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(54) **STRUCTURE AND USE OF SUCH A STRUCTURE**

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STRUCTURE ET UTILISATION D'UNE TELLE STRUCTURE

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EP 3 447 208 B1

Description

[0001] The invention relates to a structure.

[0002] WO 2013/165235A1 discloses a related structure, in casu a sandwich panel, comprising: a core, comprising a plurality of zigzag-shaped first spacers extending in a first longitudinal direction, each first spacer comprising at each corner thereof a first loop; a plurality of zigzag-shaped second spacers extending in the first longitudinal direction, each second spacer comprising at each corner thereof a second loop, each second loop having outer dimensions that are smaller than the inner dimensions of each first loop, wherein the second loops of each second spacer extend through the first loops of an adjacent first spacer; wherein the openings defined by the second loops of successive second spacers are registered in rows extending in a second longitudinal direction, which second longitudinal direction extends under an angle of at least 20° with respect to the first longitudinal direction; and wherein the first spacers and the second spacers define a second zigzag-shape in the second longitudinal direction; two skin layers arranged on opposite sides of the core, wherein each skin layer comprises a plurality of openings through which the second loops extend; a plurality of rods, each rod extending through the openings of the second loops of each row at the outer surface of each skin layer such that each rod locks the second loops in the first loops with respect to the skin layer.

[0003] The structure described herein comprises:

- a plurality of spacers, each spacer comprising a first longitudinal side and a second, opposite longitudinal side, wherein loops are provided along the first and second longitudinal sides, wherein first loops of said loops define an opening therein with a size that is larger than an outer dimension of second loops of said loops, such that the second loops are allowed to pass through said openings in the first loops, wherein the spacers are coupled to each other in such a manner that the second loops of a said spacer extend through the first loops of a next spacer, and wherein openings in the second loops of coupled spacers are registered in line with respect to each other,
- a plurality of locking elements, each locking element extending through the openings of the second loops that are registered in line with respect to each other, thereby locking the second loops with respect to the first loops.

[0004] An advantage of the structure is that a relatively strong and/or large and/or rigid structure may be formed of only a few different components.

[0005] It is noted that said locking elements extend through the openings of the second loops only and not through the openings of the first loops, thereby locking the second loops with respect to the first loops.

[0006] It is further noted that the longitudinal sides of the spacers are defined in a longitudinal direction of said spacer, wherein a longitudinal plane extends between the first and second longitudinal sides.

[0007] According to the invention each spacer comprises both first loops and second loops, and wherein the first loops are present at the first longitudinal side and the second loops are present at the second longitudinal side.

[0008] In this embodiment the structure may comprise only two different components, namely the spacers and the locking elements. The spacers have first loops at one longitudinal side thereof and second loops at the other longitudinal side thereof, such that only one type of spacer may be used. In the structure the spacers are arranged in an alternating orientation, such that the first longitudinal side of a spacer is located adjacent to and/or extends along the second longitudinal side of a next spacer that is coupled thereto.

[0009] In another embodiment of the structure according to the invention the coupled spacers may together form a substantially zigzag shape, wherein the spacers zigzag between two opposing planes, i.e. a first plane and a second plane.

[0010] In such an embodiment the first and second longitudinal sides of the spacers extend along the planes in one direction, and the zigzag shape is defined or seen in a second, opposite direction.

[0011] In particular the longitudinal planes of the spacers that extend between the first and second longitudinal sides thereof, zigzag between the two opposing planes, i.e. they extend inclined between, and with respect to, the two opposing planes as opposed to orthogonally.

[0012] The two opposing planes may be substantially straight planes, but also substantially curved planes, as seen in the direction in which the zigzag shape is visible, i.e. in the second direction.

[0013] In yet another embodiment of the structure according to the invention said line in which the second loops of coupled spacers are registered is at least partly substantially curved.

[0014] In such an embodiment the structure may be at least partly substantially curved.

[0015] In such an embodiment the above described two opposing planes may at least partly be substantially curved, as seen in the direction in which the zigzag shape is visible, i.e. in the second direction.

[0016] The locking elements may be substantially straight rods if said structure is substantially straight, i.e. if said line in which the second loops of coupled spacers are registered is substantially straight.

[0017] If said structure is at least partly substantially curved, i.e. if said line in which the second loops of coupled spacers are registered is at least partly substantially curved, said locking elements may be elongated locking elements that are at least partly substantially curved or that are flexible, such that they may be curved, such as steel wire. The curvature of the elongated locking ele-

ments may be chosen or curved in accordance with the curvature of the structure. In particular, the curvature of the elongated locking elements may be chosen or curved to be substantially identical to the curvature of the structure.

[0018] In an embodiment of the structure according to the invention the openings of the first loops have a closed circumference.

[0019] An advantage of the openings of the first loops having a closed circumference is that the second loops may be firmly locked with respect to the first loops using said locking elements extending through the openings of the second loops, which locking elements prevent the second loops from being moved outwards of the first loops in an outward direction.

[0020] For example, a said spacer having first loops may comprise an elongated element that connects the first loops on one or both longitudinal sides of said spacer and that close the openings of the first loops.

[0021] The spacers may be arranged such that only the second loops, or only a part of the second loops, are allowed to pass through the openings of the first loops, and no other part of the spacers can pass through the openings of the first loops.

[0022] In such an embodiment a spacer is locked with respect to a next spacer that is coupled thereto both in a first locking direction, said first locking direction being an inward direction of passing the second loops of said spacer through the first loops of said next spacer, and in a second locking direction by said locking element, said second locking direction being an opposite, outward direction.

[0023] Said spacer can for example be arranged such that a part of said spacer that departs from said second loops has an increased outer dimension, in particular an outer dimension that is larger than the size of openings of the first loops, such that said parts cannot pass through the openings of the first loops.

[0024] Alternatively or additionally the spacer may comprise limitation means for allowing only the second loop or a part thereof to extend through each first loop. Said limitation means may for example comprise a second elongated element that connects the second loops of a spacer having second loops and that close the openings of the second loops.

[0025] In another embodiment of the structure according to the invention the first loops and second loops of mutually coupled spacers extend under an angle with respect to each other, said angle being chosen between 30° and 150°, preferably between 90° and 135°.

[0026] The structure may for example be manufactured from a material from the group comprising metal, such as iron or (stainless) steel, and (fibre reinforced) plastic or composite material.

[0027] In another embodiment of the structure according to the invention, said structure further comprises at least one skin layer, said skin layer comprising a plurality of openings through which only the second loops of the spacers are allowed to pass, such that the first loops and second loops extend at opposite sides of said skin layer, and wherein the locking elements lock said second loops with respect to the skin layer.

[0028] Because the first loops and second loops extend at opposite sides of said skin layer, the skin layer is firmly locked between the first loops on a first side of the skin layer and the second loops with locking elements extending there trough on the opposite side of that skin layer.

[0029] Said at least one skin layer may extend in said first or second plane.

[0030] Two skin layers may be provided that extend on opposite main sides of the structure, i.e. in both the first and second plane.

[0031] The skin layer may be substantially straight or substantially curved, wherein the shape of the skin layer may be chosen in accordance with and in particular be adapted and/or identical to the shape of the first and/or second plane. The skin layer may in particular be substantially straight or substantially curved as seen in the direction in which the zigzag shape is visible, i.e. in the second direction.

[0032] The second loops may extend substantially orthogonal with respect to the at least one skin layer.

[0033] The first loops may extend substantially parallel to or under an angle of maximally 30° with respect to the at least one skin layer, wherein said angle is defined in the direction of the other skin layer or other plane.

[0034] In another embodiment of the structure according to the invention, the at least one skin layer is a mesh.

[0035] Such a mesh has the advantage that it comprises more openings than the core comprises second loops, such that the second loops may easily be placed through the openings of the mesh. Also, such a mesh is relatively cheap.

[0036] The mesh may for example be made from a material from the group comprising metal, such as iron or (stainless) steel and (fibre reinforced) plastic or composite material.

[0037] A structure comprising such a mesh skin layer may for example be filled with rocks and mud and may for example be used as a noise protection wall that may for example be located along roads in urban areas.

[0038] Also, such a structure may conveniently be used for building houses and other buildings, such as stores and offices, in area's that have suffered from a natural disaster, such as an earth quake. The broken bricks and other remainings of collapsed buildings may be used as a filling material for filling up the structure, such that new buildings may be made relatively easy and fast. Thus, the people living in said area may have new homes relatively fast. Such homes may be temporally, wherein more permanent buildings may be built while the people are living in homes comprising the structures according to the invention. After finishing the more permanent buildings, said temporally homes and buildings may easily be disassembled. The structures may then be re-

used used at a different location.

[0039] Alternatively or additionally, the at least one skin layer may be a panel.

[0040] Such a panel has the advantage that the inside of the structure is at least less visible from the outside. The thickness of the panel may be chosen as desired.

[0041] The panel may for example be made from a material from the group comprising wood, metal, such as iron or (stainless) steel and (fibre reinforced) plastic or composite material.

[0042] Alternatively or additionally, the at least one skin layer is a flexible, sheet like element.

[0043] For example, said at least one skin layer may be a woven or non woven fabric, such as for example a root barrier.

[0044] In another embodiment of the structure according to the invention, said structure further comprises at least one strip like element, said strip like element comprising a plurality of openings through which only the second loops of the spacers are allowed to pass, such that the first loops and second loops extend at opposite sides of said strip like element, and wherein a said locking element locks said second loops with respect to the strip like element.

[0045] Said strip like element may for example be a metal strip.

[0046] Said strip like element may be used instead of or in combination with a skin layer. In particular when said skin layer is a flexible, sheet like element said strip like element may provide additional rigidity to the structure.

[0047] Said strip like element may be arranged in line with the line in which the second loops of coupled spacers are registered, i.e. in line with a said locking element, or may be arranged orthogonal or oblique thereto.

[0048] In yet another embodiment of the structure according to the invention, said structure further comprises at least one second spacer comprising a first longitudinal side and a second, opposite longitudinal side, and wherein second loops are provided along both the first and second longitudinal sides, and wherein said at least one second spacer is located at an outer end of said structure.

[0049] Said second spacer may extend substantially orthogonal between the two planes of the structure, such that it forms an orthogonal end of the structure.

[0050] Said spacer and optionally said second spacer may be substantially zigzag-shaped spacers defining a plurality of corners, wherein a first row of corners extends along the first longitudinal side of the spacer and a second row of corners extends along the second, opposite longitudinal side of the spacer, wherein the first and/or second loops are provided at some or all corners.

[0051] It is noted that throughout this text the first loops are first type loops, and the second loops are second type loops.

[0052] The invention also relates to a method for assembling a structure as described above in any of the described embodiment, comprising the steps of:

(a) providing a plurality of said spacers and said locking elements;

(b) passing the second loops of a said spacer through the openings of the first loops of a next spacer;

(c) passing the locking elements through openings of the second loops that are registered in line with respect to each other, thereby locking the second loops with respect to the first loops.

[0053] According to the invention the method comprising the further step, to be performed before step (b), of:
(d) arranging the spacers in an alternating orientation, such that the first longitudinal side of a spacer is located adjacent to and/or extends along the second longitudinal side of a next spacer.

[0054] In an embodiment of the method according to the invention, the method comprises the further step, to be performed together with or after step (b):
(e) bending at least part of the structure formed by a plurality of coupled spacers, such that the line in which the second loops of coupled spacers are registered is at least partly substantially curved.

[0055] In another embodiment of the method according to the invention, the method comprises the further step, to be performed before step (c):
(f) providing at least one skin layer or at least one strip like element and connecting that at least one skin layer or strip like element to the spacers by passing only the second loops through the openings in the skin layer.

[0056] In yet another embodiment of the method according to the invention a structure according to at least claim 9 is provided, comprising the further step, to be performed before step (c):

(g) providing at least one second spacer at an outer end of said structure, wherein the second loops of the second zigzag-shaped spacer of one longitudinal side thereof are arranged adjacent and in parallel to second loops of the second longitudinal side of a next spacer;
wherein in step (c) the locking elements are passed through the opening of the second loops at both longitudinal sides of the second spacer.

[0057] The invention also relates to the use of the structure as a wall or a roof of a construction or (emergency) building, such as a house, an office building, a garage, a storage shed, a stadium, a stable, a quay, a dam, a sewer drain, a swimming pool, etc, or as a bower, a sound barrier wall, a (decorative or protective) (garden) fence, a grandstand, a presentation wall, a display, a bike park, a stage, as a building toy optionally for educational purposes, or as part of a bridge (head), of a viaduct, of the casco of a house-boat, as a support structure or beam, as part of a furniture, such as a table or bench, as a pillar etc.

[0058] It is clear that the structure may be used in any desired way, the above examples being provided as ex-

ample only and not being limited thereto.

[0059] The invention will now be explained in more detail with reference to figures illustrated in a drawing, wherein:

- figure 1 shows the structure according to a first embodiment of the invention in a perspective, schematic view;
- figure 2 is a detail of figure 1;
- figure 3 is a top view of figure 1;
- figure 4 is a single spacer of the structure of figure 1;
- figure 5 shows the structure according to a second embodiment of the invention in a schematic top view, and
- figure 6 is a detail of figure 5.

[0060] Figures 1-4 show a structure 1 comprising in this embodiment a plurality of zigzag-shaped spacers 2 defining a plurality of corners 3, wherein a first row of corners 3 extend along a first longitudinal side 4 of the spacer 2 and a second row of corners 3 extend along a second, opposite longitudinal side 5 of the spacer 2, wherein first loops 6 are present at the corners of the first row and second loops 7 are present at the corners of the second row, and wherein the second loops 7 have a smaller outer dimension than the size of openings of the first loops 6, such that the second loops 7 are allowed to pass through said openings in the first loops 6, wherein the spacers 2 are coupled to each other in such a manner that the second loops 7 of a said spacer 2 extend through the first loops 6 of a next spacer 2, and wherein the second loops 7 of coupled spacers are registered in third rows extending in direction 8, said third rows extending substantially orthogonal to a direction 9 in which the first and second rows extend. The first and second rows extend substantially parallel to each other.

[0061] As the second loops extend are registered in third rows 8, a substantially straight rod or any other suitable locking element may be inserted or passed through openings of the second loops 7 of the third rows 8, thereby locking the second loops 7 with respect to the first loops 6. For sake of simplicity, the rods are not shown in the figures, but may be imagined as straight rods extending through the openings of second loops 7 in the direction 8.

[0062] In the embodiment of figures 1 - 4, the spacers 2 comprise an elongated, bar-like element 10 that connects the first loops 6 on said first longitudinal side 4 of the spacer 2 and that close the openings of the first loops 6, such that the openings of the first loops 6 have closed circumference, see in particular figure 4.

[0063] In the embodiment of figures 1 - 4, the spacers 2 comprise a second elongated, bar-like element 11 that connects the second loops 7 on said second longitudinal side 5 of the spacer 2 and that close the openings of the second loops 7, such that the openings of the second loops 7 have closed circumference. The elongated element 11 further prevent any other part of the spacer 2 except for said second loops 7 to extend through the openings of the first loops 6 of the next spacer 2.

[0064] As is best shown in figure 3, the first loops 6 and second loops 7 of mutually coupled spacers 2 extend under an angle α with respect to each other, said angle α being in this example approximately 135°. This angle α is in particular defined between planes in which the first loops 6 and second loops 7, and in particular the openings thereof, substantially extend.

[0065] As is best shown in figure 3, the coupled spacers 2 of the structure 1 together define a substantially zigzag-shape between a first plane 12 and a second plane 13 that extends parallel to the first plane 13 at a predetermined distance d therefrom. Each spacer 2 hereby defines one zig or zag of the zigzag-shape. Each spacer 2 hereby extends under an angle β of approximately 45° with respect to each plane 12, 13. This angle β is in particular defined between a longitudinal, main plane in which the spacer 2 extends and the first plane 12 or second plane 13.

[0066] It is noted that said angles α and β may be chosen in dependence with a desired thickness d.

[0067] At the planes 12, 13 skin layers or strip like elements may be provided, said skin layers or strip like elements comprising a plurality of openings through which only the second loops 7 are allowed to pass, such that the first loops 6 and second loops 7 extend on opposite sides of the skin layers or strip like elements. The skin layers or strip like elements are thereby firmly locked between the first loops 6 and second loops 7 after the rods are passed through the openings of the second loops 7. The skin layers may extend over substantially the whole main outer surfaces of the structure 1 in the planes 12, 13. The strip like elements may extend in the planes 12, 13 in the direction 8 as a small, longitudinal element. For the sake of simplicity the skin layers or strip like elements are not shown in the figures. It is noted that although the skin layers or strip like elements are described here in plural, there may be provided only one skin layer and/or only one strip like element.

[0068] At opposite ends of the structure 1, the structure 1 further comprises second zigzag-shaped spacers 14 defining a plurality of corners 15, wherein a first row of corners extend along a first longitudinal side 16 of the second spacer 14 and a second row of corners extend along a second, opposite longitudinal side 17 of the second spacer 14, and wherein second loops 7 are present at the corners of both the first row and the second row. The second zigzag-shaped spacers thus only comprise second loops 7. The second zigzag-shaped spacers 14 further comprise third elongated, bar-like elements 118 that connect the second loops 7 on both longitudinal sides 16, 17 of the second spacer 14 and that close the openings of the second loops 7, such that the openings of the second loops 7 have closed circumference. The second loops 7 of one longitudinal side 16 extend adjacent and in parallel to second loops 7 of a next spacer 2 and parallel to further spacers 2. The second loops 7 of the other longitudinal side 17 extend parallel to second loops 7 of

other further spacers 2. The above described rods may therefore be passed through openings of the second loops 7 of the second spacers 14 at both longitudinal sides 16, 17 thereof. With adjacent it is meant here that the second loops 7 extend at least relatively close to each other, said distance between the adjacent second loops 7 being maximally the combined thicknesses of the second elongated, bar-like element 11 and third elongated, bar-like element 18 that extend along and are in contact with each other. The second spacers 14 extend substantially orthogonal between the planes 12, 13 and thereby form substantially orthogonal ends of the structure 1. The opposite ends are defined as the opposite ends of the zigzag-shape of the structure 1 defined by the spacers 2 as seen in a direction orthogonal to the zigzag-shape of the structure 1.

[0069] Figures 5 and 6 show a second embodiment of the structure according to the invention. The same elements are denoted by the same reference numerals. Similar elements are denoted by similar reference numerals with '. Only the differences with respect to the first embodiment of figures 1 - 4 are described. For a further description the reader is referred to the description of figures 1-4.

[0070] The structure according to the second embodiment differs from the first embodiment in that the structure is substantially curved. In particular the structure is curved as seen in the direction in which the zigzag shape formed by the spacers 2 is visible. In particular the planes 12' and 13' are now curved planes. In particular the structure is a substantially cylindrical structure, with the planes 12', 13' forming the sleeves of the cylinder. The second loops 7 extend in lines in direction 8', which lines are substantially curved. Instead of straight rods, curved locking elements or curveable locking elements, such as steel wire, may be used for locking the second loops 7 with respect to the first loops 6.

[0071] It is noted that the structure may have any desired shape and is not limited to being straight according to the first embodiment or curved according to the second embodiment. For example, the structure may be partly straight and partly curved. The amount of curvature, i.e. the radius thereof, may be chosen as desired.

[0072] The structure according to the invention may be designed and/or used in any desired way.

[0073] The invention is not restricted to the variants shown in the drawing, but it also extends to other preferred embodiments that fall within the scope of the appended claims.

Claims

1. Structure (1), comprising:

- a plurality of spacers (2), each spacer (2) comprising a first longitudinal side (4) and a second, opposite longitudinal side (5), wherein loops (6, 7) are provided along the first and second longitudinal sides (4, 5), wherein first loops (6) of said loops (6, 7) define an opening therein with a size that is larger than an outer dimension of second loops (7) of said loops (6, 7), such that the second loops (7) are allowed to pass through said openings in the first loops (6), wherein the spacers (2) are coupled to each other in such a manner that the second loops (7) of a said spacer (2) extend through the first loops (6) of a next spacer (2), and wherein openings in the second loops (7) of coupled spacers (2) are registered in line with respect to each other,
- a plurality of locking elements, each locking element extending through the openings of the second loops (7) that are registered in line with respect to each other, thereby locking the second loops (7) with respect to the first loops (6),

characterized in that each spacer (2) comprises both first loops (6) and second loops (7), and wherein the first loops (6) are present at the first longitudinal side (4) and the second loops (7) are present at the second longitudinal side (5).

2. Structure (1) according to claim 1, wherein said line in which the second loops (7) of coupled spacers (2) are registered is at least partly substantially curved.

3. Structure (1) according to claim 2, wherein said locking elements are elongated locking elements that are at least partly substantially curved or that are flexible, such that they may be curved, such as steel wire.

4. Structure (1) according to any of the preceding claims, wherein the openings of the first loops (6) have a closed circumference.

5. Structure (1) according to any of the preceding claims, wherein the first loops (6) and second loops (7) of mutually coupled spacers (2) extend under an angle (α) with respect to each other, said angle (α) being chosen between 30° and 150°, preferably between 90° and 135°.

6. Structure (1) according to any of the preceding claims, further comprising at least one skin layer, said skin layer comprising a plurality of openings through which only the second loops (7) of the spacers (2) are allowed to pass, such that the first loops (6) and second loops (7) extend at opposite sides of said skin layer, and wherein the locking elements lock said second loops (7) with respect to the skin layer.

7. Structure (1) according to any of the preceding claims, further comprising at least one strip like ele-

ment, said strip like element comprising a plurality of openings through which only the second loops (7) of the spacers (2) are allowed to pass, such that the first loops (6) and second loops (7) extend at opposite sides of said strip like element, and wherein a said locking element lock said second loops (7) with respect to the at least one strip like element.

8. Structure (1) according to any of the preceding claims, further comprising at least one second spacer (2) comprising a first longitudinal side (4) and a second, opposite longitudinal side (5), and wherein second loops (7) are provided along both the first and second longitudinal sides (4, 5), and wherein said at least one second spacer (2) is located at an outer end of said structure (1).

9. Method for assembling a structure (1) according to any of the preceding claims 1 - 8, comprising the steps of:

(a) providing a plurality of said spacers (2) and said locking elements;
(b) passing the second loops (7) of a said spacer (2) through the openings of the first loops (6) of a next spacer (2);
(c) passing the locking elements through openings of the second loops (7) that are registered in line with respect to each other, thereby locking the second loops (7) with respect to the first loops (6)

wherein the method further comprises a step, to be performed before step (b), of:
(d) arranging the spacers (2) in an alternating orientation, such that the first longitudinal side (4) of a spacer (2) is located adjacent to and/or extends along the second longitudinal side (5) of a next spacer (2).

10. Method according to claim 9, comprising the further step, to be performed together with or after step (b):
(e) bending at least part of the structure (1) formed by a plurality of coupled spacers (2), such that the line in which the second loops (7) of coupled spacers (2) are registered is at least partly substantially curved.

11. Method according to any of the preceding claims 9 - 10, comprising the further step, to be performed before step (c):
(f) providing at least one skin layer or at least one strip like element and connecting that at least one skin layer or strip like element to the spacers (2) by passing only the second loops (7) through the openings in the skin layer or the strip like element.

12. Method according to any of the preceding claims 9 - 11, wherein a structure (1) according to at least claim 9 is provided, comprising the further step, to be performed before step (c):

(g) providing at least one second spacer at an outer end of said structure (1), wherein the second loops (7) of the second spacer of one longitudinal side (4) thereof are arranged adjacent and in parallel to second loops (7) of the second longitudinal side (5) of a next spacer;
wherein in step (c) the locking elements are passed through the opening of the second loops (7) at both longitudinal sides (4, 5) of the second spacer.

13. Use of a structure (1) according to any of the preceding claims 1 - 8 as a wall or a roof of a construction or (emergency) building, such as a house, an office building, a garage, a storage shed, a stadium, a stable, a quay, a dam, a sewer drain, a swimming pool, etc, or as a bower, a sound barrier wall, a (decorative or protective) (garden) fence, a grandstand, a presentation wall, a display, a bike park, a stage, as a building toy optionally for educational purposes, or as part of a bridge (head), of a viaduct, of the casco of a house-boat, as a support structure or beam, as part of a furniture, such as a table or bench, as a pillar etc.

Patentansprüche

1. Struktur (1), aufweisend:

- eine Mehrzahl an Abstandshaltern (2), wobei jeder Abstandshalter (2) eine erste Längsseite (4) und eine zweite, gegenüberliegende Längsseite (5) aufweist, wobei entlang der ersten und zweiten Längsseite (4, 5) Schlaufen (6, 7) vorgesehen sind, wobei erste Schlaufen (6) dieser Schlaufen (6, 7) darin eine Öffnung definieren mit einer Größe, die größer ist als eine äußere Abmessung von zweiten Schlaufen (7) dieser Schlaufen (6, 7), so dass die zweiten Schlaufen (7) in die Öffnungen der ersten Schlaufen (6) eingeführt werden können, wobei die Abstandshalter (2) miteinander so gekoppelt sind, dass sich die zweiten Schlaufen (7) eines Abstandshalters (2) durch die ersten Schlaufen (6) eines nächsten Abstandshalters (2) erstrecken, und wobei die Öffnungen in den zweiten Schlaufen (7) der gekoppelten Abstandshalter (2) in einer Linie zueinander ausgerichtet sind,
- eine Mehrzahl an Verriegelungselementen, wobei sich jedes Verriegelungselement durch die Öffnungen der in einer Linie zueinander ausgerichteten zweiten Schlaufen (7) erstreckt, wodurch die zweiten Schlaufen (7) in Bezug auf die

ersten Schlaufen (6) verriegelt werden,

dadurch gekennzeichnet, dass jeder Abstandshalter (2) sowohl erste Schlaufen (6) als auch zweite Schlaufen (7) aufweist, und wobei sich die ersten Schlaufen (6) an der ersten Längsseite (4) und die zweiten Schlaufen (7) an der zweiten Längsseite (5) befinden.

2. Struktur (1) nach Anspruch 1, wobei die Linie, in der die zweiten Schlaufen (7) der gekoppelten Abstandshalter (2) ausgerichtet sind, zumindest teilweise im Wesentlichen gekrümmt ist.

3. Struktur (1) nach Anspruch 2, wobei es sich bei den Verriegelungselementen um längliche Verriegelungselemente handelt, die zumindest teilweise im Wesentlichen gekrümmt sind oder so flexibel sind, so dass sie gekrümmt werden können, wie beispielsweise Stahldraht.

4. Struktur (1) nach einem der vorherigen Ansprüche, wobei die Öffnungen der ersten Schlaufen (6) einen geschlossenen Umfang aufweisen.

5. Struktur (1) nach einem der vorherigen Ansprüche, wobei die ersten Schlaufen (6) und die zweiten Schlaufen (7) der miteinander gekoppelten Abstandshalter (2) zueinander einen Winkel (α) aufweisen, wobei der Winkel (α) zwischen 30° und 150°, vorzugsweise zwischen 90° und 135°, gewählt wird.

6. Struktur (1) nach einem der vorherigen Ansprüche, ferner aufweisend mindestens eine Hautschicht, wobei die Hautschicht eine Vielzahl von Öffnungen umfasst, durch die nur die zweiten Schlaufen (7) der Abstandshalter (2) hindurchgeführt werden können, so dass die ersten Schlaufen (6) und die zweiten Schlaufen (7) sich an gegenüberliegenden Seiten der Hautschicht erstrecken, und wobei die Verriegelungselemente die zweiten Schlaufen (7) in Bezug auf die Hautschicht verriegeln.

7. Struktur (1) nach einem der vorherigen Ansprüche, die ferner mindestens ein streifenartiges Element umfasst, wobei das streifenartige Element eine Mehrzahl an Öffnungen aufweist, durch die nur die zweiten Schlaufen (7) der Abstandshalter (2) hindurchgeführt werden können, so dass sich die ersten Schlaufen (6) und die zweiten Schlaufen (7) an gegenüberliegenden Seiten des streifenartigen Elements erstrecken, und wobei ein Verriegelungselement die zweiten Schlaufen (7) in Bezug auf das mindestens eine streifenartige Element verriegelt.

8. Struktur (1) nach einem der vorherigen Ansprüche, ferner aufweisend mindestens einen zweiten Abstandshalter (2), der eine erste Längsseite (4) und eine zweite, gegenüberliegende Längsseite (5) aufweist, und wobei zweite Schlaufen (7) sowohl entlang der ersten als auch der zweiten Längsseite (4, 5) vorgesehen sind, und wobei der mindestens eine zweite Abstandshalter (2) an einem äußeren Ende der Struktur (1) angeordnet ist.

9. Verfahren zum Zusammenbau einer Struktur (1) nach einem der vorherigen Ansprüche 1 bis 8, aufweisend die folgenden Schritte:

(a) Bereitstellen einer Mehrzahl der Abstandshalter (2) und der Verriegelungselemente;
(b) Durchführen der zweiten Schlaufe (7) eines Abstandshalters (2) durch die Öffnung der ersten Schlaufe (6) eines nächsten Abstandshalters (2);
(c) Durchführen der Verriegelungselemente durch Öffnungen der in einer Linie zueinander ausgerichteten zweiten Schlaufen (7), wodurch die zweiten Schlaufen (7) in Bezug auf die ersten Schlaufen (6) verriegelt werden,

wobei das Verfahren ferner folgenden, vor Schritt (b) auszuführenden Schritt aufweist:
(d) Anordnen der Abstandshalter (2) in einer alternierenden Ausrichtung, so dass die erste Längsseite (4) eines Abstandshalters (2) neben der zweiten Längsseite (5) eines nächsten Abstandshalters (2) angeordnet ist und/oder sich entlang dieser erstreckt.

10. Verfahren nach Anspruch 9, aufweisend folgenden weiteren Schritt, der zusammen mit oder nach Schritt (b) durchzuführen ist:

(e) Biegen zumindest eines Teils der durch eine Mehrzahl an gekoppelten Abstandshaltern (2) gebildeten Struktur (1) derart, dass die Linie, in der die zweiten Schlaufen (7) der gekoppelten Abstandshalter (2) ausgerichtet sind, zumindest teilweise im Wesentlichen gekrümmt ist.

11. Verfahren nach einem der vorherigen Ansprüche 9 bis 10, aufweisend folgenden weiteren Schritt, der vor Schritt (c) durchzuführen ist:
(f) Bereitstellen mindestens einer Hautschicht oder mindestens eines streifenförmigen Elementes und Verbinden dieser mindestens einen Hautschicht oder dieses streifenförmigen Elementes mit den Abstandshaltern (2), indem nur die zweiten Schlaufen (7) durch die Öffnungen in der Hautschicht oder dem streifenförmigen Element geführt werden.

12. Verfahren nach einem der vorherigen Ansprüche 9 bis 11, wobei eine Struktur (1) nach zumindest Anspruch 9 bereitgestellt wird, aufweisend folgenden weiteren Schritt, der vor Schritt (c) durchzuführen ist:

(g) Bereitstellen zumindest eines zweiten Abstandshalters an einem äußeren Ende der Struktur (1), wobei die zweiten Schlaufen (7) des zweiten Abstandshalters einer Längsseite (4) desselben benachbart und parallel zu zweiten Schlaufen (7) der zweiten Längsseite (5) eines nächsten Abstandshalters angeordnet sind;
wobei in Schritt (c) die Verriegelungselemente durch die Öffnung der zweiten Schlaufen (7) an beiden Längsseiten (4, 5) des zweiten Abstandshalters geführt werden.

13. Verwenden einer Struktur (1) nach einem der vorherigen Ansprüche 1 bis 8 als Wand oder Dach eines Bauwerks oder eines (Behelfs-) Gebäudes, wie z.B. eines Hauses, eines Bürogebäudes, einer Garage, eines Lagerschuppens, eines Stadions, eines Stalls, eines Kais, eines Damms, eines Abwasserkanals, eines Schwimmbads, etc., oder als Laube, als Lärmschutzwand, als (dekorativer oder schützender) (Garten-) Zaun, als Tribüne, als Präsentationswand, als Anzeige, als Fahrradpark, als Bühne, als Bauspielzeug, gegebenenfalls für Bildungszwecke, oder als Teil einer Brücke (Brückenkopf), eines Viadukts, des Kaskos eines Hausboots, als Stützstruktur oder Balken, als Teil eines Möbels, wie eines Tisches oder einer Bank, als Pfeiler usw.

Revendications

1. Structure (1), comprenant:

une pluralité d'entretoises (2), chaque entretoise (2) comprenant un premier côté longitudinal (4) et un second côté longitudinal (5) opposé, dans laquelle des boucles (6, 7) sont formées le long des premier et second côtés longitudinaux (4, 5), dans laquelle des premières boucles (6) desdites boucles (6, 7) définissent une ouverture à l'intérieur présentant une taille qui est supérieure à une dimension externe des secondes boucles (7) desdites boucles (6, 7), de telle sorte que les secondes boucles (7) sont amenées à passer à travers lesdites ouvertures sur les premières boucles (6), dans laquelle les entretoises (2) sont couplées l'une à l'autre d'une telle manière que les secondes boucles (7) de ladite entretoise (2) s'étendent à travers les premières boucles (6) d'une entretoise (2) suivante, et dans laquelle des ouvertures sur les secondes boucles (7) d'entretoises (2) couplées sont mises en correspondance les unes par rapport à aux autres,
une pluralité d'éléments de verrouillage, chaque élément de verrouillage s'étendant à travers les ouvertures des secondes boucles (7) qui sont mises en correspondance en ligne les unes par rapport aux autres, verrouillant ainsi les secondes boucles (7) par rapport aux premières boucles (6),

caractérisée en ce que chaque entretoise (2) comprend à la fois des premières boucles (6) et des secondes boucles (7), et dans laquelle les premières boucles (6) sont présentes au niveau du premier côté longitudinal (4) et les secondes boucles (7) sont présentes au niveau du second côté longitudinal (5).

2. Structure (1) selon la revendication 1, dans laquelle ladite ligne suivant laquelle les secondes boucles (7) d'entretoises couplées (2) sont mises en correspondance est au moins partiellement sensiblement courbe.

3. Structure (1) selon la revendication 2, dans laquelle lesdits éléments de verrouillage sont des éléments de verrouillage allongés qui sont au moins partiellement sensiblement courbes ou qui sont flexibles, de telle sorte qu'ils peuvent être courbés, tel qu'un fil d'acier.

4. Structure (1) selon l'une quelconque des revendications précédentes, dans laquelle les ouvertures des premières boucles (6) présentent une circonférence fermée.

5. Structure (1) selon l'une quelconque des revendications précédentes, dans laquelle les premières boucles (6) et les secondes boucles (7) d'entretoises (2) couplées mutuellement s'étendent sous un angle (α) les unes par rapport aux autres, ledit angle (α) étant choisi entre 30° et 150°, de préférence, entre 90° et 135°.

6. Structure (1) selon l'une quelconque des revendications précédentes, comprenant, en outre, au moins une couche de peau, ladite couche de peau comprenant une pluralité d'ouvertures à travers lesquelles seules les secondes boucles (7) des entretoises (2) sont amenées à passer, de telle sorte que les premières boucles (6) et secondes boucles (7) s'étendent sur des faces opposées de ladite couche de peau, et dans laquelle les éléments de verrouillage verrouillent lesdites secondes boucles (7) par rapport à la couche de peau.

7. Structure (1) selon l'une quelconque des revendications précédentes, comprenant, en outre, au moins un élément en forme de bande, ledit élément en forme de bande comprenant une pluralité d'ouvertures à travers lesquelles seules les secondes boucles (7) des entretoises (2) sont amenées à passer, de telle sorte que les premières boucles (6) et secondes boucles (7) s'étendent sur des faces opposées dudit élément en forme de bande, et dans laquelle ledit élé-

ment de verrouillage verrouille lesdites secondes boucles (7) par rapport au au moins un élément en forme de bande.

8. Structure (1) selon l'une quelconque des revendications précédentes, comprenant, en outre, au moins une seconde entretoise (2) comprenant un premier côté longitudinal (4) et un second côté longitudinal opposé (5) et dans laquelle des secondes boucles (7) sont agencées le long des premier et second côtés longitudinaux (4, 5), et dans laquelle ladite au moins une seconde entretoise (2) est située au niveau d'une extrémité externe de ladite structure (1).

9. Procédé d'assemblage d'une structure (1) selon l'une quelconque des revendications précédentes 1 à 8, comprenant les étapes de:

(a) fourniture d'une pluralité desdites entretoises (2) et desdits éléments de verrouillage;
(b) passage des secondes boucles (7) de l'une desdites entretoises (2) à travers les ouvertures des premières boucles (6) d'une entretoise (2) suivante;
(c) passage des éléments de verrouillage à travers des ouvertures des secondes boucles (7) qui sont mises en correspondance en ligne les unes par rapport aux autres, verrouillant ainsi les secondes boucles (7) par rapport aux premières boucles (6)

dans lequel le procédé comprend, en outre, une étape, destinée à être exécutée avant l'étape (b), de:
(d) agencement des entretoises (2) suivant une orientation alternée, de telle sorte que le premier côté longitudinal (4) d'une entretoise (2) est situé de manière adjacente et/ou s'étend le long du second côté longitudinal (5) d'une entretoise (2) suivante.

10. Procédé selon la revendication 9, comprenant l'étape supplémentaire, destinée à être exécutée ensemble avec l'étape (b) ou après celle-ci:
(e) de pliage d'au moins une partie de la structure (1) formée par une pluralité d'entretoises (2) couplées de telle sorte que la ligne suivant laquelle les secondes boucles (7) d'entretoises (2) couplées sont mises en correspondance est au moins partiellement sensiblement courbe.

11. Procédé selon l'une quelconque des revendications précédentes 9 à 10, comprenant l'étape supplémentaire, destinée à être exécutée avant l'étape (c):
(f) de fourniture d'au moins une couche de peau ou d'au moins un élément en forme de bande et de liaison de ces au moins une couche de peau ou élément en forme de bande aux entretoises (2) en faisant passer uniquement les secondes boucles (7) à travers les ouvertures sur la couche de peau ou l'élément en forme de bande.

12. Procédé selon l'une quelconque des revendications précédentes 9 à 11, dans lequel une structure (1) selon au moins la revendication 9 est formée, comprenant l'étape supplémentaire, destinée à être exécutée avant l'étape (c):

(g) de fourniture d'au moins une seconde entretoise au niveau d'une extrémité externe de ladite structure (1), dans lequel les secondes boucles (7) de la seconde entretoise d'un premier côté longitudinal (4) de celle-ci sont agencées de manière adjacente et parallèlement aux secondes boucles (7) du second côté longitudinal (5) d'une entretoise suivante;
dans lequel à l'étape (c) les éléments de verrouillage sont passés à travers l'ouverture des secondes boucles (7) au niveau des deux côtés longitudinaux (4, 5) de la seconde entretoise.

13. Utilisation d'une structure (1) selon l'une quelconque des revendications 1 à 8 précédentes, en tant que paroi ou toit d'une construction ou d'un bâtiment (d'urgence), tel qu'une maison, un bâtiment de bureau, un garage, un hangar de stockage, un stade, une écurie, un quai, un barrage, une station d'épuration, une piscine, etc., ou comme une tonnelle, un mur anti-bruit, une barrière (décorative ou de protection) (de jardin), une tribune, un mur de présentation, un écran d'affichage, un parc à vélo, une estrade, en tant que jeu de construction éventuellement pour des besoins éducatifs, ou en tant que partie d'un pont (tête), d'un viaduc, d'une péniche à fond plat, en tant que structure ou poutre de support, en tant qu'élément de mobilier, tel qu'une table ou un banc, en tant que pilier, etc..

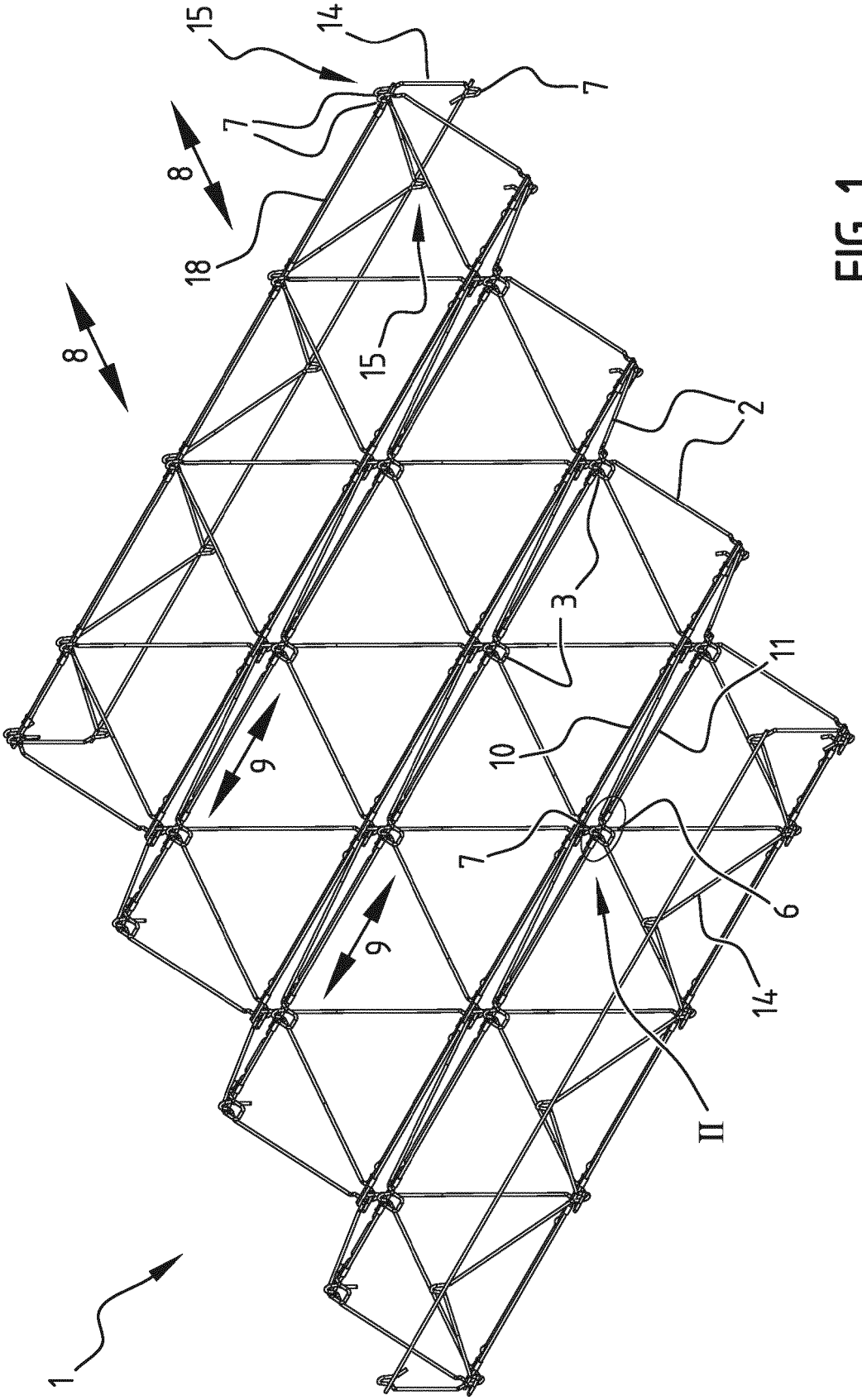


FIG. 1

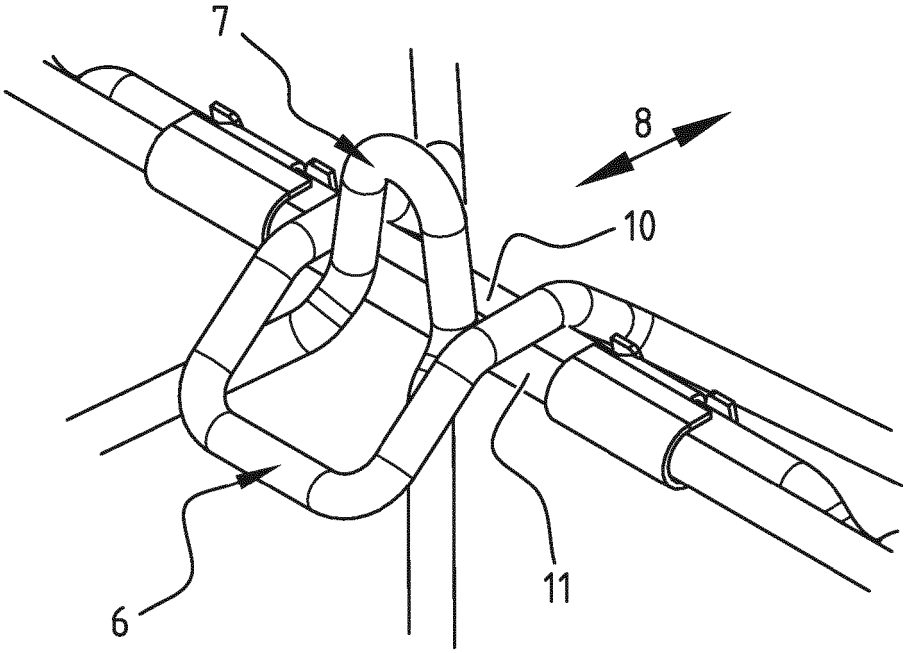


FIG. 2

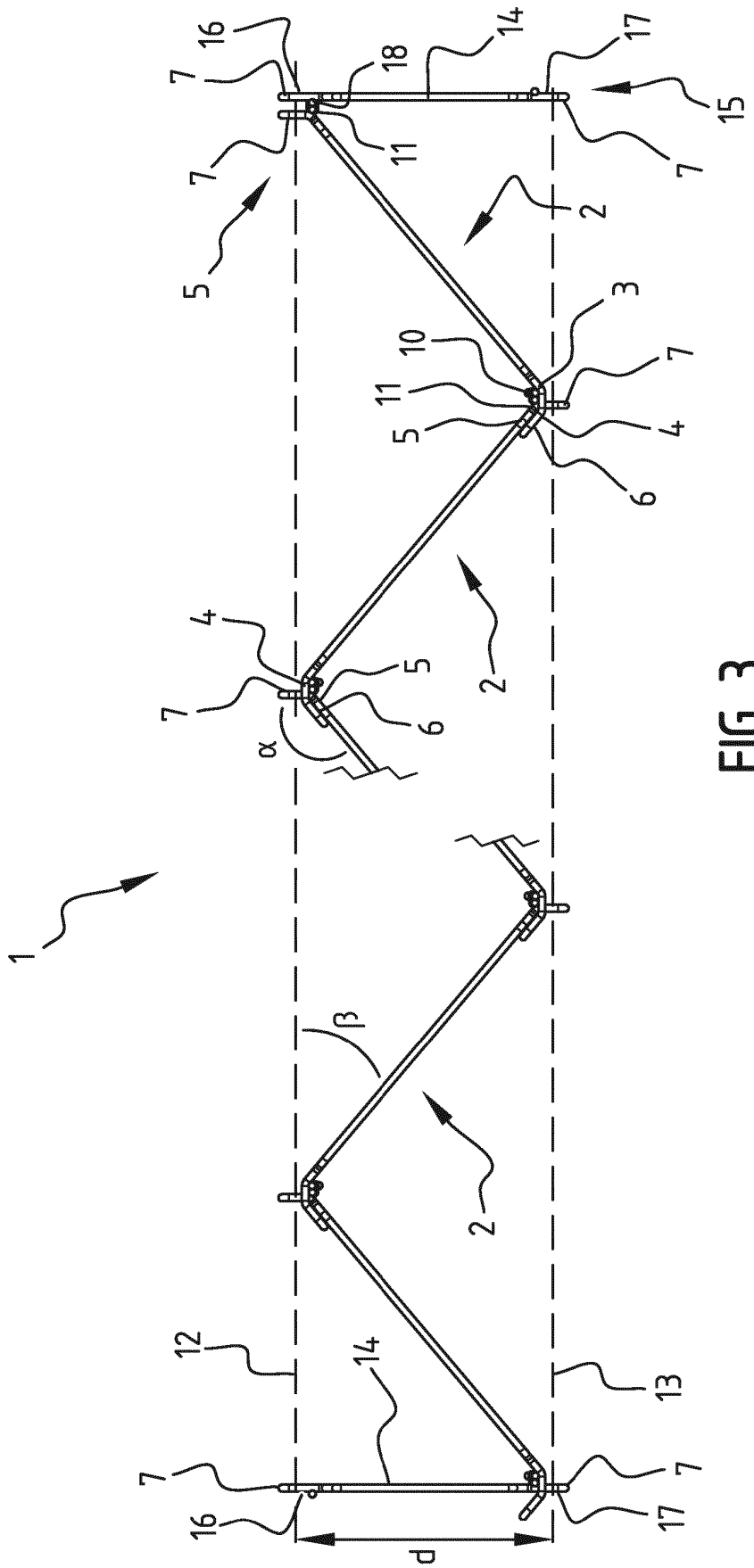


FIG. 3

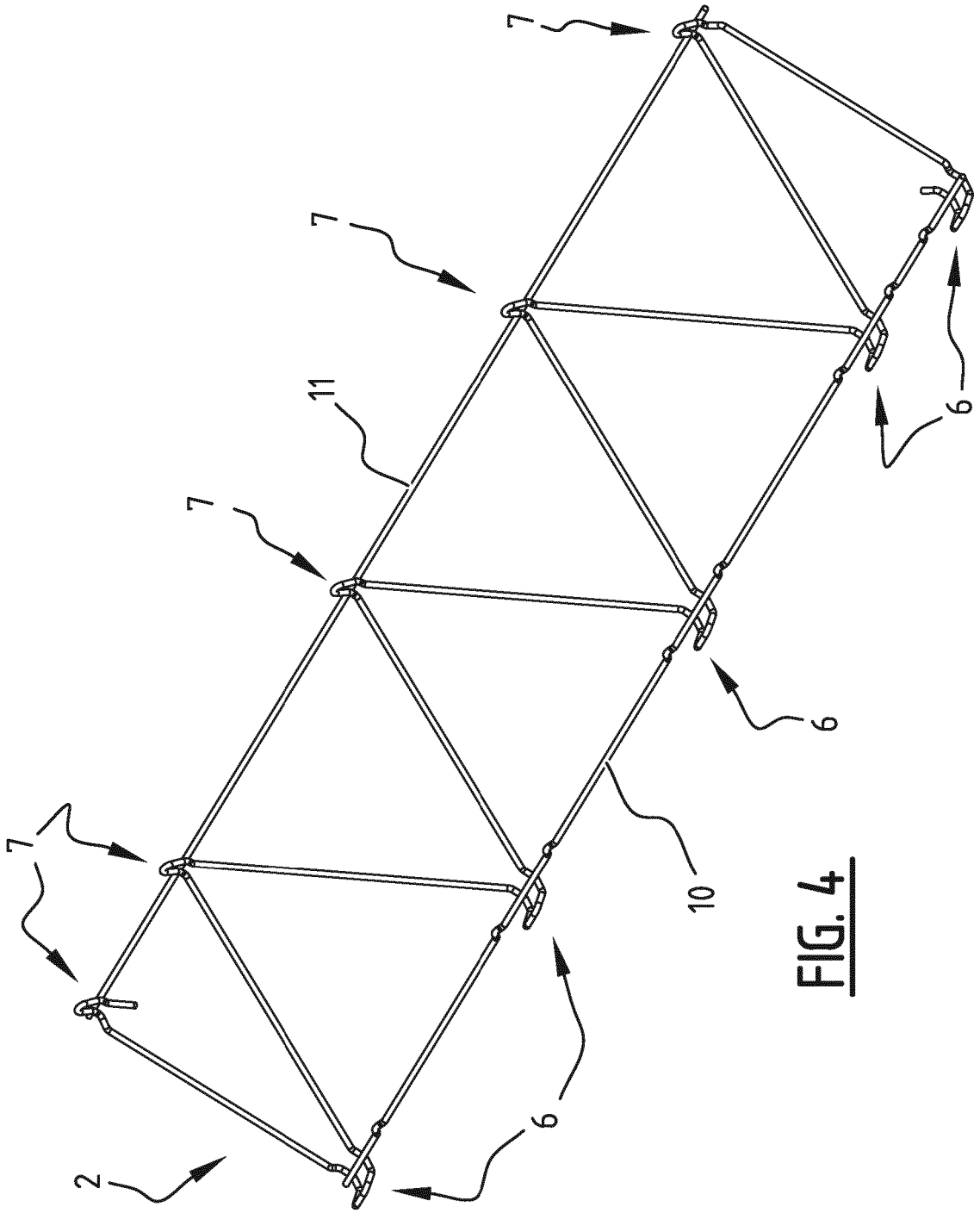


FIG. 4

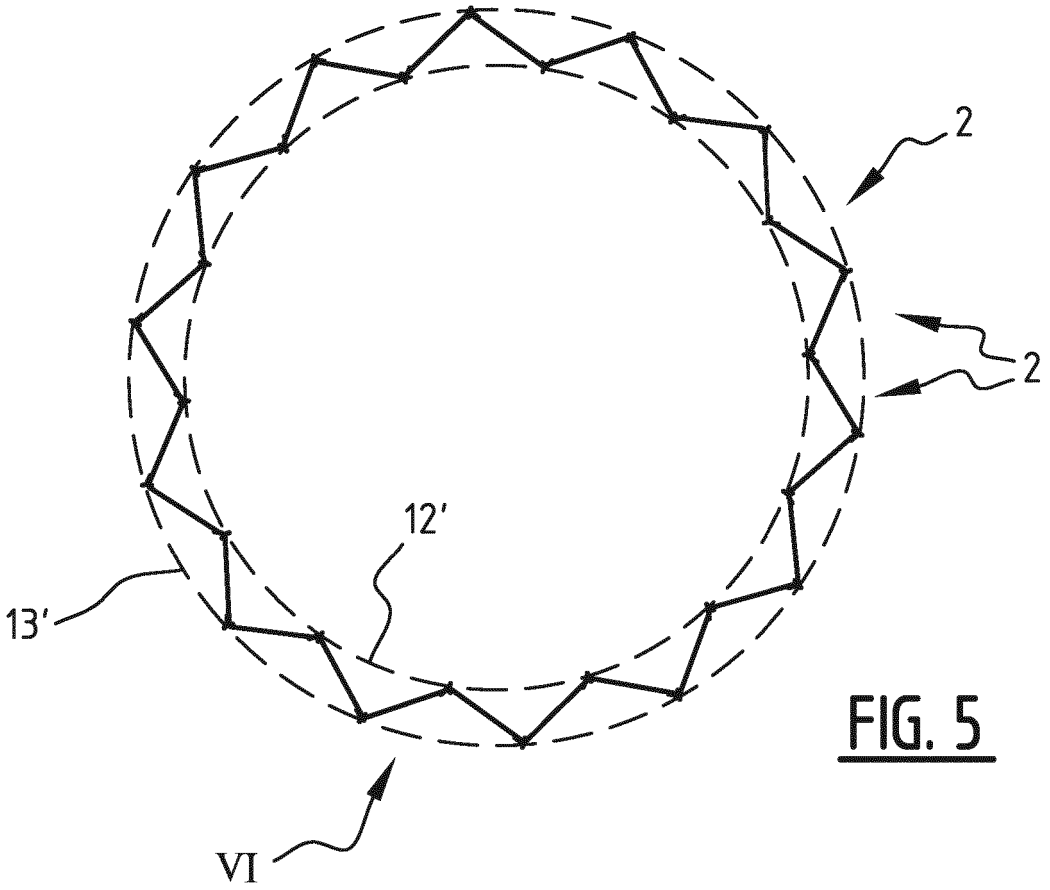


FIG. 5

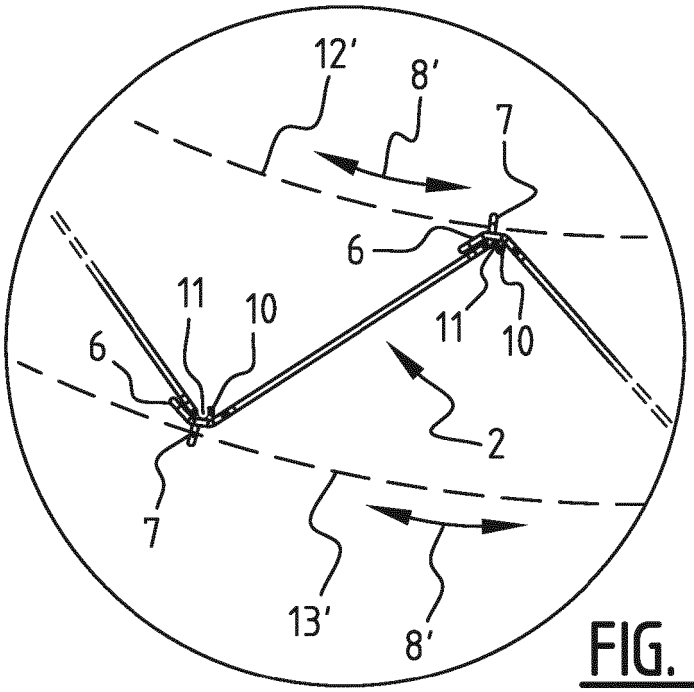


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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