

low density and lightweight characteristics of the tile 10 facilitate handling and installation.

[0042] The tile 10 can be assembled with other similar tiles 10 in any selected assembly pattern on a ceiling, wall or floor.

[0043] When used as a wall covering the tile 10 can be provided with any suitable known self-adhesive material or provided with a dry bottom surface 16 and installed with a mastic or bonding material to bond the tile 10 directly to the wall surface.

[0044] The lightweight features of the tile 10 are advantageous for obtaining a secure bond when installing the tile 10 on vertical wall surfaces. It is also especially easy to install the tile 10 at vertical corners (Figs. 7A and 7B), such as at inside corners of intersecting walls, and at outside corners, such as at entry ways. An inside or outside corner installation is accomplished by forming a groove in the foam base layer 14 of the tile 10 to facilitate bending or folding of the tile.

[0045] For example, referring to Figs. 4-6 the lower base surface 16 of the foam base layer 14 can be scored or grooved at any selected locations such as 70 and 72 (Fig. 4). The depth of the scoring or grooving should not extend past the upper surface 18 (Fig. 2) of the foam base layer 14.

[0046] The grooving or scoring can be in the form of a V-shaped groove 74 (Fig. 6) or a semi-circular groove 76 (Fig. 5). Grooves of any other known shape that facilitate bending or folding of the tile 10 can also be used to enable the tile to conform in one continuous piece to any vertical intersecting surfaces that intersect at any intersection angle.

[0047] Since most interior vertical surfaces intersect at 90° angles the V-shaped groove 74 can be approximately 120° as shown in Fig 6. The grooves 74 and 76 can be cut or formed with a router (not shown) or any other suitable known

grooving tool wherein the grooves 74 and 76 are directed into the lower base surface 16 of the foam base layer 14.

[0048] Once the base surface 16 is grooved the tile 10 can be folded or bent at the groove to conform to an inside corner 80 or an outside corner 82 as shown in Figs. 7A and 7B.

[0049] The tile 10 can also be bonded directly to a ceiling surface (not shown) in a manner similar to that described for installing the tile on a wall surface. If the tile 10 is to be continuously installed on a ceiling and wall surface the tile can be grooved and folded, as previously described, to enable the tile to conform to the intersection of the wall and ceiling surfaces.

[0050] When used in a hung ceiling installation (not shown) the tile 10 can be easily positioned in and removed from a suspended ceiling grid support frame (not shown). If desired, a suitable known low tack adhesive can be applied in one or more small spots on the wear layer 36 of the tile 10 near the peripheral edge 12 to lightly adhere the tile 10 to the ceiling grid (not shown) of the hung ceiling, yet still permit clean and easy removal of the tile 10 from the grid support.

[0051] Foam plastic materials suitable for forming the foam base layer 14 include polyurethane, polyamide copolymers, polystyrene, polyvinyl chloride (PVC), polypropylene and polyethylene foamed plastics, all of which have good molding processability.

[0052] Polyvinyl chloride (PVC) foam materials are especially suitable for forming the foam base layer 14 because they are chemically stable, corrosion resistant, and have excellent flame-retardant properties.

[0053] It is well known that foam plastic material contains hollow globules or air cells, which can be closed cells, that provide the foam plastic material with reduced density and lighter weight in comparison with dimensionally similar non-foam plastic material.

[0054] It is also well known in the art that the preparation of a composite laminated plastic tile that includes plural layers usually requires relatively high compression forces and relatively high temperatures to provide a secure surface to surface bond between the layers of the laminate tile.

[0055] Applicant has found that the elevated pressures and temperatures that are usually associated with preparing a composite laminated plastic tile with solid layers are generally not feasible for laminating the presently disclosed composite plastic tile having a foam layer. The elevated pressures and temperatures generally used for laminating solid plastic layer tile can burst or unduly compress the air cells in a foam layer and thereby substantially increase the density of the foam layer 14, compared to the density of the foam layer 14 in its non-compressed condition.

[0056] It is thus of significant importance in making the light weight, laminated, multi-purpose tile 10, to avoid a substantial increase in density of the foam base layer 14 when the component layers of the tile 10 as shown in Fig. 2 are placed under pressure to produce the laminated composite tile 10. It is also of significant importance to establish a pressure or pressure range for laminating the component layers of the tile 10 that provides a good surface to surface bond between the layers without unduly increasing the density of the foam base layer 14, compared to the density of the foam layer 14 in its non-compressed condition.

[0057] Another problem dealt with by applicant in making the tile 10 as a light weight, foam based structure is preserving the dimensional integrity of the tile 10, maintaining the stability and shape of the tile 10, and preventing warpage of the tile 10.

[0058] In making the tile 10 the foam base layer 14 is preferably formed of PVC. The thickness of the foam base layer 14 can vary from about 1 to 15 mm,

preferably from about 1.5 to 12 mm, more preferably from about 2 to 10 mm, even more preferably from about 2 to 8 mm, and most preferably from about 2 to 6 mm.

[0059] The components of the foam base layer 14 are well known in the art and typically comprise, in weight %:

Plastic material	40 to 90%
Foaming agent	0.7 to 3%
Foam control agent	4 to 8%
Stabilizing agent	1.5 to 5%
Plasticizing agent	0 to 15%
Lubrication agent	1 to 2%
Heavy calcium	0 to 50%
Toughening agent	3 to 9%
Flame-retardant agent	3 to 15%
Antiseptic and anti-mildew agent	0.5 to 2%

[0060] The density of the foam base layer 14 can vary from about 0.1 to 1.5 grams/cc, preferably from about 0.2 to 1.4 grams/cc, more preferably from about 0.3 to 1.3 grams/cc, even more preferably from about 0.4 to 1.2 grams/cc, even more preferably from about 0.5 to 1.2 grams/cc, and most preferably from about 0.6 to 1.2 grams/cc.

[0061] The upper substrate layer 24 can comprise metal, alloy or macromolecular materials, and preferably comprises macromolecular materials, for example, addition polymers such as vinyl monomer copolymers or homopolymers; condensation polymers such as polyesters, polyamides, polyimides, epoxy resins, phenol-formaldehyde resins, urea-formaldehyde resins; natural macromolecular materials or modified derivatives thereof, such as plant fibers, animal fibers, and the like, or mineral fibers such as asbestos, ceramic fibers, carbon fibers, and the like.

[0062] The upper substrate layer 24 preferably comprises addition polymers and more preferably comprises vinyl monomer copolymers and/or homo-polymers such as polyethylene, polyvinyl chloride (PVC), polystyrene, polymethacrylates, polyacrylates, polyacrylamides, ABS (acrylonitrile-butadiene-styrene) copolymers, polypropylene, ethylene-propylene copolymers, polyvinylidene chloride, polytetrafluoroethylene, polyvinylidene fluoride, hexafluoropropene, styrene-maleic anhydride copolymers, and the like.

[0063] The upper substrate layer 24 most preferably comprises polyethylene or polyvinyl chloride (PVC). The polyethylene can be low density polyethylene, medium density polyethylene, high density polyethylene or ultra high density polyethylene.

[0064] The upper substrate layer 24 can also include filler materials and other additives that improve the physical properties and/or chemical properties and/or the processability of the product. These additives include known toughening agents, plasticizing agents, reinforcing agents, anti-mildew (antiseptic) agents, flame-retardant agents, and the like.

[0065] The thickness of the upper substrate layer 24 can vary from about 0.1 to 2 mm, preferably from about 0.15 to 1.8 mm, more preferably from about 0.2 to 1.5 mm, and most preferably from about 0.3 to 1.5 mm.

[0066] The thickness ratio of the foam base layer 14 to the upper substrate layer 24 can vary from about 1 to 15 : 0.1 to 2, preferably from about 1.5 to 10 : 0.1 to 1.5, more preferably from about 1.5 to 8 : 0.2 to 1.5, and most preferably from about 2 to 8 : 0.3 to 1.5, respectively.

[0067] The adhesive layer 32 can be any well-known bonding agent or binder capable of bonding together the upper substrate layer 24 and the foam base layer 14, for example polyurethanes, epoxy resins, polyacrylates, ethylene-vinyl acetate

copolymers, ethylene-acrylic acid copolymers, and the like. Preferably, the adhesive layer 32 is a hot-melt bonding agent.

[0068] The design layer 34 can comprise any suitable known plastic material such as a known formulation of PVC resin, stabilizer, plasticizer and other additives that are well known in the art. The design layer can be formed with or printed with printed patterns, such as wood grains, metal or stone design and fibrous patterns or three-dimensional figures. Thus the design layer 34 can provide the tile 10 with a three dimensional appearance that resembles heavier products such as granite, stone or metal.

[0069] The thickness of the design layer can vary from about 0.01 to 0.1 mm, preferably from about 0.015 to 0.08 mm, more preferably from about 0.2 to 0.7 mm, and most preferably from about 0.02 to 0.5 mm.

[0070] The wear layer 36 that forms the upper surface of the tile 10 can comprise any suitable known abrasion-resistant material, such as an abrasion-resistant macromolecular material coated onto the layer beneath it, or a known ceramic bead coating. If the wear layer 36 is furnished in layer form, it can be bonded to the layer beneath it.

[0071] The wear layer 36 can also comprise an organic polymer layer and/or inorganic material layer, such as an ultraviolet coating or a combination of another organic polymer layer and an ultraviolet coating. For example, an ultraviolet paint capable of improving the surface scratch resistance, glossiness, antimicrobial resistance and other properties of the product. Other organic polymers including polyvinyl chloride resins or other polymers such as vinyl resins, and a suitable amount of plasticizing agent and other processing additives can be included, as needed.

[0072] The method for producing the light weight foamed plastic composite tile 10 includes:

- (a) preparing a foam base layer;
- (b) preparing a substrate layer;
- (c) applying adhesive on a surface of the substrate layer and/or the foam base layer;
- (d) contacting the substrate layer and the foam base layer so that the substrate layer and foam base layer are bonded together by the adhesive; and
- (e) applying pressure to the substrate layer and the foam base layer at a pressure and temperature sufficient to produce a laminated light weight foam plastic composite tile including the foam layer, wherein each of the layers of the light weight foam plastic composite tile have substantially the same thickness and density after being pressed together as they did before being pressed together.

[0073] The substrate layer 24 can be bonded to the foam base layer 14 by coating the upper surface 18 of the foam base layer 14 and/or the lower surface 26 of the substrate layer 24 with the adhesive bonding agent 32 and contacting the mating surfaces 18 and 26.

[0074] A known balance layer (not shown) can be disposed between the foam base layer 14 and the substrate layer 24. The balance layer helps provide dimensional stability to the tile 10 by minimizing the effect of coefficients of expansion of different materials that are laminated above and below the balance layer. The balance layer thus helps inhibit curving, cupping or arching of the tile 10, and also helps to ensure the dimensional stability of the tile 10.

[0075] A known balance layer (not shown) can also be included between the wear layer 36 and the upper substrate layer 24 for purposes previously described.

[0076] The bonding of the upper substrate layer 24 to the foam base layer 14 is accomplished under pressure. Other methods to bond the foam base layer 14 to the substrate layer 24 can be employed, such as a known one-step formation using an adhesive thermal bonding machine known in the art that employs pressure after adhesive application.

[0077] The substrate layer 24, the design layer 34, and the wear layer 36 can be initially laminated together to form an upper substrate laminate subassembly 40 as shown schematically in Fig. 2a. The laminate subassembly 40 and the foam base layer 14 can then be laminated together to form the tile 10 (Fig. 2).

[0078] Alternatively, the wear layer 36, the design layer 34 the substrate layer 24 and the foam base layer 14 can be laminated together simultaneously to form the tile 10.

[0079] The pressing process can be either cold or ambient temperature pressing or thermal pressing at an elevated temperature. Thermal pressing is preferred for joining together the constituent components of the tile 10, and most preferably includes a heating stage and a cooling stage as schematically indicated in Fig. 8.

[0080] The pressure applied during the heating stage can vary from about 10 to 150 kg/cm², preferably from about 10 to 80 kg/cm², more preferably from about 15 to 80 kg/cm², and most preferably from about 15 to 60 kg/cm².

[0081] The pressure applied during the cooling stage can vary from about 10 to 150 kg/cm², preferably from about 10 to 80 kg/cm², more preferably from about 15 to 80 kg/cm², and most preferably from about 15 to 60 kg/cm².

[0082] The duration of the pressing process is about 15 to 100 minutes, preferably about 20 to 90 minutes, more preferably about 25 to 80 minutes, and most preferably about 30 to 70 minutes.

[0083] The pressures applied during the heating stage and the cooling stage

can be the same or different, and are preferably the same.

[0084] The temperature during the heating stage can vary from about 40 to 150°C, preferably from about 50 to 130°C, more preferably from about 60 to 100°C and most preferably from about 75 to 100°C.

[0085] The temperature during the cooling stage can vary from about 15 to 30°C, preferably from about 18 to 26°C and most preferably from about 20 to 25°C.

[0086] The duration of pressing during the heating stage can vary from about 5 to 50 minutes, preferably from about 10 to 45 minutes and more preferably from about 15 to 40 minutes. The duration of pressing during the cooling stage can vary from about 5 to 50 minutes, preferably from about 10 to 45 minutes, and more preferably from about 15 to 40 minutes. The duration of pressing during the heating stage and the cooling stage can be the same or different, and are preferably the same.

[0087] After formation of the tile 10 one or more post-treatment finishing steps can also be included, such as cutting, polishing, burnishing, inspecting and packaging of the tile 10.

[0088] In one illustrative embodiment of the invention the tile 10 includes the foam base layer 14 being formed of PVC of the type previously described, having a thickness of 4mm. The substrate layer 24 is a PVC layer having a thickness of 1 mm, the design layer 34 has a thickness of 0.3 mm, and the abrasion resistant layer 36 has a thickness of 0.2 mm. The total thickness of the upper substrate laminate 40 is thus 1.5 mm.

[0089] The tile 10 with the PVC foam base layer 14 is formed under pressure during a heating and cooling stage as follows.

[0090] A pressure of 35 kg/cm² is applied to the PVC foam base layer 14 in contact with the upper substrate layer 24 at a temperature of about 80°C for 25

minutes. The pressure is maintained for an additional 25 minutes during the cooling stage to ambient temperature.

[0091] After pressurization, the thickness of the upper substrate laminate 40 is about 1.5 mm. The thickness of the PVC foam base layer 14 is 3.95 mm. The density of the PVC foam base layer 14 before and after pressurization basically remains unchanged at 1.0 g/cc.

[0092] Thus the base layer of foam 14 is bonded to the upper substrate layer 24, and the base layer of foam 14 is placed under pressure while being bonded to the upper substrate layer 24, and the density and thickness of the base layer of foam 14 after being bonded to the upper substrate layer 24 is substantially the same density and thickness as before being placed under pressure.

[0093] After the formation of the tile 10 is completed, and if desired, a suitable known adhesive can be applied to the lower base surface 16 of the PVC foam base layer 14, to facilitate affixation of the tile 10 to a wall or ceiling.

[0094] In a second illustrative embodiment of the invention the tile 10 includes the substrate layer 24 being formed of polyethylene (PE) having a thickness of 1 mm. The upper substrate laminate 40 has a total thickness of 1.5 mm.

[0095] The PVC foam base layer 14 has a thickness of 4mm.

[0096] The adhesive 32 is of a suitable known formulation and is contacted to the upper surface 18 of the foam base layer 14, and to the lower surface 26 of the upper substrate layer 24. The adhesive coated surface 18 of the foam base layer 14 and the adhesive coated surface 26 of the upper substrate layer 24 are then superimposed and pressed together at a pressure of 80 kg/cm² while heating to a temperature of 80°C for 25 minutes. Pressurization is then continued after the heating stage for an additional 40 minutes during the cooling stage to ambient temperature.

[0097] After pressurization, the thickness of the upper substrate laminate 40 remains at 1.5 mm and the thickness of the PVC foam base layer 14 is 3.93 mm. The density of the PVC foam base layer 14 before and after pressurization basically remains unchanged at 1.2 grams/cc.

[0098] In a third illustrative embodiment of the invention the tile 10 includes the substrate layer 24 being formed of polyethylene (PE) and the upper substrate laminate 40 having a total thickness of 0.7 mm. The foam base layer 14 is formed of PVC foam having a thickness of 4 mm.

[0099] The adhesive 32 is of a suitable known formulation and is contacted or coated onto the upper surface 18 of the PVC foam base layer 14, and to the lower surface 26 of the substrate layer 24. The adhesive surfaces are superimposed and pressed together at a pressure of 20 kg/cm² and a temperature of 60°C for 40 minutes. The application of pressure is continued after the heating stage for 20 minutes during the cooling stage to ambient temperature.

[0100] After pressurization, the thickness of the upper substrate laminate 40 is 0.7 mm and the thickness of the PVC foam base layer 14 is 3.93 mm. The density of the PVC foam material of the layer 14 before and after pressurization basically remains unchanged at 0.6g/cc.

[0101] In a fourth illustrative embodiment of the invention a floor tile for a floating floor assembly is generally indicated by the reference number 100 in Fig. 9. The features and principles of the floor tile 100 are also adaptable to floor planks.

[0102] The floor tile 100 includes a first floor member portion 102 and a second floor member portion or underlayer portion 104 that are of identical size and shape. The first floor member portion 102 is laminated to the second floor member portion 104 such that the first floor member portion 102 has a predetermined offset from the second floor member portion 104 in the manner described in U.S. patents 7,155,871, 7,322,159, and 7,458,191, the disclosures of which are hereby incorporated by

reference in this application.

[0103] The layer structure of the first floor member portion 102 includes a base layer, a substrate layer, and adhesive layer, a design layer and an abrasion resistant layer, all of which are structurally similar to the corresponding layers 14, 24, 32, 34 and 36 of the tile 10 as shown in Fig. 2.

[0104] The second floor member portion 104 is a foam layer that is structurally similar to the base layer 14 of the tile 10 as shown in Fig. 2.

[0105] The first floor member portion 102 is preferably formed as a complete and separate laminate unit before being laminated to the second floor member portion 104.

[0106] Preferably, but not necessarily, the second floor member portion 104 has no surface declinations or beveled edges.

[0107] The first floor member portion 102 extends an offset amount "a" beyond the second floor member portion 104 to define an offset L-shaped marginal section 106 (Fig. 9) of the first floor member portion 102.

[0108] Also, in the offset arrangement of the first and second floor member portions 102 and 104, the second floor member portion 104 extends the offset amount "a" beyond the first floor member portion 102 to define an offset L-shaped marginal section 108 (Fig. 9) of the second floor member portion 104.

[0109] The L-shaped marginal section 106 of the first floor member portion 102 and the L-shaped marginal section 108 of the second floor member portion 104 are of identical size and shape.

[0110] A suitable known bonding material for laminating the first and second floor member portions 102 and 104 together can be provided on either a lower surface 110 of the first floor member portion 102 or an upper surface 112 of the second floor member portion 104. Under this arrangement only one of the L-shaped marginal sections 106 or 108 is provided with adhesive.

[0111] However, the bonding material for the laminated first and second floor member portions 102 and 104 is preferably provided on the lower surface 110 of the first floor member portion 102 and on the upper surface 112 of the second floor member portion 104.

[0112] The L-shaped marginal section 106 thus has an exposed downwardly directed adhesive surface that is part of the lower surface 110 of the first floor member portion 102, and the L-shaped marginal section 108 has an exposed upwardly directed adhesive surface that is part of the upper surface 112 of the second floor member portion 104. The adhesive on the exposed adhesive surfaces on the L-shaped marginal sections 106 and 108 is the bonding material used for laminating the first floor member portion 102 and the second floor member portion 104 together.

[0113] Although the dimensions of the floor tile 100 are a matter of choice, a suitable size for the first floor member portion 102 and the second floor member portion 104 can be, for example, 12 inches by 12 inches. Smaller or larger size floor tiles are a matter of choice. The thickness of the first floor member portion 102 can vary from about 2 to 5 mm and the thickness of the second floor member portion 120 can vary from about 2 to 5 mm. The marginal offset "a" can be, for example, approximately 1 inch. The amount of offset "a" is a matter of choice, and larger or smaller offsets are also usable.

[0114] The foam structure of second floor member portion 104 of the floor tile 100 is yieldable to small bumps and other imperfections generally referred to as surface irregularities in a floor base. The second floor member portion 104 thus enables the floor tile 100 to conform to such surface irregularities and lie flat on a floor base.

[0115] During installation of the floor tiles 100 in side-by-side and end-to-end relationship the downwardly directed L-shaped marginal section 106 of the

first floor member portion 102 is positioned to engage the upwardly directed L-shaped marginal section 108 of the second floor member portion 104 in the manner shown in the tile assembly 120 of Fig. 10. The tile assembly 120 is but one example of known tile assembly patterns that are a matter of choice.

[0116] The tile 10 can be installed on a floor base without any mastic or adhesive coating on the floor base, and without mastic or adhesive on an undersurface 114 (Fig. 9) of the second floor member portion 104. Thus, during installation, the floor tiles 100 can be placed on a dry floor base surface for easy shifting to any selected position thereby facilitating installation of the floor tiles 100 in any selected pattern or arrangement.

[0117] A fifth illustrative embodiment of the invention is a flexible, laminated floor member unit generally indicated by the reference number 200 in Fig. 12. The term "floor member" as used hereinafter is intended to refer to a floor plank, but the concepts and structures described herein are also applicable to floor tiles.

[0118] The floor member is installable on a floor base with a plurality of other similar floor members without being bonded directly to the floor base as part of a "floating floor" installation.

[0119] The constituent layers and components of the floor member 200 are shown in Fig. 11 in partially exploded, enlarged fragmentary form. The floor member 200 has a polygonal shape, and is preferably in the form of an elongated rectangle.

[0120] Although the size of the floor member 200 is a matter of choice, outside dimensions of approximately 8 inches by 4 feet have been found to be an attractive size and render the floor member 200 relatively easy to handle and install.

[0121] Referring to Fig. 12, the floor member 200 has an upper portion 230 offset from a lower portion 240. The upper portion 230 of the floor member 200 includes a clear vinyl wear layer 202 (Figs. 11 and 14) of known construction. The clear vinyl wear layer 202 can be approximately 0.5 to 0.9 mm thick, and is preferably 0.7 mm thick. The clear vinyl wear layer provides the floor member 200 with protection against scuffs and abrasions.

[0122] The upper portion 230 of the floor member 200 also includes a coating or overlayer 204 (Figs. 11 and 14) with a known mixture of ceramic beads and urethane that overlies the wear layer 202. The coating 204 includes microscopic ceramic particles (not shown) suspended in an ultra-violet cured urethane coating. The coating 204 provides the floor member 200 with enhanced wear and stain resistance and also enables the floor member 200 to be easily maintained.

[0123] The upper portion 230 of the floor member 200 also includes a known decorative film or layer 208 (Figs. 11 and 14) located beneath the clear vinyl wear layer 202. The decorative film 208 incorporates a high-resolution design such as a wood-grain design, although the design or décor of the decorative film 208 is a matter of choice.

[0124] The design or decorative appearance of the floor member 200 is essentially the design or appearance of the decorative film 208, since the clear vinyl wear layer 202 and the ceramic bead layer 204 are substantially transparent.

[0125] The upper portion 230 of the floor member 200 further includes a solid vinyl layer 210 (Figs. 11 and 14) of known construction underneath the decorative film 208. The solid vinyl layer 210 can be approximately 2.5 to 3.5 mm thick, and is preferably about 3.0 mm thick. The solid vinyl layer 210, which can be formed of multiple layers of solid virgin vinyl, helps resist denting and chipping of the floor member 200 and enhances the durability as well as the dimensional

stability of the floor member 200. The solid vinyl layer 210 also facilitates any desired embossing of the overlying layers 202, 204 and 208. Such embossing embellishes the natural appearance of the floor member and also provides the surface of the floor member 200 with improved traction.

[0126] The floor member 200 further includes a core layer 216 (Fig. 14) of closed-cell polyvinyl chloride (PVC) foam provided below the vinyl layer 210. The core layer 216 is similar in its makeup to the closed-cell foam base layer 14 (Figs. 1-4) of the multi-purpose tile 10, with a density that can vary from about 0.1 to 1.5 grams/cc. However, the core layer 216 has a thickness of approximately 4.8 to 6.0 mm, and is preferably about 5.0 mm thick.

[0127] A first known floor member edge joining means 224 (Figs. 12 and 14) is provided in the core layer 216 at the upper offset portion 230 of the floor member 200, at two intersecting edges 232, 234 (Fig. 12) of the floor member 200. A second known complementary edge joining means 226 (Figs. 12 and 14) is provided in the core layer 216 at the lower offset portion 240 of the floor member 200, at the other two intersecting edges 242, 244 (Fig. 12) of the floor member 200.

[0128] The edge joining means 224 and 226 (Fig. 14) are known locking systems identified by the trademarks ALLURE CLIC and UNICLIC of Halstead New England Corporation, Norwalk, Conn.

[0129] The edge joining means 224 of one floor member 200 is connectable at one edge to the complementary edge joining means 226 of a first adjacent floor member 200, to form a non-adhesive, mechanical locking connection between two adjacent floor members 200, 200.

[0130] A known supplementary locking system identified as the 5G Locking System of Valinge Innovation AB, Viken, Sweden includes a stub-like flexible plastic projection 250 (Figs. 11 and 14) provided in the core layer 216 at the

second connection means 226 (Fig. 14) for engagement with a recess 252 (Fig. 14) provided in the core layer 216 at the first connection means 224. The plastic projection 250 and the recess 252 can extend along one or more edges of the floor member 200.

[0131] The floor member 200 further includes a resilient, shock absorbing bottom underlayment 256 (Figs. 11 and 14), bonded to the lower surface of the core layer 216, in the lower portion 240 (Fig. 12) of the floor member 200. The underlayment 256 of the floor member 200 is made of a cross-linked polyolefin foam, preferably an irradiated, cross-linked polyolefin foam known in the art as "IXPE". Preferably, the cross-linked polyolefin foam is polyethylene, and, more preferably low density polyethylene (LDPE). The IXPE is compounded with the following materials to optimize its cushioning qualities.

Table 1	
Item	Weight %
LDPE	80-85
Azobisformamide (ABFA)	0-8
Azodicarbonamide (ADCA)	0-8
Calcium carbonate	1.5-2.5
Anti-oxidant	0.75-1.5
Color	3-5

[0132] The properties of the IXPE cushioning underlayer appear in Table 2 below:

Table 2 – IXPE Properties	
Item	Property
Thickness	0.9-2.25 mm
Density	0.085-0.115 g/cm ³
Water absorption	≤ 0.01%
Elongation:	
(i) Length	150-190%
(ii) Width	145-190%
Tensile Strength:	
(i) Length	0.7-1.1 Mpa
(ii) Width	0.5-1.0 Mpa

[0133] The underlayment 256 thus provides the floor member 200 with excellent water resistance, sound insulation, and heat insulating properties in addition to its cushioning function. The underlayment 256, which can be embossed at the bottom surface, also helps to accommodate subfloor imperfections, and is approximately 1.5 to 2.5 mm thick and preferably approximately 2.0 mm thick.

[0134] In assembling or joining a plurality of floor members 200 together the edge joining means 224 (Fig. 14) of one floor member 200 is connectable at one edge such as the edge 232 (Fig. 12) of the one floor member 200 to the complementary edge joining means 226 (Fig. 14) of a first adjacent floor member 200 to form a connection between the one floor member 200 and the first adjacent floor member 200 (Fig. 15).

[0135] When the edge joining means 224 and 226 are engaged to lock two adjacent floor members 200 together, the flexible plastic connection 250 also engages the recess 252 (Figs. 14 and 15) to provide a supplemental locking connection between the two connected floor members 200.

[0136] In a similar fashion the edge joining means 224 at a second edge such as the edge 234 (Fig. 12) of the one floor member 200 is connectable to the complementary edge joining means 226 of a second adjacent floor member 200 to form a second locking connection between the one floor member 200 and the second adjacent floor member 200, such as shown in Fig. 13.

[0137] In further similar fashion the edge joining means 226 (Figs. 12 and 14) of the one floor member 200 is joinable at a third edge such as the edge 242 (Fig. 12) of the one floor member 200 to the complementary edge joining means 224 of a third adjacent floor member 200 to form another locking connection between the one floor member 200 and the third adjacent floor member 200.

[0138] And lastly, the edge joining means 226 (Figs. 12 and 14) at a fourth edge such as the edge 244 (Fig. 12) of the one floor member 200 is joinable to the complementary edge joining means 224 of a fourth adjacent floor member 200 to form another locking connection between the one floor member 200 and a fourth adjacent floor member 200, and so on. In this manner a floating floor assembly 260 (Fig. 13) of the floor members 200 can be easily installed on a floor base (not shown).

[0139] Because the core layer 216 (Fig. 14) is a closed cell foam construction it has a density that is generally less than the density of solid plastic or solid non-plastic materials. The relatively low density of the core layer 216 enables the floor member 200 to have a greater thickness and less overall weight than that of known dimensionally similar laminated floor planks formed of solid plastic or wood composite layers. The floor member 200 can thus be made thicker, lighter and sturdier than floor members formed exclusively of solid laminated plastic materials.

[0140] All layers 202, 204, 208, 210, 216 and 256 of the floor member 200 as shown in Figs. 11 and 14 are formed of water resistant and water repellant

materials such that the floor member 200 is not susceptible to moisture related warpage or other types of water damage, problems that can occur if the floor member is placed on a floor base that is subject to relatively high humidity levels, moisture condensation or if the floor base is an avenue of moisture penetration. Such warpage and water damage can occur with floor members that have non-plastic components.

[0141] The overall thickness of the floor member 200 is defined as the distance between the ceramic bead layer 204 (Fig. 14) at the top of the floor member 200 and the bottom surface of the underlayment 256. The core layer 216 has a preferred thickness of 5 mm that is preferably at least 50% of the overall thickness of the floor member 200. Under this arrangement the floor member 200 is relatively thick and sturdy, but relatively lightweight as compared to equally dimensioned floor planks formed exclusively of solid laminated plastic materials.

[0142] A sixth illustrative embodiment of the invention is a floor member generally indicated by the reference number 270 in Fig. 16.

[0143] The floor member 270 is structurally similar to the floor member 200 of Figs. 11-15. However, the floor member 270 does not include the supplemental locking system represented by the stub-like projection 250 and the recess 252 (Figs. 14 and 15). The mechanical connection between adjacent floor members 270 by interengagement of the first connection means 224 and the second connection means 226 (Fig. 16) is an effective connection or locking system. The supplemental locking system 250, 252 of Figs. 14 and 15 is thus an optional feature of the invention.

[0144] The floor member 270 is mechanically connectable to other adjacent floor members 270 (not shown) in a manner similar to that previously described for connecting adjacent floor members 200 together. A floating floor assembly (not

shown) of the floor members 270 provides all of the water resistant qualities of the floor covering previously described for the floor member 200.

[0145] Applicant has found that the approximate 5.0 mm thickness of the core layer 216 is an optimum thickness that permits optional use of the supplemental locking system 250, 252 in the floor member 200 without compromising the integrity of the core layer 216.

[0146] Furthermore, the 50% thickness ratio of the 5.0 mm core layer 216 relative to the overall thickness of the floor members 200 or 270 permits economical manufacture of the floor members 200 and 270 with the closed-cell pvc foam as compared to a wood-based core layer or a non-foam core layer.

[0147] Under this arrangement, the floor members 200 and 270 are relatively lightweight for their thickness and easy to handle during installation. The floor member with foam core as disclosed herein does not require special skills or training to handle and install, making it attractive for do-it-yourself individuals who have had no previous experience installing floor planks.

[0148] As various changes can be made in the above constructions and methods without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A floor member comprising,

a) a generally rectangular unit having a top surface, a bottom surface, a predetermined overall thickness and opposite edge portions,

b) a core layer of closed cell pvc foam plastic material with a toughening agent such that said core layer is impact resistant and is of lower density and lighter weight than a solid pvc material of similar dimension, said core layer having an upper foam surface and a lower foam surface,

c) a non-foam plastic layer provided on the upper foam surface of said core layer,

d) a display or design layer provided over the non-foam plastic layer,

e) a clear vinyl wear layer and a protective transparent plastic coating provided over the design layer, such that said design layer shows through said clear vinyl wear layer and said protective transparent plastic coating and said protective transparent plastic coating constitutes the top surface of said floor member,

f) a resilient polyethylene foam layer provided at the lower surface of said core layer, and said resilient polyethylene foam layer having a bottom surface constituting the bottom surface of said floor member,

g) joining means provided at the opposite edge portions of said floor member to permit joining of said floor member to other said floor members in adjacent edge-to-edge contact,

h) said floor member having an overall thickness defined between the top surface and the bottom surface of said floor member, and

i) said core layer having a thickness that is approximately 50 percent of the overall thickness of said floor member.

2. The floor member as claimed in claim 1 wherein said joining means include a mechanical locking formation extending along two intersecting edges of said floor member and a complementary mechanical locking formation extending along the other two intersecting edges of said floor member to enable said floor member to be mechanically joined together in edge-to-edge, adjacent contact with other said floor members.

3. The floor member as claimed in claimed 2 further including supplemental locking means comprising a flexible plastic protrusion at one of said mechanical and complementary mechanical locking formations and a complementary recess at the other of said mechanical and complementary mechanical locking formations, said flexible plastic protrusion engaging said complementary recess when the mechanical locking formation and the complementary mechanical locking formations on two of said floor members are interengaged.

4. The floor member as claimed in claim 1 wherein the thickness of the core layer is approximately 5.0 mm.

5. The floor member as claimed in claim 1 wherein the non-foam plastic layer is made of solid vinyl.

6. The floor member as claimed in claim 5 wherein multiple layers of solid vinyl constitute the non-foam plastic layer.

7. The floor member as claimed in claim 5 wherein the overall thickness of the solid vinyl is approximately 3.0 mm.

8. The floor member as claimed in claim 1 wherein the thickness of the resilient underlayment is approximately 2.0 mm.

9. The floor member as claimed in claim 8 wherein the bottom surface of the resilient underlayment is embossed.

10. The floor member as claimed in claim 1 wherein the layers d) and e) are embossed to embellish the natural appearance of the floor member and provide the floor member with surface traction.

11. The floor member as claimed in claim 5 wherein the thickness of the core layer is approximately 5.0 mm, the thickness of the solid vinyl layer is approximately 3.0 mm and the thickness of the resilient underlayment is approximately 2.0 mm such that the core layer thickness is approximately 50% of the overall thickness of said floor member.

12. The floor member as claimed in claim 1 wherein said floor member is an elongated rectangle approximately eight inches wide and four feet long

13. A method of preparing a floor member for a floating floor installation on a floor base comprising,

a) forming a generally rectangular floor member unit having a top surface, a bottom surface, a predetermined overall thickness and opposite edge portions, the overall thickness of the floor member being defined between the top surface and the bottom surface of said floor member,

b) providing the floor member with a core layer of closed cell pvc foam plastic material with a toughening agent such that said core layer is impact

- resistant and is of lower density and lighter weight than a solid pvc material of similar dimension, said core layer having an upper foam surface and a lower foam surface,
- c) providing a non-foam plastic layer on the upper foam surface of the core layer,
 - d) providing a display or design layer over the non-foam plastic layer,
 - e) providing a clear vinyl wear layer and a protective transparent plastic coating over the design layer, such that said design layer shows through the clear vinyl wear layer and the protective transparent plastic coating and the protective transparent plastic coating constitutes the top surface of the floor member,
 - f) bonding a resilient polyethylene foam layer to the lower surface of said core layer, wherein the resilient polyethylene foam layer has a bottom surface that constitutes the bottom surface of the floor member,
 - g) providing joining means at the opposite edge portions of said floor member to permit joining of the floor member to other said floor members in adjacent edge-to-edge contact,
 - h) forming the core layer with a thickness that is approximately 50 percent of the overall thickness of the floor member.

14. The method of claim 13 including forming the joining means with a mechanical locking formation that extends along two intersecting edges of the floor member and a complementary mechanical locking formation that extends along the other two intersecting edges of said floor member to enable said floor member to be mechanically joined together in edge-to-edge, adjacent contact with other said floor members.

15. The method of claim 14 including providing supplemental locking means comprising a flexible plastic protrusion at one of said mechanical and complementary mechanical locking formations and a complementary recess at the other of said mechanical and complementary mechanical locking formations, wherein the flexible plastic protrusion engages the complementary recess when the mechanical locking formation and the complementary mechanical locking formations on two of the floor members are interengaged.

16. The method of claim 13 including forming the non-foam plastic layer of solid vinyl.

17. The method of claim 16 including forming the core layer with a thickness of approximately 5.0 mm, forming the solid vinyl layer with a thickness of approximately 3.0 mm and forming the resilient underlayment with a thickness of approximately 2.0 mm such that the core layer thickness is approximately 50% of the overall thickness of the floor member.

18. The method of claim 13 including embossing the the layers d) and e) to embellish the natural appearance of the floor member and provide the floor member with surface traction.

19. The method of claim 13 including forming the floor member as an elongated rectangle approximately eight inches wide and four feet long.

20. The method of claim 13 including embossing the bottom surface of the resilient underlayment.

ABSTRACT OF THE DISCLOSURE

[0149] The floor member has a closed-cell foam core that constitutes approximately 50% of the overall thickness of the floor member. All constituents of the floor member, including a design layer, wear layer and resilient foam plastic underlayer, are highly water resistant and essentially water repellant. The closed-cell foam core is relatively lightweight and the floor member is also relatively lightweight compared to equally dimensioned floor planks formed exclusively of solid laminated plastic materials or wood-based laminated materials. The floor member has edge connecting means for convenient floating floor installation without the need to adhere the floor member to a floor base. The floor member is also easy to handle to permit a do-it-yourselfer to install a floor covering with the floor member.

FIG. 1

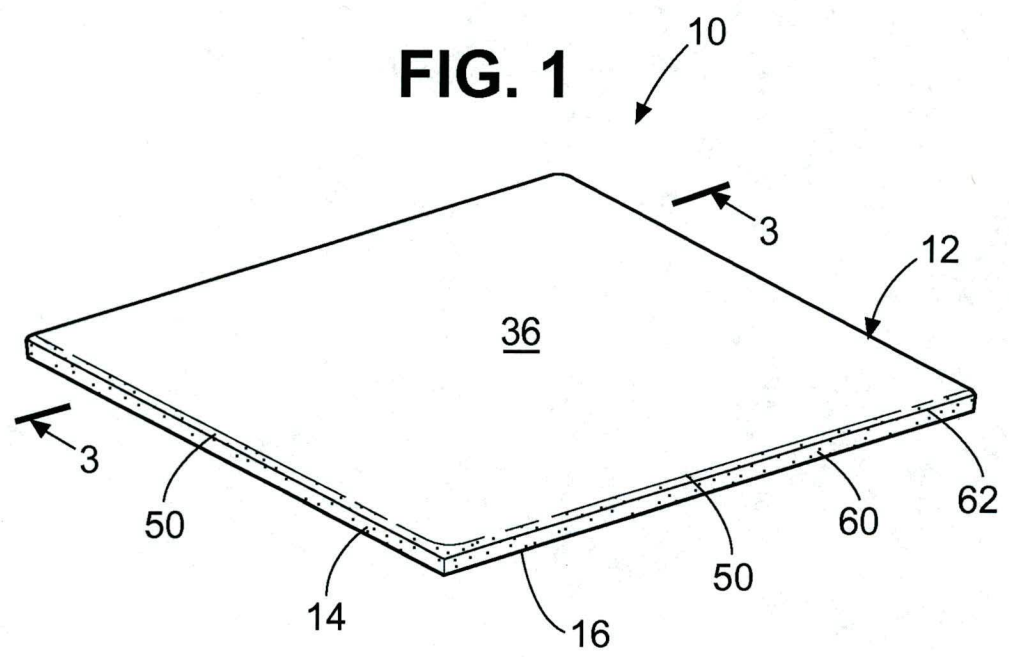


FIG. 2

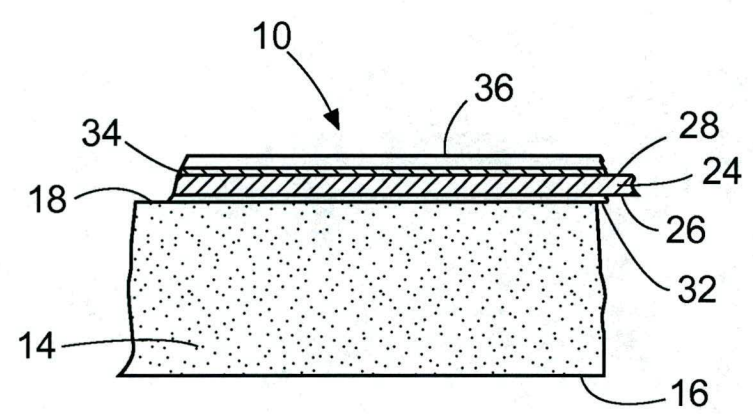


FIG. 2A

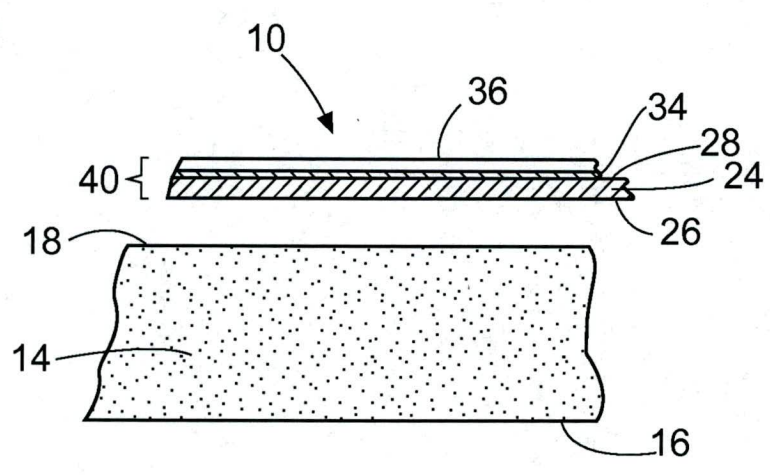


FIG. 3

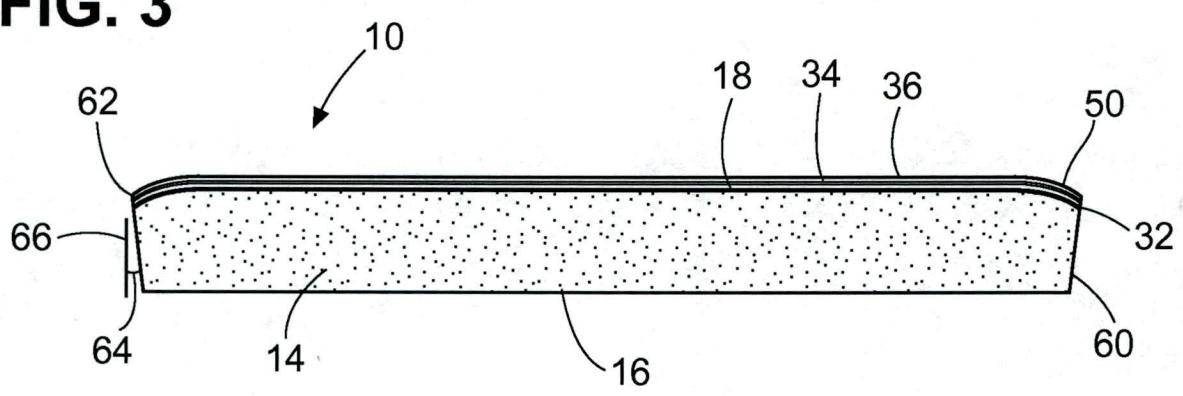


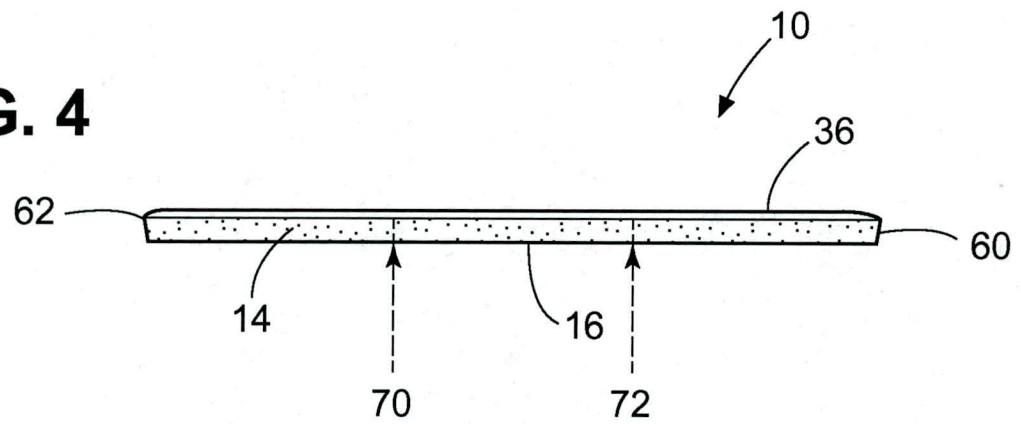
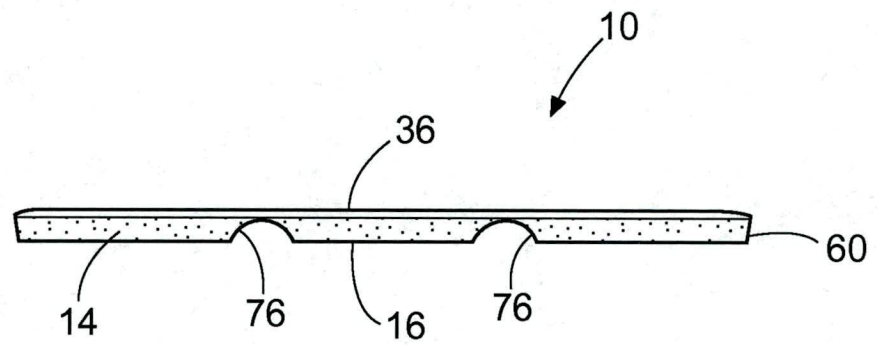
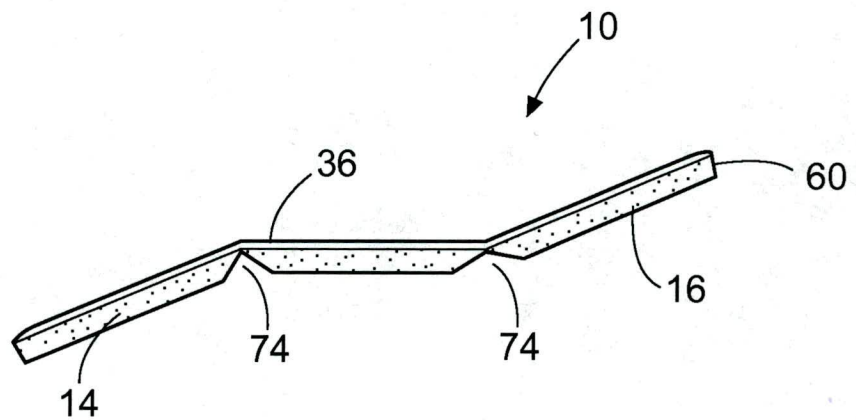
FIG. 4**FIG. 5****FIG. 6**

FIG. 7A

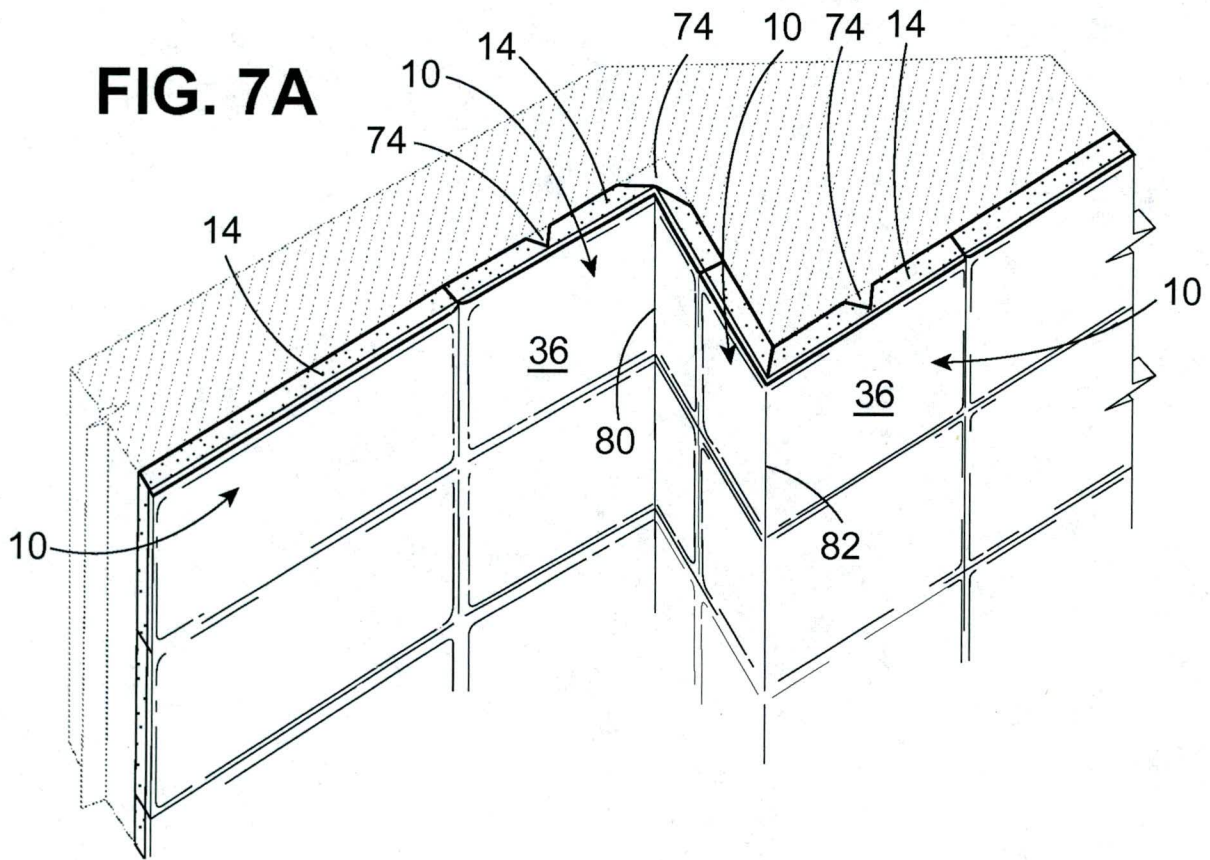


FIG. 7B

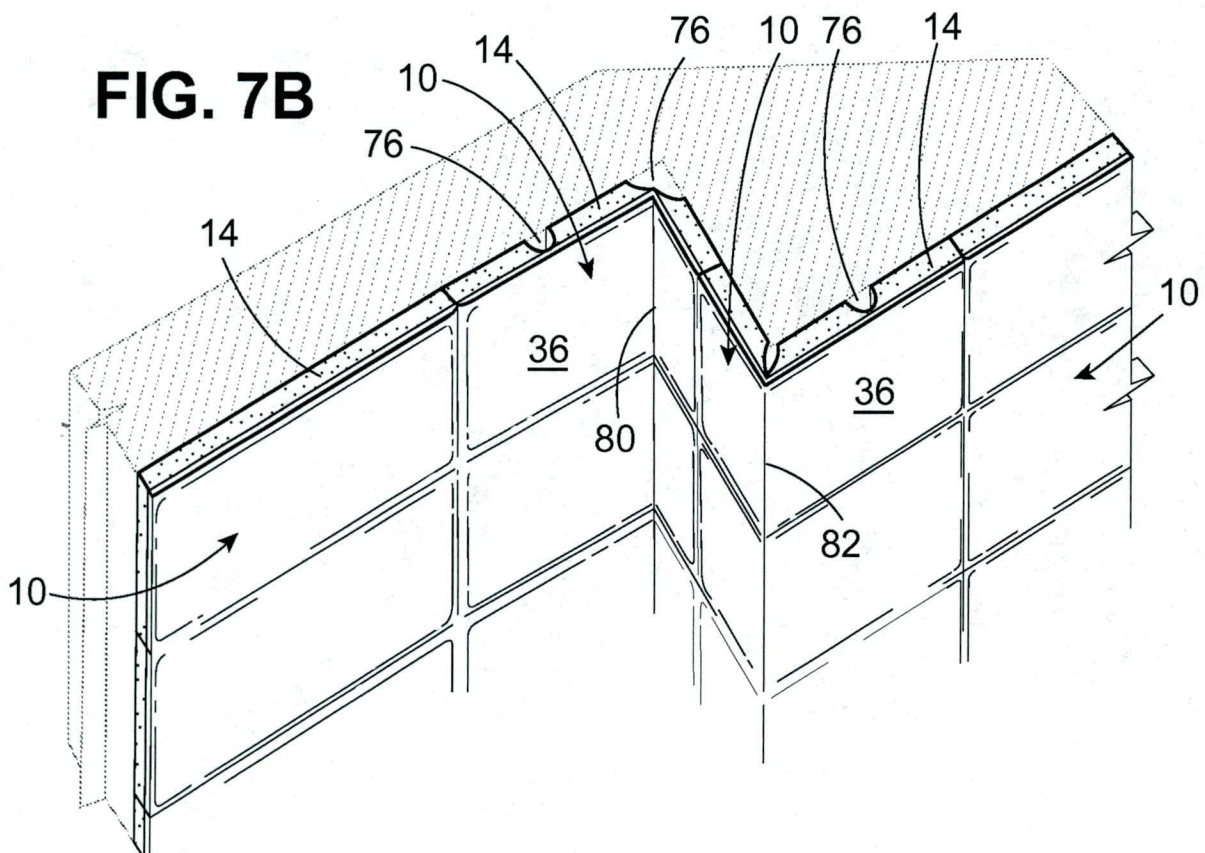


FIG. 8

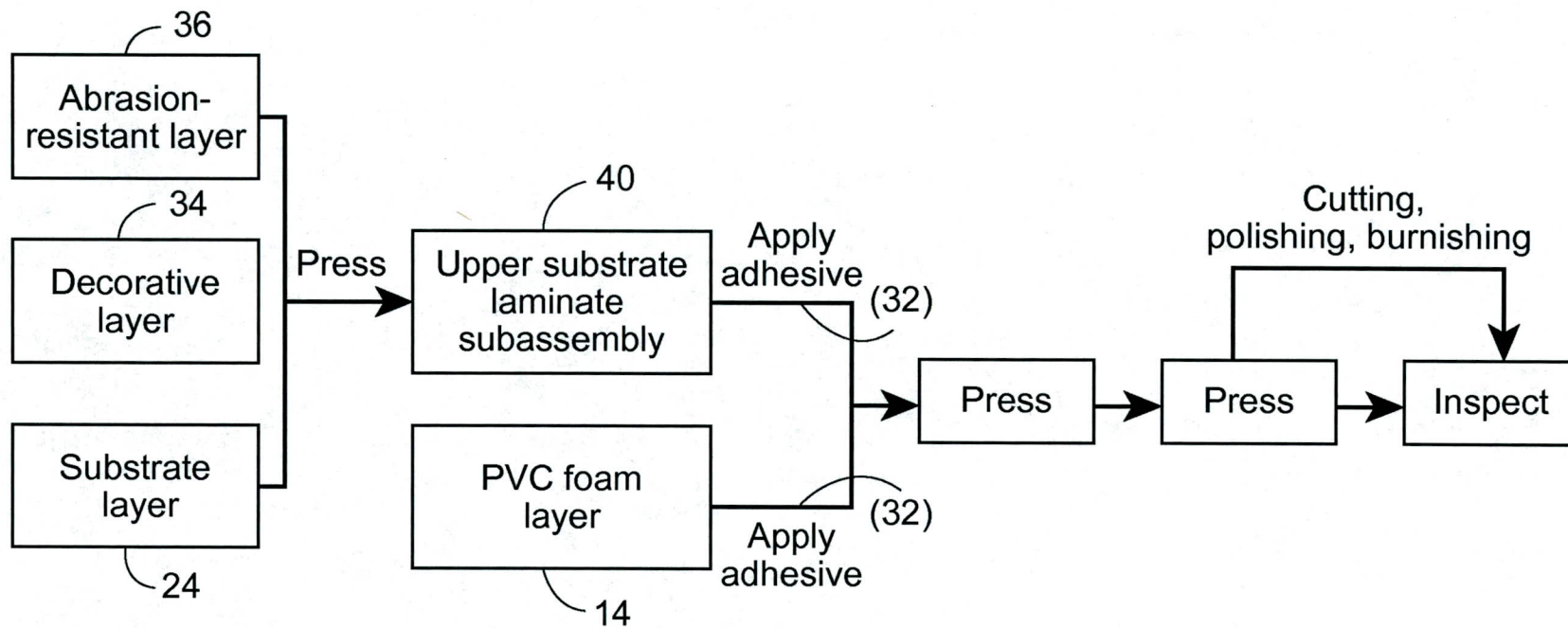


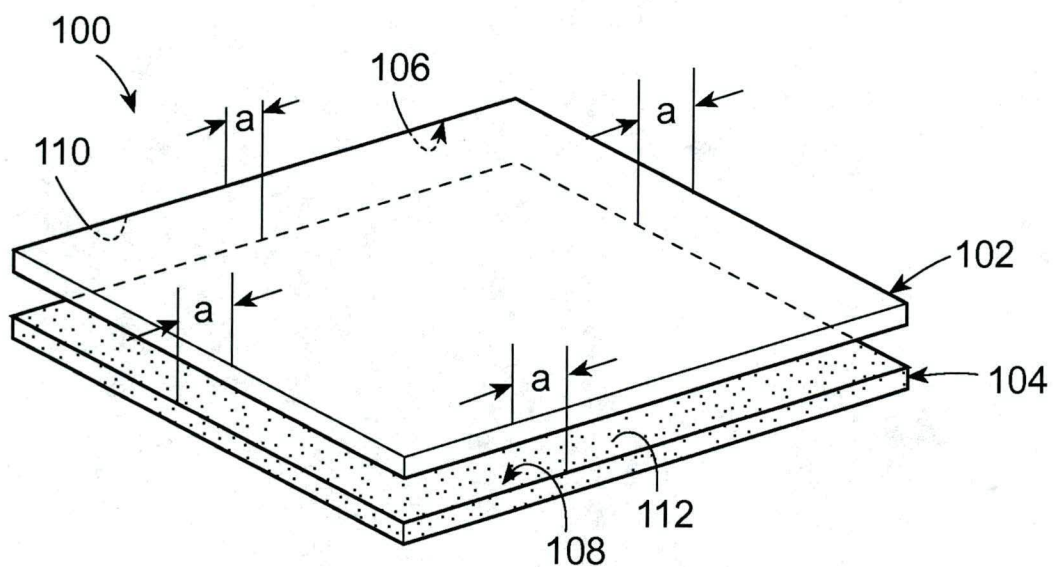
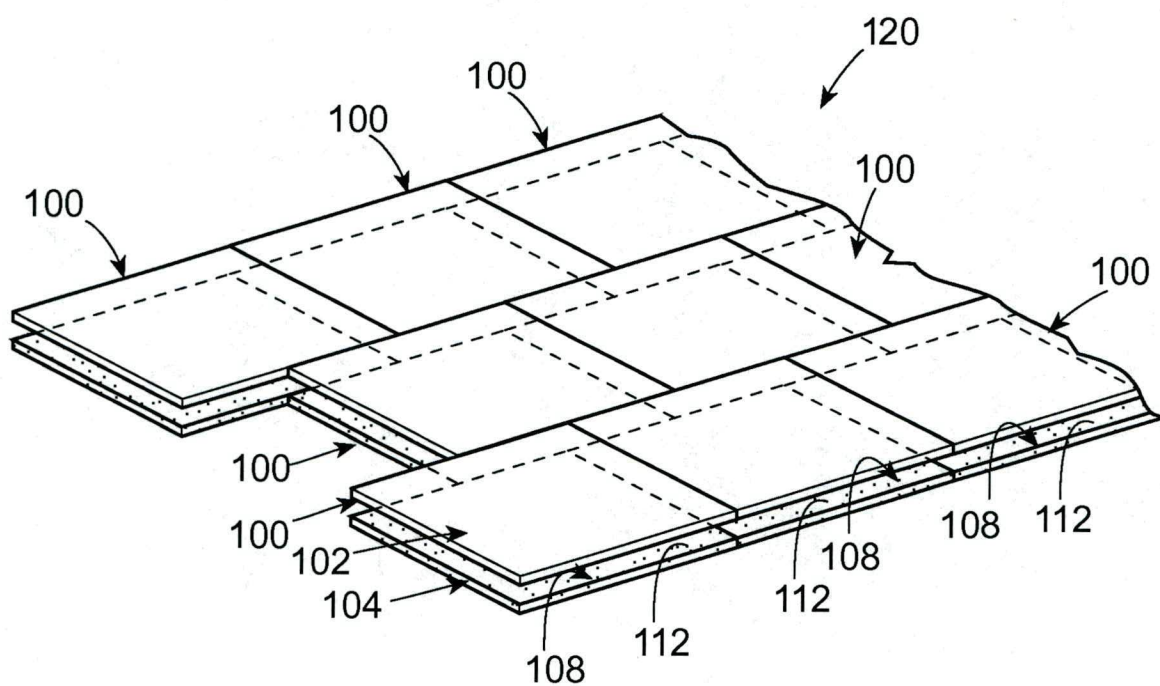
FIG. 9**FIG. 10**

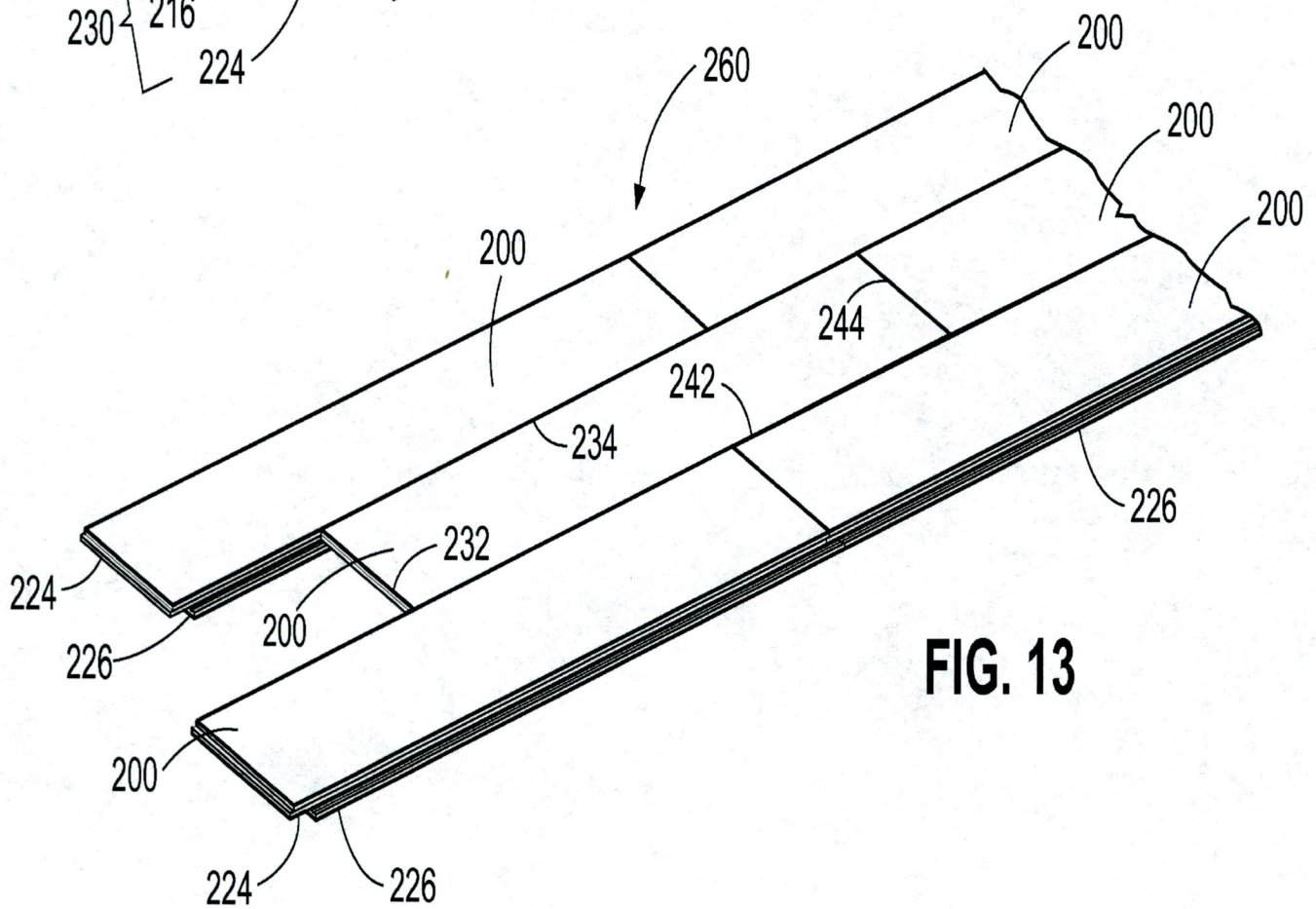
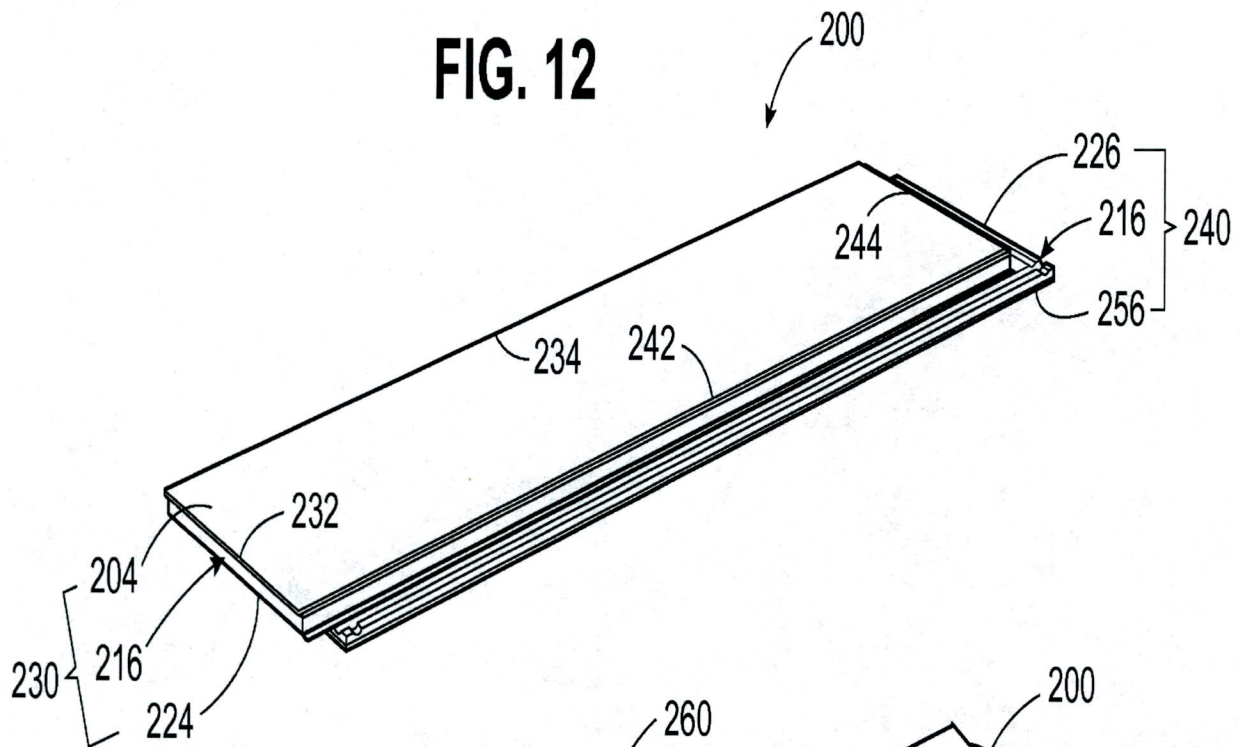
FIG. 12**FIG. 13**

FIG. 14

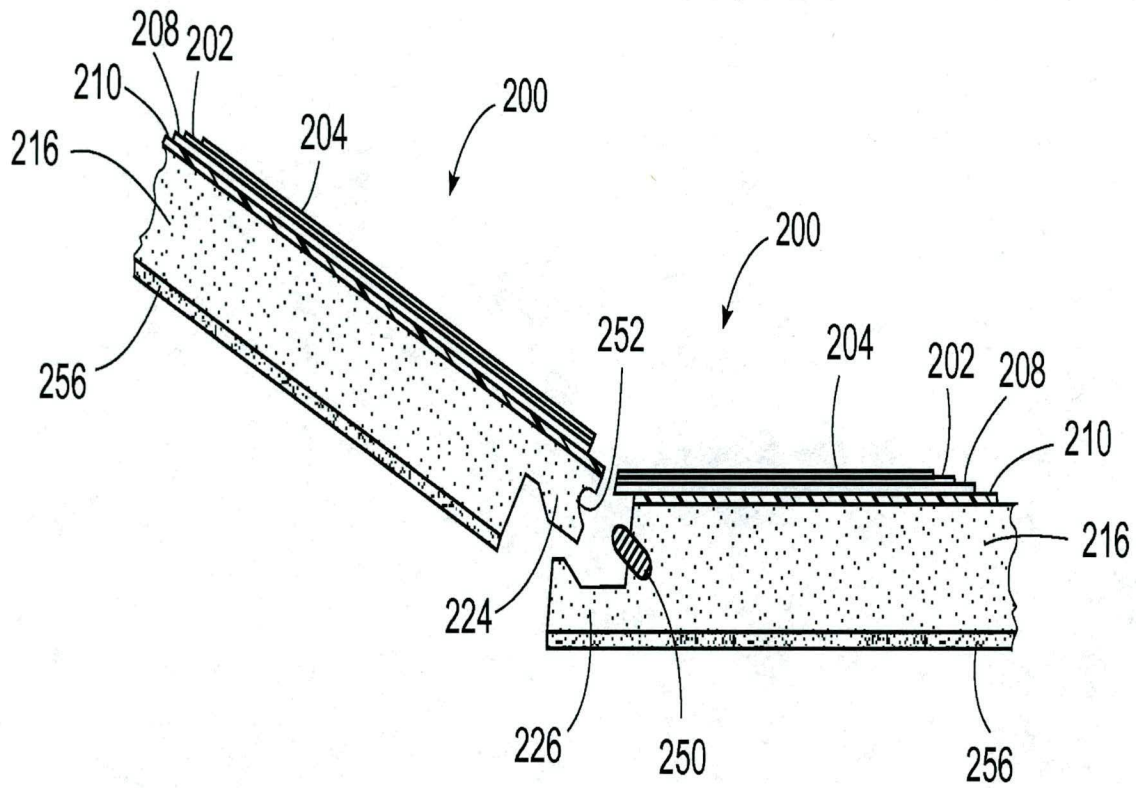


FIG. 15

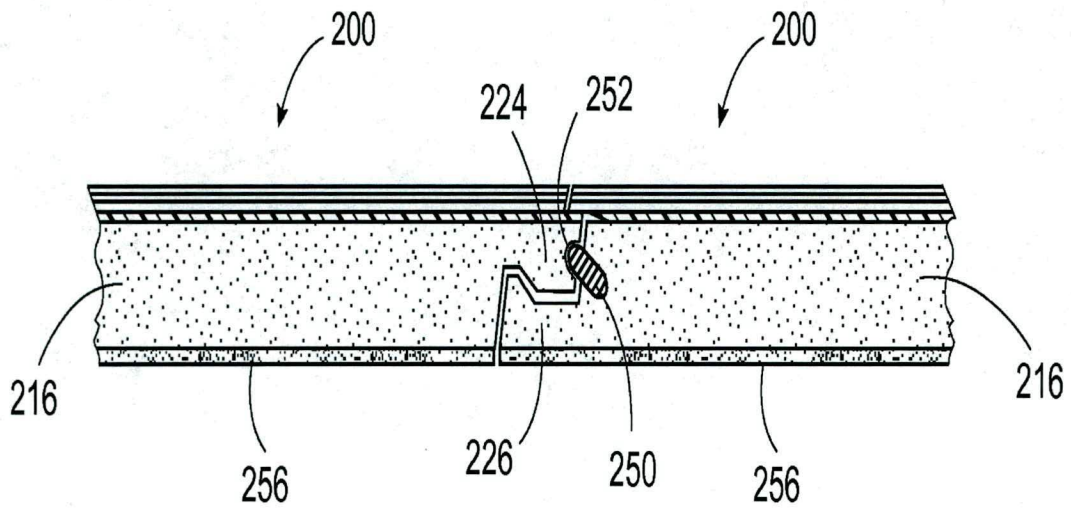
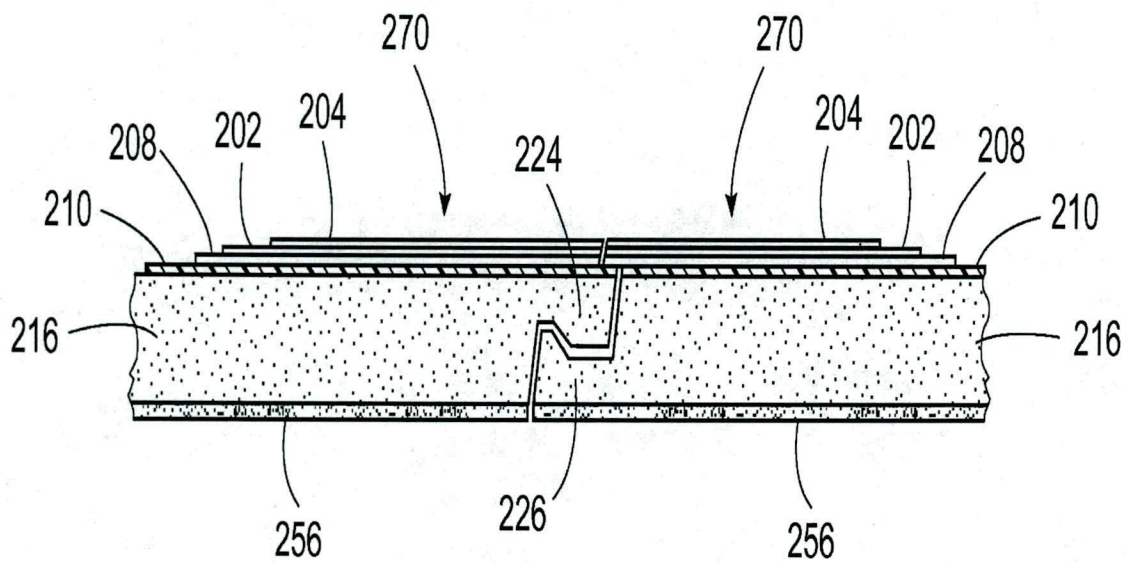


FIG. 16

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP
		Application Number	
Title of Invention	FLOOR PLANK WITH FOAM CORE		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

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Prefix	Given Name	Middle Name	Family Name	Suffix	
	Jincheng		Song		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
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Mailing Address of Inventor:					
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Address 2					
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Postal Code	215626	Country	i	CN	
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Email Address	rodrod@rodman-rodman.com	Add Email	Remove Email

Application Information:

Title of the Invention	FLOOR PLANK WITH FOAM CORE		
Attorney Docket Number	RR-781 CIP	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP
		Application Number	
Title of Invention	FLOOR PLANK WITH FOAM CORE		

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under

☐ 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
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Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	14260958	2014-04-24
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP
		Application Number	
Title of Invention	FLOOR PLANK WITH FOAM CORE		

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
201310158946.6	CN	2013-05-02	8432
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Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
201320232217.6	CN	2013-05-02	8430
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP
		Application Number	
Title of Invention	FLOOR PLANK WITH FOAM CORE		

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

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Clear				
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP
		Application Number	
Title of Invention	FLOOR PLANK WITH FOAM CORE		

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Phone Number		Fax Number	
Email Address			
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Signature:Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Philip Rodman/	Date (YYYY-MM-DD)	2015-09-04
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	RR-781 CIP		
		Application Number			
Title of Invention	FLOOR PLANK WITH FOAM CORE				
First Name	Philip	Last Name	Rodman	Registration Number	25704
Additional Signature may be generated within this form by selecting the Add button.					Add

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
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NUMERO DE APLICACIÓN: 14/846,407

FECHA DE PRESENTACIÓN: Septiembre 04, 2015

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(Firma)

M. Tarver

Funcionario de certificación.

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Número de solicitud Internacional:	
Número de confirmación:	8759
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Primer nombre del inventor /	
Nombre de aplicación:	Jincheng Song
Número de cliente:	20427
Archivador:	Charles B. Rodman
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Apoderado número de expediente:	RR -781 CIP
Fecha de recepción:	04 -Sep-2015
Fecha de presentación:	
Sello de tiempo:	17:49:47
Tipo de aplicación:	Utilidad bajo 35 USC 111 (a)

INFORMACIÓN DEL PAGO:

Presentado con el pago:	Sí
Tipo de pago:	tarjeta de crédito
El pago se ha recibido correctamente en la memoria	
RAM número de confirmación:	RAM: \$ 1600 18153
Cuenta de depósito:	
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El director de la USPTO se autoriza el pago de tasas indicadas y abonar todo excedente de la siguiente manera:	

Lista de archivos:

Numero de documento	Descripción del documento	Nombre del archivo	Tamaño de archivo (bytes)	De varias partes / zip	Paginas (Si Apli)
1	Transmisión de la nueva aplicación	1422-13 carta de envío. Pdf	243997	no	1
			1a0c6fd12aa74a10f0a0597b792fc0ed9b1bb82		

Advertencias:**Información:**

Información:					
2		1421-43 Especificaciones. Pdf	13641909	yes	32
			1ee2d050c39beb90a8c4d008106d56eed300a2a2		

Descripciones varias / archivos en PDF. Descripción postal		
Descripción del documento	Comienzo	Final
Especificación	1	26
Reclamaciones	27	31
Resúmenes	32	32

Advertencias:**Información:**

3	Dibujos- sólo dibujos lineales en blanco y negro	1422-15 Figuras. Pdf	329581	no	10
			34eaa76a8bfc80f8f4dfc435d4ef952d7d05f539		

Advertencias:

El tamaño de página en el PDF es demasiado grande. Las páginas deben ser 8.x11 o A4. Si se presenta este PDF, las páginas serán redimensionadas a la entrada en el derivador de archivos de imagen y pueden afectar el procesamiento posterior.

Información:

4	Hoja de datos de la aplicación	1421-38 Figuras. Pdf	1565953	no	7
			8980f437acf1c9761ea5495287c8f eb88fda383		

Advertencias:**Información:**

5	Hoja de cálculo de tarifa(SB06)	Cargo-info.PDF	329581	no	2
			72695761eaedf3f106f0857ab976f 6ca1cee2c5		

Advertencias:**Información:**

Tamaño total de archivos (en Bytes): 15816226

Este acuse de recibo evidencia el recibo en la fecha indicada por la USPTO de los documentos indicados, caracterizado por el solicitante, y que incluye el recuento de páginas, en su caso. Sirve como evidencias de la recepción similar a postal, como se describe en MPEP 503.

Aplicación nueva bajo 35 U.S.C. 111

Si una nueva solicitud está siendo presentada y la aplicación incluye los componentes necesarios para una fecha de presentación (vea 37 CFR 1.53 (b)-(d) y MPEP 506), un recibo de presentación (37 CFR 1.54) será emitido en su momento y la fecha que figuran en esta. El acuse de recibo se debe establecer la fecha de presentación de la solicitud

Fase nacional de una solicitud internacional en virtud 35 U.S.C. 371

Si una presentación a tiempo para entrar en la fase nacional de una solicitud internacional cumple con las condiciones de 35 U.S.C. 371 y de otros requisitos aplicables una forma PCT/DO/EO/903 indicando la aceptación de la solicitud como una presentación fase nacional de menores de 35 U.S.C. 371 se emitirán además del recibo de presentación, en el momento oportuno.

Nueva solicitud internacional presentada ante la USTPO como una oficina de recepción.

Si una nueva solicitud internacional está siendo archivado y la solicitud internacional incluye los componentes necesarios para una fecha de presentación internacional (vea PCT Artículo 11 y MPEO 1810), una notificación del número de solicitud internacional una fecha de presentación internacional (desde PCT/RO/105) se emitirá en su momento, sujeto a prescripción relativa a la seguridad nacional , y la fecha que figuran en esta acuse de recibo establecerá la fecha de presentación internacional de la solicitud.

EN LA OFICINA DE PATENTES Y MARCAS ESTADOS UNIDOS

Inventor	:	Jincheng SONG	
Número de serie	:		Gupo Arte Unidad:
Fecha de presentación	:		Examinador:
Título	:	MIEMBRO DE PISO CON CENTRO DE ESPUMA	
Estado de la entidad	:	Grande	
Nuestro expediente	:	RR-781CIP	

Comisionado de patentes
P.O. Box 1450
Alexandria, VA 22313 – 1450

Fecha: Septiembre 4, 2015

CARTA DE ENVIO

Señor:

Las tasas de presentación de esta solicitud de patente han sido pagadas con tarjeta de crédito que acompaña a la presentación de esta solicitud de patente.

En el caso de que sea necesario algún cargo adicional para cumplir con todos los requerimientos de presentación de la presente solicitud, por favor cargue las tasas adicionales a nuestra cuenta de depósito no.18-1743.

RODMAN & RODMAN
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Respetuosamente,
/Philip Rodman/
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Attorney For Applicants