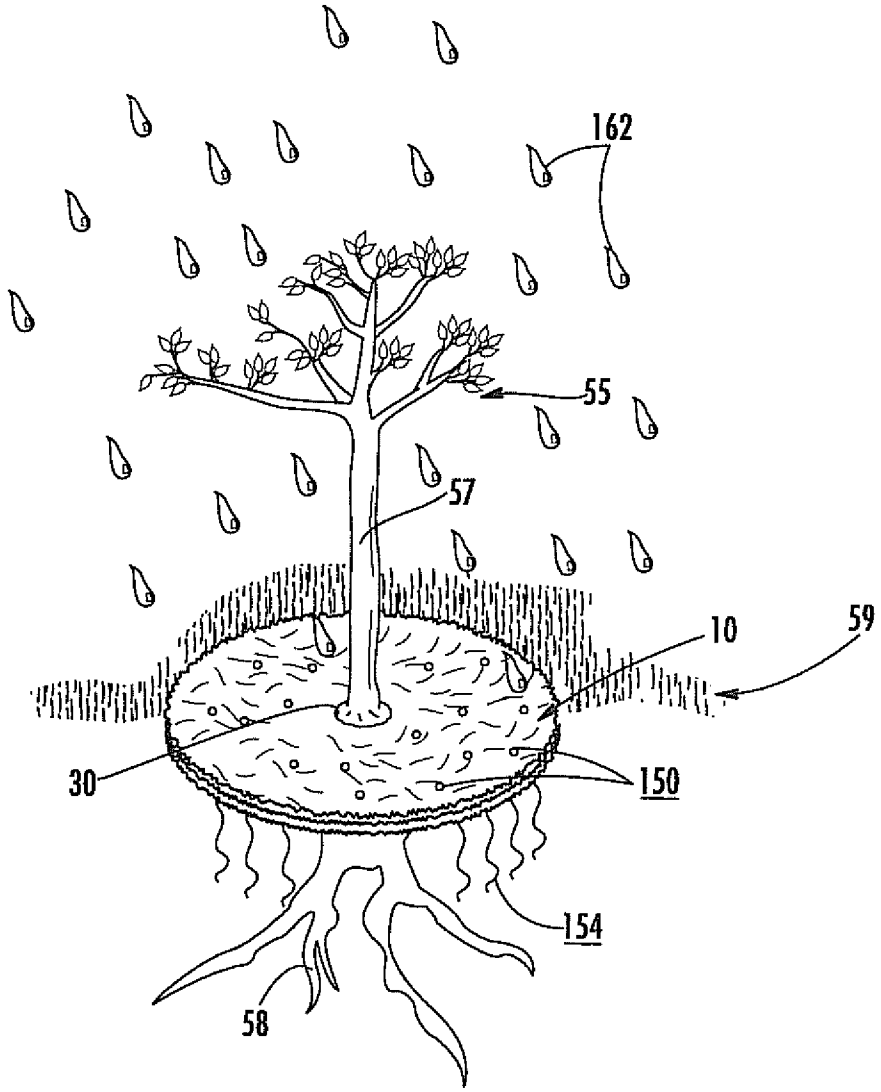


FIG. 10

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/83114

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A01G 1/00 (2008.04)
USPC - 47/33
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)
USPC - 47/9; 404/35

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST DB=PGPB,USPT,EPAB,JPAB; mulch mat, rubber, color, two-tone, reversible, tree, circle, non-uniform, thickness, appearance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br>---<br>Y | US 2008/0274342 A1 (Moore) 06 November 2008 (06.11.2008) paras. [0007]-[0013], [0045]-[0061]; Figs. 2-3 | 1-5, 8, 13-20, 24<br>---<br>6-7, 9-12, 21-23 |
| Y | US 2008/0202023 A1 (Moore) 28 August 2008 (28.08.2008) [0040], [0060]); Fig. 1 | 6-7, 21 |
| Y | US 6,233,867 B1 (Gibson) 22 May 2001 (22.05.2001) col. 3, lns. 56-61, col. 4, lns. 1-13; Fig. 1 | 9-12 |
| Y | US 2007/0101679 A1 (Harthcock et al.) 10 May 2007 (10.05.2007) para. [0042] | 22-23 |
| Y | US 2006/0070294 A1 (Spittle) 06 April 2006 (06.04.2006) para. [0039] | 10 |
| A | US 5,396,731 A (Byrne) 14 March 1995 (14.03.1995); entire document | 1-24 |
| A | US 2004/0237387 A1 (McCamy) 02 December 2004 (02.12.2004); entire document | 1-24 |

☐ Further documents are listed in the continuation of Box C. ☐

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 16 December 2008 (16.12.2008) | 02 JAN 2009 |
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-3201 | Authorized officer:<br>Lee W. Young<br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |

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