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(54) **WEATHERIZATION PANEL AND METHODS FOR SAME**

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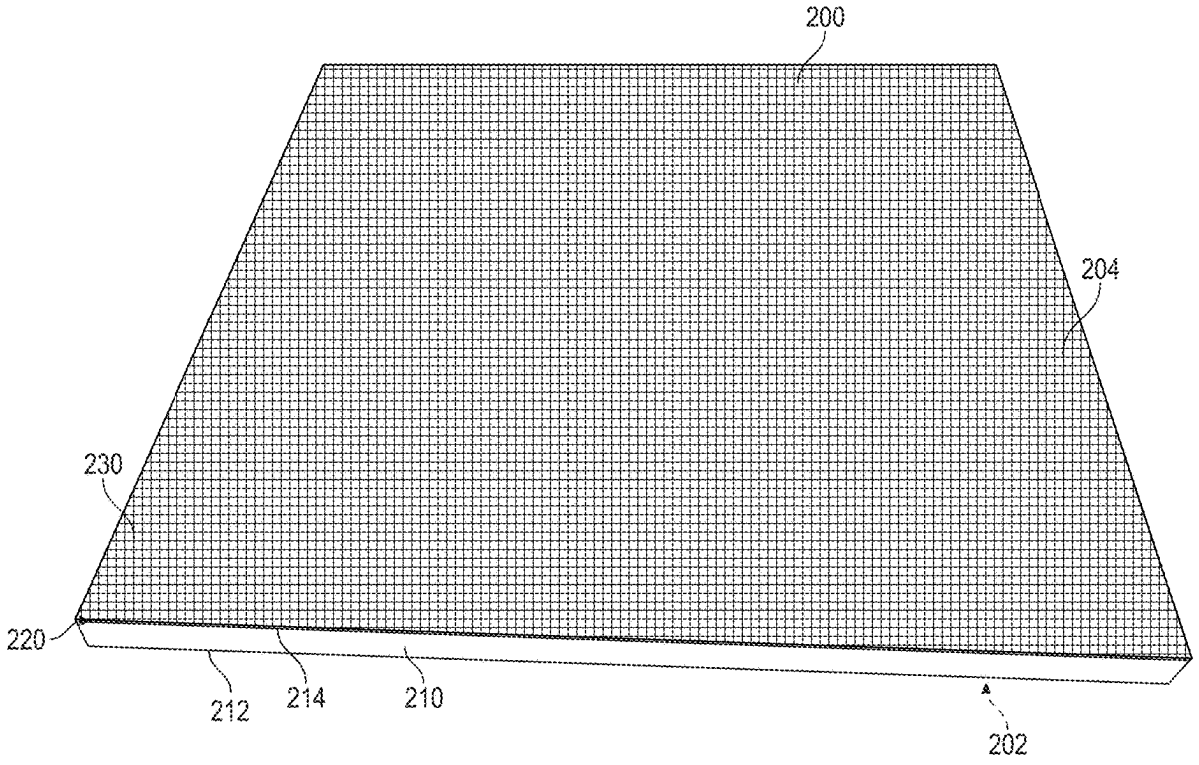
(57) **ABSTRACT**

A sheathing panel including a cementitious substrate having a first side and a second side. The first side faces an interior of a building and the second side faces towards an exterior of the building. The sheathing panel includes a moisture-resistant fabric having a first surface and a second surface opposing the first surface. The first surface is joined with the second side of the cementitious substrate and the second surface faces an exterior. The moisture-resistant fabric includes an adhesive layer disposed on the first surface.



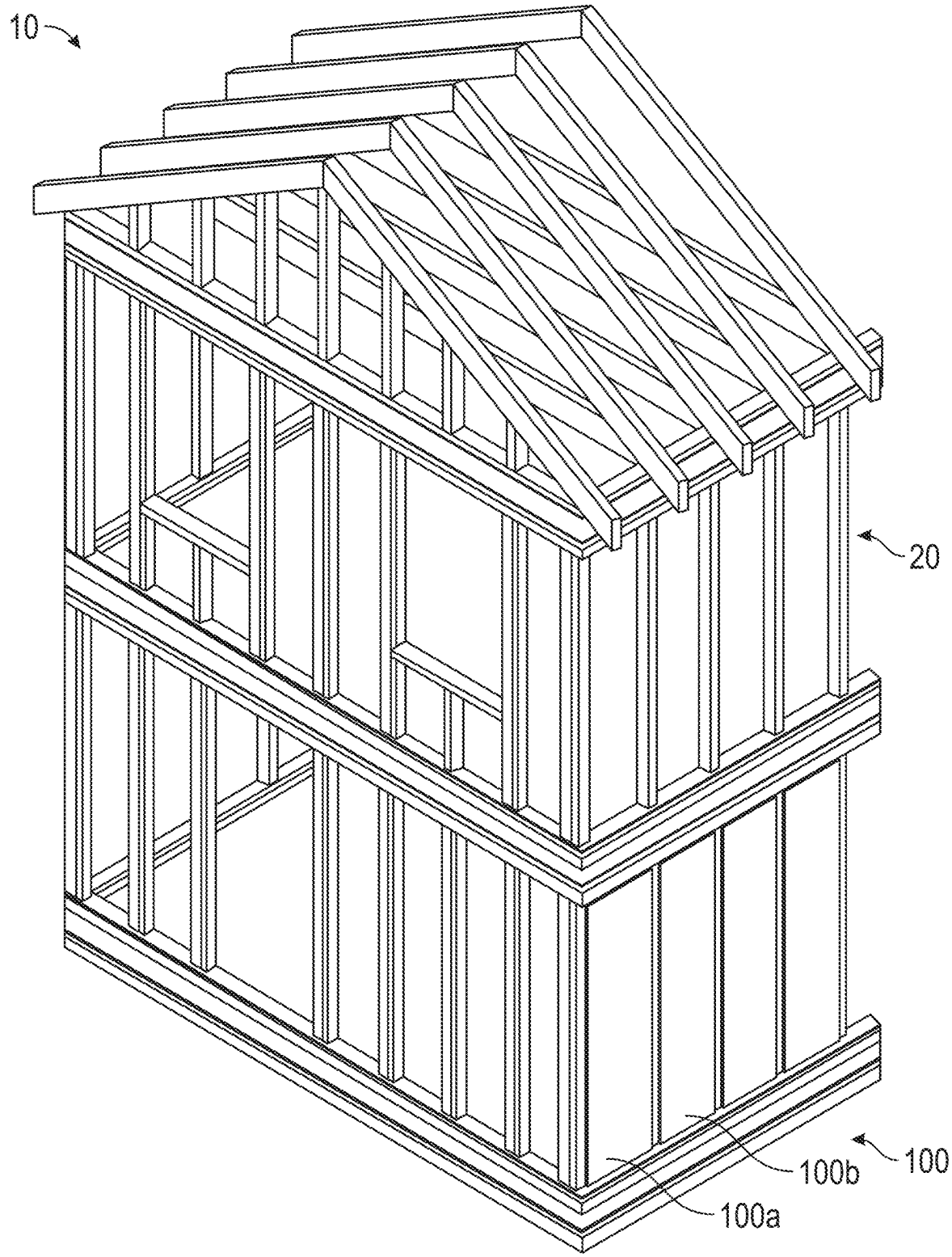


FIG. 1

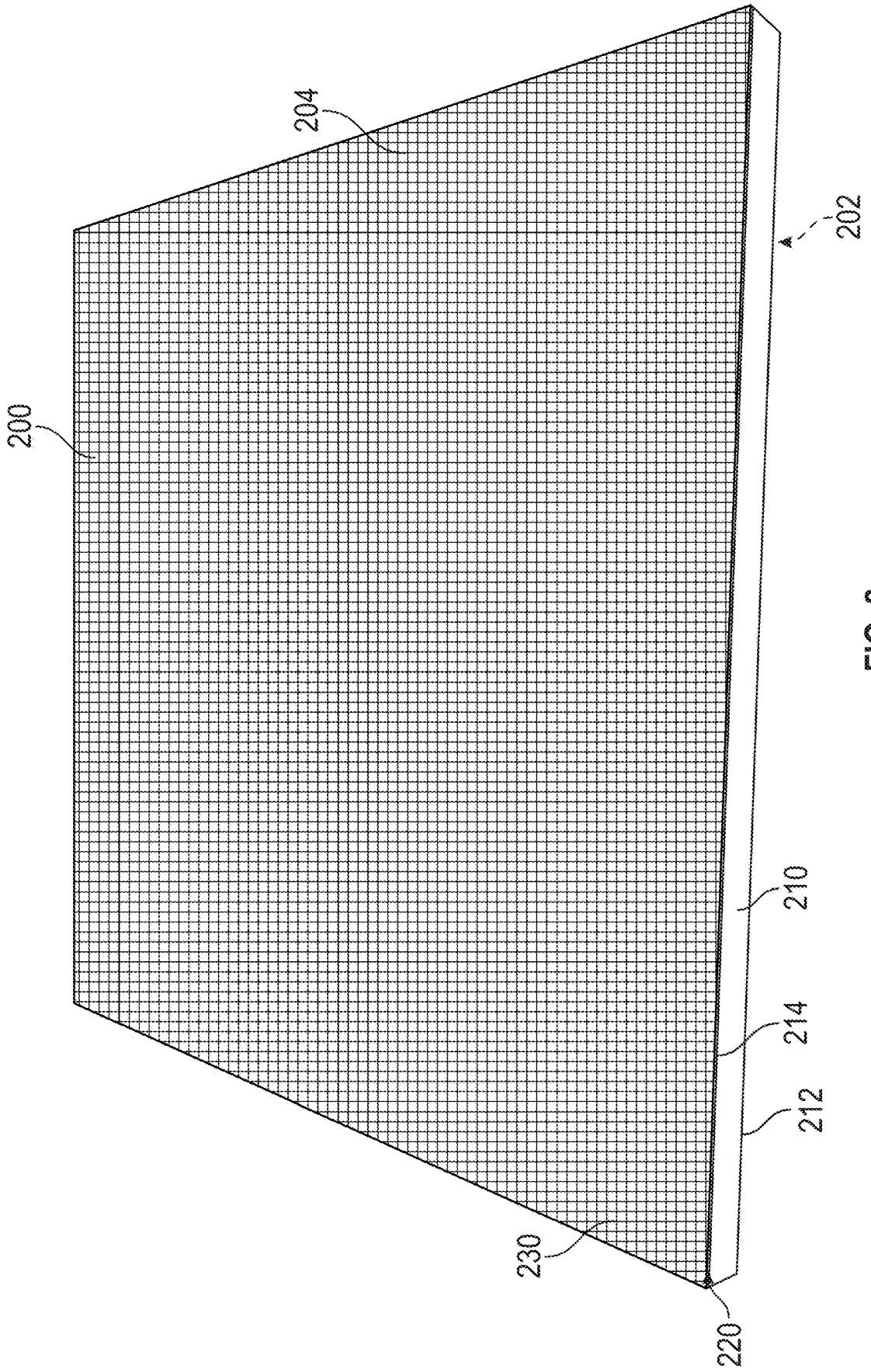


FIG. 2

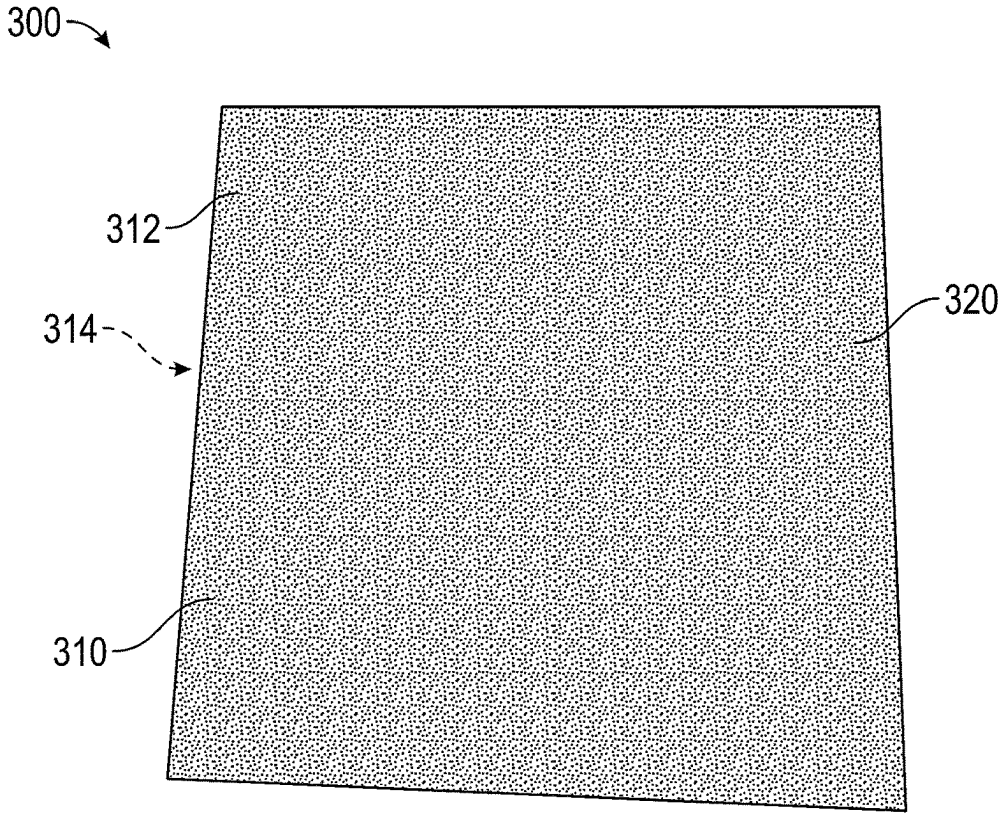


FIG. 3

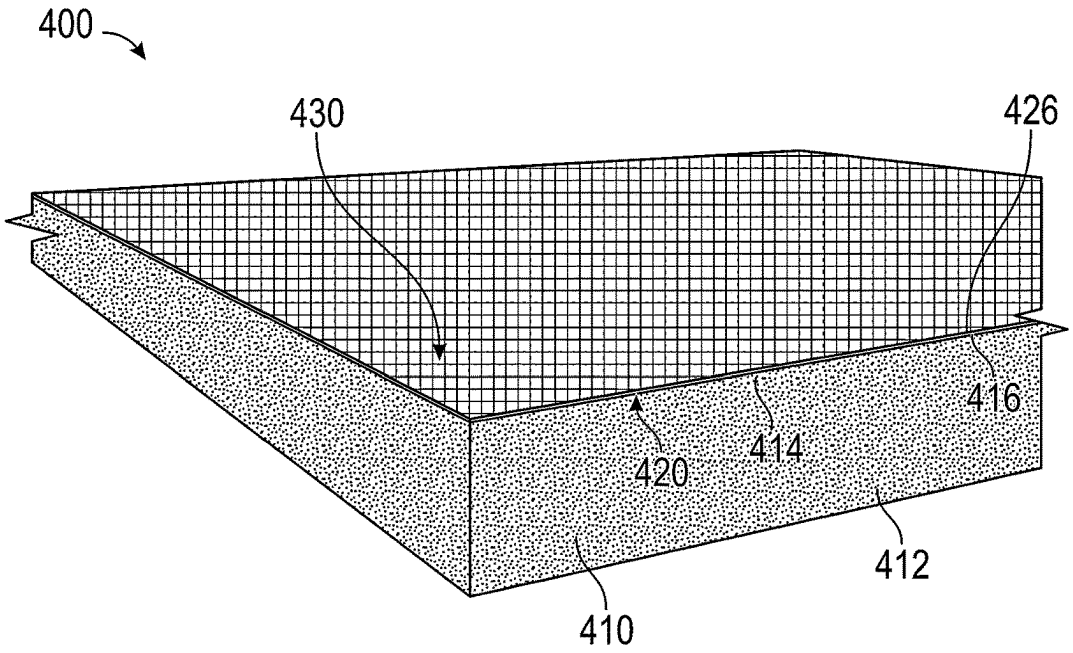


FIG. 4

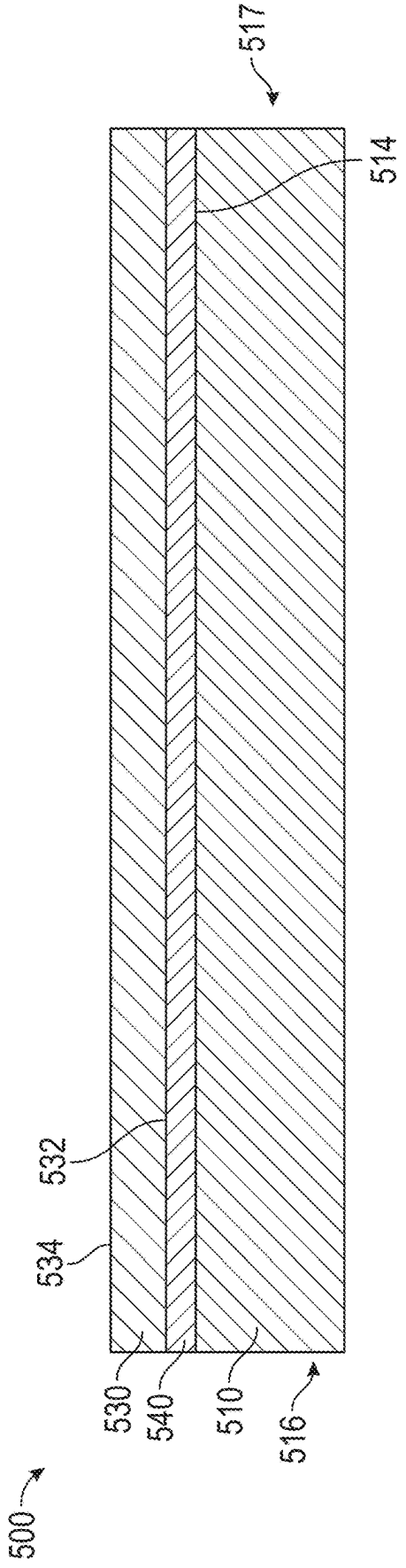

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FIG. 5

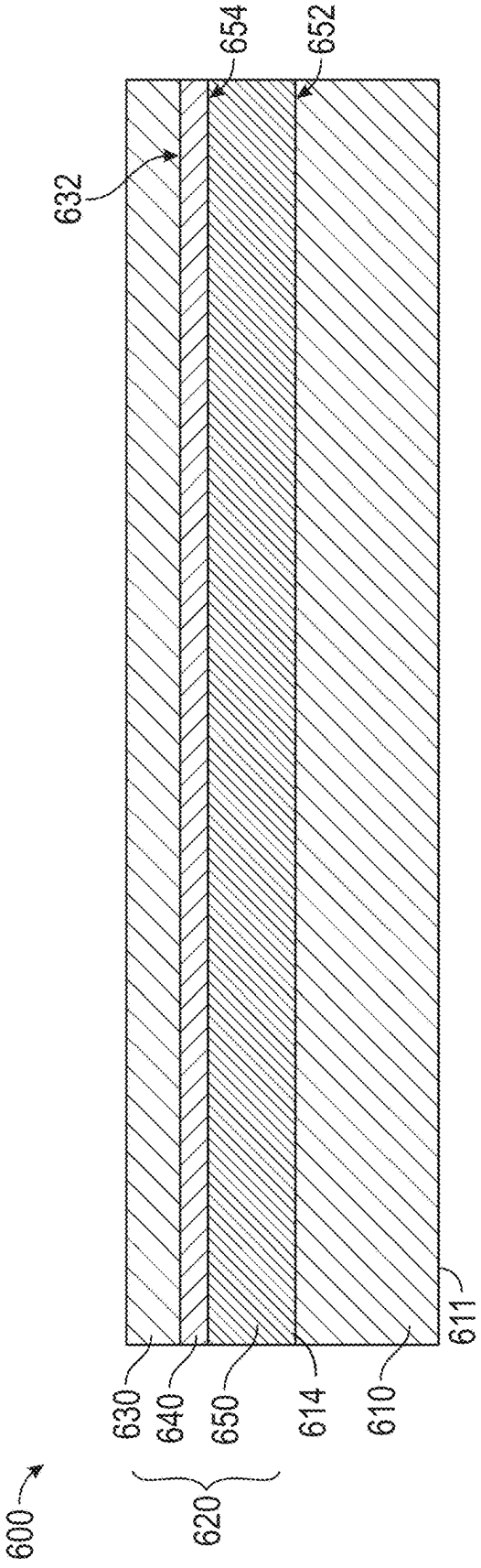
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FIG. 6

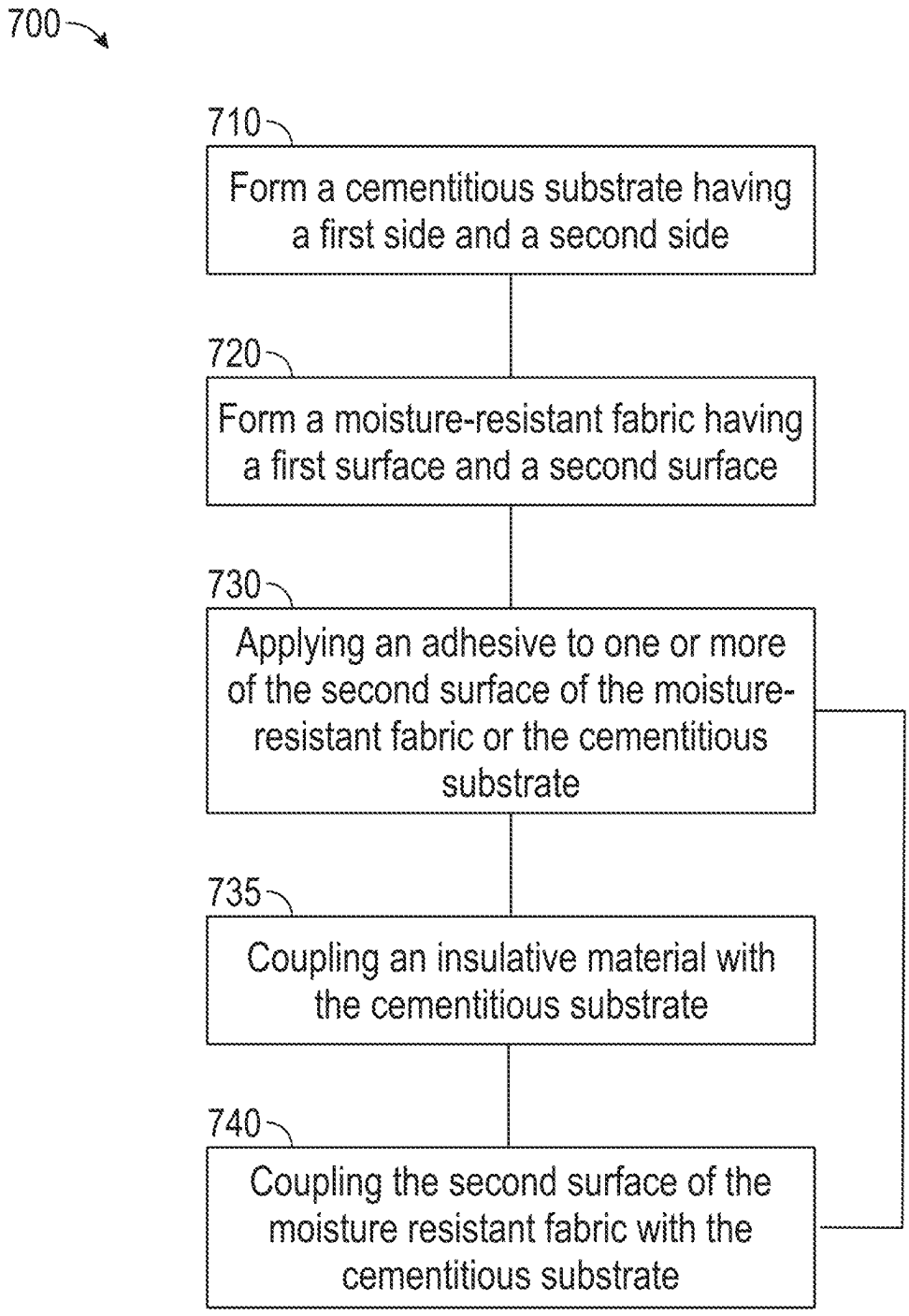
700
710
Form a cementitious substrate having a first side and a second side
720
Form a moisture-resistant fabric having a first surface and a second surface
730
Applying an adhesive to one or more of the second surface of the moisture-resistant fabric or the cementitious substrate
735
Coupling an insulative material with the cementitious substrate
740
Coupling the second surface of the moisture resistant fabric with the cementitious substrate

FIG. 7

WEATHERIZATION PANEL AND METHODS FOR SAME

PRIORITY APPLICATION

[0001] This application claims the benefit of priority to U.S. Provisional Application Ser. No. 63/555,706, filed Feb. 20, 2024, which is incorporated herein by reference in its entirety.

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TECHNICAL FIELD

[0003] This document pertains generally, but not by way of limitation, to panels with a weather resistant barrier material as a protective barrier for buildings.

BACKGROUND

[0004] Commercial and residential buildings benefit from having a weather resistant exterior. The interaction of moisture with certain building materials degrades such building materials as the frame, or internal structure, as well as the exterior materials used to enclose building interiors. Moisture from, for example, rain, humidity, air, or the like infiltrates through the building exterior and may be absorbed into building materials.

[0005] For example, moisture passes through or is absorbed and then transmitted to internal structures of buildings due to porous characteristics of some building materials. For example, wood, stucco, bricks. concrete or the like are porous materials in building construction. When porous materials are used, in some examples, an intermediate layer is installed that decreases moisture penetration between the exterior material and the interior building components (e.g., drywall, plaster or the like).

[0006] Sheathing, such as plywood or the like, is one example of a material that separates a building interior from the exterior including exterior materials, such as siding, stucco, or the like. Weather protective sealants are, in some examples, installed over the sheathing. Examples of protective sealants include liquid applied sealants, films, wraps, or the like. In other examples, insulating materials are installed in between frame members to enhance thermal insulation for the building. Optionally, insulation panels, boards or the like are installed along the sheathing (e.g., tacked, stapled, or nailed).

OVERVIEW

[0007] The present inventors have recognized, among other things, that a problem to be solved includes, for example, maintaining water-resistance for interior structures and components in buildings, such as commercial buildings or residential buildings. As described herein the options for maintaining water-resistance include components that are installed over sheathing or along sheathing. In other examples, thermal insulation is provided with components that are installed along sheathing or within the framework of the building. The installation of these components is laborious and time intensive. Additionally, poor installation (e.g., cutting, poor fitting, or similar) reduces or decreases the effectiveness of these components.

[0008] In some examples, sheathing, wraps, insulation, or the like ("protective structures") shield structures from outside environmental conditions, such as rain, humidity, temperature fluctuations, wind, particulate matter, or the like. These protective structures assist in inhibiting moisture infiltration into a building. While these products provide protection to the interior structures of a building, the protective structures at time exhibit moisture absorbing characteristics that retain moisture and potentially frustrate the maintenance and longevity of the structures.

[0009] In some examples, the protective structures include lumber-based components. For instance, sheathing is made from lumber or lumber byproducts, such as plywood or oriented strand board (OSB). Both plywood and OSB tend to absorb moisture and are also susceptible to deformation or degradation after exposure to moisture or other environmental conditions.

[0010] In other examples, sheathing or a sheathing panel includes composite material such as fiberboard (particle board). Fiberboard is optionally formed with a density based on specifications. The density of fiberboard is a relative indicator of the porosity of the material. For instance, fiberboard is formed with light, medium or high density. In some examples, a high-density fiberboard has less porosity than a light density fiberboard.

[0011] A foam board such as an expanded polystyrene board is another composite product used as a sheathing panel. In some instances, foam boards are used to increase thermal insulation of a structure. Foam board is an example of a porous protective structure that is at times susceptible to absorbing moisture. Foam board is, for instance, a material that retains moisture proximate to other components that are vulnerable to damage by moisture. The foam board is positioned proximate, or in contact with materials such as wood, plywood, OSB or the like and moisture, at times, is absorbed from the foam board.

[0012] In other examples, a sheathing panel includes a cementitious substrate. In some examples, a cementitious substrate includes moisture-resistant properties. In other examples, the cementitious substrate includes fire resistant properties. In further examples, the cementitious substrate includes structural properties. It is contemplated the sheathing panel discussed further below includes a cementitious substrate with, for example, singularly or any combination of, moisture-resistant properties, fire resistant properties and structural properties.

[0013] In some examples, a moisture-resistant panel is a component of a multi-component system that is assembled on site, such as during building construction. For instance, the moisture-resistant panel includes a cementitious substrate and also includes one or more components that are coupled along the panel by tradespeople on site. One example of additionally installed components includes water resistant barriers, such as house wraps, films or the like that are pliably rolled over the moisture-resistant panels and tacked to the panels. In other examples, insulating materials

are additional components installed along the moisture-resistant panel (e.g., tacked, stapled, or nailed). The resulting multi-component system, after assembly by tradespeople, is then ready for coupling with exterior fascia, such as siding, stucco, trim, brick, or the like.

[0014] The present inventors have recognized a solution that consolidates protective functions into a composite, ready to use, panel. Examples of sheathing panels are described herein that collectively provide two or more of moisture, fire, wind resistances, thermal insulation, or the like. For example, a cementitious substrate, includes a moisture-resistant fabric adhered to a surface of a substrate panel. For example, a magnesium oxide panel as the substrate and includes a moisture-resistant fabric adhered to a surface of a substrate panel. In an example, the moisture-resistant substrate has a first side and a second side. For example, the first side of the moisture-resistant substrate faces the interior of a building, and the second side faces an exterior of the building.

[0015] The moisture-resistant fabric optionally includes a breathable film, such as a polymer sheet, layer, panel, membrane, or the like. In examples, breathable film includes materials that permit water vapor to permeate a film but reduces liquid from penetrating through the film. Optionally, the breathable films are coated with other moisture-resistant materials, such as calcium carbonate, acrylics, oils, waxes, or the like.

[0016] In some examples, the moisture-resistant fabric has a first surface and a second surface. For example, the first surface of the moisture-resistant fabric is joined, with an adhesive, to either of the first side or the second side of the moisture-resistant substrate, such as a magnesium oxide panel. For example, the adhesive, or an adhesive layer, is disposed on the first surface of the moisture-resistant fabric prior to coupling with the moisture-resistant substrate. Such adhesives include neoprene, epoxies, polyurethanes, acrylics, silicones, modified silane (MS) polymers or the like. In examples, the adhesive is applied to the moisture-resistant fabric, so the moisture-resistant fabric is a self-adhesive fabric. A self-adhesive material includes, for example, an adhesive that forms a bond when pressure is applied to marry the adhesive with the surface to which the adhesive is applied. For example, the first surface of the moisture-resistant fabric is joined with the second side (exterior facing) of the moisture-resistant substrate. In examples, the self-adhesive, moisture-resistant fabric minimizes moisture, or other environmental elements, from infiltrating into the interior components of a building including the moisture-resistant substrate.

[0017] Many arrangements of panels, substrates, or protective structures and moisture-resistant fabric joined, either immediately or with one or more intermediary materials are contemplated herein. In one example, the moisture-resistant fabric is adhered with the moisture-resistant panel (e.g., MgO panel) and another protective structure is joined along the moisture-resistant fabric. The arrangement of the composite sheathing panel corresponds with a specified purpose (e.g., prevailing weather conditions, average or peak humidities, temperature ranges or peaks, rainfall, or the like). The composite sheathing panel is accordingly stacked and assembled based on the specified purpose to address the needs of the customer.

[0018] This overview is intended to provide an overview of subject matter of the present patent application. It is not intended to provide an exclusive or exhaustive explanation of the invention. The detailed description is included to provide further information about the present patent application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In the drawings, which are not necessarily drawn to scale, like numerals may describe similar components in different views. Like numerals having different letter suffixes may represent different instances of similar components. The drawings illustrate generally, by way of example, but not by way of limitation, various embodiments discussed in the present document.

[0020] FIG. **1** is a structure with several sheathing panels coupled to a face of the structure according to at least one example of the present disclosure.

[0021] FIG. **2** is a perspective view of a sheathing panel with a weather resistant barrier according to at least one example of the present disclosure.

[0022] FIG. **3** is a bottom view of a sheathing panel with a weather resistant barrier according to at least one example of the present disclosure.

[0023] FIG. **4** is a perspective view of a sheathing panel with a weather resistant barrier according to at least one example of the present disclosure.

[0024] FIG. **5** is a close-up cross section of a sheathing panel with a weather resistant barrier according to at least one example of the present disclosure.

[0025] FIG. **6** is close-up cross section of a sheathing panel with a weather resistant barrier and insulation according to at least one example of the present disclosure.

[0026] FIG. **7** is a method of forming a sheathing panel according to at least one example of the present disclosure.

DETAILED DESCRIPTION

[0027] In building construction, the structural components such as the frame, electrical and mechanical systems, insulation, and the like are protected from environmental conditions with additional structural components or materials. An example of an additional structural component or material includes sheathing. Sheathing is, for example, an outer layer or casing that is designed to protect at least one of the floors, ceilings, roofs, or walls of the building. In examples, sheathing is coupled (e.g., attached, fastened, or joined) to a frame of a building and is, in some examples, externally facing when coupled to a frame or a wall of a building. For example, at least a surface of a sheathing panel faces towards outdoor environmental conditions.

[0028] In examples, sheathing is supplied as panels. Each of the panels is, for example, coupled to a frame of a building. For example, at least two sheathing panels are coupled to a frame of a building such that each of the at least two sheathing panels are coupled to the frame and positioned adjacent to each other to provide a continuous surface. In examples, a continuous surface decreases environmental conditions from penetrating from the outside environment to inside structures of the building. For example, sheathing minimizes water or moisture from penetrating into a building, or the structural components of a building.

[0029] Optionally, sheathing is an insulation material that enhances thermal efficiency or energy efficiency of a building. In examples, sheathing minimizes outside environmen-

tal conditions from seeping to the inside and interior environmental conditions from escaping to the outside. For example, sheathing assists in maintaining stable temperature or moisture conditions within a building.

[0030] In other examples, sheathing minimizes fire from spreading throughout a building, should the structure or a component of a building catch on fire. For instance, sheathing is formed from materials that present fire-resistant characteristics. Sheathing presenting fire-resistant characteristics is optionally include gypsum, or cementitious materials such as magnesium oxide or the like.

[0031] One example of a moisture-resistant substrate includes using a cementitious material such as magnesium oxide (MgO). A MgO panel is moisture-resistant in so far as it does not quickly decay or deform when exposed to moisture. However, a MgO panel may retain moisture in proximity to other less moisture-resistant components (e.g., lumber, wood-based products). In some examples, a magnesium oxide (MgO) panel is coated with a liquid product that subsequently sets or dries. The coating decreases moisture absorption of the magnesium oxide.

[0032] To resist moisture absorption, weather resistant barriers are coupled or applied to protective structures. In one example, a weather resistant barrier includes coatings that are applied to the surfaces of composite materials or lumber. The coating, in some examples, reduces absorption of moisture into the protective structure. In examples, coatings include resin coatings. In other examples, liquid polymers are applied to surfaces of a composite material or lumber to minimize absorption of moisture. In examples, a weather resistant barrier is applied with a sprayed substance such as a polyurethane coating, a ceramic infused coating, a silicon dioxide coating, or the like.

[0033] In an example, the moisture-resistant fabric includes a weather resistant barrier that minimizes infiltration of environmental elements into the interior structures of a building. An example of a moisture-resistant fabric includes nonwoven or woven fabrics. The moisture-resistant fabric, for instance, is a nonwoven or woven polypropylene. Nonwoven fabrics include those similar to house wraps made by TAMLYN® under the brand name such as TAMLYNWRAP® or TAMLYNWRAP ELITE™ and those described in U.S. Pat. Nos. 11,408,142; and 11,274,437 incorporated by reference herein in their entirety. In other examples, the nonwoven fabric includes fibrous materials that are bonded together by, for example, chemical, mechanical, heat or solvent treatments. In other examples, the moisture-resistant fabric includes woven fabrics or spunbonded fabrics.

[0034] In some examples, the moisture-resistant fabric is joined to the moisture-resistant substrate, such as a magnesium oxide panel, with an intermediate component disposed between the moisture-resistant fabric and the panel. For instance, a layer of insulation is installed between the moisture-resistant fabric and the moisture-resistant substrate. The resulting composite product, in this example, includes each of the fabric, insulation layer and the substrate (and one or more adhesive layers). The layer of insulation optionally includes graphite polystyrene, polystyrene, polyisocyanurate, expanded polystyrene or other insulation materials. In other examples, the insulation is sandwiched (e.g., laminated) between two moisture-resistant substrate panels, such as two magnesium oxide panels. In an example, the moisture-resistant fabric is joined to the exterior facing panel of the two panels.

[0035] Illustrated in FIG. **1** is an example of a building **10** having a frame **20**. The building **10** is, for example, a house, residential building, commercial building, storage building or the like. In some examples, such as outdoor locations, the building **10** benefits from resisting the penetration of outside environmental conditions through the frame including, but not limited to, moisture, draft, heat transfer or the like between the interior and exterior of the building **10**. In some examples, protective materials are coupled to the frame **20** of the building **10** to provide separate layers having different functions. The protective materials include plywood, oriented strand board (OSB) to decrease heat transfer, interrupt drafts, provide sheeting for siding, stucco, or the like. In other examples, one or more of a wrap, tar paper or painted on (or sprayed on) coatings are separately applied to the plywood or OSB to decrease moisture permeation.

[0036] As described herein, alternatives to separately installed components for the building **10** are described. For instance, one or more sheathing panels **100** are installed to the frame **20**. Each of the one or more sheathing panels **100** includes a robust substrate (e.g., plywood, OSB, MgO or the like) having an integrated moisture-resistant layer, such as a fabric or the like that decreases or prevents the likelihood of moisture penetration to the underlying substrate (and interior of the building **10**). The one or more sheathing panels **100** are coupled (e.g., attached, fastened, joined) to the frame **20** or similar structure of the building **10** in a unitary manner that installs the substrate and moisture-resistant layer at the same time and in the same step.

[0037] Illustrated in FIG. **1**, a first sheathing panel **100***a*, of the one or more sheathing panels **100**, is positioned adjacent to a second sheathing panel **100***b*, of the one or more sheathing panels **100**. In an example, the first sheathing panel **100***a* is at least partially in contact with the second sheathing panel **100***b*, for instance abut at a joint overlying a stud. In another example, the one or more sheathing panels **100** are optionally arranged in an abutting arrangement. For example, a first sheathing panel **100***a* abuts an adjacent, second sheathing panel **100***b*. In yet another example, the first sheathing panel **100***a* and the second sheathing panel **100***b* have a specified space between. The one or more sheathing panels **100** are positioned in a continuous arrangement around the exterior of the frame **20** of the building **10**.

[0038] Illustrated in FIG. **2** is an example of a sheathing panel **200**. In this example, the sheathing panel **200** is a rectangular panel having a specified length, width, and depth according to the specifications of the sheathing panel **200**, building codes or the like. The sheathing panel **200** includes a first face **204** and an opposing second face **202**. The first face **204** is optionally an exterior facing side of the sheathing panel **200** and the opposing second face **202** is an interior facing side of the sheathing panel **200**. For example, the sheathing panel **200** is coupled to the frame of a building with the opposing second face **202** directed toward the inside of the building and the first face **204** is directed toward the exterior of the building.

[0039] In examples, the sheathing panel **200** includes a substrate **210**, also referred to as a base layer or a foundational layer. The substrate **210** is an example of a foundation layer onto which other materials are joined (e.g., adhered, bonded, coupled, welded or the like) as part of the construc-

tion of the sheathing panel **200** to provide a composite panel having the various functions described herein. For example, the substrate **210** is formed from a robust material that supports additional layers. For example, the substrate **210** of the sheathing panel **200** is formed from a cementitious material that is durable and has lower moisture permeability than materials such as plywood, composite woods, or the like.

[0040] The substrate **210** is, for example, a foundational layer formed from a cementitious material. In an example, the substrate **210** has a first side **214** and a second side **212**. The first side **214** of the substrate **210** faces, for example, the exterior of a building and the second side **212** of the substrate **210** faces, for example, the interior of a building, when the sheathing panel **200** is coupled to a frame of a building. In an example, one or more functional layers **220** are coupled (e.g., adhered, joined, bonded, welded or the like) to one or more of the first side **214** or second sides **212** of the substrate **210**. In the present example, the one or more functional layers **220** face the exterior of the building. In some examples described herein, the one or more functional layers **220** decrease the permeability of the sheathing panel **200**, and thereby limit moisture infiltrating into the substrate **210** and/or the interior of the building.

[0041] As shown in FIG. **2**, the sheathing panel **200** is a composite building material having layers (e.g., substrate, fabric, insulation) coupled with the substrate **210** and the additional layers with one or more of more of fasteners, adhesives, bonding, or the like. As described herein, the one or more functional layers **220** optionally includes a moisture-resistant material **230**. A moisture-resistant material **230** includes components that minimize or prevent moisture from penetrating though the moisture-resistant material **230**. A moisture-resistant material **230** includes components such as, but not limited to, polyphenylene ether (PPE), polyethylene (PE), high density polyethylene (HDPE) or the like. In an example, the moisture-resistant material **230** is coupled as a membrane or sheet with the first side **214** of the substrate **210**.

[0042] Coupling or joining the moisture-resistant material **230** to the substrate **210** is an example of a way to decrease the moisture permeability of the sheathing panel **200**. For instance, the moisture-resistant material **230** decreases moisture penetration to the substrate **210**. In another example, the moisture-resistant material **230** decreases moisture penetration to the frame or other internal features of the building. Moisture or fluctuations in temperature, in certain conditions, deform substrate materials and associated functional layers. In some examples, the substrate **210** is a moisture-resistant material that maintains the integrity, adhesion, or other properties of the one or more functional layers **220** coupled to the substrate **210**. Optionally, the substrate **210** and the moisture-resistant material **230** cooperate to resist moisture penetration to building internal features.

[0043] The example sheathing panel **300** shown in FIG. **3** includes a durable, structurally sound, substrate **310**. The sheathing panel **300** is, for instance, more durable than wood-based products, OSB, gypsum or the like.

The substrate **310**, for instance, is a durable layer that supports one or more functional layers, for example the one or more functional layers **220** illustrated in FIG. **2**. The one or more functional layers **220** are optionally joined or coupled to one or more of a first side **314** or a second side **312** of the substrate **310**. In some examples, the first side **314** is an exterior side (the illustrated surface of FIG. **2**) and the second side **312** is an interior side (the surface shown in FIG. **3**). The substrate **310**, in examples, supports the one or more functional layers **220** and is resistant to deforming, decaying, or degrading, for instance, due to environmental conditions, applied loads, or the like. For example, the substrate **310** is resistant to warping, cracking or the like in response to environmental conditions, installation activities (e.g., nails, screws, mounting of siding, stacking, or the like). In some examples, environmental conditions include, but are not limited to, moisture, temperature fluctuations or the like.

[0044] In some examples, the substrate **310** includes a cementitious material having cement-like properties. For example, materials that set, harden, and bind formative materials together. The cementitious material includes, for example, structural properties that promote durability. For instance, a cementitious material is resistant to swelling, deformation or degradation when exposed to moisture. In some examples, cementitious materials are more resistant to decay compared to wood-based materials (e.g., OSB or plywood). Plaster or gypsum are other examples of durable materials for the substrate **310** that are resistant to decay in comparison to wood-based materials. In other examples cementitious substrates, plaster-based substrates, or gypsum substrates, include fire resistant materials. In still other examples, cementitious materials are robust to support loads including, but not limited to, nails, screws, fasteners, cutting, mounting of siding, trim, stacking, layering, or the like.

[0045] Optionally, the cementitious material of the substrate **310** includes magnesium oxide (MgO) as example durable material for the one or more sheathing panels **100**, **200**, **300**. MgO is a durable substrate that is resistant to environmental conditions that precipitate degrading, decaying, cracking, warping, shrinking, expanding or the like. For instance, MgO is more robust than wood-based materials, OSB, gypsum or the like. MgO is a more robust material because it, for example, presents greater shear strength in comparison to wood-based products, OSB, gypsum or the like.

[0046] In addition to the benefits of MgO as a structurally durable substrate, MgO is resistant to environmental conditions such as moisture, pests, and other environmental elements that promote degradation of a material. For example, MgO is moisture-resistant and thereby resists (including full resistance or enhanced resistance relative to wood base products), or reduces swelling, deformation, or degrading when exposed to moisture. In some examples, MgO is also resistant to mold, mildew or other environmental hazards that are prevalent in other materials, such as wood-based materials (e.g., OSB, plywood, particle board or the like). MgO is also fire-resistant material (e.g., in some examples non-combustible) in comparison to wood-based materials.

[0047] MgO, while having increased structurally durable characteristics as compared to wood-based products, OSB, gypsum or the like, does not include chemicals or additives that are toxic or harmful to humans. Optionally, MgO combined with one or more other constituents for the substrate **310** including, but not limited to, magnesium chloride, water, and other fillers like perlite, wood chips, or fiberglass to enhance properties of the substrate. Enhanced properties with these additives include, but are not limited to, stress reduction, hardness, or fire rating.

[0048] When forming a substrate **310** from MgO as a sheathing panel special tools are not required to modify the substrate **310** and it can be modified using commonly available construction tools such as a circular saw, band saw, or even scoring and snapping. In some examples, MgO is a weight bearing foundational substrate that supports components fastened (e.g., screwed, nailed, stapled or the like) to the MgO.

[0049] In examples, the substrate **310** has a first side **314** and a second side **312** where the first side **314** optionally faces the exterior of a building and the second side **312** faces the interior of the building. In other examples, the second side **312** faces the exterior of the building and the first side **314** faces the interior of the building. Illustrated in FIG. **3** is the second side **312**, for example, similar to the second side **312** of the substrate **210** coupled with the frame of the building **10** (illustrated in FIG. **1**). A first side **314** of the sheathing panel **300** as an example of the exterior facing side of the substrate **310**. As illustrated in the example of FIG. **3**, the substrate **310** is formed as a rectangular panel, for instance having dimension corresponding to a sheet of plywood (e.g., four feet by eight feet). As described herein, the substrate **310**, includes a cementitious material and optionally, other materials to enhance properties, such as, but not limited to, durability or other performance properties (e.g., moisture resistance, resistance to temperature variations, thermal insulation, or the like).

[0050] In examples, the one or more other materials include a mesh **320** (e.g., fibers, fabrics, or the like) that increases the structural characteristics of the cementitious material. For instance, the mesh **320** includes a fiberglass mesh. The mesh **320** is optionally added as either of an open-weave or a closed-weave sheet to a slurry or mixture of the cementitious material during manufacturing of the sheathing panel **300**.

[0051] In one example, at least one layer of mesh **320** is positioned in a mold, container, on a flexible tape or carrier film, or the like. In examples, a slurry of cementitious material administered to at least partially cover the mesh **320**. Optionally, one or more layers of mesh **320** are embedded or positioned proximate to outer surfaces of the slurry. The mesh **320**, in examples, is coupled with the remainder of the substrate **310** (e.g., adhered, fastened or the like) and the coupled mesh enhances the maintenance of the shape, profile or form of the substrate **310**. In an example, the mesh **320** is proximate to one or more of the first side **314** and the second side **312**. In other examples, the mesh **320** is positioned to be on one of the first side **314** or the second side **312**. After the mesh **320** sets with the slurry, the mesh **320** enhances the structural durability of the sheathing panel **300** shape, profile, or the like.

[0052] FIG. **4** is a perspective view of another example of the sheathing panel **400**. In an example, the sheathing panel **400** includes features described herein (e.g., in FIGS. **2** and **3**). For instance, the sheathing panel **400** includes a cementitious substrate **410**, and one or more functional layers **420** coupled (e.g., joined, bonded, adhered or the like) to one or more of the first side **414** or the second side **412**. In the example shown in FIG. **4** the one or more functional layers **420** are coupled with the first side **414** of the cementitious substrate **410**. The first side **414** of the cementitious substrate **410** is, for example, the exterior facing side of the cementitious substrate **410**. For instance, the first side **414** is exposed to weather-related conditions in comparison to the second side **412**, the interior facing side. In examples, the sheathing panel **400** is coupled to the frame of a building (e.g., frame **20** in FIG. **1**), and the first side **414** faces away from the frame of the building. In some examples, when the second side **412** of the sheathing panel **400** is coupled with the frame of a building, the first side **414** is covered with siding, brick, stucco, a supplemental membrane (in addition to the sheathing panel **400**) or other façade examples.

[0053] In an example, the one or more functional layers **420** provide (including enhancing) one or more functional characteristics to the cementitious substrate **410**. Including the one or more functional layers **420** enhances moisture resistance and thereby decreases moisture penetration of the cementitious substrate **410**. For example, the one or more functional layers **420** decreases absorption (e.g., infiltrating, penetrating, or the like) of moisture or other environmental matter into the cementitious substrate **410**. The one or more functional layers **420** that enhance moisture resistance are examples of one or more barrier layers. In examples, the one or more functional layers **420** includes at least one barrier layer that enhances moisture resistance of the cementitious substrate **410**.

[0054] The one or more functional layers **420** include a moisture-resistant material, as described herein. The moisture-resistant fabric **430** is a weather resistant barrier that decreases infiltration of environmental elements into the cementitious substrate **410** and interior of buildings. In one example, the moisture-resistant material includes a fabric or a fabric-like material. For instance, the moisture-resistant material (an example of one or more functional layers **420**) is a moisture-resistant material including one or more of woven, non-woven or synthetic materials. In other examples, the moisture-resistant fabric **430** includes laminates of woven or non-woven filaments and a sheet or membrane material. In other examples, the moisture-resistant fabric **430** includes polymer-based materials, such as plastic sheets or the like.

[0055] The moisture-resistant fabric, for instance, is a woven or nonwoven polypropylene. Moisture-resistant fabric, wraps, wraps including fabrics or the like, include house wraps made by R. H. Tamlyn & Sons, LP under brand names such as TAMLYNWRAP® or TAMLYNWRAP ELITE™, wraps described in U.S. Pat. Nos. 11,408,142, and 11,274, 437 each incorporated by reference herein in their entirety.

[0056] In other examples, the moisture-resistant fabric **430** includes laminated materials, such as polymer membranes or the like. In other examples, the moisture-resistant fabric **430** includes a nonwoven fabric including fibers, filaments, strands or the like that are bonded together one or more of chemical, mechanical, thermal, adhesive processes, or the like. In other examples, the moisture-resistant fabric **430** includes woven fabrics or spunbonded fabrics. In other examples, the moisture-resistant fabric **430** optionally includes a breathable film.

[0057] In still other examples, the moisture-resistant fabric **430** includes a polymer material or fabric positioned between one or more layers of a fabric (woven, non-woven or the like). For instance, the moisture-resistant fabric **430** includes a polyethylene gas breathable film (while also moisture resistant) laminated with the woven or non-woven fabric. The moisture-resistant fabric **430** includes more than one layer of material (e.g., woven fabric, non-woven fabric, films, plastics, or the like) stacked, laminated, coupled or the like. In examples, at least one of the layers resists moisture

penetration to the cementitious substrate **410**. Materials and arrangements have been discussed herein for the moisture-resistant fabric **430**, other materials include moisture permeating to the cementitious substrate **410** are suitable.

[0058] In various examples, the moisture-resistant fabric **430** extends across the cementitious substrate **410**. For instance, the moisture-resistant fabric **430** covers (e.g., spans, continuously extends along, covers, covers from edge to edge of the sheathing panel **400** or the like) the cementitious substrate **410**. The moisture-resistant fabric **430** is coupled (e.g., joined, adhered, bonded or the like) to the cementitious substrate **410**. For instance, the moisture-resistant fabric **430** is joined with the first side **414** of the cementitious substrate **410** such that the first side **414** is not exposed.

[0059] In some examples the moisture-resistant fabric **430** is coupled with the cementitious substrate **410** in a manner that extends beyond the cementitious substrate **410**. For instance, the moisture-resistant fabric **430** is trimmed to fit the cementitious substrate **410**. In other examples, the moisture-resistant fabric **430** matches the size of the cementitious substrate **410**. For instance, a perimeter **416** (including surface area) of the cementitious substrate **410** matches (e.g., is coextensive, aligns, matches 90-95 percent or the like) with the moisture-resistant fabric perimeter **426** (including its surface area). The moisture-resistant fabric **430**, for example, is in continuous contact (including near continuous, such as 80 or 90 percent or more) with the cementitious substrate **410**. For instance, the moisture-resistant fabric **430** is joined with the cementitious substrate **410** and is free (including 80 or 90 percent free) of ripples, wrinkles, gaps, or other irregularities that permit moisture penetration. Further, the moisture-resistant fabric **430** is applied as a solid layer in contract to a fluid or sprayed-on coating to ensure coverage of the cementitious substrate **410** while conversely avoiding gaps in coverage.

[0060] FIG. **5** is a schematic cross section of an example sheathing panel **500**. The sheathing panel **500** includes, in this example, a cementitious substrate layer **510**, an adhesive layer **540** and a moisture-resistant fabric **530** (e.g., as discussed related to any of FIGS. **1**, **2**, **3**, **4**). The sheathing panel **500** includes, in examples, at least one of woven, non-woven, fibrous, polymer material or the like. In an example, the moisture-resistant fabric **530** has a first surface **534** and a second surface **532**. The first surface **534** is, for example, an exterior facing surface of the moisture-resistant fabric **530** and the second surface **532** is, for example, an interior facing surface of the moisture-resistant fabric **530** (e.g., directed toward the building).

[0061] In an example, the second surface **532** of the moisture-resistant fabric is coupled with a first side **514** of the cementitious substrate layer **510**. The adhesive layer **540** is an example of an adhesive material distributed across the first side **514** that couples (e.g., attaches, fastens, or joins) the moisture-resistant fabric **530** with the cementitious substrate layer **510**. In some examples, the adhesive layer **540** includes one or more of acrylics, neoprene, epoxies, polyurethanes, silicones, or modified silane (MS) polymers. For instance, the adhesive layer **540** is applied, sprayed, painted, or the like as a fluid continuously (e.g., completely covering, applied from proximate one side to proximate a second side, covers more than approximately 90 percent or the like) from a first end **516** to an opposing second end **517** of the cementitious substrate layer **510**.

[0062] Optionally, the adhesive layer **540** is applied to the first side **514** of the cementitious substrate layer **510**. In an example, the adhesive layer **540** is continuously applied (e.g., from end to end, covering greater than 90 percent of the surface area of the first side **514** of the cementitious substrate layer **510** or the like) to the cementitious substrate layer **510**. The adhesive layer **540** is, for instance, spread or deposited on the first side **514** of the cementitious substrate layer **510** reducing disengagement of the moisture-resistant fabric **530** from the cementitious substrate layer **510**. In examples, the adhesive layer **540** is applied in one or more specified locations on the first side **514** of the cementitious substrate layer **510**.

[0063] In another example, the adhesive layer **540** is applied to the second surface **532** of the moisture-resistant fabric **530**. The adhesive layer **540** applied to the second surface **532** of the moisture-resistant fabric **530** includes one or more of acrylics, neoprene, epoxies, polyurethanes, silicones, or MS polymers. For example, the adhesive layer **540** is sprayed, painted, continuously applied (e.g., from end to end, covering greater than 90 percent of the surface area of the first side **514** of the cementitious substrate layer **510** or the like) or the like to the second surface **532**. In other examples, the adhesive layer **540** is applied in specified locations of the second surface **532** of the moisture-resistant fabric **530**. In some examples with the adhesive layer **540** applied to the moisture-resistant fabric **530**, the moisture-resistant fabric **530** is a self-adhesive layer. The self-adhesive forms a bond when pressure is applied to marry the adhesive with the moisture-resistant fabric **530**. For example, the moisture-resistant fabric **530** is coupled (e.g., bonds) with the cementitious substrate layer **510** when pressure is applied to at least one of the moisture-resistant fabric **530** or the cementitious substrate layer **510**.

[0064] In examples, the adhesive layer **540** includes a contact adhesive with the adhesive applied to both the first side **514** of the cementitious substrate layer **510** and the second surface **532** of the moisture-resistant fabric **530**. For example, a contact adhesive is applied to both surfaces that are joined, such as the second surface **532** of the moisture-resistant fabric **530** and the cementitious substrate layer **510**. After application of the adhesive layer **540**, the solvent in the adhesive (or water in water-based adhesives) evaporates, leaving behind a tacky film. Once both surfaces (e.g., the second surface **532** and the first side **514**) are set and the adhesive is tacky, the two surfaces are pressed together and the bond forms with contact.

[0065] A contact adhesive, for example including a polymer solvent applied to the moisture-resistant fabric **530**, is joined with the cementitious substrate layer **510**. In examples using a contact adhesive, the cementitious substrate layer **510** is fixedly joined with the moisture-resistant fabric **530** (e.g., one or both of the cementitious substrate layer **510** and the moisture-resistant fabric **530** would be damaged if separated).

[0066] The moisture-resistant fabric **530** is, for example, coupled with the cementitious substrate layer **510** with the adhesive layer **540** positioned between the moisture-resistant fabric **530** and the cementitious substrate layer **510**. For example, the second surface **532** of the moisture-resistant fabric **530** matches (e.g., is coextensive, aligns, matches 90-95 percent or the like) the size of the cementitious substrate layer **510**. In an example, the moisture-resistant fabric **530** is positioned on the cementitious substrate layer

510 free (including free, such as 80 or 90 percent or more) of wrinkles, ripples, gaps, protrusions or the like.

[0067] The adhesive layer **540** is optionally applied to the cementitious substrate layer **510** in a controlled environment, such as during a manufacturing process of the sheathing panel **500**. A controlled environment includes, for examples, areas with reduced moisture, wind, temperature fluctuations, or the like. In examples, application of the moisture-resistant fabric **530** to the cementitious substrate layer **510** (either with the adhesive layer **540** applied to the moisture-resistant fabric **530** or the cementitious substrate layer **510** or both) in a controlled environment promotes accurate placement and coupling of the moisture-resistant fabric **530** with the cementitious substrate layer **510** to form the sheathing panel **500** having moisture-resistant properties as a unitary panel ready for later installation. In some examples, the controlled environment of the manufacturing process reduces misapplication of the moisture-resistant fabric **530** relative to the cementitious substrate layer **510** (e.g., overhanging an edge, portions of the cementitious substrate layer **510** have gaps in coverage or the like) or deformation (such as wrinkles, folds, undulations or the like) during application of the moisture-resistant fabric **530** to the cementitious substrate layer **510**, for instance during a field application of a spray or film to a panel. In other examples, the sheathing panel **500** including the moisture-resistant fabric **530** is assembled in the field, for instance by a technician, tradesperson, lamination machine or the like applying adhesive layer **540** and coupling the moisture-resistant fabric **530** and the cementitious substrate layer **510** together.

[0068] FIG. **6** is an example of a sheathing panel **600** including additional functional layers **620**. Additional functional layers **620** includes, for example, an insulation layer **650** that includes an insulation material. In examples, the insulation layer **650** promotes thermal insulation characteristics of the sheathing panel **600**. The insulation layer **650** includes one or more of, but is not limited to, fiberglass, mineral wool, foam, cellulose, including multiple layers or the like.

[0069] The additional functional layers **620** are positioned, for example, between a moisture-resistant fabric **630** and a substrate **610**. In an example, the insulation layer **650** has a first side **652** and a second side **654**. The first side **652** of the insulation layer **650** is coupled, for instance, along a first side **614** of the substrate **610**. The second side **654** of the insulation layer **650** is coupled with the moisture-resistant fabric **630** with an adhesive layer **640** along a second surface **632** of the moisture-resistant fabric **630**. In an example, the second surface **632** of the moisture-resistant fabric **630** (e.g., nonwoven or woven material, including films, sheets or the like) is joined with the insulation layer **650** with a contact adhesive (as an example of the adhesive layer **640**), as previously discussed with regard to the sheathing panel **500** in FIG. **5**.

[0070] In another example, the second surface **632** of the moisture-resistant fabric **630** is joined to the insulation layer **650** with the adhesive layer **640** applied to the insulation layer **650** (in contrast to the moisture-resistant fabric **630**). In other options, the adhesive layer **640** is a contact adhesive applied to both the moisture-resistant fabric **630** and the insulation layer **650**.

[0071] Optionally, the sheathing panel **600** includes at least one or more substrates **610**. In an example including two substrates **610**, a second instance of the substrate **610** is coupled along a second instance of the moisture-resistant fabric **630**. For example, the second instance of the moisture-resistant fabric **630** is coupled along an opposed surface of the sheathing panel **600** (e.g., a first side **611** of the substrate **610**) and the second instance of the substrate **610** is coupled along an interior face of the second instance of the moisture-resistant fabric **630**.

[0072] In another example, the one or more substrates **610** are coupled with a second instance of the insulation layer **650** (shown in FIG. **6**). For instance, the second instance of the insulation layer **650** is coupled along a first side **611** of the substrate **610**. Optionally, the second instance of the insulation layer **650** is interposed between a second instance of the moisture-resistant fabric **630** (shown in FIG. **6**) and the substrate **610**. In another example, any one or more of the functional layers **620** (e.g., moisture-resistant fabric **630**, adhesive layer **640**, insulation layer **650**, combinations of the same or the like) discussed herein or shown in one or more of FIGS. **1-6** are coupled with the substrate **610**.

[0073] FIG. **7** illustrates one example of a method **700** of forming a moisture-resistant sheathing panel, such as the one or more sheathing panels **100**, **200**, **300**, **400**, **500** and **600** as discussed related to any of FIGS. **1-6**. In describing the method **700**, reference is made to one or more components, features, functions, steps, or the like previously described herein. Where convenient, reference is made to the components, features, functions, steps, or the like with reference numerals. Reference numerals provided are exemplary and are not exclusive. For instance, components, features, functions, steps, or the like described in the method **700** include, but are not limited to, corresponding numbered elements provided herein, other corresponding features described herein (both numbered and unnumbered) as well as their equivalents.

[0074] In the method **700** of forming a moisture-resistant sheathing panel, a cementitious substrate is formed, as indicated in **710**. The cementitious substrate includes, for example, a first side and second side. As shown in the examples of FIGS. **1-6**, the first side of the cementitious substrate faces an exterior of a building, and the second side faces the interior of a building. For example, the first side is closer in proximity to environmental conditions than the second side.

[0075] A moisture-resistant fabric is formed as indicated in **720**. The moisture-resistant fabric is, for example, the moisture-resistant fabric shown at least in FIGS. **4** and **5**. In examples, the moisture-resistant fabric includes nonwoven or woven fabrics, as discussed previously. The moisture-resistant fabric includes a weather resistant barrier that decreases infiltration of environmental elements into the cementitious substrate and interior of buildings. The moisture-resistant material includes, but is not limited to, a fabric or a fabric-like material, polymer-based materials (including continuous sheets, membranes, films, or layers) or the like. For instance, the moisture-resistant fabric includes a first surface and a second surface. In one example, the moisture-resistant fabric includes the first surface directed toward the exterior of a building and the second surface directed toward the interior of the building.

[0076] The method **700** includes applying an adhesive layer, as indicated in **730** to, for example, one or more of the second surface of the moisture-resistant fabric or the first side of the cementitious substrate. The application of the

adhesive layer to the second surface of the moisture-resistant fabric, for example, forms a self-adhesive, moisture-resistant fabric. A self-adhesive material is an example of type of adhesive that forms a bond when pressure is applied to marry the adhesive with the surface to which the adhesive is applied. Optionally, the adhesive layer is applied to the first side of the cementitious substrate, and coupling occurs by applying pressure to the moisture-resistant fabric against the cementitious substrate layer.

[0077] The method **700** further includes coupling the second surface of the moisture-resistant fabric with the adhesive layer applied to the cementitious substrate layer, as indicated in **740**. In some examples, the moisture-resistant fabric is coupled to the first side of the cementitious substrate layer. In another example, intermediate layers (e.g., insulation layer **650** shown in FIG. **6**) are positioned between the first side of the cementitious substrate layer and the moisture-resistant fabric. Intermediate layers include, for example, functional layers, such as an insulation layer, supplemental moisture-resistant layers, or the like (as discussed related to FIG. **6**).

[0078] Optionally, the method **700** includes coupling an insulation layer between the moisture-resistant fabric and the cementitious substrate, as indicated in **735**. In other examples, the insulation layer is joined with the first side of cementitious substrate, such as an opposing side relative to the placement of the moisture-resistant fabric. In examples where the moisture-resistant fabric and the insulation layer are on the same side (e.g., second side) of the cementitious substrate, the insulation layer is interposed between the moisture-resistant fabric and the substrate.

[0079] In examples, are two or more layers of a moisture-resistant fabric are coupled with the cementitious substrate. In other examples, two or more insulation layers are coupled with the cementitious substrate.

Various Notes and Aspects

[0080] Aspect 1 can include subject matter such as a sheathing panel including: a cementitious substrate having a first side and a second side; wherein the first side faces an interior of a building; wherein the second side faces towards an exterior of the building; a moisture-resistant fabric having a first surface and a second surface opposing the first surface; wherein the first surface is joined with the second side of the cementitious substrate; wherein the second surface faces an exterior; and an adhesive layer disposed on the first surface of the moisture-resistant fabric.

[0081] Aspect 2 can include, or can optionally be combined with the subject matter of Aspect 1, to optionally include the cementitious substrate includes magnesium oxide.

[0082] Aspect 3 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 1 or 2 to optionally include the cementitious substrate is at least one of moisture-resistant or fire resistant.

[0083] Aspect 4 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 1-3 to optionally include the moisture-resistant fabric includes a nonwoven fabric.

[0084] Aspect 5 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 1-4 to optionally include the adhesive layer is configured to be applied to the cementitious substrate; wherein the moisture-resistant fabric including the adhesive layer is configured to form a self-adhesive moisture-resistant fabric.

[0085] Aspect 6 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 1-5 to optionally include an insulation material disposed between the cementitious substrate and the moisture-resistant fabric.

[0086] Aspect 7 can include subject matter such as a sheathing panel including: a cementitious substrate including magnesium oxide, the cementitious substrate having a first side and a second side; wherein the first side is configured to be coupled with a frame of a building; wherein the second side faces towards an exterior of a building; a moisture-resistant fabric having a first surface and a second surface opposing the first surface; wherein the first surface is joined with the second side of the cementitious substrate; wherein the second surface faces an exterior; and an adhesive applied to the first surface of the moisture-resistant fabric; wherein the moisture-resistant fabric with the adhesive substrate applied is configured form a self-adhesive moisture-resistant fabric.

[0087] Aspect 8 can include, or can optionally be combined with the subject matter of Aspect 7, to optionally include an insulation material positioned between the first surface of the moisture-resistant fabric and the second side of the cementitious substrate.

[0088] Aspect 9 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7 or 8 to optionally include a sheathing panel, wherein the cementitious substrate is a first moisture-resistant substrate, the sheathing panel including: a second substrate; and an insulation material having a first side and a second side, the first side of the insulation material coupled with a first side of the second substrate and the second side of the insulation material coupled with the first moisture-resistant substrate.

[0089] Aspect 10 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7-9 to optionally include the insulation material includes at least one of graphite polystyrene or polystyrene.

[0090] Aspect 11 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7-10 to optionally include the adhesive includes an acrylic.

[0091] Aspect 12 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7-11 to optionally include the cementitious substrate is at least one of moisture-resistant or fire-resistant.

[0092] Aspect 13 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7-12 to optionally include the cementitious substrate is mold and mildew resistant.

[0093] Aspect 14 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 7-13 to optionally include the cementitious substrate includes polymer filaments.

[0094] Aspect 15 can include subject matter such as a method of forming a moisture-resistant sheathing panel including: forming a cementitious substrate; wherein the substrate has a first side and a second side; forming a moisture-resistant fabric; wherein the moisture-resistant fabric has a first surface and an opposing second surface; converting the moisture-resistant fabric to a self-adhesive

moisture-resistant fabric, including: applying an adhesive to the first surface of the moisture-resistant fabric; and joining the first surface of the moisture-resistant fabric with one of the first side or the second side of the cementitious substrate.

[0095] Aspect 16 can include, or can optionally be combined with the subject matter of Aspect 15, to optionally include the cementitious substrate is moisture-resistant and includes magnesium oxide.

[0096] Aspect 17 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 15 or 16 to optionally include the moisture-resistant fabric is a nonwoven fabric.

[0097] Aspect 18 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 15-17 to optionally include coupling a layer of insulation between the self-adhesive moisture-resistant fabric and the moisture-resistant substrate.

[0098] Aspect 19 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 15-18 to optionally include the moisture-resistant fabric includes a polymer.

[0099] Aspect 20 can include, or can optionally be combined with the subject matter of one or any combination of Aspects 15-19 to optionally include the adhesive includes one or more of neoprene, epoxies, polyurethanes, acrylics, silicones, MS polymers.

[0100] Each of these non-limiting aspects can stand on its own, or can be combined in various permutations or combinations with one or more of the other aspects.

[0101] The above description includes references to the accompanying drawings, which form a part of the detailed description. The drawings show, by way of illustration, specific embodiments in which the invention can be practiced. These embodiments are also referred to herein as "aspects" or "examples." Such aspects or example can include elements in addition to those shown or described. However, the present inventors also contemplate aspects or examples in which only those elements shown or described are provided. Moreover, the present inventors also contemplate aspects or examples using any combination or permutation of those elements shown or described (or one or more features thereof), either with respect to a particular aspects or examples (or one or more features thereof), or with respect to other Aspects (or one or more features thereof) shown or described herein.

[0102] In the event of inconsistent usages between this document and any documents so incorporated by reference, the usage in this document controls.

[0103] In this document, the terms "a" or "an" are used, as is common in patent documents, to include one or more than one, independent of any other instances or usages of "at least one" or "one or more." In this document, the term "or" is used to refer to a nonexclusive or, such that "A or B" includes "A but not B," "B but not A," and "A and B," unless otherwise indicated. In this document, the terms "including" and "in which" are used as the plain-English equivalents of the respective terms "comprising" and "wherein." Also, in the following claims, the terms "including" and "comprising" are open-ended, that is, a system, device, article, composition, formulation, or process that includes elements in addition to those listed after such a term in a claim are still deemed to fall within the scope of that claim. Moreover, in the following claims, the terms "first," "second," and "third," etc. are used merely as labels, and are not intended to impose numerical requirements on their objects.

[0104] Geometric terms, such as "parallel," "perpendicular," "round," or "square," are not intended to require absolute mathematical precision, unless the context indicates otherwise. Instead, such geometric terms allow for variations due to manufacturing or equivalent functions. For example, if an element is described as "round" or "generally round," a component that is not precisely circular (e.g., one that is slightly oblong or is a many-sided polygon) is still encompassed by this description.

[0105] The above description is intended to be illustrative, and not restrictive. For example, the above-described aspects or examples (or one or more aspects thereof) may be used in combination with each other. Other embodiments can be used, such as by one of ordinary skill in the art upon reviewing the above description. The Abstract is provided to comply with 37 C.F.R. § 1.72(b), to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. Also, in the above Detailed Description, various features may be grouped together to streamline the disclosure. This should not be interpreted as intending that an unclaimed disclosed feature is essential to any claim. Rather, inventive subject matter may lie in less than all features of a particular disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description as aspects, examples, or embodiments, with each claim standing on its own as a separate embodiment, and it is contemplated that such embodiments can be combined with each other in various combinations or permutations. The scope of the invention should be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

The claimed invention is:

1. A sheathing panel comprising:

a cementitious substrate having a first side and a second side;

wherein the first side faces an interior of a building;

wherein the second side faces towards an exterior of the building;

a moisture-resistant fabric having a first surface and a second surface opposing the first surface;

wherein the first surface is joined with the second side of the cementitious substrate;

wherein the second surface faces the exterior; and

an adhesive layer disposed on the first surface of the moisture-resistant fabric.

2. The sheathing panel of claim **1**, wherein the cementitious substrate includes magnesium oxide.

3. The sheathing panel of claim **1**, wherein the cementitious substrate is at least one of moisture-resistant or fire resistant.

4. The sheathing panel of claim **1**, wherein the moisture-resistant fabric includes a nonwoven fabric.

5. The sheathing panel of claim **4**, wherein the adhesive layer is configured to be applied to the cementitious substrate;

wherein the moisture-resistant fabric including the adhesive layer is configured to form a self-adhesive moisture-resistant fabric.

6. The sheathing panel of claim 1, including an insulation material disposed between the cementitious substrate and the moisture-resistant fabric.

7. A sheathing panel comprising:

a cementitious substrate including magnesium oxide, the cementitious substrate having a first side and a second side;

wherein the first side is configured to be coupled with a frame of a building;

wherein the second side faces towards an exterior of the building;

a moisture-resistant fabric having a first surface and a second surface opposing the first surface;

wherein the first surface is joined with the second side of the cementitious substrate;

wherein the second surface faces the exterior; and

an adhesive applied to the first surface of the moisture-resistant fabric;

wherein the moisture-resistant fabric with the adhesive applied is configured to form a self-adhesive moisture-resistant fabric.

8. The sheathing panel of claim 7, including:

an insulation material positioned between the first surface of the moisture-resistant fabric and the second side of the cementitious substrate.

9. The sheathing panel of claim 7, wherein the cementitious substrate is a first moisture-resistant substrate, the sheathing panel including:

a second substrate; and

an insulation material having a first side and a second side, the first side of the insulation material coupled with a first side of the second substrate and the second side of the insulation material coupled with the first moisture-resistant substrate.

10. The sheathing panel of claim 9, wherein the insulation material includes at least one of graphite polystyrene or polystyrene.

11. The sheathing panel of claim 7, wherein the adhesive includes an acrylic.

12. The sheathing panel of claim 7, wherein the cementitious substrate is at least one of moisture-resistant or fire-resistant.

13. The sheathing panel of claim 7, wherein the cementitious substrate is mold and mildew resistant.

14. The sheathing panel of claim 7, wherein the cementitious substrate includes polymer filaments.

15. A method of forming a moisture-resistant sheathing panel comprising:

forming a cementitious substrate;

wherein the cementitious substrate has a first side and a second side;

forming a moisture-resistant fabric;

wherein the moisture-resistant fabric has a first surface and an opposing second surface;

converting the moisture-resistant fabric to a self-adhesive moisture-resistant fabric, including:

applying an adhesive to the first surface of the moisture-resistant fabric; and

joining the first surface of the moisture-resistant fabric with one of the first side or the second side of the cementitious substrate.

16. The method of forming the moisture-resistant sheathing panel of claim 15, wherein the cementitious substrate is moisture-resistant and includes magnesium oxide.

17. The method of forming the moisture-resistant sheathing panel of claim 15, wherein the moisture-resistant fabric is a nonwoven fabric.

18. The method of forming the moisture-resistant sheathing panel of claim 15, includes:

coupling a layer of insulation between the self-adhesive moisture-resistant fabric and the cementitious substrate.

19. The method of forming the moisture-resistant sheathing panel of claim 15, wherein the moisture-resistant fabric includes a polymer.

20. The method of forming the moisture-resistant sheathing panel of claim 15, wherein the adhesive includes one or more of neoprene, epoxies, polyurethanes, acrylics, silicones, modified silane (MS) polymers.

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