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(54) **CLAPBOARD SIDING PANEL WITH BUILT IN FASTENER SUPPORT**

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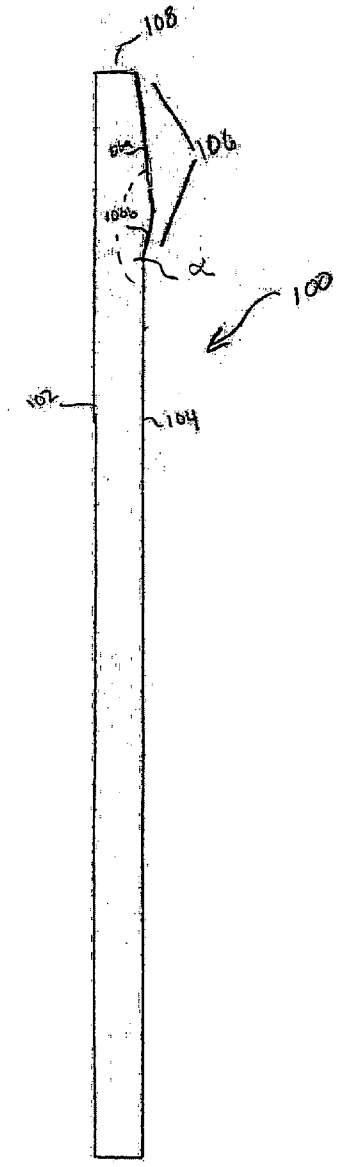
(57) **ABSTRACT**

A generally rectangular siding panel is provided having a front and rear faces, The rear face has a first area proximate to a top end of the rear face and shaped such that at least a portion of the area sits substantially flush with a portion of a vertical wall when the siding panel is secured to the vertical wall and angled to overlap at least a portion of a second siding panel secured to the vertical wall.



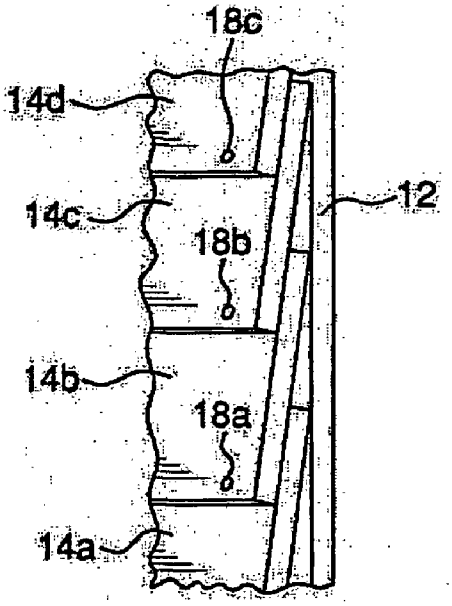



FIG. 1
(PRIOR ART)

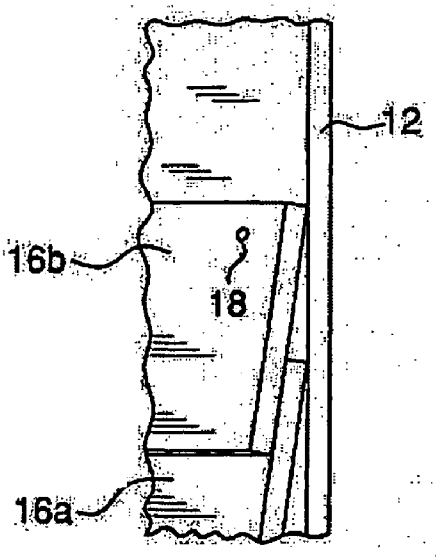



FIG. 2
(PRIOR ART)

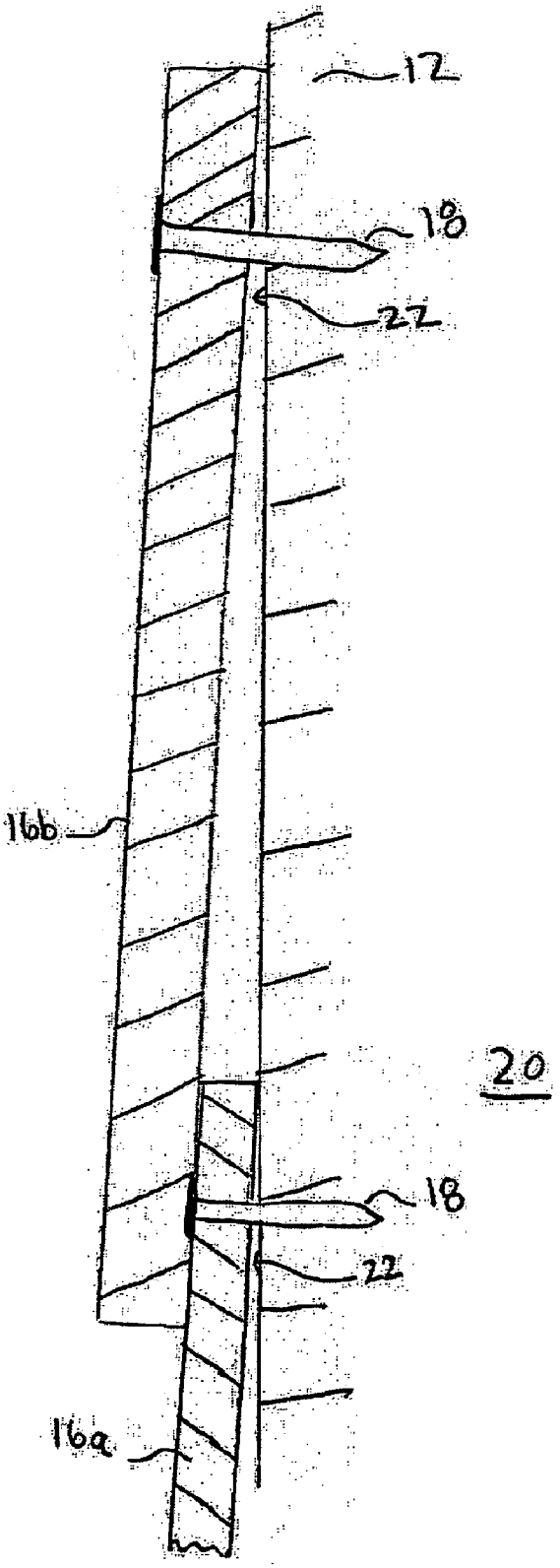



Fig. 3
(Prior Art)

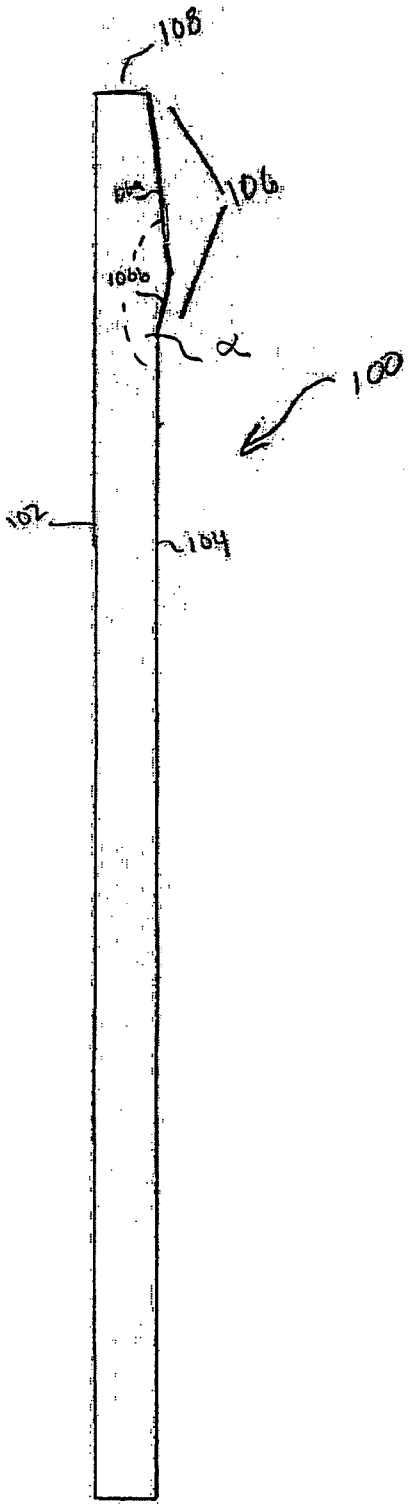



FIG. 4

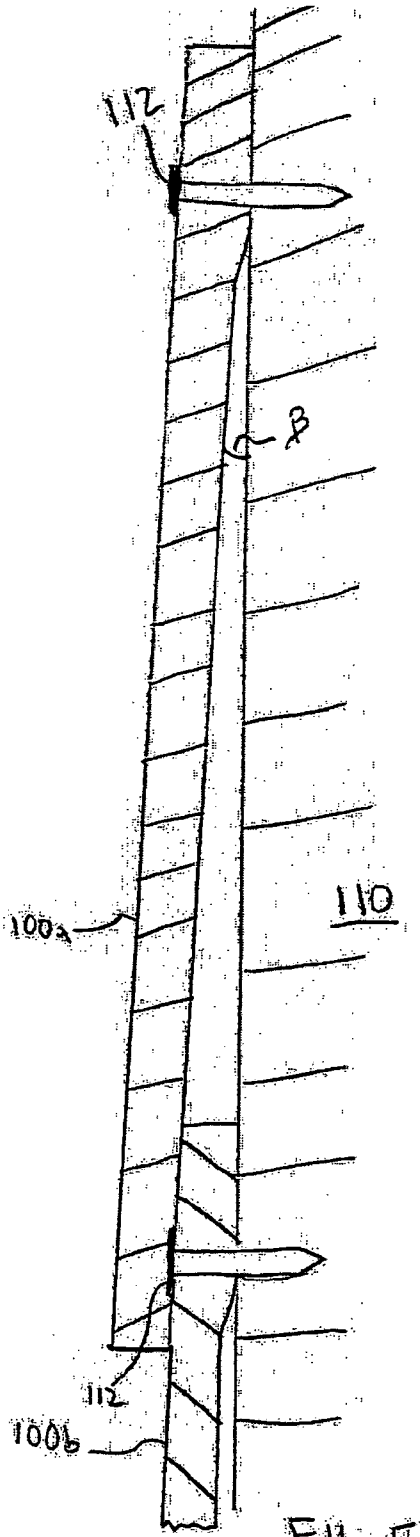



FIG. 5

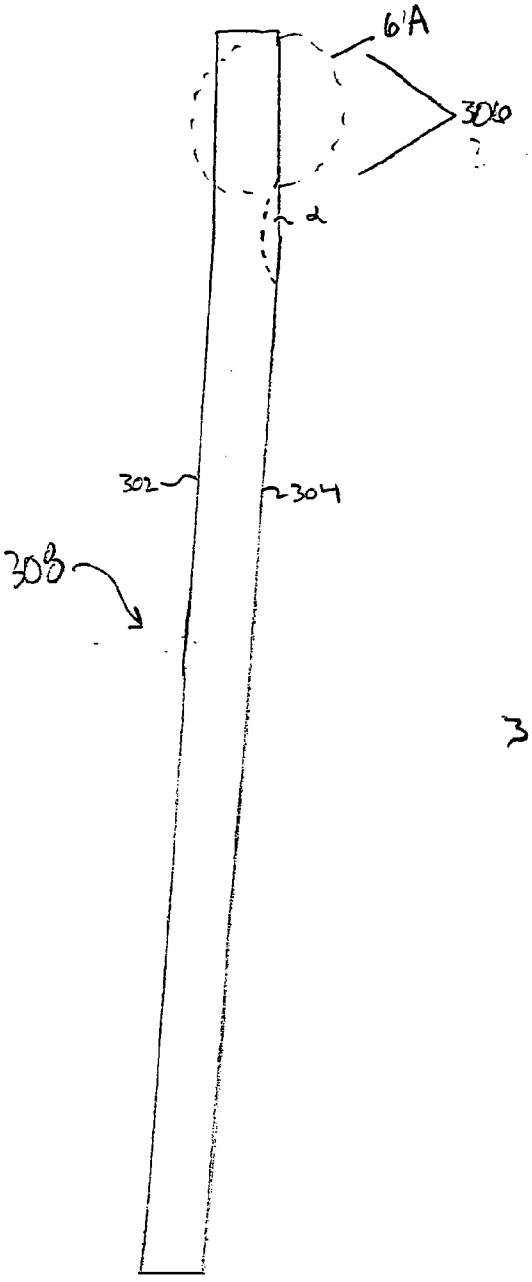



FIG. 6

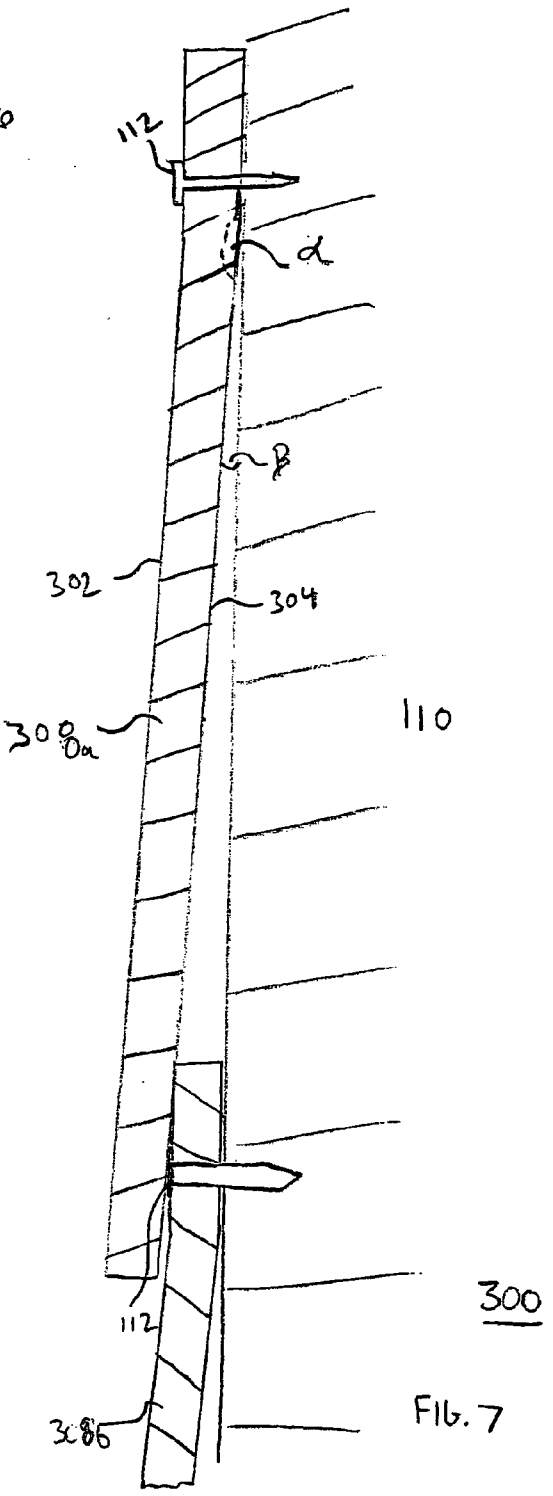



FIG. 7

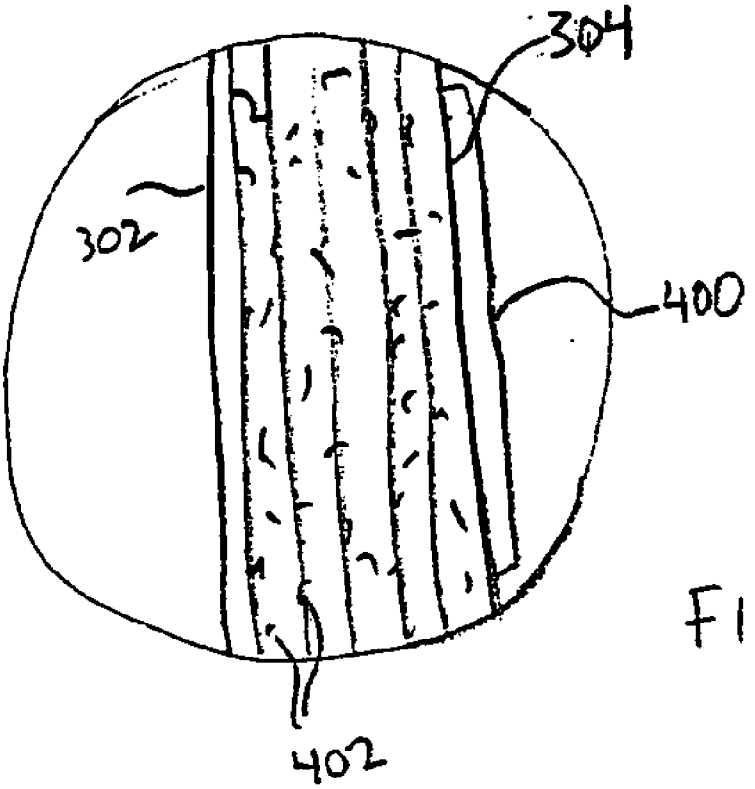



FIG. 6A

# CLAPBOARD SIDING PANEL WITH BUILT IN FASTENER SUPPORT

## FIELD OF THE INVENTION

[0001] The present invention relates to siding products and methods of installing siding products, and more particularly to clapboard siding products and methods of installing the same.

## BACKGROUND OF THE INVENTION

[0002] Typically, clapboard siding panels, such as fiber cement clapboard siding panels, are installed on a wall of a structure, generally on a sheathing product, in one of two ways—either in a so called "blind nail" method or a so called "face nail" method. In the blind nail method, illustrated by siding panel assembly **20** of **FIG. 2**, a first siding panel **16***a* is aligned on the face of a wall **12** and a series of horizontally spaced nails (not shown) is driven through the panel **16***a*, generally through an upper region of the exterior face of the panel **16***a*, into the wall **12**. A second panel **16***b* is then secured to the wall **12** in the same manner using a series of nails **18**. The second panel **16***b* overlaps a portion of the exterior face of the first panel **16***a* and covers the nails or fasteners driven through the first panel **16***a*. Another panel (not shown) is then installed overlapping panel **16***b* and covering nails **18**.

[0003] In the face nailing method shown by panel assembly **10** of **FIG. 1**, the first siding panel **14***a* is properly aligned on the wall **12**. A second siding panel **14***b* is then aligned overlapping the first siding panel **14***a*, as described above, and nails **18***a* are driven through both siding panels **14***a*, **14***b*, exposing the head of the nail **18***a* at the exterior surface of the second siding panel **14***b*. This process is repeated with subsequent siding courses, such as panels **14***c* and **14***d* shown in **FIG. 1**, using nails **18***b* and **18***c*.

[0004] **FIG. 3** is a side cross-sectional view of the panel assembly **20** of **FIG. 2**. As can be seen from the cross-sectional view, the panels **16***a* and **16***b* of this assembly do not sit flush with the wall **12**, i.e., a gap, illustrated generally by reference **22**, exists between the siding panels and the wall **20** proximate to where nails **18** are driven through the panels. As explained above, fasteners **18** secure the panels to the wall **20**. Because of the gap between the wall **20** and the siding panels, the fasteners apply a bending force to the panel, both when being driven through the panels and after being secured to wall **20**. This bending force stresses the panels and can lead to cracking. Further, the nails tend to fracture the rear surface of the panels as they puncture the rear surface and enter the gap area **22** between the rear surface of the panels and the wall, like a bullet exiting an object into free space. The stress cracks and fractures, in turn, can expose the panels to water, weaken the holding strength of the fasteners and generally reduce the product life of the panels. Similar problems are encountered with the assembly **10** of **FIG. 1**.

[0005] In light of the above, there is a need for a new siding panel system and panel configuration that reduce or eliminate stresses and fractures placed on the siding panel both during and after installation.

## SUMMARY OF THE INVENTION

[0006] A generally rectangular siding panel is provided having a front and rear faces. The rear face has a first area proximate to a top end of the rear face and shaped such that at least a portion of the area sits substantially flush with a portion of a vertical wall when the siding panel is secured to the vertical wall and angled to overlap at least a portion of a second siding panel secured to the vertical wall.

[0007] Because at least a portion of the rear face, i.e., a first or protruding portion of the rear face, sits flush with the vertical wall, a gap proximate to the nail puncture and between the rear face and the wall is substantially eliminated and the wall provides support for the rear face during the nailing step. This support helps to reduce the fracturing or splintering of the rear face local to the nail puncture and helps to minimize bending of the siding panel as the nail is driven into the wall, thereby further reducing stresses that can lead to fractures in the siding panel. The reduction of fractures in the siding panel can reduce exposure of the siding panel to water damage and improve the strength of the connection between the siding panel and the wall, thereby improving the panel's wind load resistance.

[0008] In one embodiment, a generally rectangular shaped clapboard siding panel is provided having a front and rear faces, the rear face having a first area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of a vertical wall when the siding panel is secured to the vertical wall and angled to overlap at least a portion of a second siding panel secured to the vertical wall, such that the vertical wall provides support for the rear face when fasteners are driven through the clapboard siding panel and into the vertical wall through the first area. The first area can be reinforced, such as by thickening, fibrous, particle or resin reinforcement or by the addition of a reinforcing member, such as a metal mesh, scrim, fabric, or panel, for example, made of glass, graphite, plastic or metal, such as galvanized steel mesh or sheet metal. These reinforcements are preferably embedded or laminated to the panel at least on or in the first area.

[0009] A siding panel assembly is also provided including a first and a second siding panels attached to a vertical wall of a structure. Each of the siding panels has a generally rectangular shaped panel having a front and rear faces. The first siding panel is angled to overlap at least a portion of the second siding panel. The rear face of at least the first siding panel has a first area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of the vertical wall.

[0010] A method of installing a siding panel assembly on a structure is also provided. A first and second siding panels are provided. Each of the siding panels has a generally rectangular shaped panel having a front and rear faces. The rear face of at least the first siding panel has a protruding area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of the vertical wall when the first siding panel is secured to the wall and angled to overlap at least a portion of the second siding panel.

[0011] The above and other features of the present invention will be better understood from the following detailed description of the preferred embodiments of the invention that is provided in connection with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings illustrate preferred embodiments of the invention, as well as other information pertinent to the disclosure, in which:

[0013] **FIG. 1** is a partial perspective view of a prior art face nail clapboard panel assembly;

[0014] **FIG. 2** is a partial perspective view of a prior art blind nail clapboard panel assembly;

[0015] **FIG. 3** is a side cross-sectional view of the assembly of **FIG. 2**;

[0016] **FIG. 4** is a side elevational view of a clapboard siding panel according to the present invention;

[0017] **FIG. 5** is a side cross-sectional view of a clapboard siding panel assembly utilizing the clapboard siding panel of **FIG. 4**;

[0018] **FIG. 6** is a side elevational view of an alternative embodiment of a clapboard siding panel according to the present invention;

[0019] **FIG. 6A** is an enlarged view of a portion of the panel of **FIG. 6**; and

[0020] **FIG. 7** is a side cross-sectional view of a clapboard siding panel assembly utilizing the clapboard siding panel of **FIG. 6**.

## DETAILED DESCRIPTION

[0021] Referring first to **FIG. 4**, a side elevational view of a siding panel **100** is shown. Siding panel **100** has a generally rectangular shape, like the siding panels shown in the perspective views of **FIGS. 1 and 2**, and, in an exemplary embodiment, is a clapboard siding panel, preferably a fiber cement clapboard siding panel. "Fiber Cement" refers to a cementitious composition including Portland cement, cellulose fibers and aggregate (typically, sand). Siding panel **100** has front and rear faces **102** and **104**, respectively. In one embodiment, the siding panel may be between about 12'-16' in length, as is conventional, with faces between about 5" to 16" in height. The siding panel has a thickness typically between about ⅛ to ½", and preferably around 5/16".

[0022] The panel **100** includes a first area **106** located proximate to the top edge **108** of the panel and preferably extending along the length of the rear face **104**. The first area **106** is shaped such that a face of the area sits flush against a vertical wall **110** when a first siding panel **100***a* is secured to a wall **110** and angled to at least partially overlap a second siding panel **100***b*, as shown in the assembly **200** of **FIG. 5**. In one embodiment, the first area has a first planar face **106***a* that contacts the wall **110** during and after installation and a second face **106***b* that connects the first face to the remainder of the rear face **104**. The first planar face **106***a* extends from the top edge **108** and forms an angle "α" with the major portion of the rear face **104** of the siding panel. Angle α is selected such that the sum of angle α and angle "β" are preferably between about 170-190°, and more preferably about 180°, at installation where angle β is the angle between the major surface of rear face **104** and the wall **110** created when the panel is installed (as described below in connection with **FIG. 5**) to overlap another siding panel. Angle β is typically between about 1-10°, so angle α is preferably between about 170-179° so that the face **106***a* is substantially flush with the wall **110**.

[0023] During installation of a panel **100**, nails are driven through a siding panel to secure the panel to the wall after the panel is correctly positioned on a wall. In a conventional assembly, each nail is typically positioned within about an inch from the top edge **108**. With respect to siding panel **100**, it is preferred that the nails are driven through the first area **106** of the siding panel **100**, and preferably through face **106***a* that sits flush with the vertical wall after the panel **100** is correctly positioned. For this reason, face **106***a* should have a height along rear face **104** of at least one inch.

[0024] During installation, a siding panel **100** is positioned on a wall **110** so that at least a portion of the first area **106** is flush with a portion of the wall **110**, as shown in **FIG. 5**. A series of horizontally spaced nails **112** are then driven through the siding panel **100** and through the first portion **106** (specifically, through the face **106***a* that lies flush with the wall **110**), and into the wall **110**. Because the face **106***a* sits flush with the wall **110**, the gap **22** proximate to the nail puncture is eliminated and the wall **110** provides support for the face **106***a* during the nailing step. This support prevents the fracturing or splintering of the rear face **104** local to the nail puncture and prevents bending of the siding panel as the nail **112** is driven into the wall **110**. The reduction of fractures and other stresses in the siding panel can reduce exposure of the siding panel to water damage and improve the strength of the connection between the siding panel and the wall, thereby improving the panel's wind load resistance and product life.

[0025] Although **FIG. 5** illustrates a siding panel assembly **200** having only two overlapping siding panels **100***a*, **100***b*, it should be understood that this is for purposes of illustration only. Also, although siding panel assembly **200** is shown assembled via the so called "blind nail" method, an assembly may also be formed using panels **100** via the "face nail" assembly method described above in the "Background of the Invention" section. Similar panels are preferably, but not necessarily, used to form the assembly, i.e., each panel preferably has a respective first area **106** located on the rear face **104**.

[0026] Although the siding panels illustrated herein are described as clapboard fiber cement siding panels, this is by no means a requirement. One of ordinary skill will realize that siding panels may be fabricated from a variety of materials other than fiber cement, such as wood or plastic, such as PVC, or composites thereof. It should also be apparent that, although not illustrated, the siding panel assembly described herein may include other products typically included in panel assemblies, such as sheathing, air and water barriers and insulation.

[0027] Fabrication of the panels **100** having first portion **106** described above may be accomplished using known fabrication techniques for manufacturing fiber cement or other clapboard siding panels. For example, first area shapes can simply be incorporated into the press or mold contour used to fabricate fiber cement clapboard siding panels. This manufacturing process is often referred to as "Post Press." Alternatively, an accumulator roll process, for example, may be utilized.

[0028] A method of installing a siding panel assembly on a structure is also provided herein. A first and second siding

panels are provided. At least a first one of the siding panels is configured like a siding panel **100** described above, i.e., it has a first area **106** on a rear face thereof. First and second siding panels are attached to the structure such that the first area of the first siding panel sits substantially flush with the vertical wall of the structure when the first siding panel is angled to overlap at least a portion of the second siding panel. Nails are driven through the panels to secure the panels to the wall as described above in either the face or blind nail manner. Preferably, this process is repeated until the structure is covered with siding panels. As noted, the nails are preferably positioned so that they are driven through the portion of the first area that is flush with the wall of the structure, thereby providing a secure nailing surface and reducing or eliminating stress induced fracturing of the rear face of the siding panel.

[**0029**] **FIG. 6** illustrates a siding panel **308** having first area **306** without a protruding area, described in connection with the panel **100** of **FIG. 4**, but angled to provide the flush seating with wall **110**, as shown in the assembly **300** of **FIG. 7**. Panels **308***a* and **308***b* are installed in the manner described above for panels **100** in the assembly **200**. Like panel **100**, siding panel **308** has front and rear faces **302**, **304** respectively and a longitudinal length. The rear surface **304** has a first portion of the rear face **304** forming an oblique angle $\beta$ with respect to the exterior surface of vertical wall **110** to which the siding panels **308** are affixed. The rear surface **304** of the siding panels **308** also include a second portion in area **306** that is disposed in substantially flush contact with the vertical wall **110** when the siding panel **308** is affixed to the vertical wall **110**. The portion of rear face that sits flush with wall **110** forms an angle $\alpha$ with the first portion of rear surface **304**. The sum of angles $\alpha$ and $\beta$ preferably total 180°, but may be in the range of about 170-190° so that the second portion is substantially flush with the wall **110**. The second portion of the rear face in contact with the wall **110** preferably has a height of at least 1" so that nails or other fasteners may be driven through the same and into wall **110**, thereby providing a secure nailing surface and reducing or eliminating stress induced fracturing of the rear face of the siding panel.

[**0030**] In one embodiment, the first area **306** (**FIG. 6**) (or **106** for panel **100**) can be reinforced, such as by thickening, fibrous, particle or resin reinforcement or by the addition of a reinforcing member, such as a metal mesh, scrim, fabric, or panel, for example, made of glass, graphite, plastic or metal, such as galvanized steel mesh or sheet metal. These reinforcements are preferably embedded or laminated to the panel on or in the first area as taught in, for example, U.S. patent application Ser. No. 10/288,189 to William P. Bezubic Jr., filed Nov. 5, 2002, entitled "Cementitious External Sheathing Member with Rigid Support Member" commonly assigned to the assignee of the present application, the entirety of which is hereby incorporated by reference herein.

[**0031**] Bezubic Jr. teaches that a rigid support member **400** may be bonded with a fiber cement material, as shown in the enlarged partial side view of the panel **308** (**FIG. 6A**). The enlarged view of **FIG. 6A** illustrates fiber cement panel **308** as including plurality of laminated layers with a support member **400** bonded to the rear surface **304** at last along a portion of rear surface **304** at the first area **306**. Bezubic Jr. provides that the support member **400** may includes a rigid polymer resin, such as, rigid polyvinyl chloride ("PVC"), fiberglass-reinforced epoxy or polyester, or a metal plate, sheet or lath. Suitable metallic materials include anodized or polymer-coated aluminum or copper, brass, bronze, stainless steel, or galvanized steel, in plate, sheet or lath form. If aluminum is selected, it should be coated wherever it comes in contact with the cementitious material, since it is prone to attack by alkali compositions. Similarly, carbon steel selections should be coated or galvanized in order to prevent rusting. The metal plate or lath can be roll formed and punched in order to provide through-holes for fasteners. If a lath, scrim, or mesh construction is used, separate holes may not be necessary since the open construction of a lath, scrim, or mesh is ideal for mechanically locking with the cementitious layer of the panel **308** and is easily penetrated by fasteners such as nails and screws. With lath or scrim constructions, embedding the support member within the cementitious layer of the panel **308** is an option, in which case, the rigid support member may contain corrugations, grooves perforations or ridges to assist in mechanically locking with the cementitious layer of the panel.

[**0032**] As noted, Bezubic Jr. also teaches the use of reinforcing additives within the fiber cement structure. These additives are shown as fibers **402** in **FIG. 6A**. These fibers may be added to the cementitious layers of the panel **308** in order to increase the interlaminar bond strength, compressive, tensile, flexural, and cohesive strengths of the unhardened wet material as well as the hardened panels made therefrom. Fibers should preferably have high tear and burst strengths (i.e., high tensile strength), examples of which include waste paper pulp, abaca, southern pine, hardwood, flax, bagasse (sugar cane fiber), cotton, and hemp. Fibers with a high aspect ratio of about 10 or greater work best in imparting strength and toughness to the moldable material.

[**0033**] In U.S. patent application Ser. No. 10/342,529 to William P. Bezubic Jr. and Claude Brown Jr., filed Jan. 15, 2003, entitled "Cementitious External Sheathing Member Having Improved Interlaminar Board Strength" (Bezubic II), commonly assigned to the assignee of the present application, the entirety of which is hereby incorporated by reference herein, the Applicants teach the introduction of a resinous bond promoter, such as acrylic, starch, polyvinyl alcohol, or polyvinyl acetate, a Theological agent, or the use of mechanical means described below to improve the strength between individual layers of cementitious material. Sufficient resinous additions, manipulation of the fiber, or both, can result in improvements to ILB (inter-laminate board) strength. In addition to resinous bond promoters and Theological agents, Bezubic II proposes the use of mechanical manipulation of the wood fiber so that the individual fibers can be oriented in a "z" direction between layers to improve ILB strength. In addition to using the suggested additives, or apart therefrom, Bezubic II proposes the use of a series of pins, partially or fully disposed within the layer or layers of the fiber cement product to pierce the sheet and displace the fibers perpendicular to the direction of the forming machine, thus allowing the fibers to join the sheets together. Bezubic II also teaches employing further, or alternatively, a piercing wheel, punching die, vibration table, needling equipment, or a smoother surface such as a roll or plate that can be used to upset the fiber location on each, or selective ones, of the layers of the fiber cement product.

[0034] Although the invention has been described in terms of exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed broadly to include other variants and embodiments of the invention that may be made by those skilled in the art without departing from the scope and range of equivalents of the invention.

What is claimed is:

**1**. A generally rectangular siding panel having a front and rear faces, said rear face having a first area proximate to a top end of said rear face shaped such that at least a portion of said area sits substantially flush with a portion of a vertical wall when said siding panel is secured to said vertical wall and angled to overlap at least a portion of a second siding panel secured to said vertical wall.

**2**. The siding panel of claim 1, wherein said siding panel is a clapboard siding panel.

**3**. The siding panel of claim 1, wherein said siding panel is a fiber cement or wood clapboard siding panel.

**4**. The siding panel of claim 1, wherein said first area comprises a reinforced area

**5**. The siding panel of claim 4, wherein said reinforced area comprises a protruding area that extends substantially along the entire length of said rear face.

**6**. The siding panel of claim 4, wherein said reinforced area includes a planar first face that is disposed to contact said portion of said vertical wall, said planar first face having a height of about at least one inch.

**7**. The siding panel of claim 4, wherein said reinforced area includes a planar face a planar face that is disposed to sit substantially flush with said portion of said vertical wall when said rear face overlaps said second siding panel such that a major portion of said rear face forms an angle with said vertical wall between about 1-10 degrees.

**8**. The assembly of claim 4, wherein said reinforced area comprises: a thickened portion, a resinous, fibrous or particulate reinforcement, a fabric, scrim or panel.

**9**. A siding panel assembly, comprising:

at least a first and a second siding panels attached to a vertical wall of a structure, each of said siding panels being a generally rectangular shaped panel having a front and rear faces, said first siding panel angled to overlap at least a portion of said second siding panel, said rear face of at least said first siding panel having a reinforced area proximate to a top end of said rear face shaped such that at least a portion of said area sits substantially flush with a portion of said vertical wall.

**10**. The assembly of claim 9, wherein said reinforced area extends substantially along the entire length of said rear face.

**11**. The assembly of claim 9, wherein said siding panels are fiber cement clapboard siding panels.

**12**. The assembly of claim 9, wherein said siding panels are installed using a blind nail method using a plurality of nails and at least some of said nails are disposed through said reinforced area.

**13**. The assembly of claim 9, wherein said siding panels are installed using a face nail method using a plurality of nails and at least some of said nails are disposed through said reinforced area.

**14**. The assembly of claim 9, wherein said siding panels are secured to said vertical wall at least in part by a series of fasteners extending through said respective siding panels and into said vertical wall, wherein at least some of said fasteners are disposed through said reinforced area.

**15**. The assembly of claim 9, wherein said reinforced area includes a planar first face that contacts said portion of said vertical wall, said planar first face having a height of at least about one inch.

**16**. The assembly of claim 9, wherein said reinforced area includes a planar face that contacts said portion of said vertical wall, said planar face extending from a top edge of said first siding panel at an angle that substantially matches an angle between said rear face of said first panel and said wall created by said overlap.

**17**. A method of installing a siding panel assembly on a structure, comprising the following steps:

providing at least a first and second siding panels, each of said siding panels being a generally rectangular shaped panel having a front and rear faces, said rear face of at least said first siding panel having a first area proximate to a top end of said rear face shaped such that at least a portion of said area sits substantially flush with a portion of said vertical wall when said first siding panel is secured to said wall and angled to overlap at least a portion of said second siding panel; and

attaching said first and second siding panels to said structure such that a rear face of said first siding panel partially overlaps a front face of said second siding panel.

**18**. The method of claim 17, wherein said first area is a reinforced area.

**19**. The method of claim 18, wherein:

said attaching step utilizes a blind nail attachment method comprising driving a series of nails through said first siding panel, through said reinforced area and into said vertical wall.

**20**. The method of claim 18, wherein:

said attaching step utilizes a face nail attachment method comprising driving a series of nails through said first siding panel, through said reinforced area and into said vertical wall.

**21**. The method of claim 17, wherein said attaching step includes the step of driving a series of nails fasteners through said first area of said first siding panel.

**22**. The method of claim 17, wherein said siding panels are clapboard siding panels.

**23**. The method of claim 17, wherein said siding panels are fiber cement clapboard siding panels.

**24**. The method of claim 17, wherein said first area includes a planar face that contacts said portion of said vertical wall and a major portion of said rear face forms an angle with said vertical wall between about 1-10 degrees.

**25**. A generally rectangular shaped clapboard siding panel having a front and rear faces, said rear face having a protruding area proximate to a top end of said rear face shaped such that at least a portion of said area sits substantially flush with a portion of a vertical wall when said siding panel is secured to said vertical wall and angled to overlap at least a portion of a second siding panel secured to said vertical wall, such that said vertical wall provides support for said rear face when fasteners are driven through said clapboard siding panel and into said vertical wall through said protruding area.

**26**. The siding panel of claim 25, wherein said protruding area includes a planar face that is disposed to sit substantially flush with said portion of said vertical wall when said rear face overlaps said second siding panel such that a major portion of said rear face forms an angle with said vertical wall between about 1-10 degrees.

**27**. A siding panel having front and rear faces and a longitudinal length, said rear surface having a first portion forming and oblique angle with respect to a vertical wall to which said siding panel is affixed, said rear surface of said siding panel also including a second portion which is disposed in substantially flush contact with said vertical wall when said siding panel is affixed to said vertical wall.

* * * * *