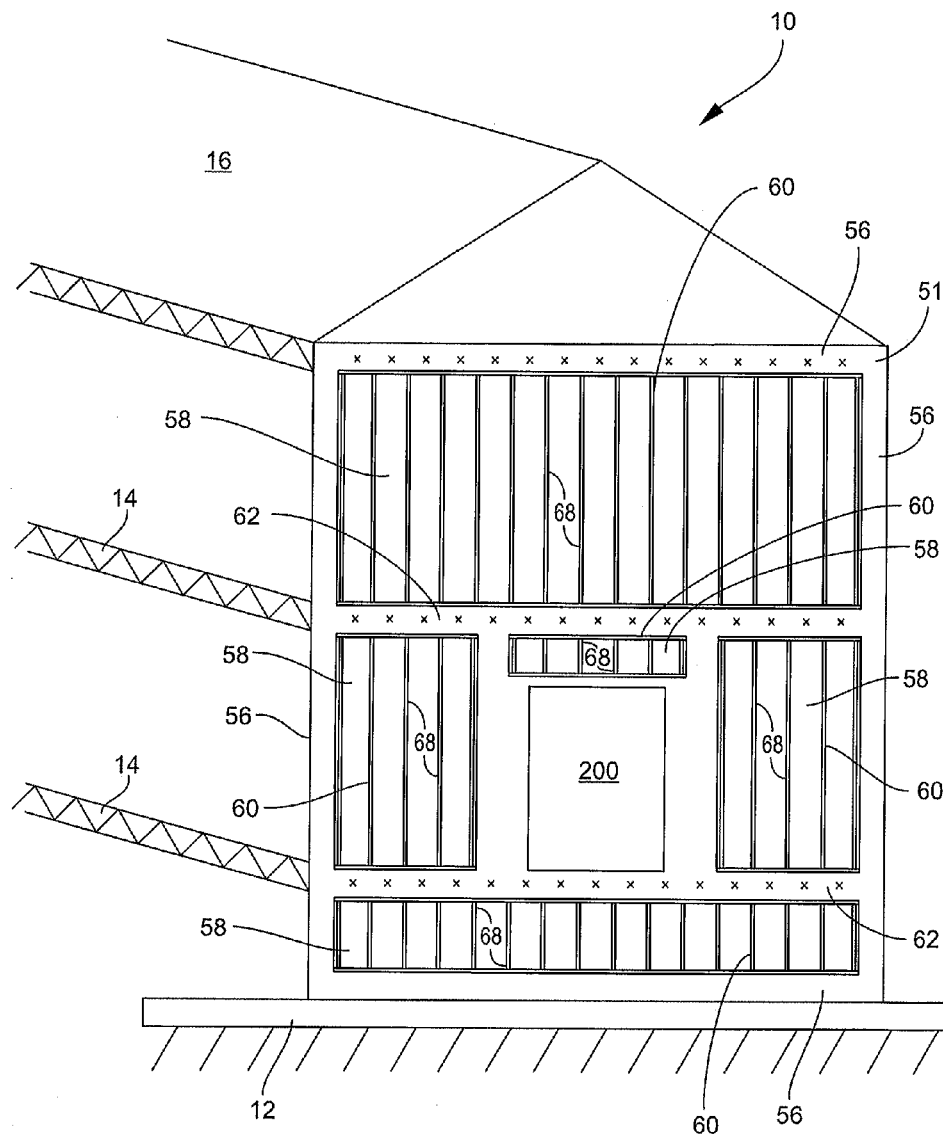




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(19) **United States**(12) **Patent Application Publication**
Hill(10) **Pub. No.: US 2019/0249407 A1**(43) **Pub. Date: Aug. 15, 2019**(54) **CEMENTITIOUS BUILDING PANEL****Publication Classification**(71) Applicant: **Solid Structures LLC**, Mooresville,
NC (US)(72) Inventor: **Daniel J. Hill**, Cornelius, NC (US)(73) Assignee: **Solid Structures LLC**(21) Appl. No.: **16/274,539**(22) Filed: **Feb. 13, 2019****Related U.S. Application Data**(60) Provisional application No. 62/629,760, filed on Feb.
13, 2018.(51) **Int. Cl.****E04B 1/04** (2006.01)**E04C 1/40** (2006.01)**E04D 3/26** (2006.01)(52) **U.S. Cl.**CPC **E04B 1/04** (2013.01); **E04D 3/26**
(2013.01); **E04C 1/40** (2013.01)**ABSTRACT**

A building component includes: a monolithic cementitious panel with a first face and a second face, and peripheral frame members; the second face has an open cavity, the peripheral frame members define a periphery of the cavity; and a frame fits into and is secured along the periphery of the cavity.



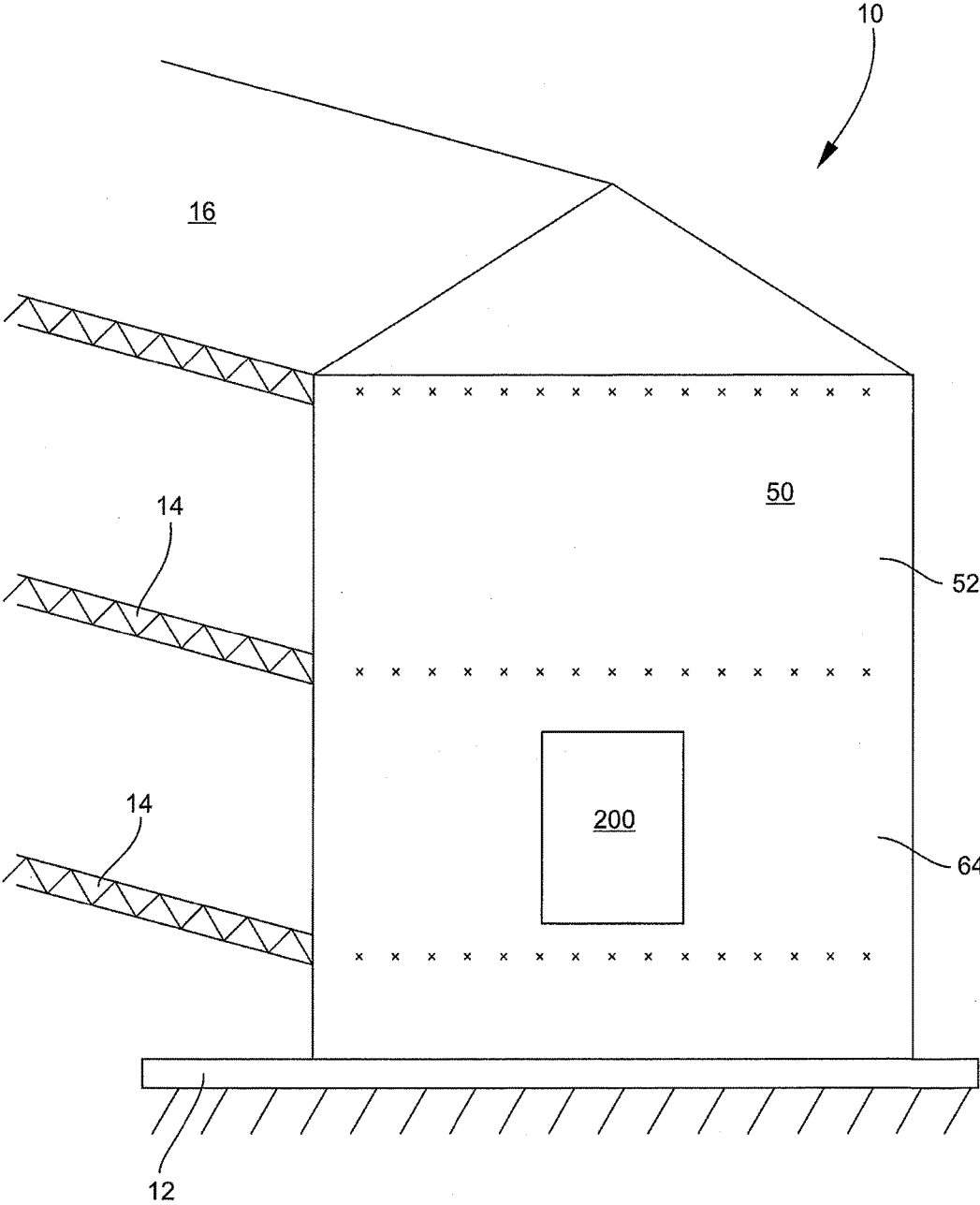


FIG. 1

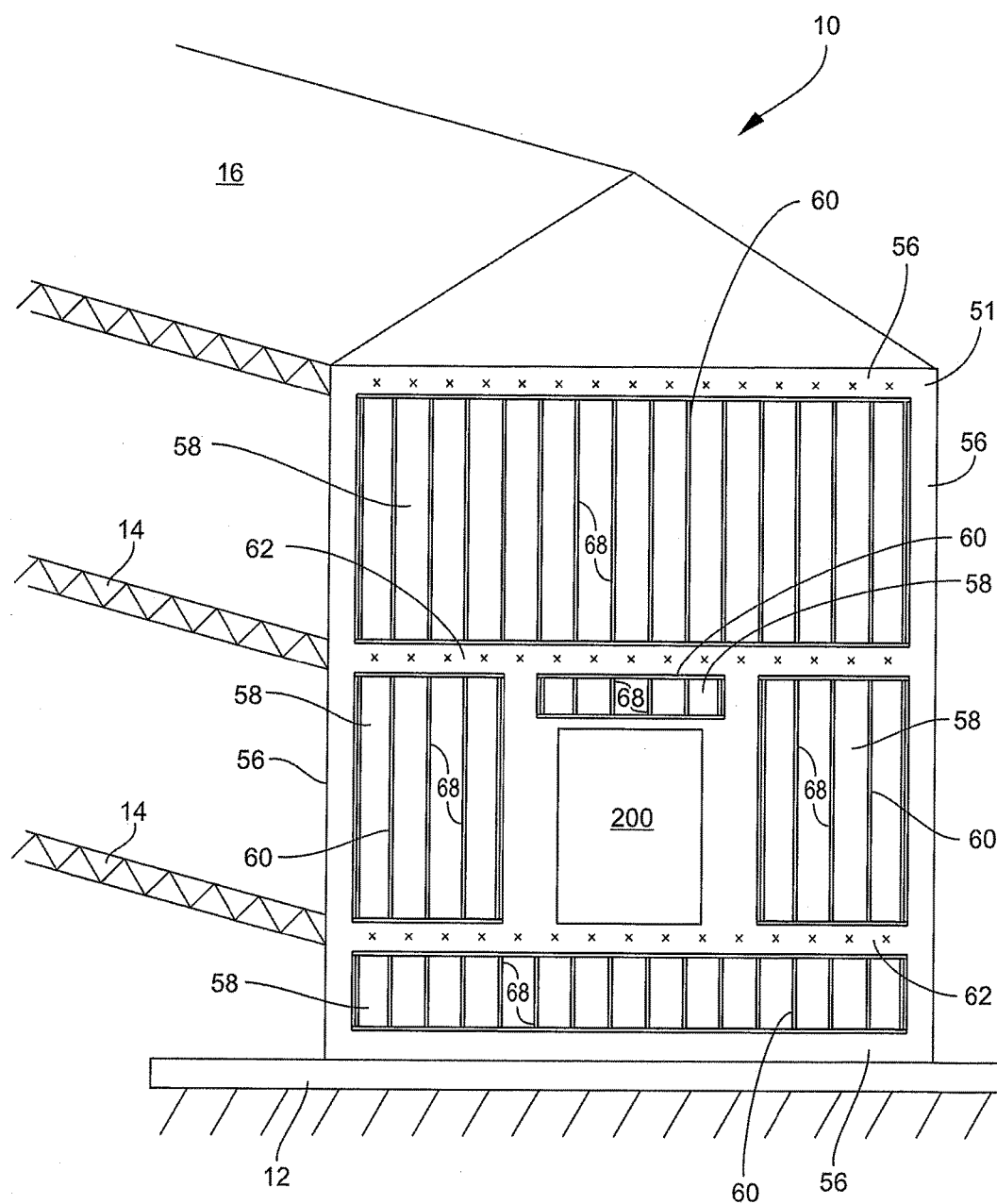


FIG. 2

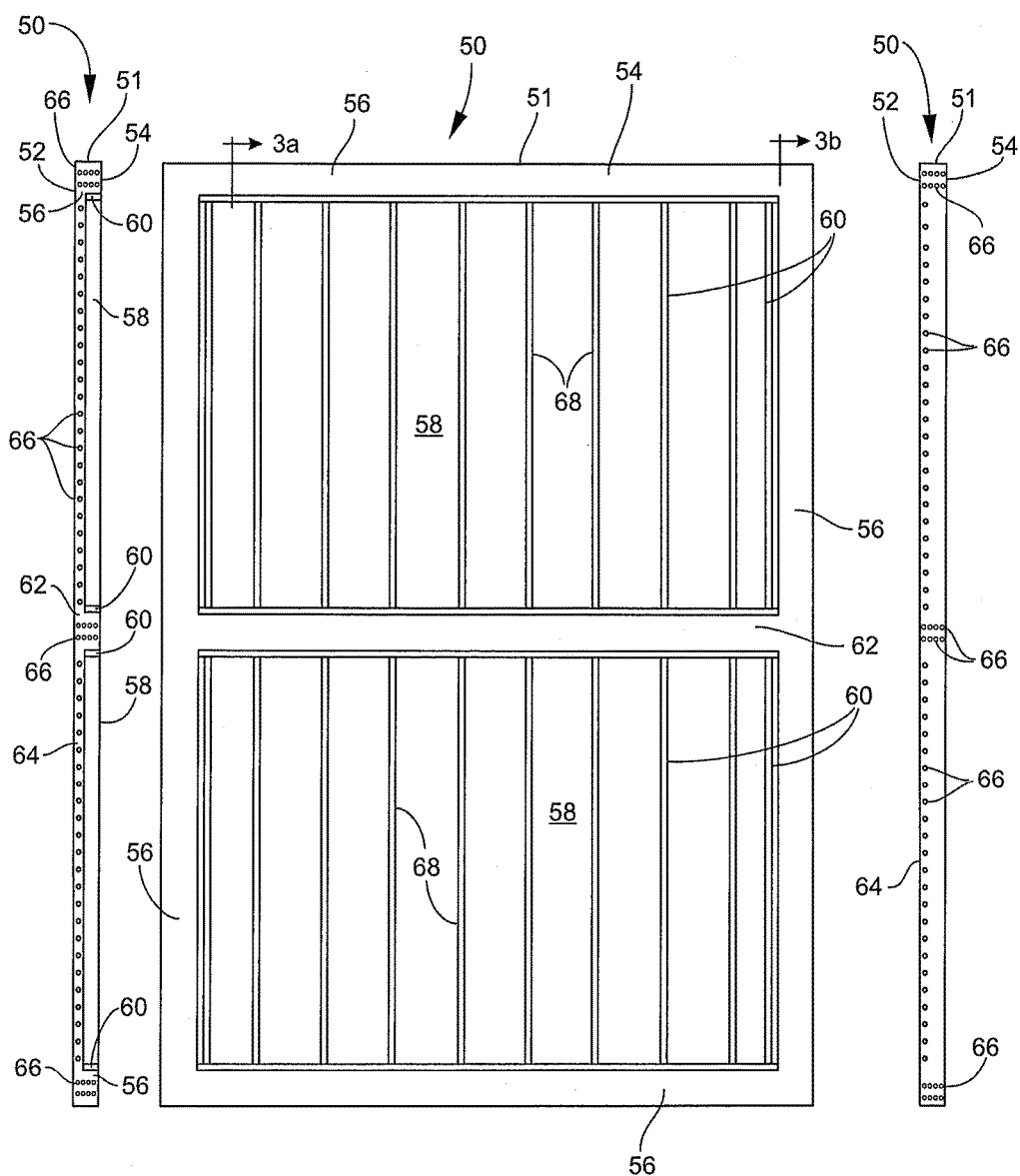


FIG. 3A

FIG. 3

FIG. 3B

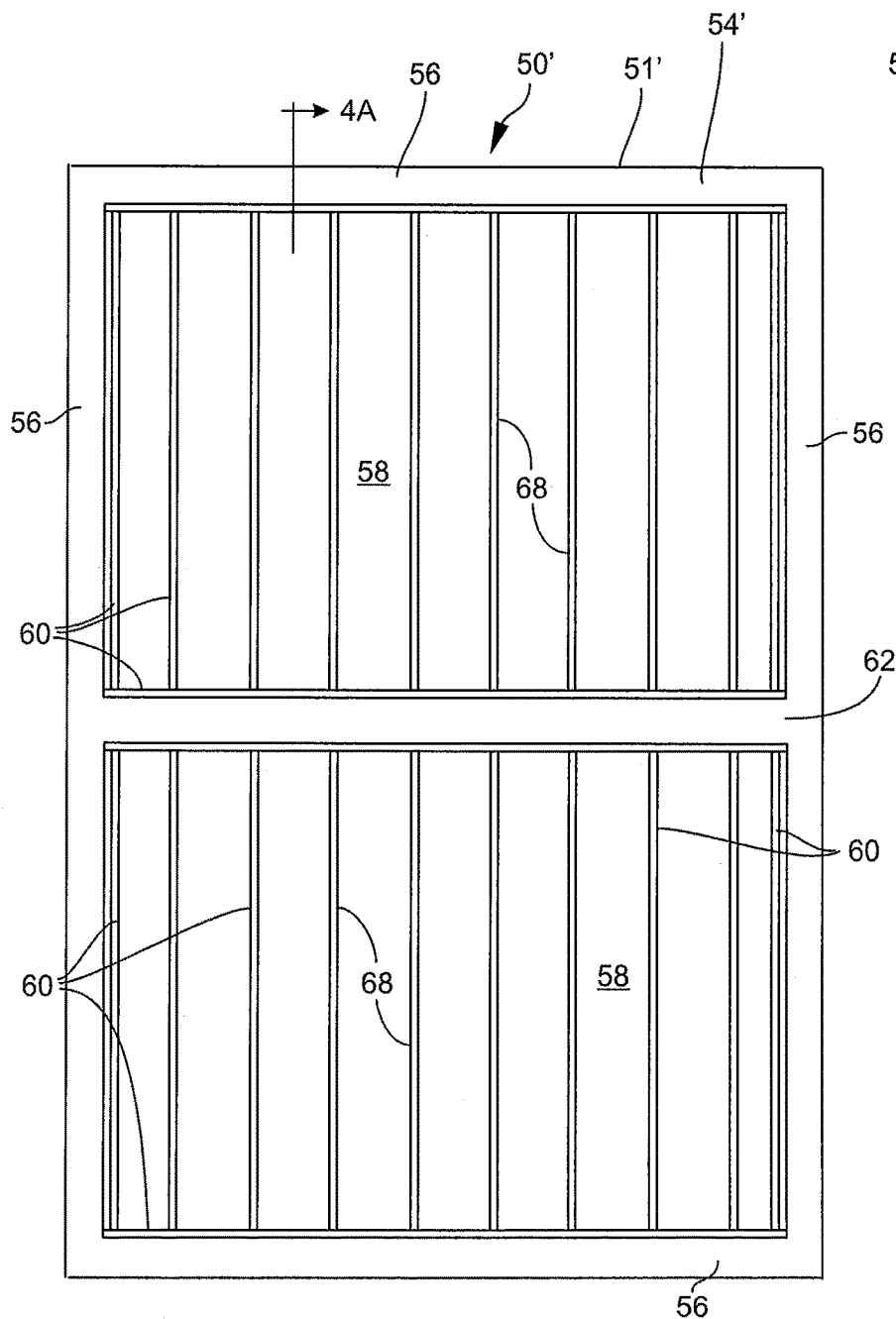


FIG. 4

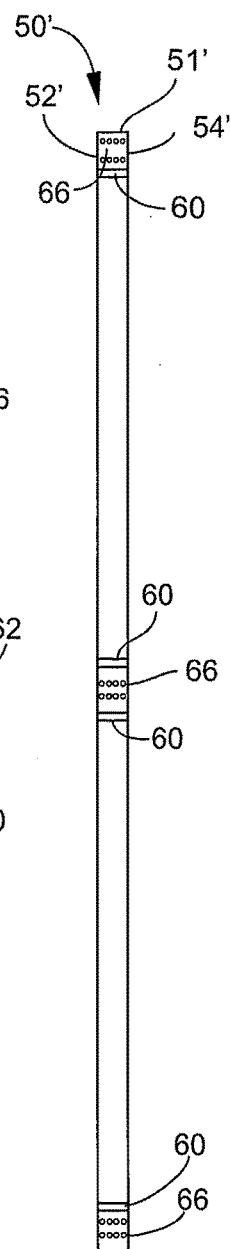


FIG. 4A

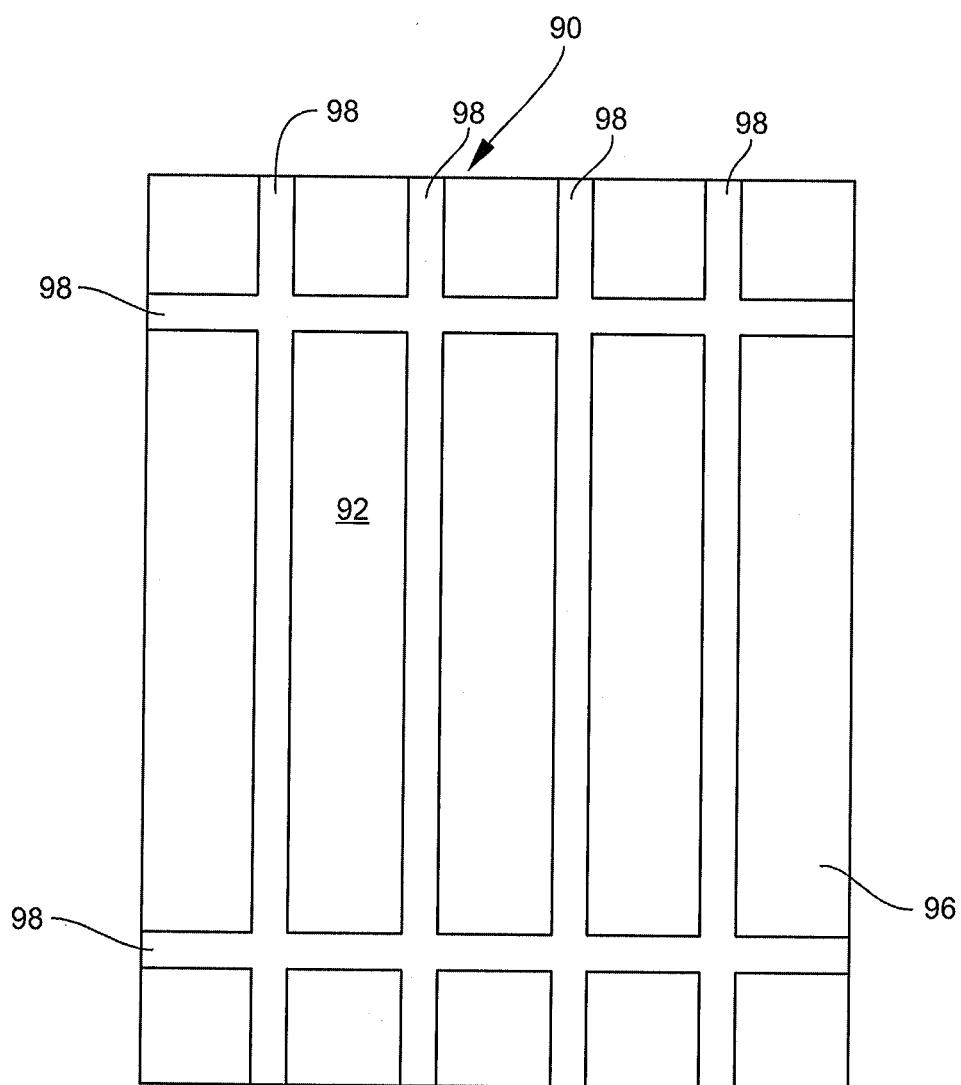


FIG. 5B

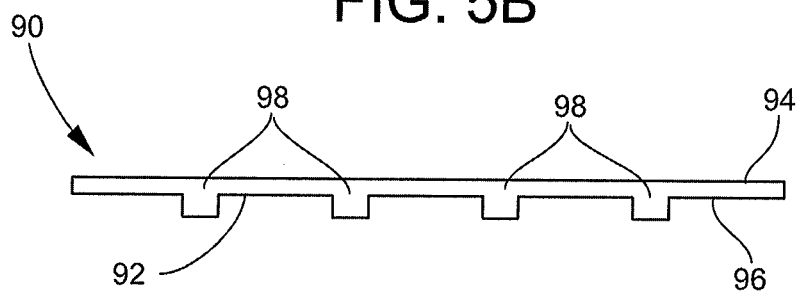


FIG. 5A

CEMENTITIOUS BUILDING PANEL

RELATED APPLICATION

[0001] This application claims the benefit of co-pending U.S. Provisional Application No. 62/629,760 filed Feb. 13, 2018, incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention is directed to building panels used in building construction.

BACKGROUND OF THE INVENTION

[0003] In an effort to reduce building costs, builders are considering modular (or prefabricated) components. Such modular components are manufactured away from the building site, and are then assembled at the building site. The use of such modular components may be used to assemble a building at a lower cost than a 'stick-built' structure.

[0004] There is a need for new modular (or prefabricated) building components.

SUMMARY OF THE INVENTION

[0005] A building component includes: a monolithic cementitious panel with a front face and a rear face, and peripheral frame members; the rear face has an open cavity, the peripheral frame members define a periphery of the cavity; and a frame fits into and is secured along the periphery of the cavity.

DESCRIPTION OF THE DRAWINGS

[0006] For the purpose of illustrating the invention, there is shown in the drawings a form that is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

[0007] FIG. 1 is a view of the inventive building component on a front face of a building with a side of the building open or exposed or without any covering for clarity and illustration.

[0008] FIG. 2 is another view of the inventive building panel shown in FIG. 1 with the front face of the inventive component broken away (or removed) for clarity and illustration.

[0009] FIG. 3, FIG. 3A, and FIG. 3B illustrate an embodiment of the inventive building panel, e.g., a wall component.

[0010] FIG. 4 and FIG. 4A illustrate another embodiment of the inventive building panel, e.g., a floor component.

[0011] FIG. 5A and FIG. 5B illustrate yet another embodiment of the inventive building panel, e.g., a roof component.

DESCRIPTION OF THE INVENTION

[0012] Referring to the drawings, wherein like numerals indicate like components, there is shown, in FIG. 1, a building with a building component on a front face of a building. The building component discussed herein are not limited to any dimensions and may be sized as needed.

[0013] Building, as used herein, refers to any building, for example, a residential building or a commercial building. In some embodiments, the building may be a residential building. A building generally includes: a foundation (or footing),

a framing system built on the foundation (or footing), the framing system has a flooring system, a wall system, and a roofing system.

[0014] FIG. 1 illustrates the use of an inventive building component on a building. This is not the only possible use of the inventive building component discussed hereinafter, as will be evident to those of ordinary skill. Accordingly, the building component is not limited to the use illustrated in FIG. 1. These will be discussed in greater detail after the explanation of the various embodiments below.

[0015] In FIG. 1, building 10 has a foundation (e.g., footer) 12, building component 50 resting on the foundation 12, a flooring system 14 is structurally connected (in FIGS. 1 and 2 note the rows of X's), in any conventional fashion, to building component 50, and a roofing system 16 is structurally supported on the building 10. The side of building 10 has been removed, so that other building systems may be seen in relation to the building component 50. The missing side maybe another building component 50 so that the components 50 surround the exterior face of the building, or the face of the building may be a combination of building components 50 and conventional exterior covering. Multiple building components 50 may be combined along any exterior wall of the building.

[0016] The building component 50 for walls (see FIGS. 2, 3, 3A, and 3B) and floors (see FIGS. 4 and 4A) generally include: a monolithic cementitious panel with a front face and a rear face, and peripheral frame members; the rear face has an open cavity, the peripheral frame members define a periphery of the cavity; and a frame fits into and is secured along the periphery of the cavity. The building component 50 for roofs (see FIGS. 4 and 4A) generally include: a monolithic cementitious panel with a front face and a rear face, and a plurality of ribs on the rear face.

[0017] FIGS. 2, 3, 3A, and 3B illustrate building component 50 used as a wall. The building component 50 used as a wall generally includes: a monolithic cementitious panel 51 with a front (or exterior or first) face 52 and a rear (inward or second) face 54, a peripheral frame member 56, a cavity 58 open at the rear face 54, and a frame 60 fit into and secured along a periphery of the cavity 58. The peripheral frame member 56 may include vertical members and horizontal members located adjacent a peripheral edge of the panel 51. Additionally, panel 51 may include a cross-member 62. For the wall, panel 51 may have a closed front face 64.

[0018] Monolithic cementitious, as used herein, means that the panel 51 with the peripheral frame members 56, cross member 62, cavity 58, and closed front face are cast is a single pour, as understood by those of ordinary skill. The desired panel 51 is formed and then the cementitious material is added to the form in a single cast or pour. In some embodiments a reinforcing material 66 may be added as is known. Such reinforcing material 66 may be conventional, for example, rebar and/or wire mesh. In some embodiments, the cementitious material may be concrete. The exterior face of the panel may include decorative patterns.

[0019] The cavity 58 is bounded on its peripheral edges by the frame members 56 and, if necessary, by cross-member 62. In the wall, the cavity 58 may be open at the rear face 54 and closed at the front face, compare FIGS. 1 and 2. The depth of the cavity 58 is less than the depth or the thickness of the panel 51. In some embodiments, the depth of the cavity is sized to fit dimensional lumber.

[0020] The frame 60 is fit into and secured to the peripheral edge of the cavity 58. The frame 60 may be any conventional framing material. Such materials include, for example, wood (e.g., dimensional lumber, plywood, OSB, engineered lumber and the like), metal, plastic, and/or foam (e.g., structural foam). In one embodiment, the frame 60 surrounds the cavity. In another embodiment, the frame may be a conventional dimensional lumber. The lumber in contact with the cementitious material may be treated lumber. In addition to the lumber in contact with the cementitious material, studding 68 may be included with the wooden frame. The studding 68 facilitates fastening of interior sheathing (e.g., drywall and/or paneling).

[0021] In some embodiments, holes (not shown) may be included through the frame members, cross-member, and frame. These holes accommodate, for example, the electrical service and/or plumbing services and/or communication services, and/or the like. These holes are generally parallel to the panel faces.

[0022] FIGS. 4 and 4A illustrate building component 50' used as a floor. The building component 50' used as a floor generally includes: a monolithic cementitious panel 51' with a top (or first) face 52' and a bottom (or second) face 54', a peripheral frame member 56, a cavity 58 open at the second face 54, and a frame 60 fit into and secured along a periphery of the cavity 58. The peripheral frame member 56 may include vertical members and horizontal members located adjacent a peripheral edge of the panel 51'. Additionally, panel 51' may include a cross-member 62. For the floor, the cavity 58 of panel 51' may open at both the first and second faces.

[0023] Monolithic cementitious, as used herein, means that the panel 51' with the peripheral frame members 56, cross member 62, and cavity 58 are cast as a single pour, as understood by those of ordinary skill. The desired panel 51' is formed and then the cementitious material is added to the form in a single cast or pour. In some embodiments a reinforcing material 66 may be added as is known. Such reinforcing material 66 may be conventional, for example, rebar and/or wire mesh. In some embodiments, the cementitious material may be concrete.

[0024] The cavity 58 is bounded on its peripheral edges by the frame members 56 and, if necessary, by cross-member 62. In the floor, the cavity 58 may be open at the first and second faces. In some embodiments, the depth of the cavity is sized to fit dimensional lumber.

[0025] The frame 60 is fit into and secured to the peripheral edge of the cavity 58. The frame 60 may be any conventional framing material. Such materials include, for example, wood (e.g., dimensional lumber, plywood, OSB, engineered lumber and the like), metal, plastic, and/or foam (e.g., structural foam). In one embodiment, the wooden frame surrounds the cavity. In another embodiment, the frame may be a conventional dimensional lumber. The lumber in contact with the cementitious material may be treated lumber. In addition to the lumber in contact with the cementitious material, studding 68 may be included with the wooden frame. The studding 68 facilitates fastening of interior sheathing (e.g., drywall and/or paneling). In the floor, the studding may be referred to as joists.

[0026] In some embodiments, holes (not shown) may be included through the frame members, cross-member, and frame. These holes accommodate, for example, the electrical

service and/or plumbing services and/or communication services, and/or the like. These holes are generally parallel to the panel faces.

[0027] When building component 50' is used as a floor member, the top (or first) face (or surface) may be covered with conventional sub-flooring.

[0028] FIGS. 5A and 5B illustrate building component 90 used as a roof component. Building component 90 generally includes: a monolithic cementitious panel 92 with a first (or top) face 94 and a second (or bottom) face 96, and having a plurality of ribs 98 on the second face. The ribs 98 may run in the length and width direction.

[0029] Monolithic cementitious, as used herein, means that the panel 92 with the ribs 98 and the panel interlocking system 100, 102 are cast as a single pour, as understood by those of ordinary skill. The desired panel 92 is formed and then the cementitious material is added to the form in a single cast or pour. In some embodiments a reinforcing material 66 (not shown) may be added as is known. Such reinforcing material 66 may be conventional, for example, rebar and/or wire mesh. In some embodiments, the cementitious material may be concrete.

[0030] In use and referring to FIG. 1, the foregoing building components, wall component 50, floor component 50', and roof component 90 may be used in any combination to assemble the building. For example, as illustrated in FIGS. 1 and 2, only the wall component 50 is used. However, the conventional flooring system and roof system may be replaced with the foregoing inventive panels. Moreover, note in FIGS. 1 and 2 that a rough opening 200 has been formed into the panel. Rough openings may be, for example, for doors, windows, stairwells, and chimneys. Moreover, the panels may be sized for any size building. For example, FIG. 1 shows a two-story building with a crawl space. FIG. 3 illustrates a single-story panel with two cavities.

[0031] The present invention may be embodied in other forms without departing from the spirit and the essential attributes thereof, and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

I claim:

1. A building component comprises:

a monolithic cementitious panel with a first face and a second face, and includes peripheral frame members; the second face has an open cavity, the peripheral frame members define a periphery of the cavity; and a frame fits into and is secured along the periphery of the cavity.

2. The building component of claim 1 wherein the frame is a wooden frame.

3. The building component of claim 1 wherein the peripheral frame members of the monolithic cementitious panel further comprises a cross member interconnecting the some of the peripheral frame members.

4. The building component of claim 1 wherein the building component is a wall component and the first face further comprises a cementitious face integral with the peripheral frame members and defining a bottom of the cavity on the second face.

5. The building component of claim 1 wherein the building component is a floor component and the cavity is open through the first face.

6. The building component of claim 1 further comprises the peripheral frame members has at least one-hole therethrough and the hole is generally parallel to the first face, the hole is adapted for the passage of electrical and/or plumbing components.

7. The building component of claim 3 further comprising the cross member has at least one-hole therethrough and the hole is generally parallel to the first face, the hole is adapted for the passage of electrical and/or plumbing components.

8. The building component of claim 1 further comprising a reinforcement material located within the peripheral frame members.

9. The building component of claim 3 further comprising a reinforcement material located within the cross member.

10. A building made with the building component of claim 1.

11. A building made the building component of the claim 3.

12. A building component comprises:

a reinforced monolithic cementitious panel with a first face and a second face, and includes peripheral frame members and a cross member interconnecting the some of the peripheral frame members, and the peripheral frame members and/or the cross member include at least one-hole therethrough, the hole is generally par-

allel to the first face, and the hole is adapted for the passage of electrical and/or plumbing components; the second face has an open cavity, the peripheral frame members define a periphery of the cavity; and a wooden frame fits into and is secured along the periphery of the cavity.

13. The building component of claim 12 wherein the building component is a wall component and the front face further comprises a cementitious face integral with the peripheral frame members and the cross member and defining a bottom of the cavity on the second face.

14. A building made with the building component of claim 12.

15. A building component comprises:

a monolithic cementitious panel with a first face and a second face, and

a plurality of ribs on the second face.

16. The building component of claim 15 wherein the plurality of ribs include ribs disposed at angles to one another.

17. The building component of claim 15 wherein the building component is a roof component.

18. A building made with the building component of claim 15.

* * * * *