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Structural panel

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(56) Related Art
NO 20161845 A1
WO 1997/035078 A2
RU 67136 U1
ES 2246667 A1
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US 2004/0065034 A1

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Abstract

A building panel is formed with at least one concrete outer skin and an inner core of EPS concrete. A reinforcing mesh includes a panel which locates within the outer skin, and mesh connections which extend in a direction generally perpendicular to the outer skin, passing through the inner core.

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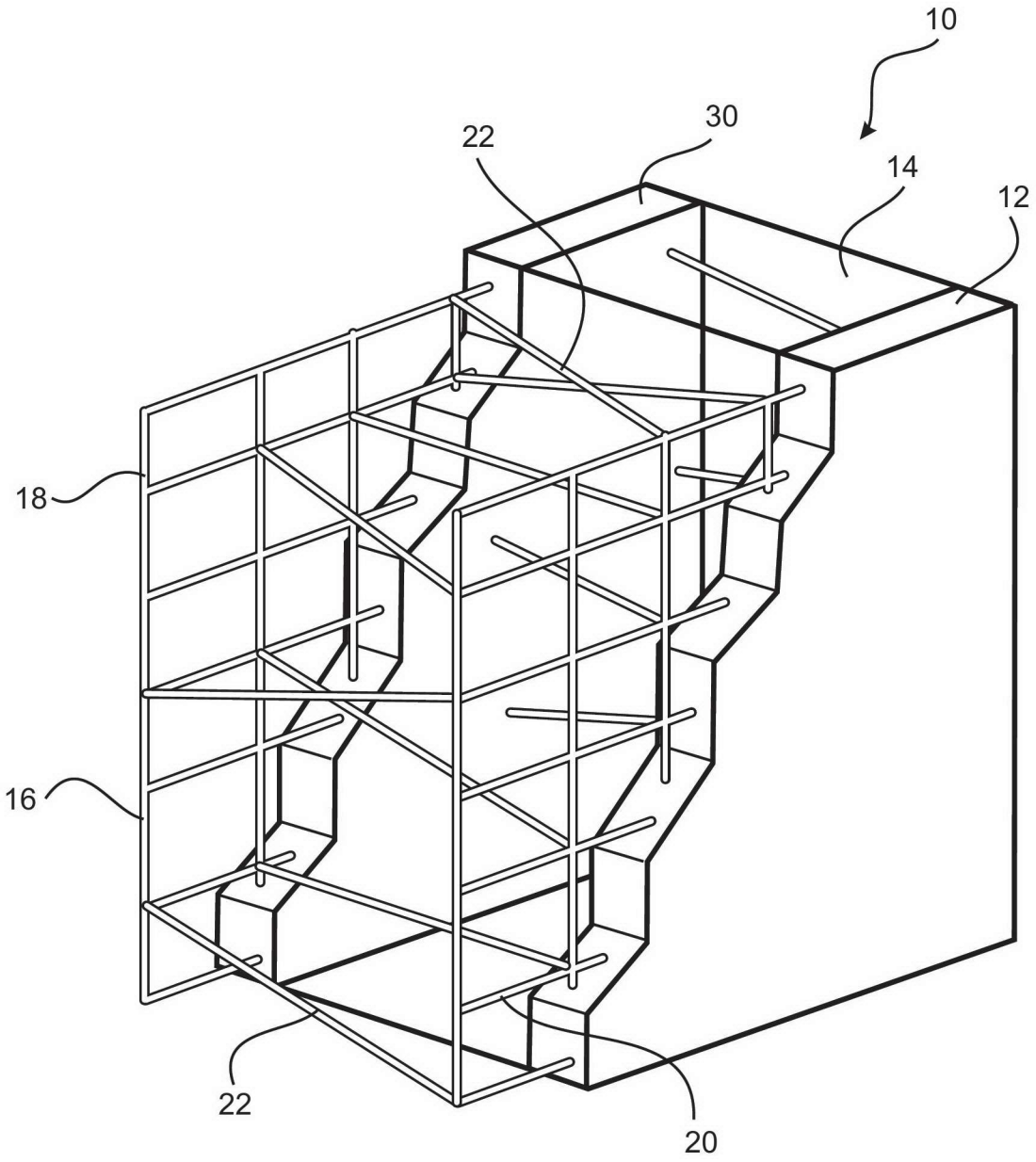

Fig. 2

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AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

Invention title:

"STRUCTURAL PANEL"

Applicant:

MCGRATH, TANIA MARIA

Associated provisional applications:
Provisional patent application number 2018902727 filed 27 July 2018

The following statement is a full description of the invention, including the best method of performing it known to me:

"STRUCTURAL PANEL"

Field of the Invention

[0001] The present invention relates to panels for use in building construction.

Background to the Invention

[0002] Traditional concrete building panels are formed by casting concrete into rectangular panels, with a wire mesh encased within the concrete for purposes of reinforcement.

[0003] More recently, expanded polystyrene (EPS) concrete has been used as a building material. EPS concrete has many desirable qualities, including thermal and sound insulation properties, as well as being significantly lighter in weight than traditional concrete materials.

[0004] EPS concrete has one major disadvantage, however, in that its strength is considerably less than that of traditional concrete panels.

[0005] The present invention seeks to use some of the advantages of EPS concrete while mitigating the disadvantages.

Summary of the Invention

[0006] According to one aspect of the present invention there is provided a building panel having an outer skin, an inner core, and a reinforcing mesh, wherein the reinforcing mesh has a primary portion which extends in a first plane generally parallel to the outer skin, the reinforcing mesh having secondary portions which extend away from the primary portion such that the secondary portions pass through the inner core, the reinforcing mesh having a plurality of angled secondary portions being oriented at an acute angle relative to the primary portion, the plurality of angled secondary portions including a first angled secondary portion which lies in a second plane, the second plane being perpendicular to the first plane, and a second angled secondary portion which lies in a third plane, the third plane being

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perpendicular to the first plane, whereby the second plane and the third plane are not mutually parallel.

[0007] Preferably the inner core includes a matrix of EPS concrete.

[0008] The reinforcing mesh may include two mesh panels which are each generally parallel to the outer skin, the mesh panels being spaced apart, the mesh panels being connected by generally transversely oriented mesh connections.

[0009] It is preferred that the mesh panels are square-holed mesh panels, such as SL72 mesh.

[0010] It is preferred that the transversely oriented mesh connections are arranged at an acute angle relative to the mesh panels. In this way, the mesh connections extend diagonally between the mesh panels. The mesh connections may act with portions of the mesh panels to form a truss.

[0011] Where square-holed or rectangular-holed mesh panels are used, each panel is formed by a set of parallel wires oriented in a first direction, crossed with a set of parallel wires oriented in a second direction perpendicular to the first direction. This provides for an array of crossing points where the wires intersect. It is preferred that each mesh connection extend from a crossing point of a first mesh panel to a crossing point in a second mesh panel. The crossing point of the second mesh panel is preferably offset from the crossing point of the first mesh panel either in the first direction, the second direction, or in both the first and second directions.

[0012] The reinforcing mesh is preferably formed from galvanised steel wire.

[0013] The outer skin is preferably formed from concrete.

[0014] In a preferred embodiment, each mesh panel provides reinforcement to an outer skin and the mesh connections provide reinforcement to the inner core.

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[0015] The building panel may have two outer skins sandwiching the inner core. Alternatively, the building panel may have a single outer skin, with the inner core having an exposed outer face.

Brief Description of the Drawings

[0016] It will be convenient to further describe the invention with reference to preferred embodiments of the present invention. Other embodiments are possible, and consequently the particularity of the following discussion is not to be understood as superseding the generality of the preceding description of the invention. In the drawings:

[0017] Figure 1 is a schematic perspective of a reinforcing mesh for use within a panel in accordance with the present invention;

[0018] Figure 2 is a partially cut-away schematic perspective of a panel in accordance with the present invention, employing the reinforcing mesh of Figure 1;

[0019] Figure 3 is a schematic side view of the panel of Figure 2, with the reinforcing mesh shown in phantom;

[0020] Figure 4 is a schematic side view of the panel of Figure 2, with concrete matrices shown in phantom;

[0021] Figure 5 is a schematic side view of the panel of Figure 2, showing an inner core matrix in place but with outer skins of the panel removed;

[0022] Figure 6 is a schematic perspective of a second embodiment of a panel in accordance with the present invention;

[0023] Figure 7 is a partially cut-away schematic perspective of a third embodiment of a panel in accordance with the present invention;

[0024] Figure 8 is a schematic perspective of a fourth embodiment of a panel in accordance with the present invention; and

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[0025] Figure 9 is a schematic perspective of the panel of Figure 8, with its concrete matrices shown in phantom.

Detailed Description of Preferred Embodiments

[0026] Referring to Figures 1 to 5, there can be seen a building panel 10 having a first outer skin 12. The first outer skin 12 is formed by a generally rectangular concrete panel.

[0027] The building panel 10 has an inner core 14. The inner core 14 is formed of EPS concrete.

[0028] The building panel 10 has a reinforcing mesh 16. The reinforcing mesh 16 has a primary portion consisting of a first mesh panel 18 and a second mesh panel 20. The mesh panels 18, 20 are generally rectangular in shape, and form a standard concrete reinforcement mesh. The first mesh panel extends in a first plane. In the embodiment of drawings, the mesh panels are square-holed mesh panels such as SL72 mesh. The mesh panels 18, 20 are parallel to each other, and are spaced apart by nearly the width of the building panel 10.

[0029] A plurality of secondary portions being mesh connections 22 extend between the first mesh panel 18 and the second mesh panel 20. The mesh connections 22 extend at an acute angle relative to the mesh panels 18, 20.

[0030] Each mesh panel 18, 20 has a plurality of rigid wires 24 oriented in a first direction, and a plurality of rigid wires 26 oriented in a second direction, parallel to the first direction. The two sets of wires intersect to form a square array of intersections 28.

[0031] The mesh connections 22 extend between selected intersections 28 of the first mesh panel 18 and selected intersections 28 of the second mesh panel 20. In general, each mesh connection 22 does not extend between corresponding intersections 28, but rather between intersections which are spaced in at least one of the first and second directions between the panels

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18, 20. The arrangement is such that the mesh connections 22 are not all parallel to each other, but rather create a series of triangular, truss-like connections between the panels 18, 20.

[0032] Some of the mesh connections 22 lie in a second plane, perpendicular to the first mesh panel 18, the second plane extending in a longitudinal direction relative to the first mesh panel 18. Other mesh connections 22 lie in a third plane, perpendicular to the first mesh panel 18, the third plane extending in a transverse direction relative the first mesh panel 18. Still other mesh connections lie in planes perpendicular to the first mesh panel and angled relative to both the second and third planes.

[0033] In the embodiment of the drawings most mesh connections 22 extend from an intersection of the first mesh panel 18 to a location in the second mesh panel20 which is within one intersection in the first and/or second direction of the corresponding intersection.

[0034] The arrangement is such that the first mesh panel 18 provides reinforcement for the first outer skin 12. The second mesh panel 20 may provide reinforcement for a second outer skin 30. The mesh connections 22 provide reinforcement for the inner core 14.

[0035] The mesh connections 22 interact with the mesh panels 18, 20 to form truss-like connections. In this way, load applied to the inner core 14 can be effectively transmitted to the outer skin 12, and distributed through the building panel 10.

[0036] The reinforcing mesh 16 is preferably formed from galvanised steel wire.

[0037] The size and shape of the building panel 10 can be varied without departing from the nature of the invention. Figure 6 shows an alternative building panel 32, having a similar depth to the panel 10 but a much greater width and breadth.

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[0038] Figure 7 shows another alternative building panel 34, having a similar width and breadth to the panel 32 but having a shallower depth, notably by a reduction in the relative size of the inner core 14

[0039] A further alternative building panel 40, being a floor panel, is shown in Figures 8 and 9. In the alternative building panel 40 a single outer skin 12 is employed on a first side of the building panel 40, with a second side of the building panel 40 being formed by an exposed face 42 of the inner core 14. This allows for ready shaping of the exposed face 42, making use of the readily workable property of EPS concrete.

[0040] It will be appreciated that outer skins 12, 30 can be applied to shaped inner cores such as that of the panel 40.

[0041] Modifications and variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

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Claims

1. A building panel having an outer skin, an inner core, and a reinforcing mesh;, wherein the reinforcing mesh has a primary portion which extends in a first plane generally parallel to the outer skin, the reinforcing mesh having secondary portions which extend away from the primary portion such that the secondary portions pass through the inner core, the reinforcing mesh having a plurality of angled secondary portions being oriented at an acute angle relative to the primary portion, the plurality of angled secondary portions including a first angled secondary portion which lies in a second plane, the second plane being perpendicular to the first plane, and a second angled secondary portion which lies in a third plane, the third plane being perpendicular to the first plane, whereby the second plane and the third plane are not mutually parallel, and wherein the first angled secondary portion and the second angled secondary portion are not co-planar.

2. A building panel as claimed in claim 1, wherein the reinforcing mesh is formed from galvanised steel wire.

3. A building panel as claimed in claim 1 or claim 2, wherein the outer skin is formed from concrete.

4. A building panel as claimed in any preceding claim wherein the inner core includes a matrix of EPS concrete.

5. A building panel as claimed in any preceding claim, wherein the reinforcing mesh includes two mesh panels which are each generally parallel to the outer skin, the mesh panels being spaced apart, the mesh panels being connected by generally transversely oriented mesh connections being secondary portions.

6. A building panel as claimed in claim 5, wherein the mesh panels are square-holed or rectangular-holed mesh panels.

7. A building panel as claimed in claim 5 or claim 6, wherein each panel has array of crossing points where constituent wires intersect, and each mesh

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connection extends from a crossing point of a first mesh panel to a crossing point in a second mesh panel.

8. A building panel as claimed in claim 7, wherein the crossing point of the second mesh panel is offset from the crossing point of the first mesh panel either in a direction of one or both of the constituent wires.

9. A building panel as claimed in any one of claims 5 to 8, wherein each mesh panel provides reinforcement to an outer skin and the mesh connections provide reinforcement to the inner core.

10. A building panel as claimed in any preceding claim, wherein the building panel has two outer skins sandwiching the inner core.

11. A building panel as claimed in any one of claims 1 to 9, wherein the building panel has a single outer skin, with the inner core having an exposed outer face.

MCGRATH, TANIA MARIA
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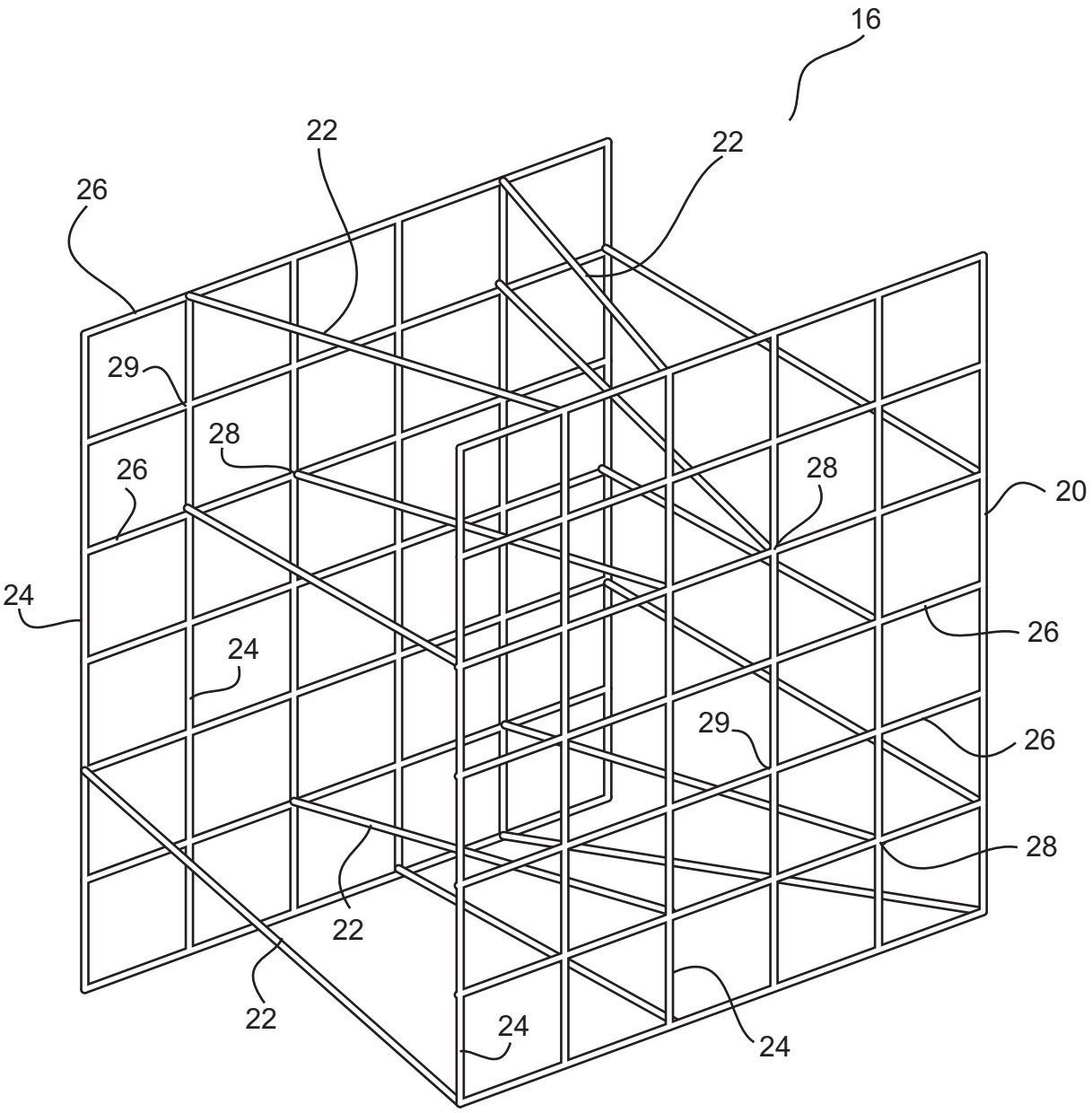

Fig. 1

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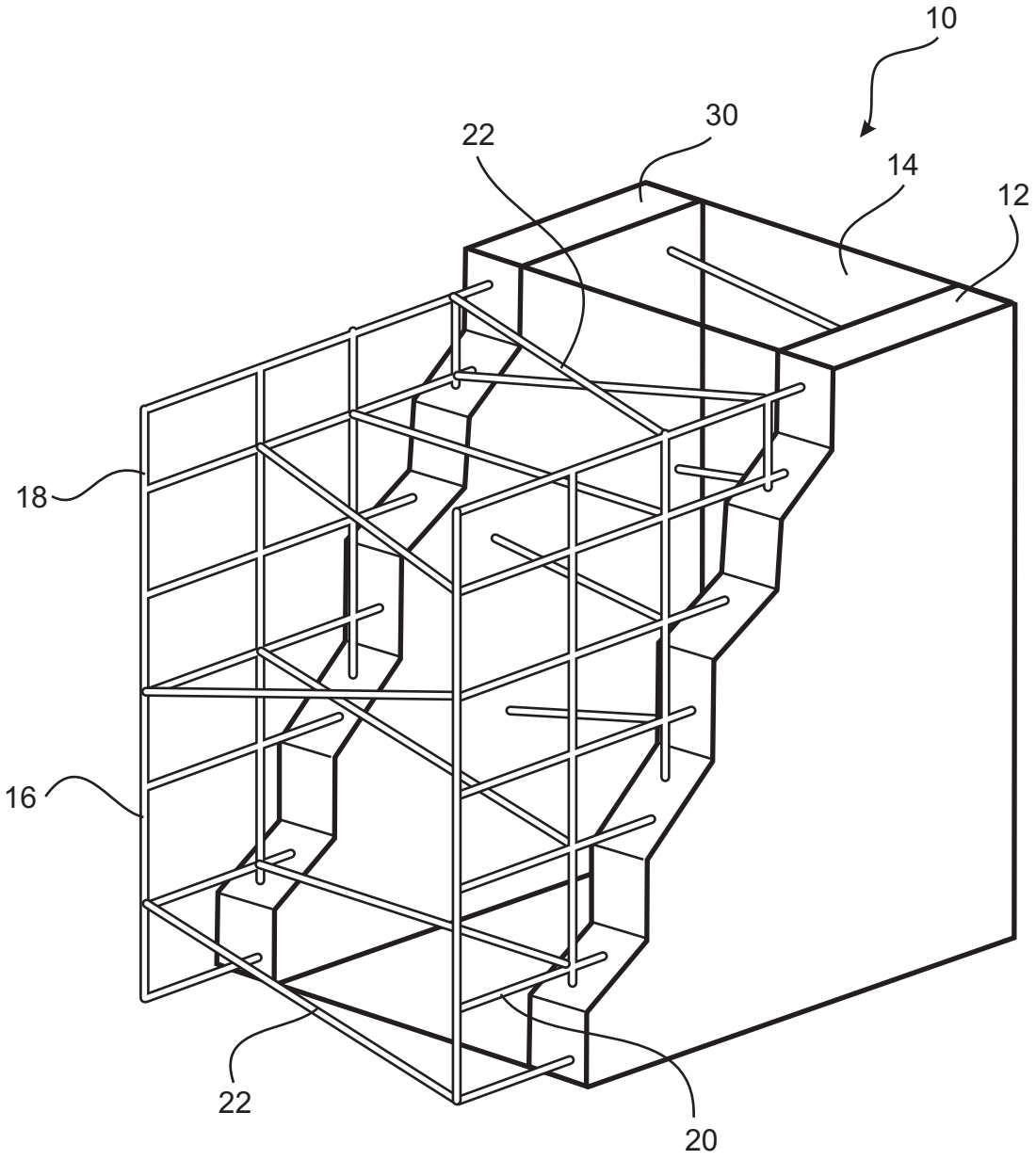

Fig. 2

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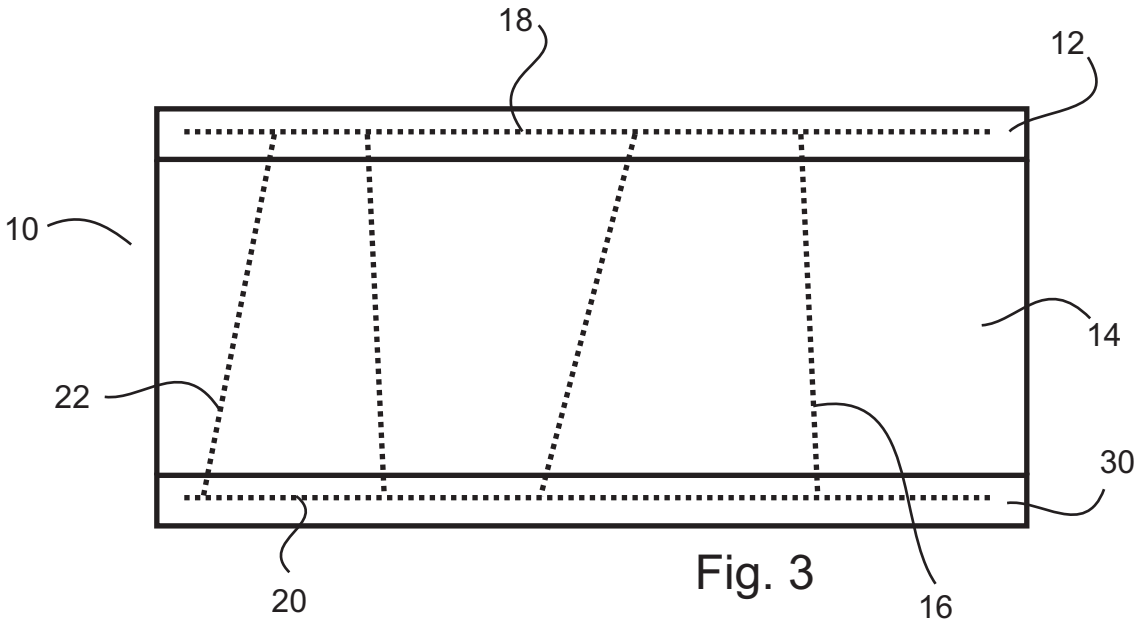

Fig. 3

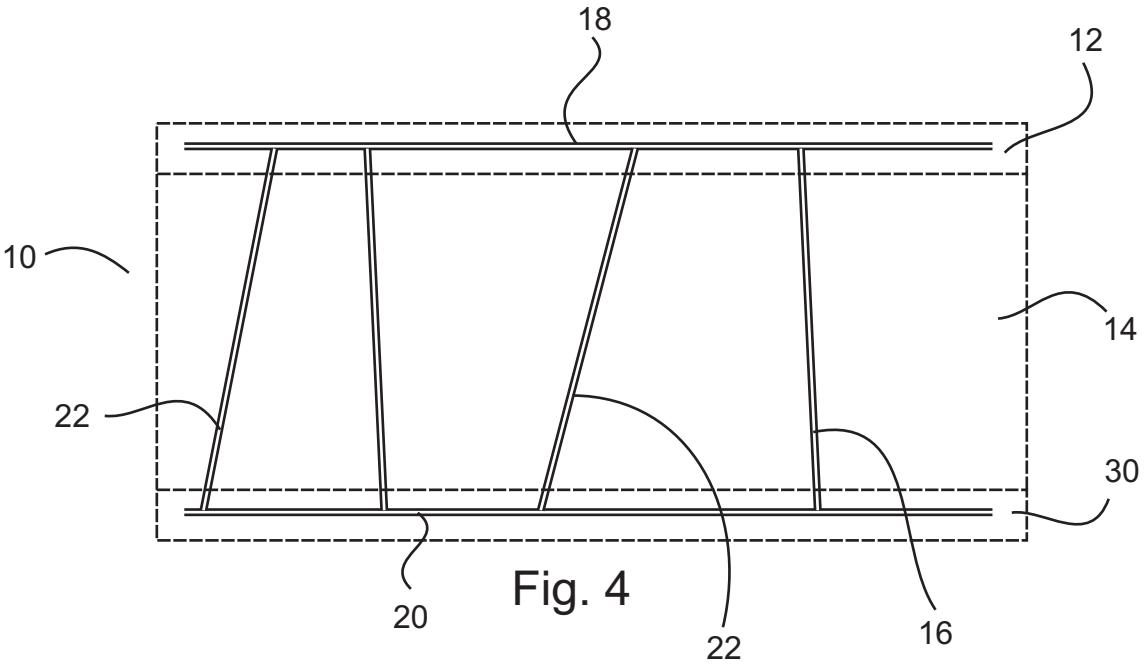

Fig. 4

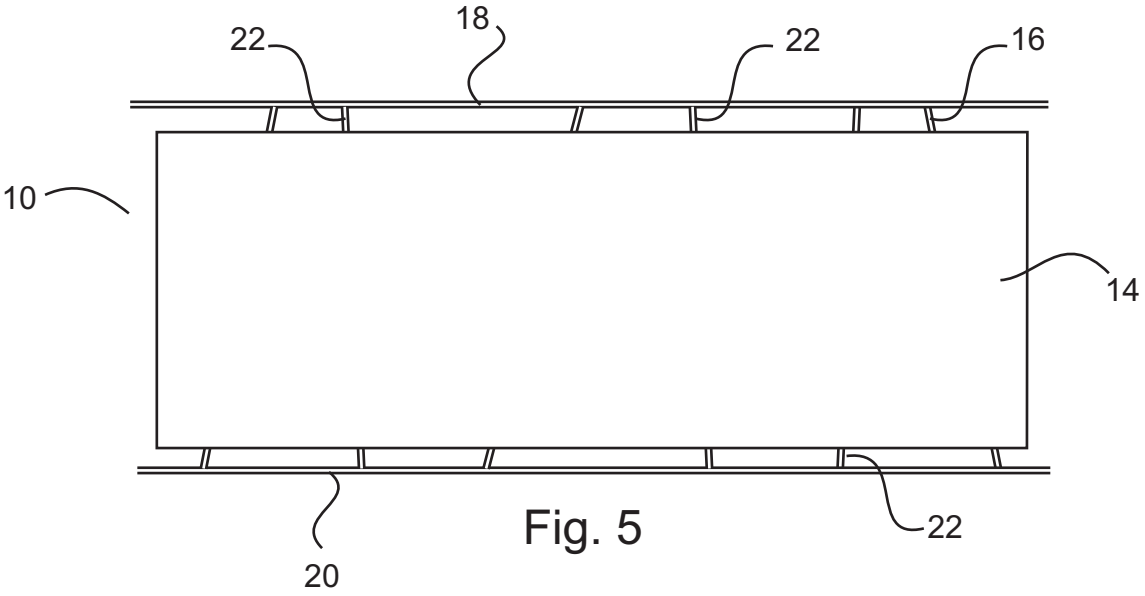

Fig. 5

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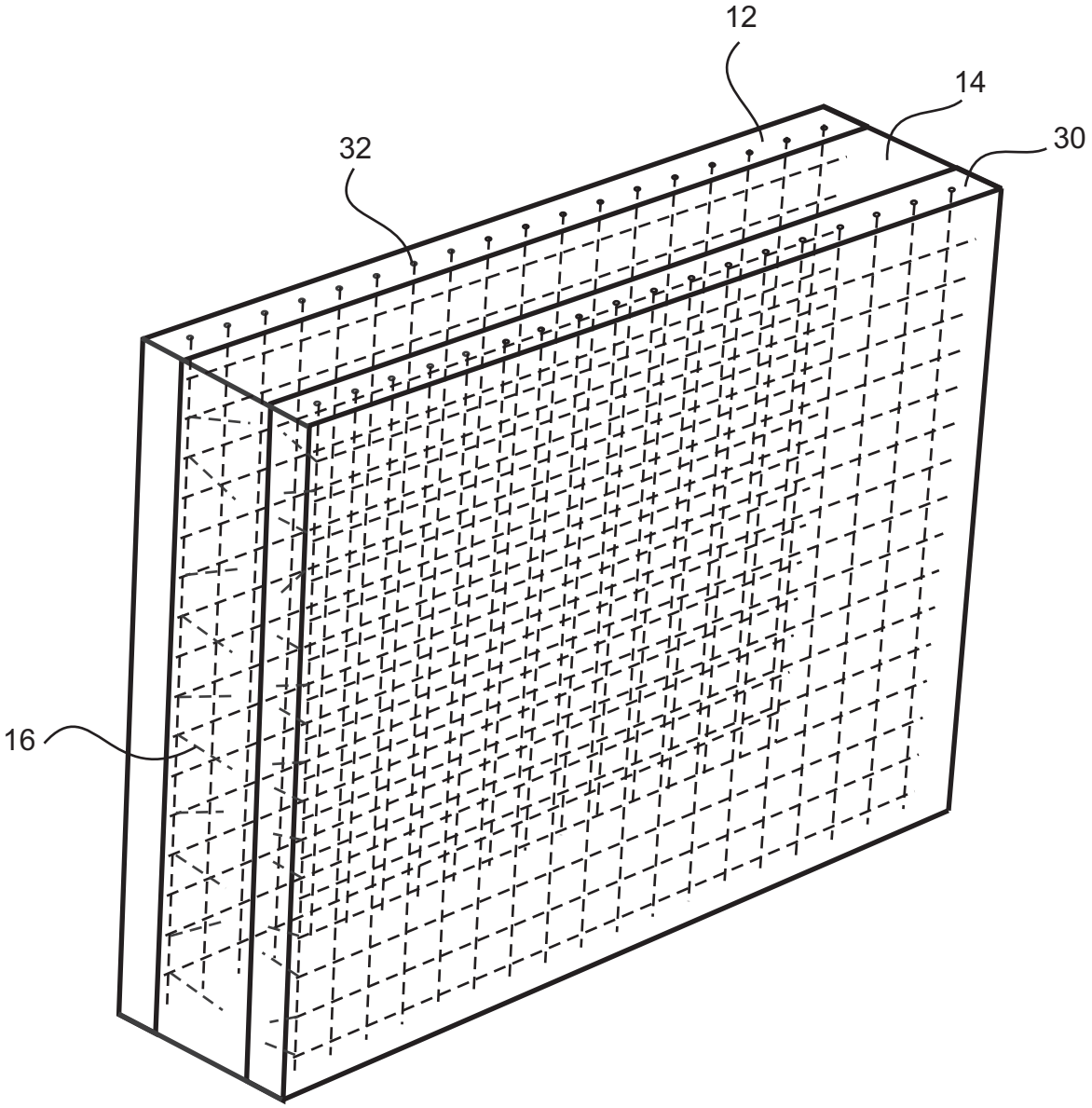

Fig. 6

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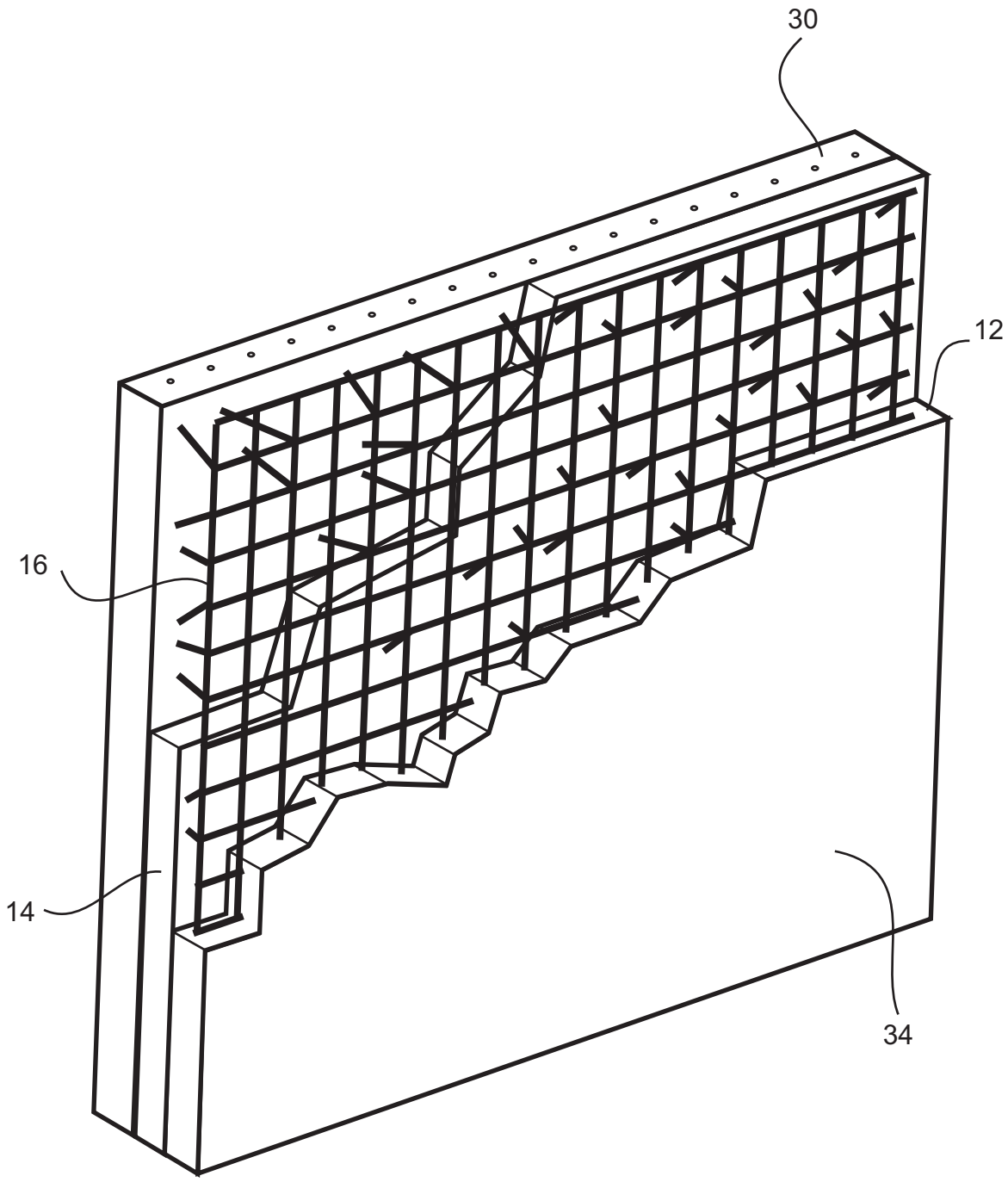

Fig. 7

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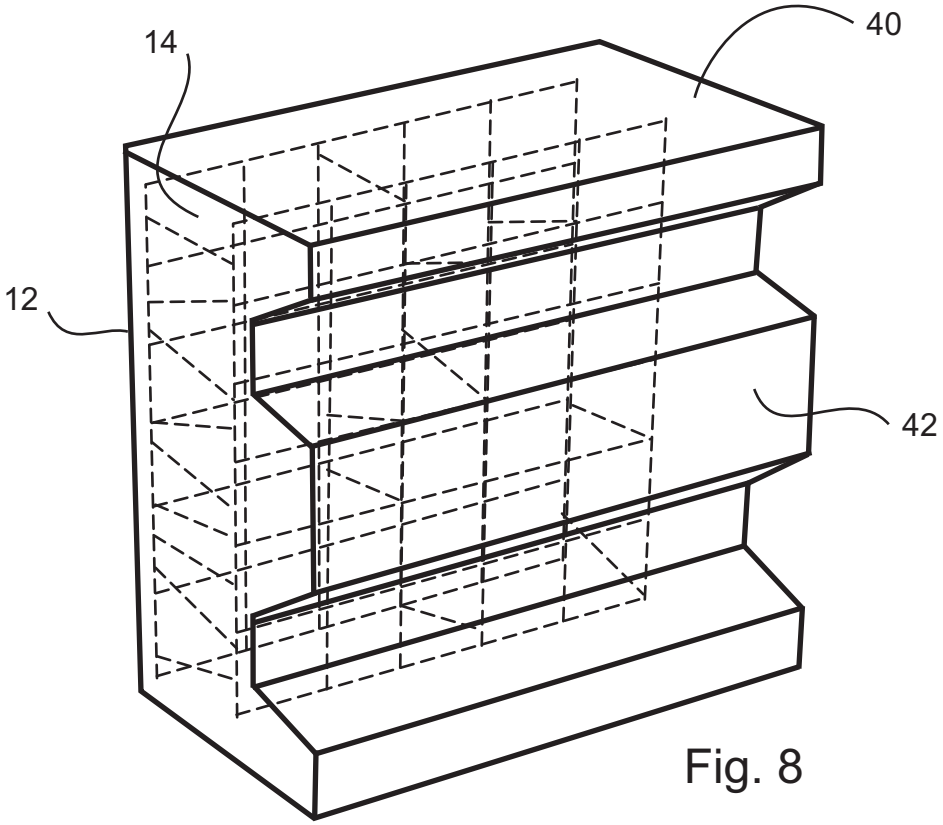

Fig. 8

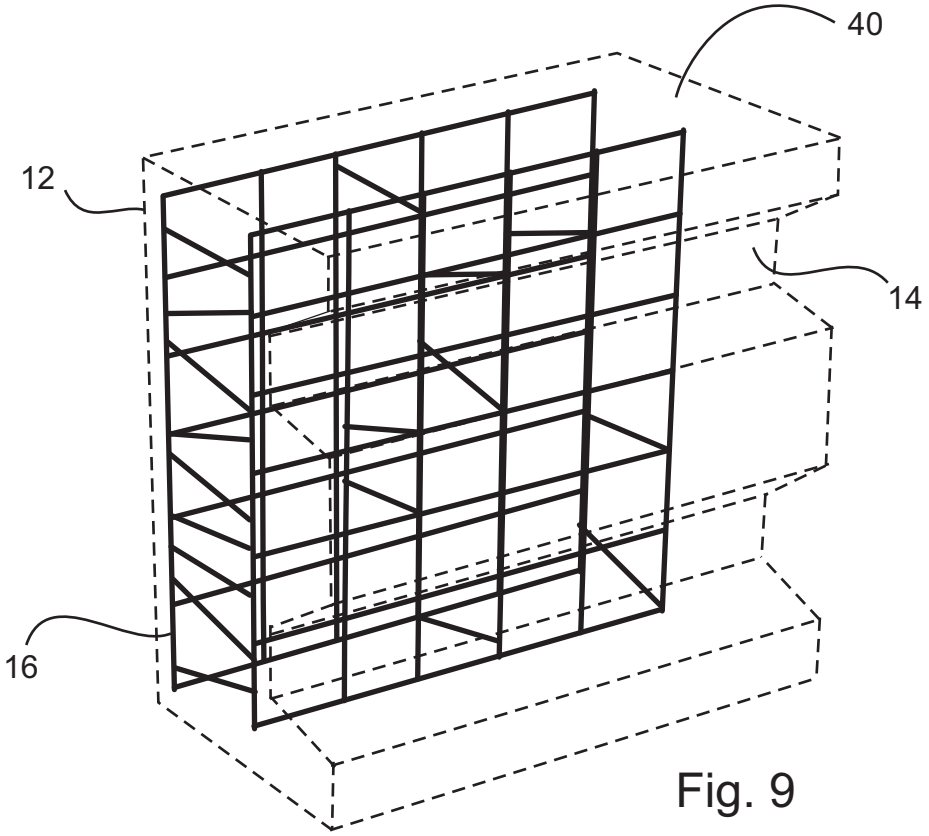

Fig. 9