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(54) **SHOE MIDSOLE**

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(57) **ABSTRACT**

A midsole of a shoe with multiple layers in which at least one of the layers is wrapped in film in order to protect it from the elements, provide stability and also to provide some visual features.

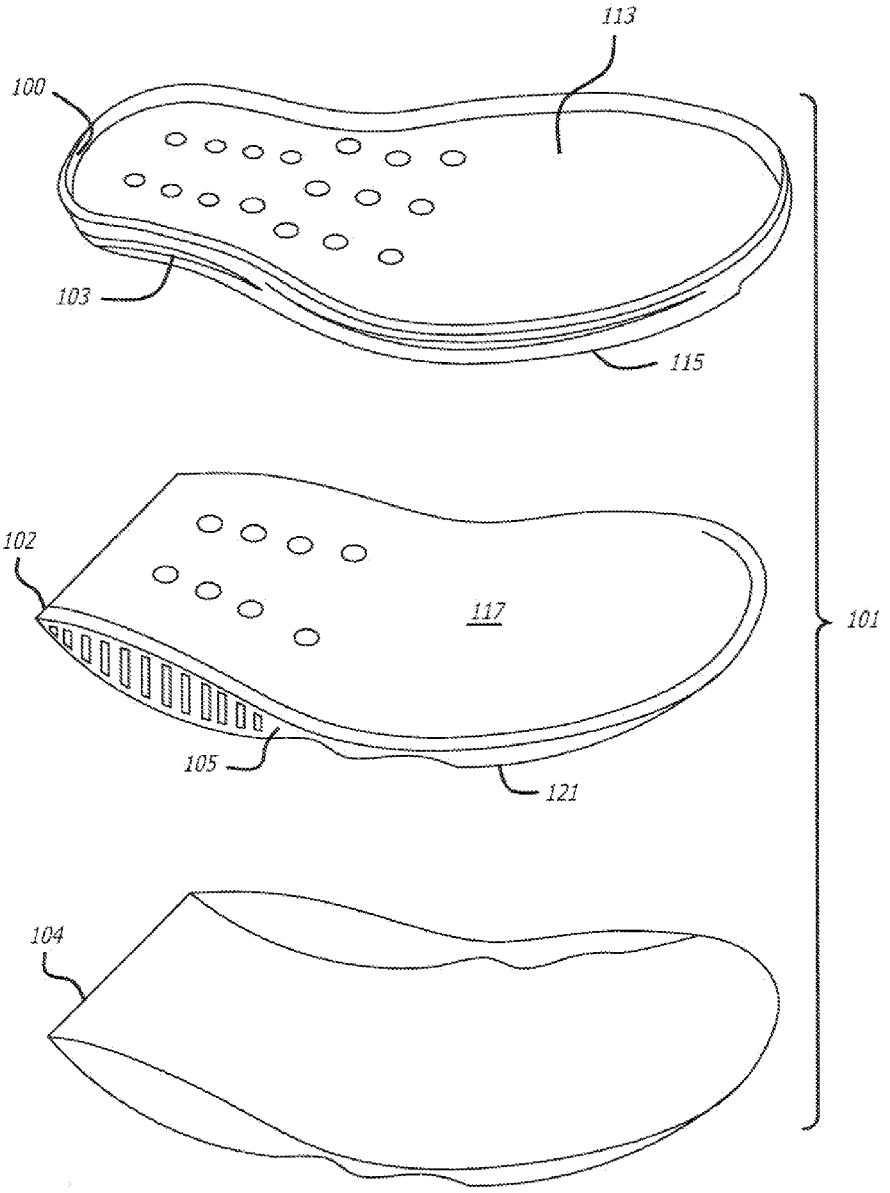


FIG. 1

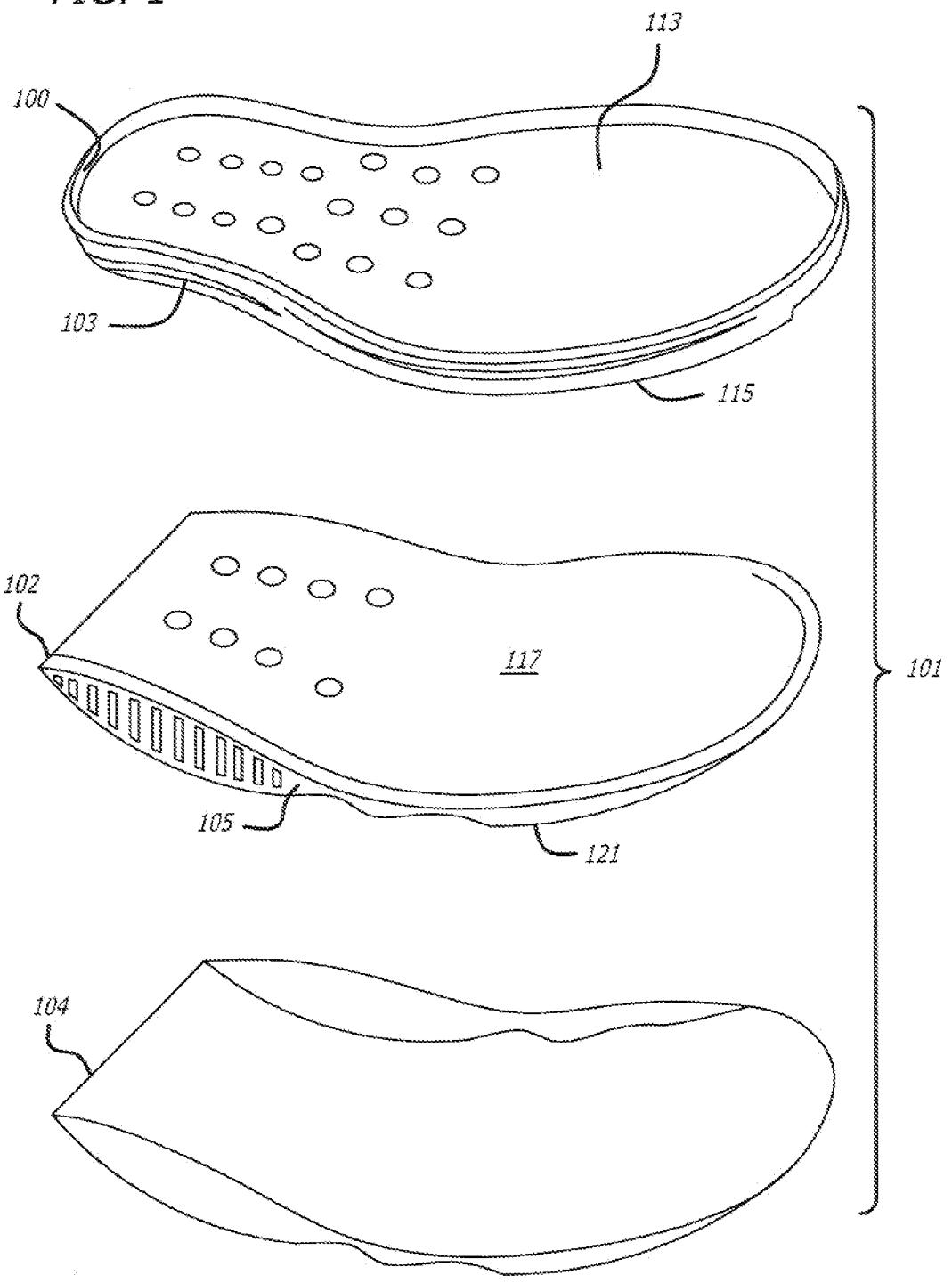
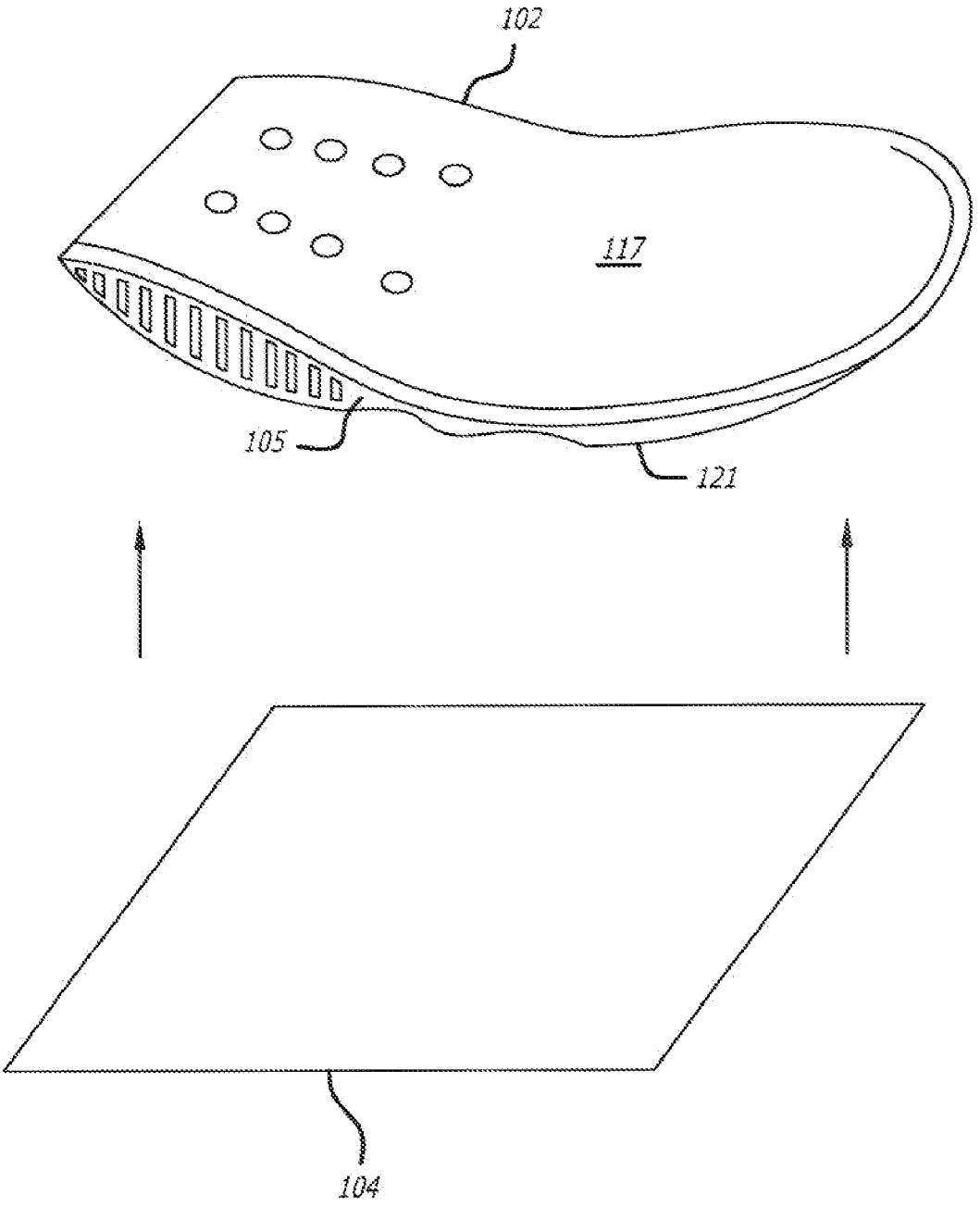


FIG. 2



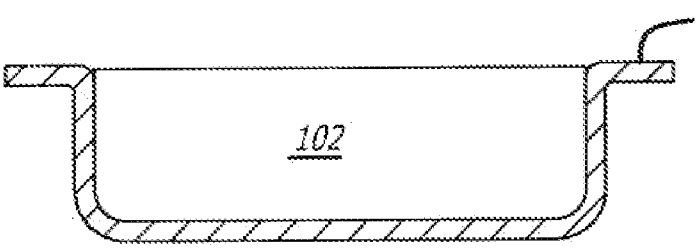


FIG. 3

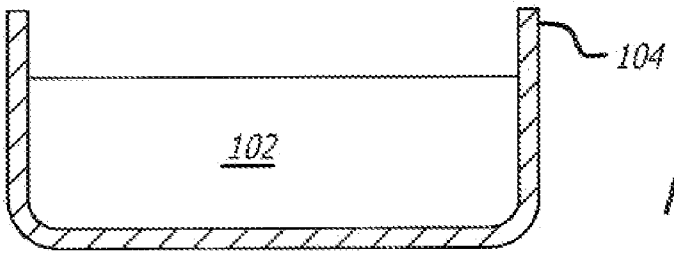


FIG. 4

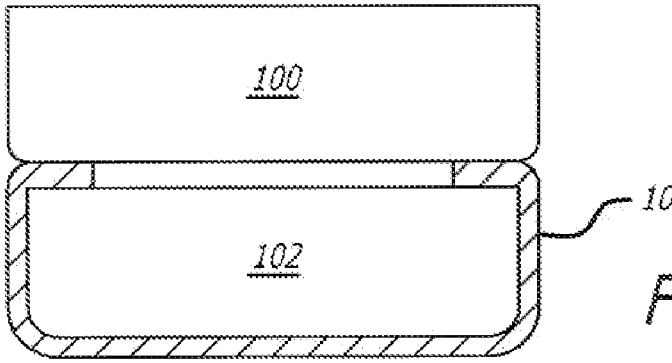


FIG. 4A

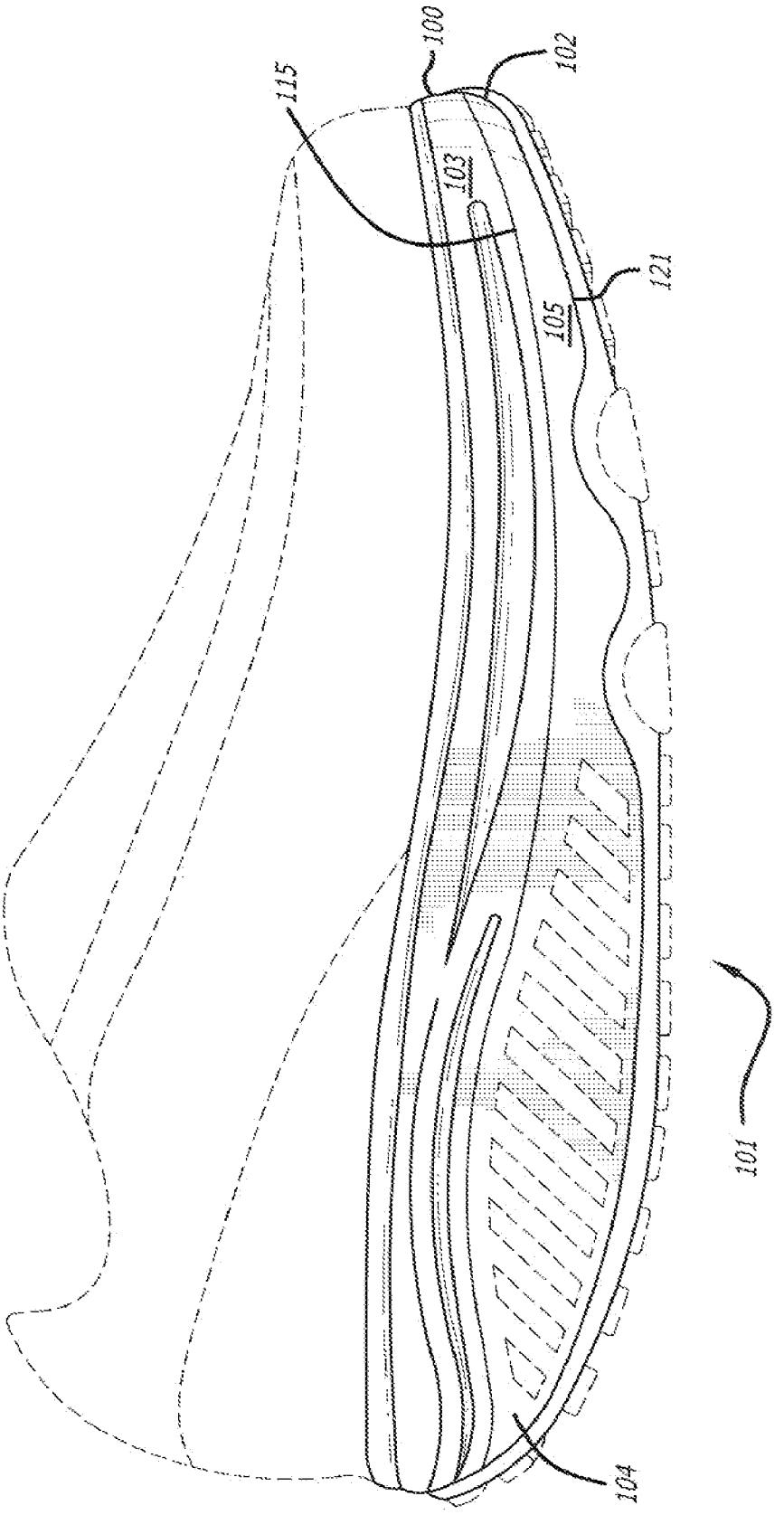


FIG. 5

SHOE MIDSOLE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the structure of a midsole for a shoe. More particularly, the present invention relates to a midsole that has a soft layer wrapped in a protective, stabilizing and/or decorative film.

[0003] 2. Description of the Related Art

[0004] Shoes are comprised of an upper, midsole and outsole. Shoes are designed for many purposes—from protection on the job, to performance during athletic activity on the track or court, to special occasions and everyday lifestyle. In order to achieve these purposes, shoes are made with different types of uppers, midsoles and outsoles that enable them to properly suit the activity. Midsoles are an integral part of the shoe and provide stability and cushioning to the user of the shoe.

[0005] A shoe midsole may be designed with various considerations. Some of those considerations present limitations and disadvantages. In some applications, the midsole must have a soft element in order to facilitate a particular is walking motion. However, due do the soft element, stability is compromised. Furthermore, due to the material that the soft element is made out of, the soft part of the midsole can take on elements, such as water, that may cause chemical reactions and lead to the breakdown of the midsole.

[0006] In general, most footwear functions to keep the foot properly and comfortably positioned, stabilized, and minimizes a tendency toward a medial and/or lateral rolling motion. Prior art midsoles which have a soft lower layer are unstable and therefore usually require stabilization material such as a shank piece or a relatively hard upper midsole layer. Prior art shoes have attempted to protect the entire midsole, but not in a dual durometer, two layer configuration.

[0007] Modern midsoles can be comprised of multiple layers. In particular, some midsoles have layers having different durometers of hardness. A soft durometer layer for cushioning and a firmer durometer layer for stability. Materials used are generally comprised of elastomeric materials that would include polyurethane, polyester elastomer, fluoroelastomer, chlorinated polyethylene, polyvinyl chloride, chlorosulfonated polyethylene, polyethylene/ethylene vinyl to acetate copolymer, neoprene, butadiene acrylonitrile rubber, butadiene styrene rubber, ethylene propylene polymer, natural rubber, silicone rubber, polyethylene, synthetic rubber, sulfide rubber, nitrile rubber, halogenated butyl rubber, polyethylene glycol, and combinations thereof. Soft lower layers in general are not used exclusively as they are not stable and could cause discomfort, pain or injury if is not used in conjunction with a stabilization device, such as a shank piece or relatively hard upper midsole layer to support the lateral to medial motion of the foot. The stabilization device is made from a more dense material such as rubber, plastic, thermoplastic, which acts to control pronation and guide the wearer into the proper gait cycle.

[0008] Furthermore, the elastomeric materials used for midsoles include foams that are susceptible to damage from the elements that can cause chemical reactions and lead to breakdown of the midsole. In particular, outside elements such as extreme heat or cold, hydrolysis, ozone oxidation, UV radiation, and acid rain can cause a chemical breakdown of the elastomeric materials used for midsoles, thus reducing the efficiency and lifespan of the midsole.

[0009] Also, there is difficulty printing intricate patterns on elastomeric materials used for midsoles and it is costly to change the color of the elastomeric material to represent a different color for each shoe style.

[0010] The present invention seeks to provide a soft midsole which is s wrapped in film to protect it from the elements and to increase stability. The film may also add a decorative component to the midsole by having colors and/or prints on it.

SUMMARY OF THE INVENTION

[0011] It is an object of the present invention to have a midsole with a layer that is relatively soft that is wrapped in an impermeable film such as thermoplastic polyurethane, polyvinyl chloride, or polyolefin.

[0012] In a preferred embodiment, the invention includes a midsole that is comprised of a distinct upper layer and a distinct lower layer. The layers may be made of elastomeric materials that would include polyurethane, polyester elastomer, fluoroelastomer, chlorinated polyethylene, polyvinyl chloride, chlorosulfonated polyethylene, polyethylene/ethylene vinyl acetate copolymer, neoprene, butadiene acrylonitrile rubber, butadiene styrene rubber, ethylene propylene polymer, natural rubber, silicone rubber, polyethylene, synthetic rubber, sulfide rubber, nitrite rubber, halogenated butyl rubber, polyethylene glycol, and combinations thereof.

[0013] The lower layer, which may or may not be made of the same material as the upper layer, has a density that is less than the density of the upper layer and is sufficiently low in density and high in compressibility so as to allow the lower layer to compress and deform a higher, or greater, amount under a given weight than the upper layer would compress and deform under that same weight.

[0014] Due to the low density of the lower layer, the layer is particularly susceptible to damage from the elements. Outside elements, if allowed to contact the lower layer or seep in between the layers may cause chemical reactions and lead to the breakdown of the midsole. In particular, outside elements such as extreme heat or cold, hydrolysis, ozone oxidation, UV radiation, and acid rain can cause a chemical breakdown of the elastomeric materials used for midsoles, thus reducing the efficiency and lifespan of the midsole.

[0015] In order to prevent such damage, the soft lower layer of the midsole is wrapped in film in order to provide protection to that layer from the elements. The film could also provide a new pattern, design or color.

[0016] Furthermore, when a soft midsole layer is used in a shoe, the user of the shoe may experience excess instability such that the user loses his balance and falls down. The wrapping of the soft midsole layer with a film counteracts this effect. The film confines the soft midsole layer and prevents excess deformation of that layer, thereby enhancing stability.

[0017] The wrapping of the soft layer of the midsole in a film is typically done during the molding process. The film is positioned into the mold having a surface complementary to the desired predetermined surface shape of the midsole. The film may be applied in a vacuum mold. The vacuum mold forms the shape of the film so that it is in the desired shape of the midsole layer. The elastomeric material that makes up the midsole layer is poured inside the mold and inside the film that is formed to the desired shape of the midsole layer.

[0018] The film used in the vacuum mold forming process is formed either to the side or upwards of the midsole layer.

Any excess film is then either trimmed or folded over onto the top surface of the midsole layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] By way of example only, selected embodiments and aspects of the present invention are described below. Each such description refers to a particular figure ("FIG.") which shows the described matter. All such figures are shown in drawings that accompany this specification. Each such figure includes one or more reference numbers that identify one or more part(s) or element(s) of the invention.

[0020] FIG. **1** is an exploded view of the midsole.

[0021] FIG. **2** is an exploded view of the lower layer and film.

[0022] FIG. **3** is a cross section view of the lower layer and film.

[0023] FIG. **4** is a cross section view of the lower layer and film.

[0024] FIG. **4**A is a cross section view of the midsole.

[0025] FIG. **5** is an elevation view of the midsole.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0026] The invention will now be described with reference to the preferred embodiment shown in FIG. **1**. This embodiment shows a midsole **101**, the upper layer of the midsole **100**, the lower layer of the midsole **102** and the film **104**. As used herein, "above" and "below" refer to relative locations of identified elements when a shoe and thus the midsole is in its normal, upright position as shown in FIGS. **1** and **5**.

[0027] The midsole **101**, as shown in FIG. **1**, comprises an upper layer **100** and a lower layer **102**. The upper layer **100** may comprise a plurality of sub-layers. The upper layer **100** has a top surface **113** substantially opposite a bottom surface **115**. The upper layer **100** has a peripheral wall **103**. The lower layer **102** has a top surface **117** substantially opposite a bottom surface **121**. The lower layer **102** has a peripheral wall **105**. As shown in FIGS. **1** and **5**, when the midsole is in its normal, upright position, the lower layer **102** is below the upper layer **100**.

[0028] In the preferred embodiment, the upper layer **100** has a first density and the lower layer **102** has a second density that is less dense than the first density. The upper layer **100** has a first compressibility and the lower layer **102** has a second compressibility that is greater than the first compressibility. The compressibility of the lower layer **102** is relatively high. The upper layer **100** is typically made of elastomeric materials that would include polyurethane, polyester elastomer, fluoroelastomer, chlorinated polyethylene, polyvinyl chloride, chlorosulfonated polyethylene, polyethylene/ethylene vinyl acetate copolymer, neoprene, butadiene acrylonitrile rubber, butadiene styrene rubber, ethylene propylene polymer, natural rubber, silicone rubber, polyethylene, synthetic rubber, sulfide rubber, nitrile rubber, halogenated butyl rubber, polyethylene glycol, and combinations thereof. However, the upper layer **100** can be made from any other material without departing from the scope of the present invention. The lower layer **102** is made of a compressible and deformable yet resilient material which may or may not be the same material of which the upper layer **100** is made. The upper layer **100** has a bottom surface **115** that may be connected to the top surface **117** of the lower layer **102** by either friction and/or an adhesive, molding and/or other similar means. However, the upper layer **100** and lower layer **102** can be connected by other means, not connected at all, or connected only in part, without departing from the scope of the present invention.

[0029] In the preferred embodiment, the bottom surface **121** and the peripheral wall **105** of the lower layer **102** are wrapped by film **104**. The film **104** may also overlap the peripheral wall **105** and extend to the top surface **117** of the lower layer **102**. The film may be wrapped by hand, through a molding process, a vacuum molding process or overlay. However, the film may be wrapped by other means without departing from the scope of the present invention. The film **104** may be made out of polyurethane, polyvinyl chloride, rubber, thermal plastic rubber or thermoplastic polyurethane. However, the film **100** can be made from any other material without departing from the scope of the present invention. The bottom surface **121** and peripheral wall **105** are wrapped by film **104**, prior to the lower layer **102** being connected to the upper layer **100**.

[0030] FIG. **2** is an exploded view of the lower layer **102** and the film **104**. As shown, the film **104** is normally flat or in rolls. The film **104** can either be translucent, transparent, colored or patterned. The film **104** is applied to the bottom surface **121** and peripheral wall **1.05** of the lower layer **102** as described above.

[0031] FIG. **3** shows a cross section view of the film **104** combined with the lower layer **102**, during the production process. As shown, the film **104** overlaps to the side of the lower layer **102** up the peripheral wall **104** and can be trimmed or folded over to the top surface **117** of the lower layer **102**.

[0032] FIG. **4** is a cross section view of the film **104** combined with the lower layer **102**, during an alternative production process. As shown, the film overlaps upwards of the peripheral wall of the lower layer **102** and can be trimmed or folded over to the top surface **117**.

[0033] FIG. **4**A is a cross section view of the film **104** combined with the lower layer **102**. During the production process, as shown, the film is folded upwards on the top surface **117** of the lower layer **102**.

[0034] FIG. **5** is an elevation view of a preferred embodiment of the complete midsole **101**. FIG. **5** shows the upper layer **100** placed on top of the lower layer **102** and film **104** combined together to form the complete midsole **101**. The midsole **101** is below a shoe upper (shown in phantom) in a complete shoe. The midsole **101** is above a shoe outsole (shown in phantom) in a complete shoe.

What is claimed is:

1. A shoe midsole comprising:

A plurality of layers each having a surface substantially opposite the surface on an adjacent layer;

wherein at least one layer in the plurality of layers is wrapped by a film.

2. The shoe of claim **1** in which said film is transparent.

3. The shoe of claim **1** in which the film is selected from the group consisting of polyurethane, polyvinyl chloride, rubber and thermal plastic rubber or combination thereof.

4. The shoe of claim **1** in which the film is comprised of at least one member of the group consisting of polyurethane, polyvinyl chloride, rubber and thermal plastic rubber.

5. A shoe midsole comprising:

a plurality of layers;

said plurality of layers comprising an upper layer and a lower layer;

wherein said upper layer and said lower layer each having a density wherein the density of the upper layer is denser than the density of the lower layer; and

a film wrapped around said lower layer.

6. The shoe of claim **4** in which said film is transparent.

7. The shoe of claim **4** in which the film is selected from the group consisting of polyurethane, polyvinyl chloride, rubber and thermal plastic rubber or combination thereof.

8. The shoe of claim **4** in which the film is comprised of at least one member of the group consisting of polyurethane, polyvinyl chloride, rubber and thermal plastic rubber.

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