Abstract: A floating structure based on the tensegrity principle is described. A planar closed loop structure (1700) has a plurality of beams (300) and a plurality of beam adapters (700). Each of the plurality of beams (300) is formed by coupling multiple n-strut twisted prism units which includes n-sided planar polygonal surfaces on opposite sides through which the respective n-strut twisted prism unit is coupled to another n-strut twisted prism unit or a beam adapter. Each of the plurality of beam adapters (700) is an m-strut twisted prism unit having planar polygonal side faces for coupling to an n-sided planar polygonal surface of a beam (300).
<table>
<thead>
<tr>
<th>Declarations under Rule 4.17:</th>
<th>Published:</th>
</tr>
</thead>
<tbody>
<tr>
<td>— of inventorship (Rule 4.17(iv))</td>
<td>— with international search report (Art. 21(3))</td>
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<tr>
<td></td>
<td>— with amended claims and statement (Art. 19(1))</td>
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<tr>
<td>Date of publication of the amended claims and statement: 12 October 2017</td>
<td></td>
</tr>
</tbody>
</table>
I/We claim:

1. A floating structure comprising a closed loop tensegrity structure (1700, 1800, 1900, 2100, 2200, 2300) including:
   - a plurality of beams (200, 300, 400, 500, 600), wherein each beam of the plurality of beams (200, 300, 400, 500, 600) is formed by coupling multiple n-strut twisted prism units (100), n is an integer greater than 2, wherein each of the multiple n-strut twisted prism units includes n-sided planar polygonal surfaces (106, 108) on opposite sides through which the respective n-strut twisted prism unit is coupled to another n-strut twisted prism unit or a beam adapter; and
   - a plurality of beam adapters (700, 900, 1100, 1200, 1500), wherein each beam adapter of the plurality of beam adapters (700, 900, 1100, 1200, 1500) is an m-strut twisted prism unit (700), m is an integer greater than 4, wherein the m-strut twisted prism unit comprises:
     - m-sided planar polygonal top surface (710, 1102);
     - m-sided planar polygonal bottom surface (712, 1104), opposite to the m-sided planar polygonal top surface (710, 1102); and
     - at least m number of side faces (714, 1106) formed as planar polygons,
   - wherein an n-sided planar polygonal surface (202, 302, 402, 502) of a beam of the plurality of beams (200, 300, 400, 500, 600) is coupled to a side face of a beam adaptor of the plurality of beam adaptors (700, 900, 1100, 1200, 1500) in such a way that vertices of the n-sided planar polygonal surface of the beam and vertices of the side face of the beam adaptor form common vertices of a surface.

2. The floating structure as claimed in claim 1, wherein length of edges of an n-sided planar polygonal surface (106) of each of the n-strut twisted prism unit (100) are equal to length of edges of another n-sided planar polygonal surface (108) on opposite side of the respective n-strut twisted prism unit (100).
3. The floating structure as claimed in claim 1, wherein length of edges of an n-sided planar polygonal surface of each of the n-strut twisted prism unit (602) are smaller than length of edges of another n-sided planar polygonal surface on opposite side of the respective n-strut twisted prism unit (602).

4. The floating structure as claimed in claim 3, wherein two n-strut twisted prism units (602, 604) of the multiple n-strut twisted prism units are coupled by respective n-sided planar polygonal surfaces having edges of equal length.

5. The floating structure as claimed in claim 1, wherein length of edges of the m-sided planar polygonal top surface (710) are equal to length of edges of the m-sided planar polygonal bottom surface (712) in the m-strut twisted prism unit (700).

6. The floating structure as claimed in claim 1, wherein length of edges of the m-sided planar polygonal top surface (1102) are smaller than length of edges of the m-sided planar polygonal bottom surface (1106) in the m-strut twisted prism unit (1100), and wherein the m-sided planar polygonal top surface (1102) is offset from the m-sided planar polygonal bottom surface (1104), such that a plane formed by each vertex of the m-sided planar polygonal top surface (1102) with an edge of the m-sided planar polygonal bottom surface (1104) below the respective vertex of the m-sided planar polygonal top surface (1102) is perpendicular to the m-sided planar polygonal top surface (1102) and to the plane m-sided planar polygonal bottom surface (1104).

7. The floating structure as claimed in claim 1, wherein the at least m number of side faces (714) are substantially perpendicular to the m-sided planar polygonal top surface (710) and the m-sided planar polygonal bottom surface (712) of the m-strut twisted prism unit (700).

8. The floating structure as claimed in claim 1, wherein each of the multiple n-strut twisted prism units (100) has n number of struts (102) arranged to form the
respective n-strut twisted prism unit (100), wherein ends of the struts (102) of a respective n-strut twisted prism unit (100) form vertices of the n-sided planar polygonal surface (106, 108), and wherein pre-tensioned ropes (104) attached to ends of adjacent struts (102) form edges of the n-sided planar polygonal surface (106, 108).

9. The floating structure as claimed in claim 8, wherein vertices of respective n-sided planar polygonal surface (106, 108) of an n-strut twisted prism unit (100) of the multiple n-strut twisted prism units (100) are coupled to vertices of respective n-sided planar polygonal surface of another n-strut twisted prism unit of the multiple n-strut twisted prism units (100).

10. The floating structure as claimed in claim 9, wherein the vertices of n-sided planar polygonal surfaces (106, 108) are coupled by joints selected from one of a ring joint (2700), a ball joint (2800), and a ball-socket joint (2900).

11. The floating structure as claimed in claim 8, wherein each of the vertices of an n-sided planar polygonal surface of the n-sided planar polygonal surfaces (106, 108) comprises:

   a base plate (3002) including:

   a first planar side (3004), wherein the first planar side (3004) comprises:

   a first hinge (3008) provided at a centre of the first planar side (3004) for coupling one end of a strut of the respective n-strut twisted prism unit;

   a first pair of parallel plate (3010) with holes (3016) provided at the first planar side (3004) for coupling to a pre-tension rope of the respective n-strut twisted prism unit; and

   a first hook (3012) and a second hook (3014) provided at the edges of the first planar side (3004) and at the either sides of the first...
hinge (3008) for coupling to the other pre-tensioned ropes of the respective n-strut twisted prism unit; and
a second planar side (3006), wherein the second planar side (3006) comprises:

5 a second hinge provided at a centre of the second planar side for coupling one end of a strut of another n-strut twisted prism unit; and

10 a second pair of parallel plate (3018) with holes provided at the second planar side for coupling a pre-tension rope of another n-strut twisted prism unit.

12. The floating structure as claimed in claim 8, wherein vertices of respective n-sided planar polygonal surface (106, 108) of an n-strut twisted prism unit (100) of the multiple n-strut twisted prism units (100) are coupled to edges of respective n-sided planar polygonal surface (106, 108) of another n-strut twisted prism unit (100).

13. The floating structure as claimed in claim 8, wherein m-strut twisted prism unit (700, 900, 1100, 1200, 1500) has m number of struts (702) arranged to form the m-strut twisted prism unit (700, 900, 1100, 1200, 1500), ends of the struts (702) form vertices of the m-sided polygonal top surface (710, 1102), vertices of the m-sided polygonal bottom surface (712, 1104), and vertices of the at least m number of side faces (714, 1108), and wherein pre-tensioned ropes (704) attached to ends of adjacent struts (702) form edges of the m-sided polygonal top surface (710, 1102) and the m-sided polygonal bottom surface (712, 1104).

14. The floating structure as claimed in claim 13, wherein vertices of a side face of a beam adapter of the plurality of beam adapters (700, 900, 1100, 1200, 1500) are coupled to vertices of an n-sided planar polygonal surface of a beam of the plurality of beams (200, 300, 400, 500, 600).
The floating structure as claimed in claim 14, wherein each of the vertices of the m-strut twisted prism unit (700) comprises:

- a first plate (3102) having a first end (3104) and a second end (3106);
- a second plate (3108) having a first end (3110) and a second end (3112), wherein the first end (3110) of the second plate (3108) abuts with the first end (3104) of first plate (3102), such that the second plate (3108) is inclined at an obtuse angle with the first plate (3102) and forming an outer face of a convex shape and an inner face of a concave shape;
- a first integrated lunge-hook arrangement (31 14) provided at the first plate (3102) and at the outer face for coupling to an end of a strut and a pre-tensioned rope forming a vertex of the n-sided planar polygonal surface of a beam;
- a second integrated hinge-hook arrangement (3116) provided at the second plate (3108) and at the outer face for coupling to an end strut and a pre-tensioned rope forming a vertex of an n-sided planar polygonal surface of another beam;
- a first hook (3118) provided towards the second end (3106) of the first plate (3102) and «Lthe inner face for coupling to a pre-tensioned rope from an adjacent vertex provided towards the first plate (3102);
- a second hook (3120) provided towards the second end (3112) of the second plate (3108) and at the inner face for coupling to a pre-tensioned rope from an adjacent vertex provided towards the second plate (3108); and
- a hinge (3122) provided between the first hook (3118) and the second hook (3120) and at the inner face for coupling one end of a strut of the m-strut twisted prism unit (700).

The floating structure as claimed in claim 1, wherein the m-strut twisted prism unit (802) has m number of struts arranged to form the m-strut twisted prism unit, ends of the struts form vertices of the m-sided polygonal top surface, vertices of the m-sided polygonal bottom surface, and vertices of the side faces formed as folded polygons, wherein pre-tensioned ropes attached to ends of adjacent struts form edges of the m-sided polygonal top surface and the m-sided polygonal bottom surface, wherein the vertices of each of the side faces formed as folded polygons.
arc coupled to p-strut twisted prism unit (1202), \( p \) is equal to the number of vertices in each of the side faces of the m-strut twisted prism unit, wherein the p-strut twisted prism unit has a p-sided planar polygonal surface (1204) perpendicular to the re-sid ed polygonal top surface and the m-sided polygonal bottom surface.

17. The floating structure as claimed in claim 16, wherein the p-strut twisted prism unit (1202) has \( p \) number of struts of variable lengths, ends of the struts of the p-strut twisted prism unit form vertices of the p-sided planar polygonal surface (1204) and vertices of p-sided folded polygonal surface of the p-strut twisted prism unit, wherein the p-sided planar polygonal surface (1204) is coupled to an n-sided polygonal surface of a beam of the plurality of beams, and wherein the p-sided folded polygonal surface is in symmetry with the side faces formed as folded polygons of the m-strut twisted prism unit and vertices of the p-sided folded polygonal surface is coupled to the vertices of one of the side faces formed as folded polygons of the m-strut twisted prism unit.

18. The floating structure as claimed in claim 1, wherein each of the multiple n-strut twisted prism units of a beam of the plurality of beams is coupled to a corresponding n-strut twisted prism unit of the multiple n-strut twisted prism units of adjacent beam, and wherein the coupling is by one of a rope, a chain, and a cable.

19. The floating structure as claimed in claim 1, wherein the plurality of beam adapters is coupled to buoys (3202).

20. The floating structure as claimed in claim 1, wherein the plurality of beams is coupled to buoys (3202).

21. The floating structure as claimed in claim 1, wherein the plurality of beam adapters is coupled to anchors.
STATEMENT UNDER ARTICLE 19 PCT

In response to the International Searching Report (ISR) and the objections raised in the Written Opinion of the International Search Authority (ISA), the Applicant has amended the original claim 1.

Claim 1 is amended to recite that an n-sided planar polygonal surface of a beam of the plurality of beams is coupled to a side face of a beam adaptor of the plurality of beam adaptors in such a way that vertices of the n-sided planar polygonal surface of the beam and vertices of the side face of the beam adaptor form common vertices of a surface. The underlines phrase is added in the amended-claim 1. This amendment is carried out to clarify that a surface of a beam is coupled to a side face of a beam adaptor by way of a vertex to vertex connection, or a strut to strut connection. In such a connection, the vertices of the surface of the beam are joined with the vertices of the side face of the beam adaptor to form common vertices at the joints in the strut to strut connection.

The abovementioned feature, which is included in claim 1, finds support from paragraphs [0060] and [0061] of the as-filed specification.

The amendment to claim 1 is in line with the suggestion of the examining division of the ISA at Point 1.6 of the written opinion. In Point 1.6, the examining division has indicated that inclusion of such a feature in claim 1 could lead to an allowable claim.

The Applicant believes that the scope of the amended claim 1 is within the scope of the original claims and within the scope of the as-filed specification, and no new subject matter is added in the amended claims. The Applicant also believes that the amended
claims are novel and involve an inventive step with respect to the prior art documents D1-D7 cited in the ISR.