

(19)



(11)

**EP 4 488 475 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**08.01.2025 Bulletin 2025/02**

(51) International Patent Classification (IPC):  
**E04G 13/00 (2006.01) E04B 1/16 (2006.01)**  
**E04B 2/86 (2006.01)**

(21) Application number: **24186684.7**

(52) Cooperative Patent Classification (CPC):  
**E04G 13/00; E04B 1/161; E04B 2/8635**

(22) Date of filing: **04.07.2024**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA**  
Designated Validation States:  
**GE KH MA MD TN**

(71) Applicant: **Landau, Avraham Beit Shemesh (IL)**

(72) Inventor: **Landau, Avraham Beit Shemesh (IL)**

(74) Representative: **Kancelaria Eupatent.pl Sp. z.o.o Ul. Kilinskiego 185 90-348 Lodz (PL)**

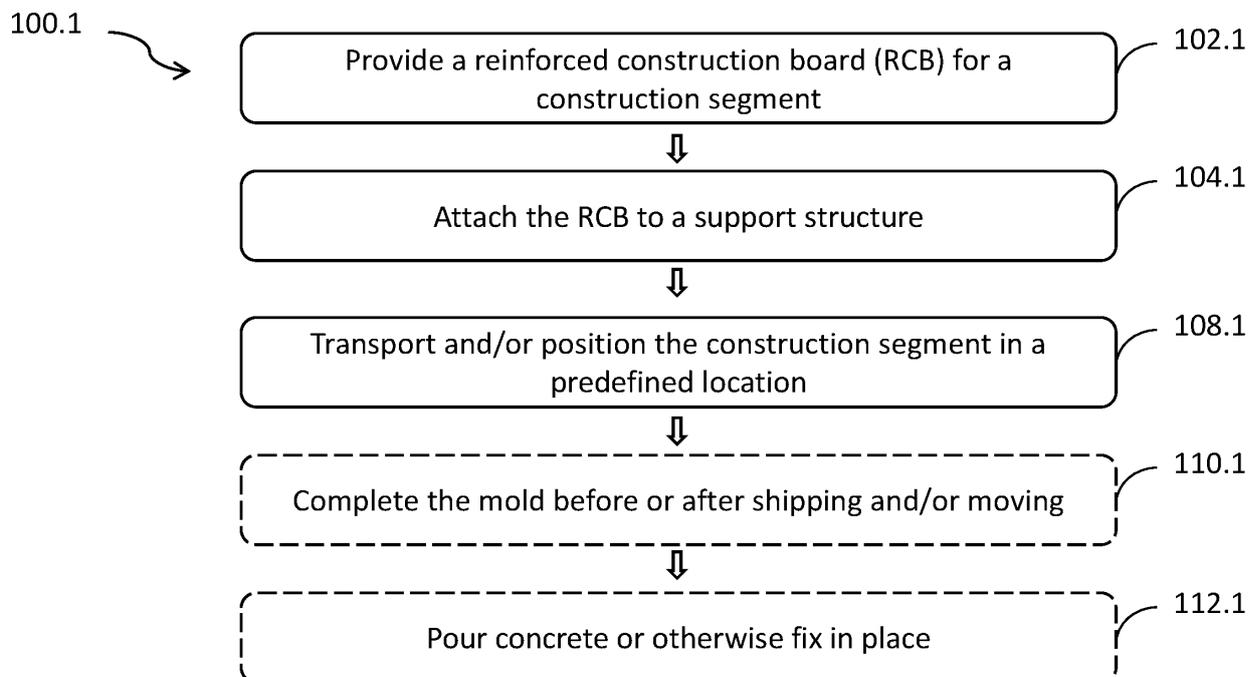
(30) Priority: **05.07.2023 US 202363524941 P**

(54) **CONSTRUCTION METHOD**

(57) A system and method of construction, including: preparing a construction segment by: providing first reinforced construction board (RCB) and a support struc-

ture, and attaching the RCB to a first side of the support structure; and moving the construction segment to a predefined location.

**FIG. 1A**



**EP 4 488 475 A1**

FIG. 1B

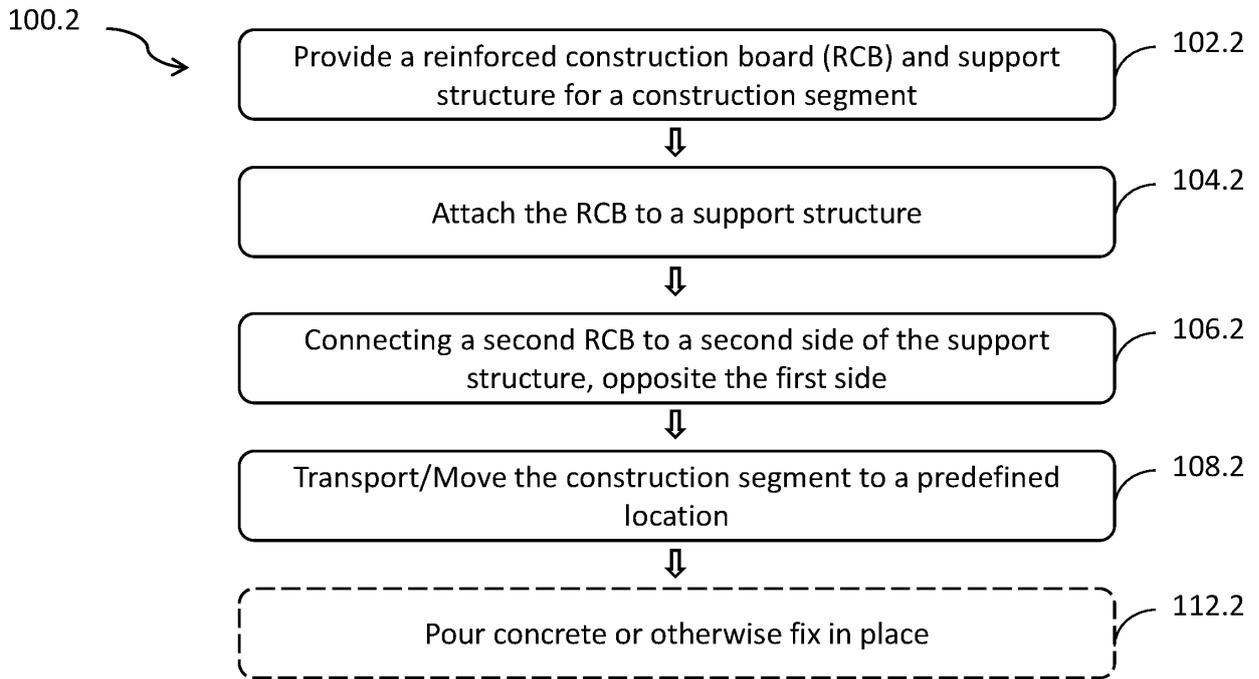


FIG. 1C

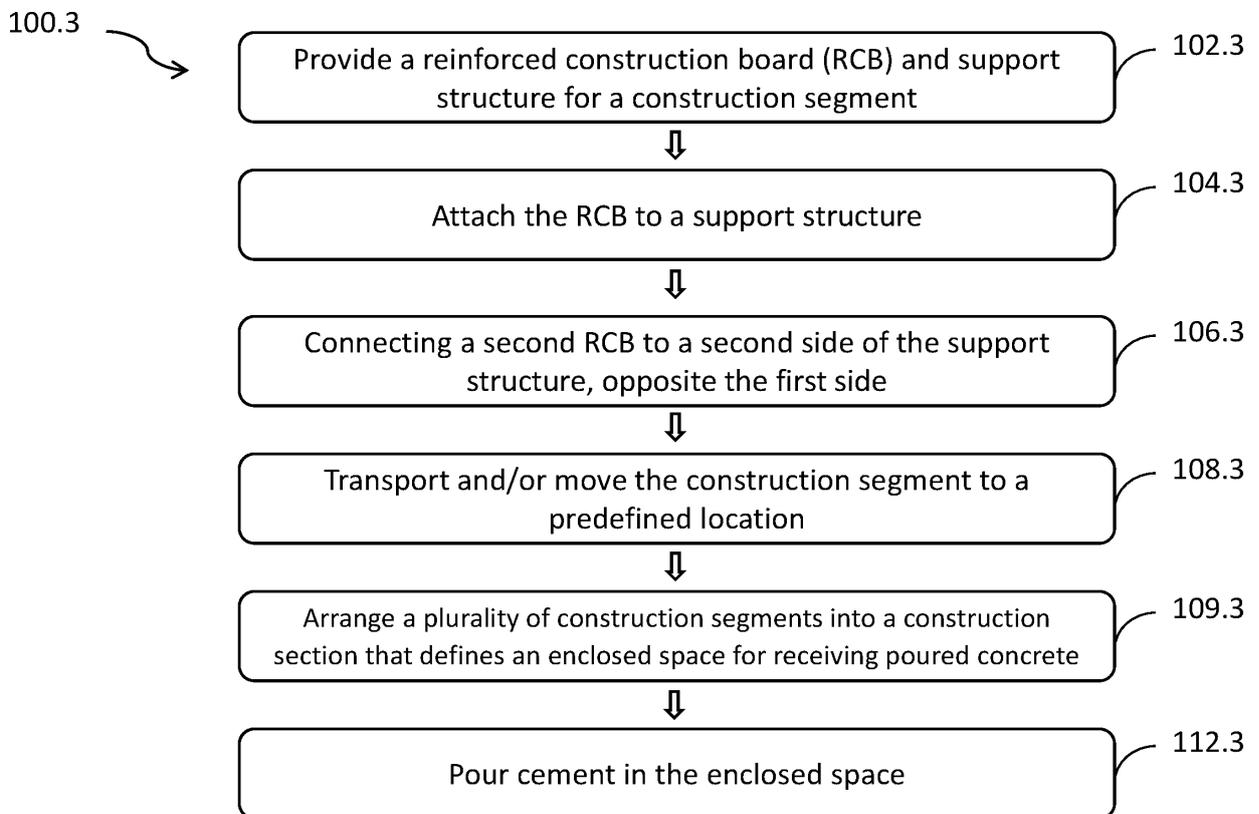


FIG. 1D

100.4

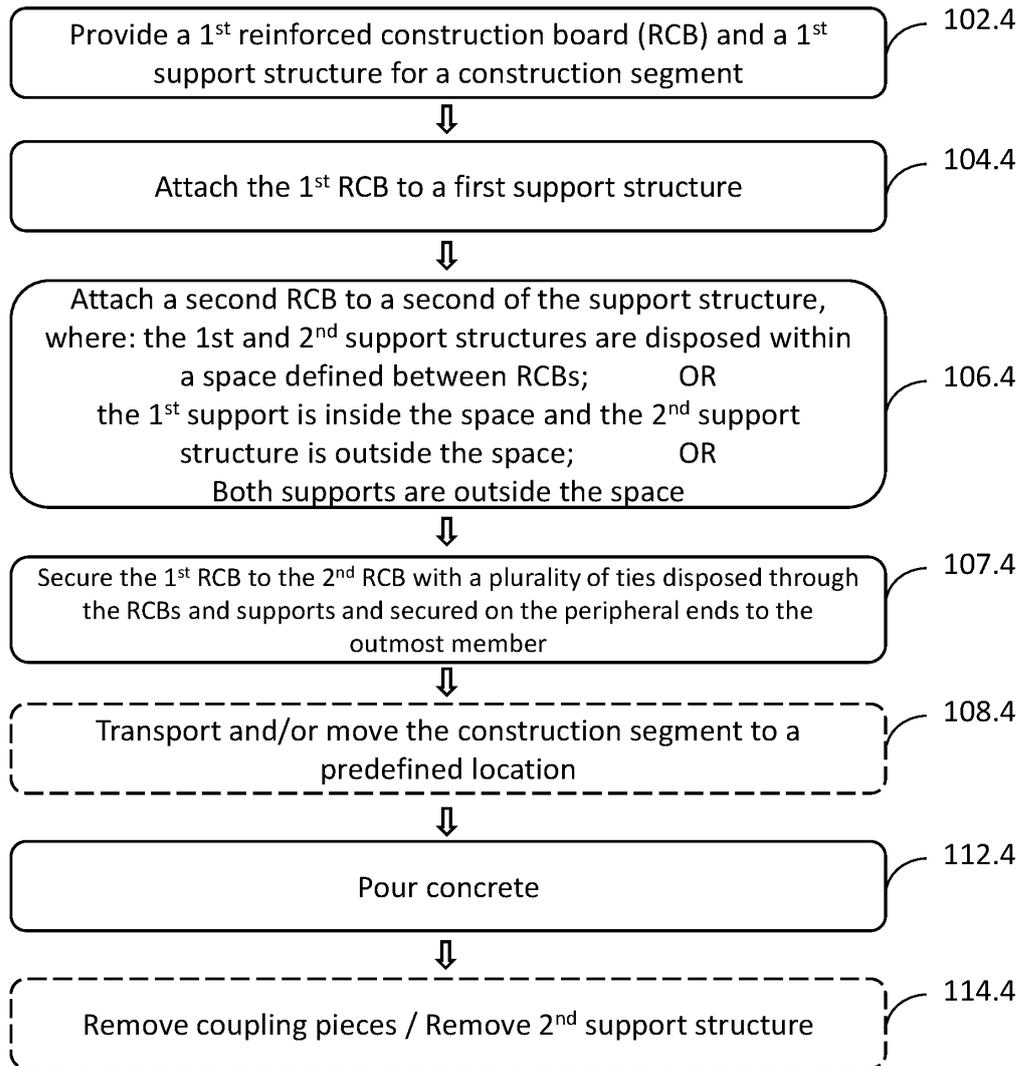


FIG. 1E

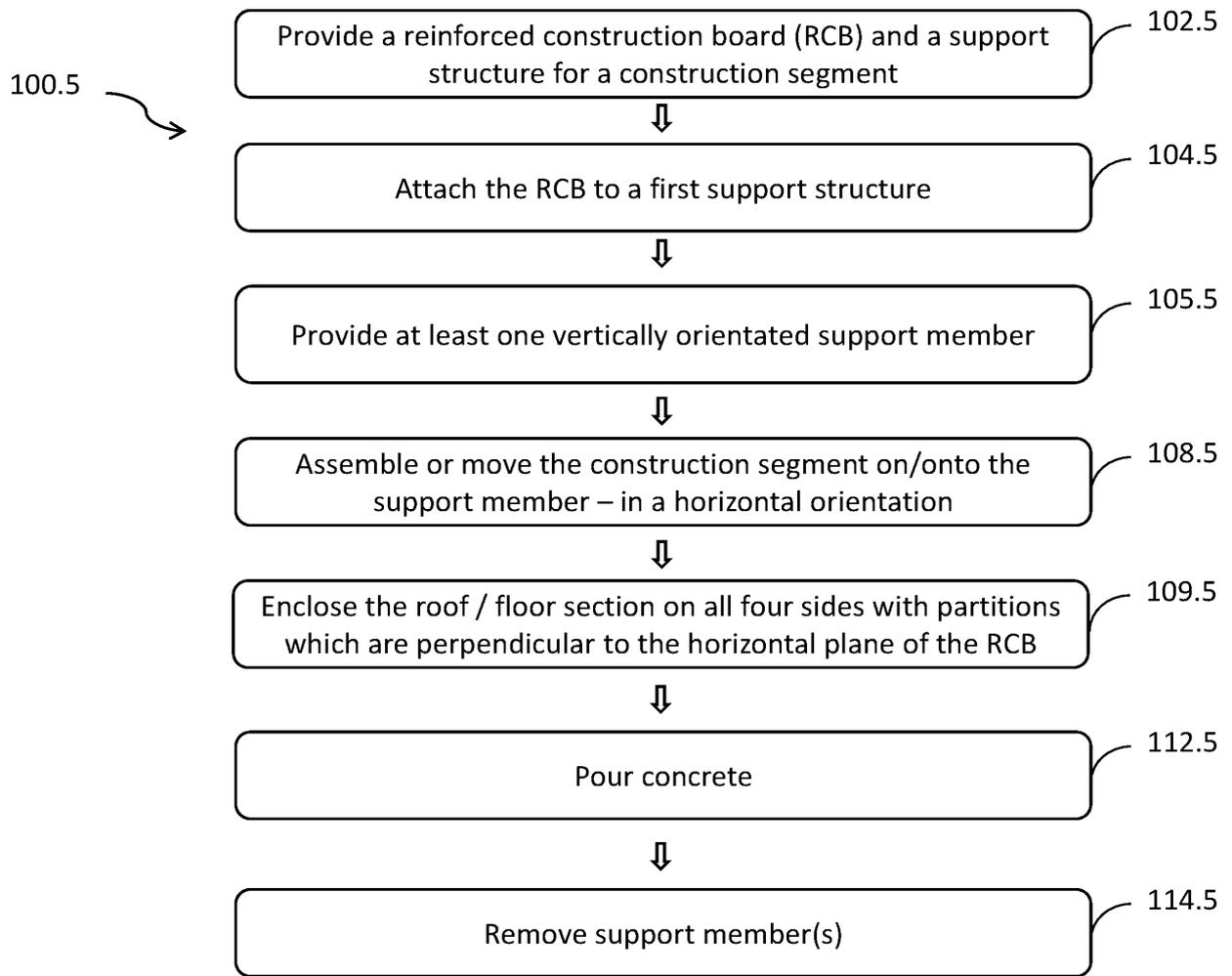
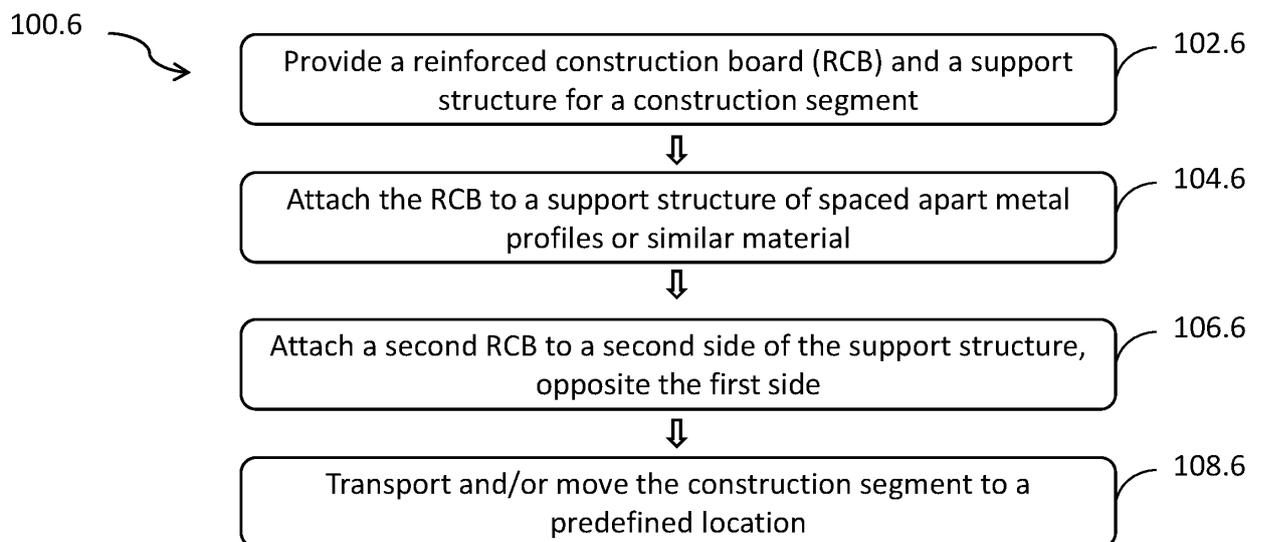


FIG. 1F



## Description

**[0001]** This patent application claims priority from, and the benefit of, U. S. Provisional Patent Application No. 63/524,941, filed July 5, 2023, which is incorporated in its entirety as if fully set forth herein.

### FIELD OF THE INVENTION

**[0002]** The present invention relates to the field of construction methods, and more particularly to the field of prefabricated cast molds.

### BACKGROUND OF THE INVENTION

**[0003]** Construction techniques known in the market typically use building of building molds for preparation before concrete cast. The production of cast-in-place (CIP) concrete walls involves casting concrete and a mix of aggregates into a mold at the worksite. Building such molds is labor intensive, time consuming, and results in a lot of waste and dirt on the building site. The mold first needs to be built and then, after the cement has been poured, dismantled. Building the mold, or formwork, entails assembling wooden or metal boards which by lining then up in the shape of the cement wall and securing the boards on the outside with two-by-fours which themselves are held in place by nails and/or various accessories. Ties are disposed between the boards to "hold" the concrete. These are complex construction sub-projects in and of themselves and much time and resources are used on these sub-projects. Moreover, once the cement is poured and dried, these complex formworks need to be dismantled and stored for the next sub-project or removed from the site. There is a lot of wear-and-tear on the lumber and cast boards, some of which cannot be reused after one or more uses.

**[0004]** After dismantling the molds, the cast wall has to be cleaned from all the ends of the steel wires that were used for holding the wooden or steel panels together. Then, the wall has to be plastered to receive an even, flat, and smooth surface. These smooth surfaces are then ready for receiving paint or siding and the like. When dealing with construction projects that area taller than the average person, any work that is done on the external walls, and sometimes on the internal walls, scaffolding has to be erected around the building in order to plaster and then adorn the external walls with facade materials and finishes. Each of these steps is extremely labor intensive. Furthermore, the lumber, plywood, nails, ties and other accessories used in the art are expensive and need much care for repeat use.

### SUMMARY OF THE INVENTION

**[0005]** According to the present invention there is provided a method of construction, including: preparing a construction segment by: providing first reinforced con-

struction board (RCB) and a support structure, and attaching the RCB to a first side of the support structure; and moving the construction segment to a predefined location.

**[0006]** According to further features in preferred embodiments the first RCB is adapted to form at least part of a formwork for receiving poured concrete, and after the poured concrete has dried serving as a finishing material for the poured concrete. According to still further features the first RCB is a finishing material or is adapted to support a finishing material.

**[0007]** According to still further features the method further includes connecting a second reinforced construction board (RCB) to a second side of the support structure, the second side being opposite the first side. According to further features the first RCB and the second RCB define therebetween a space for receiving poured concrete.

**[0008]** According to still further features the method further includes arranging a plurality of construction segments into a construction section that defines a contiguous space for receiving poured concrete; enclosing the construction section while leaving open a top side thereof; and inserting a building preparation in the contiguous space.

**[0009]** According to still further features the method further includes arranging a plurality of construction segments into a construction section that defines a contiguous space for receiving poured concrete; enclosing the construction section while leaving open a top side thereof; and inserting a building preparation in the contiguous space.

**[0010]** According to still further features the method further includes positioning the construction section in a horizontal orientation on at least one vertically oriented support member before inserting the building preparation.

**[0011]** According to still further features the method further includes connecting a second reinforced construction board (RCB) to a second support structure; wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete; and wherein the first support structure and the second support structure are each disposed outside the space for receiving poured concrete.

**[0012]** According to further features the first support structure is attached to the second support structure by a plurality of coupling pieces, each coupling piece adapted to be secured on one end to the first support structure and on another end to the second support structure.

**[0013]** According to further features the method further includes connecting a second reinforced construction board (RCB) to a second support structure; wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete and the first support structure and the second support structure are both disposed inside the space; inserting each of a plurality of coupling pieces through the first RCB, the first support

structure, the space, the second support structure and the second RCB; securing peripheral ends of the plurality of coupling pieces to the first RCB and second RCB respectively.

**[0014]** According to still further features the method further includes connecting a second reinforced construction board (RCB) to a second support structure; wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete and the first support structure is disposed within the space for receiving poured concrete and the second support structure is disposed outside the space for receiving poured concrete; inserting each of a plurality of coupling pieces through the first RCB, the first support structure, the space, the second RCB, and the second support structure; securing peripheral ends of the plurality of coupling pieces to the first RCB and second support structure respectively.

**[0015]** According to still further features each coupling piece of the plurality of coupling pieces is disposed in a sheath and adapted to be removed from the sheath after the poured concrete cures or each coupling piece is adapted to be buried in the poured concrete and the peripheral ends are configured to be snapped off.

**[0016]** According to further features the support structure is comprised of spaced apart metal profiles, wherein the construction segment is transportable due to a load-bearing strength of the first RCB and the second RCB. According to further features the support structure includes load-bearing metal profiles and formwork defining a space into which concrete can be poured. According to further features the support structure includes at least load-bearing materials.

**[0017]** According to another embodiment there is provided a construction item, including: a construction section formed from a plurality of construction segments arranged in a contiguous formation, each construction segment including: a support structure, a first reinforced construction board (RCB) attached to a first side of the support structure, and a second RCB attached to the support structure; wherein the construction section is adapted to receive a building preparation in a frame formed, at least in part, by the first RCB and the second RCB of each of the plurality of construction segments; and wherein for each construction segment the first RCB and the second RCB remains attached to the building preparation after curing, serving as a finishing material for the building preparation.

**[0018]** According to another embodiment there is provided a construction item, including: a construction segment including: a support structure, a first reinforced construction board (RCB) attached to a first side of the support structure, and a second RCB attached to the support structure; wherein the support structure includes at least a combination of two components selected from the group comprising: metal profiles, RCB formwork defining a space into which concrete can be poured, load-bearing metal profiles.

**[0019]** According to still further features the construction item further includes: a plurality of pieces of exterior covering material, each piece thereof including a groove; a connecting piece having a head and shaft, the head being adapted to be disposed in an opening defined by grooves of two adjacent pieces of exterior covering material, and the shaft disposed through, at least, the first RCB and the support structure such that the connecting pieces serves as an anchor for the two adjacent pieces of exterior covering material.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0020]** Various embodiments are herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIGS. 1A-1F are flow diagrams of processes for preparing construction segments;

FIG. 2A-C are example construction elements that can be used for cement-filled construction segments;

FIG. 2D is a cross-sectional view of an element in which light or heavy steel is integrated as the support structure;

FIG. 2E is a construction segment which includes different construction materials in the same segment;

FIG. 3A is a schematic diagram of a ceiling or a beam connected to a wall;

FIG. 3B is a schematic diagram of the roof structure including additional detail;

FIG. 4A is a prior art diagram of conventional formwork for a concrete wall;

FIG. 4B is a cross-sectional view of an example construction item with separate support structures;

FIG. 4C is a cross-sectional view of a construction element with external support structures;

FIG. 5 is a cross section of a stone covering or any other covering that can be attached to the RCB;

FIG. 6 is a configuration of a support structure that consists of two parts, a base and a closure;

FIG. 7 is a phase-by-phase preparation of rebar rods;

FIG. 8 is an example embodiment 800 with a combination of thermal or acoustic insulation material.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0021]** The principles and operation of method for erection of inner and outer walls in houses, multi-story buildings, and high-rises according to the present invention may be better understood with reference to the drawings and the accompanying description.

**[0022]** The presently disclosed methods and systems entails the use of complete prefabricated molds which can be produced outside of the worksite (e.g., in a factory)

and brought the worksite. Alternatively, parts (components, materials) or accessories for assembling molds at the worksite can be supplied to the worksite and the molds assembled on-site. Finally, a combination of the two previous options can be used as dictated by the conditions of the area and the requirements of the customer or the designer.

**[0023]** What follows is a short list of terms with a definition defining how those terms are to be understood as used herein.

**[0024]** Reinforced Construction Board (RCB) - panels of construction material that is adapted to withstand the pressure force exerted, at least, by concrete that is poured onto the board or between two boards that define a space between them. The panels are finishing material for the support material.

**[0025]** Frame / Container / Box / Formwork - are all terms that refer to panels that are assembled together in the shape of a construction item such as a wall, pillar, beam, floor, roof, and the like. The panels are RCBs and are attached to a support structure. In some cases, a simple system of support elements is used during the pouring of cement. The system is easily and quickly dismantled without any specialized tools. The frames can include spaces for doors and windows, as well as for infrastructure such as electricity, communications, water, gas, plumbing, etc.

**[0026]** Support structure - refers to a piece or combination of pieces that are attached to an RCB (at least on one side). The combination of the support structure and the RCB provides a sturdy structure upon which all the construction items are built. In transport, the RCB provides a significant portion of the structural integrity of the prefabricated frame or element. When in place, the support structure either connects the RCBs to the concrete or serves as the support material and anchor for the construction item.

**[0027]** Support material - refers to the building material that is disposed between RCBs. This can be concrete, metal profiles, RHS, light thermal concrete, polyurethane foam, or any other filler.

**[0028]** Construction segment - refers to a construction item that is made up of at least an RCB attached to a support structure which is part of a larger 'construction section' such as a wall, floor, pillar, beams, etc.

**[0029]** The boards that are used in the present construction system are reinforced boards that are robust and heavy-duty. They can be made of fiber-cement, High Pressure Laminate (HPL), reinforced polymer-based materials, wood, stone, marble and the like. For example, fiber cement board is a composite building and construction material made of cement reinforced with cellulose fibers used for both commercial and domestic applications as ceiling, partition, flooring, cladding. Fiber cement board can withstand weather ranging from strong sun to heavy rain and can be used for exterior-work. Fiber cement board is well suited for roofing and facade products because of its strength and durability. One common

use is fiber cement siding on buildings. Fiber-cement boards are also used as flooring. Innovatively, these reinforced siding, flooring, roofing, and/or decorative materials are being used as for two purposes, on the one hand, they are being used like formwork for prefabricated construction segments which can be transported to the worksite and installed / assembled together to form a construction section such as a wall, ceiling, and/or the like; on the other hand, they serve as finishing material in and of themselves.

**[0030]** In this document, the term Reinforced Construction Board (RCB) is used to refer to any reinforced board that is used in any of the examples and/or methods described herein. One characteristic of an RCB is that it is capable of being used as, or more precisely in place of, formwork. Specifically, the boards used need to be able to withstand the pressure of cement poured between partitions made of the RCBs. Also importantly, the RCBs remain in place as part of the construction element (wall, floor, pillar, roof, etc.). It is important to note that every example construction element, and method of producing the same, starts with a first RCB that is attached to a support structure. From that starting kernel, all of the example construction pieces and methods of producing the same are derived. What follows is a limited number of example construction elements which can be produced by the methods disclosed thereafter.

#### Example 1: Cement-filled Construction Item

**[0031]** One embodiment of the construction system is a prefabricated mold that is used as a box/container or formwork into which fresh concrete is poured. Unlike regular formwork where the wooden or metal sheets (and the support elements holding them in place) are removed once the cement has dried, the external elements of the container or formwork, according to the present invention, remain in place as part of the construction item. The external board or boards are connected (see below for more details) to an internal support structure.

**[0032]** This internal structure may be made of metal, plastic, polymeric material, wood, etc. The internal structure is buried / lost in the poured cement. It is noted that the internal structure discussed here is not reinforcement rebar that is generally used to reinforce cement walls. The internal structure may be made from simpler metal or other materials as mentioned. Rebar may be added, in addition to the structure, to reinforce the cement. In such cases, the rebar rods will often be tied to the support structure to hold the rebar in place before pouring the cement.

**[0033]** The RCB formwork defines a construction section (e.g., a wall, floor) which is assembled together from multiple construction segments. Once the construction segments are assembled together, the formwork / container is enclosed on five of six sides (front, back, right, left, bottom, with top side open). One side is open to

receive the poured concrete. For example, with walls, the 'bottom' side will be enclosed by the surface on which the wall is being formed. This may be the wall's foundation or an existing wall (that is now being extended higher) and the like. The construction segments are not usually enclosed on all five sides.

**[0034]** Figure 2A illustrates an example construction element 200 that can be used for cement-filled construction segments. A first reinforced construction board (RCB) 210 is provided. A reinforced construction board, as used herein, refers to a construction board, element, piece, sheet, siding, that is capable of withstanding a force exerted thereon by poured concrete. Examples of RCB include, but are not limited to cement fiber board, High Pressure Laminate (HPL), sidings and the like. (HPL is considered one of the most durable decorative surface materials).

**[0035]** A support structure 220 is attached to the first RCB. The support structure can be made from any relevant material including, but not limited to: metal, plastic, polymer composites, wood, etc.

**[0036]** A second RCB 230 is attached to the opposite side of the support structure. The RCBs define a space between them. This space is adapted to receive filler. In example embodiments, the construction segment is one piece of a construction section, such as a wall. The segments can be prefabricated off-site or assembled onsite or some combination of the two. To build the wall, a number of construction segments are arranged side-by-side according to the specifications of the wall. The end pieces are enclosed. In all, the construction section is enclosed on five sides (front, back, right, left, and bottom) and open on one side (top). The segments can be transported on flatbed trucks and maneuvered/craned into place using cranes. The construction sections are relatively light, e.g., relative to huge steel formwork partitions used in large-scale building projects. The RCBs not only serve as formwork for the cement filler, but also serve as a finishing material for the wall. There is no need to plaster the cement center of the wall. Furthermore, the RCB can be a decorative facade and/or siding. The RCB can be painted on, or even pre-painted at the fabrication stage, off-site.

**[0037]** The embodiment depicted in Fig. 2A includes a support structure 220 that is lost in the poured cement. In the example embodiment of segment 200, the support structure 220, in the example embodiment, is made up of metal "ladders" disposed vertically between the RCBs at regular intervals. The ladders include two long metal profiles disposed in an orientation parallel to the orientation of the boards, and a number of short metal profiles disposed between, and connecting, the long profiles. Together, the boards and ladders provide a sturdy, element capable of standing unaided. The short profiles support the cement like ties.

**[0038]** Figure 2B depicts another example embodiment 200.1. Segment 200.1 includes an RCB 210.1 and a support structure 220.1. The RCB 210.1 covers

about half of the support structure. When enclosed, the bottom half of the support structure will support poured cement (according to one optional embodiment). This lower part of the structure will be lost in the cement.

5 According to this embodiment, the structure 220.1 is assembled from small pieces either in the factory (off-site) or at the worksite. The RCB 210.1 connects the pieces of the support structure. Adding another RCB creates a partial container or a segment of formwork for casting concrete. The pieces 222.1 of the support structure that are laid widthwise between the parallel RCBs serve as spacers for maintaining a consistent space between the RCBs as well as serving to support the poured concrete (like ties in regular cast-in-place concrete walls and the like). If needed, the transverse members (widthwise pieces) 222.1 may be more tightly arranged at the lower part of the segment, where the pressure from the poured cement is greater and more transverse members (ties) are needed to support the concrete. In some embodiments, some of the support structure can extend outside of the formwork / container.

**[0039]** Figure 2C depicts another example embodiment 200.2. Segment 200.2 includes an RCB 210.2 and a support structure 220.2. The example support is arranged in cubes, with lengthwise pieces 224.2 which connect the ladder pieces together. The result is a framework or cage type of support structure.

#### Example 2: Hollow / Non-filled Item with Internal Support Structure

**[0040]** In another embodiment, the construction system can be installed without pouring concrete. Segments 200, 200.1, and 200.2 (Figs. 2A, 2B, and 2C) can also be used as construction segments without adding poured cement. By attaching the RCBs to the support structure, the entire segment can be transported. The sturdiness of the RCBs will generally ensure that the segments do not break or deform during transport. This is in contrast, for example, to gypsum boards connected to aluminum profiles which can only be erected in place; i.e., they cannot be prefabricated in one location and shipped to another location, as the boards would break, and the aluminum structure would deform. A wall made from gypsum boards attached to aluminum framework cannot be transported on a flatbed, it cannot be lifted off the flatbed and maneuvered into place by a crane, in most cases it cannot even be moved from one spot to another spot in the same location.

50 **[0041]** A prefabricated wall or partition arranged from construction segments 200, 200.1, and 200.2, without poured concrete, can be used as a wall or partition that is not load bearing. Figure 2D is a cross-sectional view (e.g., a top-down view) of an element 200.3 in which light or heavy steel is integrated as the support structure 220.3. Alternatively, a different material can be used with comparable strength. As mentioned, the support structure can be formed from any one of numerous materials

having the requisite strength and rigidity.

**[0042]** The depicted construction element can be used as non-load-bearing walls such as an internal partition, etc., as well as load-bearing walls. The RCB panels 210.3, 230.3 are integrated with the support structure, completing the element as a wall or column or beam or ceiling or any other element that is not intended to receive poured concrete. In some cases, however, the space 240.3 between the profile pieces can be filled with ordinary concrete or light thermal concrete or polyurethane foam or any other filler material, or simply left as empty space.

**[0043]** As mentioned above, the combination of support structure and reinforced boards creates a construction element that can be prepared off-site and can be transported to the worksite. Due to the robust, heavy-duty nature of the boards, the product does not get damaged during transportation. The construction segments are assembled together to form a construction section, such as a wall, floor, or ceiling.

#### Example 3: Combination Hollow, Concrete, Steel Construction Item

**[0044]** In some embodiments, a single construction section can be assembled from hollow and filled segments. In some cases, a single construction segment can have a combination of hollow and cement filled parts in the same segment. In some cases, some parts of the segment or section can additionally, or alternatively, have, for example, a Rectangular Hollow Section (RHS). Other constructions systems known in the art can have only one type of filler (e.g., concrete, empty, RHS, etc.) but not a combination of two or more types of fillers.

**[0045]** RHS is also known as Cold Formed Rectangular Hollow, Rectangular Mild Steel Hollow. RHS is the most prevalent term and is generally accepted for describing square hollow section as well, which is technically incorrect. The correct term for square tube is SHS which stands for Square Hollow Section. Less known is the term CHS, this stands for Circular Hollow Section. These terms are widely used to describe mild steel; however, they can also be used for stainless steel and aluminum engineering and construction.

**[0046]** Figure 2E depicts a construction segment 200.4 which includes different construction materials in the same segment. The segments can be prefabricated off-site and shipped to the site. Alternatively, each segment can be partially prefabricated off-site and then assembly can be completed on-site. In yet another alternative, the construction components can all be shipped to, and assembled at, the worksite. The segment 200.4 includes a first RCB 210.4 and a second RCB 230.4. A composite support structure 220.4 is disposed between the RCBs. In the depicted example, a basic, ladder type member 226.4 is part of the support structure. RCB internal partitions 228.4 are used to define a portion of

the segment where concrete C (or some other building mixture such as lightweight concrete, polyurethane foam, and the like) is to be poured (or otherwise injected). RHS 250.4 or another equivalent constructive component is part of the composite support structure. Some portions of the construction segment are left as empty spaces 240.4. No other construction system combines two or more constructive materials, such as concrete and RHS in the same construction segment or element. Any type of combination of the aforementioned materials within a single construction segment is considered to be within the scope of the invention. The construction segment itself can be part of a wall, or a beam, pillar, ceiling, or any other constructive element.

#### Example 4: Floor or Roof

**[0047]** The following example construction item is a derivative of the cement filled example discussed above, with some variations. Figure 3A is a schematic diagram of a ceiling or a beam connected to a wall. A construction segment 300 includes a reinforced construction board 310 and a support structure 320. The RCB 310 serves as a base for a 'box' that encloses a space in which concrete floor is poured (the peripheral enclosing pieces are not shown in the figure). The support structure is made from a plurality of metal ladders 326 that are disposed perpendicular to the surface of the RCB. In some embodiments, the 'ladders' actually have a zig-zag pattern. The zig-zag pattern is a more robust and supportive configuration. The support structure is lost/buried in the poured cement. Alternatively, the support structure could be used only for the mold until the casting is finished, and then removed (but usually not). The support structure can be designed - with heavier than usual metal pieces - to support the load of the building (load-bearing - supporting the roof) and its own load (like rebar does). The instant construction segment can be used as a template to level the ceiling and obtain a smooth and straight, or sloped, surface as needed.

**[0048]** Any of the aforementioned support structures, alone or in combination, can be used to form the wall 390 which is integrated and connected with the roof piece either by welding, screws, clamps, and/or various connection accessories. If the ceiling is cast concrete, then the ceiling can be temporarily supported (i.e., at least until the fresh concrete has hardened) by support members 380 disposed under the ceiling. Alternatively, the ceiling profile 326 can stand independently of other supports and bear the load of the fresh concrete. A combination of construction items using different construction segments in the present project. Here, an element that serves as a wall can continue to be raised that also goes up above the ceiling level and/or used as a beam or create a higher wall.

**[0049]** Figure 3B is a schematic diagram of the roof structure 300 including additional detail. Fig. 3B depicts a ceiling and the rebar rods 302 as well as the integration of

electrical systems, etc. 304 which can be placed / positioned in the factory during prefabrication or on-site.

#### Example 5: Structure-less / External Molds

**[0050]** According to another embodiment, the formwork / container does not include an internal structure. These molds / containers can be prefabricated off-site and shipped into the site for immediate assembly / erection / placement. Here, the support structures may be disposed outside of the construction element.

**[0051]** Figure 4A is a prior art diagram of conventional formwork for a concrete wall. There are many conventional ways of making formwork for cement walls, but almost all follow similar principles. The terminology for the components is also varied, such that there are different words or terms for the same or similar components. With that in mind, the following basic features are common to all formwork for cast-in-place walls. Sheeting / Sheathing refers to panels that are part of the form. These panels are in contact with the concrete but are removed after the concrete dries. Form/Shutter refers to the part of formwork which consists of the sheeting and its immediate supporting or stiffening members. False-work is the temporary structure erected to support work in the process of construction. It is composed of shores, formwork for beams or slabs (or both) and lateral bracing. The formwork includes plywood (usually, but sometime plastic or metal panels) which is supported by studs (vertical members) and waling (horizontal members). Struts or braces brace the formwork against the ground. Scaffolding is often erected to provide a platform for the workers to work on the formwork.

**[0052]** The frames / containers / boxes detailed elsewhere herein (e.g., example 1) obviate the need for almost all of the aforementioned components. Generally, no studs are needed, no waling, sheeting/plywood/panels, and no scaffolding. Furthermore, the RCB panels of the instant invention are connected to the concrete wall and not removed. The concrete wall does not need to be "finished" (plastered or have drywall attached to it), rather the RCB is the finishing material for the support material, which, in this case, is concrete.

**[0053]** Figure 4B is a cross-sectional view of an example construction item with separate support structures. Construction segment 400 is formed from a first reinforced construction board (RCB) 410 attached to a first support structure 420A and a second RCB 430 attached to a second support structure 420B. These support structures are not connected by widthwise pieces. The support structures may include, for example, thin metal profile pieces, vertically oriented, which are attached to the RCBs on the inner faces of RCBs (i.e., the surfaces of the RCBs that define between them the space into which the concrete is poured). Ties 422 are threaded through the support structures and RCBs and secured on the outer ends to the outside facing surfaces of the RCBs. In some cases, the ties 422 are disposed in sleeves (or

removable in other ways) and can be removed and reused once the concrete has cured. Concrete C (or some other support material / filler) is poured between the two RCBs 410 and 430.

5 **[0054]** In some embodiments, there may be additional external support structures 420C and 420D, for additional support. In these cases, the outer ends of the reusable ties (or snap ties) are attached to the outside facing surfaces of the external support structures. Once the concrete has dried, the ties and external support structures are removed. If snap ties are used, the protruding ends of the snap ties are snapped off, leaving the main body of the tie buried in the concrete.

10 **[0055]** Figure 4C illustrates a cross-sectional view of a construction element 400.1 with external support structures. In the depicted example embodiment, a first RCB 410.1 and a second RCB 410.1 are individually attached to support structures 420.1C and 420.1D respectively. These support structures are attached to the outer faces of the RCBs. Ties 422.1 are threaded through the support structures and RCBs and the outer ends of the ties are secured to the external support structures 420.1C and 420.1D. In some cases, the ties 422.1 are disposed in sleeves (or removable in other ways) and can be removed and reused once the concrete has set. Concrete (or some other support material / filler) is poured between the two RCBs 410.1 and 430.1. Once the concrete has dried, the ties and external support structures are removed. If snap ties are used, the protruding ends of the snap ties are snapped off, leaving the main body of the tie buried in the concrete.

20 **[0056]** Even these embodiments are uniquely distinguished from the prior art. Unlike the methods known in the art, such as prior art in Fig. 4A, the present method and system uses reinforced panels that remain connected to the cement wall and are not removed after the cement dries. Rather the RCB serves as finishing material for the concrete wall / construction element.

25 **[0057]** In all the of the aforementioned embodiments, the raw materials for the assembly of the elements are combined with materials that are used as final / finishing materials and replace the plaster or stone cladding and the like. The finishing material and structure of the element is determined according to the requirements of the client or the designer and are implemented at the fabricating stage, which can be off-site. The elements can be partially prepared or completely prepared (e.g., with the desired external facade and painted internal walls).

30 **[0058]** At the most basic level, the external boards are ready to receive any finishing without the need for plastering over the cement. This is a level of preparation that is similar to gypsum board in the meaning that both types of boards can be painted on immediately without further preparation. However, the instantly used reinforced boards, unlike gypsum boards, are sufficiently strong to receive cladding/siding without any special hanging accessories.

35 **[0059]** On another level, the type of reinforced board

may itself be cladding / siding or have a contoured / decorated facade. So, for example, a paintable reinforced board can be used for the internal face of the wall and the siding reinforced board can be used as the external face of the wall. In embodiments, the basic level reinforced board can be adorned with finishings. This can be done at the fabrication stage, e.g., in a factory. In some cases, the construction segment can be prefabricated in a completely prepared manner (e.g., a painted inner wall and cladding outer wall) before being assembled at the worksite.

**[0060]** In this manner, the construction segments can be partially or completely prepared and then shipped to the site for assembly (and cement pouring, if necessary). Some or no further finishings may need to be added, but the cement portion of the construction section does not need any further conditioning (i.e., no removing of wires, ties, sanding, plastering, and/or additional finishings).

**[0061]** It can therefore be said that the reinforced construction boards, as used herein, serve a dual purpose. The first purpose is to serve as formwork for poured cement / concrete or to support the integrity of the internal support structure during transportation / moving. The second purpose is as a finishing material or a partial / pre-finishing material. The term 'finishing material', as used herein, refers to a material that is on the finished construction item, or at the very least "finishes" the underlying support material (obviating the need for plastering or attaching drywall to the 'unfinished' concrete). For example, this can be cladding, paint, tiles, stone, and the like. The terms 'partial finishing material' or 'pre-finishing material' and variations thereof, are used herein to refer to a material that, without any additional intervening layers of material (such as plaster or drywall boards and the like), is adapted to receive a finishing material such as paint, tiles, siding, stone, etc.

**[0062]** The present system provides solutions for all the structural elements of a building project. This is in contrast to most construction systems that provide a specific solution to a specific problem. For example, a conventional system that is used for building a wall cannot be used for building a roof and vice versa; a conventional system for building internal walls cannot be used for building load-bearing walls, and so on.

**[0063]** In contrast, the present system is based on the elementary idea of an internal structure with reinforced boards on either side. This arrangement can be used for cement-filled walls/ceilings, RHS in walls, light metal internal structure, as well as hollow walls or any combination thereof for external walls, internal walls, load-bearing pillars, walls with load-bearing section, etc.

**[0064]** Using prefabricated pieces obviates the need for building formwork and for dismantling the formwork after the cement is poured. There is no need for tying rebar rods on-site, as the prefabricated pieces are prepared off-site, ideally in a factory setting, out of the sun and in pleasant working conditions. No infrastructure preparation work needs to be done on-site. All infrastruc-

ture preparations are included in the prefabricated pieces. These pieces are then shipped to the worksite and assembled like Legos® using cranes to maneuver the pieces into place and minimal manpower for assembly.

**[0065]** Bringing prefabricated pieces to the worksite saves on performing a large portion of the work at the worksite. This reduces on-site noise, mess, garbage, man hours spent in worksite conditions, material waste, and so on.

**[0066]** The present system saves on the amount of labor needed and provides a partial solution to the lack of professional labor which, in a factory setting, can be trained more easily and have to perform less-complex jobs, all the while doing so in more favorable working conditions. Other benefits include increased turnover, while making the work more accessible to less experienced and less professional workers.

**[0067]** The working conditions in a factory increase turnover, speed up and shorten schedules. Even the work that remains to be done on-site is done in a significantly simpler and faster method. Construction waste is significantly reduced. The construction can be considered "Green" construction. Factory work has higher quality control and better monitoring.

**[0068]** Figure 5 illustrates a cross section of a stone covering or any other covering that can be attached to the RCB. In the depicted example, stone pieces 595 (or any other covering material, exterior material, finishing material) is provided with an option for being glued to an RCD 510 and is anchored into the casting area C with screws 585. After the concrete is poured and hardens the stone remains attached to the casting / concrete.

**[0069]** According to another option, the exterior / covering material 595 is prepared with a groove 597 or similar preparation. A stainless steel or metal accessory or any type of standard accessory 570 is shaped to fit in the space created by two adjacent grooves 597. The accessory 570 is coupled to a screw or a special connector 575 which is attached through the RCB to the support structure 520. According to this configuration, the covering material is connected and anchored to the support structure by the aforementioned set of accessories. It is also possible to add grouting or filler material 599 between the covering pieces. It is also possible not to add poured cement in this case, and the stone etc. will still be sufficiently connected to the wall.

**[0070]** According to another configuration 600 shown in Figure 6. Fig. 6 illustrates a configuration of a support structure that consists of two parts, a base 620B and a closure 620C. Each part of the support structure is attached to a different RCB. The first RCB 610 is attached to the base part 620B which consists of a profile 621 that is parallel to the board and shorter profiles 622 disposed on the long profile 621, but in a perpendicular orientation to the long profile. The closing part is a profile 620C which is oriented parallel to long profile 621 and adapted to be attached to a second RCB 630. The two parts can be

connected by welding or with screws or using other connection accessories.

**[0071]** Figure 7 illustrates a phase by phase preparation of rebar rods 702. Rebar, short for "reinforcing bar" or "reinforcement bar", is a metal bar that is used to help increase the tensile strength of concrete. As a result, it helps concrete structures withstand tensile, bending, torsion, and shearing loads. Since these are areas of weakness for concrete, rebar strengthens concrete structures that would otherwise fall apart under these forces. Rebar is not typically visible in concrete structures because it is usually buried within the concrete structure. It is almost always made of steel because steel has thermal expansion properties like concrete which reduces temperature change issues. Rebar is usually not smooth; it is made with ribs to prevent slippage within the concrete structure.

**[0072]** Rebar 702 is combined with, or attached, to a support structure 720 that is buried or partially buried in the cement. The construction element is enclosed with PCBs 710, 730. This type of building method is suitable for preparation that is carried out at the worksite, e.g., when adding on to an existing wall or building.

**[0073]** In other embodiments, the rebar is integrated into a transportable frame / container / formwork that can be prepared off-site or on-site. The process for fabricating or prefabricating (if done off-site) a frame which includes rebar begins with attaching a first RCB to a support structure, thereby closing in one side. Thereafter, rebar rods are inserted. Conveniently, the rebar can be tied to the support structure. Once all the rebar has been secured in place, the second RCB is attached to the other side, closing the frame / construction segment. It is noted that sometimes it is necessary to leave openings for connecting elements or threading and combining additional elements. With a horizontally oriented construction element, such as a roof, there is no need to close the second panel. Once all the segments of a construction section have assembled in place, the enclosing pieces are attached to completely close the frame. A wall, for example has two side pieces that need to be closed. A roof, on the other hand, needs to be enclosed on all four sides (right, left, front, and back) be concrete can be poured.

**[0074]** Figure 8 illustrates an example embodiment 800 with a combination of thermal or acoustic insulation material 802. Alternatively, or additionally, other material can be added in the same way and place, between one RCB 810 and a support structure 820. In some embodiments, the insulation (or other) material can be attached, in addition, to the second RCB 830 (option not shown).

**[0075]** Additional benefits include:

- Reducing the burden on site managers and other professionals in the field.
- Combining integrated finishing materials such as sand and stone cladding and/or all types of cladding and finishing materials saves on the need for per-

forming various steps that are conventionally necessary (e.g., sanding, wire removal, plastering) but not necessary using the present system.

- Saving on plaster as well as the various finishing materials in general.
- Pouring straight floors. This is a notoriously difficult task which is usually not done well, resulting in floors which are not level. When floors are not properly levelled throughout, tilers usually pour filler to be able to lay tiles that area properly levelled. The present system provides a level floor which saves on filler material and the consequential mess as well as speeding up the work, resulting in both financial savings and a more professional work product.
- The prefabricated parts can have electrical and plumbing infrastructures integrated into the parts, as well as any other systems that usually run through the walls and/or floors.
- Bringing prefabricated rooms and complete building sections - including finishes - which are based on concrete castings and not plaster walls and the like. A prefabricated room, such as a bathroom, can be prepared in a factory with the walls of the room constructed using the presently disclosed methods and system of construction. The entire room is then transported to the worksite and craned into place within the building. Instead of simply securing the room in place with locking elements and attachment pieces, the present method allows for pouring concrete into the prefabricated walls. This results in the room becoming a part (being integrated into) of the building, and not merely any added element with [flimsy] plaster walls.
- Reducing waste and environmental irritants.
- Less disruption to the environment and traffic as a result of speeding up the work and significantly reducing the number of steps that need to be performed.
- Savings in management and logistics staff. The elements / prefabricated pieces arrive ready for placement and installation, therefore less professional / skilled / experienced workers are required on the site. The management / logistics staff also need to do much less measuring, supervising, and other management activities performed on a construction site.
- The work on-site is reduced significantly. Reducing on-site work has many direct and indirect advantages. For example, direct advantages are lower costs for laborers who are paid by the hour. Indirectly, projects get completed quicker, which is beneficial to the owners of the project and to the contractors.
- Modular work can be completed very efficiently in the factory, saving a lot of time and reducing the amount of work needed on-site. Construction pieces prepared in a factory setting have higher precision of work product, as well as better quality control.
- Partially prefabricated pieces or completely prefabricated construction pieces that are supplied to the

worksite reduce or eliminate the need for building formwork, assembling steel constructions, building interior partitions, as well as many other jobs, while increasing precision and speed.

- The safety conditions are very significantly improved, and the dangers and risks are significantly decreased, as a result of working in closed and fenced spaces. Scaffolding work is reduced or even eliminated, preventing the dangers of scaffolding work.
- Many additional advantages are not detailed here; however, it is clear that working with the instant system and method saves on almost all aspects of the construction project and boosts productivity many-fold.

**[0076]** A computerized system with proprietary software and/or a designated website includes already designed construction elements that can be selected and arranged to design a construction project such as a house or building. The software includes preliminary calculations which are preprogrammed in the software which at the end of entering the building details will calculate and output the required elements and materials. Such a system saves on expensive designers and 3D simulations. The system uses known components / elements to create customized building projects.

**[0077]** Not only does the instant construction system afford the ability to include water and electrical infrastructure in the prefabricated pieces, but painted construction sections, complete room sections, even bathroom and kitchen pieces can be prefabricated in the factory and shipped to the site for installation.

**[0078]** Going in another direction, standard construction segments can be produced in the factory *en masse* and sold as DIY and/or ready-to-make houses, sheds, and other types of buildings of different sizes. Customers may, for example, design or choose the type of construction project they want and then the necessary standard construction pieces needed for that project can be supplied (like designing a cupboard in IKEA®) and shipped to the location or provided to the customer on the spot for them to take. It is also possible to order specialized pieces or customized orders.

**[0079]** This invention allows several different options at the execution phase:

A. Bringing complete prefabricated construction elements to the worksite with details for connecting the various elements together. Once assembled at the worksite, the concrete can be poured. In some cases, the construction elements are assembled and installed without pouring concrete.

B. Bringing rooms and larger construction parts which are prepared in advance, off-site.

C. Delivering construction materials to the worksite for assembly on-site. This option is recommended in cases where the construction project is mainly ex-

tending or expanding an existing building. In such cases it is not always possible to connect the prefabricated elements and molds to the existing building. This option is also relevant in places where the transportation conditions and/or crane usage is/are limited (e.g., sites where it is not possible to bring in cranes and/or other heavy machinery). The building materials, using this option, still reduce or completely eliminate the need for building formwork, disassembling the formwork, plastering, and so on. The instant building system, even when the construction segments are assembled on-site, still provides a level of precision, finish, and many other advantages (discussed elsewhere herein) that cannot be found using conventional methods or specialized building systems.

D. Supplying prefabricated construction segments and elements that can be adjusted or customized at the worksite. For example, the construction pieces may not be closed on all sides or locked in a specific configuration. This option provides flexibility for on-site customization and adjustment, which can be very helpful in places and/or situations where the measurements are complex or a combination of other elements that requires flexibility in the final-product dimensions.

**[0080]** Figure 1A is a flow diagram 100.1 of a method of construction for preparing a construction segment.

**[0081]** The method of construction includes preparing a construction segment (at least part of a floor, wall, roof, etc.) with the following steps:

Step 102.1: provide a first reinforced construction board (RCB) and a support structure. An RCB is any construction board that is capable of withstanding a force exerted thereon by poured concrete. The concrete may be poured between two RCBs or may be poured between an existing wall and an RCB or may be poured onto an RCB (e.g., in the case of a roof). An example of an RCB is cement fiber board. The RCB has the dual purpose of serving as a frame for the construction item (e.g., a frame for the poured concrete) as well as serving as a finishing material for the constructive material (concrete, polyurethane foam, metal profiles, etc.) which supports or anchors the construction item. 'Unfinished' concrete has rough protrusions and an uneven surface. The RCB 'finishes' the cast-in-place wall surface, thus obviating the need for plaster or plaster board to cover the unfinished concrete surface. The support structure may be made of metal, plastic, other polymeric materials, wood, and the like.

Step 104.1: attach the RCB to a first side of a support structure.

Step 108.1: move or position the construction segment in a predefined location. This step may include transporting the prefabricated item from a factory to

the worksite and/or craning the item from the truck (or from the floor) to the predefined location within the building area. Alternatively, the partial mold may be prepared in the factory and shipped to the worksite. Step 110.1: Optionally, at the worksite, additional components may be added to finish the construction segment. Optionally, the mold may be completed before shipping or moving.

**[0082]** In optional step 112.1, the partial mold can be completed into a segment of a wall (Figs. 2A-C), a segment of a roof (Fig. 3A-B) or an entire roof (both of which are completed by pouring cement or the like), a hollow segment (fig. 2D), or a composite segment (fig. 2E). In fact, all of the construction elements discussed herein are based on the steps of diagram 100.1.

**[0083]** The combination of the RCB and the support structure uniquely allows for the transportation and movement of these composite construction items. Some prefabricated construction items can be moved from place to place, but these items are not able to be placed and then receive poured concrete. Other construction items, such as drywall, cannot be attached to a metal framework and then moved from one place to another, as they will break in transit. Some prefabricated items first have the concrete poured and set, and then are craned into position. These are massive loads and not comparable to the relatively light molds which can be craned into place (with cranes that are not so heavy duty) and, once in place, receive the poured concrete.

**[0084]** Other distinctions between items known in the art are discussed elsewhere but are relevant throughout the disclosure. This is true of all the characteristics, details, and explanations which are disclosed herein for one or more construction items and are understood to be relevant, mutatis mutandis, to all the comparable or relevant examples.

**[0085]** Figure 1B is a flow diagram 100.2 of a method of construction for preparing a construction segment.

**[0086]** The method of construction includes preparing a construction segment (at least part of a wall, beam, pillar, etc.) with the following steps:

Step 102.2: Provide a first reinforced construction board (RCB) and a support structure (as above).

Step 104.2: Connect the RCB to a first side of the support construction (as above).

Step 106.2: Connect a second reinforced construction board (RCB) to a second side of the support structure, the second side being opposite the first side.

Step 108.2: Transport and/or move the construction segment in a predefined location.

Step 112.2: (Optional) Pour concrete or otherwise fix the item in place.

**[0087]** Figure 1C is a flow diagram 100.3 of a method of construction for preparing a construction section.

Step 102.3: provide an RCB and a support structure.  
Step 104.3: connect the RCB to a first side of the support construction.

Step 106.3: connect a second reinforced construction board (RCB) to a second side of the support structure, the second side being opposite the first side.

Step 108.3: transport and/or move the construction segment to a predefined location.

Step 109.3: Arrange a plurality of construction segments into a construction section that defines an enclosed space for receiving poured concrete.

Step 112.3: Pour a building preparation (e.g., a cement mixture) between the first and second construction boards.

**[0088]** Figure 1D is a flow diagram 100.4 of a method of construction for preparing a construction segment.

**[0089]** The method of construction includes preparing a construction segment (at least part of a floor, wall, roof, etc.) with the following steps:

Step 102.4: provide an RCB and a support structure.

Step 104.4: connect the RCB to the support structure.

Step 106.4: connect a second reinforced construction board (RCB) to a second support structure. The first RCB and the second RCB define therebetween a space for receiving poured concrete.

**[0090]** In one configuration, the first support structure is disposed inside the space for receiving poured concrete and the second support structure is disposed outside the space for receiving poured concrete.

**[0091]** In another configuration, the 1<sup>st</sup> and 2<sup>nd</sup> support structures are disposed within the space defined between RCBs but are not connected to each other (at least initially).

**[0092]** In a third configuration, both support structures are disposed outside the space.

**[0093]** Step 107.4: secure the first RCB to the second RCB by a plurality of coupling pieces, such as ties. Each of coupling pieces is threaded through the RCBs and support structures and secured on the peripheral ends to the outermost member.

**[0094]** Step 108.4 (optional): If the construction segment was not assembled in place, then the construction segment is transported / moved in the predefined location.

**[0095]** Step 112.4: Pour concrete.

**[0096]** Step 114.4 (optional): Each coupling piece of the plurality of coupling pieces is disposed in a sheath (or otherwise adapted to be removed from the concrete after it dries). Remove coupling pieces from the sheath or snap off the ties after the poured concrete cures. Remove the external support structure(s).

**[0097]** Figure 1E is a flow diagram 100.5 of a method of construction for preparing a construction segment or

section for a floor or roof.

**[0098]** Step 102.5: provide an RCB and a support structure.

**[0099]** Step 104.5: connect a first reinforced construction board (RCB) to the support structure.

**[0100]** Step 105.5: Provide at least one vertically orientated support member.

**[0101]** Step 108.5: Assemble the construction segment on the at least one vertically orientated support member or move the construction segment onto the support member. The construction segment, or at least the RCB, being disposed in a horizontal orientation.

**[0102]** Step 109.5: Enclose the roof / floor section on all four sides with partitions which are perpendicular to the horizontal plane of the RCB

**[0103]** Step 112.5: Pour concrete.

**[0104]** Step 114.5: Remove the support member or members.

**[0105]** Figure 1F is a flow diagram 100.6 of a method of construction for preparing a construction segment without pouring concrete.

**[0106]** Step 102.6: provide an RCB and a support structure.

**[0107]** Step 104.6: attach the RCB to a first side of the support structure. The support structure is made up, for example, of spaced apart metal profiles or similar materials.

**[0108]** Step 106.6: connect a second reinforced construction board (RCB) to a second side of the support structure, the second side being opposite the first side.

**[0109]** The construction segment is transportable due to a load-bearing strength of the first RCB and the second RCB.

**[0110]** Step 108.6: position the construction segment in a predefined location.

**[0111]** Implementation of the method and/or system of embodiments of the invention can involve performing or completing selected tasks manually, automatically, or a combination thereof. Moreover, according to actual instrumentation and equipment of embodiments of the method and/or system of the invention, several selected tasks could be implemented by hardware, by software or by firmware or by a combination thereof using an operating system.

**[0112]** For example, hardware for performing selected tasks according to embodiments of the invention could be implemented as a chip or a circuit. As software, selected tasks according to embodiments of the invention could be implemented as a plurality of software instructions being executed by a computer using any suitable operating system. In an exemplary embodiment of the invention, one or more tasks according to exemplary embodiments of method and/or system as described herein are performed by a data processor, such as a computing platform for executing a plurality of instructions. Optionally, the data processor includes a volatile memory for storing instructions and/or data and/or a non-volatile storage, for example, non-transitory storage media such as a mag-

netic hard-disk and/or removable media, for storing instructions and/or data. Optionally, a network connection is provided as well. A display and/or a user input device such as a keyboard or mouse are optionally provided as well.

**[0113]** For example, any combination of one or more non-transitory computer readable (storage) medium(s) may be utilized in accordance with the above-listed embodiments of the present invention. A non-transitory computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: a portable computer diskette, a hard disk, a random-access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable non-transitory storage medium may be any tangible medium that can contain or store a program for use by or in connection with an instruction execution system, apparatus, or device.

**[0114]** A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in base-band or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electro-magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device.

**[0115]** As will be understood with reference to the paragraphs and the referenced drawings, provided above, various embodiments of computer-implemented methods are provided herein, some of which can be performed by various embodiments of apparatuses and systems described herein and some of which can be performed according to instructions stored in non-transitory computer-readable storage media described herein. Still, some embodiments of computer-implemented methods provided herein can be performed by other apparatuses or systems and can be performed according to instructions stored in computer-readable storage media other than that described herein, as will become apparent to those having skill in the art with reference to the embodiments described herein. Any reference to systems and computer-readable storage media with respect to the following computer-implemented methods is provided for explanatory purposes and is not intended to limit any of such systems and any of such non-transitory computer-readable storage media with regard to embo-

diments of computer-implemented methods described above. Likewise, any reference to the following computer-implemented methods with respect to systems and computer-readable storage media is provided for explanatory purposes and is not intended to limit any of such computer-implemented methods disclosed herein.

**[0116]** The flowcharts and block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

**[0117]** The descriptions of the various embodiments of the present invention have been presented for purposes of illustration but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments. The terminology used herein was chosen to best explain the principles of the embodiments, the practical application or technical improvement over technologies found in the marketplace, or to enable others of ordinary skill in the art to understand the embodiments disclosed herein.

**[0118]** As used herein, the singular form "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

**[0119]** The word "exemplary" is used herein to mean "serving as an example, instance or illustration". Any embodiment described as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments and/or to exclude the incorporation of features from other embodiments.

**[0120]** It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination or as suitable in any other described embodiment of the invention. Certain features described in the context of

various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

**[0121]** The above-described processes including portions thereof can be performed by software, hardware and combinations thereof. These processes and portions thereof can be performed by computers, computer-type devices, workstations, processors, micro-processors, other electronic searching tools and memory and other non-transitory storage-type devices associated therewith. The processes and portions thereof can also be embodied in programmable non-transitory storage media, for example, compact discs (CDs) or other discs including magnetic, optical, etc., readable by a machine or the like, or other computer usable storage media, including magnetic, optical, or semiconductor storage, or other source of electronic signals.

**[0122]** The processes (methods) and systems, including components thereof, herein have been described with exemplary reference to specific hardware and software. The processes (methods) have been described as exemplary, whereby specific steps and their order can be omitted and/or changed by persons of ordinary skill in the art to reduce these embodiments to practice without undue experimentation. The processes (methods) and systems have been described in a manner sufficient to enable persons of ordinary skill in the art to readily adapt other hardware and software as may be needed to reduce any of the embodiments to practice without undue experimentation and using conventional techniques.

**[0123]** While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made. Therefore, the claimed invention as recited in the claims that follow is not limited to the embodiments described herein.

## Claims

1. A method of construction, comprising:
  - preparing a construction segment by:
    - providing first reinforced construction board (RCB) and a support structure, and attaching the RCB to a first side of the support structure; and
    - moving the construction segment to a predefined location.
2. The method of claim 1, wherein the first RCB is adapted to form at least part of a formwork for receiving poured concrete, and after the poured concrete has dried serving as a finishing material for the poured concrete.

3. The method of claim 1, wherein the first RCB is a finishing material or is adapted to support a finishing material.
4. The method of claim 1, further comprising: 5  
connecting a second reinforced construction board (RCB) to a second side of the support structure, the second side being opposite the first side.
5. The method of claim 4, wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete. 10
6. The method of claim 1 or claim 5, further comprising: 15  
arranging a plurality of construction segments into a construction section that defines a contiguous space for receiving poured concrete; enclosing the construction section while leaving open a top side thereof; and 20  
inserting a building preparation in the contiguous space.
7. The method of claim 6 as dependent from claim 1, further comprising: 25  
positioning the construction section in a horizontal orientation on at least one vertically oriented support member before inserting the building preparation.
8. The method of claim 1, further comprising: 30  
connecting a second reinforced construction board (RCB) to a second support structure; wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete; and 35
9. The method of claim 1, further comprising: 40  
connecting a second reinforced construction board (RCB) to a second support structure; wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete and the first support structure and the second support structure are both disposed inside the space; 45  
inserting each of a plurality of coupling pieces through the first RCB, the first support structure, the space, the second support structure and the second RCB; 50  
securing peripheral ends of the plurality of coupling pieces to the first RCB and second RCB respectively.
10. The method of claim 1, further comprising: 55  
connecting a second reinforced construction board (RCB) to a second support structure;
- wherein the first RCB and the second RCB define therebetween a space for receiving poured concrete and the first support structure is disposed within the space for receiving poured concrete and the second support structure is disposed outside the space for receiving poured concrete; inserting each of a plurality of coupling pieces through the first RCB, the first support structure, the space, the second RCB, and the second support structure; securing peripheral ends of the plurality of coupling pieces to the first RCB and second support structure respectively.
11. The method of claim 10, wherein each coupling piece of the plurality of coupling pieces is disposed in a sheath and adapted to be removed from the sheath after the poured concrete cures or each coupling piece is adapted to be buried in the poured concrete and the peripheral ends are configured to be snapped off.
12. The method of claim 4, wherein the support structure is comprised of spaced apart metal profiles, wherein the construction segment is transportable due to a load-bearing strength of the first RCB and the second RCB.
13. The method of claim 4, wherein the support structure includes load-bearing metal profiles and formwork defining a space into which concrete can be poured.
14. A construction item, comprising: 35  
a construction section formed from a plurality of construction segments arranged in a contiguous formation, each construction segment including: 40  
a support structure,  
a first reinforced construction board (RCB) attached to a first side of the support structure, and  
a second RCB attached to the support structure; 45  
wherein the construction section is adapted to receive a building preparation in a frame formed, at least in part, by the first RCB and the second RCB of each of the plurality of construction segments; and 50  
wherein for each construction segment the first RCB and the second RCB remains attached to the building preparation after curing, serving as a finishing material for the building preparation.
15. A construction item, comprising:

a construction segment including:

- a support structure,
- a first reinforced construction board (RCB) attached to a first side of the support structure, and
- a second RCB attached to the support structure;

wherein the support structure includes at least a combination of two components selected from the group comprising: metal profiles, RCB formwork defining a space into which concrete can be poured, load-bearing metal profiles.

5

10

15

20

25

30

35

40

45

50

55

FIG. 1A

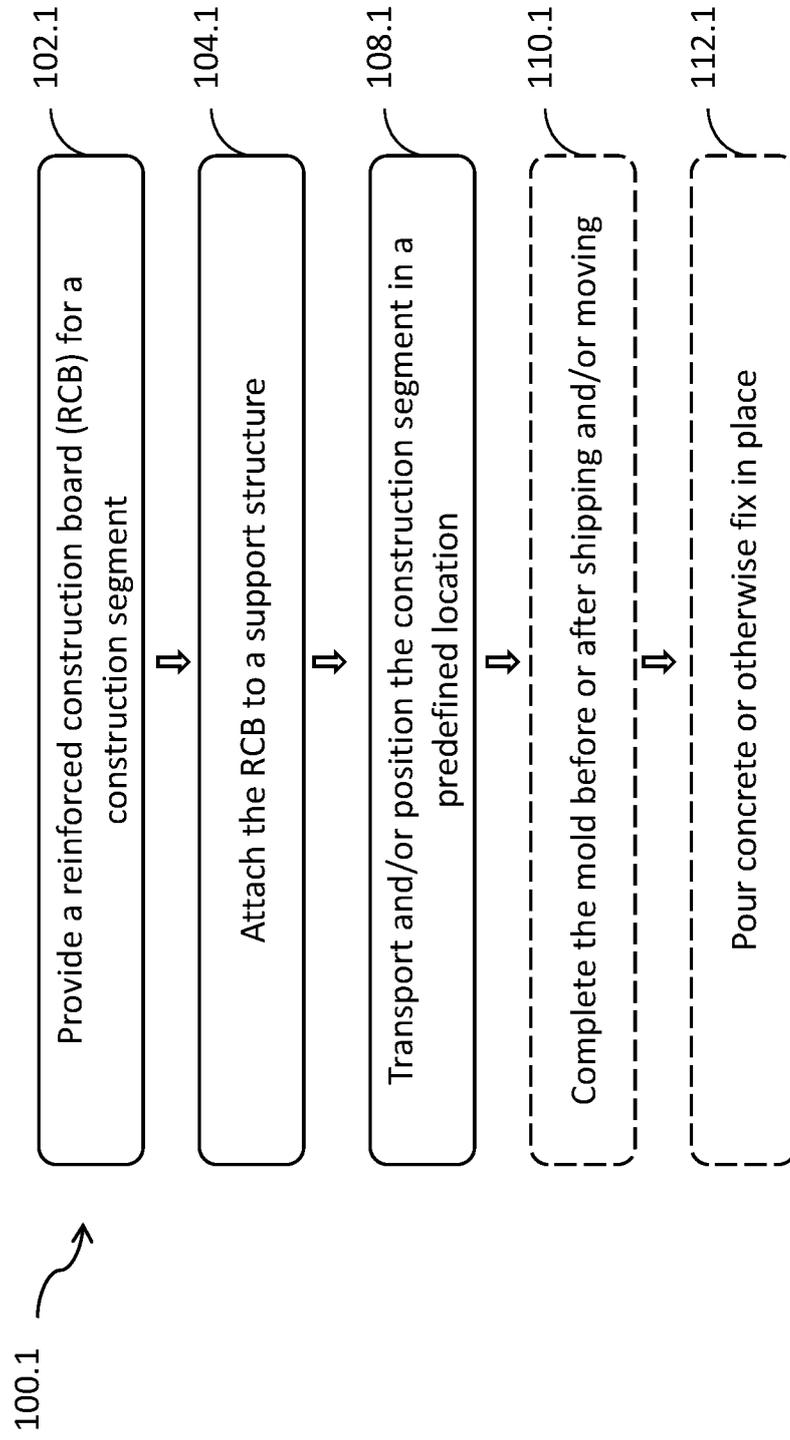


FIG. 1B

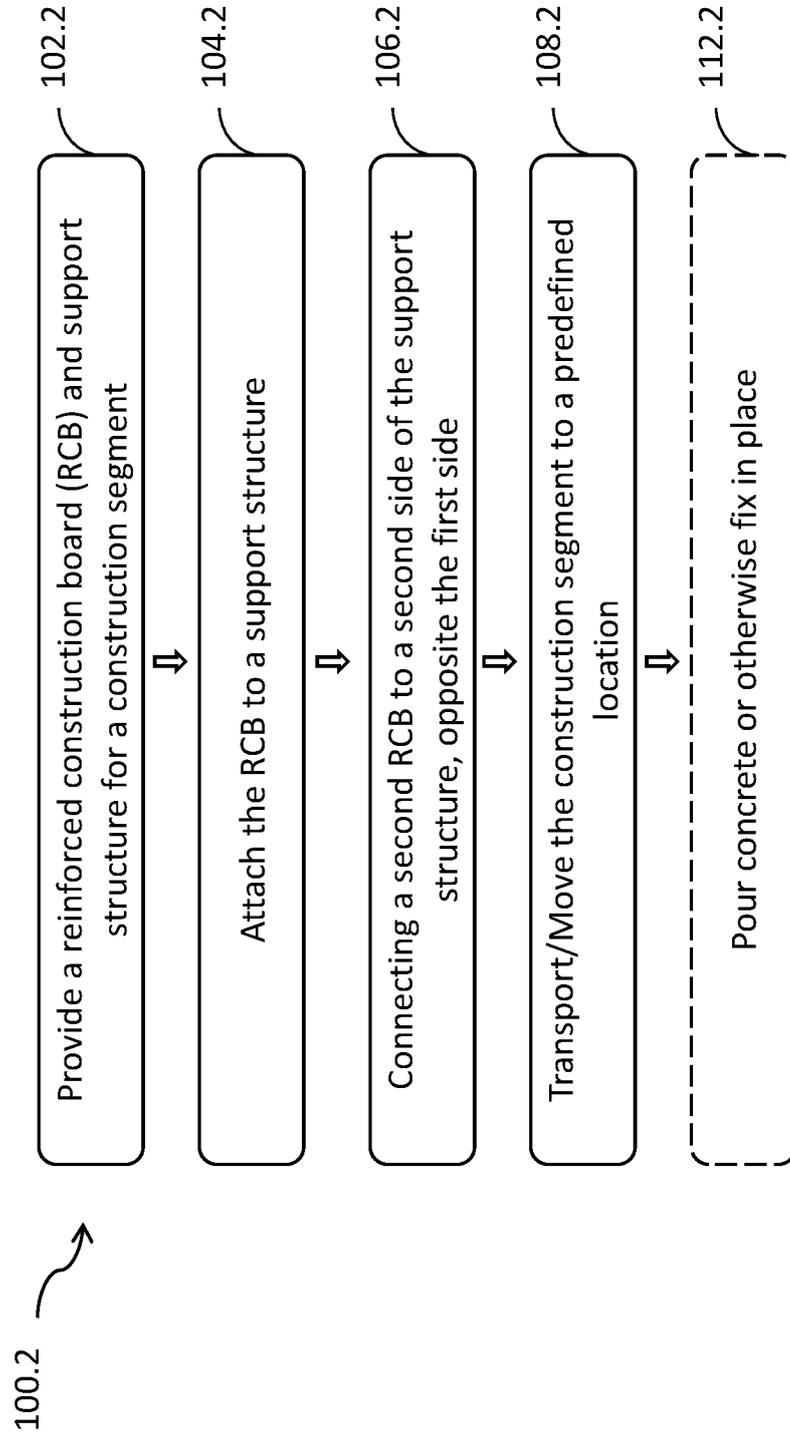


FIG. 1C

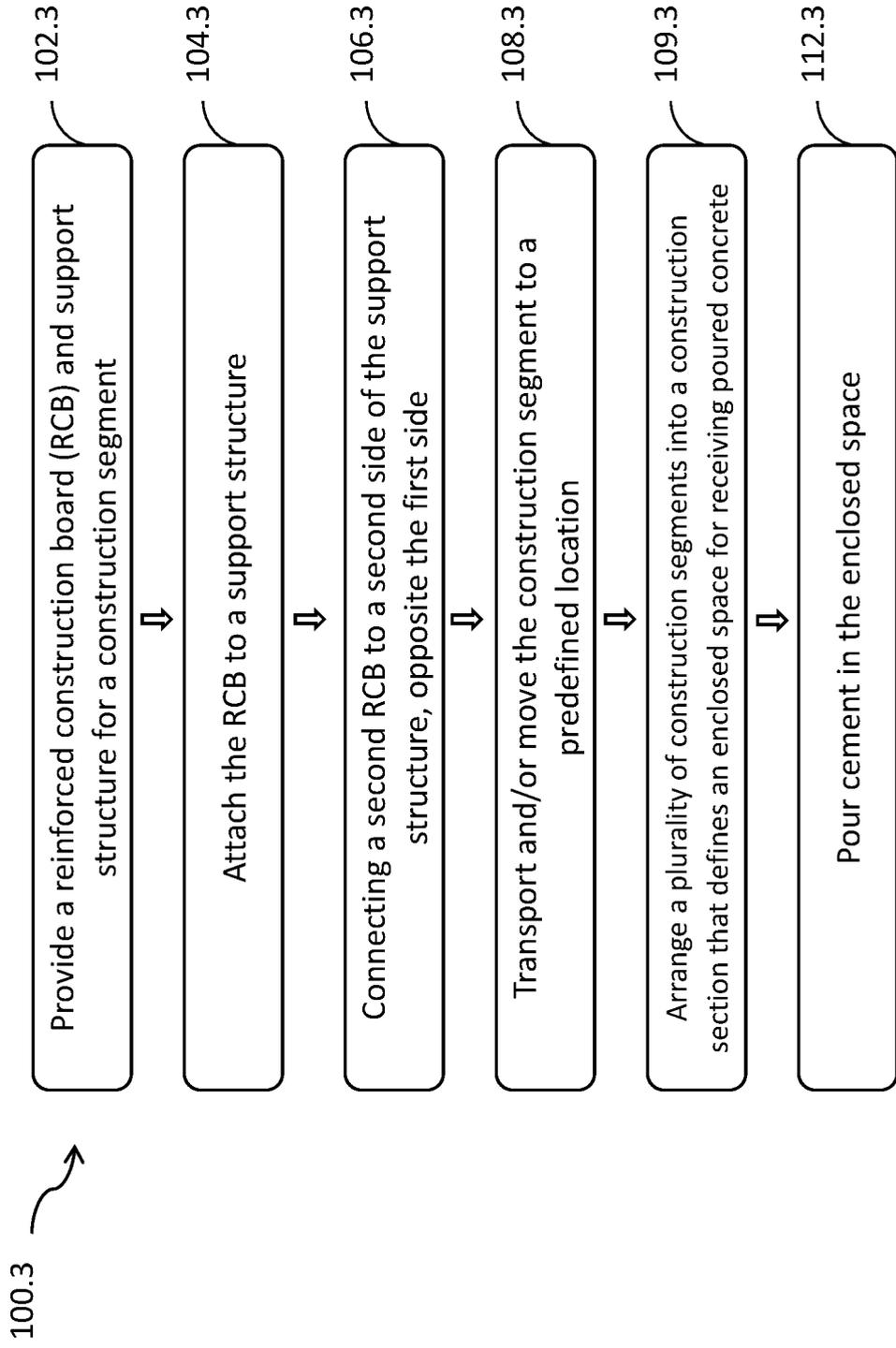


FIG. 1D

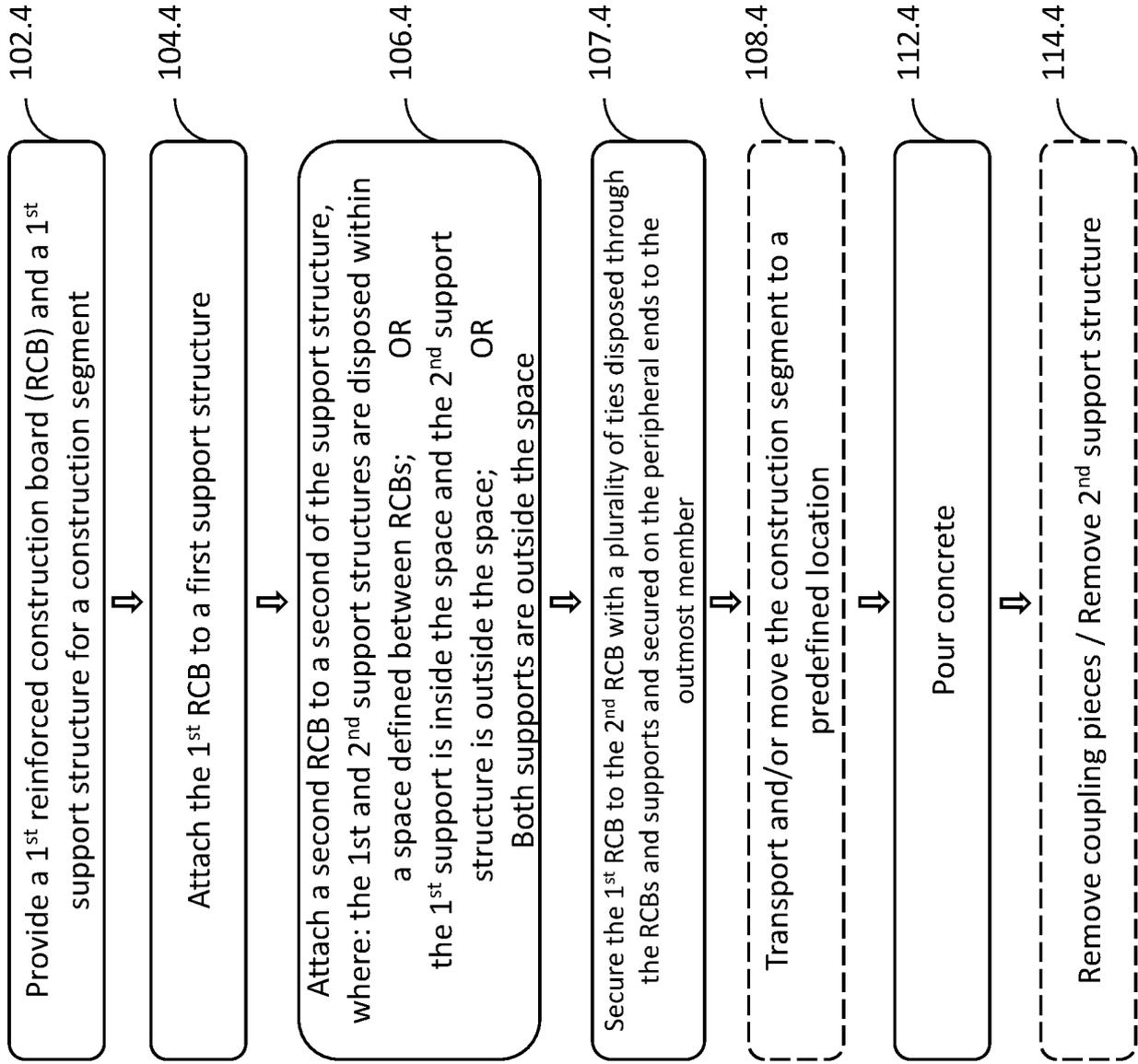


FIG. 1E

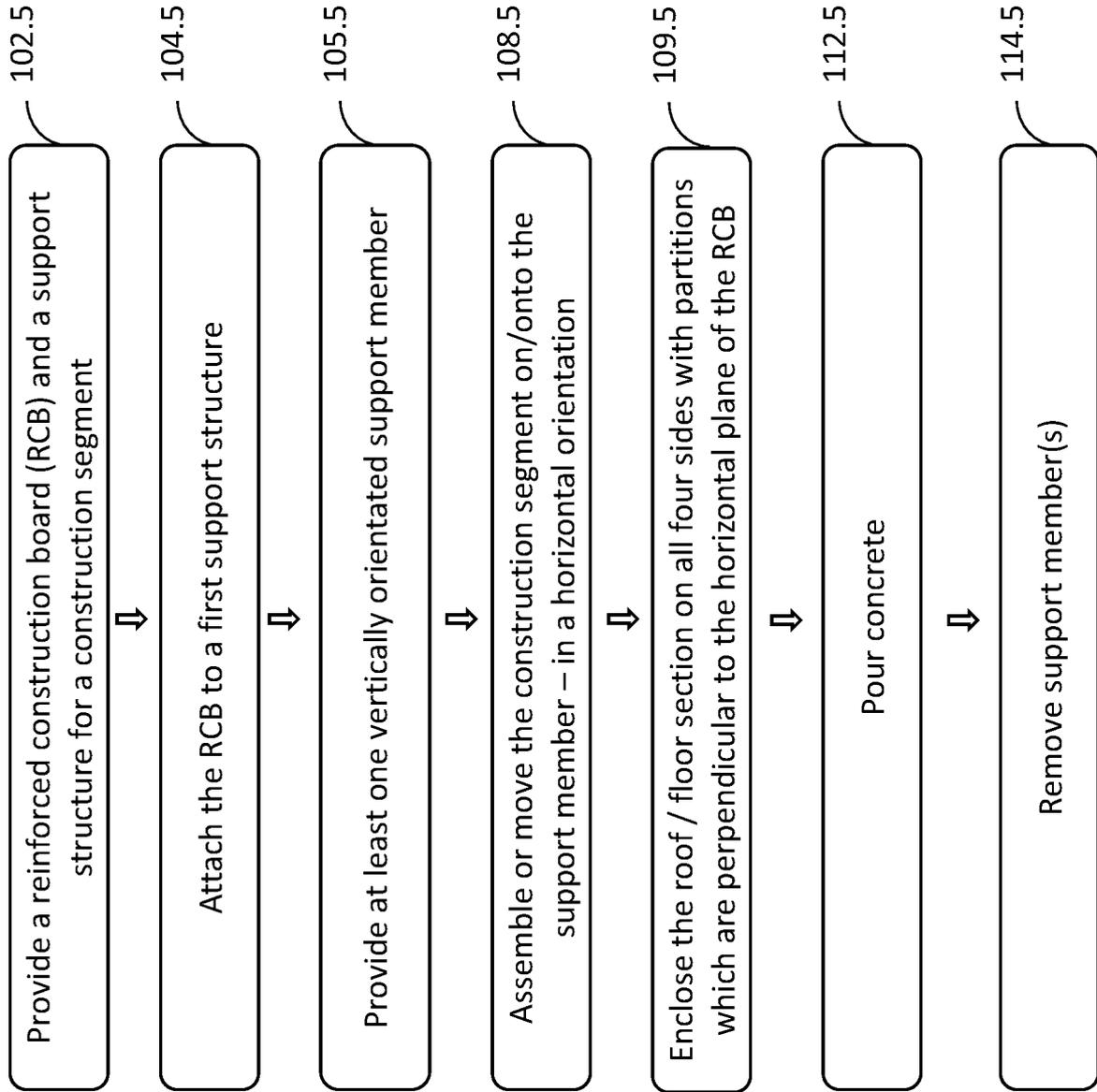
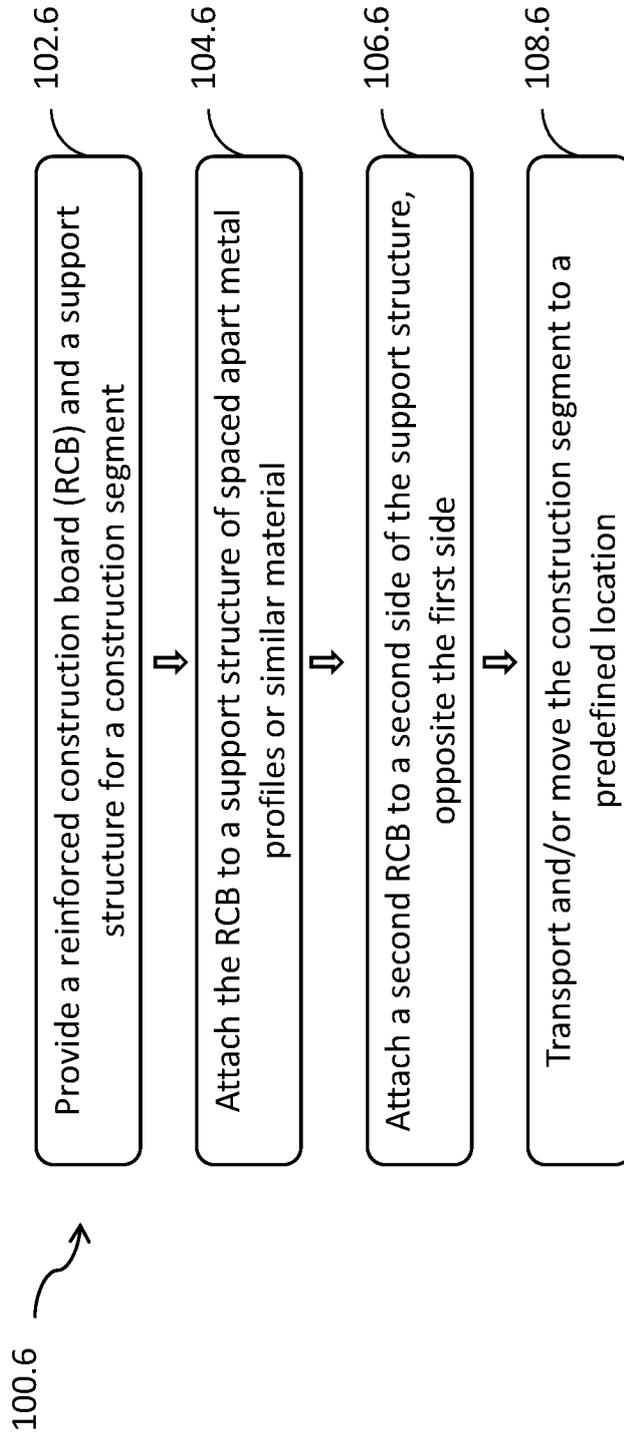


FIG. 1F



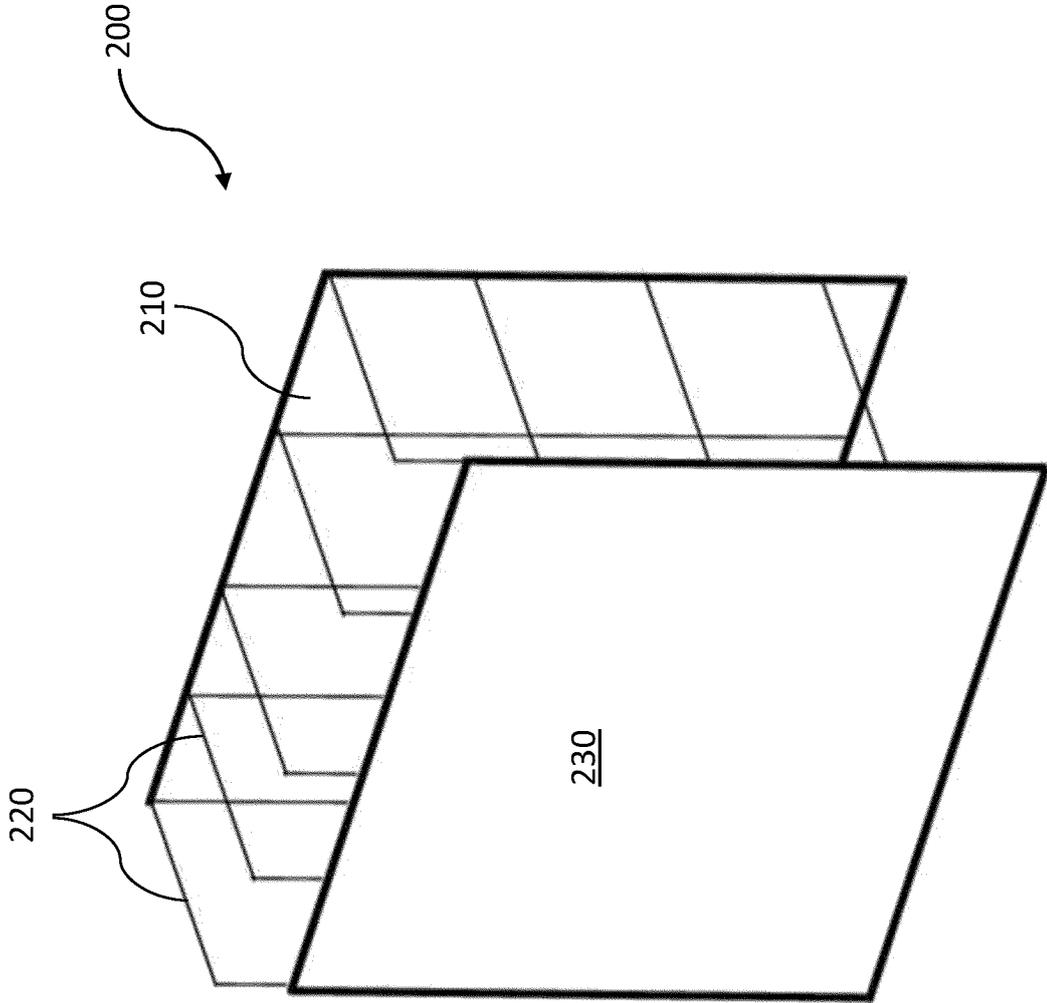
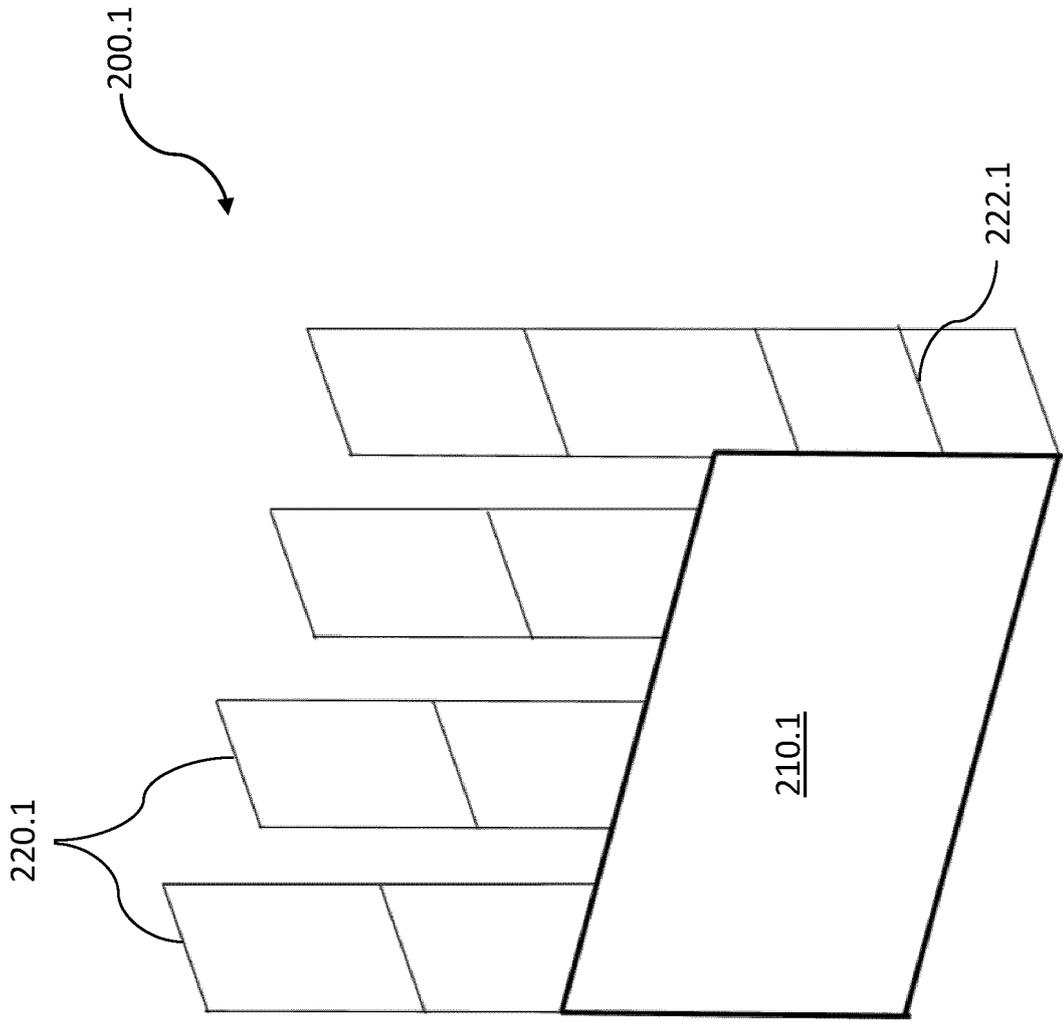


FIG. 2A

FIG. 2B



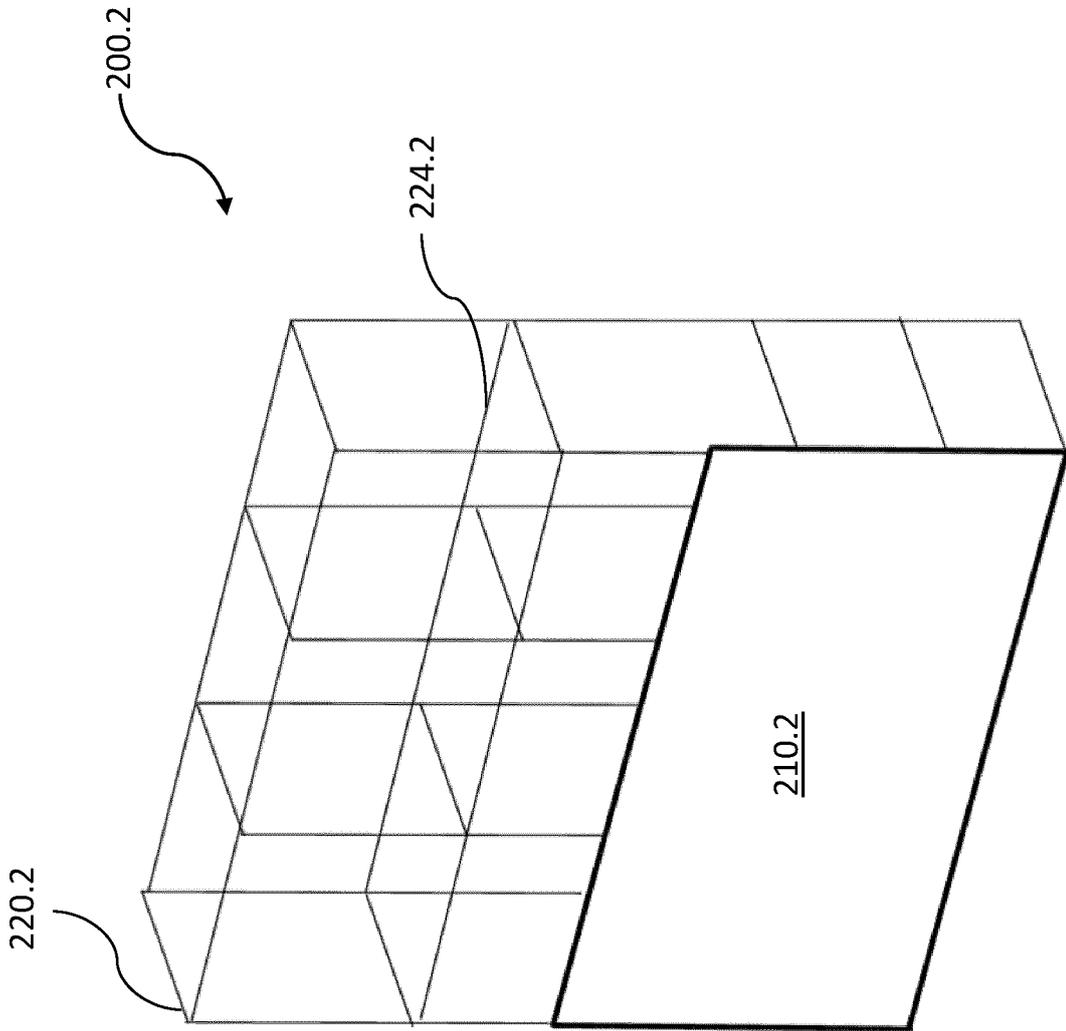


FIG. 2C

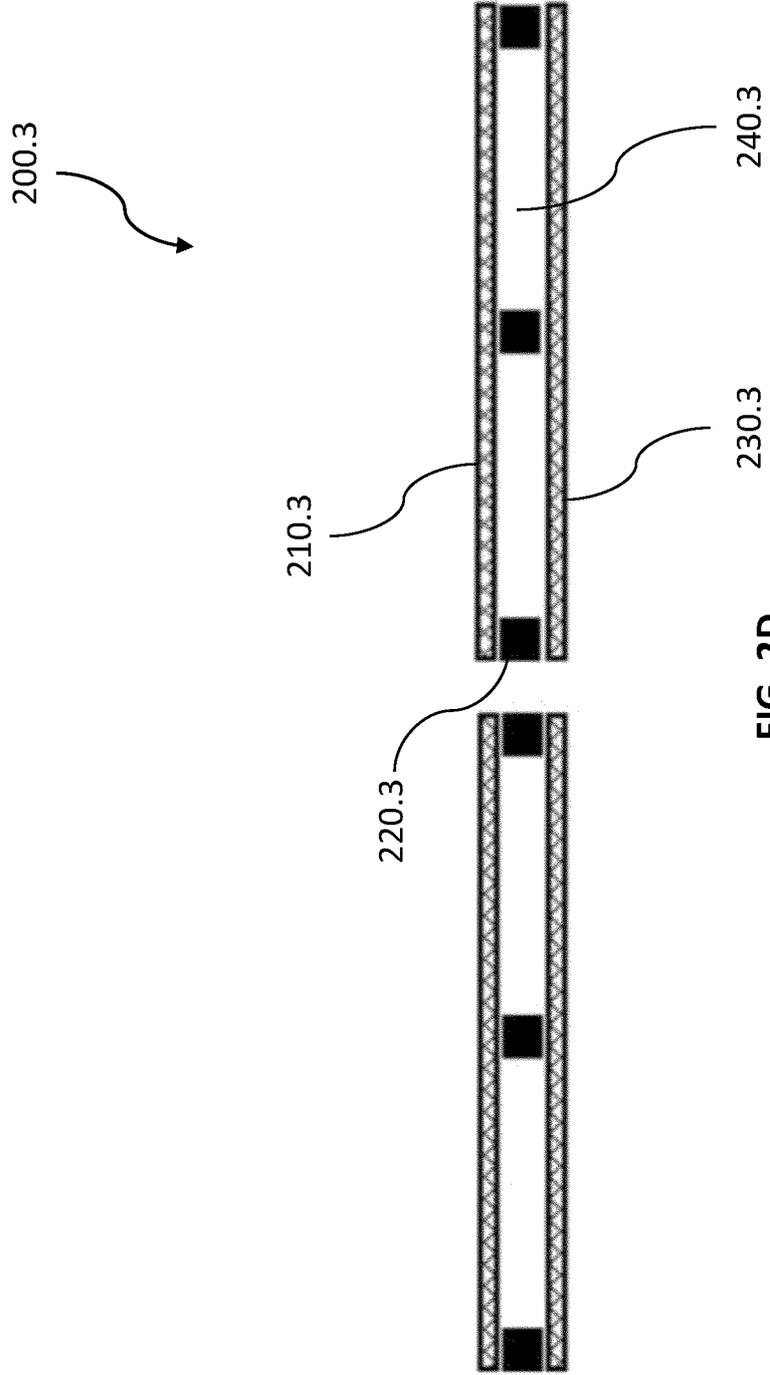


FIG. 2D

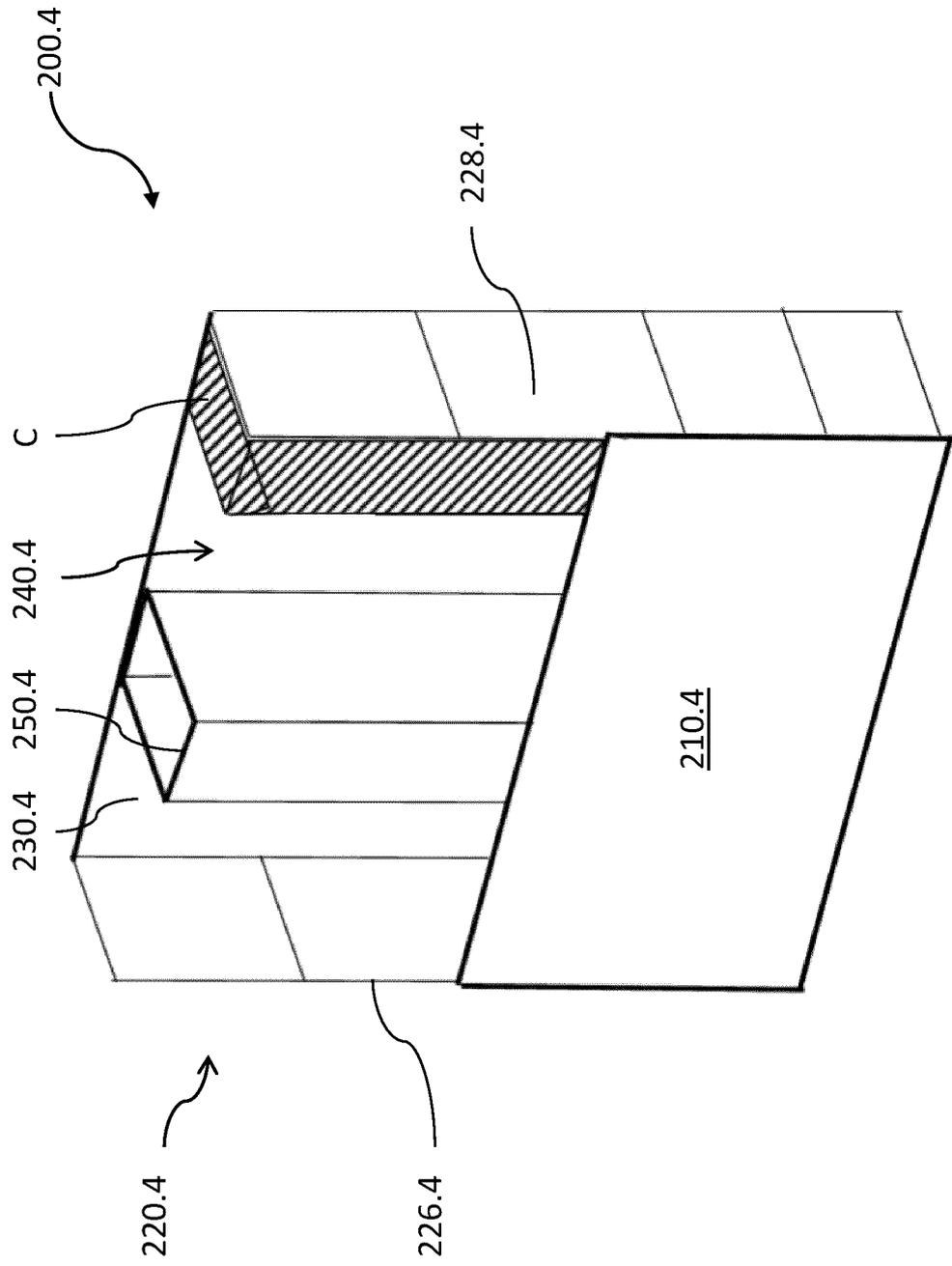


FIG. 2E

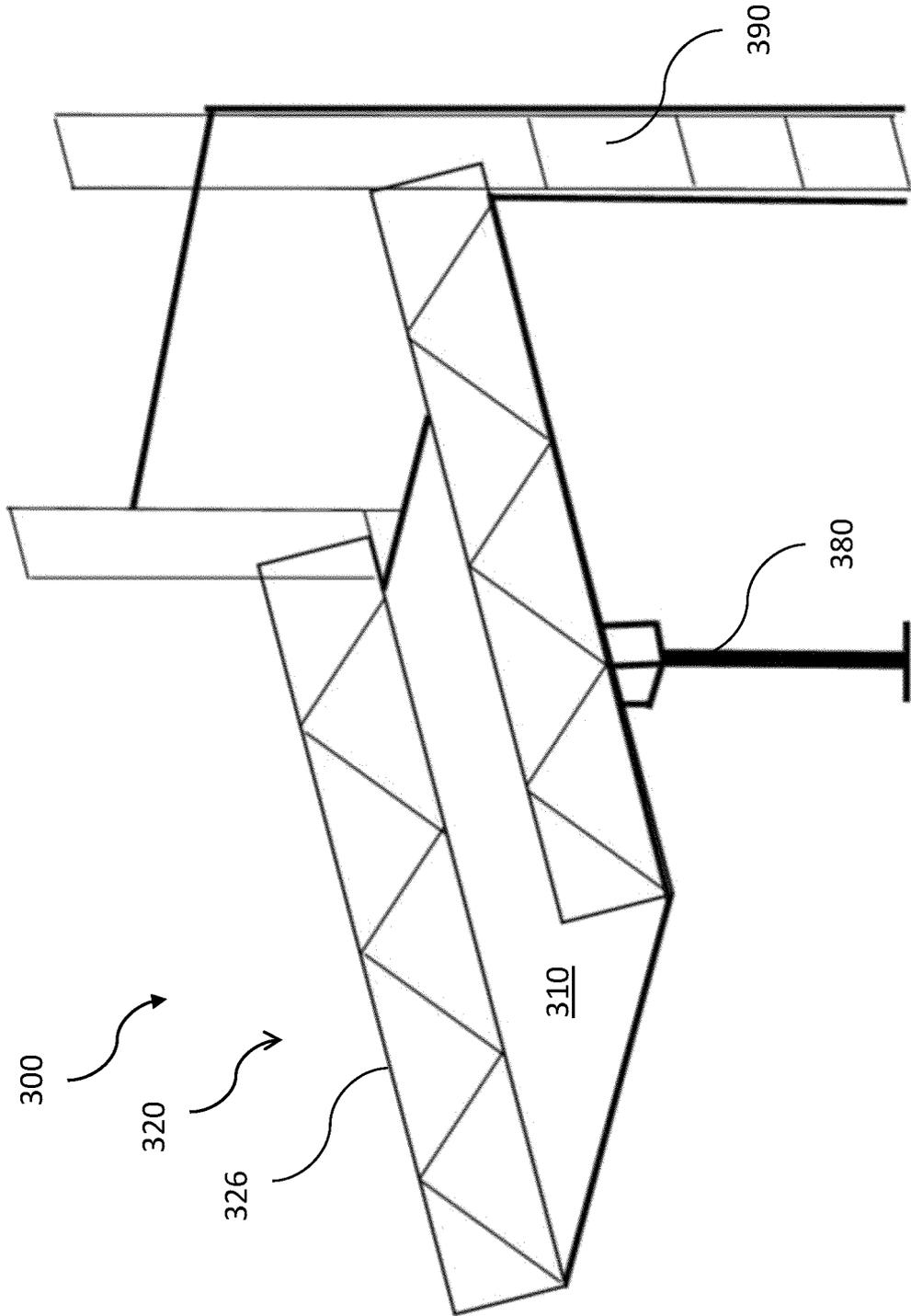


FIG. 3A

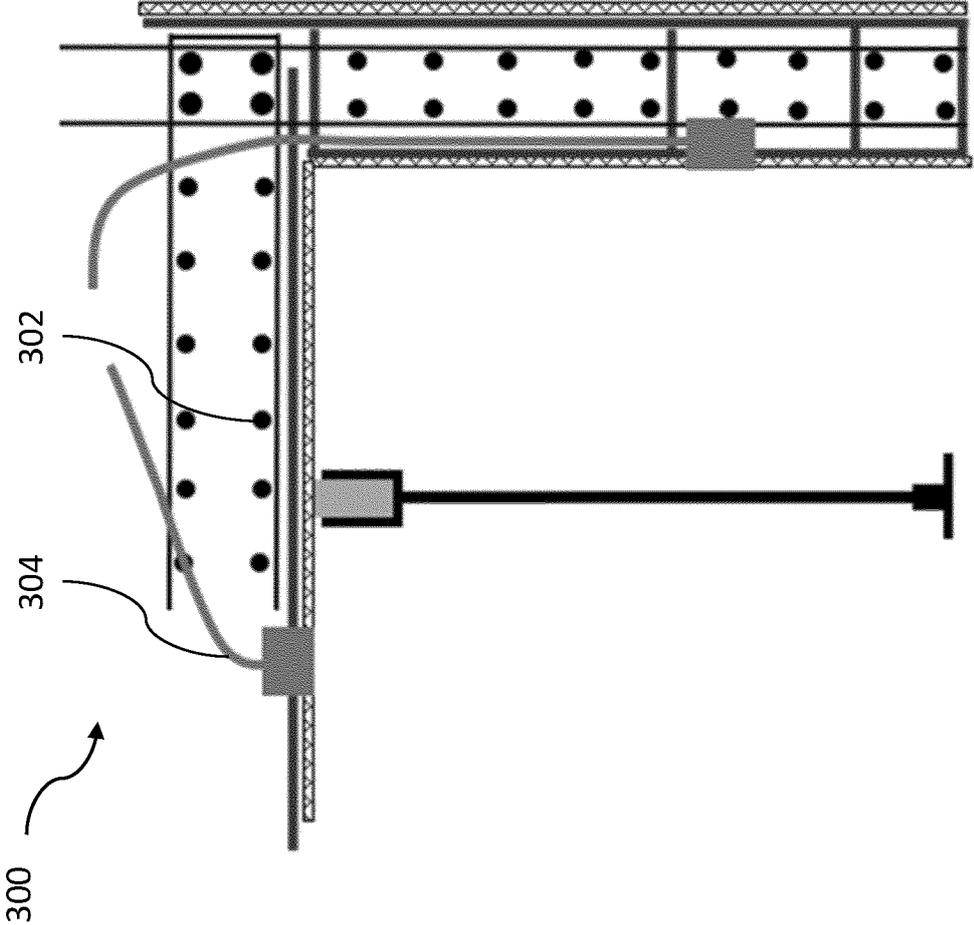
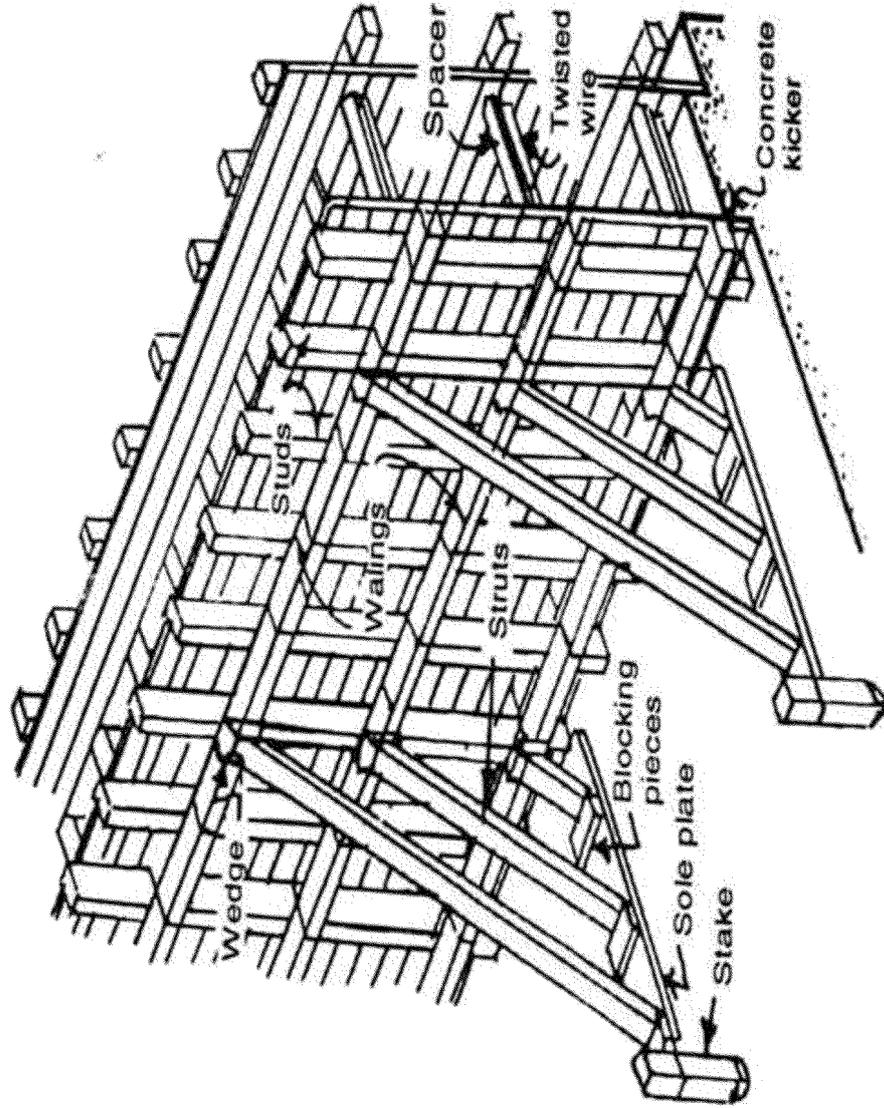


FIG. 3B

FIG. 4A



PRIOR ART

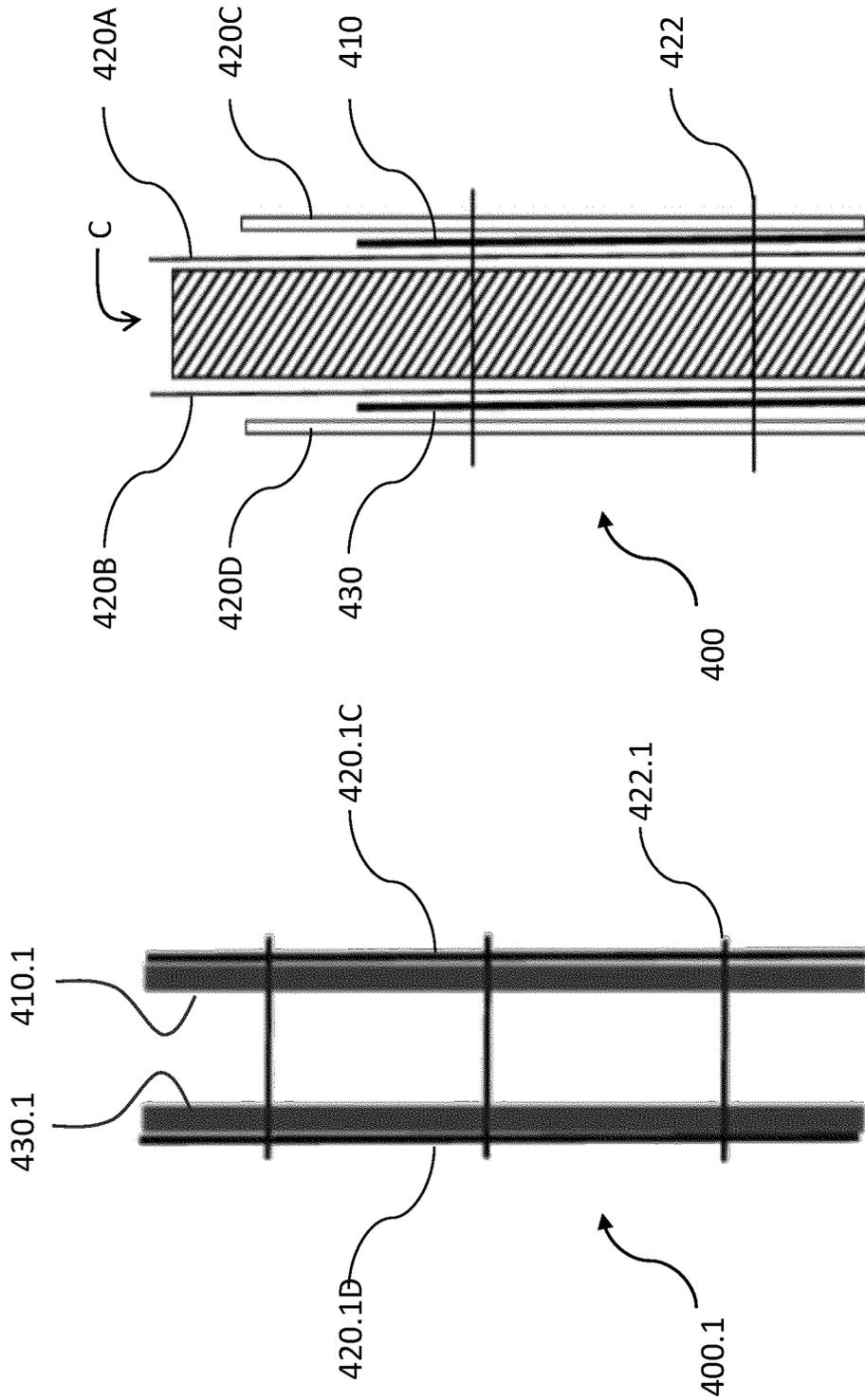


FIG. 4B

FIG. 4C

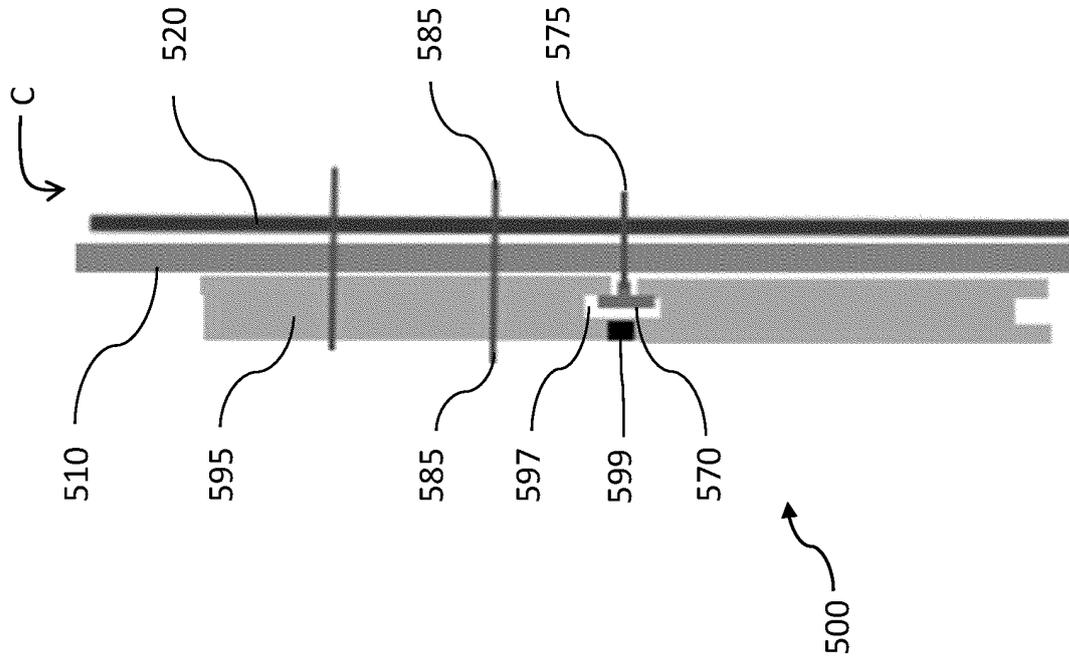


FIG. 5

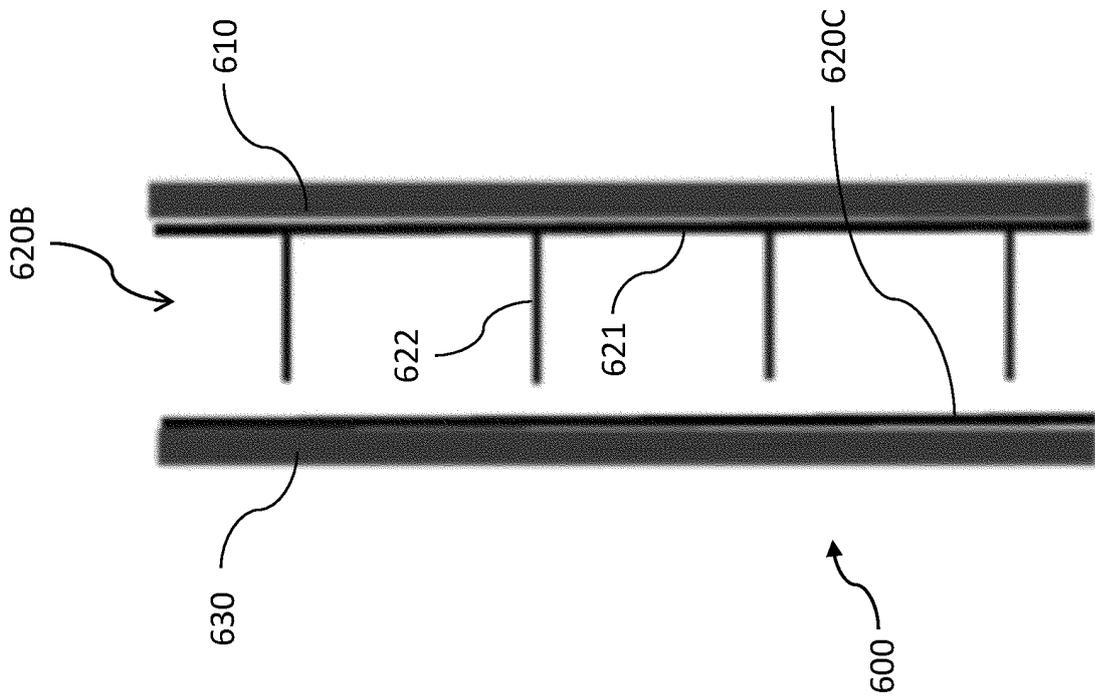
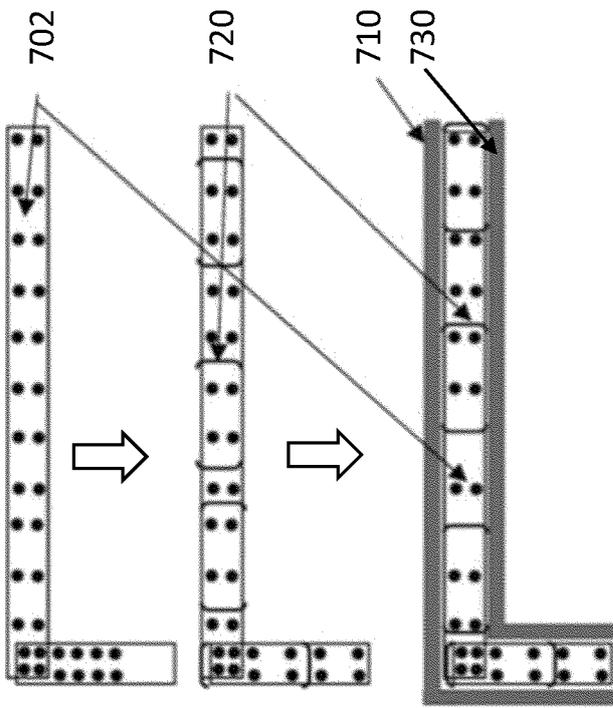
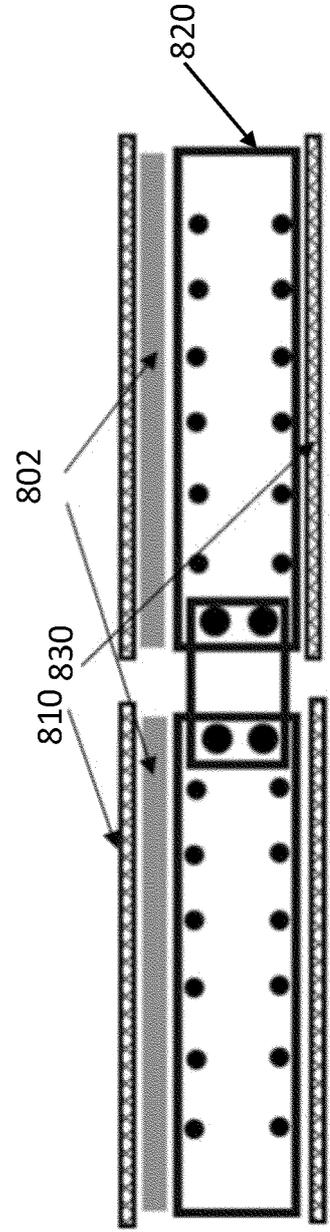


FIG. 6



700

FIG. 7



800

FIG. 8



EUROPEAN SEARCH REPORT

Application Number  
EP 24 18 6684

5

10

15

20

25

30

35

40

45

50

55

1  
EPO FORM 1503 03.82 (F04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 644 592 B1 (POLYFINANCE COFFOR HOLDING S A [CH]) 9 January 2008 (2008-01-09) * paragraph [0019]; figures 1-5 * * paragraph [0034] - paragraph [0040] * -----	1-15	INV. E04G13/00 E04B1/16 E04B2/86
X	US 2007/044426 A1 (DEANS SCOTT [US]) 1 March 2007 (2007-03-01) * paragraph [0028] - paragraph [0039]; claims 7,12; figures 7,13,20 * -----	1-15	
X	US 2022/213684 A1 (BESJAK CHARLES [US] ET AL) 7 July 2022 (2022-07-07) * paragraph [0123] - paragraph [0125]; claim 21; figures 2,3, 18, 21a-21c * * paragraph [0029] * * paragraph [0070] - paragraph [0073] * * paragraph [0102] * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04G E04B
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>1 November 2024</b>	Examiner <b>Manera, Marco</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 24 18 6684

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-11-2024

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1644592	B1	09-01-2008	AP 2192 A 07-01-2011
			AR 047234 A1 11-01-2006
			AT E383475 T1 15-01-2008
			AU 2003283655 A1 19-05-2005
			BR 0318566 A 10-10-2006
			CA 2544521 A1 12-05-2005
			CN 1878921 A 13-12-2006
			CY 1107356 T1 19-12-2012
			DE 60318634 T2 15-01-2009
			DK 1644592 T3 13-05-2008
			EA 200600653 A1 27-10-2006
			EG 24410 A 20-05-2009
			EP 1644592 A1 12-04-2006
			ES 2299737 T3 01-06-2008
			IL 175208 A 29-04-2010
			KR 20060070579 A 23-06-2006
			MA 28148 A1 01-09-2006
			MY 140687 A 15-01-2010
			OA 13320 A 13-04-2007
			PL 208862 B1 30-06-2011
PT 1644592 E 07-04-2008			
SI 1644592 T1 30-06-2008			
TN SN06125 A1 15-11-2007			
UA 82128 C2 11-03-2008			
US 2007028544 A1 08-02-2007			
WO 2005042864 A1 12-05-2005			
ZA 200603516 B 26-09-2007			
-----			
US 2007044426	A1	01-03-2007	NONE
-----			
US 2022213684	A1	07-07-2022	AU 2021416527 A1 01-09-2022
			CA 3165038 A1 14-07-2022
			CN 115244260 A 25-10-2022
			EP 4077826 A1 26-10-2022
			JP 2023514035 A 05-04-2023
			US 2022213684 A1 07-07-2022
WO 2022150224 A1 14-07-2022			
-----			

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- US 63524941 [0001]