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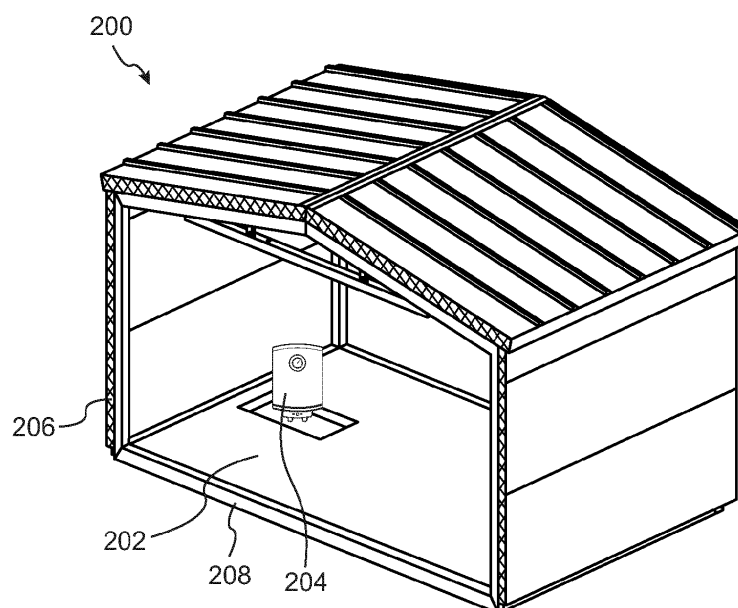
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**(54) A FLOOR FRAMEWORK FOR A BUILDING, AND A BUILDING**

(57) Embodiments of the present disclosure provide a floor framework (202) for a building (200) for housing electrical power equipment (204). The floor framework (202) comprises of one or more metallic framework elements (206) and one or more CLT wooden framework elements (208) positioned between the one or more metallic framework elements (206). The one or more metallic framework elements (206) are connected to

the one or more CLT wooden framework elements (208). The disclosure also provides a building (600) for housing electrical power equipment (602). The building (600) comprises of a floor (604) and a superstructure (606) comprised by walls (608) and a roof (610). The floor (604) in the building (600) comprises a floor framework (612).

**FIG. 2A****EP 4 528 043 A1**

## Description

### TECHNICAL FIELD

**[0001]** The present disclosure relates generally to a field of electrical building structures (E-building structures). More particularly, it is related to a floor framework for a building for housing electrical power equipments.

### BACKGROUND

**[0002]** A concept of modular houses or E-houses has gained a lot of popularity since last few decades. Such modular houses are generally designed in a container-like structure which are not only cost-effective but are also easy to relocate. Technical components of these modular houses may be manufactured at some large and open spaces or factories and then may be lifted to a desired location.

**[0003]** Though lot of options are available that design and manufacture such modular buildings/housings, however majority of these available options faces a challenge in terms pre-requisite of early designing or pre-fabrication of floor frames. Since placement of different equipments (any heavy equipments or electrical equipments) may require particular design of the modular building, the changes in floor framework may be a tedious task, if performed at a later stage. The floor framework need to be pre-designed as per the fixing requirements of equipment over the floor framework.

**[0004]** Another challenge faced by the existing solutions lies in cabled openings that are provided in the floor framework in order to fix the equipments. In case there is a need to change the equipment while assembling the modular building, it is extremely challenging to alter the design of the floor framework. Such a change in the equipment may lead to lot of redesigning or modifications in the floor framework which is not only complex task but also leads to lot of financial losses. Additionally, with available floor structures, any possible extensions or late customizations may not be possible due.

**[0005]** Furthermore, in case of currently available steel structures which are used for making the modular housings and the floor frameworks, application of fire proofing or cable penetrations during designing and redesigning deteriorates the strength of the steel floor.

### SUMMARY

**[0006]** Consequently, there is a need for an improved floor framework and a building for providing easy customization in the design of the floor framework and the design of the building (for example, providing any late customizations in the floor framework).

**[0007]** It is therefore an object of the present disclosure to provide a floor framework and a building for housing electrical power equipment, which mitigate, alleviate, or eliminate all or at least some of the above-discussed

drawbacks of presently known solutions.

**[0008]** According to a first aspect of the present disclosure, a floor framework for a building for housing electrical power equipment is provided. The floor framework comprises one or more metallic framework elements and one or more CLT (Cross Laminated Timber) wooden framework elements positioned between the one or more metallic framework elements. The one or more metallic framework elements are further connected to the one or more CLT wooden framework elements.

**[0009]** Therefore, with the proposed floor framework, any late or future customizations in the floor framework are possible and the proposed floor framework may allow fixing of electrical equipments of any design and at any stage. The use of CLT, which can be to a high degree self-supporting and does not require stabilizing metal beams across the floor, enables easy attachment of electrical equipment by means of bolting (without the need of taking the position of any beams into consideration), and also enables a free positioning of through holes for guidance of cables through the floor.

**[0010]** In some embodiments, the metal of the one or more metallic framework elements comprises steel.

**[0011]** In some embodiment, the floor framework comprises a protective layer which is electrically non-conductive and may be arranged on a top surface of the one or more CLT wooden framework elements.

**[0012]** In some embodiment, the material of the protective layer comprises at least one of rubber, plastic, pressed hardboard, plywood or surface-finished plywood.

**[0013]** In some embodiment, the protective layer is attached to the one or more CLT wooden framework elements through a fixing means comprising at least one of a glue joint, a screw joint and a bolt joint. In particular, the use of CLT is advantageous when screw joints and bolt joints are applied, since the CLT reduces the need of a framework of supporting beams of metal, and since the CLT itself is suitable for such attachment and can be made self-supporting.

**[0014]** Therefore, the CLT framework as provided in the proposed floor framework enables any customization at any point of time while assembling the building.

**[0015]** The proposed CLT -wooden panel are made from CLT wood which is highly fire resistant and avoids a need of any separate fireproofing for the floor framework.

**[0016]** In some embodiment, the one or more metallic framework elements extend around the one or more CLT wooden framework elements in a shape of a ring-shaped beam.

**[0017]** Therefore, such combination of metallic framework elements and the CLT wooden framework elements in the proposed floor framework makes the building more sustainable and provide better fire resistance.

**[0018]** In some embodiment, the ring-shaped beam comprises provisions for bolt connections for arranging a superstructure on top of the floor framework.

**[0019]** In some embodiment, the ring-shaped beam is provided at at least one end of the one or more CLT wooden framework elements and each of the CLT wooden framework elements is connected to and supported by the ring-shaped beam.

**[0020]** In some embodiment, the one or more CLT wooden framework elements are provided with one or more openings. With such openings, the low-medium-high electrical equipments of any design may be easily fixed, which reduces any re-designing or engineering.

**[0021]** Therefore, the openings (may also be referred as holes) may be made easily in a late stage with simple wood working tools and the CLT wooden floor framework elements also allow for easy fastening of the electrical equipments on a whole surface of the floor framework. Such electrical equipments may be fixed even when the location of openings gets finalised at a later stage.

**[0022]** Additionally, with the proposed CLT wooden framework elements any kind of equipment extensions are easy to execute regarding making new openings and fixing of electrical equipments.

**[0023]** In some embodiment, the one or more CLT wooden framework elements are designed to carry a weight of at least 500 kg/m<sup>2</sup> thereon, preferably at least 1000 kg/m<sup>2</sup>.

**[0024]** According to a second aspect of the present disclosure, a building for housing electrical power equipment is provided. The building comprises of a floor and a superstructure. The superstructure is further comprised by walls and a roof.

**[0025]** The proposed building becomes universal and may be manufactured for stock usage as the CLT floor framework elements forming the floor and superstructure may be customised at any stage.

**[0026]** In some embodiment, the building comprises of electrical power equipment arranged on the floor and attached to the floor by means of bolt joints.

**[0027]** In some embodiment, the electrical power equipment exerts a pressure of at least 500 kg/m<sup>2</sup> on the floor.

**[0028]** In some embodiment, the one or more CLT wooden framework elements form a continuous sheet defining a floor area of at least 10 m<sup>2</sup>.

**[0029]** In some embodiment, the electrical power equipment (104) is a low-medium-high voltage equipment.

**[0030]** Advantageously, the proposed floor framework and the building provide an easy to customize CLT wooden framework which provides an easy assembling and fixing of any low-medium-high voltage electrical equipments. Such CLT wooden framework elements in the floor framework is an energy-efficient construction material, where renewable and recyclable timber is used as raw materials.

**[0031]** In some embodiments, any of the above aspects may additionally have features identical with or corresponding to any of the various features as explained above for any of the other aspects.

**[0032]** Other advantages may be readily apparent to one having skill in the art. Certain embodiments may have none, some, or all of the recited advantages.

## 5 BRIEF DESCRIPTION OF THE DRAWINGS

**[0033]** The foregoing will be apparent from the following more particular description of the example embodiments, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the example embodiments.

15 FIG. 1 is a prior art building according to some embodiments;

FIG. 2(A) shows a perspective view of a floor framework for a building according to some embodiments;

20 FIG. 2(B) shows alternate perspective view of a floor framework for a building according to some embodiments;

25 FIG. 3 shows one or more metallic framework elements extended around one or more CLT wooden framework elements in a ring-shaped beam according to some embodiments;

30 FIG. 4 shows an overview of one or more CLT wooden framework elements positioned between the one or more metallic framework elements in the building according to some embodiments;

35 FIG. 5(A) shows a front view of a floor framework for a building along with a superstructure to be fixed over the floor framework according to some embodiments;

40 FIG. 5(B) shows a front view of a floor framework for a building with lifting support/means for lifting the floor framework with superstructure according to some embodiments; and

45 FIG. 6 shows a perspective view of a building for housing electrical power equipment according to some embodiments.

## DETAILED DESCRIPTION

50 **[0034]** Aspects of the present disclosure will be described more fully hereinafter with reference to the accompanying drawings. The floor framework and building disclosed herein can, however, be realized in many different forms and should not be construed as being limited to the aspects set forth herein. Like numbers in the drawings refer to like elements throughout.

**[0035]** The terminology used herein is for the purpose

of describing particular aspects of the disclosure only, and is not intended to limit the invention. It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps, or components, but does not preclude the presence or addition of one or more other features, integers, steps, components, or groups thereof. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

**[0036]** Embodiments of the present disclosure will be described and exemplified more fully hereinafter with reference to the accompanying drawings. The solutions disclosed herein can, however, be realized in many different forms and should not be construed as being limited to the examples set forth herein.

**[0037]** In the following description of exemplary embodiments, the same reference numerals denote the same or similar components.

**[0038]** FIG. 1 shows a prior art building (100) having a floor framework. The building (100) as shown in the prior art is building made from metallic frameworks for making walls, roofs and superstructure. The floor framework includes steel beams placed as per the requirement of electrical equipments.

**[0039]** In an embodiment, FIG. 2A discloses an example floor framework (202) for a building (200) for housing electrical power equipment (204). The floor framework (202) comprises one or more metallic framework elements (206) and one or more CLT wooden framework elements (208). The one or more CLT wooden framework elements (208) are positioned between the one or more metallic framework elements (206). The one or more metallic framework elements (206) are further connected to the one or more CLT wooden framework elements (208).

**[0040]** In existing building solutions (for example, building (100) shown in prior art of FIG. 1), it is essential to pre-fabricate the floor framework as per the design of electrical equipments to be fixed in the floor framework. The existing building solutions do not provide any flexibility in terms of any late customization in the design of the floor framework thus making it non-flexible and non-customizable. Different equipment lead to different building frames, and therefore the floor framework need to be tailor designed or manufactured. Due to a complete metal-based floor framework which is across the floor preferably at a distance of 60 cm cc, any changes in the floor framework of the existing solutions may require a lot of engineering and time.

**[0041]** According to some embodiments, the proposed floor framework provides a combination of metallic framework elements and the CLT wooden framework thus making it possible to implement any late or future customizations while fixing electrical equipments of any design while avoiding a need of fire proofing.

**[0042]** In some embodiment, as shown in FIG. 2(B), the floor framework (202) comprises a protective layer (210)

arranged on a top surface of the one or more CLT wooden framework elements (108). The protective layer (210) comprises an electrically non-conductive and non-static protective layer (210) made from the material comprising at least one of rubber, plastic, pressed hardboard, plywood, or surface-finished plywood. In some embodiment, the protective layer (110) is attached to the one or more CLT wooden framework elements (208) through a fixing means comprising at least one of a glue joint, a screw joint and a bolt joint.

**[0043]** As also shown in FIG. 2(A), each CLT wooden framework element in the one or more CLT wooden framework elements (208) comprises one single piece of CLT wood which may be easily lifted from one place to other. The one or more CLT wooden framework elements (108) are provided with one or more openings (212). The electrical equipments may be fixed in the floor framework (202) through the one or more openings (212).

**[0044]** The one or more openings (212) in the floor framework (202) provide easy and quick cable penetrations for the electrical equipments (204). Additionally, the one or more CLT wooden framework elements (206) are monolithic in structure thus making it easier to make openings (212) in the floor framework (202). Such openings (212) may be done with wood working tools and doesn't require any complex tools or engineering which saves lot of time and cost.

**[0045]** As shown in FIG. 3, the one or more metallic framework elements (206) extend around the one or more CLT wooden framework elements (208) in a shape of a ring-shaped beam (302). The metal of the one or more metallic framework elements (206) comprises steel. The ring-shaped beam (302) is provided at at least one end of the one or more CLT wooden framework elements (208). Furthermore, each of the CLT wooden framework elements (208) is connected to and supported by the ring-shaped beam (302) in the floor framework (202).

**[0046]** In some embodiment, FIG. 4 shows an overview of the floor framework (202) in the housing (200) having the one or more CLT wooden frameworks (208) positioned between the one or more metallic framework elements (206). The one or more metallic frameworks (206) are arranged circumferentially outside the floor framework (202).

**[0047]** With the proposed floor framework, the prefabricated building may be manufactured without knowing the final electrical equipments to be placed inside the building. Buildings and building modules may even be manufactured in stock.

**[0048]** In some embodiment, FIG. 5(A) shows the floor framework (202) that may be manufactured separately and may then be fixed to a superstructure (504). The dashed lines in FIG. 5(A) shows unarranged/separate superstructure (504). The super structure (504) comprises detachable superstructure which may be fixed to the floor framework (202) thus forming the building

(200). The superstructure (504) may be made of welded steel profiles.

**[0049]** FIG. 5(B) shows the ring-shaped beam (302) comprises provisions for bolt connections (502) for arranging the superstructure (504) on top of the floor framework (202). Once the superstructure (504) is arranged over the top of the floor framework (202), the building (200) may be lifted through lifting support or lifting means (506) provided over a top side of the one or more metallic framework elements (206).

**[0050]** In some embodiments, the one or more CLT wooden framework elements (208) are designed to carry a weight of at least 500 kg/m<sup>2</sup> thereon, preferably at least 1000 kg/m<sup>2</sup>. In the disclosed embodiment, the CLT wooden framework elements are designed to carry 1 100 kg/m<sup>2</sup>.

**[0051]** According to a second aspect of the present disclosure, as shown in FIG. 6, a building (600) for housing electrical power equipment (602) is provided. The building (600) comprises of a floor (604) and a superstructure (606). The superstructure (606) is further comprised by walls (608) and a roof (610). The floor (604) comprises a floor framework (612).

**[0052]** The floor framework (612) comprises one or more metallic framework elements (614) and one or more CLT wooden framework elements (612) positioned between the one or more metallic framework elements (614). The one or more metallic framework elements (614) are connected to the one or more CLT wooden framework elements (612). The one or more CLT wooden framework elements (612) are having one or more openings (618) for fixing the electrical equipments (602) in the floor (604).

**[0053]** In some embodiment, the floor framework (612) comprises a protective layer arranged (616) on a top surface of the one or more CLT wooden framework elements (612). The protective layer (616) comprises an electrically non-conductive and non-static protective layer made from the material comprising at least one of rubber, plastic, pressed hardboard, plywood, or surface-finished plywood. In some embodiment, the protective layer (616) is attached to the one or more CLT wooden framework elements (612) through a fixing means comprising at least one of a glue joint, a screw joint and a bolt joint.

**[0054]** In some embodiment, the building (600) comprises of electrical power equipment (602) arranged on the floor (604) and attached to the floor (604) by means of bolt joints. In some embodiment, the electrical power equipment (104) is a low-medium-high voltage equipment.

**[0055]** In some embodiment, the one or more CLT wooden framework elements form a continuous sheet defining a floor area of at least 10 m<sup>2</sup>. In the disclosed embodiment, the one or more CLT wooden framework elements form a continuous sheet defining a floor area of 30 m<sup>2</sup>.

**[0056]** In some embodiment, the electrical power

equipment (602) exerts a pressure of at least 500 kg/m<sup>2</sup> on the floor (204).

**[0057]** In some embodiment, the building (600) comprises an E-house which may be manufactured as a single lift building with a height of up to 30m or more and with an area of up to 44m<sup>2</sup>. The building (600) may also be manufactured as a building consisting of one or more building modules. Each of the building module may be considered as similar to the building module (600) as discussed in FIG. 6. The building (600) may be arranged as each of a domestic-purpose building or a commercial-purpose building.

**[0058]** Details and description of the floor framework (612) as shown in FIG. 6 are similar to the details and description of the floor framework (202) as discussed above and hence are not repeated for the sake of brevity.

**[0059]** The proposed floor framework as discussed in FIG. 1 to FIG. 6 also allows for easy fastening of the electrical equipments on a whole surface of the floor framework. Possible electrical equipment extensions are easy to execute regarding making new openings and fixing of the electrical equipments.

**[0060]** The proposed floor framework and the building comprising floor framework is made from solid timber CLT framework elements which is an energy-efficient construction material. In the CLT framework elements, renewable and recyclable timber is used as raw material. The CLT wood used in the CLT framework elements bind carbon dioxide and the CLT built building acts as carbon banks. Therefore, this way of building the floor framework and the building is more sustainable than the traditional all steel structures. In the proposed floor framework, the floor beams are replaced by the CLT wooden framework elements while limiting the metallic framework elements of steel structure in the building to about 30-40%.

**[0061]** The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the scope of the disclosure.

## Claims

1. A floor framework (202) for a building (200) for housing electrical power equipment (204), **characterized in that** the floor framework (202) comprises:

- one or more metallic framework elements (206) and;  
one or more CLT wooden framework elements (208) positioned between the one or more metallic framework elements (206),  
wherein the one or more metallic framework elements (206) are connected to the one or more CLT wooden framework elements (208).
2. The floor framework (202) of claim 1, wherein the metal of the one or more metallic framework elements (206) comprises steel.
  3. The floor framework (202) according to claim 1 or 2, wherein the floor framework (202) comprises a protective layer arranged (210) on a top surface of the one or more CLT wooden framework elements (208).
  4. The floor framework (202) of any of the preceding claims, wherein the one or more metallic framework elements (206) extend around the one or more CLT wooden framework elements (208) in a shape of a ring-shaped beam (302).
  5. The floor framework (100) of claim 4, wherein the ring-shaped beam (302) comprises provisions for bolt connections (502) for arranging a superstructure (504) on top of the floor framework (202).
  6. The floor framework (202) of any of claims 4 or 5, wherein the ring-shaped beam (302) is provided at at least one end of the one or more CLT wooden framework elements (208) and that each of the CLT wooden framework elements (208) is connected to and supported by the ring-shaped beam (302).
  7. The floor framework (202) of any of the preceding claims, wherein the one or more CLT wooden framework elements (208) are provided with one or more openings (212).
  8. The floor framework (202) of any of the preceding claims, wherein the one or more CLT wooden framework elements (208) are designed to carry a weight of at least 500 kg/m<sup>2</sup> thereon, preferably at least 1000 kg/m<sup>2</sup>.
  9. The floor framework (202) according to claim 3, wherein the material of the protective layer (210) comprises at least one of rubber, plastic, pressed hardboard, plywood or surface finished plywood.
  10. The floor framework (202) of any of the preceding claims, wherein the protective layer (210) is attached to the one or more CLT wooden framework elements (208) through a fixing means comprising at least one of a glue joint, a screw joint and a bolt joint.
  11. A building (600) for housing electrical power equipment (602), said building (600) comprising a floor (604) and a superstructure (606) comprised by walls (608) and a roof (610), and **characterized in that** the floor (604) comprises a floor framework (612, 202) according to any one of claims 1-10.
  12. A building (600) according to claim 11, comprising electrical power equipment (602) arranged on the floor (604) and attached to the floor (604) by means of bolt joints.
  13. A building (600) according to claim 12, wherein the electrical power equipment (602) exerts a pressure of at least 500 kg/m<sup>2</sup> on the floor (604).
  14. A building (600) according to any one of claims 11-13, wherein the one or more CLT wooden framework elements (612) form a continuous sheet defining a floor area of at least 10 m<sup>2</sup>.
  15. A building (600) according to claim 12 or 13, wherein the electrical power equipment (602) is a low-medium-high voltage equipment.

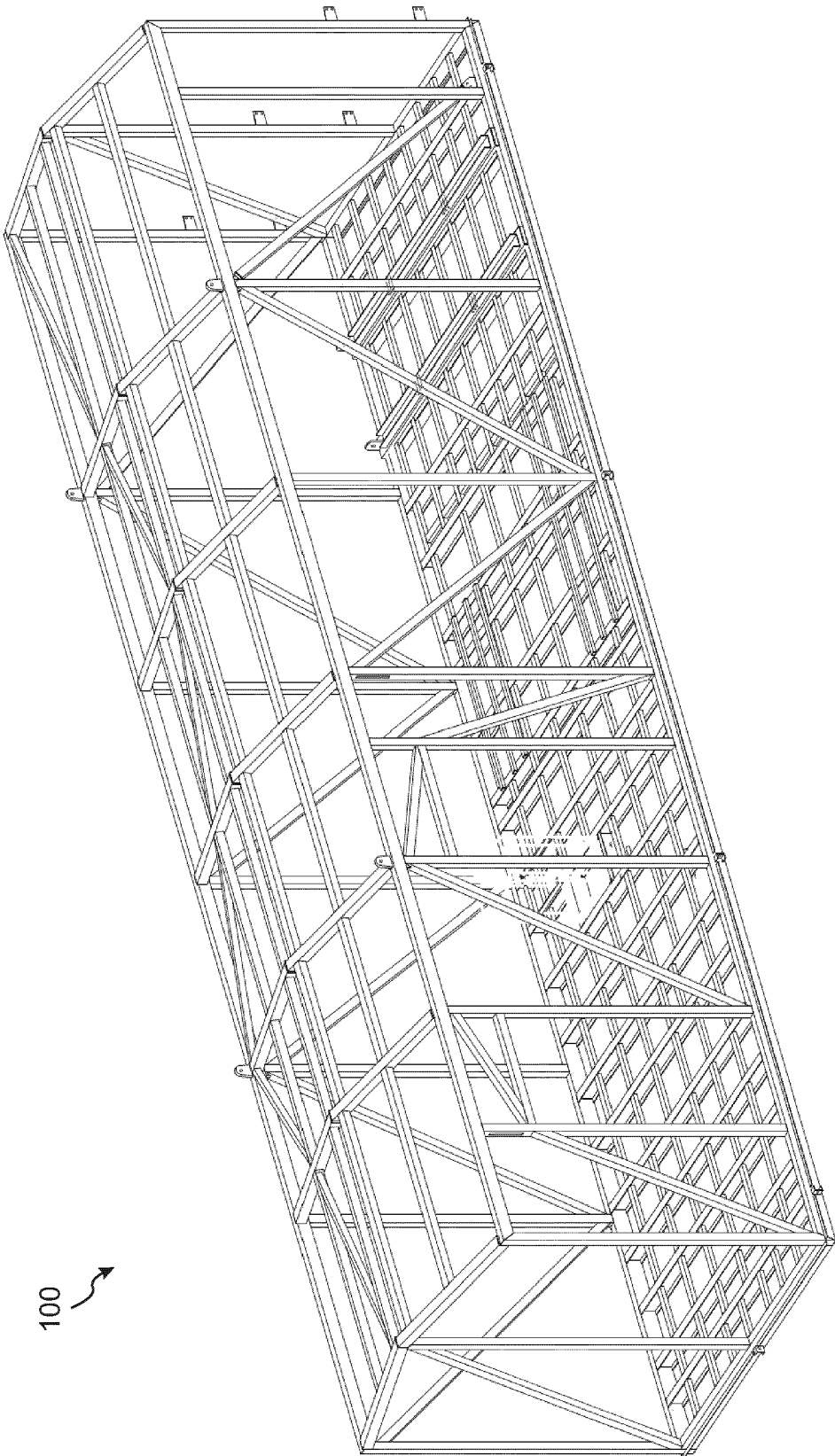


FIG. 1

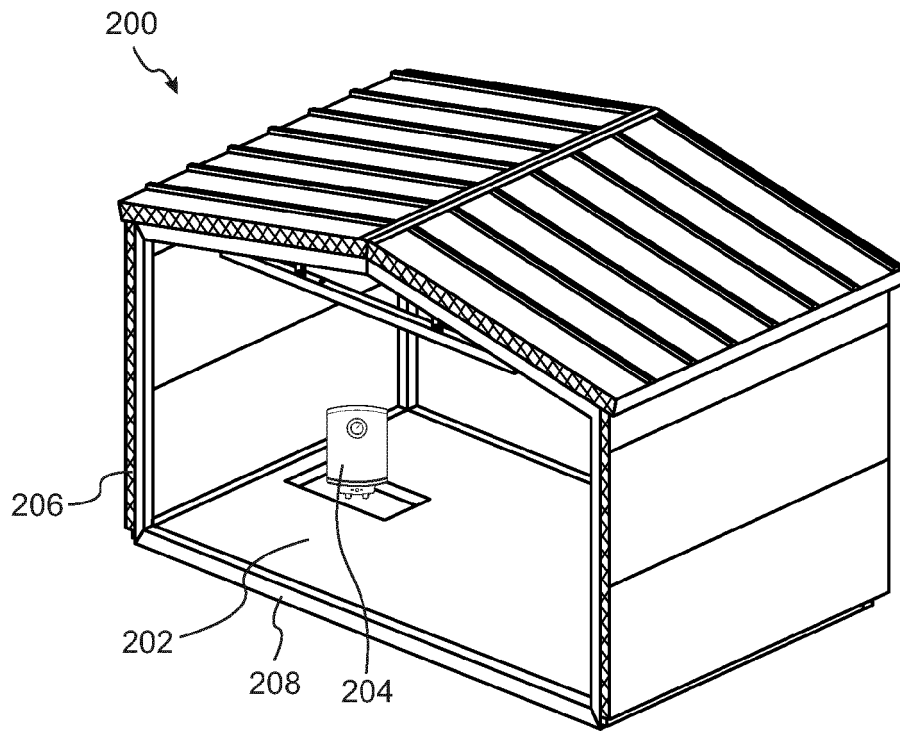


FIG. 2A

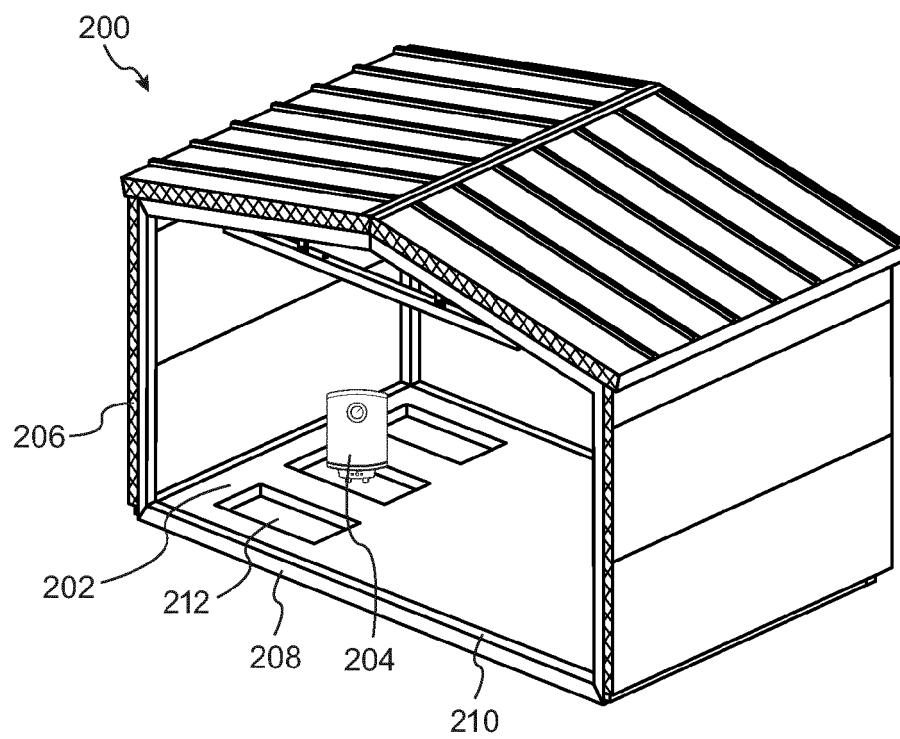


FIG. 2B



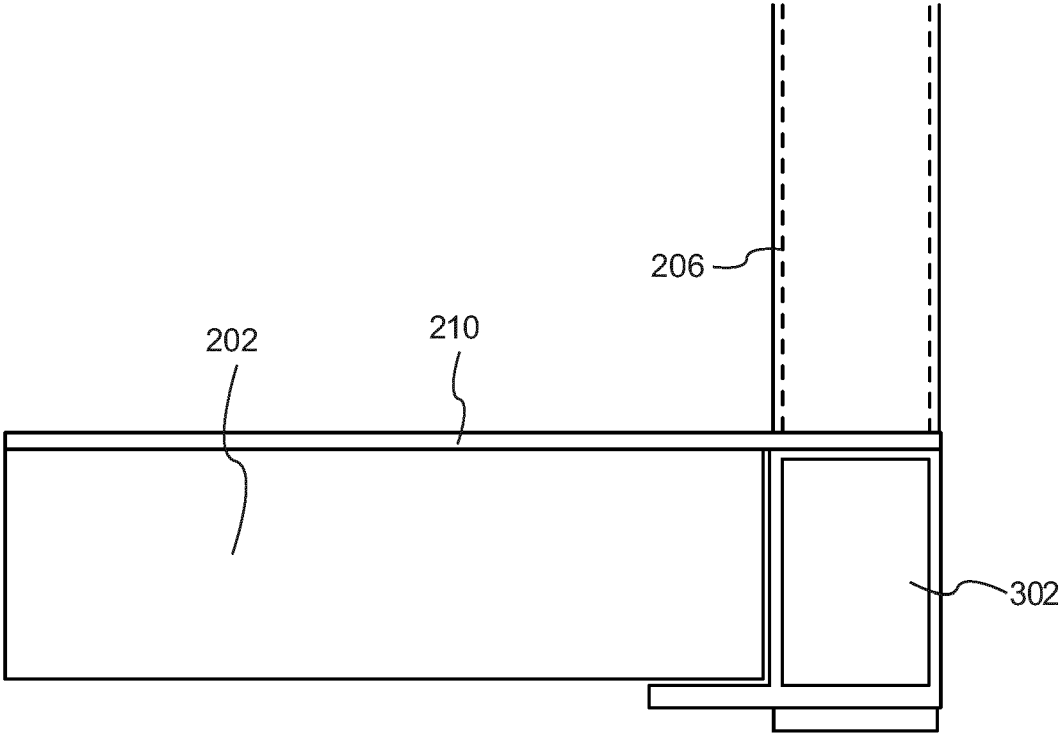


FIG. 3

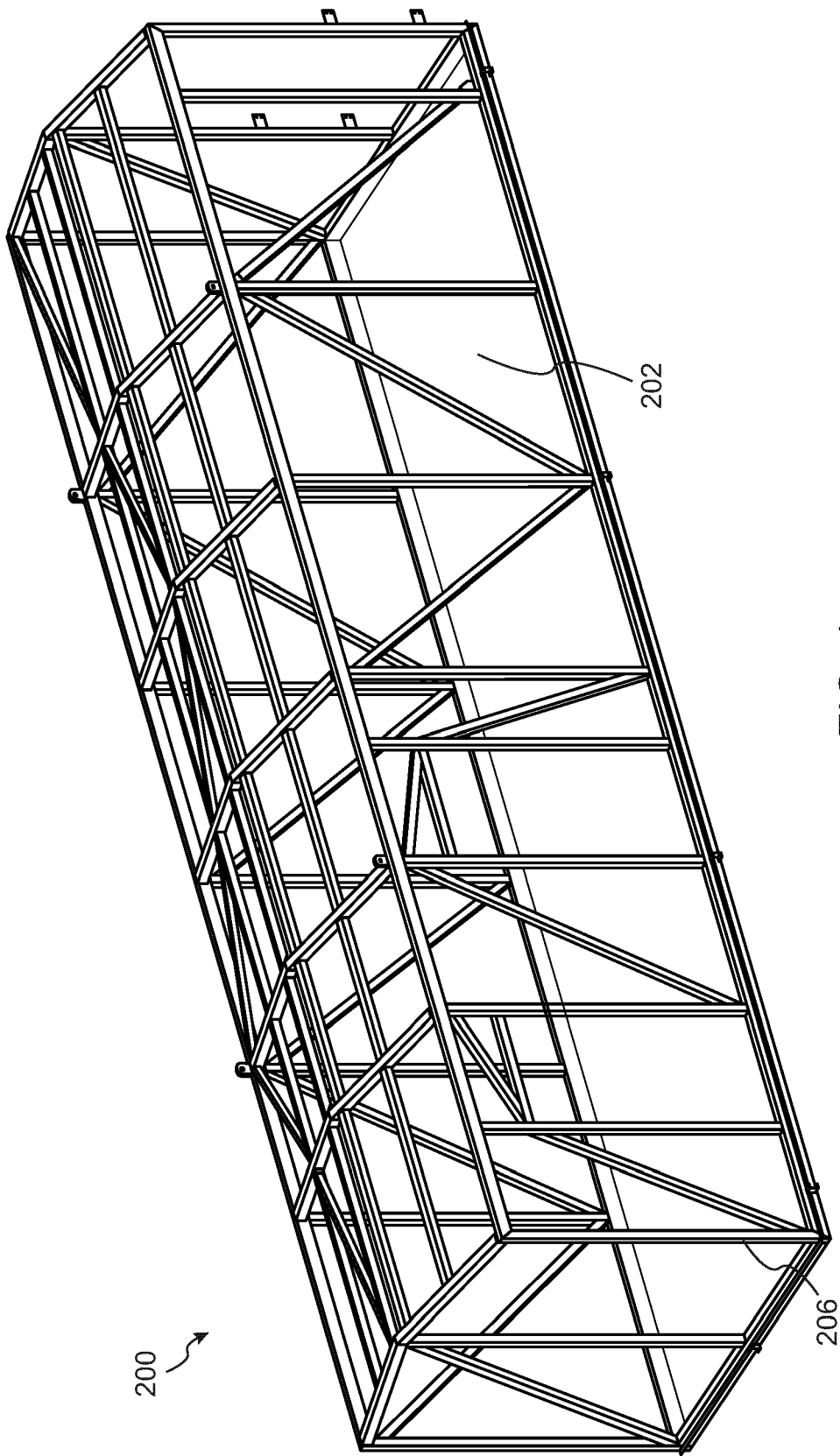


FIG. 4

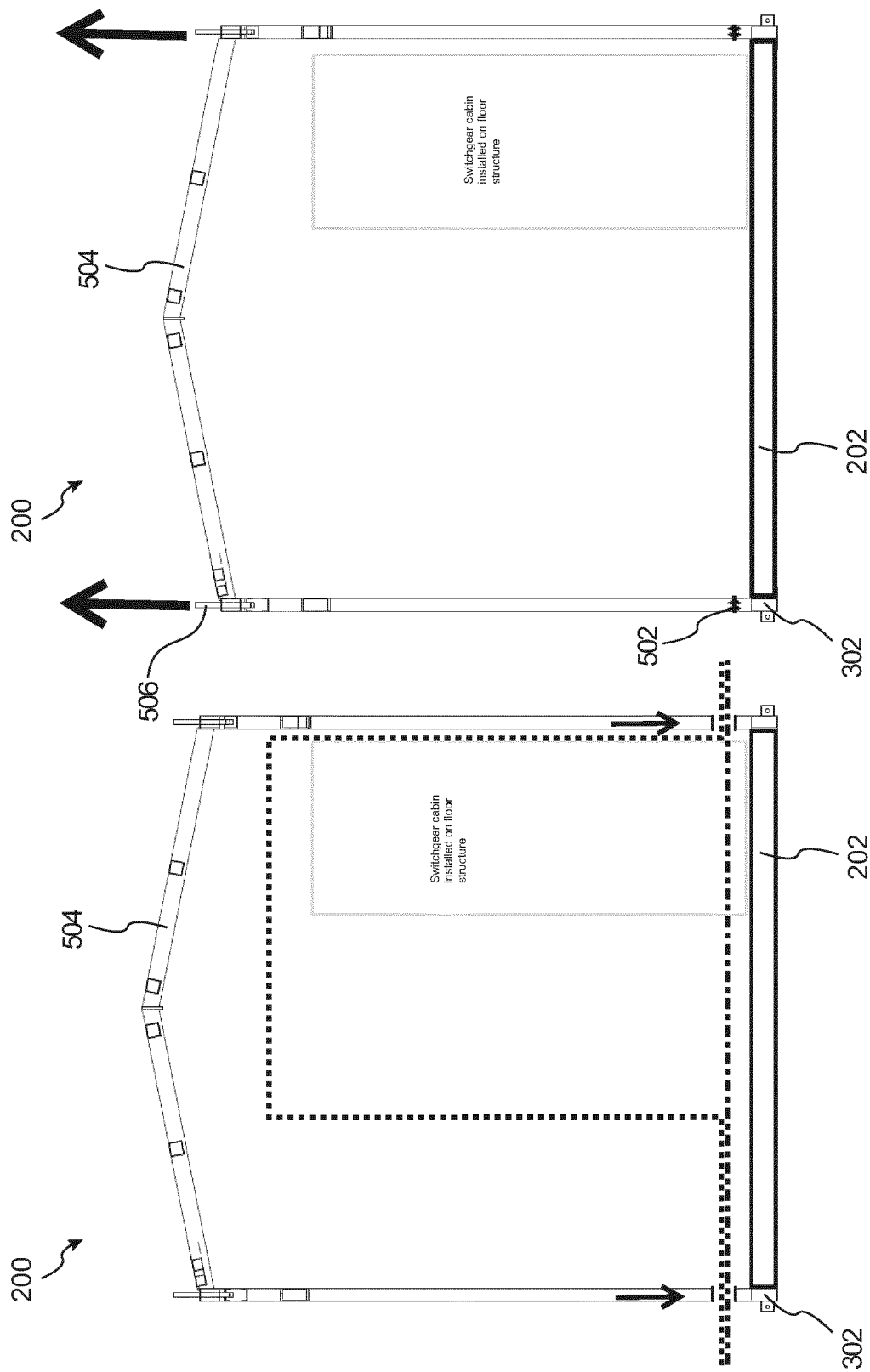


FIG. 5B

FIG. 5A

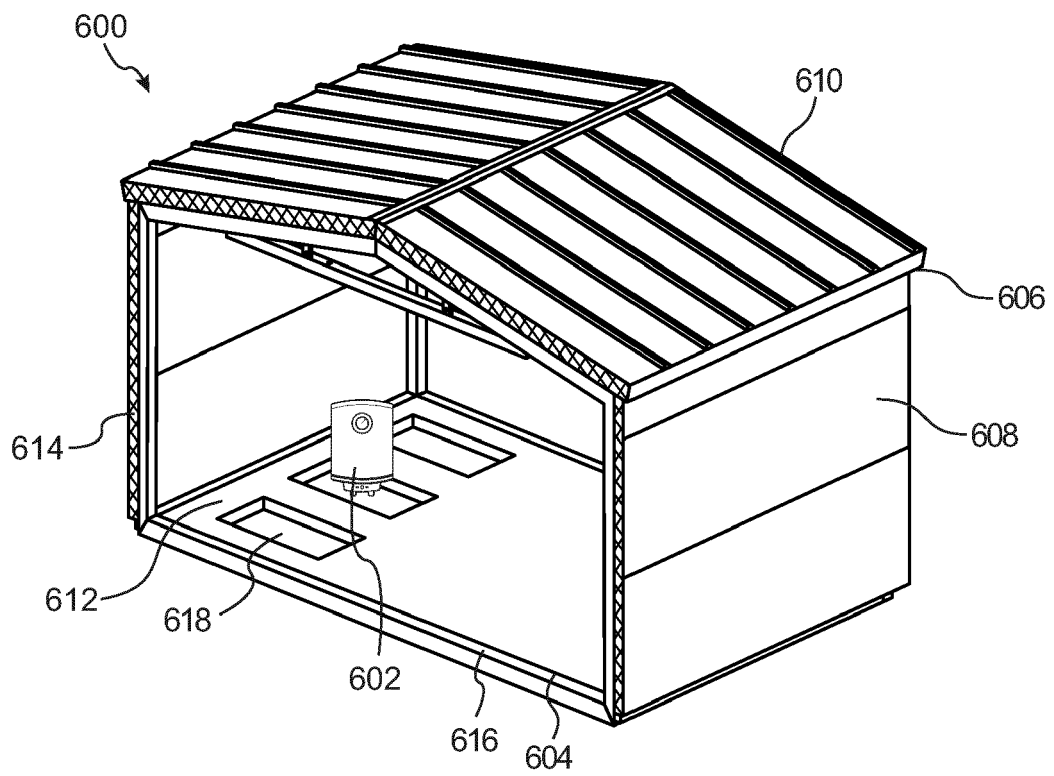


FIG. 6



## EUROPEAN SEARCH REPORT

Application Number

EP 23 19 8479

## 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 2 194 202 A2 (INDUO GES ZUR VERWERTUNG VON S [DE]) 9 June 2010 (2010-06-09)<br>* paragraphs [0040], [0043] - [0068];<br>figures 1a-5 * | 1-15                             | INV.<br>E04B1/348<br>E04B5/10<br>E04B5/12<br>E04H1/12 |
| X                                                                                                                                                                                                                                                                            | EP 4 219 848 A1 (VALEURS ALPINES [FR]) 2 August 2023 (2023-08-02)<br>* paragraphs [0001], [0032] - [0084];<br>figures 1-4, 6, 7 *         | 1-4,<br>6-11, 14                 |                                                       |
| A                                                                                                                                                                                                                                                                            | CH 536 563 A (CZERNIK ROMAN DIPL ING [AT]) 30 April 1973 (1973-04-30)<br>* column 1, line 1 - column 3, line 6;<br>figures 1-3 *          | 1-15                             |                                                       |
|                                                                                                                                                                                                                                                                              |                                                                                                                                           |                                  | TECHNICAL FIELDS SEARCHED (IPC)                       |
|                                                                                                                                                                                                                                                                              |                                                                                                                                           |                                  | E04B<br>E04H<br>H02B                                  |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                   |                                                                                                                                           |                                  |                                                       |
| Place of search                                                                                                                                                                                                                                                              |                                                                                                                                           | Date of completion of the search | Examiner                                              |
| The Hague                                                                                                                                                                                                                                                                    |                                                                                                                                           | 8 February 2024                  | Melhem, Charbel                                       |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                                                                  |                                                                                                                                           |                                  |                                                       |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document                                                      |                                                                                                                                           |                                  |                                                       |
| T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                           |                                  |                                                       |

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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  
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| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date                                        |
|-------------------------------------------|---------------------|----------------------------|------------------------------------------------------------|
| EP 2194202                                | A2                  | 09-06-2010                 | NONE                                                       |
| EP 4219848                                | A1                  | 02-08-2023                 | EP 4219848 A1<br>FR 3132113 A1                             |
| CH 536563                                 | A                   | 30-04-1973                 | AT 305555 B<br>CH 536563 A<br>DE 2242131 A1<br>IT 964342 B |

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