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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **Foldable telescopic structure for houses**

(57) Foldable telescopic structure for houses formed by pillars (1), stringers (2) and traverses (3), wherein said pillars (1), stringers (2) and traverses (3) have telescopic elements (1.1), (2.1) and (3.1) deployable, respectively, from either one of their ends or housed between the parts whereinto said elements are divided. The structure can also be folded due to having pillars with several sections articulated therebetween and in their joint with the stringers, obtaining a structure wherein the three spatial dimensions can be modified and folded, saving volume for transport and storage thereof.

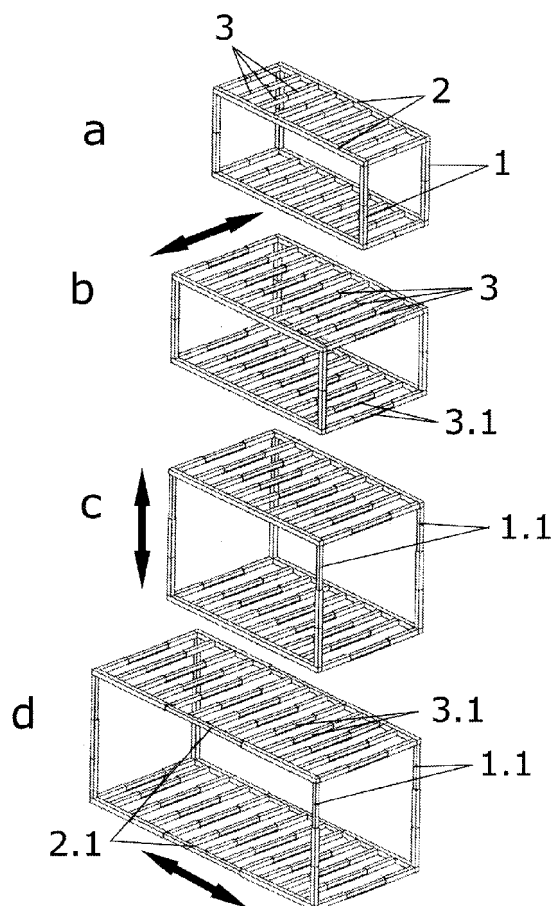


FIG.1

Description

OBJECT OF THE INVENTION

[0001] The object of the present invention, as established in the title of the invention, is a foldable telescopic structure for houses or equipment, i.e. it makes reference to the elements that form the structure of a house or equipment, such as pillars, stringers and beams, having the peculiarity of being able to modify the width and length thereof, due to the fact that other elements contained telescopically therewithin are deployable and that said telescopic structure is foldable.

[0002] The present invention is characterised in that the elements that form the structure are specially configured and designed to achieve a structure with modifiable dimensions, which can also be folded, with the ensuing saving in space for transport and assembly time, rendering the structure object of the invention ideal for fast, simple and inexpensive construction of houses or equipment.

[0003] Therefore, the present invention falls within the sphere of construction, particularly within the sphere of pre-assembled structures and, if applicable, within the sphere of structures with modifiable dimensions.

BACKGROUND OF THE INVENTION

[0004] To date, in most cases the construction of housing, building and equipment structures is executed in situ, firstly laying foundations wherefrom pillars emerge, whereon frameworks are built between floors.

[0005] Although to date this construction method has achieved its intended purpose, that of obtaining a robust and solid structure, it is equally true that it is limited by the operations inherent to said construction method, construction cannot advance to another floor until the framework and pillars have duly set, in the case of construction using concrete, due to which there is finally a minimum necessary construction time.

[0006] Additionally, in some cases prefabricated structural elements are used, such as pillars or beams, which are assembled and fixed therebetween on site, being reinforced concrete or metallic elements which, while expediting execution, are limited with regard to their dimensions, as they allow the construction of buildings with fixed dimensions.

[0007] Therefore, the object of the present invention is to overcome the aforementioned drawbacks in terms of necessary times and dimensional limitations in the use of prefabricated structural elements, developing a structure such as that described hereunder, the essentiality of which is reflected in the first claim.

DESCRIPTION OF THE INVENTION

[0008] The object of the invention is a telescopic and foldable structure, i.e. a structural assembly which ena-

bles the telescopic deployment of the elements that form part of the structure and thus the final dimensions of the houses, buildings or equipment; additionally, the assembly can be folded, facilitating transport and storage thereof.

[0009] In order to achieve said objectives, the structure comprises:

- a series of pillars;
- a series of stringers; and
- a series of crossbeams.

[0010] All of which have the peculiarity of having telescopically deployable elements, allowing extension or reduction of their length.

[0011] In order to modify their length, they have a hollow profile wherein the projecting telescopic element is housed, the outer and inner telescopically deployable sections being joined by any means for fixing two telescopic elements, such as for example a screw and nut, weld, bolts and safety pins.

[0012] The cross-section of said elements may vary, being square, circular, rectangular, etc. The only condition is that, structurally, it must have a geometry of sufficient size and thickness to withstand the stresses required thereof, and the deployable telescopic sections must be easily housed and deployed from the interior of the structural elements.

[0013] Additionally, while not being an essential characteristic, the structural pillars can be deployed, for which purpose they will have at least two sections, where each of said sections is articulated with the consecutive section by means of an articulated joint.

[0014] This characteristic, specifically applied to pillars, enables folding of a structure to a particularly small volume, allowing the structure to be stored and transported in a very small volume.

[0015] With the object of avoiding folding of the articulated parts, once these have been deployed and the final desired shape has been obtained, the articulations are blocked or impeded in such a manner that the sections are perfectly aligned and in their final position.

EXPLANATION OF THE FIGURES

[0016] In order to complement the description provided hereunder and with the object of helping to better understand its characteristics, this specification is accompanied by a series of drawings wherein the most significant details of the invention are represented in an illustrative and non-limiting manner.

Figure 1 shows a general representation of a volumetric structure, where the different elements that form part of the structure and their evolution in the modification of the final dimensions of the structure can be observed.

Figure 2 shows a representation similar to the

former, wherein a single-gable roof is obtained.

Figure 3 shows a structure such as the foregoing but having a double-gabled roof.

Figure 4 shows a detailed view of three of the possible forms of fixing the fixed and deployable telescopic sections of each element that forms part of the structure.

Figure 5 shows the folding process of a deployed structure.

Figure 6 shows the same folding process but for a structure with a double-gable roof.

Figures 7, 8, 9 and 10 show different types of folds, which will be explained later in detail.

Figures 11, 12, 13, 14 and 15 show the different types of sloping roofs.

Figure 16 shows different embodiments of the articulation during the construction of the unit.

Figures 17 and 18 show the formation of a house with an auxiliary folding sub-structure.

Figures 19 to 25 show the formation of different possible combinations.

PREFERRED EMBODIMENT OF THE INVENTION

[0017] Based on the foregoing figures, a preferred embodiment of the proposed invention is described below.

[0018] Figure 1 shows a structure formed by pillars (1), longitudinal beams which we refer to as stringers (2) and crossbeams or traverses (3) connecting the stringers.

[0019] The volume defined by the structure shown in figure 1 a) corresponds to the dimensions of the pillars (1), stringers (2) and traverses (3). In a structure such as that shown there would be no possibility of modifying the volume or dimensions of the structure. Now, due to the fact that all the structural elements have telescopically deployable sections, the volume can be modified.

[0020] The structure can be modified in terms of width, height and length. Therefore, in figure 1 b) it can be observed how the length of the traverses (3) have been modified by deploying a telescopic section (3.1), modifying the width or depth of the entire structure.

[0021] Figure 1 c) shows how the height of the total structure has been modified by deploying the telescopic sections (1.1) of the pillars (1). Finally, in figure 1 d) the total width of the structure has been modified by deploying the telescopic sections (2.1) of the stringers (2).

[0022] In the case of the traverses (3) and stringers (2), one possible way of deploying telescopic sections (3.1) and (2.1), respectively, could be from one of the ends of the pillars. Additionally, the traverses (3) and stringers (2) could have two halves, housing the telescopic sections in their interior as shown in the figures.

[0023] The assembly shown in figure 2, from figure 2 a) to figure 2 b), shows the whole deployment process of a structure with a single-gable roof, for which it is sufficient to deploy the telescopic sections of the pillars (3.1) at the back of the structure.

[0024] Likewise, the assembly shown in figure 3, from

figure 3 a) to figure 3 d), shows the deployment process of a structure with a double-gable roof, for which the elements (4) that form the roof also have the possibility of telescopically deploying deployable sections (4.1) housed inside the elements (4). Consequently, it is also possible to modify the three dimensions of the entire original structure, i.e. width, height and length.

[0025] In figure 4, figure 4 a) shows a possible way of joining the fixed section of one of the elements that form the structure and its corresponding telescopic section, wherein the position has been fixed by means of a screw (5). In figure 4 b) the position has been fixed by means of welding, while in figure 4 c) the position has been fixed by means of a pin (7) and bolt (8).

[0026] Figures 5 and 6 show the sequence of a structure folding process, in one case a parallelepiped structure and in another case a double-gable roof. In either of the aforementioned cases the pillars (1) have at least two sections (1.2) and may have several sections, whereupon one section is articulated with respect to the continuous section and with respect to the joint with the stringers by means of an articulation (1.3).

[0027] Figures 7, 8, 9 and 10 show different types of folds. In figure 7 we can observe a simple fold, wherein each of the represented pillars is formed by a series of sections (1.2), in this case two, joined to each other and to the stringers by means of an articulated joint (1.3). Once all the sections that form part of each pillar have been aligned, said articulations, as shown in the preceding figure, will be blocked by means of blocking parts (1.4) of the articulation (1.3), which prevents the building from folding.

[0028] In figure 8, which represents a multiple fold, each of the pillars is formed by more than two sections, being joined to each other and to the stringers (2) by means of articulated joints (1.3), which are blocked by blocking parts (1.4), once all the stringer sections are aligned and in their final position.

[0029] The embodiments shown in figures 7 and 8 are characterised in that the articulated joints (1.3) of the consecutive sections are disposed on the same side of the pillar.

[0030] On the other hand, figures 9 and 10 show two embodiments wherein folding between sections is alternate, i.e. the articulated joints (1.3) between consecutive sections are disposed in such a manner that one of the articulated joints is disposed on one side of the pillar and the next articulated joint on the other side of the pillar, due to which the blocking parts (1.4) are disposed in an alternate manner on both sides of the pillar, as can be observed in the lower representation of each figure. Figure 9 shows a double fold of short sections, while figure 10 shows a double fold of long sections, enabling higher constructions.

[0031] Figure 11 shows the formation of a slope from the base. Figure 12 shows the formation of a slope as of a telescopic extension. Figure 13 shows the formation of a slope from the base and increasing the number of per-

forations for telescopic extension. Figure 14 shows the formation of a slope from the base and increasing the height of the second support. Finally, figure 15 shows the formation of a slope from the base and increasing the height of the second support.

[0032] Figure 16 shows a detailed view of possible embodiments of the envisaged articulation, which can be executed using a bolt (9) and pin (10) or using a screw (11) and nut (12).

[0033] In figure 17 we can observe a structure with an auxiliary folding sub-structure of steel profiles or other materials. Finally, in figure 18 we can observe the structure with the sub-structure deployed.

[0034] Figure 19 shows a basic combination, without a sloping roof, with a flat roof, where cavities have been opened as required.

[0035] Figure 20 shows a combination with a sloping roof, while figures 21 and 22 show the construction of a two-storey building, one with a sloping roof and the other with a flat roof, respectively.

[0036] Figure 23 shows the formation of areas or entire buildings with double-gable roofs, while figure 24 shows a building with a single-gable roof.

[0037] Finally, in figure 25 we can observe the construction of a semi-detached building. These figures are examples of different combinations. The possibilities are infinite.

[0038] It must be pointed out that the materials for manufacturing the structures can range from any combination of metals, preferably iron, steel, to plastic materials, such as PVC, or resins or carbon fibres, i.e. any material that offers sufficient structural resistance.

[0039] On the other hand, the telescopic deployment of the deployable sections can be executed both manually and using other mechanisms (pneumatic, hydraulic, etc.).

[0040] Therefore, thanks to the previously described characteristics we will achieve, on one hand, a deployable structure in all the dimensions of space, which adapts to all the desired space and volume requirements, in addition to being foldable, resulting in reduced transport and storage space.

[0041] Variations in materials, shape, size and arrangement of the constituent elements, described in a non-limiting manner, do not alter the essentiality of the invention, which is sufficient for reproduction thereof by a person skilled in the art.

Claims

1. Foldable telescopic structure for houses or equipment, formed by pillars (1), stringers (2) and cross-beams or traverses (3) that connect the stringers (2), **characterised in that** the pillars have deployable telescopic elements (1.1), the stringers (2) have deployable telescopic elements (2.1) and the traverses (3) have deployable telescopic elements (3.3) and

means for fixing the position of the deployable telescopic elements with respect to the structural elements wherefrom they are deployed.

2. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the pillars (1), stringers (2) and traverses (3) have a hollow profile wherein the corresponding deployable telescopic element is housed.
3. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the means for fixing the pillars (1), stringers (2) and traverses (3) to their corresponding deployable telescopic elements is by means of mechanical fixation, such as for example a screw and nut or weld or bolts and safety pins or similar.
4. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the deployable telescopic sections (1.1), (2.1) and (3.1) of the pillars (1), stringers (2) and traverses (3), respectively, is executed from one of the ends of the pillars (1), stringers (2) or traverses (3).
5. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the pillars (1), stringers (2) and traverses (3) have two parts, the corresponding deployable telescopic sections being housed between the two parts of the pillars (1), stringers (2) or traverses (3).
6. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the pillars (1) have at least two sections (1, 2), one section being articulated with respect to the continuous section and with respect to the joint with the stringers by means of an articulation (1.3).
7. Foldable telescopic structure for houses or equipment, according to claim 6, **characterised in that** the articulations (1.3) between consecutive sections of the pillars (1.2) are disposed on the same side of the pillars.
8. Foldable telescopic structure for houses or equipment, according to claim 6, **characterised in that** the articulations (1.3) between consecutive sections (1.2) of the pillars are disposed alternately on one side or on the in-facing side of the pillars.
9. Foldable telescopic structure for houses or equipment, according to claim 6, 7 or 8, **characterised in that** the articulations (1.3) are blocked by means of blocking parts (1.4).
10. Foldable telescopic structure for houses or equipment, according to claim 6, **characterised in that**

the articulated joints (1.3) are executed using a bolt (9) and pin (10).

11. Foldable telescopic structure for houses or equipment, according to claim 6, **characterised in that** the articulated joints (1.3) are executed using a screw (11) and nut (12). 5

Amended claims in accordance with Rule 137(2) EPC. 10

1. Foldable telescopic structure for houses or equipment, formed by pillars (1), stringers (2) and cross-beams or traverses (3) that connect the stringers (2), wherein the pillars have deployable telescopic elements (1.1), the stringers (2) have deployable telescopic elements (2.1) and the traverses (3) have deployable telescopic elements (3.3) and means for fixing the position of the deployable telescopic elements with respect to the structural elements wherefrom they are deployed, **characterized in that** the pillars (1) have at least two sections (1. 2), one section being articulated with respect to the continuous section and with respect to the joint with the stringers by means of an articulation (1.3). 15 20 25

2. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the pillars (1), stringers (2) and traverses (3) have a hollow profile wherein the corresponding deployable telescopic element is housed. 30

3. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the means for fixing the pillars (1), stringers (2) and traverses (3) to their corresponding deployable telescopic elements is by means of mechanical fixation, such as for example a screw and nut or weld or bolts and safety pins or similar. 35 40

4. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the deployable telescopic sections (1.1), (2.1) and (3.1) of the pillars (1), stringers (2) and traverses (3), respectively, is executed from one of the ends of the pillars (1), stringers (2) or traverses (3). 45

5. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the pillars (1), stringers (2) and traverses (3) have two parts, the corresponding deployable telescopic sections being housed between the two parts of the pillars (1), stringers (2) or traverses (3). 50 55

6. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the articulations (1.3) between consecutive sections

of the pillars (1.2) are disposed on the same side of the pillars.

7. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the articulations (1.3) between consecutive sections (1.2) of the pillars are disposed alternately on one side or on the in-facing side of the pillars.

8. Foldable telescopic structure for houses or equipment, according to claim 1, 6 or 7, **characterised in that** the articulations (1.3) are blocked by means of blocking parts (1.4).

9. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the articulated joints (1.3) are executed using a bolt (9) and pin (10).

10. Foldable telescopic structure for houses or equipment, according to claim 1, **characterised in that** the articulated joints (1.3) are executed using a screw (11) and nut (12).

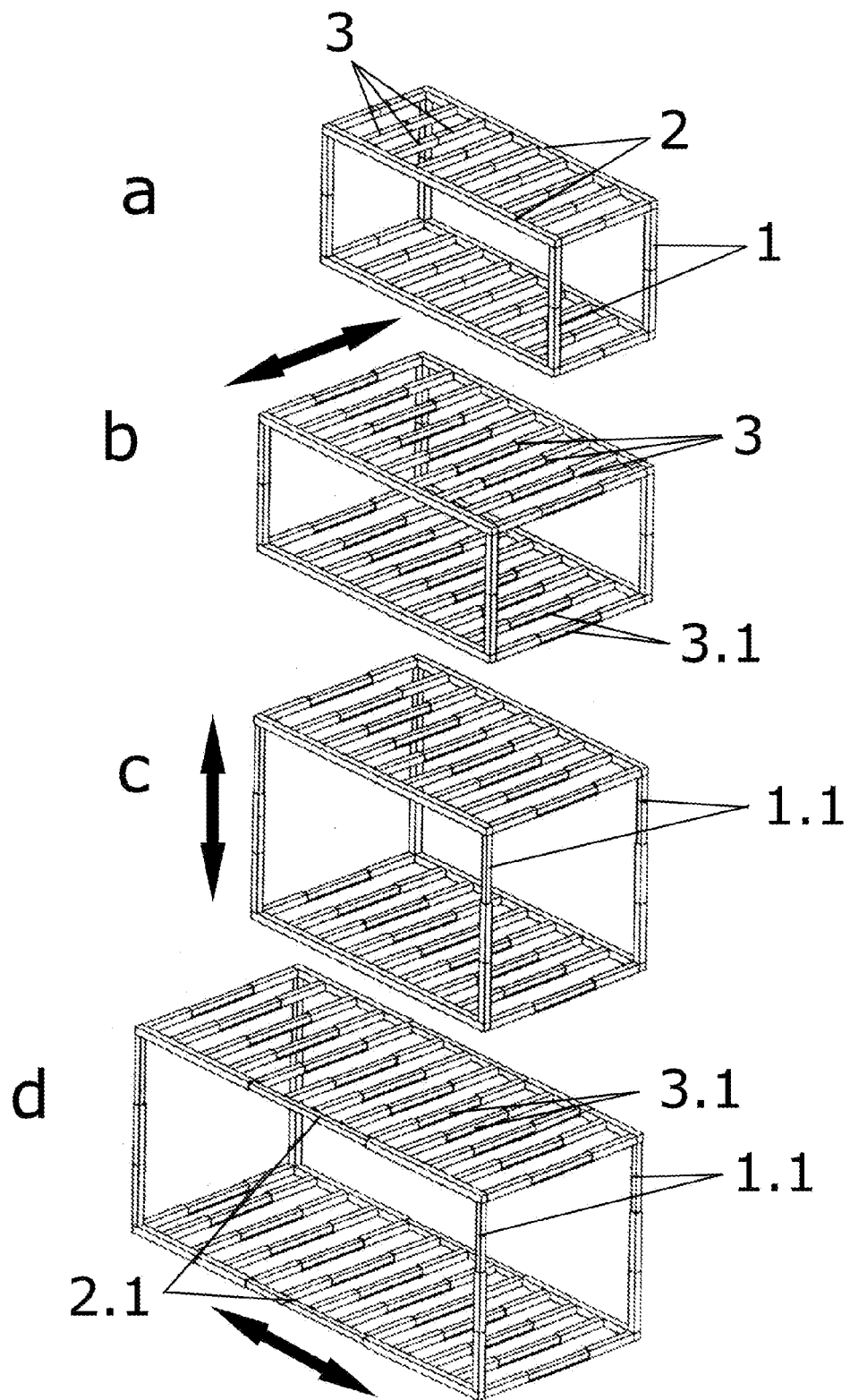
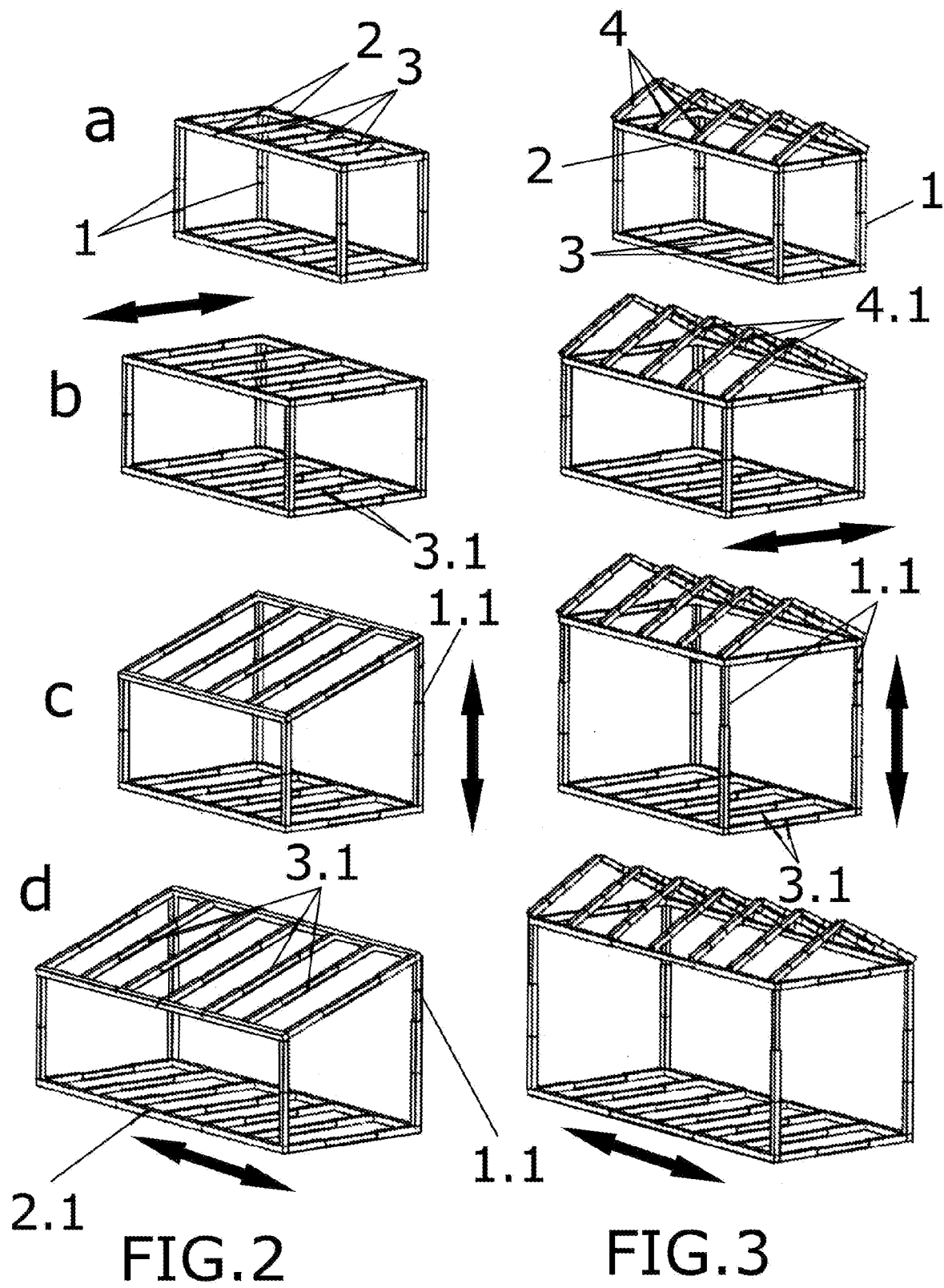


FIG.1



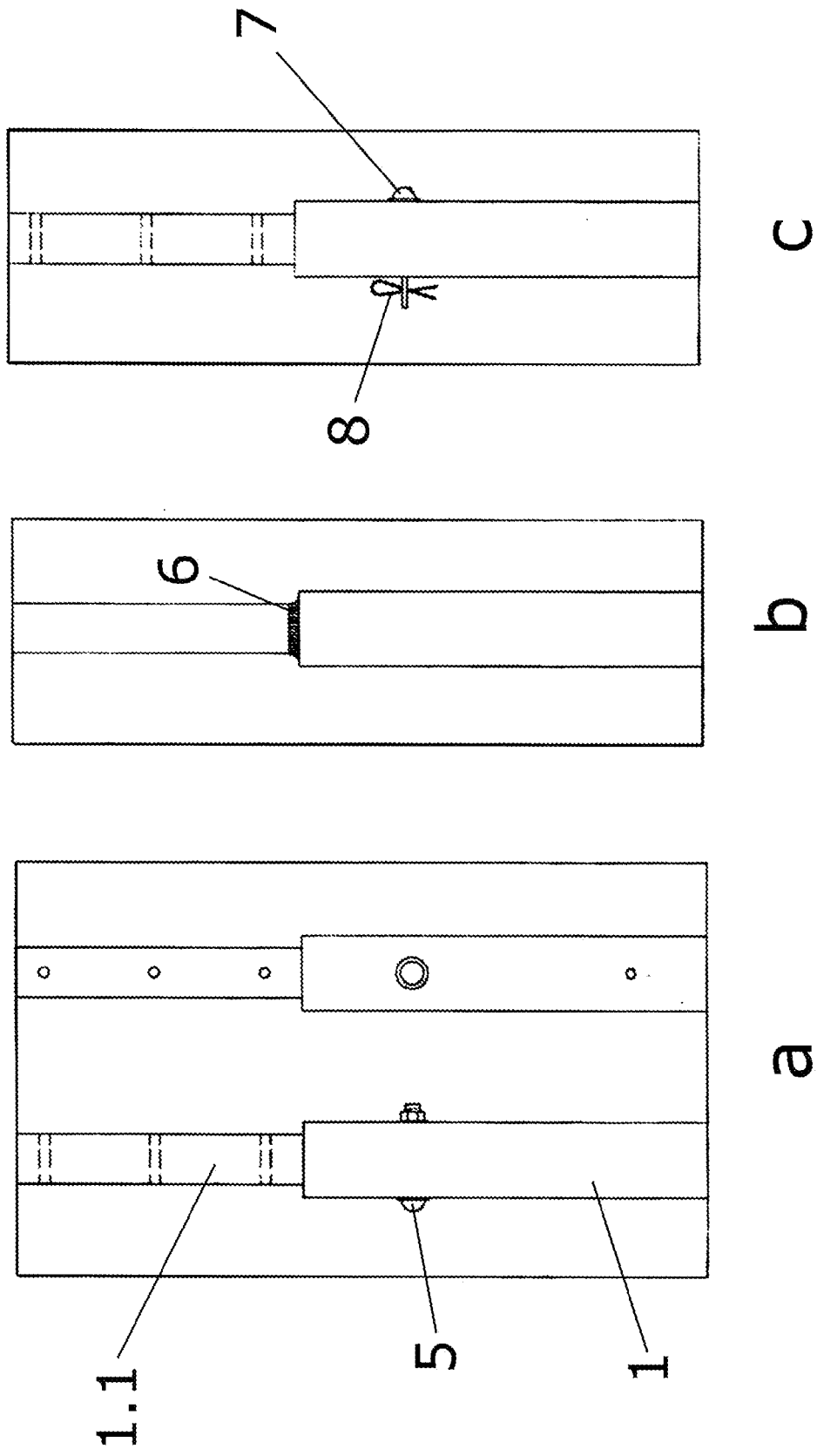


FIG.4

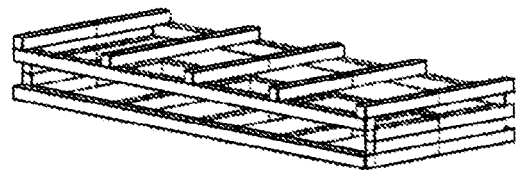
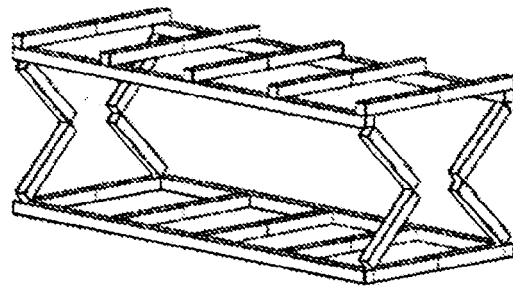
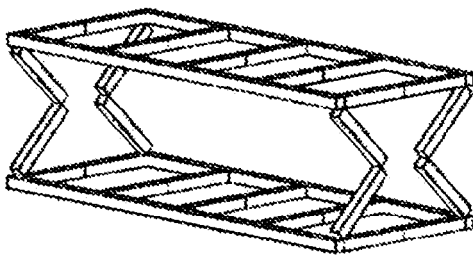
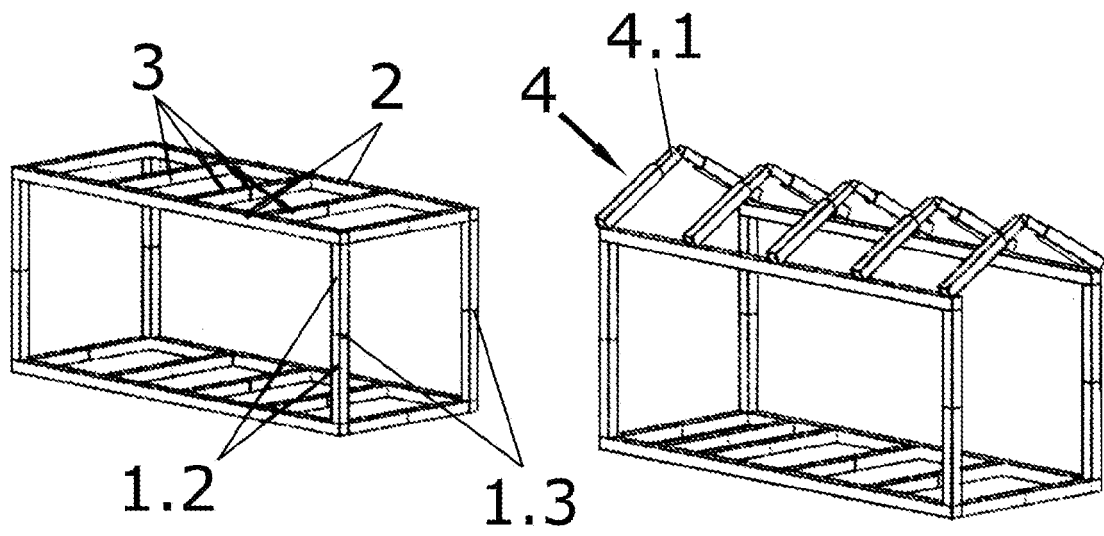


FIG.5

FIG.6

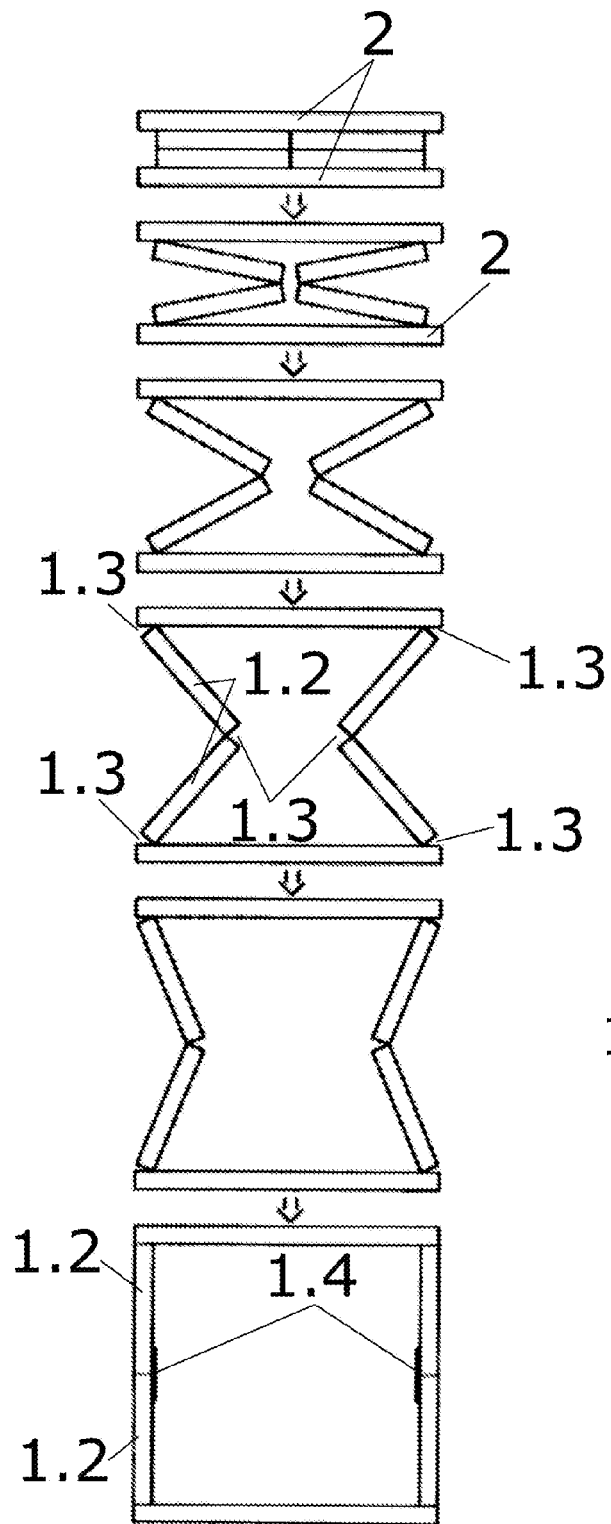


FIG. 7

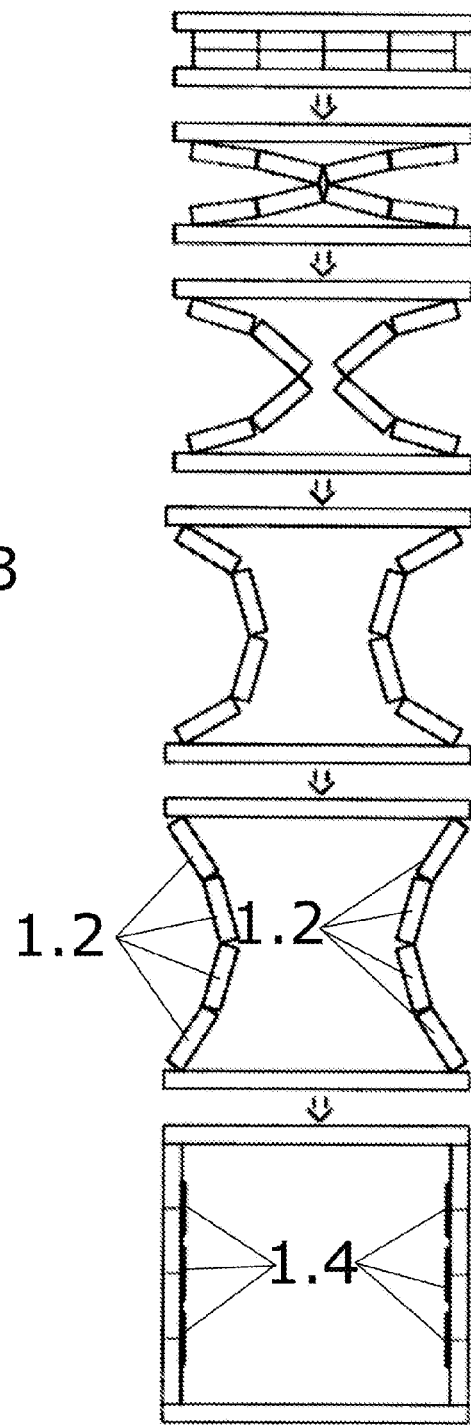


FIG. 8

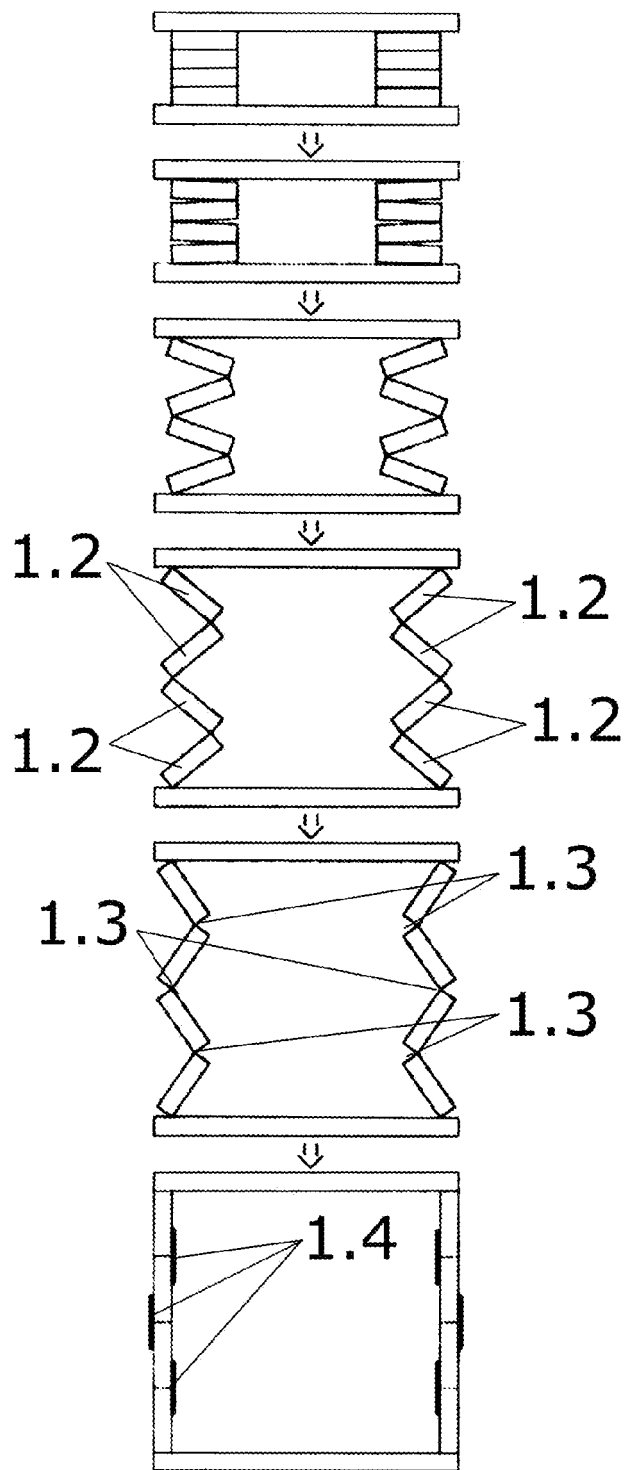


FIG. 9

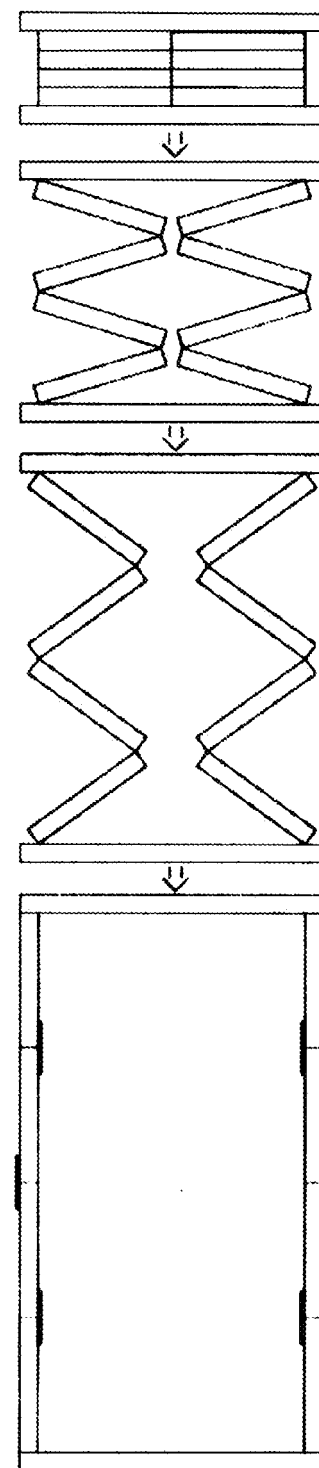


FIG. 10

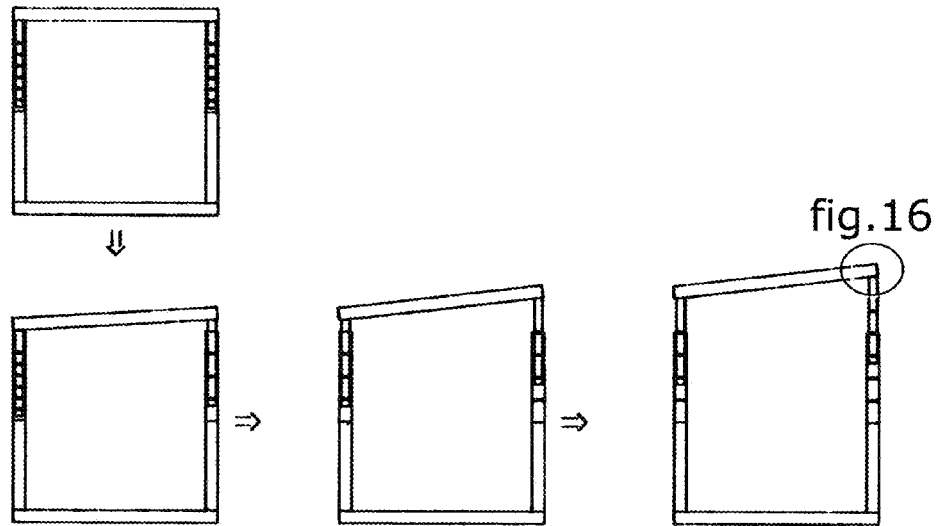


FIG.11

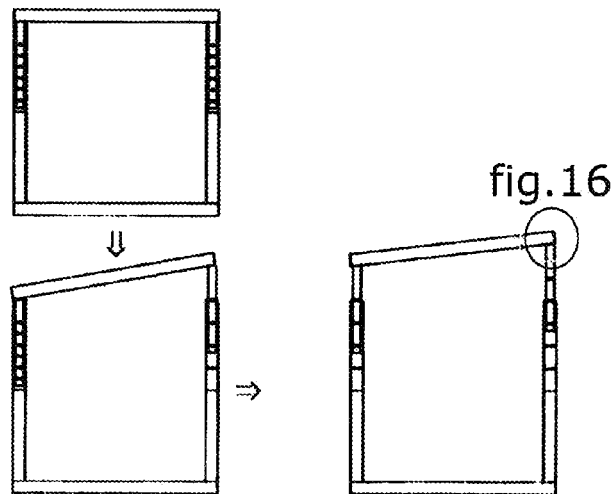


FIG.12

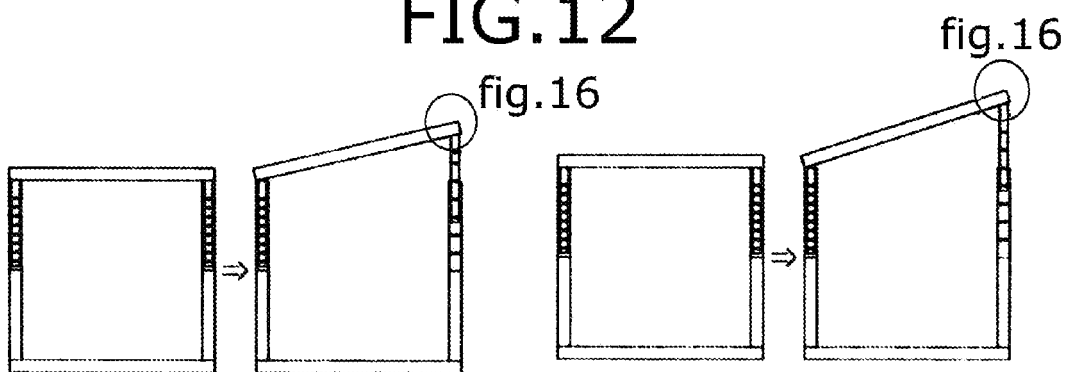


FIG.15

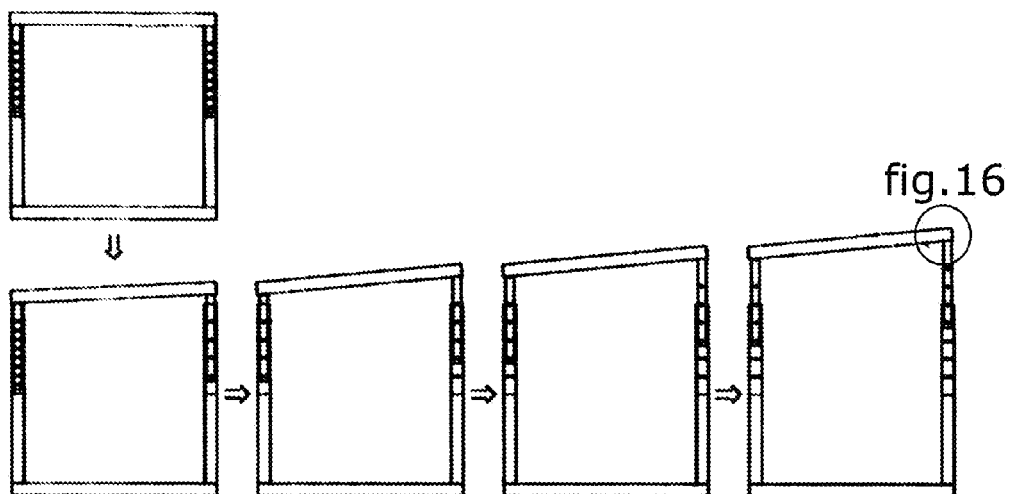


FIG. 13

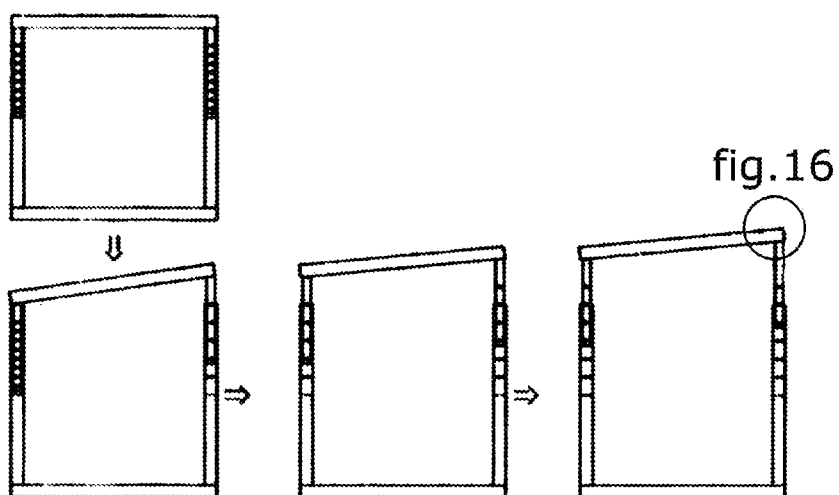


FIG. 14

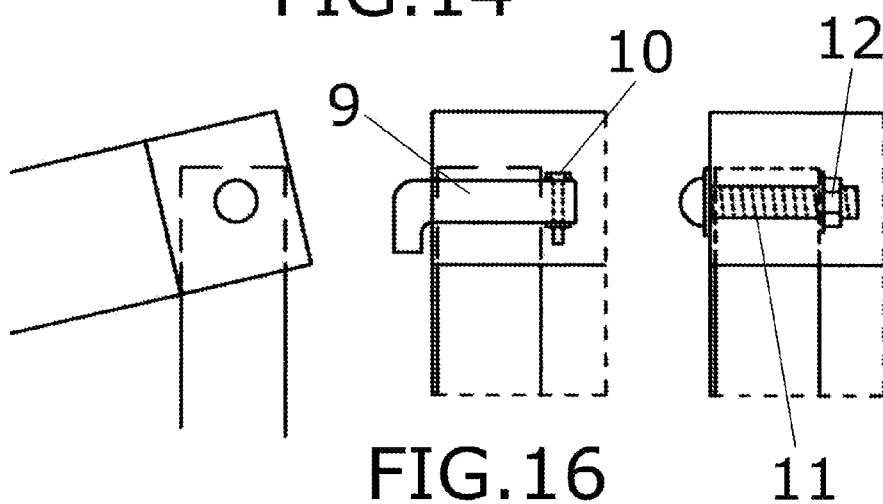


FIG. 16

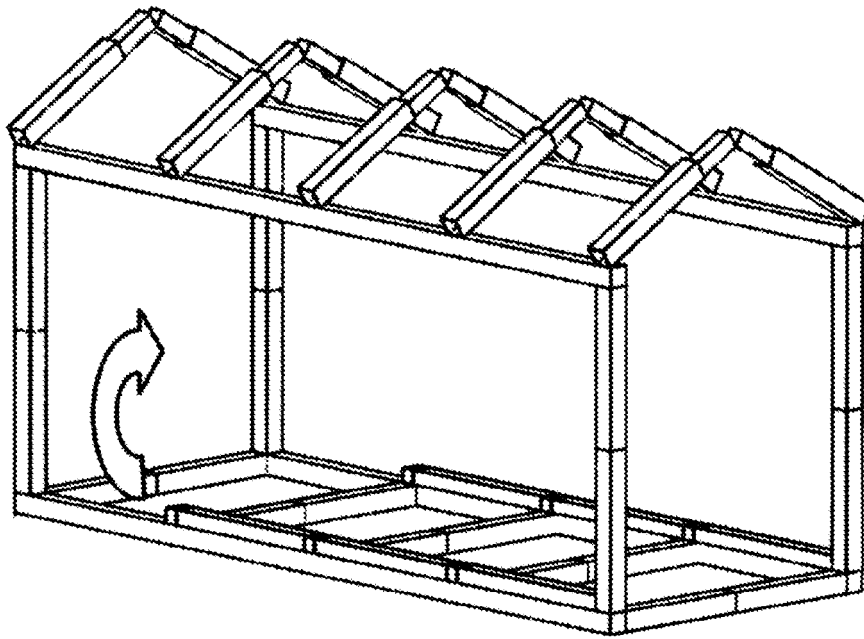


FIG. 17

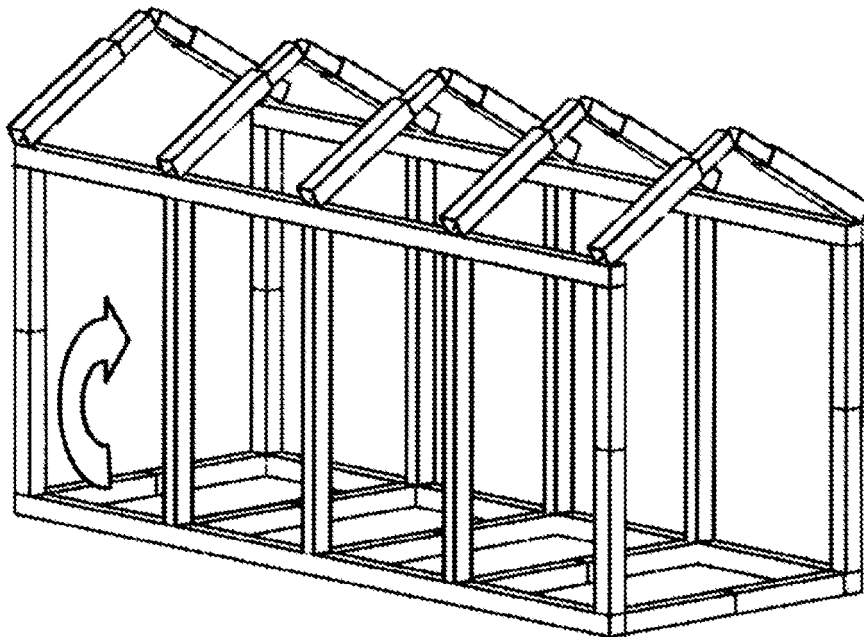


FIG. 18

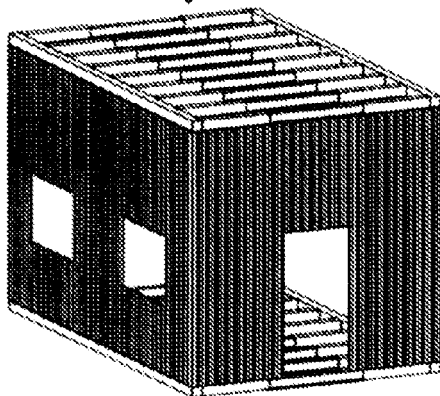
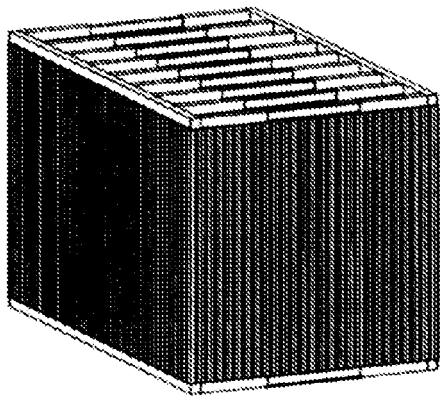
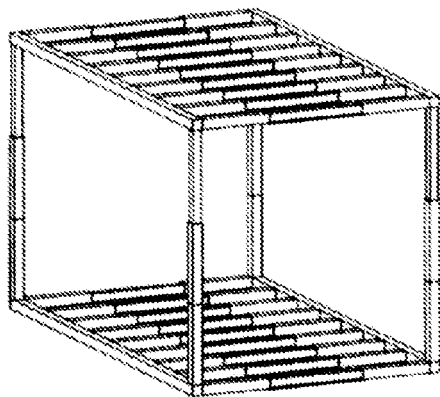


FIG.19

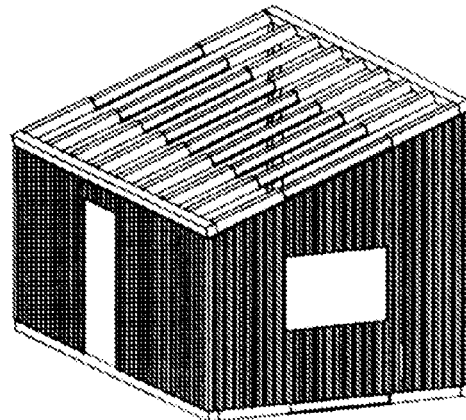
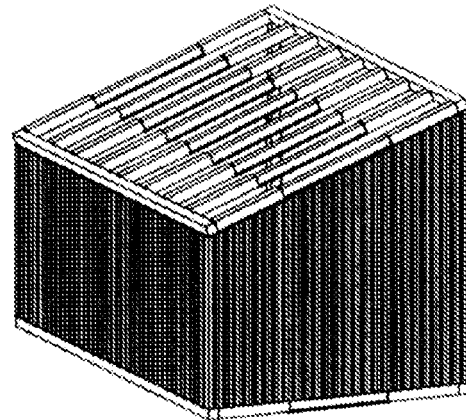
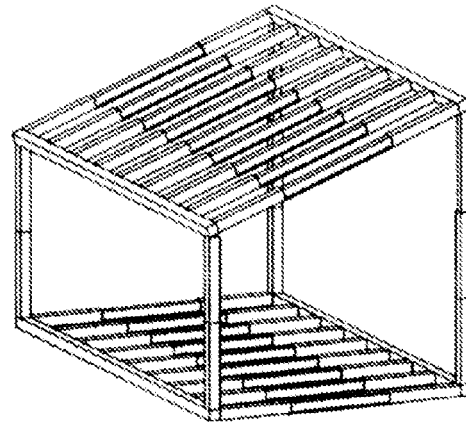


FIG.20

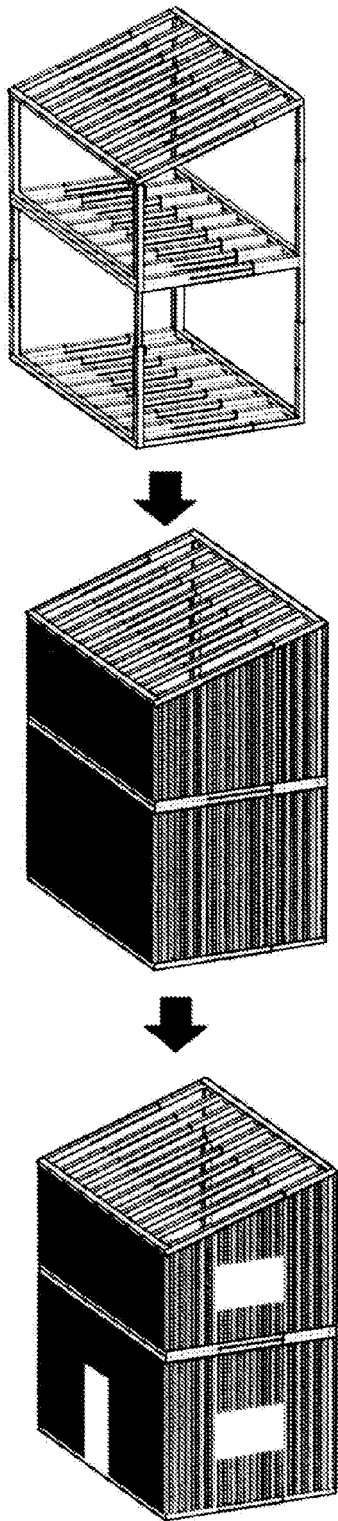


FIG. 21

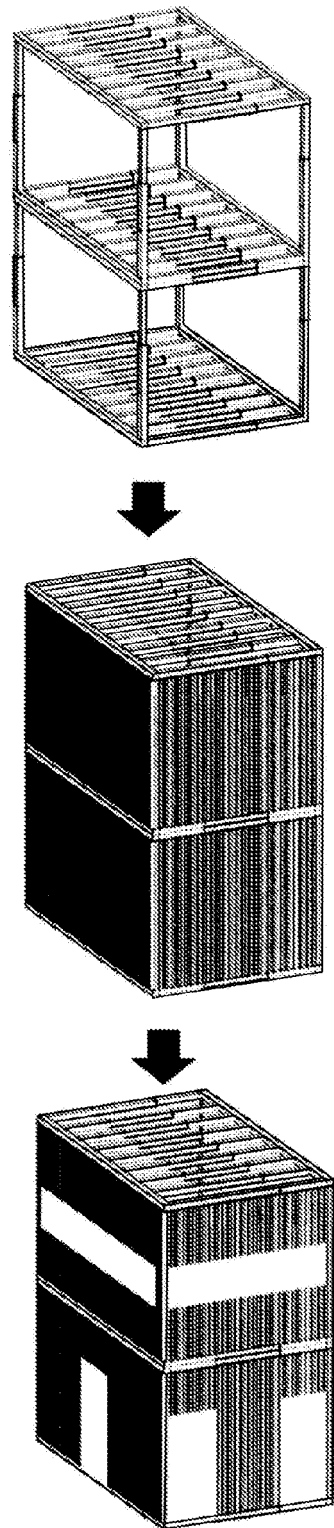


FIG. 22

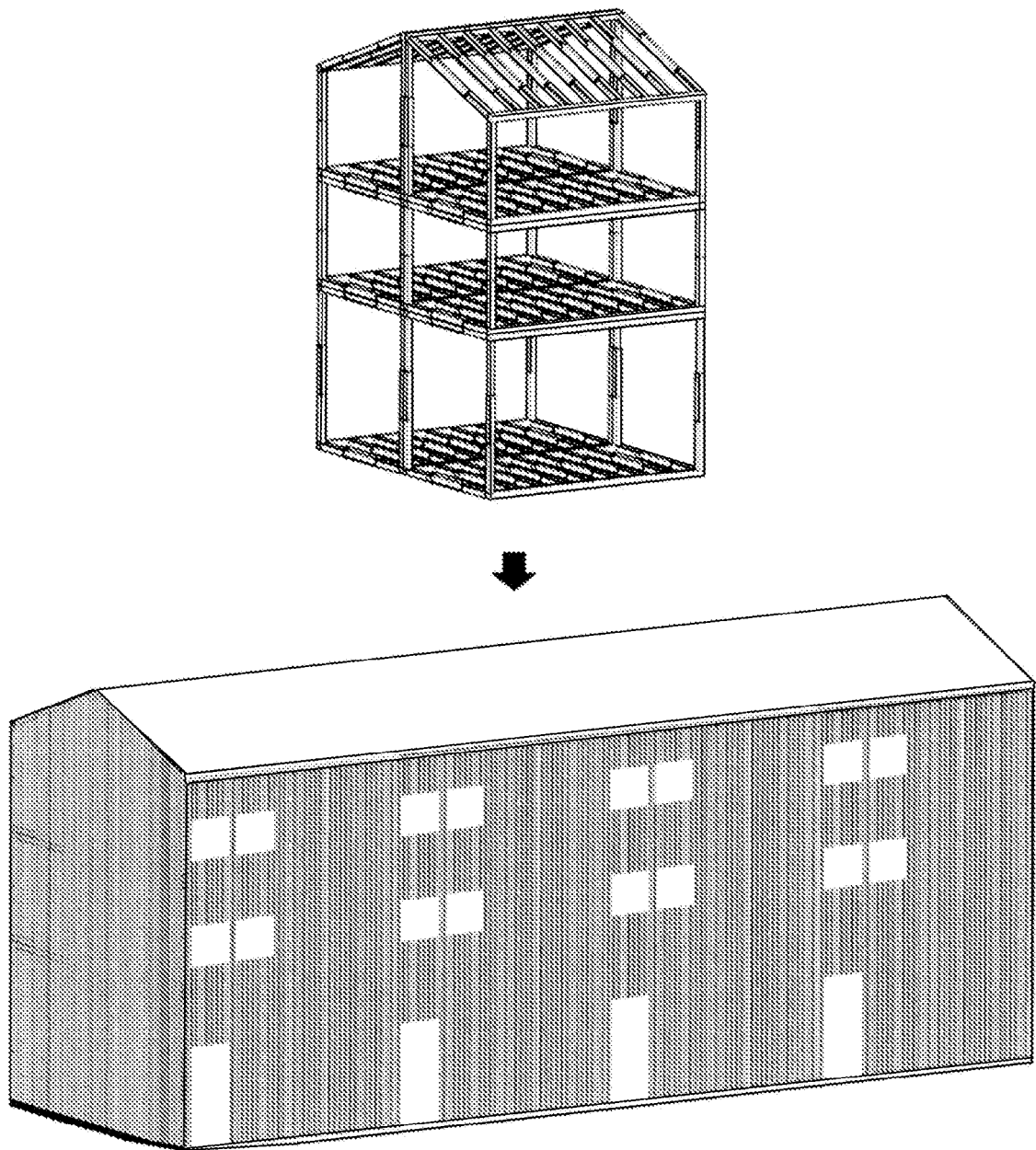


FIG.23

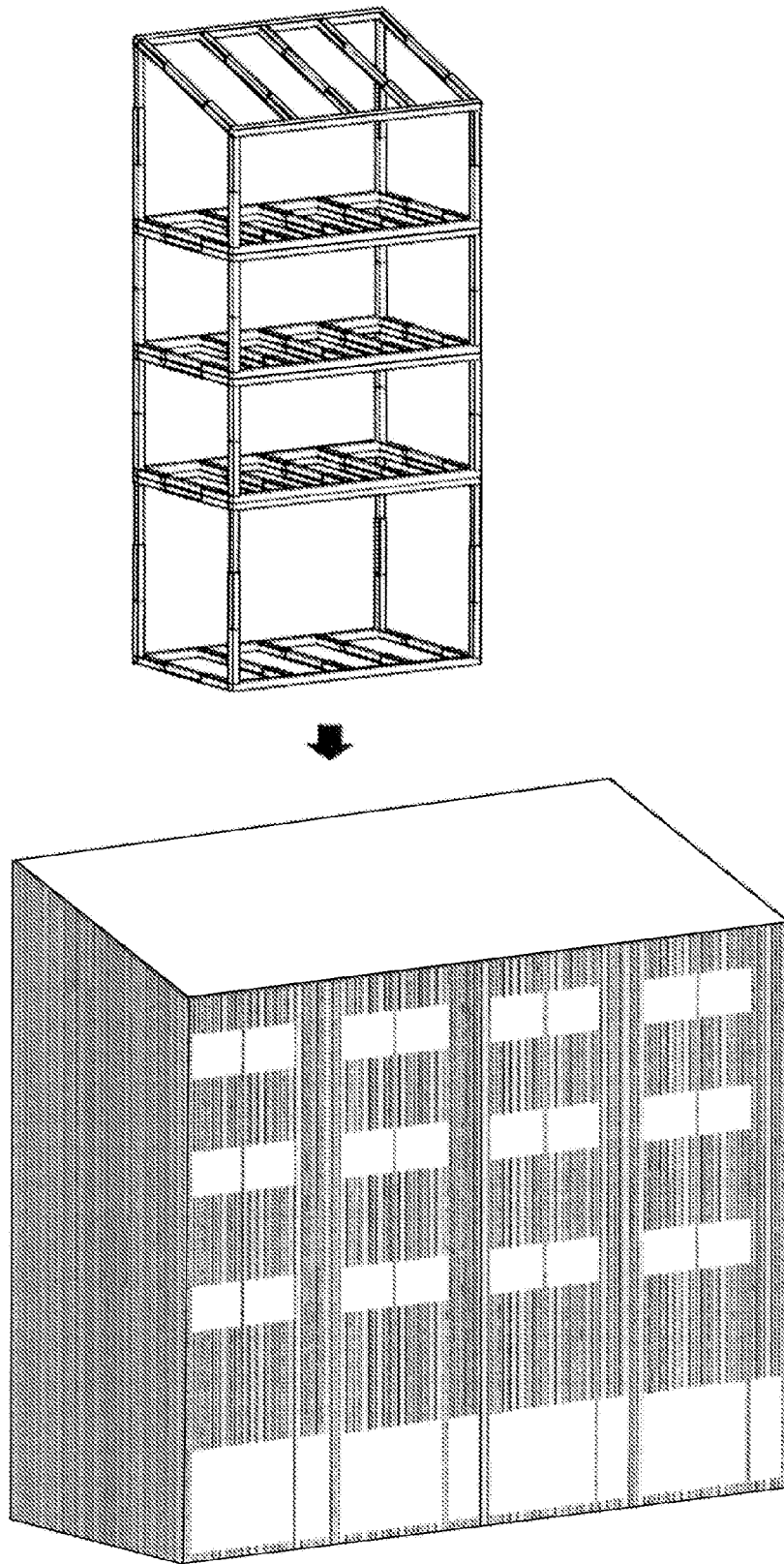


FIG.24

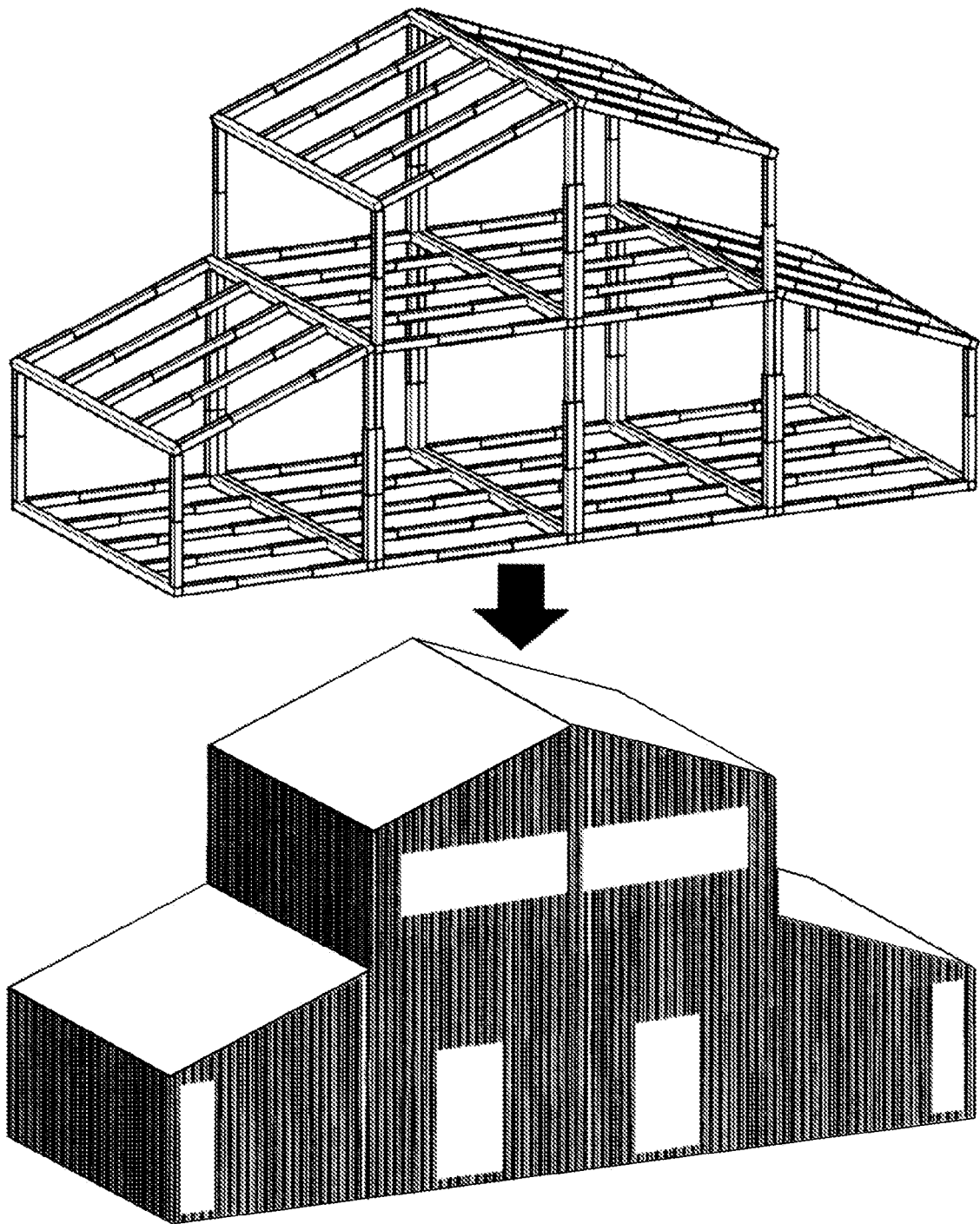


FIG.25



EUROPEAN SEARCH REPORT

Application Number
EP 11 38 2057

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	WO 2004/076762 A1 (LAMBRETH HENRIK [DK]) 10 September 2004 (2004-09-10)	1,2,4-6	INV. E04B1/343 E04B1/24
Y	* page 9, line 15 - page 12, line 5; figures 1-31 *	3,7-11	
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A	----- US 5 403 055 A (ALLISON ROBERT S [US]) 4 April 1995 (1995-04-04) * abstract; figure 1 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 December 2011	Examiner Khera, Daljit
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 11 38 2057

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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